ITEM 1.

Clean the Commutators of the 20 Volt Filament and 300 Volt Bias Motor-Generators in Service, with Coarse Thread Canvas each morning, per "Starting Procedure Carteret", Book No. (3) Sec. No. (A) Page No. (48) Item #53.

(a) "Basement": Proceed to the Basement and clean the Commutator of the 20 Volt Motor-Generator (MG1P or MG2P) in Service with Coarse Thread Canvas.

A Supply of Clean Canvas is kept in the Lower Right Hand Corner of "D12P" "Filament Selector Switch" Cabinet, located on the 20 Volt Filament Generator Concrete Platform in the Basement.

Fold the Canvas into a Pad 2 inches by 4 inches.

Be sure that there are no loose Threads hanging.

They may come off and tangle with the Brushes and Brush Holders.

Place the Canvas Pad against the Commutator, press firmly, and move back and forth across the Commutator.

Do this on both Sections of the Commutator.

Have One Technician "Standing By" the 50 KW Transmitter "Control Unit" #1 (A) to adjust the "Filament Generator Rheostat" "R16A"

The cleaning of this Commutator may cause the 20 Volt Filament Voltage to vary.

Keep adjusting the "Filament Generator Rheostat" "R16A" so as to maintain Voltage Reading on "Amplifier Filament Voltage" Voltmeter "M1A" as specified on the "Starting Procedure Carteret" (19.7 Volts)

Technician will continue "Standing By" until "Amplifier Filament Voltage" is steady.

If Canvas fails to clean properly, use Commutator Brush "Re-seating Stone" kept in Drawer # (6) of Basement Work Bench.

Continued to next Page.

ITEM 1.

This Stone is used ONLY IF CANVAS FAILS TO "STEADY" the Voltage.

Wipe off End-Bearings and Generator Frame with a Rag lightly dampened with Machine Oil.

Clean Motor-Generator Concrete Base.

Wipe out Drip Pans.

It is essential that cleaning be done very thoroughly, since Carbon and Copper dust collects freely and can cause Erratic Voltage.

Excess Film and Dirt on the Commutator is caused by heavy, continuous Power Load, excess Dirt about the Plant, uneven Brush Pressure, and many other Causes.

Cleaning with Canvas takes care of the Slight Amount of Film that collects on the Commutator and is usually a sure cure for slight Erratic Voltage Fluctuations.

The "Brush Re-seating Stone" takes care of the more "Stubborn" Cases.

Checking Brush Spring Pressure per Wednesday Item #5, Paragraph (D). Page No. (27) takes care of it when Canvas and the "Brush Re-seating Stone" do not.

Cleaning the Commutator each Morning with Canvas leaves the Normal Coating on the Commutator, assuring Perfect Commutation.

The Cleaning Stone improves Brush Performance, reduces Noise, assures even Distribution of Brush Voltage Drop and Brush Wear.

Sparking and Chattering are also reduced.

The "Brush Re-seating Stone" (Cleaning Stone) also cleans Film from the Brushes and helps to re-seat them.

Correct Brush Spring Pressure assures a Steady Output Voltage.

Continued to next Page.

ITEM 1.

If, after cleaning the Commutator, the Voltage varies considerably, do the following.

Use the "Fisherman's Scale" and increase Spring Tension to 4 Lbs. for each Brush.

The Brush Springs on the Bottom are those which usually lose their Temper the quickest.

See that this is done IF THE "AMPLIFIER FILAMENT VOLTAGE" VARIES MORE THAN 1/2 OF 1 VOLT.

COMMUTATOR NOTES:

NEVER use Emory Cloth.

NEVER use Coarse Sandpaper.

NEVER use SANDPAPER of any kind with FINGER PRESSURE.

NEVER use Oil on Commutators.

NEVER use any Lubrication on Surface of the Commutator.

If Sandpaper is the only Course left, use a #0000 Grain Sandpaper around a Square Edged Block of Wood.

PRESS LIGHTLY against the Commutator.

(b) "Basement": While in the Basement, clean the Commutator of the 500 Volt Motor-Generator (MG3P or MG4P) in Service with Coarse Thread Canvas. Procedure same as Item No. 1 (a) (Sunday) except for the following:

EXTREME CARE should be exercised when cleaning the Commutator of this Motor-Generator, since the moving of either One of the Brushes from the Commutator will remove the Bias Voltage from the Transmitter and CAUSE 50 KW TRANSMITTER CARRIER FAILURE.

Continued to next Page.

ITEM 1.

The Left Brush is Positive.

The Right Brush is Negative.

(As viewed from the Generator End of the Machine)

Do NOT USE THE FISHERMAN'S SCALE TO ADJUST SPRING PRESSURE on this Generator.

Press an Insulated Prod against the Brush and attempt to WEAR IT IN.

No adjustment should be made which requires Brush Tension Adjustment or handling WITHOUT RUBBER GLOVE PROTECTION.

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End Item 1.

ITEM 2.

Dust all Control Desks, Window Frames and Ledges, 50 KW Transmitter and 5 KW Transmitter Enclosures, Spare Tube Room Enclosure, Antenna Coupling Room Enclosure, Tops of Tables and Chairs, and all Equipment that may be reached on the Main Floor of the Transmitter Building.

(a) "Transmitter Room": Proceed to this Room and dust with a Soft Dry Cloth all Equipment as listed.

Transmitter Room Control Desk.

50 KW Transmitter Front Panels with Meters and Controls, Units #1 (A) to #8 (I) inclusive.

Exercise Care not to alter any Adjustments.

5 KW Transmitter Front Panels with Meters and Controls, Units #1 (A) to #6 (F) inclusive.

Exercise Care not to alter any Adjustments.

"WREY" Beacon Transmitter Front Panels with Meters and Controls.

Window Frames, Doors and all Equipment in the Transmitter Room.

Procedure in Dusting is simple, merely wipe off with clean Cloth, shaking Outdoors frequently.

Dust is settling very fast and cooperation on our part will aid the "Non Technical Building Maintenance Technician" and lighten his Cleaning Burdens.

(b) "Audio Facilities Control Room": Proceed to this Room and dust with a Soft Dry Cloth all Equipment listed.

Audio Facilities Control Desk - Left Turret, Slanting Turret, and Right Turret.

CAUTION: Exercise Care not to change the positions of any of the Keys on the Slanting Turret while Dusting.

Best Procedure is to hold Key with Finger while dusting.

Use a small piece of cloth and wipe Dust off this Slanting Turret very carefully,

Continued to Next Page.

ITEM 2.

since accidentally knocking a Key "Off", or changing the Position of a Key might cut the Audio Feed to the Transmitter, taking the Program Off the Air. Dust all parts of Audio Facilities Control Desk, including the Telephone and Morse Instrument Compartments.

Audio Facilities Speech Input Equipment, Bays #1 #2 #3 #4

CAUTION: Exercise Care not to alter the Adjustments of any Amplifiers or other Equipment on these Bays.

BE CAREFUL not to accidentally knock "Off" any 115 Volt A.C. Supply Switch on any of the Amplifiers or other Equipment on these Bays.

Window Frames, Doors, Furniture and all Equipment in this Room.

Procedure same as Item No. 2 (a) (Sunday)

(c) "Supervisor's Office": Proceed to this Room and dust with a Soft Dry Cloth all Equipment as listed.

Supervisor's Desk.

Window Frames, Doors, Furniture and all Equipment in this Room.

Procedure same as Item No. 2 (a) (Sunday)

(d) "Reception Office": Proceed to this Room and dust with a Soft Dry Cloth all Equipment as listed.

Office Desk.

Steel Files.

Window Frames, Doors, Furniture and all Equipment in this Room.

Procedure same as Item No. 2 (a) (Sunday)

(e) "Measuring Equipment Room": Proceed to this Room and dust with a Soft Dry Cloth all Equipment as listed.

Office Table.

Steel Files.

Continued to next Page.

ITEM 2.

Drawing Table.

50 KW Transmitter Distilled Water Expansion Tank and associated Pipes.

5 KW Transmitter Distilled Water Expansion Tank and associated Pipes.

Measuring Equipment Bays #3 #4 #5 #6 #7 #8 #9.

CAUTION: Exercise Care not to alter the Adjustments of any Amplifiers or other Equipment on these Bays.

BE CAREFUL not to accidentally knock "Off" any 115 Volt A.C. Supply Switch on any of the Amplifiers or other Equipment on these Bays.

Window Frames, Picture Frames, Enclosure Ledges, Doors, Furniture and all Equipment in this Room.

Procedure same as Item No. 2 (a) (Sunday)

(f) "5 KW Transmitter Enclosure": Proceed to Passageways on both Sides and Rear of this Transmitter and dust with a Soft Dry Cloth all Metal Panels and Ledges.

Procedure same as Item No. 2 (a) (Sunday)

(g) "Kitchen": Proceed to this Room and dust with a Soft Dry Cloth all Equipment as listed.

Kitchen Table and Chairs.

Storage Cabinets.

Food Cabinet.

Top, Back and Sides of "WREY" Beacon Transmitter.

Window Frames, Doors, Furniture and all Equipment in this Room, such as Electric Refrigerator and Electric Stove.

Procedure same as Item No. 2 (a) (Sunday)

(h) "Lavatory": Proceed to this Room and dust with a Soft Dry Cloth all Equipment as listed.

Continued to next Page.

ITEM 2.

Window Frames, Doors, Furniture and all Equipment in this Room.

Procedure same as Item No. 2 (a) (Sunday)

(i) "Spare Tube Room": Proceed to this Room, enter the Enclosure and dust with a Soft Dry Cloth all Equipment as listed.

All Metal Panels and Ledges.

Glass Frame in Door and entire Door.

Leave this Room, close the Door, then proceed to dust with a Soft Dry Cloth all Metal Panels and Ledges, Glass Frame in Door and entire Door.

(j) "50 KW Transmitter Enclosure": Proceed to Passageways on both Sides and Rear of this Transmitter and dust with a Soft Dry Cloth all Metal Panels and Ledges.

Dust Walls, Door Frames, Liconse Frame in these Passageways.

Procedure same as Item No. 2 (a) (Sunday)

(k) "Antenna Coupling Room": Proceed to the Front of this Room and dust with Soft Dry Cloth all Metal Panels and Ledges.

Procedure same as Ite m No. 2 (a) (Sunday)

(l) "Rear Door": Proceed to Areaway in Front of Rear Entrance Door, and dust Walls and Ledges.

Procedure same as Item No. 2 (a) (Sunday)

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End Item 2.

ITEM 5

Clean all parts of the Main Transmitter Room Light Fixture, replacing all burnt out Lamps.

Clean all Light Fixtures and replace all burnt out Lamps in all Fixtures in Main Transmitter Room, Front Vestibule, Front Foyer Office, Supervisor Office, Audio Facilities Control Room, Measuring Equipment Room, Rear Passageway, Antenna Coupling Room, Spare Tube Room, Lavatory, and Kitchen.

(a) "Main Transmitter Room": Tools, Cleaning Equipment, and Spare Lamps needed for this Maintenance Work are:

Tall Step Ladder. (Kept in the Switch Room)

7 Foot Step Ladder. (Kept in the Switch Room)

Supply of Clean Polishing Rags. (Kept in the Storage Room)

6 Mazda 100 Watt Lamps. (Kept in Transfile No. "F")

6 Mazda 200 Watt Lamps. (Kept in Transfile No. "M")

Lamps for Fluorescent Fixtures as required.

Vacuum Cleaner with Brush Nozzle. (Kept in Maintenance Tray #1 in the Spare Tube Room)

115 Volt A.C. Extension Light.

(b) Proceed to the "Audio Facilities Control Room", open the Door of the "120 Volt Control Room Wall Panel Box" and put "ON" Regular 120 Volt Switches #1 #2 #3 #4.

(c) "Main Transmitter Room": Proceed to the Main Transmitter Room and Service the Main Light Fixture.

Place the Tall Step Ladder directly under the outer edge of the Large Reflector of this Light Fixture.

Connect the Plug on the Cord Connection of the Vacuum Cleaner to a 115 Volt

Continued on next Page.

ITEM 3.

A.C. Outlet on the Transmitter Wall.

Carry the Vacuum Cleaner up the Step Ladder and place it on the Adjustable Platform on rear of the Ladder.

Put "ON" the 115 Volt Supply Switch on top of the Vacuum Cleaner and clean out the Top of the Large Reflector Plate.

It will be necessary to move the Ladder four times to entirely clean out this Reflector Plate.

Wipe off all Lenses used in front of Lamps with a clean dry cloth.

DO NOT WIPE OR ATTEMPT TO SHINE METAL REFLECTORS UNLESS ORDERED TO DO SO.

Report the Condition of Reflectors that may be tarnished.

Replace all burnt out Lamps with spare 200 Watt Frosted Lamps.

List the number of Lamps replaced on the "50 KW M.O.L."

Wipe off the Lamps. Reflectors, and metal cases of the 2 Fluorescent Fixtures.

These 2 Fixtures are place on the Large Fixture Reflector.

Each is fitted with One 40 Watt Daylight Fluorescent Lamp.

They are illuminated from 115 Volt A.C. Supply controlled by Switch #2 in the 120 Volt Control Room Wall Panel Box in the "Audio Facilities Control Room".

Switches #1 #3 #4 in the "Audio Facilities Control Room" control the 115 Volt A.C. Supply to the Frosted Lamps in the Fixture.

(d) "Front Vestibule": Proceed to this Front Entrance, climb up on the 7 Foot Step Ladder and service Light Fixture.

Remove the Reflector as follows:

Lift Reflector up a trifle, then tilt it sideways, reach in and remove all three Ball Chain supports from special brackets on the Reflector.

Continued on Next Page

ITEM 3.

Merely slide the Chain up so that the Ball will pass through the enlarged Hole above the supporting slot.

Do this for each of the Three Ball Chain Supports.

Carefully lower the Metal Reflector and drop all Dead Moths, Flies, and other insects into the Waste Basket.

Wipe out the Inside of the Reflector with a soft dry cloth.

Use work Gloves to remove the 200 Watt Lamp.

Wipe out the inside and outside of the Frosted Glass Fixture with a soft dry cloth. If this is insufficient to clean the Glass, wet a small piece of clean cloth in Water, wring out and clean all dirt off the Glass.

After cleaning Glass with Wet Cloth, dry off with Soft dry Cloth.

Replace the 200 Watt Lamp in the Socket.

Proceed to the Wall in the Foyer-Office and put "ON" the 115 Volt A.C. Supply Switch.

If the Lamp is burned out (by observation,) remove it and replace it with a new 200 Watt Frosted Lamp.

Replace the Reflector by putting the End Ball of the Ball Chain Supports through the enlarged mounting hole, then slide it into the slot.

(e) "Front Foyer Office": Proceed to this Office, climb up on the 7 Ft. Step Ladder and service the Light Fixture.

Proceedure same as Item No. 3 (d) (Wednesday.)

(f) "Supervisor's Office: Proceed to this Office, climb up on the 7 Ft. Step Ladder and clean Lamps and all parts of the Fluorescent Light Fixture with Clean Dry Cloth.

Continued on Next Page

ITEM 3

Pull the String on the Side of the Fixture to put "ON" the Lamps.

Replace any burnt out Lamp as follows:

Lamps are 40 Watt Fluorescent "Champion" "Daylight".

To remove a Lamp, carefully twist the Lamp in either Direction 1/4 Turn until you "Feel it release" - i.e. until the two pin connections on each end of the Lamp are parallel to the inserting slot in the Bakelite Sockets.

CAREFULLY pull the lamp straight out.

If, after replacing a "Burnt Out" Lamp and putting "ON" the 115 Volt A.C. Switch, the light will not become illuminated, suspect that the "Starter" is at fault.

There is one "Starter" for each Fluorescent Light.

In this case remove the Fluorescent Lamp as indicated, then twist the "Starter" counter-clockwise" 1/4 turn until you "feel it release", then lift it straight out.

Starter is Type "TL - 3" Translite Pec No. 6 or Type "UL G.E. Company" kept in Transfile #

Insert a new "Starter". Turn it 1/4 turn clockwise until you "feel it catch".

Replace the Original Lamp, or if burnt out, remove and install a New Lamp.

List the number of Lamps replaced on the "50 KW M.O.L.".

(g) <u>"Audio Facilities Control Room":</u> . Proceed to this Control Room, climb up on the 7 foot Step Ladder and clean Lamps and all parts of the Light Fixture with a clean dry cloth.

Procedure same as Item No. 3 (f) (Wednesday), except as follows:

Fluorescent Lamps are Champion Daylight 20 Watt.

Switch to put "ON" these Lights is located on the Wall to left of the Entrance Door to the "Measuring Equipment Room".

<u>Continued on next Page.</u>

ITEM 3

(h) "Measuring Equipment Room": Proceed to this Room, climb up on the 7 foot Step Ladder, clean Lamps and all parts of the Light Fixture with a soft dry cloth.

Procedure same as Item No. 3 (f) (Wednesday) except as follows:

There are 3 Light Fixtures in the Room.

Two of them are Regular Metal Fixtures, fitted with one 200 Watt Frosted Lamp each.

The third Fixture is fitted with 4 Fluorescent Champion Daylight Type 40 Watt Lamps

Switch on the Wall adjacent to the Entrance door to the "Audio Facilities Control Room" controls the 115 Volt A.C. Supply to the Frosted Lamp Fixture Directly overhead.

Switch on the Wall to right of the Entrance Door to the Main Transmitter Room controls the 115 Volt A.C. Supply to the Frosted Lamp Fixture directly above Bays #6 and #7, also the Fluorescent Light Fixture above the Passageway on the Right of the 5 KW Transmitter.

Fluorescent Fixture is also fitted with a Pull Chain Switch.

Cleaning Procedure of the Frosted Lamp Fixtures is as follows:

Lift the Metal Reflector up a trifle, then tilt it sideways. Reach in and remove all three Ball Chain Supports from the Metal Side piece of the Fixture. Merely slide the Chain up so that the Ball will pass through the Enlarged Hole above the supporting Slot.

Do this for each of the Three Ball Chain Supports.

Carefully lower the Metal Reflector and drop all dead Moths, Flies, and other Insects into the Waste Basket.

Continued on next Page.

ITEM 3

Wipe out the inside of the Reflector with a soft Dry Cloth.

Carefully wipe off all parts of the Light Fixture with soft Dry Cloth.

Put "ON" the 115 Volt A.C. Supply Switch.

If the Lamp is burned out (by observation), remove it and replace it with a new 200 Watt Frosted Lamp.

Replace the Reflector by putting the End Ball of the Ball Chain Supports through the enlarged maounting Holes, then slide it into the Slot.

(i) "Rear Passageway": Proceed to the Switch Plate mounted on the Wall just to the right of the Entrance Door to the 5 KW Transmitter Enclosure. Switch #1 controls the 115 Volt A.C. Supply to the two Frosted Lamp Regular Light Fixtures suspended from the Ceiling over the 5 KW Transmitter Enclosure. Switch #2 Controls the 2 Fluorescent Light Fixtures, one over the Areaway just to the right of the Entrance Door to 5 KW Transmitter Enclosure, and the other over the middle of the Enclosure around the 50 KW Transmitter.

Switch #3 Controls 4 Frosted Lamp Fixtures suspended from ceiling within 50 KW Transmitter Enclosure and 4 Frosted Lamp Fixtures over left and right passageway around the 50 KW Transmitter.

Procedure for Frosted Lamp Fixtures over 5 KW Transmitter Enclosure is the same as Item No. 3 (h)(Wednesday) except as follows: Proceed to front of "A.C. Power Panel" Unit #1 (A) of 5 KW Trans. and put "OFF" 230 V. AC "Power Supply" Switch "D4A". Open door to 5 KW Transmitter Enclosure and put "OFF" "High Voltage Transformer Dixconnect Switch" "D5A".

Place 7 Ft. Step ladder under Light Fixtures to be serviced, but be careful not to drop tools or cleaning equipment on Units of the 5 KW Transmitter.

When finished serviceing these 2 Fixtures, remove all equipment from within the Transmitter Enclosure, put on "High Voltage Transformer Disconnect Switch" "D5A".

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ITEM 3

Close and lock the Door to the 5 KW Transmitter Enclosure.

Put "ON" the 230 Volt A.C. "Power Supply" Switch "D4A".

Procedure for Fluorescent Light Fixture over the Middle of the 50 KW Transmitter Enclosure is the same as Item No. 3 (f) (Wednesday) except as follows: Merely put "ON" 115 Volt A.C. Supply Switch No. 2 and observe if all 4 Fluorescent "Champion" "Daylight" Type 40 Watt Lamps are illuminated. If they are, this portion of the Item is OK, but if one or more Lamps keep on flickering or do not become illuminated, enter this data on the "50 KW M.O.L.", and also include it on Routine Report to the Supervisor.

In this case, Lamp or Lamps must be renewed and Maintenance Work performed on this Fixture as outlined, during the next period that the 50 KW Transmitter is "OFF" the Air for the "50 KW T. and A.E. Maintenance".

Procedure for Regular Frosted Lamp Fixtures over the Passageway around the 50 KW Transmitter Enclosure, same as Item No. 3 (h) except as follows:

There are 2 Fixtures over the right side, and 2 Fixtures over the Left Side of the Enclosure that may be serviced at once.

Merely put "ON" 115 Volt A.C. Supply Switch #3 and proceed as outlined, but VISUALLY inspect if the 4 Frosted Lamp Regular Fixtures suspended from the Ceiling within the Enclosure are illuminated.

If they are, this portion of the Item is OK, but if they are not, enter this Data on the "50 KW M.O.L.", and also include it on Routine Report to the Supervisor.

In this Case, Lamp or Lamps (200 Watt Frosted) must be renewed and Maintenance

Continued on next Page.

ITEM 3

Work performed on this Fixture as outlined, during the nexp Period that the 50 KW Transmitter is "OFF The Air" for the "50 KW T. & A.E. Maintenance".

(j) "Antenna Coupling Room" Unit #9 (J):" There is One Frosted Lamp Regular Light Fixture suspended from the Ceiling, directly over the Middle of the Enclosure.

This Lamp is controlled by the "Emergency 120 Volt A.C. Service" Switch #4 in the "Control Room Wall Panel Box" in the "Audio Facilities Control Room".

Since this Switch is Normally "ON" at all times, proceed to this Room and merely observe if the 200 Watt Frosted Lamp is illuminated.

If it is, this portion of the Item is OK.

If it is not, enter this Data on the "50 KW M.O.L.", and also include it on Routine Report to the Supervisor.

In this case, Lamp must be renewed and Maintenance Work performed on this Fixture as outlined, during the next period that the 50 KW Transmitter is "Off the Air" for the "50 KW T & A.E. Maintenance".

Climb up on the 7 Ft. Step Ladder and wipe off the entire outer case and Front Lens of the Spot Light.

Observe if the Lamp is illuminated.

If it is not, twist the front Metal Lens Frame of the Spot Light Counter-Clockwise and lift off Frame and Lens.

Remove the burnt out Lamp.

Wipe out inside of Spot Light, Lens Frame, and Lens with Soft Dry Cloth.

Install a new 60 Watt 120 Volt Frosted Lamp.

Replace the Lens and Metal Frame on the Spot Light and twist clock-wise to lock it in place.

Continued on next Page.

ITEM 3

This Spot Light is aimed so that the greatest amount of light and the sharpest Spot is focussed directly on the indicating Scale of the "Antenna Current" Ammeter mounted on a bakelite Sub-Panel against the Wall in this Room.

This Spot light received its 115 Volt A.C. Supply from the Convenience Outlet in the Wall within the "Antenna Coupling Room".

This Plug on the End of the Spot light Cord cannot be removed or inserted while the 50 KW Transmitter is "On the Air" it must be done during an "Off the Air" Period.

(k) "Spare Tube Room": Proceed to this Room, climb up on the 7 Foot Step Ladder, Clean Spot Light Fixtures with Clean dry Cloth.

There are 2 Switches to control the 115 Volt A.C. Supply to both Spot Lights simultaneously.

The Main 115 Volt A.C. Supply Switch is located on the Wall just to the left of the Entrance Door of the "Spare Tube Room".

Put "ON" this Snap Switch.

The 2nd Switch is a small Toggle Switch and is located on the top Moulding of the Enclosure just below the left hand Spot Light. (It is normally "ON" at all times except when "OFF" as specified during portions of Tube Reconditioning)

Put "ON" this Toggle Switch if it should be found "OFF".

Climb up on the 7 Foot Step Ladder and wipe off the Entire Outer Case and Front Lens of both Spot Lights.

Observe if the lamps of both spotlights are illuminated.

If they are not, the burnt out Lamp or Lamps must be replaced.

Each Spot Light is fitted with one ~~250~~ 100 Watt Clear (Round) 120 V. Floodlight Lamp.

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ITEM 3

To renew the Lamp, merely pull back the rear hinged cover, reach inside and unscrew the Lamp.

Wipe out the inside of the Spotlight with soft dry cloth.

Wipe off the Inside of the Lens with a soft dry cloth.

Insert new Lamp in the Socket and tighten in place.

Close the Rear Hinged Cover.

Each Spot Light is prefocussed.

If it becomes necessary to alter the focussing, merely loosen the Wing Nut on the under side of the spot light housing and move back and forward until Focus is correct, then tighten the Wing Nut.

To Raise or Lower the Spotlight, loosen the Wing Nut on the adjustable fitting on the end of the Supporting Stand, then place Spot Light Housing as desired and tighten the Wing Nut.

Merely move the spotlight Right or Left as desired.

Both Spotlights are so aimed that the greatest amount of area over the Tube Rack is covered by both Lights.

When Maintenance Work is completed, shut "OFF" the Main 115 Volt A.C. Supply Switch.

(l) "Lavatory": Proceed to this Room, climb up on the 7 Foot Step Ladder and service the Light Fixture.

Procedure same as Item No. 3 (h) (Wednesday).

(m) "Kitchen": Proceed to this Room, climb up on the 7 Ft Step Ladder and service the Light Fixture.

Procedure same as Item No. 3 (h) (Wednesday).

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ITEM 3

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End Item 3

ITEM 4.

Clean all Pencil marks, Ink Spatter Marks, Finger marks and other dirty Smudges from Walls of Front Vestibule, Front Foyer Office, Supervisor's Office, Audio Facilities Control Room, Measuring Equipment Room, Passageway to rear of 5 KW Transmitter, Rear Door Areaway, Passageway to rear of 50 KW Transmitter, Spare Tube Room, Lavatory, Kitchen, and Passageway to Basement.

(a) "Main Transmitter Room": Cleaning Equipment needed for this Maintenance Item is:

Supply of clean Polishing Cloths. (Kept in the Storage Room)

Box of Oakite. (Kept in Metal Cabinet in the Kitchen)

Small Water Pail (kept in the Storage Room)

(b) "Kitchen": Proceed to this room and fill the Pail about 1/2 full of warm Water (Not Hot)

Pour 2 or 3 tablespoonsful of "Oakite" into the Water to make a saturated Solution.

(c) "Front Vestibule": Proceed to this room and clean all Marks from Walls with Saturated Solution of "Oakite" or equivalent.

CAUTION: Too much cleaning is just as bad as leaving the Wall dirty, in that a very clean surface will show up as a light Spot on a wall slightly faded, or soiled all over entire surface.

Wet a piece of cleaning Cloth in the "Oakite" Solution, then thoroughly wring out.

Carefully clean off the Mark with the Wet Cloth being careful not to cause excess Solution to drip down the Wall.

Continued on next Page.

ITEM 4

Carefully wipe off any such Excess with clean dry cloth.

If "Oakite" is not available, use "Bab-O" or equivalent Cleaner.

In this Case, merely wet the Cloth in Water, thoroughly wring out, and shake a small amount of Cleanser on the Damp Cloth.

Clean the Mark off the Wall, then wipe over the Spot with dry cloth.

Change the Water and "Oakite" when same becomes dirty.

Make the removal of all Scratches and Paint Smudges and larger dirty areas "Work To Be Done" Items in Book No. (12) per procedure outlined in Book No. (5) Sec. No. (B) Page No. (63) Item No. 55.

(d) "Front Foyer Office": Proceed to this Room and clean all Marks from Walls with solution of "Oakite" or equivalent.

Procedure same as Item No. 4 (c) (Wednesday).

(e) "Supervisor's Office": Proceed to this Room and clean all Marks from Walls with Solution of "Oakite" or Equivalent.

Procedure same as Item No. 4 (c) (Wednesday).

(f) "Audio Facilities Control Room": Proceed to this Room and clean all Marks from Walls with Solution of "Oakite" or Equivalent.

Procedure same as Item No. 4 (c) (Wednesday).

(g) "Measuring Equipment Room": Proceed to this Room and clean all Marks from Walls with Solution of "Oakite" or Equivalent.

Procedure same as Item No. 4 (c) (Wednesday).

(h) "Passageway to Rear of 5 KW Transmitter": Proceed to this Passageway and clean all Marks from Wall with Solution of "Oakite" or Equivalent.

Procedure same as Item No. 4 (c) (Wednesday).

Continued on next Page.

ITEM 4.

(i) "Rear Door Areaway": Proceed to this Areaway, and clean all Marks from Walls with Saturated Solution of "Oakite" or Equivalent.

Procedure same as Item No. 4 (c) (Wednesday)

(j) "Passageway to Rear of 50 KW Transmitter": Proceed to this Passageway and clean all Marks from Walls with Saturated Solution of "Oakite" or Equivalent.

Procedure same as Item No. 4 (c) (Wednesday) except do not clean Transmitter Enclosure nor the "Antenna Coupling Room" Enclosure.

(k) "Spare Tube Room": Proceed to this Room and clean all Marks from Walls with Saturated Solution of "Oakite" or Equivalent.

Procedure same as Item No. 4 (c) (Wednesday) except do not clean inside or Outside of the Enclosure.

(l) "Lavatory": Proceed to this Room and clean all Marks from Walls with Saturated Solution of "Oakite" or Equivalent.

Procedure same as Item No. 4 (c) (Wednesday) except do not clean the Tile.

(m) "Kitchen": Proceed to this Room and clean all Marks from Walls with Saturated Solution of "Oakite" or Equivalent.

Procedure Same as Item No. 4 (c) (Wednesday) except do not clean Rear of Beacon Transmitter, nor Built in Cabinets.

(n) "Passageway to Basement": Proceed down this Stairway, cleaning all marks from Walls with Saturated Solution of "Oakite" or Equivalent.

Procedure same as Item No. 4 (c) (Wednesday).

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End Item 4.

ITEM 5.

Service and Clean the following Idle 50 KW Transmitter Rotating Equipment:

20 Volt D.C. Filament Motor Generator "MG1P" or "MG2P".

Motor Blower "M06P".

300 Volt D.C. Bias Motor Generator "MG3P" or "MG4P".

50 KW Transmitter Pond Pump "M01P" or "M02P".

50 KW Transmitter Distilled Water Pump "M03P" or "M04P".

Sump Pumps "M09P" and "M010P".

50 KW and 5 KW Distilled Water System Filler Pump "M05P".

Ventilating System Motors and Fans "M07P" and "M08P".

One Form for each of the above mentioned Machines is supplied at the end of this Item on Pages No. (110) to (130) inclusive.
Make proper entry on these Forms.

ITEM 5.

(a) "Basement": Proceed to the Basement and gather all Maintenance and Cleaning Equipment needed for performance of this Item:

Maintenance Tray No. 2, containing the following:

1 Undercutting Tool.

1 Fisherman's Spring Scale (0 to 10 Lbs).

1 Alemite Grease Gun.

1 Red Plastic Oil Can full of "Vacuoline" Grade "C" Oil treated with "Pyroil" Type "B" Oil.

1 Piece of Heavy Cleaning Canvas.

1 Hand Flashlight.

1 Special Insulated Hook.

1 Sheet of No. 00 Sandpaper.

1 Sheet of Crocus Cloth.

Maintenance Tray No. 2 is kept on the "Maintenance Bench" in Corner just to the Left of the "Short Wave Shelves".

1 "Ideal Polishing Stone" (Kept in Drawer #6 of Basement Work Bench)

Vacuum Cleaner with Brush Nozzle and Special High Velocity Nozzle. (Kept on "Maintenance Bench" in Corner just to Left of the "Short Wave Bench")

1 Motor Blower. (Kept on Maintenance Bench in Corner just to Left of the "Short Wave Shelves")

1 3/8ths inch Open End Wrench. (Kept on Display Board of Work Bench)

2 Cleaning Rags. (Rough Rags, kept in Bin in the Storage Room)

2 Polishing Cloths. (Kept in Bin in the Storage Room)

1 115 Volt A.C. Extension Light. (Kept hanging on the Wall in the Basement near the 5 KW Generator Platform)

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ITEM 5

1 Can of Gargoyle Type "BRB" #1 Grease".(Kept on Small Maintenance Bench just to the Left of Short Wave Shelves).

1 5 Gallon Can of"Vacuoline" Grade "C" Oil,treated with "Pyroil" Type "B" in the proportion of 2 Ounces of "Pyroil" to 1 Quart of "Vacuoline" Oil. This Oil Can is marked "Treated with Pyroil B" and is kept on the Floor under the "Maintenance Bench" in the Corner just to the Left of the "Short Wave Shelves".

(b) "CAUTION": Never have any loose ends of Rags, Threads, Wires hanging near Machinery while working.

The inward Air Draft of the Motors will draw threads etc. into the Machine with entire Rag or material following, unless these Threads or ends break. This can cause serious damage to the Machine.

The Swiftly moving Coupling between Motor and Generator might catch a loose end, damaging the Coupling.

NO LOOSE SLEEVES - NO NECKTIES HANGING - NO RAGS HANGING OUT OF POCKETS.

Roll up Sleeves, Remove Neckties, Keep Rags and other loose Material out of Pockets, to prevent serious personal injury should they get caught in the moving part of Machinery.

CHECK CAREFULLY WHICH MOTOR-GENERATOR OR PUMP IS IN SERVICE TO AVOID ANY POSSIBILITY OF ATTEMPTING TO CLEAN THE MACHINE IN SERVICE.

It is possible to make this Mistake.

Consult Proper Form for number of Machine to be Serviced.

Continued on Next Page

ITEM 5

(c) "Outline of "Step Method" for Maintenance of Rotating Machinery":

1. Check Brush Spring Pressure.
2. Check Brush Position.
3. Check Brushes and renew any that are worn within 1/8 inch of the Metal Rivet.
4. Inspect Commutator Clamping Ring.
5. Examine Brush Holders and Clean them if dirty.
6. Inspect and tighten Connections on Motor and Control.
7. Clean Motor thoroughly, blowing out dirt from Windings and Wipe Commutators and Brushes.
8. Check Motor Foot Bolts, Shield Bolts, Coupling, Gear and Journal Set Screws, and "Keepers".
9. See that all Motor Covers and Gear Guards are in good order, in place and Securely Fastened.
10. Check Air Gap.
11. Clean out Magnetic Dust that may be hanging on Poles.
12. Check Clearance between Shaft and Bearing of Sleeve Bearing Motors to determine if Bearings are worn.
13. Clean out Undercut Slots in Commutator.
14. Examine Connections of Commutator and Armature Connections.
15. Inspect Armature Bands.
16. Drain, Wash out, and renew Oil in Sleeve Bearings.
17. Check Grease in Ball or Roller Bearings.
18. Clean out and renew Grease in Ball or Roller Bearings.
19. Test Insulation Resistance.
20. Check Operating Speed(s).

Continued on next Page.

ITEM 5.

21. How to treat a Hot Bearing.

22. Principles of Commutator - Brush Holders - Brush Pressures - Current Collectors.

(d) "Basement": Proceed to the Basement, service and clean Idle 50 KW Transmitter 80 Volt D.C. Filament Motor-Generator "MG1P" or "MG2P". This Motor-Generator is mounted on a Concrete Platform against the right Wall in Main Basement Room.

Group all Maintenance and Cleaning Equipment within easy reach.

STEP #1: Check Brush Spring Pressure.

Use the Fisherman's Scale, placing the "Weighing Clip" around the Brush Spring Arm just above the point where it rests against the Brush.

Slowly pull out on the Fisherman's Scale until the Spring Arm BEGINS TO MOVE AWAY FROM THE BRUSH.

The number of pounds indicated on the Fisherman's Scale is the Brush Spring Tension.

Correct Brush Spring Tension: Minimum 4 Lbs., Maximum 4.5 Lbs.

If Tension is less than minimum, increase same by placing the Curved Spring Adjustment end in the next Notch, producing more tension on the Brush Spring Arm.

Measure Brush Spring Tension.

If the curved Spring Asjustment End is in the last Notch, providing maximum Tension, but same measures less than 4 Lbs, replace with a new Brush Spring.

New Brush Springs are kept in Transfile No. 104 .

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ITEM 5.

As viewed from the Motor End, the Top Right Brush Holder Bracket has 6 Brush Holders mounted as follows:

Outer Brush Holder is secured to Arm so that edge of Brush is even with the outer Edge of the Commutator.

The next 3 Brush Holders are locked to the Arm with separation of 3/8 inch as measured at the Arm; thus placing the Brushes 1/4 inch apart.

The fifth Brush Holder in from outer edge is locked to the Brush Holder Arm so as to place that Brush 1/8 inch away from the Clamping Ring.

The Sixth and last Brush Holder on this Arm is saparated 3/8 inch from the 5th Brush Holder which provides 1/4 inch separation between the 5th and 6th Brushes.

As viewed from the Motor End, the Top Left Brush Holder Bracket has 6 Brush Holders mounted exactly same as the Top Right, except that the first Brush Holder is locked in position so that first Brush is 1/4 inch in from the Outer Edge of the Commutator, and the 5th Brush is 3/8 inch away from the Clamping Ring

As viewed from the Motor End, the Bottom Left Brush Holder Bracket has 6 Brush Holders mounted exactly same as the Top Right, except that the first Brush Holder is locked in position so that the first Brush is 1/2 inch in from the Outer Edge of the Commutator, and the 5th Brush is 5/8 inch away from the Clamping Ring.

Bracket
The Bottom Right Brush Holder/as viewed from Motor End has 6 Brush Holders mounted exactly same as Top Right except that the first Brush Holder is locked in position so that the first Brush is 3/4 inch in from the Outer Edge of the Commutator, and the 5th Brush is 7/8 inch away from the Clamping Ring.

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ITEM 5

STEP #2: Check Brush Position.

Correct Clearance of Brush Holder is 1/8 inch from Commutator.

In testing for Clearance of Brush Holder, a piece of 1/8 inch Bakelite may be used as a thickness Gauge.

Merely place the 1/8 inch Gauge between the Brush Holder and Face of the Commutator.

If the Clearance is insufficient, first loosen the Locking Bolt, then move the Holder away from Commutator.

Place Brush Holder tightly against the 1/8 inch Thickness Gauge, then tighten the Locking Bolt.

Clearance of more than 1/8 inch will cause the Brushes to wedge, resulting in chattering and excess sparking.

Clearnace of less than 1/8 inch might cause the Brush Holder to strike the Commutator resulting in serious damage to the Segments.

Check Brush Holders on the Bracket for looseness by pulling up with Ringers. If same can be thus moved, they are loose.

If for any Reason the Brush Holders become Loose, the Locking Bolts must be tightened after adjusting Holders for 1/8 inch Clearance.

If Brush Holders have moved from original positions, loosen the Locking Bolts, move Brush Holders to correct positions, adjust to 1/8 inch Clearance, then tighten the Locking Bolts.

Note that tightening the Locking Bolt has a Tendency to raise the Brush Holder from the Commutator, so that it must be held firmly during the tightening Process Tightening must be done with Discretion, i.e. use a Steady Pull, to avoid stripping Threads.

Continued on Next Page

ITEM 5

As will be observed, this "Staggers" the brushes covering nearly all of the Commutator Surface, thus preventing excessive wear of sections of Commutator.

Observe that the Brush "Rocker Arms" is in correct Position as will be evidenced by the mark on "Rocker Arm" and Generator Casting being in alignment.

If the alignment is not correct report to Supervisor.

STEP #3: Check Brushes and renew any that are worn within 1/8 inch of the Metal Rivet.

Remove all Brush Spring Curved Ends from the Notches and allow them to rest against ends of Brush Spring Arms (point of least Spring tension).

Lift the Brush Spring Arm clear of the Brush, then carefully lift the Brush out of the Holder.

Remove all of the Brushes from their Holders as outlined, allowing them to be supported by the "PigTail" Connection.

Pull the Brushes away from the Commutator.

All Brushes will hang free of the Commutator except the Left Top six which must be hung over the ends of the Springs keeping Brushes clear avoiding possibility of their being jammed while Machine is running.

Be sure to put Brush back in correct Brush Holder.

Inspect to be sure that Brushes do not wear down to the Metal Rivet where the "Pig Tail" Connection is made to the Brush. This will Damage the Commutator.

When installing new Brushes, fit them carefully to the Commutator.

The "Ideal Brush Seating Stone" used for this purpose is kept in Drawer #6 of the Basement Workbench.

These Brushes may also be fitted by inserting a strip of fine Sandpaper, with the sand side up, between the Commutator and the Brush.

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ITEM 5.

Rotate the Commutator back and forth, allowing the brushes to bear on the sandpaper only when the Commutator is moved in the correct direction (Same as direction of Rotation during operation)

The Brushes should be lifted so that they will not touch the Sandpaper on the back pull.

Sand only, until the curve of the Brushes is the same as that of the Commutator.

Be sure that the Brush Shunt ("Pig Tails") are fastened securely so that Current will not overheat the Brushes and Brush Holders.

STEP #4: Inspect Commutator Clamping Ring. for signs of looseness, rough or worn mica edges.

Clamping Ring is rigidly "Shrunk" around Commutator.

If abnormal conditions are found, report same to Supervisor.

STEP #5: Examine Brush Holders and clean them if dirty.

Clean dirty Brush Holders with a Rag dipped in Carbon-Tet, wiping out entire inside of the Holder.

Wipe off the outside of the Holder with a clean dry cloth.

Wipe off Brushes with rag dipped in Carbon-Tet.

Make sure that Brush rides freely in the Brush Holder.

To do this merely, place the Brush back in the Holder and move in and out of the Holder.

There should be no Binding.

If Brush binds in Holder, either the Brush or the Holder is still dirty.

Merely clean again with Rag dipped in Carbon-Tet.

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ITEM 5

If the Brush is New and just installed, first clean Brush and Holder with Rag dipped in Carbon-Tet, then try again for binding.

If it still binds, the Brush is slightly too big.

In this case remove the Brush and rub all 4 sides several times over piece of Crucus Cloth.

Wipe the Residue from Brush with Rag dipped in Carbon-Tet.

Again test Brush for binding.

Repeat the Crocus Cloth Process until Brush fits properly.

After cleaning Brushes, Holders, and properly fitting Brushes, leave all Brushes out of Brush Holders as outlined in Step #3.

STEP #6: Inspect and tighten Connections on Motor and Control.

External Connections to the Motor feed through Condulet Fitting in side of the Motor Housing.

Cover of this Condulet may be removed for inspection of the Connections, when it is desired to inspect or tighten them.

Connections are Bolted, then wrapped with 2 layers of Rubber Tape, 1 layer of Friction Tape and coated with Insulating Varnish.

Do not remove this Cover to inspect connections unless erratic operation of the Motor is observed.

Connections to the Generator are made exactly the same as those to the Motor.

Do not remove the Cover to inspect connections unless Voltage Output is very unsteady and cannot be corrected by normal Maintenance Procedure.

Continued on Next Page.

ITEM 5

STEP #7: Clean the Motor Thoroughly, blowing out dirt from Windings and Wipe Commutators and Brushes.

Use the Portable A.C. Blower and blow out all dust and dirt from around the Armature inside of the Motor Casing.

This is an Induction Type Motor, which does not have any Brushes or Collector Rings.

After all dust and dirt is rmmoved from within the Motor Casing, wipe off the entire outer Casing with a clean dry cloth.

STEP #8: Check Motor Foot Bolts, Shield Bolts, Coupling, Gear and Journal Set Screws, and "Keepers".

Check Motor Foot Bolts for looseness.

Use Open End Wrench of proper Size, tightening Nuts with steady even pull.

NEVER JERK, when tightening any Nuts or Bolts, since this adds to the strain frequently stripping the threads or breaking off heads of Bolts.

Check Generator Foot Bolts for looseness.

Use open End Wrench of proper Size, tightening with steady even pull.

Check Motor-Generator Main Frame Bolts for looseness.

Loosen all 4 Wing Nuts holding the Shield around the coupling. Use Gas Pliers.

Remove the Shield.

Inspect the Coupling Bolts that hold Fabric Discs.

Be careful to note if there is any Fabric dust in the Coupling as this will indicate loose Bolt at this point.

Use the proper Open End Wrenches and tighten any loose Coupling Nut and Bolt.

Check Clearance of Bolt Heads against sides of Openings in Coupling Flange.

Continued on next Page.

ITEM 5

Clearance should be a Minimum of 1/8 inch.

When bolt heads touch side of opening, replace the fabric disc.

Use the A.C. Portable Blower to blow all dust out of the Coupling.

Each half of the Coupling is held rigidly in place on the Shaft by means of a "Keeper".

Procedure in checking for loose "Keeper" is as follows:

Grasp one half of the Coupling and "Try" it back and forth.

If both "Keepers" are tight, there will be no "Play" between Flange and Shaft.

"Play" may be defined as the slack in any coupling arrangement.

"Play"between the Flange and Shaft must be taken up before the Motor and Generator Shafts rotate in unison.

Since the Coupling Bolts have been tightened, any "Play" is the result of a loose "Keeper".

Merely use a hammer and flat edge punch to knock the "Keeper" in to the flat slot on Shaft and Flange.

This will tighten the "Keeper".

Do this to "Keepers" on both the Motor and Generator Ends of the Coupling Flange as required.

Replace the Coupling Guard over the Coupling, lining up the four mounting bolts through the elongated Holes in base of the Guard.

Replace the 4 Wing Nuts on Bolts and tighten them down with fingers.

STEP #9: See that all Motor Cover, and Gear Guards are in good order, in place, and properly and securely fastened.

This does not apply.

There are no motor Covers, nor Gear Guards on this 20 Volt DC Motor-Generator.

Continued on next Page.

ITEM 5

STEP #10: Check Air Gap.

Check clearance between Generator Armature and all Six Field Pole Surfaces.
Clearance must be the same between Armature and any Field Pole to prevent Armature from striking Feild Pole.
Use Open End Wrench to Tighten Bolts that hold Field Poles to Frame of Generator.

STEP #11: Clean out Magnetic Dust that may be hanging on Poles.

Wipe off all sides of the Generator Field Poles, including Laminations and Insulation Coverings of Windings with a cloth dipped in Carbon-Tet.
When Carbon-Tet is not available, use a clean dry Cloth.

STEP #12: Check Clearance between Shaft and Bearings of Sleeve Bearing Motors to determine if Bearings are worn.

Use a Wood Bar 2" X 4" about 4 Ft long as a pry under the Shaft where it projects from the Motor Bearing.
Carefully pry upward to determine if there is any movement of shaft.
This movement of shaft must not exceed .005 inch
It is not possible to check other bearing of Motor by this procedure.
Remove cap from end of Casting and visually inspect for excessive wear.
In the case of the Generator Bearings this is first shown up where Clearance between Armature and Bottom Field Pole is less than Clearance between Armature and Top Field Pole.
Test for excessive Bearing Wear.

Continued on next Page.

ITEM 5

STEP #13: Clean out Undercut Slots in Commutator.

Start the Motor by putting "ON" 480 Volt A.C. Supply Switch "D2P" or "D3P".

Wait until Machine reaches full speed.

Place "Ideal Polishing Stone" lightly on the Commutator to remove any Glazing or Scum.

Fold Canvas into a Pad about 3 inches square and press against commutator.

Be sure that there are no loose threads on Canvas Pad.

While Machine is running, observe if Oil Rings on both ends of the Motor and Both ends of the Generator are revolving, thus carrying oil to Bearing Surfaces.

Stop the Motor by putting "OFF" 480 Volt A.C. Supply Switch "D2P" or "D3P".

Wait until the Machine has completely stopped before proceeding.

Use A.C. Portable Blower to blow all Copper Dust and other Residue from Generator Commutator, Armature, and Frame.

Clean Slots of the Commutator with Special Tool made from Hack-Saw Blade.

Merely place the sharp edge of cleaning tool in the slot and pull it back through the slot to remove Carbon Brush Particles, Dust, Dirt and other Residue.

Avoid too much cleaning of the Slots, since this cuts away the Mica Insulation between Commutator Segments.

Begin at the inside end of the Slots on the Narrow section of the Commutator, cleaning Narrow Slot first, then clean the same Slot from the Clamping Ring to the Outer edge of the Commutator.

The Slot being cleaned should be on top, just to the right of the top Metal Frame Member.

Rotate the Armature as each complete slot is cleaned, until all slots are Cleaned.

Continued on next Page.

ITEM 5

STEP #14: Examine Connections of Commutator and Armature.

Check all Bolted connections to the Armature, Series Field and Shunt Field for looseness.

Use proper Open end wrenches to tighten these bolted connections.

Tighten with a Steady even pull.

STEP #15: Inspect Armature Bands.

Check Binding Cords and wrappings for loose Ends, while at the same time check Soldered connections to Commutator Segments.

Resolder all loose Ends of Armature Wire Binding Wire, then paint over with Black Insulating Varnish.

If any Solder has been "Thrown" from Connections to Commutator Segments, carefully resolder, using Hard Solder and Flux.

In soldering the Connection, be sure to fill up the entire Slot in the Commutator where connection is made.

Carefully file excess Solder from Commutator, being CAREFUL NOT TO FILE THE COMMUTATOR ITSELF.

Smooth off the Solder with Crocus Cloth, then wipe off the Residue with a rag dipped in Carbon-tet.

STEP #16: Drain, Wash out, and renew Oil in Sleeve Bearings.

This does not apply, except on 1st and 2nd Wednesdays of the Month.

See Sec. No. (E) Item No. (8) Page No. (140) Item No. (9) Page No. (154).

STEP #17: Check Grease in Ball or Roller Bearings.

This doesn't apply.

This Motor and Generator do not have Roller Bearings.

Continued on Next Page.

STEP #18: Clean out and renew Grease in Ball or Roller Bearings.

This does not apply.

This Motor and Generator do not have Roller Bearings.

STEP #19: Test Insulation Resistance.

This does not apply unless in Emergency or authorized by Supervisor.

For Procedure See Sec. No. (E) Page No. (95)

STEP #20: Check operating Speed(s).

This does not apply.

Procedure: See Sec. No. (E) Page No. (96).

STEP #21: How to treat a Hot Bearing.

This does not apply.

Procedure: See Sec. No. (E) Page No. (100).

STEP #22: Principles of Commutators - Brush Holders - Brush Pressures - Current Collectors.

This does not apply.

Procedure: See Sec. No. (E) Page No. (102).

STEP #23: Wipe off Brushes and inside of Brush Holders with Dry Cloth.

Replace all Brushes in proper Brush Holders.

Grasp curved adjustment End of Spring, push it away from Brush Spring Arm and place it in the 3rd Notch.

As outlined in Step #1, use Fishermans Scale to adjust Spring Pressure to Correct Value.

Continued on next Page.

ITEM 5

STEP #24: Check Level of Oil in Sight Cups - 3/4 Full is Correct.

When Motor is idle, do not fill Oil Cups to the Top.

There are 2 Oil Level Sight Cups on the Motor, one on each end of the Shaft.

There are 2 Oil Level Sight Cups on the Generator, one on each end of the Shaft.

Add Oil through the covered opening on top of the Bearing Housing to Raise level of Oil in Sight Cup to 3/4 Full.

STEP #25: Inspect "Tel-Temp" for looseness.

To Tighten, merely twist entire "Tel-Temp".

Wipe off Celluloid Face of the instrument with slightly damp cloth.

Clean Motor Frame, Generator Frame, and Main Base Frame with cloth dipped in Carbon-Tet.

Polish Motor Frame, Generator Frame, and Main Base Frame with Stafford's Polish.

Wipe off entire concrete Platform with Rag dipped in Carbon-tet, then polish with Stafford's Polish.

Sweep Floor around Motor-Generator Platform to avoid tracking Dust and Dirt thruout the Plant.

STEP #26: Feel Main Fuse "F3P" for OVERHEATING.

Feel knife ends of Fuse for OVERHEATING.

Fuse and Ends normally operate Very Warm.

Feel Main Generator Output Selector Switch "D12P" for OVERHEATING.

Tighten Compression Clamp with Large Screw Driver.

Wipe out Switch Box with Dry Cloth.

Continued on next Page.

ITEM 5

STEP #27: Feel Connections of Choke Coil "L5P" for OVERHEATING.

Connections should be Warm NOT HOT.

If Hot, Tighten Connections.

If Hot and unable to Tighten further, report to Supervisor.

Wipe off choke "L5P" and Base with Cloth dipped in Carbon-tet.

Observe amount of Sediment and Precipitation in Condenser "C1P" and "C2P".

Clean Porcelain Tops with Staffords Polish.

Remove and Test Fuses "F11P" and "F12P" on "Fuse Tester Rack" at foot of Basement Stairs.

Replace Fuses if good. Throw away if found "Blown" and install new Fuses of Correct Size.

With either "MG1P" or "MG2P" running merely place a 110 Volt Test Lamp across terminals of "C1P" to test Fuse "F12P" and across terminals of "C2P" to test "F11P".

Lamp will glow if Fuses are good.

Replace "Blown" fuses.

Dust off tops of all Terminal Boxes, Conduit Pipes and Equipment adjacent to "MG1P" and "MG2P".

CAUTION: NEVER START MOTOR GENERATOR "MG1P" OR "MG2P" UNTIL EVERY NUT, BOLT, OR LOCK WASHER IS ACCOUNTED FOR, OR UNTIL OTHER EQUIPMENT IS REMOVED FROM THE MACHINE.

STEP #28: Test "MG1P" or "MG2P" as follows:

Put "ON" 480 Volt A.C. Supply Switch "D2P" or "D3P".

Continued on next Page.

ITEM 5

Allow Motor-Generator to run for a few minutes.

Visually inspect all parts of Motor and Generator while it is running.

When brief Test is Completed, put "OFF" Switch "D2P" or "D3P".

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ITEM 5.

"Basement": Clean and Service Motor Blower "MO6P".

This Motor Blower is normally placed on the Black Mark on Concrete Platform just to Left of 50 KW Transmitter Motor Generator "MG1P" or "MG2P".

Notify Technician on Transmitter Watch to keep Careful Watch on 20 Volt "Amplifier Filament Voltage" Voltmeter "M1A" while Blower and Motor "MO6P" is being serviced.

This is an Induction Type Motor, having no brushes, Commutator or Slip Rings.

Motor is fitted with Sleeve Bearings and Wick Lubrication.

Put "OFF" A.C. Toggle Switch on side of Motor Housing.

Pull Plug on end of rubber-covered Service Cord on 115 Volt A.C. Convenience Outlet.

Place a large piece of cloth on floor, then place Motor Blower on floor to Service.

Use large screw driver and gas pliers to remove the 4 bolts mounting base of Motor to Main Machine Base.

Use large screw driver to loosen the Set Screw on Fan Shaft.

Remove Motor from Main Base.

Use large Screw Driver to loosen, then remove all Bolts around edge of Right Blower Fan End Plate (nearest to motor).

This will permit fan and Housing to be Removed.

Lift Fan Rotor out of Housing.

Dip a Cloth in Naptha, wring out, then Clean Inside and Outside of Fan Housing and Fan Rotor.

Wrap a small piece of cloth about the blade of a small screw driver, dip in Carbon Tet, then clean in between all Blades of Fan Rotor.

Continued on Next Page.

ITEM 5.

Manually Spin the Rotor several times to be Sure that it is Fully Centered in Housing.

Lift Snap Covers on both Bearings Oil Openings and Pour a small amount of Oil in.

CAUTION: Avoid Over-Oiling Motor Bearings; excess Oil will damage the Rubber Mountings for Motor.

Tighten Connections on A.C. Plug.

Remove Cover over 115 Volt A.C. Terminals on Motor, Tighten Connections, then replace cover.

Wipe off rubber-covered Service Cord with rag dipped in Carbon Tet.

Put a small amount of Stafford's Polish on Floor Wax on a cloth and Clean Motor Base and Outside of Fan Housing.

Place Motor Blower "MO6P" back on Black Spot on Concrete Platform adjacent to "MG1P" or "MG2P" (Whichever is in Service).

Connect A.C. Plug in 115 Volt A.C. Convenience Outlet.

Put "ON" Toggle Switch.

Observe that Fan is Operating and Forcing Air toward Generator Commutator.

Notify Technician on Transmitter Watch that Blower "MO6P" is back in Service.

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ITEM 5.

(e) "Basement" Service and clean idle 50 KW Transmitter 500 Volt D.C. Bias Motor-Generator "MG3P" or "MG4P".

This Motor-Generator is mounted on a concrete platform against right wall in main Basement just to left of 20 Volt Filament Motor-Generators.

Group all Maintenance and cleaning equipment within easy reach.

STEP #1: Check Brush Spring Pressure.

CAUTION: Exercise extreme care not to ground the Brushes to the Frame of the Machine when removed as this places additional 1 1/2 ampere load on Machine that is in service.

This extra load would reduce the Bias Voltage from Generator in service to seriously affect the operation of the 50 KW Transmitter.

Open all 4 Metal guards on Bias Generator Commutators.

Use the Fisherman's Scale.

Placing the "Weighing Clips" around the Brush Spring arm just above the point where it rest against the brush.

Slowly pull out on the Fisherman's Scale until the Spring arm BEGINS TO MOVE AWAY FROM THE BRUSH.

The number of pounds indicated on the Fisherman's Scale is the Brush Spring Tension.

Correct Brush Spring Tension: Minimum 2 Lbs., Maximum 5 Lbs.

If Tension is less than minimum, increase same by placing the curved spring adjustment end in the last notches, producing more tension on the Brush Spring arm.

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Measure Brush Spring Tension.

It the curved Spring adjustment end is in the last notch, providing maximum tension, but same measures less than 4 Lbs. , replace with a new Brush Spring.

New Brush Springs are kept in Transfile No. 98 .

STEP #2: Check Brush Position.

Correct clearance of Brush Holder is 3/32 inch from Commutator.

In testing for clearance of Brush Holder, a piece of 3/32 inch Bakelite may be used as a thickness gauge.

Merely place the 3/32 inch gauge between Brush Holder and face of the Commutator.

If Clearance is unsufficient, first loosen the locking bolt, then remove the Holder away from Commutator.

Place Brush Holder tightly against the 3/32 inch thinkness gauge then tighten locking bolt.

Clearance of more than 3/32 inch might cause the Brush Holder to strike the Commutator resulting in serious damage to the Segments.

Check Brush Holders on the Bracket for looseness by pulling up with fingers. If same can be thus moved, they are loose.

If for any reason the Brush Holders become loose, the locking Bolts must be tightened after adjusting Holders for 3/32 inch clearance.

If Brush Holders have moved from original positions, loosen the locking Bolts, move Brush Holders to correct positions, adjust to 3/32 inch clearance, then tighten the locking Bolts.

Note that tightening the locking Bolt has a tendency to raise the Brush Holder

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ITEM 5.

from the Commutator, so that it must be held firmly during the tightening process.

Tightening must be done with Discretion, i.e., use a Steady Pull to avoid stripping Threads.

There are only 2 Brushes, one on right side and one on left side of Commutator.

Observe that both Brush Holders are secured to the Brush Holder bracket so that both Brushes rest on center point of Cpmmutator.

Observe that the Brush "Rocker" bearing is in correct position as will be evidenced by the mark on "Rocker" Bearing and generator casting being in alignment.

If the alignment is not correct reportto Supervisor.

STEP #3: Check Brushes and renew any that are worn within 1/8 inch of Metal Rivet.

Inspect Commutator Clamping Ring, for signs of looseness, rough or worn mica edges.

Clamping Ring is rigidly "Shrunk" around Commutator.

If abnormal conditions are found, report same to Supervisor.

STEP #4: Inspect Commutator Clamping Ring.

Inspect Commutator Clamping Ring for signs of looseness, rough or worn mica edges.

This does not apply.

There is no Clamping Ring on this Generator Commutator.

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ITEM 5.

STEP #5: Examine Brush Holders and clean them if Dirty, Make sure that Brush rides freely in the Holders.

Clean dirty Brush Holders with a Rag dipped in Carbon-tet, wiping out entire inside of the Holder.

Wipe off the outside of the Holder with a clean dry cloth.

Wipe off Brushes with rag dipped in Carbon-tet.

Make sure that Brush rides freely in the Brush Holder.

To do this merely, place the Brush back in the Holder and move in and out of the Holder.

There should be no Binding.

If Brush binds in Holder, either the Brush or the Holder is still dirty.

Merely clean again with Rag dipped in Carbon-tet.

If the Brush is New and just installed, first clean Brush and Holder with Rag dipped in Carbon-tet, then try again for binding.

It it still binds, the Brush is slightly too big.

In this case remove the Brush and rub all 4 sides several times over piece of Crocus Cloth.

Wipe the Residue from Brush with Rag dipped in Carbon-tet.

Again test Brush for binding.

Repeat the Crocus Cloth Process until Brush fits properly.

After cleaning Brushes, Holders, and properly fitting Brushes, leave all Brushes out of Brush Holders as outlined in Step. #3.

STEP #6: Inspect and Tighten Connections on Motor and Control.

External Connections to the Motor feed through Conduiet Fitting inside of the Motor Housing.

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Cover of this Condulet may be removed for inspection of the Connections, when it is desired to inspect or tighten them.

Connections are Bolted, then wrapped with 2 layers of Rubber Tape, 1 layer of Friction Tape and coated with Insulating Varnish.

Do not remove this Cover to inspect connections unless erratic operation of the Motor is observed.

Connections to the Generator are made exactly the same as those to the Motor.

Do not remove the Cover to inspect connections unless Voltage Output is very unsteady and cannot be corrected by normal Maintenance Procedure.

STEP #7: Clean Motor thoroughly, blowing out dirt from Windings and wipe Commutators and Brushes.

Use the Portable A.C. Blower and blow out all dust and dirt from around the Armature inside of the Motor Casing.

This is an Induction Type Motor, which does not have any Brushes or Collector Rings.

After all dust and dirt is removed from within the Motor Casing, wipe off the entire outer Casing with a clean dry cloth.

STEP #8: Check Motor Foot Bolts, Shield Bolts, Coupling, Gear and Journal Set Screws, and "Keepers".

Check Motor Foot Bolts for looseness.

Use open End Wrench of proper size, tightening Nuts with steady even pull.

NEVER JERK, when tightening any Nuts or Bolts, since this adds to the strain frequently stripping the threads or breaking off heads of Bolts.

Check Generator Foot Bolts for looseness.

Use open End Wrench of proper size, tightening with steady even pull.

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Check Motor-Generator Main Frame Bolts for looseness.

Loosen the 2 Wing Nuts holding the Shield around the coupling.

Use Gas Pliers to remove the shield.

Inspect the Coupling Bolts and Nuts for looseness.

Tighten them with proper open End Wrenches, if any are found loose.

This is a Rigidly Bolted coupling, since this Motor-Generator is a 3 Bearing Machine, i.e. 2 Bearings on the Motor and 1 Bearing on the Generator.

Use A.C. Portable Blower to blow all dust out of the Coupling.

Each half of the Coupling is held rigidly in place on its shaft by means of a "Keeper".

Procedure in checking for "loose Keeper" is as follows:

Grasp one half of the coupling and "Try" it back and forth.

If both "Keepers" are tight there will be no "Play between Shaft and Coupling flange.

"Play" may be defined as the slack between any coupling. This must be taken up before the Motor and Generator Shafts rotate in Unison.

Since the Coupling Bolts have been tightened, any "Play" is caused by a loose "Keeper".

Merely use a hammer and flat edge punch to knock the "Keeper" into the flat slot on Sahft and Coupling flange.

This will tighten the "Keeper".

Do Do this to "Keepers" on both the Motor and Generator ends of the Coupling.

Replace the guard over the Coupling, lining up the two mounting Bolts through the holes in the base of the Guard.

Replace the Wing Nuts and tighten them down with fingers.

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STEP #9: See that all Motor Covers, and Gear Guards are in good order, in place, and securely fastened.

There are no Motor Covers nor Gear Guards on the 300 Volt D.C. Motor-Generator.

There are 4 Hinged Covers over the Commutator end of the Generator.

These Guards are provided with many Ventilation openings.

Each Guard is hinged and fitted with Spring Compression Latches which hold Guards tight when they are properly closed.

Open and Close and observe that latches work properly.

STEP #10: Check Air Gap.

Check Clearance between Generator Armature and all Three Field Pole Surfaces.

Clearance must be the same between Armature and any Field Pole to prevent Armature from striking Field Pole.

Use Large Screw Driver to tighten Bolts that hold Field Poles to Frame of the Generator.

STEP #11: Clean out Magnetic Dust that may be hanging on Poles.

Wipe off all sides of the Generator Field Poles, including Laminations and Insulation Coverings of Windings with a cloth dipped in Carbon-Tet.

When Carbon-Tet is not available, use a clean dry Cloth.

STEP #12: Check Clearance between Shaft and Bearings of Sleeve Bearing Motors to determine if Bearings are Worn.

Use Small Screw Driver to remove Metal Cover over opening on outer end of Motor Bearing Supporting Frame.

Use Large Screw Driver as a pry on End of the Motor Shaft.

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ITEM 5

Carefully pry upward to determine if there is any upward movement of the Shaft.

This movement of shaft must not exceed .005 inch.

Use a wood Bar 2" X 4" about 4 feet long as a pry under the Shaft adjacent to the inside bearing.

Carefully pry upward to determine if there is any movement of Shaft.

This movement of Shaft must not exceed .005 inch.

Check the one Generator Bearing by same procedure as as the Outer Motor Bearing.

In the case of Generator Bearing, this is first shown up where clearance between Armature and Bottom Field Pole is less than clearance between Armature and either Right or Left Field Pole.

STEP #13: Clean out undercut Slots in Commutator.

Start the Motor by putting "ON" 480 Volt A.C. Supply Switch "D6P" or "D7P".

Wait until Machine reaches full Speed.

Place "Ideal Polishing Stone" lightly on the Commutator to remove any Glazing or Scum.

Fold Canvas into a Pad about 2 or 3 inches square and press against Commutator.

Be sure that there are no loose threads on Canvas Pad.

While the Machine is running, observe if Oil Rings on both ends of the Motor are revolving, thus carrying Oil to the Bearing Surfaces.

Stop the Motor by putting "OFF" 480 Volt A.C. Supply Switch "D6P" or "D7P".

Wait until the Machine has completely stopped before proceeding.

Use A.C. Portable Blower to blow all Copper Dust and other Residue from the Generator Commutator, Armature, and Frame.

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ITEM 5

Clean Slots of the Commutator with Special Tool made from Hack Saw Blade.
Merely place the Sharp Edge of cleaning tool in the Slot and pull it back through the Slot to remove Carbon Brush Particles, Dust, Dirt and other Residue.
Avoid too much cleaning of the Slots, since this cuts away the Mica Insulation between Commutator Segments.
Begin at the Inside end of the Slots cleaning twoard the Outer Edge of the Commutator.
The Slot being cleaned should be on top, just to the left of the top metal Frame Member.
Rotate the Armature as each complete Slot is cleaned, until all Slots are cleaned.

STEP #14: Examine Connections of Commutator and Armature.
Inspect all connections to the Armature, and Shunt Field.
Connections are Soldered, wrapped with 2 layers of Rubber Tape, one layer of friction Tape, and painted with Black Insulating Varnish.
If Tape is frayed, dried out, or unravelled, replace it and paint over with With Black Insulating Varnish.
Two Connections to the Bottom Field Coil are Bolted to Terminals.
Tighten these with Screwdriver.

STEP #15: Inspect Armature Bands.
Check Binding cords and wrappings for loose Ends, and at the same time check Soldered Connections to Commutator Segments.
Binding cords are several layers of Lacing Cord wrapped around the Wires just before they connect to Commutator Segments.

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Layers of Empire Cloth cover the Binding cords and are painted with Black Insulating Varnish.

If Empire Cloth is in good Condition, nothing need be done.

If Empire Cloth is loose, lift up end and inspect the Bindings and Soldered Connections.

If any Solder has been "Thrown" from Connections to Commutator Segments, carefully resolder, using hard solder and Flux.

In soldering the connections, be sure to fill up the entire Slot in the Commutator where connection is made.

Carefully file excess solder from Commutator being CAREFUL NOT TO FILE THE COMMUTATOR ITSELF.

Smooth off the Solder with Crocus Cloth, then wipe off the residue with a Rag dipped in Carbon-Tet.

Cut off loose ends of Binding.

Wrap with new layers of Empire Cloth.

Wrap lacing cord around the Empire Cloth and "Seize" both ends.

Paint over with Black Insulating Varnish.

Report this condition to Supervisor.

STEP #16: Drain, wash out, and renew Oil in Sleeve Bearings.

This does not apply, except on 1st and 2nd Wednesdays of the Month.

See Sec. No. (E) Item No. (8) Page No. (140).

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ITEM 5

STEP #17: Check Grease in Ball or Roller Bearings.

This does not apply.

This Motor and Generator do not have Roller Bearings.

STEP #18: Clean out and renew Grease in Ball or Roller Bearings.

This does not apply.

This Motor and Generator do not have Roller Bearings.

STEP #19: Test Insulation Resistance.

This does not apply unless in Emergency or authorized by Supervisor.

For Procedure see Sec. No. (E) Page No. (95)

STEP #20: Check operating Speed(s).

This does not apply.

Procedure: See Sec. No. (E) Page No. (96)

STEP #21: How to treat a Hot Bearing.

This does not apply.

Procedure: See Sec. No. (E) Page No. (100).

STEP #22: Principles of Commutators - Brush Holders - Brush Pressures - Current Collectors.

This does not apply.

Procedure: See Sec. No. (E) Page No. (102).

STEP #23: Wipe off Brushes and inside of Brush Holders with Dry Cloth.

Replace all Brushes in proper Brush Holders.

Grasp curved adjustment End of Spring, push it away from Brush Spring Arm and place it in the 3rd Notch.

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ITEM 5

As outlined in Step #1, use Fishermans Scale to adjust Spring Pressure to Correct Value.

STEP #24: Check Level of Oil in Sight Cups - 3/4 Full is correct.
When Motor is idle, do not fill Oil Cups to the Top.
There are 2 Oil Level Sight Cups on the Motor, one on each end of the Shaft.
There are 2 Oil Level Sight Cups on the Generator, one on each end of the Shaft.
Add Oil through the covered opening on top of the Bearing Housing to Raise level of Oil in Sight Cup to 3/4 Full.

STEP #25: Inspect "Tel-Temp" for looseness.
To Tighten, merely twist entire "Tel-Temp".
Wipe off Celluloid Face of the instrument with slightly damp cloth.
Clean Motor Frame, Generator Frame, and Main Base Frame with cloth dipped in Carbon-Tet.
Polish Motor Frame, Generator Frame, and Main Base Frame with Stafford's Polish.
Wipe off Entire Concrete Platform with Rag dipped in Carbon-tet, then polish with Stafford's Polish.
Swaep Floor around Motor-Generator Platform to avoid tracking Dust and Dirt thruout the Plant.

STEP #26: Observe amount of Sediment and Precipitation in Condenser "C4P" and "C5P".
Cloan Porcelain Tops with Staffords Polish.
Remove and Test Fuses "F9P" and "F10P" on "Fuse Tester Rack" at foot of Basement Stairs.

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ITEM 5

Replace Fuses if Good.

Throw away if found "Blown", and install new fuses of correct Size.

With either "MG3P" or "MG4P" running, merely place 230 Volt Test Lamp across Terminals of "C4P" to test Fuse "F9P" and across Terminals of "C5P" to test Fuse "F10P".

Lamp will light full brilliance if Fuses are good.

Replace "Blown" Fuses.

Dust off Tops of all Terminal Boxes, conduit Pipes and equipment adjacent to "MG3P" and "MG4P".

Remove Wing Nut, open Hinged Metal Compartment and Clean cases of Condensers "C3P" and Chokes "L6P" and "L7P" with dry Cloth.

Wipe inside of Metal Cabinet, close the hinged door, and screw Wing Nut in Place.

CAUTION: NEVER START MOTOR GENERATOR "MG3P" OR "MG4P" UNTIL EVERY NUT, BOLT, OR LOCK WASHER IS ACCOUNTED FOR, OR UNTIL OTHER EQUIPMENT IS REMOVED FROM THE MACHINE.

STEP #27: Test "MG3P" or "MG4P" as follows:

Put "ON" 480 Volt A.C. Supply Switch "D6P" or "D7P".

Allow Motor-Generator to run for a few minutes.

Visually inspect all parts of Motor and Generator while it is running.

When brief test is completed, put "OFF" Switch"D6P" or "D7P".

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(f) "PUMP ROOM": Proceed to the Pump Room, service and clean idle 50 KW Transmitter Pond Pump "M01P" or "M02P".

This electric motor driven pump is mounted on a concrete platform in front of the 50 KW Transmitter "Intercooler".

Group all maintenance and cleaning equipment within easy reach.

STEPS #1 to #5:

1. Check Brush Spring Pressure.
2. Check Brush Position.
3. Check Brushes and renew any that are worn within 1/8 inch of the Metal Rivet.
4. Inspect Commutator Clamping Ring.
5. Examine Brush Holders and clean them if dirty.

These do not apply. This is an Induction Type Motor.

STEP #6: Inspect and tighten connections on motor and control.

External connections to the motor feed through a condulet fitting on the side of the motor housing.

Cover on this condulet may be removed for inspection of the connections, when it is desired to inspect or tighten them.

Connections are bolted, then wrapped with 2 layers of rubber tape, 1 layer of friction tape and then coated with insulating varnish.

Do not remove this cover to inspect connections unless erratic operation of the motor is observed.

To remove the cover, merely push a screw driver blade between the edges of the cover and fitting, then "snap" it off.

When finished, replace it over the fitting until it "snaps" into place.

STEP #7: Clean motor thoroughly, blowing out dirt from windings and wipe commutators and brushes.

Use the portable A.C. Blower and blow out all dust and dirt from around the armature, inside of the motor casing.

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ITEM 5.

This is an Induction Type Motor, which does not have any Brushes or Collector Rings.

After all dust and dirt is removed from within the motor casing, wipe off the entire outer casing with a clean dry cloth.

STEP #8: Check motor foot bolts, shield bolts, coupling, gear and journal set screws and "keepers".

Motor and Pump are manufactured as a single unit.

Use Open End Wrench of proper size tightening nuts, with steady even pull. NEVER JERK when tightening any nuts and bolts, since this adds to the strain, frequently stripping the threads or breaking off heads of bolts.

STEP #9: See that all motor covers and gear guards are in good order, in place and securely fastened.

This does not apply.

There are no motor covers or gear guards on this 480 Volt Motor Driven Pump.

STEPS #10 and #11:

10. Check Air Gap.

11. Clean out Magnetic Dust that may be hanging on Poles.

These do not apply.

See 1st Wednesday Item No. (8) Page No. (144) Step No. (-)
and 2nd Wednesday Item No. (9) Page No. (154) Step No. ( )

STEPS #12 to #16:

12. Check clearance between Shaft and Bearing of Sleeve Bearing Motors to determine if Bearings are worn.

13. Clean out Undercut Slots in Commutator.

14. Examine connections of Commutator and Armature.

15. Inspect Armature Bands.

16. Drain, Wash out and renew oil in Sleeve Bearings.

These steps do not apply to this Induction Motor.

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ITEM 5.

STEP #17: Check grease in Ball or Roller Bearings.

Remove the 2 screw plug caps with screw driver.

There is one grease opening for each bearing of this motor. Use Alemite Gun with special fitting, to push Gargoyle Type "BRB" #1 Grease down into bearing.

Fill to within 1/4 inch of the top of the casing.

Replace screw plugs.

STEP #18: Clean out and renew Grease in Ball or Roller Bearings.

See 1st Wednesday Item No. (8) Page No. ( ) Step No. ( )

and 2nd Wednesday Item No. (9) Page No. ( ) Step No. ( )

This does not apply except on Step No. ( ).

STEP #19: Test Insulation Resistance.

This does not apply unless in Emergency or authorized by Supervisor.

Procedure: See Sec. No. (E) Page No. (95).

STEP #20: Check Operating Speeds.

This does not apply.

Procedure: See Sec. No. (E) Page No. (96).

STEP #21: How to Treat a Hot Bearing.

This does not apply unless in Emergency.

Procedure: See Sec. No. (E) Page No. (100).

STEP #22: Principles of Commutators - Brush Holders - Brush Pressures - Current Collectors.

This does not apply.

STEP #23: Check that Inlet and Outlet Valves "A-1 and D-1" or "B-1 and C-1" are closed, depending upon which Pump is being worked on.

Use Open End Wrench to loosen and remove all 4 bolts holding the metal cover on the Strainer Compartment.

(Loosen bolts diagonally, loosening each bolt a trifle at a time until all 4 are ready to be removed.)

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When all bolts are removed, place screw driver under edge of cover and pry it loose, being careful not to score the rubber gasket.

Lift cover off strainer housing. Lift rubber gasket off strainer housing.

Remove strainer and inspect for dirt, sludge, grass, pieces of algae or damage.

Clean inside and outside of the removed strainer with a wire brush. Wash residue out of strainer with water in the 5 gallon pail.

Place cleaned strainer in Transfile No.

Scrape all scale from seat inside of strainer housing, also remove all water.

Remove all dirt, scale, grit or sludge from strainer housing.

Put a clean strainer in strainer housing.

Replace rubber gasket on top of strainer housing.

Replace metal cover on strainer housing with all holes lined up.

Replace bolts, tightening them diagonally, the same as they were removed, tightening each bolt a trifle at a time until all 4 are fully tight.

Open Outlet Valve "A-1 or B-1" to check strainer housing for leaks.

If strainer housing leaks, close Outlet Valve, then tighten bolts on strainer housing.

STEP #24: Clean corrosion from Pump Gland Studs with a wire brush. Place a few drops of oil on each of the Stuffing Gland adjusting Studs to delay corrosion.

Clean out Pump Drain Pipe if it is stopped up.

Merely run a piece of wire through the pipe to remove obstructions. Wipe up all water and grease from the Drip Chamber.

STEP #25: Inspect "Tel-Temp" for looseness.

To tighten, merely twist entire "Tel-Temp", wipe off celuloid face of the instrument with slightly damp cloth.

Clean frame and entire motor pump casting with Staffords Polish.

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Wipe off entire concrete platform with rag dipped in Carbon-Tet, then polish with Staffords Polish.

Sweep floor around pump platform to avoid tracking dust and dirt throughout the plant.

CAUTION: NEVER START PUMP "MO1P or MO2P" UNTIL EVERY NUT, BOLT, LOCK WASHERS ARE ACCOUNTED FOR, OR UNTIL OTHER EQUIPMENT IS REMOVED FROM THE MACHINE.

STEP #26: Test "MO1P or MO2P" as follows:

Open Inlet Valve "C-1 or D-1". Put on 480 Volt A.C. Switch "D8P or D9P".

As soon as the motor begins to rotate, open Outlut Valve "B-1 or C-1".

Observe that the Pond Water Pressure Gauge at the right of the Inter-cooler has increased 4 to 6 pounds, indicating that the newly serviced pump is pumping.

Inspect pump glands for leakage. Tighten the nuts on the stuffing gland, adjusting the studs a trifle if leaking is excessive.

It is very easy to tighten too much, which will burn up the packing in this gland.

Be sure to feel the Stuffing Gland Compression Flangs after tightening the nuts.

Wait several minutes to be sure that the packing is not getting hot.

Allow pump to run for a few moments.

Visually inspect all parts of the motor and pump while it is running.

When brief test is completed, put "off" Switch "D8P or D9P".

Carefully and only slightly tighten packing nuts on Valve Stems of Input and Output Valves "A-1 and D-1" or "B-1 and C-1".

Renew Pump Packing if unable to stop excessive water leakage from Stuffing Gland.

Procedure: See Wednesday Item No. (5) Page No. (71) Step No. (26).

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ITEM 5

(g) "Pump Room": Service and Clean Idle 50 KW Transmitter Distilled Water Pump "M03P" or "M04P".

This Motor Driven Pump is mounted on a concrete platform to the left of the Pond Water Pumps.

Group all Maintenance and Cleaning Equipment within easy reach.

STEP #1 to #5:

1. Check Brush Spring Pressure.
2. Check Brush Position.
3. Check Brushes and renew any that are worn within 1/8 inch of the Metal Rivet.
4. Inspect Commutator Clamping Ring.
5. Examine Brush Holders and clean them if dirty.

These do not apply. This is an Induction Type Motor.

STEP #6: Inspect and tighten connections on Motor and Control.

External connections to the motor feed through a Condulet Fitting on the side of the Motor Housing.

Cover on this Condulet may be removed for inspection of the Connections when it is desired to inspect or Tighten them.

Connections are Bolted, then wrapped with 2 layers of Rubber Tape, 1 layer of Friction Tape and coated with Insulating Varnish.

Do not remove the cover to inspect connections unless erratic Operation of the Motor is observed.

STEP #7: Clean the Motor thoroughly, blowing out dirt from Windings, and wipe Commutators and Brushes..

Use the Portable A.C. Blower and blow out all Dust and Dirt from around the

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Armature inside of the Motor Casing.

This is an Induction Type Motor, which does not have any Brushes or Collector Rings.

After all dust and dirt is removed from within the Motor Casing, wipe off the Entire Outer Casing with a clean dry Cloth.

STEP #8: Check Motor Foot Bolts, Shield Bolts, Coupling, Gear and Journal Set Screws and "Keepers".

Check Motor Foot Bolts for looseness.

Use open end wrench of proper size, tightening nuts with steady even pull.

NEVER JERK when tightening any nuts or bolts, since this adds to the Strain frequently stripping the threads or breaking off heads of Bolts.

Check Main Base Bolts for looseness.

Tighten these Main Base Bolts with open end wrench.

Loosen all 4 Wing Nuts holding the shield around the Coupling.

Use gas pliers to remove this shield.

Inspect the Coupling Bolts that hold Fabric Discs.

Be careful to note if there is any Fabric dust in the coupling as this will indicate loose Bolt at this point.

Use the proper open end wrenches and tighten any loose coupling nut and bolt.

Check clearance of Bolt Heads.against sides of Openings in coupling flange.

Clearance should be a Minimum of 1/8 inch.

When bolt heads touch side of opening, replace the fabric disc.

Use the A.C. Portable Blower to blow all dust out of the Coupling.

Each half of the Coupling is held rigidly in place on the Shaft by means of a "Keeper".

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Procedure in checking for loose "Keeper" is as follows:

Grasp one half of the Coupling and "Try" it back and forth.

If both "Keepers" are tight, there will be no "Play" between halves of the coupling.

"Play" may be defined as the slack between halves of the Coupling, which must be taken up, before the Motor and Generator Shafts rotate in Unison.

Since both halves of the Coupling have been tightened, any "Play" is caused by a loose "Keeper".

Merely use a hammer and flat edge punch to knock the "Keeper" in to the flat slot on Shaft and Coupling.

This will tighten the "Keeper".

Do this to "Keepers on both the Motor and Generator Ends of the Coupling as required.

Replace the Coupling Guard over the Coupling, lining up the four mounting bolts through the elongated Holes in base of the Guard.

Replace the 4 Wing Nuts on Bolts and tighten them down with Gas Pliers.

STEP #9: See that all Motor Covers, and Gear Guards are in good order, in place and securely fastened.

This does not apply.

There are no Motor Covers, Nor Gear Guards on this Distilled Water Pump or Motor.

STEPS #10 and #11:

10. Check Air Gap

11. Clean out Magnetic Dust that may be hanging on Poles.

These do not apply.

Continued on next Page.

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See 1st Wednesday Item No. (8) Page No. ( ) Step No. ( ) and
2nd Wednesday Item No. (9) Page No. ( ) Step No. ( ).

STEP #12: Check clearance between Shaft and Bearing of Sleeve Bearing Motors to determine if Bearings are worn.

Use a small Screw driver to remove Metal Cover over opening on outer end of Motor Bearing Supporting Frame.

Use Large Screw driver as a pry on end of the Motor Shaft.

Carefully pry upward to determine if there is any upward movement of Shaft.

This movement of shaft must not exceed .005 inch.

Use a Wood Bar 2" X 4" about 4 feet long as a pry under the shaft adjacent to inside motor bearing.

Carefully pry upward to determine if there is any movement of shaft.

This movement of shaft must not exceed .005 inch.

STEPS #13 to #15:

13. Clean out undercut slots of Commutator.

14. Examine Connections of Commutator and Armature Connections.

15. Inspect Armature Bands.

These Steps do not apply.

This is an induction type motor.

STEP #16: Drain, Wash out, and renew Oil in Sleeve Bearings.

This does not apply except on 1st and 2nd Wednesdays of the Month.

See Sec. No. (E) Item No. (8) Page No. (140)

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ITEM 5

STEP #17: Check Grease in Ball or Roller Bearings.

This does not apply to the Motor; its Bearings are Sleeve Type.

Both Pump Bearings are Ball Type which are greased through Alemite Fittings.

Use Alemite Gun to grease Bearings with Gargoyle Type "BRB" #1 Grease.

Squeeze Grease into Bearing until it begins to come out of the Bearing.

Wipe off the excess Grease.

STEP #18: Clean out and renew Grease in Ball or Roller Bearings.

This does not apply except on 1st Wednesday

See Item No. (5) Page No. (91) Step No. ( ) and

2nd Wednesday Item (9) Page No. ( ) Step No. ( ).

STEP #19: Test Insulation Resistance.

This does not apply.

Procedure: See Sec. No. (E) Page No. (98).

STEP #20: Check operating Speed(s).

This does not apply.

Procedure: See Sec. No. (E) Page No. (96).

STEP #21: How to treat a Hot Bearing.

This does not apply.

Procedure: See Sec. No. (E) Page No. (100).

STEP #22: Principles of Commutators - Brush Holders - Brush Pressures - Current Collectors.

This does not apply.

Procedure: See Sec. No. (E) Page No. (102).

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ITEM 5

STEP #23: Check that inlet and outlet Valves "H" and "V" or "E" and "G" are closed, depending upon which pump is being worked on.

Use open End wrench to loosen then remove all 4 Bolts holding metal cover on Strainer Compartment.

(Loosen Bolts diagonally, loosening each bolt a trifle at a time until all 4 are ready to be removed.)

(If Strainer Housing begins to leak when bolts are loosened, immediately tighten bolts and tighten input and output valves which may be improperly seated causing the leak)

When all bolts are removed place screw driver under edge of cover and pry it loose, being careful not to Score the Rubber Gasket.

Lift cover off strainer Housing.

Lift Rubber Gasket off Strainer Housing.

Remove Strainer and inspect for dirt, sludge, and scale.

Clean inside and outside of the removed strainer with a Wire Brush.

Wash residue out of Strainer with Water in the 5 Gallon Pail.

Place cleaned strainer in Transfile # 105.

Scrape all scale from seat and entire inside of Strainer Housing.

Remove all Water from Strainer Housing.

Remove all dirt, sludge and Scale from Strainer Housing.

BE CAREFUL TO REMOVE ALL LOOSE MATERIAL from inside of Strainer Housing to prevent danger of Reduced Distilled Water Pressure from causing loss of 50 KW Carrier.

Put a Clean Strainer in Strainer Housing.

Continued on next Page.

ITEM 5

Replace Rubber Gasket on top of Strainer Housing.

Replace Metal Cover on Strainer Housing with all Holes lined up.

Replace Bolts, tightening them diagonally, same as they were removed, tightening each Bolt a trifle at a time until all 4 are fully tight.

Open output Valve "J" or "G" to check Strainer Housing for leaks.

If Strainer Housing leaks, close outlet valve, then tighten Bolts on Strainer Housing.

While outlet valve is open observe Pump Packing Glands for excess leakage.

It is correct for a small amount of leakage to be present.

If leakage is a small stream, tighten nuts on Stuffing Gland Studs only a TRIFLE.

It is very easy to tighten these nuts too much, which will result in Burning Out the Packing when pump is placed in service.

Clean corrosion from pump Gland Studs with a wire Brush.

Place a few drops of oil on each of the Stuffing Gland Adjusting Studs to delay corrosion.

STEP #24: Check level of oil in Sight Cups - 3/4 full is correct.

When Motor is Idle, do not fill Oil cups to the top.

There are 2 Oil Level cups on the Motor, one on each end of the shaft.

Add oil through covered opening on top of the Bearing Housing to raise level of oil in Sight Cup to 3/4 full.

Clean out pump Drain Pipe if it stopped up.

Merely run a piece of wire through pipe to remove obstruction.

Continued on next Page.

ITEM 5

Wipe up all water and grease from Drip Chamber beneath the Pump.

STEP #25: Inspect "Tel-Temp" for looseness.

To Tighten, merely twist entire "Tel-Temp".

Wipe off Celuloid Face of the instrument with slightly Damp Cloth.

Clean Frame and entire motor pump casting with Stafford's Polish.

Wipe off entire concrete platform with rag dipped in Carbon-tet, then polish with Staffords Polish.

Sweep floor around pump platform to avoid tracking dust and dirt thruout the Plant.

CAUTION: NEVER START PUMP "MO3P" OR "MO4P" UNTIL EVERY NUT, BOLT OR LOCK WASHER IS ACCOUNTED FOR, OR UNTIL OTHER EQUIPMENT IS REMOVED FROM THE MACHINE.

STEP #26: Test "MO3P" or "MO4P" as follows.

Leave both input and output valves closed.

CAUTION: RUN PUMP FOR ONLY A FEW MINUTES during this test.

Put "ON" 480 Volt A.C. Supply Switch "D4P" or "D5P".

Quickly inspect all parts of MOTOR and Generator during this brief test.

Note that Oil Rings are revolving carrying oil to the Bearings.

When test is completed, put "OFF" Switch "D4P" or "D5P".

Never run pump "MO3P" or "MO4P" for any length of time with Input Valve Closed as this will burn out the packing and result in leaks when pump is next used.

Carefully and only slightly tighten packing nuts on Valve Stems of Input and Output Valves "H" and "J" or "E" and "G".

Reason for Overheating of these circulating pumps Motor Bearings (MO3P & MO4P).

The following may prove helpful when doing maintenance work on these Machines:

Continued on next Page.

ITEM 5

It has been found that this condition of overheating is caused by the Grooves which carry oil from center of Bearing to the ends becoming filled with thick deposits of dirt.

Remedy is to remove the head of the Motor and thoroughly wash out the bearing in Kerosene, then again wash out in Benzine or Naptha to evaporate Kerosene. Cleaning of these Bearings about twice a year will remove any Danger from this source.

The end plated on the inside end of the Motor cannot be removed for cleaning as those on the outside, due to the Flange on the Shaft being in the Way, but inside bearings do not appear to have any tendency to run warm, nor does the oil in this inside bearing get as dark as the Oil on the Outside Bearing.

CAUTION: Be sure to put Vacuoline Type "C" on the shaft before replacing the Bearing to prevent any Dry Spots.

Exercise care when replacing Bearing not to damage Oil Ring.

Be sure to put oil in oil Well when maintenance work is finished.

Use A.C. Extension Light to see that Oil Ring is revolving thus carrying oil to all parts of Bearing when Motor is tested.

Procedure to renew Pump Packing in 50 KW Distilled Water Pumps "M03P" and "M04P"; 50 KW Transmitter Pond Water Pumps "M01P" and "M02P"; 50 KW and 5 KW Distilled Water System Filler Pump "M05P"; 5 KW Distilled Water Pumps "M01P" and "M02P".

It becomes necessary to renew Pump packing when water leakage can not be stopped by tightening the nuts on the studs holding compression flange against Gland packing.

Renew Pump Packing as follows:

Continued on next Page

ITEM 5.

Pump must be out of Service.

Both Inlet and Outlet Valves Closed tight.

50 KW Transmitter Distilled Water Pumps "M03P" "M04P" and 5 KW Transmitter Distilled Water Pumps "M01P" and "M02P" each have 2 Glands.

50 KW Transmitter Pond Water Pumps "M01P" and "M02P", and Distilled Water System Filler Pump each have only one Gland.

Use open End Wrench to remove nuts from Packing Gland studs.

Pull compression Bushing away from the Gland, sliding it along the Pump Shaft.

Use a sharp pointed instrument such as a scriber or small screw driver to pull the old packing from the Gland.

This Packing consists of two complete circles, each cut to permit its being placed around the shaft.

New Packing is kept in Transfile No. 104.

Use the old removed packing as form or template to make new packing.

Cut new packing to exact size with Tin shears.

Cut off all threads and "Ravellings" with pair of diagonal pliers.

Coat each piece of new packing liberally with Graphite grease(Kept in Transfile No. 104)

Wrap packing around Pump shaft and push into Pump Gland.

Use compression flange to push first piece. Packing all way into the Gland.

If unable to push it in by hand, put nuts on studs and tighten them, then remove the nuts.

Put 2nd piece of packing into the Gland by same procedure.

Be sure that 2nd piece of packing is put into the Gland with the joint opposite to that of the 1st. piece of packing.

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ITEM 5.

This will avoid leakage.

Be sure that no ravellings or threads stick off ends of packing when inserting into the Gland.

If any "Ravellings" or threads become loosened when packing is inserted, tuck them into the Gland.

Place compression flange against the packing.

Replace nuts on studs and tighten them firmly to push packing into place.

Loosen nuts leaving them "Finger Tight".

Check pump for operation as follows:

Open the Inlet valve of the Pump (does not apply to 50 KW and 5 KW Filler Pump "MO5P") wide.

Put on the proper 480 Volt A.C. supply Motor Switch to start Pump.

Wait a few seconds, then feel the packing Gland, and compression flange with the fingers.

It is normal for Gland and compression flanges to get hot, but not hot enough for steam to form.

It steam is seen coming from the Gland, loosen the nuts on compression studs at once to allow a little water to run out of the Gland until it cools down enough to hold fingers on.

Repeat the tightening and loosening process until the Gland runs without excess heat (does not steam) and only a few drops of water per minute escape.

Operate the pump 2 or 3 minutes for this test.

CAUTION: Never tighten the compression flanges on any pump Gland without running it under observation for several minutes afterwards.

When test is completed, put "Off" 480 Volt A.C. supply switch and Close Inlet valve.

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ITEM 5.

Carefully observe Pump Glands when next placed into service.

Check (50 KW and 5 KW Distilled Water System) Filler Pump "M05P" for operation as follows:

Close 50 KW System Inlet valve "K" , and 5 KW System Inlet valve "L" (Normally is Closed)

Put "Off" 480 Volt A.C. supply switch "D10P" (Pump Room), Put "On" 480 Volt A.C. supply switch "D11P" (Measuring Equipment Room).

Proceed back to the Pump Room , open quadrangle valves "P" and "N" (Normally Open)

Close quadrangle valve "O" and "M" (Normally Closed).

Put "On" Filler Pump 480 Volt A.C. supply switch "D10P" (Pump Room).

Observe operation of pump Gland same as for other listed Pumps.

When test is completed, put "Off" switch "D11P" (Measuring Equipment Room),

Proceed back to Pump Room and put "On" switch "D10P".

Open 50 KW Transmitter Distilled Water Inlet valve "K" (Normally is open).

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ITEM 5.

(h) "Pump Room": Service and clean the Sump Pumps "M09P" and "M010P" (No. 1 and No. 2).

These Motor Driven Pumps are mounted on an iron grating over the main sump in the Pump Room.

Group all maintenance and cleaning equipment within easy reach.

STEPS #1 to #16: Procedure is the same as that listed in paragraph (f) 50 KW Transmitter Pond Water Pumps "M01P" and "M02P" Wednesday Sec. No. (E) Item No. (5) Page No. (57).

STEP #17: Check grease in Ball or Roller Bearings.

Unscrew and remove the two "Turn Down Cups", fill with Gargoyle type "BRB" #1 Grease.

Replace the "Turn Down Cups" and turn them 2 full turns clockwise. Both these Grease Cups are for the Pump moving parts.

Perform this on both motors.

Unscrew, then remove the Grease Plug located in the center of the top of each motor.

Push blade of small screw driver into opening to ascertain if grease is present.

If there is grease in the receptacle, replace the plug.

If no grease is present, use the Alemite Grease Gun with special fitting to fill grease receptacle, then replace the plug.

This is the top motor bearing.

Unscrew, then remove the Grease Plug located on the left side of the motor near the bottom.

Check and fill this grease receptacle by the same procedure as the top motor bearing.

This is the bottom motor bearing.

Wrap a rag around the blade of the screw driver, then insert it in the groove where motor shaft enters housing.

Continued on next page.

ITEM 5.

STEPS #18 to #22: Procedure is the same as that listed in paragraph (f) 50 KW Transmitter Pond Water Pumps "M01P" and "M02P" Wednesday Sec. No. (E) Item No. (5) Pages No. (57).

STEP #23: On the side of each motor housing is a switch box with push-pull type switches marked "Pull to Stop" and "Push to Start".

These switches are normally "IN".

On the wall at the right of the motor are two switches with chrome plated "Preventer" pins, to prevent accidentally shutting off the 480 volts A.C. power supply to the motors.

Under the switches are Thermal Cutout Units with two buttons, on each marked "RESET".

The Pump Motors are operated automatically by means of copper ball floats in the pit directly under the motors.

The rod which extends up from each float slides through an eye in the end of an arm projecting from the switch on each motor.

On the rod are movable stops which are set at the proper positions to automatically put on the switch when the water in the pit reaches 1/2 full.

These need no further servicing, unless adjustments have become altered.

Use the waste water funnel as a handle to remove the cover of the sump pit.

Merely lift it straight off.

Observe that both copper floats, float in the water at the same level.

If they do not, it indicates leakage of water into one ball. If neither ball floats, both are leaking.

Enter data on "50 KW M.O.L." with instructions to staff to manually turn "ON" Sump Pumps, when sump pit needs emptying.

Report these conditions to the Supervisor on a Routine Report.

Replace cover over sump pit inspection opening.

Merely push bolts through the holes, they do not have nuts to tighten.

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ITEM 5.

CAUTION: NEVER START PUMPS "MO9P" and "MOlOP" UNTIL EVERY NUT, BOLT, LOCK WASHERS ARE ACCOUNTED FOR, OR UNTIL OTHER EQUIPMENT IS REMOVED FROM THE MACHINES.

These pumps are only operated when pumping waste water out of the sump pit.

Operation of both is entirely automatic.

STEP #24: Proceed to test pumps "MO9P" and "MOlOP".

Lift float rod up until the "STOP" bushing pushes the underside of the switch arm up. This puts the motor "ON".

The motor will start, as evidenced by the slight vibration of the motor and the lowering of the water level, as shown by the gradually dropping float rod.

If the motor does not start, check the button switch marked "Push to Start".

It must be left "Pushed In". (Normally is).

Press both "Reset" buttons.

If these do not start the motors, check the 480 volt switch on the wall.

Remove the "Preventer" pins, wait two minutes, then push "ON".

Wipe off motor and shaft down to the floor with soft dry cloth. Polish motor to shaft housing with Staffords Polish.

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ITEM 5.

(i) "Pump Room": Service and clean the 50 KW and 5 KW Transmitters Distilled Water System Filler Pump "MO5P".

This Motor Driven Pump is mounted on a concrete Platform to the right of the 200 Gallon Storage Tank.

Group all Maintenance and cleaning Equipment within easy reach.

STEPS #1 to #22: Procedure is the same as that listed in Paragraph (f) 50 KW Transmitter Pond Water Pumps "MO1P" and "MO2P" Wednesday Sec. No. (E) Item No. (5) Page No. (57).

STEP #23: Clean Corrosion from Pump Gland Studs with a Wire Brush.

Place a few drops of Oil on each of the Stuffing Gland Adjusting Studs to delay Corrosion.

Wipe up all Water and Grease from the Drip Chamber.

STEP #24: Clean Frame and entire Motor Pump Casting with Stafford's Polish.

Wipe off entire Concrete Platoform with rag dipped in Carbon-tet, then polish with Stafford's Polish.

Sweep floor around Pump Platform to avoid tracking dust and dirt throughout the Plant.

CAUTION: NEVER START PUMP "MO5P" UNTIL EVERY NUT, BOLT, LOCK WASHERS ARE ACCOUNTED FOR, OR UNTIL OTHER EQUIPMENT IS REMOVED FROM THE MACHINE.

This Pump is operated only when pumping Distilled Water into or out of either the 50 KW Transmitter or 5 KW Transmitter Distilled Water System.

STEP #25: Procedure for testing Filler Pump "MO5P" is same as that

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ITEM 5.

listed in paragraph (g) 50 KW Transmitter Distilled Water Pumps "M03P" and "M04P" Wednesday Sec. No. (E) Item No. (5) Page No. (62).

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ITEM 5

(j) "Basement": Proceed to the Basement, service and clean the Ventilating Motors and Fans, "MO7P" & "MO8P".

"MO7P" is the Motor that operates the Exhaust Fan.

It is mounted on a concrete Platform behind Transfiles No. (136) to No. (189).

"MO8P" is the Motor that operates the Ventilating Fan.

It is mounted on a Concrete Platform adjacent to "Passageway to Mixing Chamber".

Group all Maintenance and Cleaning Equipment within easy reach.

Proceed to "Passageway to Mixing Chamber" and push "OFF" Red "Stop" Button Switch of Exhaust Fan Motor.

Place Handle of Exhaust fan Motor Rheostat #1 to Minimum Position (Fully Counter-Clockwise).

Put "OFF" 230 Volt A.C. Supply Switch #2.

This switch is in Wall Cabinet Box.

Wait until Exhaust Fan and Motor have come to complete stop before proceeding with Maintenance Work.

Use large Screw Driver to remove the 4 Screws holding each of 2 Covers over the 2 Brush Compartments on Motor "MO7P".

CAUTION: The Fan and Motor may Turn from action of Air in the Ducts. BE CAREFUL.

STEP #1: Check Brush Pressure.

This does not apply.

The adjustment end of the Spring Pressure Arm is always placed in the last Notch, at point of greatest Spring Tension.

New Brush Springs are kept in Transfile No. 98.

STEP #2: Check Brush Position.

This is an A.C. Motor fitted with 3 Slip Rings.

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ITEM 5

There are 2 Brushes bearing on each Slip Ring.

Correct Clearance of Brush Holder is 3/16 inch.

In testing for clearance of Brush Holder, a piece of 3/16 inch bakelite may be used as a thickness gauge.

Merely place the 3/16 inch gauge between the Brush Holder and face of the Slip Ring.

If clearance is insufficient, first loosen the locking Bolt, then move the holder away from the Slip Ring.

Place Brush Holder tightly against the 3/16 inch thickness gauge, then tighten the locking bolt.

Clearance of more than 3/16 inch will cause severe sparking between Brush and Ring.

Clearance of less than 3/16 inch might cause the Brush Holder to Strike the Slip Ring resulting in sereous damage.

Check Brush Holders on the Bracket for looseness by pulling up with fingers.

If Holders can be moved, they are loose.

If for any reason the Brush Holders become loose, the locking bolts must be tightened after adjusting Holders for 3/16 inch Clearance.

This is the only possible adjustment of Brush Holders.

The 2 Brushes on each Slip Ring are separated approximately 3 inches.

STEP #3: Check Brushes and renew any that are worn within 1/8 inch of Metal Rivet.

This does not apply.

These 6 Brushes do not have metal rivets.

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ITEM 5

Pig Tail connections are moulded right onto the Brush itself.

Brushes are placed in holders so that the rest on the Slip Ring at an angle.

As the Brushes wear away, one side will be shorter than the other.

Remove all Brush Spring curved adjustment Ends from the Notches and allow them to rest against ends of Brush Spring Arms.

(Point of least Spring Tension)

Lift the Brush Spring Arm clear of the Brush, then carefully lift the Brush out of the Holder.

Remove all of the Brushes from their holders as outlined, allowing them to be supported by the "Pig Tail" Connections.

Measure all brushes with Rule.

Renew any that measure 1/2 inch or less on its short vertical side.

Be sure that all Brushes hang free so that none will "Jam" when Armature of Motor is rotated manually.

When installing new Brushes, fit them carefully to the Slip Ring.

The "Ideal Brush Seating Stone" used for this purpose is kept in Transfile #____.

It is necessary to operate the Motors.

Be sure to replace ALL Brushes, putting Spring adjustment in the last Notch.

Proceed to put "ON" 230 Volt A.C. Switch #2 (Wall Cabinet Box)

Push Black "Start" Button Switch of Exhaust Fan Motor.

Use an insulated stick to press the new Brush hard against the Slip Rings

Brush Spring Tension is not Sufficient.

With the Machine running, hold the "Brush Seater" at the heel of the new Brush, snug against Brush Holder.

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ITEM 5

Touch the Brush Seater to the revolving surface just hard enough to free a little of the "Brush Seater" material.

Usually it is only necessary to touch the "Brush Seater" intermittently to the revolving slip ring.

A small amount of the Brush Seater material at a time will do as much work as a large amount.

Completely stop the motor when new Brushes are Seated Correctly.

Remove all Brushes.

These Brushes may also be fitted by inserting a strip of fine Sandpaper, with the Sand side up, between the Slip Rings and the Brush.

Manually rotate the armature back and forth, allowing the Brushes to bear on the Sandpaper only when the armature is moving in the correct direction (same as direction of rotation during operation).

Lift Brushes so they will not touch the Sandpaper on the Back Pull.

Sand only, until the curve of the Brushes is the same as that of the Slip Ring.

STEP #4: Inspect Commutator clamping ring.

This does not apply.

This is an A.C. Motor.

It does not have a commutator.

STEP #5: Examine Brush Holders and clean them if Dirty.

Make sure that Brush Rides freely in the Holders.

Procedure: See Wednesday Item No. (5) Sec. No. (E) Page No. (81) Step No. (5).

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ITEM 5

STEP #6: Inspect and Tighten connections on Motor and Control.

Procedure: See Wednesday Item No. (5) Sec. No. (E) Page No. (32) Step No. (6), except that this is a Motor driven Ventilating Fan. There are no Generator Connections to check.

STEP #7: Clean the Motor thoroughly, blowing out dust from Windings and wipe commutators and Brushes.

Use the Portable A.C. Blower and blow out all dust and dirt from around the Armature inside the Motor Casing.

After all dust and dirt is removed from within the Motor Casing, wipe off the entire outer Casing with a clean dry cloth.

STEP #8: Check Motor Foot Bolts, Shield Bolts, Coupling, Gear and Journal Set Screws, and "Keepers".

Check Motor Foot Bolts for looseness.

Use open end wrench of proper size, tightening any nuts or bolts with steady, even pull.

NEVER JERK when tightening any nuts or Bolts, since this adds to the strain, frequently stripping the threads or breaking off heads of Bolts.

Use Screw driver to loosen bolts, then remove top half of the Belt and Coupling Guard.

Use Allen Set Screw Wrench to tighten Setscrews on Pulleys of both Motor and Fan.

STEP #9: See that all Motor Covers, and Gear Guards are in good order, in place and securely fastened.

Wipe off all Pulleys, and belts with clean dry cloth.

Wipe off entire inside of both halfs of Belt Guard

Continued on next Page.

ITEM 5

Replace the top half of the pulley and belt guard.

Replace the Bolts and tighten them.

Check over all other bolts and nuts on bottom half of Belt Guard, tightening all that require it.

STEP #10: Check air gap.

Clearance between armature and Field Poles should be _____

When it measures less than ___ remedy is to replace the sleeve bearings.

STEP #11: Clean out Magnetic dust that may be hanging on Poles.

Wipe off all sides of Motor Field Poles, including laminations and insulation coverings with a cloth dipped in Carbon-tet.

If carbon-tet is not available, use a clean dry cloth.

STEP #12: Check clearance between shaft and bearings of sleeve bearings Motors to determine if Bearings are Worn.

Use a wood Bar 2" X4" about 4 feet long as a pry under the pulley.

Carefully pry upward to determine if there is any movement of shaft.

This movement of shaft must not exceed .005 inch.

Place the wood bar under collector rings to check other bearing.

Again carefully pry upward to determine if there is movement of the shaft.

This movement of the shaft must not exceed .005 inch.

STEP #13, 14, & 15: Clean out undercut slots in commutator.

Examine connections of commutator and armature.

Inspect armature Bands.

These Steps do not apply.

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ITEM 5

STEP #16: Drain, Wash out, and renew oil in Sleeve Bearings.

This does not apply except on 1st Wednesdays of the Month.

Procedure: See Sec. No. (E) Item No. (5) Page No. (142).

STEP #17: Check Grease in Ball or Roller Bearings.

This applies to the Fan Bearings.

Grease the Fan Bronze Bearings with regular Alemite Grease Gun.

Grease with Gargoyle Type "C" "BRB" #1 Grease.

Force grease in until very small amount appears on shaft.

Wipe off excess grease with clean cloth.

STEP #18: Clean out and renew grease in Ball and Roller Bearings.

This does not apply.

STEP #19: Test insulation Resistance.

This does not apply unless in emergency or authorized by Supervisor.

Procedure: See Sec. No. (E) Page No. (95).

STEP #20: Check operating Speed(s).

This does not apply.

Procedure: See Sec. No. (E) Page No. (96).

STEP #21: How to treat a Hot Bearing.

This does not apply.

Procedure: See Sec. No. (E) Page No. (100).

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ITEM 5

STEP #22: Principles of Commutators - Brush Holders - Brush Pressures - Current Collectors.

This does not apply.

Procedure: See Sec. No. (E) Page No. (102)

STEP #23: Wipe off Brushes and inside of Brush Holders with dry cloth.

Replace all Brushes in Proper Brush Holders.

Grasp curved adjustment end of Spring, push it away from Brush Spring Arm and place it in the last Notch (Equal to Minimum Pressure).

STEP #24: Check level of oil in Sight Cups - 3/4 Full is correct.

When Motor is idle, do not fill Oil Cups to the Top.

There are 2 Oil Level Sight Cups on the Motor, one on each end of the Shaft.

Add Oil through the covered opening on top of the Bearing Housing to raise the level of Oil in Sight Cups to 3/4 full.

STEP #25: Inspect "Tel-Temp" for looseness.

To tighten, merely twist entire "Tel-Temp".

Wipe off celluloid face of the instrument with slightly damp cloth.

Use A.C. Extension Light to inspect Motor Slip Rings.

If they appear dirty or gummy, start Motor Operating as outlined before, then clean them with a piece of #000 Sandpaper.

Leave Motor Rheostat at Minimum Position.

Check all 4 Belts for looseness.

The belts should not strike the lower belt guard.

If they do, loosen all 4 motor foot bolts, then turn clockwise the large Square Headed Bolt in middle of Motor Base Platform.

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ITEM 5

This moves the Motor further away from the Fan Pulley, thereby tightening the Belts.

Note if any of the 4 Belts are looser than the rest.

If this is so, it is generally possible to find another used belt in Transfile #99 , which is the same length as the other three.

Again stop Motor as outlined, remove top half of Belt Guard.

Then remove the longer belt and replace it with a Belt of proper size.

Replace the upper half of the Belt Guard.

Replace the Metal Covers over Brush Compartments.

Screw in the bolts and tighten them.

STEP #26: Move Rheostat Control Handle back and forth from Minimum to Maximum, then replace at Minimum (fully counter clockwise).

Note if any Roughness is felt.

Action of Rheostat should be smooth.

If it is not, open cover of the Rheostat Box and smooth the contacts with Crocus Cloth.

Wipe residue off contacts with cloth dampened in Carbon-tet.

Apply a light coat of "3 in 1" Oil or "Walscolube" to Contacts.

Replace the cover, taking care that the control lever engages the Rheostat Arm properly.

Leave the Rheostat Handle set at Minimum.

Inspect "Tel-Temp" for looseness.

To tighten, merely twist entire "Tel-Temp" clockwise.

Wipe off celluloid face of the Instrument with slightly damp cloth.

Continued on next Page.

ITEM 5

Wipe off Motor Frame, Base, Platform, Guard, and Fan Shaft with clean dry cloth.

Polish Motor Casing with Stafford's Polish.

Sweep Floor around Motor Platform to avoid tracking dust and dirt throughout the Plant.

STEP #27: Place Exhaust Fan and Motor in operation as follows:

Put "ON" 230 Volt A.C. Supply Switch #1.

Push "ON" Black "Start" Button.

Move Exhaust Fan Motor Rheostat Control Handle #2 to "Summer" or "Winter" setting depending on the Season.

Proceed to "Passageway to Mixing Chamber" and push "OFF" Red "Stop" Button Switch of Circulating Fan Motor.

Place handle of Circulating Fan Motor Rheostat #1 to minimum position (fully counter clockwise).

Put "OFF" 230 Volt A.C. Supply Switch #1.

This Switch is in Wall Cabinet Box.

Wait until Circulating Fan and Motor have come to complete stop before proceeding with Maintenance.

Use large Screwdriver to remove the 4 Screws holding each of 2 of the covers over the 2 Brush Compartments on Motor "MO8P".

STEPS #1 to #27: These are same as for Exhaust Fan Item No. (5) Sec. No. (E) Pages No. (77 to 88), except put Circulating Fan back into operation as follows:

Put "ON" 230 Volt A.C. Supply Switch #2 (Wall Cabinet Box).

Push "ON" Black "Start" Button for "Circulating" Motor.

Move Circulating Fan Motor Rheostat Handle #1 to Summer or Winter Setting,

Continued on next Page.

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depending on the Season.

The following portion of this item is to be performed once per year, preferably the 1st Wednesday in April:

These motors accumulate a large amount of dirt and debris during the year, and should be cleaned out once a year, preferably in the Spring, before the hot weather starts, since the operation takes considerable time, during which the air circulation is shut down.

This accumulation clogs the ventilating ducts of the motor, and prevents free circulation of air thru the machine, and is the chief reason for need of cleaning periodically.

To perform this operation it is necessary to completely stop Fan Motors to be worked on.

Completely remove the Belt Guards.

After the top portion is off, the lower part is removed by taking off four nuts: two at the top and the two which hold the bracket to the frame of the fan.

The four belts are then removed, and the motor pulley taken off by loosening two Woodruff screws in the pulley hub.

It can then be forced off with a Gear Puller, and the key removed from the Shaft.

Use large screwdriver to remove the 4 screws holding each of 2 covers over 2 brush compartments on the Motor.

Lift all 6 Brushes from Brush Holders as outlined.

Remember that the Oil in the Bearing Well will run out when the Head is removed.

Lay rags on floor under Bearing end.

Place metal Drip Pans on Rags to catch the oil.

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ITEM 5

The four bolts are removed from the head of the motor.

The head is set into the frame about a quarter of an inch, and is a fairly tight fit.

It may be removed by inserting a bar or chisel into one of the Ventilating openings in the back of the frame and GENTLY tapped loose with a hammer. (It is made of cast iron which breaks easily).

After the head is removed, the rotor of the motor can be taken out, and the dirt removed with a stick and rag dipped in carbon-tet, and the interior of the frame wiped out with a rag dipped in carbon-tet.

It will be found that the ventilating openings on the end nearest the Slip Rings are filled with greasy deposits.

CAUTION: There are sharp edges on these castings.

IMPORTANT: Replace the Rotor GENTLY AND CAREFULLY as not to damage Oil Rings.

The Oil Ring on the Brush end may be held up with the finger after removing the small cover on the end of the housing.

The Oil ring on the pulley end will be OK merely by turning the head upside-down when putting it on the Shaft.

Re-assemble in the reverse order.

Put fresh oil in the Pulley End.

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ITEM 5.

(k) 18. - "Clean out and Renew Grease in Ball or Roller Bearings".

CLEANING BALL BEARINGS:

Using Ballrex #1 Grease. This grease is of a very high grade for the following reasons:

1. Consisting of a higher melting point than that of vaseline, maintained over the operating temperature range.
2. Melting point preferably over 150° C.
3. Freedom from separation of oil and soap under operating and storage conditions.
4. Freedom from abrasive matter, acid and alkali.

In greasing a motor, care must be taken not to add too large a quantity of grease, or it will cause too high an operating temperature with resulting expansion and baking of grease. This is especially true of large bearings operated at low speeds.

Be sure no dirt gets into the bearing with the grease, by wiping clean the pressure gun fitting, bearing housing and relief plug.

Allow the motor to run long enough after adding grease to permit the rotating parts of the bearing to expel all excess grease from the housing. This very important step prevents over-greasing the bearings.

For other type motors using grease such as those requiring pressure gun fittings, it requires that the bearings be removed and supplied with new grease. To do this, disassemble the bearing housing and clean inside of the housing, housing plates or caps, clean with carbon-tet. Apply new grease either by hand or from tube over and between the balls. Fill 1/2 to 3/4. Do not use too much grease.

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ITEM 5.

"Clean out and renew Grease in Ball or Roller Bearings".

Carbon-tet may be used for flushing out bearings of Fans, etc., when doing so and the bearing is flushed out, fill with small amount of light lubricating oil.

Allow to churn for one or two minutes before draining off.

Then complete the job by greasing.

In fractional-horse power motors there may be no means of checking oil level, as the oil may be held in the waste packing. A good general rule is to add thirty to seventy drops of oil.

Re-oil every 1000 hours of operation.

ITEM 5.

(1) 19 - "Test Insulation Resistance."

CARE OF INSULATION OF MOTORS.

Care of Insulation goes hand in hand with Lubrication as one of the Major Features of a Motor Generator Maintenance Program.

In case the Motor is inoperative because of Water, through sweating or direct Contact, the most effective Method of drying out Motors is to pass current thru the Windings, using a voltage low enough to be safe for the Winding in its moist condition.

Thermometers should be placed on the Windings to see that they are heated uniformly.

Temperatures should not exceed 90 ^{o}C (For Class "A" Insulation).

This Method is effective on High Voltage Motors where Insulation is comparatively thick.

Heat can be supplied externally by placing Heating Units around the Machines covering with Canvas, and leaving a Vent at the Top to permit Moisture to escape.

It is also essential that there be circulation of Warm air over all the surfaces to be dried.

The Air should be allowed to escape as soon as it has absorbed moisture.

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ITEM 5

Twelve inch Fans set to Blow air across the fronts of "Glow Heaters" or others and then into the lower part of a Motor from opposite sides will produce good results.

Small Type Machines may be placed in Ovens, the same Temperature being observed.

INSULATION RESISTANCE TESTS:

During times of Heating and drying, Motors Insulation resistance measurements should be taken at intervals of four or five hours until a fairly constant Value is reached.

These Tests are a good indication of the General Condition of the Insulation and its ability to stand the Operating Values.

The Resistance should at least equal the recommended "A.I.E.E. Standard" which is:

$$\text{MEGOHMS equals } \frac{\text{Rated Voltage of the Machine}}{\text{Rating in K.V.A.}} \text{ plus } 1000 = \frac{E}{KVA+1000}$$

Insulation Resistance Tests should be made before a High Potential Test to determine whether the Insulation is ready for such a Test, and afterward to make certain that the High Potential has not injured the Insulation.

The insulation resistance of Generator Windings is measured usually with an instrument called a "MEGGER". This instrument contains a hand operated Magneto which is capable of putting out a very High Voltage.

The indicated resistance is not a function of the "MEGGER" Output Voltage, but a function of the unbalancing in the circuit due to a difference of

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resistance in the Winding of the Generator. Since this is true, it is unnecessary to turn the Magneto at a speed higher than required to give normal output.

No new Machine should have an insulation Resistance of less than 1 megohm, and the Insulation Resistance of machines in service should be checked periodically to determine possible deterioration of the Windings.

This measurement gives an indication of the condition of the insulation, particularly with regard to moisture and dirt. The actual value of resistance varies greatly in individual machines depending on the size and Voltage.

The chief value of measurement therefore is in the relative Values of resistance of the same machine taken at various times. During a dryout period, for example, the insulation resistance rises as the winding drys out although it may fall appreciably at first. When measurements are made at regular intervals, with the machine at the same temperature, as part of the Maintenance Routine, it is possible to detect an abnormal condition of the insulation and take steps to remedy it before failure occurs.

HIGH POTENTIAL TESTS:

High Potential Tests should be made after drying out or after repairs to check the Dielectric Strength of the Insulation.

New Windings should successfully stand a High Potential Test of twice the normal Voltage plus 1000.

Motors that have been in operation for sometime should be tested with this method after thorough cleaning and drying, using a voltage 150 per cent of normal Voltage applied for one minute.

ITEM 5.

(m) 20. - "Check Operating Speed (s)".

OPERATING INSTRUCTIONS FOR THE STROBOTAC

The Strobotac is a device primarily designed to provide a rapid and accurate means of measuring Speed (s) in the range from 600 RPM to 19,000 RPM.

The Strobotac has one outstanding advantage over other types of speed-measuring devices, that is, it does not require any mechanical contact with the rotating or reciprocating mechanism, hence no power is absorbed from the device undergoing measurement.

The Strobotac consists primarily of a specially designed Neon Lamp, mounted on a Parabolic Reflector, a Power Supply, and a Vacuum Tube Relaxation Oscillator for controlling the rate at which the Neon Lamp is flashed. By adjusting a calibrated dial, the frequency of the oscillator, and hence the flashing speed of the Neon Lamp can be adjusted and any value between 600 RPM and 14,000 RPM may be measured, since the Flashing Speed can be adjusted to any value between 600 and 14,000 flashes per minute.

Provision is made for Calibrating the Strobotac in terms of the A.C. Line Frequency. This method of calibration has the advantage of rendering the Oscillator self-compensating for its own drift during operation.

The Calibrated Scale comprises two ranges, one of which covers from 600 RPM to 3,600 RPM and the other from 2,400 RPM to 14,000 RPM.

To make speed measurements using the Strobotac, proceed as follows:

First, connect the Strobotac to a source of electric current at a potential of 110 Volts A.C. and turn the Power Switch on the Strobotac to the "ON" position.

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After the Neon Lamp begins to flash, allow approximately one minute for heating-up of the Oscillator. In the event that very accurate speed measurements are to be made, this heating-up period should be increased to approximately five minutes.

Hold the Strobotac in position so that the light from the Neon Lamp will illuminate the desired part of the rotating or reciprocating mechanism under observation.

Slowly adjust the calibrated dial until the moving part appears to stand still. When making adjustments for Fundamental Synchronism it is considered a good practise to begin at the high speeds, that is, the points at which several images appear, then, the highest scale reading at which a single Stationary Image appears will indicate Synchronism and is, therefore, the correct setting of the Calibrated Dial, from which the Speed in Revolutions Per Minute is directly read.

In the majority of applications the approximate speed expected of a given mechanism is known, therefore, sub-multiple effects, such as double and triple images should be disregarded.

When using the Strobotac to view rotating mechanisms such as the end of a shaft or wheel having identical spokes, a chalk mark should be made at a convenient point on the mechanism, this is to serve as a means of identification, otherwise there would be the possibility of obtaining erroneous speed readings.

With the Strobotac it is also possible to measure higher speeds, that is, speeds beyond its basic speed range. This is accomplished by the use of arithmetical ratios. For example: the Shaft of a Motor is rotating at a speed of

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36,000 RPM and two Points of Synchronism are observed, that is, two Images, one at 4,000 RPM and the other at 4,500 RPM. Now, it may be seen that the Ratio between these two speeds is 8/9, in which the first member is the ninth multiple of the fundamental and the second member is the eight multiple, therefore,if the First Point of Synchronism is multiplied by 9, the correct motor speed is obtained, that is, 36,000 RPM. The same is true if the Second Point of Synchronism is multiplied by 8.

For speeds lower than 600 RPM, a knowledge of the Arc described by two Images is necessary. For example: two Images spaced 180° apart will be representative of a speed equal to the actual speed multiplied by a factor "2", consequently, Three Images spaced 60° apart will represent the actual speed multiplied by a factor "3". The foregoing simplifies to the fact that, conversely, the Actual Motor Speed is found by Dividing the Calibrated Dial's Reading by the number of Images being observed.

If it is desired to study the motion of other parts of the mechanism, slowly rotate the Calibrated Dial until the specific region comes into view.

OPERATING INSTRUCTIONS FOR THE TACHOMETER

This instrument is a mechanical device employed in the measuring of the speed in Revolutions per Minute of motors and other rotating equipment. It consists essentially of a train of gears, the ratios of which are so proportioned, that a calibrated Dial or Scale, calibrated directly in RPM, is caused to rotate at a given sub-multiple of its main axle speed. In measuring speed, this axle,

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being equipped with a Friction Rubber Cap, is made to come in contact with the center of the axle or shaft whose speed is to be measured, this causes the gear train to rotate, which in turn casues the RPM-Calibrated Dial to rotate, thus giving a direct and final indication of the Speed, in Revolutions Per Minute.

To use this instrument, simply press the Friction Rubber Cap at the extreme end of its axle against the center of the Rotating Shaft. The Speed of the Rotating Shaft is then read Directly on the Calibrated Scale of the Tachometer - needless to say that in order to obtain the RPM, the Tachometer's Axle through its Friction Rubber Cap, must be held firmly against the center of the rotating shaft during a period of EXACTLY 60 Seconds.

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(L) 21. - "How to Treat a Hot Bearing".

All oil found in the basement containers is treated with the proper amount of Pyroil. The proportion is 2 ounces to one quart of lubricating oil. The 2 ounce measures will be found being used as drip cups under Bias Machines. In cases of persistent overheating, the oil may be treated with 5 ounces to each quart, which means adding three ounces to that already treated.

The following directions are found on the Pyroil container:

"Pyroil penetrates any oil filter, will not clog ducts or oil leads, no matter how small, goes any place oil will go. Will not "short" electrical equipment. Affords heat-proof and dilution-proof protection for main and connecting rod bearings, pins, cams, gears, lower rings and cylinder walls."

"Pyroil inhibits corrosion. Bearings and Shafts lubricated with Pyroil resist chemical attack and therefore last longer and gives better service".

On plain Babbitt Bearings, in case of overheating caused by lack of oil or any other cause, the treatment is to pour fresh oil into the top, at the same time putting a container under the bearing to catch that overflowing from the filler cup. A pint or quart slowly poured in this manner usually overcomes the trouble. Throw away the old oil. If any particles of metal appear in the old oil, call this to the attention of the Supervisor. In the case of the ball bearings on the water circulating pumps, force fresh grease into the bearing with the screw feed grease gun, or keep filling the cups and screwing them down until the grease appearing on the outside of the bearing appears clean. When doing this, remove the small metal cap from the end of the bearing so that the excess grease will escape at this point, rather than go inside the motor housing.

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ITEM 5.

"How to Treat a Hot Bearing".

This can be done only on the outside end of the motor. The inside ends have not as yet shown any signs of overheating.

Any unusual conditions such as damaged commutators, badly worn couplings, excessive vibration, etc., that are noted during maintenance, should be reported to the Supervisor. If the repairs are made, report in detail as to the exact condition and the remedy.

ITEM 5.

(o) 22. - "Principles of Commutators - Brush Holders - Brush Pressures - Current Collectors".

In discussing the current collection, we must consider such parts as commutators, slip-rings, brushes and brush-holders.

We must also remember that "The little brush always gets the blame". Sparking frequently is but a sympton of trouble in the machine other than in connection with current collection.

The purpose of the brush-holder is obviously to keep the brush in its proper position on the ring or commutator.

Thus the first consideration is to see that the holders are not loose or bent.

On slip-rings, the brush spacing is not of much importance and it is necessary only to see that the holders are firmly attached to the yoke, that they hold the brushes in the same plane as the rings and in the radial position or at the correct angle on the ring.

Where the brushes are designed to operate at a position other than radial, the correct angle is important; otherwise the reaction between the brush friction on the ring and the applied spring pressure may cause binding in the holders. (Most slip-ring brushes operate radially, although there are some exceptions to this rule.)

In the case of commutator brush-holders, the same rules should be observed as for slip-ring brushes.

In addition, it is essential that the holders are properly spaced so that the brushes will all contact the commutator on the electrical neutral.

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"Principles of Commutators - Brush Holders - Brush Pressures - Current Collectors".

This means that all brush studs must be equally spaced on the yoke and the yoke held in the proper relation to the neutral position on the commutator.

A simple method of spacing the brushes is to divide the number of commutator bars by the number of brush studs and then set the studs so that the toes of the brushes in adjacent studs will be separated by the number of bars.

A more accurate method, since commutator bars may vary slightly, is to cut a piece of paper to the exact commutator circumference, mark it accurately in equal divisions corresponding in number to the brush studs, wrap it carefully around the commutator, and then set the toes of the brushes on these marks.

At the same time, the individual brushes in each stud should be checked to be sure that they all line up on the commutator correctly; otherwise the effect is of a thicker brush, with resulting poor commutation and other difficulties.

Since brushes move freely in the holders to contact the rings or commutator properly, it is essential that the inside surfaces of the holders be free from dirt or gummy materials, worn or burned spots, or similar defects. Any roughness or dirt should be removed, as it would interfere with proper brush movement.

If holders are worn, they will permit the brushes to tip, as the result of friction against the ring or commutator. Such holders should be repaired or replaced.

Springs are a vital part of brush-holders and should be carefully checked to be sure they act freely and exert the proper pressure on the brush. The correct pressure will depend on many factors, including commutator diameter and speed, brush grade, size and angle.

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ITEM 5.

"Principles of Commutators - Brush Holders - Brush Pressures - Current Collectors".

In general, it should be expressed in pounds per square inch of brush area of contact as follows:

For Electro-Graphite Brushes	1.75 to 2.5 lbs./in.^{2}
For Graphite Brushes	1.5 to 3 lbs./in.^{2}
For Carbon-Graphite Brushes	1.75 to 2.5 lbs./in.^{2}
For Metal Brushes on Slip-ring	3 to 4 lbs./in.^{2}
For Metal Brushes on Commutators	2 to 3.5 lbs./in.^{2}
For Combination Copper-Carbon Brushes . .	3.5 to 4 lbs./in.^{2}

In the case of heavy slip-ring brushes, more spring pressure is required on the bottom brushes than on the top ones, to compensate for the weight of the brushes, which in one case works to retard the spring and in the other case to aid it in forcing the brush against the spring.

The brush is, primarily, a conductor of electricity.

Therefore, the connection between brush shunt and the holders or stud should be clean and the bright so as to insure a low resistance joint.

Brushes should be checked to be sure they move freely in the holders with no binding from any cause.

When new ones are installed they should be sanded in with a sanding stone, not emery, to fit the commutators or rings as closely as possible; in doing this the sanding stone should be moved under the brush in the same direction as the armature normally runs.

Although many operators feel that newly sanded brushes should be run in for some time at no load, or a very light load, we find some objection to this. Probably better results are more often obtained if the running in is done at something between half load and full load.

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ITEM 5.

"Principles of Commutators - Brush Holders - Brush Pressures - Current Collectors".

After brushes have become thoroughly seated, they should be examined for any copper particles that may have become embedded in their surfaces; any such particles should be picked out with a knife.

If newly sanded brushes on a raw or newly-ground commutator are found to chatter when everything is properly adjusted, it is sometimes helpful to touch the commutators with a rag slightly moistened with oil or paraffin wax and then wipe it with a dry lintless cloth.

This will leave enough lubricant to reduce the friction during the seasoning period with leaving enough to cause subsequent trouble. In considering commutators or rings, we should think in terms of mechanical perfection.

It is important that they operate in such a manner as not to cause bouncing of the brushes.

They must, therefore, be as free as possible from eccentricity, high or flat spots, roughness of any sort, or projections of mica insulation; these factors becoming more and more important as the speed increases.

Conditions are likely to be worse with commutators than with rings, since they are built up of a large number of individual copper bars separated from one another by insualtion and it is not uncommon for one or more bars to rise slightly beyond the others, due to heat strains or centrifugal force.

As little as 0.0002 inch difference in height between adjacent bars, may under certain conditions, cause severe sparking at the brushes.

Likewise, a thin film of mica, hardly visible to the eye, may project beyond the commutator surface, cause the brush to jump and result in serious trouble.

It is apparent, therefore, that small imperfections must be overcome if commutators or rings are to do their best work.

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ITEM 5.

"Principles of Commutators - Brush Holders - Brush Pressures - Current Collectors".

Assuming proper alignment, good bearings, etc., they should be ground or turned; and in doing this work, it should be done in such a way as to give a smooth, polished and concentric surface.

Commutators should be properly under-cut (though few machines are designed to operate with flush mica.)

As has been noted, brushes will sometimes vibrate or pickup copper when run on a raw commutator.

These conditions are generally only temporary, but it is important that the brushes be helped over this period, otherwise, burning and roughening of the commutator may result.

ITEMS 5 - 8 - 9

50 KW Transmitter - 20 Volt D.C. Motor Generator "MG1P" - "MG2P"

WESTERN ELECTRIC

"MG1P" - MOTOR

MODEL: 99E86G9
TYPE: KT501
FORM: BL
VOLTS: 440
PHASE: 3
CYCLES: 60
NO. : 5245503
KS : 5154
AMPS.: 24.5
H.P. : 20

"MG1P" - GENERATOR

MODEL 53 A 748
TYPE: CD 93
FORM: AL
COMPOUND WOUND
AMPS: 550
VOLTS: 24/24
SPEED: 1800
NO. : 1671098
KW : 13.2
KS : 5154

"MG2P" - MOTOR

MODEL: 99E50G2
TYPE: KT 501
FORM: BL
PHASE: 3
CYCLES: 60
AMPS. : 24
NO. : 5262394
H.P. : 20
KS : 5154

"MG2P" - GENERATOR

MODEL: 53 A 748
TYPE : CD 93
FORM: AL
COMPOUND WOUND
AMPS.: 550
VOLTS: 24/24
SPEED: 1800
NO. : 1668723
KS : 5154

ITEM 5

Motor Blower "MO6P"

MANUFACTURER:	GEN. ELECTRIC
MODEL:	5KH43AB36
TYPE:	KH
H.P.:	1/8
VOLTS:	110
CYCLES:	60
PHASE:	1
R.P.M.:	1725
TEMP. RISE:	40° C.
TIME RATING:	CONT.

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50 KW Transmitter - 300 Volt D.C. Motor Generator "MG3P" - "MG4P".

"MG3P" - MOTOR

W.E. INDUCTION MOTOR

MODEL: 403848

TYPE: KT932

CYCLES: 60

PHASE: 3

AMPS.: 3.88

VOLTS: 440

SPEED: 1730

H.P. : 30

TEMP.: 40° C.

KS : 5155

NO.: EK 1468

"MG3P" - GNERATOR

MODEL: 45 A 808

TYPE: BD 45

FORM: CL

SHUNT WOUND

AMPS.: 5.0

VOLTS: 400

SPEED: 1750

NO. : 1669442

K.W.: 2

TEMP.: 50° C.

KS : 5155

"MG4P" - MOTOR

W.E. INDUCTION MOTOR

MODEL 403848

TYPE: KT932

CYCLES: 60

PHASE: 3

AMPS.: 3.88

VOLTS: 440

SPEED: 1750

H.P. : 3

TEMP: 40° C.

NO. : EK 1462

"MG4P" - GENERATOR

MODEL: 45 A 808

TYPE: BD 45

FORM: CL

SHUNT WOUND

AMPS.: 5.0

VOLTS: 400

SPEED: 1750

NO. : 1669440

K.W. : 2

TEMP: 50° C.

KS : 5155

ITEMS 5 - 8 - 9

Pond Pumps "MO1P" - "MO2P"

Worthington Centrifugal Pumps.

	"MO1P"	"MO2P"
CURRENT:	AC	AC
UNIT SERIAL #:	874340	874339
TYPE:	PA	PA
FRAME:	9230W	9230W
STYLE:	12703	12703
CONT. TEMP.:	40° C.	40° C.
H.P. :	3	3
CYCLES:	60	60
VOLTS:	220/440	220/440
AMPS. :	7.6/3.8	7.6/3.8
RPM :	3425	3425
SER. #:	DF 4798	DF 4804

Pump
2-D-18-A

2-D-18-A

ITEMS 5 - 8 - 9

50 KW Transmitter Distilled Water Pumps "M03P" - "M04P"

	"M03P"	"M04P"
MOTOR:	W.E. INDUCTION	W.E. INDUCTION
MODEL:	69 A 162	69 A 162
TYPE :	FT 948	FT 948
PHASE:	3	3
CYCLES:	60	60
VOLTS:	440	440
AMPS :-	12.8	12.8
SPEED FL	3475	3475
NO.:	MK 1460	MK 1459
H.P. :	10	10
TEMP. CONT.	40° C.	40° C.

Pump -
Serial # 878063
1½ R1
MP 10
RPM 3510
TDH 196 FT
GPM 80

Pump
Serial # 78064
1½ R1
MP 10
RPM 3510
TDH 196 - FT
GPM 80

Note:-
"See reverse side"

ITEMS 5 - 8

SUMP PUMPS "M09P" - "M10P"
Sump

MOTORS:	"M09P"	"M10P"
MANUFACTURER:	HOWELL ELECTRIC MOTORS, MICHIGAN.	
MODEL:	17-5	17-5
SERIAL NO:	217601	217822
VOLTS:	220	220
CYCLES:	60	60
AMPS:	1.8	1.8
H.P.	1/2	1/2
R.P.M.	1725	1725
TYPE:	VBB	BBV
PHASE:	3	3
TEMP. RISE:	40° C. FL	40° C. FL

PUMPS: YEOMANS BROS. CO. PUMPING MACHINERY, CHICAGO.

NO. 17096

ITEM 5

50 & 5 KW Transmitter Distilled Water Filler Pump "MO5P"

MANUFACTURER:	WORTHINGTON
UNIT SERIAL #:	874078
CURRENT:	AC
TYPE:	PA
FRAME:	7420
STYLE:	12387
TEMP. CONT.:	40° C.
H.P.	1/2
CYCLES:	60
VOLTS:	220/440
AMPS:	1.6/0.8
RPM:	1725
PHASE:	3
SERIAL #:	DE 1274

Pump -
1½ D 2/3

ITEM 5

Ventilating System Motor and Fan "MO7P" - "MO8P"

MOTORS:	"MO7P"	"MO8P"
MANUFACTURER:	GENERAL ELECTRIC INDUCTION MOTORS	
MODEL:	5M 254 B3	5M 254 B3
VOLTS:	220/440	220/440
AMPS:	14.7/7.35	14.7/7.35
SEC. VOLTS:	77.0	77.0
SEC. AMPS:	33.1	33.1
FRAME	254	254
TYPE:	M	M
CYCLES:	60	60
PHASE:	3	3
SPEED FL:	1665	1665
NO.:	LJ2174	KJ2805
H.P.:	5	5

EXHAUST AND CIRCULATE FANS

MANUFACTURER:	AMERICAN BLOWER CORP., DETROIT MICH.
SIZE:	5
SERIES:	30
NUMBER:	92337

ITEM 6

Proceed to the Basement, clean all Tools and Equipment on the Basement Work Bench.

Straighten out Tools on Work Bench and in Drawers.

Clean Basement Work Bench with Naptha.

Polish Top of Work Bench and Linoleum Covers with Floor Wax.

(a) "Basement": Proceed to the Work Bench in the Basement and perform the following maintenance Work.

Remove all the Glass Jars of Nuts, Bolts Etc., on top Ledge of "Display Board" and dust them, with a Soft Clean Cloth.

Wipe all Dust off top Ledge of "Display Board", then replace Glase Jars of Nuts Bolts etc.

Use a Soft Clean Cloth to get this Ledge clean.

Wipe the dust and Dirt off all Equipment and tools on the Work Bench with a Clean Cloth.

If this is insufficient to clean them dampen the Cloth in Naptha.

This means the Lathe, Vise, Drill Press also.

Wipe off the "Display Board" with a Clean Dry Cloth.

Empty the Metal Scrap Container beneath the Lathe.

Wipe off all dust, dirt and metal scrap from top of the Work Bench.

Clean top of work bench with Naptha, using a small amount on a clean cloth.

Open all Drawers beneath the Work Bench, wipe off tools, then straighten them out so that the next man may use them in a hurry if needed.

Remove all loose screws, bolts, nuts, papers etc., placing them in the proper jars, drawers or Bins.

Continued on next Page.

ITEM 6

All Spools and holders for Wires and cables under the Bench should not have any loose ends hanging down.

Wipe dust and dirt off all Spools of wire and cable beneath Work Bench, using dry cloth.

Wipe off fronts of Drawers and spaces beneath the Work Bench with clean dry Cloth.

Wipe off ends of Work Bench with clean dry cloth.

As the last operation, polish top of work Bench with Floor Wax.

About a table-spoonful on a clean cloth two or three times a week is sufficient.

Apply the Wax lightly, spread evenly over entire top of Work Bench (Remove pieces of Linoleum).

Allow a few moments to dry.

When Wax is dry, polish off with clean Cloth, rubbing vigorously.

Polish pieces of Linoleum in the same manner then replace in proper places on Top of Work Bench.

It is not necessary to apply Wax every day, best way to determin this is to polish top of Work Bench with Clean soft Cloth, also the pieces of Linoleum. If they take a polish, that is appear clean and have new clean bright lustre, no Wax need be applied.

Book No. (2.1) ( ) ( ) ( ) ( ) ( )
Sec. No. (A) ( ) ( ) ( ) ( ) ( )
Page No. ( ) ( ) ( ) ( ) ( ) ( )

End Item

ITEM 7

Service and clean Gasoline Driven Lawn Mower.

This Item is performed during the Months of April to October.

When not in use the Gasoline Driven Lawn Mower is kept in the Storage Room (Garage).

(a) "Storage Room": Gather all Tools and cleaning equipment necessary for performance of this Item.

2 Gallon Can of Naptha or Benzine (Kept in the Storage Room)

2 Inch dry paint brush (Kept in the Storage Room)

Supply of Clean rags (Kept in the Storage Room)

Alemite Compression Gun (Kept in the Storage Room)

Large Screwdriver (ept on Display Board of Basement Workbench)

Samll Screwdriver (Kept on Display Board of Basement Workbench)

Pair of Gas Pliers (Kept on Display Board of Basement Workbench)

Set of open end Wrenches (Kept on Display Board of Basement Workbench)

Red Plastic Oil Can filled with Gargoyle Type "C" Oil (Kept in Maintenance Tray #2)

(b) "Storage Room": Push the Lawn Mower outdoors in the Parking Driveway. Use the large paint brush dipped freely in Gasoline to thoroughly clean entire Lawn Mower, Motor, and Handle.

This will loosen all grease and dirt.

Clean all dirt and grease from Lawn Mower with dry rag.

(c) "Parking Driveway": Proceed to test Gasoline Driven Lawn Mower. Disconnect both Motor Clutches by turning Clutch Control levers to their upward and over Center Positions.

Continued on next Page.

ITEM 7

Both Clutch levers are mounted on Lawn Mower Handle.

They are connected to the Motor Clutches by means of Long Chains.

The Left Clutch Lever (facing forward) controls operation of Cutter Blades.

The Right Clutch Lever (facing forward) controls the movement of the Lawn Mower.

This clutch is engaged when lever is placed to the Right.

Set the Throttle to 1/2 Speed.

This Throttle Control Lever is mounted on the Handle.

Turn the Gasoline Shut Off Valve to the left to allow flow of Gasoline to the Carburetor.

It is located on top of the Gasoline Tank.

Turn the "Choke" lever to the Right.

It is located on the Carburetor.

Pull the "Starting Lever" once or twice, then partially open the choke by turning it to the Left.

The Starting Lever extends out over the Right Wheel.

Pull up on the Starting Lever until the Engine begins to operate.

Re-adjust the Engine Throttle to about 1/2 Speed and allow the engine to run until the Crankcase Oil is hot.

Stop the engine by pressing the flat spring on the top of the Spark Plug until it rests on the top of the plug.

While the engine is hot, drain out the crank case oil by removing the Yellow Plug at the front of the engine and tipping the machine forward.

Continued on next Page.

ITEM 7

Remove the Blue Oil Filler Plug in Crankase.

Refill the Crank Case with any standard Brand of Engine Oil S.A.E. 20 Kept in Transfile #_____.

Fill to the level of the Blue Filler Plug Opening.

Remove the Air Cleaner from the Carburetor and wash it in a can of Gasoline or Kerosene to remove all dirt and debris.

Remove the Filter Bowl by taking off the thumb nut at the top.

Refill with Crancase Oil to point marked on outside of Filter Bowl.

Replace the Filter and tighten thumb nut securely.

Use the Alemite Grease Gun supplied with the Machine to apply grease to the following points on the Mower.

To use this gun place the nozzle over the small grease fitting found at lubrication points and work the plunger up and down until pressure is felt and a small amount of grease may be seen on the Alemite Fitting after removing the nozzle from the fitting.

Grease the driven clutch discs through the Alemite fitting in the hub of the driven disc of each clutch.

The Clutches should be closed (engaged) and not open when grease is applied.

Grease the revolving cylinder bearings thru Alemite fittings at the ends of the cylinder shaft.

Grease the Drive Shaft Bearings thru Alemite fittings near each end of the Drive Shaft.

Grease the Wheel Bearings thru Alemite Fittings in the ends of the Wheel Shaft.

Continued on next Page.

ITEM 7

Grease the Wheel Gears thru Alemite fittings on the face of the disc of each Wheel.

Grease the differential gear case thru the Alemite fitting in the side of the Case.

Grease the Clutch Spindle Ball Bearings thru Alemite fittings in each Clutch Bearing Housing.

Lubricate with Oil the Drive Chain.

Oil penetrates the joints of the chain; grease does not.

Oil the rear roller sections by tipping the machine so that one drive wheel is higher than the other and apply oil to the rear roller rod at the high ends of the roller section.

The height of the cut is regulated by the vertical position of the rear roller.

Raising the roller makes the machine cut closer.

Lowering the roller with respect to the side plates increases the height of Cut.

Tension adjustments are provided for all three drive chains so that the slack can be taken up as the drive chain stretches in service without the necessity of frequent removal of Links.

To adjust the tension of the driving chain, loosen the nuts on the four bolts through the base of the engine and motor plate.

Slide the entire motor forward or back until the correct chain tension is obtained then tighten the nuts on the four bolts.

To adjust the traction drive chain connecting the traction clutch with the differential, rotate the entire clutch bracket on the rear tie rod by means of the adjustment screws at the left hand end of the clutch bracket.

To adjust the cylinder drive chain connecting the cylinder clutch and the cylinder sprocket, move the entire clutch bracket away from or toward the revolving cylinder by adjusting the nuts on the clutch bracket U Bolts and

Continued on next Page.

ITEM 7

adjusting the two set screws projecting through the clutch bracket and bearing upon the rear tie rod.

None of the chains should be adjusted so as to run under excessive tension.

A Moderate amount of slack does no harm.

Each chain must be maintained at sufficient tension to prevent it from jumping the sprocket teeth.

It is important to keep the bed plate knife in proper contact with the cylinder knives.

The forward one of the two screws inside the side plate and at each end of the bed plate moves the bed knife away from the cylinders when the screw is turned to the right.

The rear screw advances the bed knive towards the cylinders when the screw is turned to the right.

It is usually unnecessary to loosen the bolts through the side plates at the end of the bed plate when making adjustment.

The knife adjustment should be checked after the first few periods of use and reset if necessary.

Thereafter adjustment is less frequently required.

With the clutch open the cylinder should turn freely by hand.

Do not apply excessive pressure to the adjustment screws, merely be sure that they are tight.

Unduly heavy knife contact not only consumes engine power unnecessarily, but also produces rapid wear on both the bed knife and cylinder knives.

After all cleaning, change of oil and adjustments are made or checked, tighten

Continued on next Page.

ITEM 7

all nuts, bolts and screws with wrench or screwdriver.

Apply a few drops of oil to the control levers on the handles and on the control wire which operates the gas throttle, wo that the oil will run down inside of the wire housing.

Manually place the machine on the Grass of rear yard and proceed to test the Lawn Mower by cutting a small Portion of Grass.

Start the engine and operate the controls to be sure that they all function properly and that the Grass is cut properly.

Book No. ( ) ( ) ( ) ( ) ( ) ( )

Sec. No. ( ) ( ) ( ) ( ) ( ) ( )

Page No. ( ) ( ) ( ) ( ) ( ) ( )

End of Item 7.

ITEM 8.

Renew Oil and Grease in all 50 KW Transmitter Rotating Machinery not in Service.

Make Entry on Proper Form in Book No. (6) Sec. No. (E) Pages No. (110 to 130).

20 Volt D.C. Filament Motor-Generator "MG1P" or "MG2P".

500 Volt D.C. Bias Motor-Generator "MG3P" or "MG4P".

Pond Pump "M01P" or "M02P".

Distilled Water Pump "M03P" or "M04P".

Renew Oil and Grease in Sump Pumps "M09P" and "M010P".

Renew Oil and Grease in 50 KW and 5 KW Transmitter Distilled Water System Filler Pump "M05P".

Renew Oil and Grease in Ventilating System Motors and Fans "M07P" and "M08P".

Renew Oil and Grease in 5 KW Transmitter Rotating Machinery:

14 Volt - 1600 Volt D.C. Motor-Generator "MG1P".

22 Volt D.C. Filament Motor Generator "MG2P".

250 Volt D.C. Bias Motor-Generator "MG4P".

Distilled Water Pump "M01P".

Oil or Grease is removed whether dirty or not, purely as a Safety Measure.

If any part of the Machine is removed for any reason, such as cotter pins, nuts and bolts, they must be replaced before machine is run.

Clean and service Floor washing and Waxing Machine.

Clean and service Portable Electric Hedge Cutter.

(a) "Basement": Proceed to the Basement and gather Oiling and Greasing Equipment:

1 Red Plastic Oil Can full of "Vacuoline" Grade "C" Oil treated with Pyroil Type "B" Oil. (Kept in Maintenance Tray #2)

Maintenance Tray #2 and Gargoyle Grease are kept on the "Maintenance Bench" Just to the left of the "Short Wave Shelves". 1 Can of Gargoyle Type "BRB" #1 Grease

Continued on next Page

ITEM 8

1 - 5 Gallon Can of "Vacuoline" Grade "C" Oil treated with Pyroil "B" Oil. (Kept on floor under "Maintenance Bench" in corner to left of the "Short Wave Shelves".)

1/4 Inch Open End Wrench (Kept on Display Board of Workbench.)

2 Gallon Can of Kerosene (Kept in Storage Room.)

Supply of Cleaning Cloths. (Kept in Storage Room.)

One of the Drip Pans . (Kept beneath one Bearing on "MG1P" or "MG2P", whichever Machine is to be worked on.)

(b) CAUTION: CHECK CAREFULLY WHICH 50 KW MOTOR GENERATOR OR PUMP IS IN SERVICE TO AVOID POSSIBILITY OF ATTEMPTING TO CLEAN THE MACHINE IN USE. CONSULT THE PROPER FORM FOR THE NUMBER OF THE MACHINE TO BE SERVICED.

(c) "Basement": Proceed to the Basement and renew Oil in Bearings of the Idle (50 KW Transmitter) 20 Volt D.C. Filament Motor-Generator "MG1P" or "MG2P". Group all equipment within easy reach.

There are 2 Sleeve Bearings on the Motor and 2 Sleeve Bearings on the Generator. Both Bearings on Motor and Generator are fitted with 2 Oil draining plugs, one on the Bottom and one on the side.

Bottom Plugs on "MG2P" are cemented in place and cannot be removed.

Drain the Oil thry the Side Plugs.

Place the Oil Drip pan on Concrete Platform beneath the outer Bearing on the Generator.

Use the 1/4 inch open-end wrench to remove the bottom or side Drain Plug from the Bearing.

Allow all oil in bearing to drain out into the pan and dispose of it into the Sump Pit in the Pump Room.

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ITEM 8

Replace the Drain Plug tightening it in place with 1/4 inch open-end wrench.

Lift up the Hinged Cover on top of the Bearing and pour Kerosene into it until the Sight Cup is 1/2 Full.

Sight Cup is also fitted with hinged cover.

Put "ON" 480 Volt A.C. Supply Switch "D2P" or "D3P" for a few seconds.

This will permit the machine to rotate a few times to mix the Kerosene in the Bearing and clean it.

Wait until Machine comes to a full Stop.

Remove the Drain Plug from the Bearing and allow all Kerosene to drain into the drip pan and dispose of it into the Sump Pit.

Leave Bearing Drain Plug out then pour 1/2 pint of clean fresh oil through the Bearing.

Wait until the Flushing Oil has stopped draining then replace the Drain Plug and Tighten.

Lift up the hinged cover on top of the Bearing and pour fresh Gargoyle Type "C" in until the Oil Level Sight cup is 3/4 full.

Change oil in inside Generator Bearing, inside Motor Bearing, and outside Motor Bearing by the Same Procedure.

After Oil has been changed in ALL four bearings, briefly test machine to be sure Oil Rings are functioning properly.

Merely put on 480 Volt A.C. Switch "D2P" or "D3P".

Lift Hinged cover of each Bearing and observe that Oil Rings are revolving thus carrying oil to moving Bearings.

If they are not, immediately stop Motor Generator and ascertain reason.

Oil Rings must ALWAYS REVOLVE when machine is in motion.

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ITEM 8

CAUTION: Never leave machine until All Bearings contain Oil.

Book No. (1) (1) (1) (2) (1) ( )
Sec. No. (MG) (P) (W) (C) (FV) ( )
Page No. ( ) ( ) ( ) ( ) ( ) ( )

(d) "Basement": Proceed to renew oil in Bearings of Idle (50 KW Transmitter) 300 Volt D.C. Bias Motor-Generator "MG3P" or "MG4P".

Group all equipment within easy reach.

There are 2 Sleeve Bearings on the Motor and 1 Sleeve Bearing on the Generator.

Procedure same as 1st Wednesday Item No. (8) Paragraph No. (c) Pages No. ( ) to ( ), except the following:

To Test, put "ON" 480 Volt A.C. Switch "D6P" or "D7P".

Book No. (1) (1) (1) (1) (2) ( )
Sec. No. (MG) (P) (W) (FV) (C) ( )
Page No. ( ) ( ) ( ) ( ) ( ) ( )

(e) "Pump Room": Proceed to this room and inspect Grease in Idle (50 KW Transmitter) Pond Pump "M01P" or "M02P".

It is not practicable nor necessary to change the Grease in Motors or Pond Pumps; merely keep the Bearing full of Gargoyle Type "BRB" #1 Grease.

It has been found that these motors accumulate an excess amount of Grease on the bottom of the casing and that they need cleaning out occasionally.

It is possible to clean only the bearing on the end away from the pump without dismantling the pump in order to remove the Rotor.

The following portion of this Item is to be performed once per year, preferably the 1st and 2nd Wednesdays in April.

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ITEM 8

Additional Tools necessary for this Item are:

Set of Lock Wrenches (Kept in Drawer #6 of Workbench)

2 Large Screwdrivers (Kept on Display Board of Workbench)

Coffee Can filled with Kerosene (Kept in Storage Room)

Supply of Cleaning Rags.

Use the proper Socket Wrench to loosen, then remove the Nuts from ends of long Studs on the Motor End Plate.

These long Studs hold both End Plates of Motor securely in place.

Force the thin edge of a Screwdriver into the crack between the end plate and Main Frame.

After a slight opening appears, use 2 Screwdrivers on opposite sides of End Plate to pry end plate off.

Apply pressure evenly to avoid forcing one side more than the other, which might damage the Ball Bearing.

Ball Bearing is held rigidly in place and must not be twisted.

It will be found that considerable pressure is required to remove the End Plate which is fitted very closely in the Frame and on the Ball Bearing.

The Ball Bearing will remain on the shaft and cannot be removed without the aid of a Gear Puller.

Take the Motor End Plate outdoors and Wash out all the old grease with Kerosene.

CAUTION: Observe care when washing out Bearing not to damage the thin Steel Shims inside of the Bearing Housing.

After all Grease is removed, wash the casting with Naptha or Gasoline to remove the Kerosene.

Continued on next Page

ITEM 8

Place a drip pan or empty coffee can under the other Motor Bearing.

Wash out the other Motor Bearing with Kerosene and a Rag.

Rinse out Bearing with Carbon-tet until all Kerosene is cleaned out.

Repack Ball Bearing with Grease.

While the Motor End Plate is removed, use the High Speed Electric Blower to clean all dust and dirt out of Motor Housing.

Wipe all Dust and Dirt off every internal part of the Motor possible to reach.

Replace the Motor End Plate lining it up with the Studs thru the Holes.

Exercise care not to force End Plate on unevenly.

NOTE: The Bearings are of such an accurate fit in the Housing that if the End Plate has been outdoors long enough to get much colder than the Motor, it will be necessary to heat it in the Stove Oven until it is nearly same temperature as rest of this Motor before being able to replace the End Plate.

When End Plate is fully replaced and lined up, replace all 4 nuts on the Studs and tighten them.

Use the Alemite Gun to grease both Motor Bearings.

To Test see Procedure: Wednesday Item No. (5) Paragraph No. (f) Page No. (61) Step No. (26).

CAUTION: Never leave Machine until both Bearings are properly greased.

Book No. (/) (1) (/) (/) (2) ( )
Sec. No. (MG) (P) (W) (FU) (C) ( )
Page No. ( ) ( ) ( ) ( ) ( ) ( )

(f) "Pump Room": Proceed to renew oil and grease in Bearings of the Idle (50 KW Transmitter) Distilled Water Pump "M03P" or "M04P".

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ITEM 8

Group all equipment within easy reach.

MOTOR:

Procedure same as Wednesday Item No. (8) Paragraph (c) Page No. (26) except the following: Put "ON" 480 Volt A.C. Supply Switch "D4P" or "D5P" for a few seconds to mix Kerosene and again to observe proper functioning of oil ring after oil has been renewed.

PUMP:

It is not practicable nor necessary to thoroughly clean out all grease in Pump Bearings without completely dismantling the pump.

Proceed as follows:

Remove cover from Regular Alemite Grease Gun.

Remove all grease from Gun.

Fill Grease Gun with "Vacuolin" Type "C" Oil, then replace the cover.

Force all the oil into one Pump Bearing noting that the old dirty grease will escape around the shaft.

Again fill the Alemite gun with "Vacuolin" Type "C" Oil and force all oil into other Pump Bearing.

Use Rag to wipe all old grease from outside of Bearings and Pump Shafts.

Put "ON" 480 Volt A.C. Supply Switch "D4P" or"D5P" to run Motor and Pump for 1/2 minute then put "OFF".

Fill Grease Gun with Gargoyle Type "BRB" #1 Grease.

Force Grease into both Pump Bearings unitl oil is forced out and Grease may be seen coming out of the Space around the shaft.

To Test, see procedure: Wednesday Item No. (5) Paragraph (g) Page No. (69) Step No. (26)

Continued on next Page

ITEM 8

Except the following: Open Inlet Valve "E" or "H" before running the Pump to avoid burning Pump Packing.

Run the Pump for only a few minutes then put "OFF" Switch "D4P" or "D5P" and clean all excess grease from outside of pump bearing and shaft.

Book No. (/) (/) (/) (/) (2) ( )
Sec. No. (M) (P) (W) (FV) (C) ( )
Page No. ( ) ( ) ( ) ( ) ( ) ( )

(g) "Pump Room:" Proceed to inspect Grease in Sump Pumps "M09P" (#1) and "M10P" (#2).

It is not practicable nor necessary to change grease in Motors or pumps; merely keep Bearing full of Gargoyle Type "BRB" #1 Grease.

Book No. (/) (/) (/) (2) ( ) ( )
Sec. No. (P) (W) (FV) (C) ( ) ( )
Page No. ( ) ( ) ( ) ( ) ( ) ( )

(h) Proceed to inspect Grease in 50 KW and 5 KW Transmitters Distilled Water System Filler Pump "M05P".

It is not practicable nor necessary to change grease in Motor of this Pump; merely keep the Bearings full of Gargoyle Type "BRB" #1 Grease.

Book No. (/) (/) (/) (2) ( ) ( )
Sec. No. (P) (W) (FV) (C) ( ) ( )
Page No. ( ) ( ) ( ) ( ) ( ) ( )

(i) "Basement": Proceed to Main Room in the Basement and renew Oil in Bearings of Exhaust Fan Motor "M07P" and circulating fan Motor "M08P". Renew Grease in Bearings of Exhaust Fan "M07P" and Circulating Fan "M08P".

Exhaust Fan Motor "M07P":

Group all Equipment within easy reach.

Continued on next Page

ITEM 8:

Shut down Exhaust Motor and Fan.

Procedure: Wednesday Item No. (5) Paragraph No. (j) Page No. (79)

There are 2 Sleeve Bearings on the Motor.

Renew Oil in both Motor Bearings.

Procedure same as for 20 Volt Motor-Generator "MG1P" or "MG2P".

Exhaust Fan: The Exhaust Fan has 2 Babbit Bearings each fitted with one Alemite Grease Fitting.

Motor must be operating and Fan Running at minimum speed before Grease can be renewed.

Force Grease into both Fan Bearings until old Black Grease is forced out on to the Splash Shield.

First Grease to appear will be Black and get lighter until the new Grease appears. Stop forcing new Grease in at this time.

It will take approximately 1/4 of a grease gun to renew grease in each Bearing.

Stop Fan and wipe all excess grease from Shield and Shaft.

Circulating Fan Motor and Fan "M08P": Procedure same as for Exhaust Fan "M07P", except shut down Circulating Motor and Fan.

Procedure: Wednesday Item No. (5) Paragraph No. (j) Pages No. (79) to (99).

Book No. (/) (/) (/) (2) (2) ( )
Sec. No. (P) (W) (FV) (C) (B) ( )
Page No. ( ) ( ) ( ) ( ) ( ) ( )

CAUTION: Use no Kerosene in Bearings of 5 KW Motor-Generators as Oil Capacities are very small; there is danger of diluting the Oil.

(j) "Basement": Proceed to renew Oil in Bearings of 14 Volt D.C.;1600 Volt D.C. Motor-Generator "MG1P". Jan 1st & July 1st only.

Group all Equipment within easy reach.

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ITEM 3.

There are 2 Sleeve Bearings on the Motor.

2 Sleeve Bearings on the 14 Volt Generator and 2 Sleeve Bearings on the 1600 Volt Generator.

All Bearings on the Motor and Generators are fitted with 2 drain Plugs, one on the bottom and one on the side of the Bearing Housing.

Proceed to "AC Power Panel" Unit #1 (A) of the 5 KW Transmitter and put "OFF" the 230 Volt A.C. "Power Supply" Switch "D4A".

Loosen the Wing Nuts, then remove the 2 Coupling Guards.

Place Oil Drip Pan on concrete platform beneath the Outer Bearing on the 14 Volt Generator.

Use the 1/4 inch Open-end Wrench to remove the bottom Drain Plug from the Bearing.

Allow all oil in the Bearing to drain out into the pan and dispose of it into the Sump Pit in the Pump Room.

Replace the Drain Plug, tightening it in place with 1/4 inch open-end Wrench.

Lift up the Hinged Cover on top of the Bearing and pour fresh "Vacuoline" (Gargoyle) Type "C" oil in until the Oil Level Sight Cup is 3/4 full.

Change Oil on inside 14 Volt Generator Bearing, both Bearings of 1600 Volt Generator and both Motor Bearings, by same Procedure.

After Oil has been changed in all Bearings, briefly test machine to be sure Oil Rings are functioning properly.

Proceed to "D.C. Power Panel" Unit #1 (A) of the 5 KW Transmitter and put "ON" 230 Volt A.C. "Power Supply" Switch "D4A".

Push "Master Control" "Start" Button "D3A".

Lift hinged cover of each bearing and observe that the Oil Rings are revolving, thus carrying oil to the moving bearings.

If they are not, immediately stop Motor Generator and ascertain reason.

Oil rings must always revolve when the machine is in motion.

Continued on next page.

ITEM 8.

Push "Master Control" "Stop" Button "D3A".

Put off 230 Volt A.C. "Power Supply" Switch "D4A".

Replace coupling guards and tighten wing nuts.

Wipe up oil drippings from machine and concrete platform.

CAUTION: NEVER LEAVE MACHINE UNTIL ALL BEARINGS CONTAIN OIL.

Book No. (9) (1) (1) (2) ( ) ( ).

Sec. No. (K) (W) (FU) (C) ( ) ( ).

Page No. ( ) ( ) ( ) ( ) ( ) ( ).

(k) "Basement": Proceed to renew oil in bearings of 22 Volt D.C. Motor Generator "MG2P". Jan 12th & July 12th each year.

When spare 22 Volt D.C. Motor Generator "MG3P" ~~is in regular use~~, renew oil in bearings. Jan 12th & July 12th each year.

Procedure: Wednesday Item No. (8) Paragraph No. (J)

Page No. (147).

Book No. (9) (1) (1) (2) ( ) ( ).

Sec. No. (K) (W) (FU) (C) ( ) ( ).

Page No. ( ) ( ) ( ) ( ) ( ) ( ).

(l) "Basement": Proceed to renew oil in bearings of 250 Volt D.C. Motor Generator "MG4P", Motor. Jan 12th & July 12th each year.

Procedure: Wednesday Item No. (8) Paragraph (J)

Page No. (147).

Generator: This 250 Volt D.C. Generator is fitted with oil wicks, it is not necessary to renew oil. Put small amount of oil in bearings & be sure & wipe excess from shaft & commutator.

Spare 250 Volt Motor and Generator "MG5P" is fitted with oil wicks, it is not necessary to renew oil. Do this Jan 12th & July 12th each year.

Do same for MG5P.

(m) "Pump Room": Proceed to this room and renew oil in bearings of 5 KW Transmitter Distilled Water Pump "MO1P". & spare Pump MO2P Jan 12th & July 12th each year.

Motor: "Procedure": Wednesday Item No. ( ) Paragraph (J)

Page No. (147).

Continued on next page.

ITEM 8.

Pump: It is not necessary to renew grease in these 2 Ball Bearings. Regular greasing performed ~~each Wednesday is sufficient.~~ each year is sufficient

(n) "Pump Room": Proceed to inspect oil and grease in 5 KW Transmitter spare pump "MO2P". same as for MO1P

Motor: Merely observe that bearings are oiled.

This motor is exactly like the Spare 250 Volt Motor Generator "MG5P".

Pump: It is not necessary to renew the grease in these 2 Ball Bearings. Merely observe that Grease Cups are full. same as for MO1P

Book No. (9) (/) (/) (2) ( ) ( ).

Sec. No. (F) (W) (FU) (C) ( ) ( ).

Page No. ( ) ( ) ( ) ( ) ( ) ( ).

(o) "Transmitter Room": Proceed to gather tools and cleaning equipment necessary to service Floor Washing and Waxing Machine.

Set of Socket Wrenches	(Kept in drawer #6 of Work Bench).
Pair of Gas Pliers	(Kept on display board of Work Bench).
Large and Medium Screw Drivers	(Kept on display board of Work Bench).
High Speed Electric Blower	(Kept on Maintenance Bench in Basement).
Set of Open End Wrenches	(Kept on display board of Work Bench).
Supply of Cleaning Rags	(Kept in Storage Room).
Kerosene	(" " " ").
Carbon-Tet	(" " " ").
Clean Paint Brush	(" " " ").
Red Plastic Oil Can	(Kept in Basement Maintenance Kit #2).

"Loading Platform": Take the Floor Washing and Waxing machine on the loading platform. It is kept in left rear corner of Measuring Equipment Room when not in use.

Continued on next page.

ITEM 8.

Loosen the locking adjustments on the handle and lift handle nearly vertical, then tighten locking adjustments.

Lambs wool pad will remain on the floor.

Squeeze the ends of holding springs in center of brush holder plate and lift assembly off driving shaft and turn upside down.

Lift all four scrubbing brushes off the holder plate.

They are held in place by means of flat springs.

Replace any broken springs or those that do not properly hold the brushes in place.

Clean both sides of brush holder plate with naptha.

Use Socket Wrench to loosen, then remove three machine bolts holding motor in the frame.

Remove the motor from the frame.

Use a screw driver to remove the two Brush Retainer Caps.

Remove and inspect both brushes.

Brush, spring and pigtail are a single unit.

Renew brushes when they measure 3/8 of an inch or less.

New brushes are kept in Transfile No. 95.

Wipe off brushes with a cloth dipped in Carbon-Tet.

Wrap cloth about blade of small screw driver, dip in Carbon-Tet and clean inside of both brush holders.

Use small piece of 00 Sandpaper to clean motor commutator, clean residue off with a rag dipped in Carbon-Tet.

Place motor on a board on the ground and pour about a quart of Benzine or Naptha through the motor.

Place motor on one end and allow all cleaning fluid to escape.

Use portable Electric Blower to force air through motor until all remaining cleaning fluid is evaporated.

Continued on next page.

ITEM 8.

This will prevent fire when machine is started.

Clean entire motor frame with rag and brush dipped in Naptha.

Inspect entire length of rubber covered service cord.

Remove switch plate on top of handle and tighten connections.

Place a few drops of oil on wheel bearings.

Replace the motor in the frame, lining up the mounting holes.

Replace the bolts and tighten them.

Lift up the snap cover of rear oil hole and pour about ten drops of oil into it.

Oil the frame bearings as follows:

Oil hole is marked "oil".

Use part of small screw driver to push down on the ball bearing in the "Oil" hole.

Pour about ten drops of oil into the bearing.

Squeeze the ends of the holding spring and place the Metal Brush Holder plate on end of driving shaft.

Inspect the lambs wool pad mounting block.

This is a wooden block in the center of the pad.

Tighten any loose iron cleats.

If a new wooden block is needed, make this a "Work to be Done" Item in Book No. (12) per Book No. ( ) Sec. No. ( ) Page No. ( ).

Take the Machine into the Main Transmitter Room and test it by buffing a small section of the floor.

Book No. (/) ( ) ( ) ( ) ( ) ( ).
Sec. No. NG) ( ) ( ) ( ) ( ) ( ).
Page No. ( ) ( ) ( ) ( ) ( ) ( ).

Continued on next page.

ITEM 8.

(p) "Storage Room": Proceed to the Storage Room, service and clean the Portable Electric Hedge Cutter.

This portion of the maintenance item is performed from April to November.

CAUTION: EXERCISE CARE WHEN WORKING ON THIS HEDGE CUTTER, IT IS POSSIBLE TO CUT OFF A FINGER OR DO OTHER PERSONAL DAMAGE.

Loosen, then remove the Brush Retainer Screw Caps.

Lift the brushes out of their holders.

Loosen, then partially remove the two bolts holding the motor together.

Pull the front part of the motor housing away from the rear portion. Cutter, Gear Box and Armature will separate from rear portion, containing the frame, fields and brushes.

Each mounting bolt is fitted with a sleeve and lock washer. Keep them on the bolts.

Clean commutator with 000 Sandpaper.

Clean residue from commutator with rag dipped in Carbon-Tet.

Clean brushes with rag dipped in Carbon-Tet.

Wrap small piece of cloth around blade of small screw driver and clean inside of brush holders.

Clean inside of motor housing with rag dipped in Naptha.

The motor bearings are Bronze, impregnated with oil.

Place a few drops of oil on edges of both bearings.

Put motor together, placing rear armature shaft into rear bearing.

Tighten the mounting bolts.

If brushes measure 3/8 of an inch or less, renew them.

New brushes are kept in Transfile No. 95.

Replace brushes.

Replace bakelite retainer caps.

Use screw driver to remove plug in gear box.

Fill with Gargoyle "BRB" #1 grease.

Continued on next page.

ITEM 9.

Renew oil in all 50 KW Transmitter Rotating Machinery not in sevice, if same was not renewed per Wednesday Item No. (8).

Make Entry on proper Form in Book No. (6) Sec. No. (E) Pages No. (110 to 130)

Reason for this is that the 50 KW Transmitter Rotating Machinery is switched to newly serviced set each week.

Renew oil and grease in:

20 Volt D.C. Filament Motor Generator "MG1P" or "MG2P".

300 Volt D.C. Bias Motor Generator "MG3P2 or "MG4P".

Pond Pumps "M01P".

Distilled Water Pumps "M03P" or "M04P".

Procedure: 1ST. Wednesday Item No. (8) Paragraphs (a) (b) (c) (d) (e) (f) Pages No. (139 to 146).

Book No. (1) (1) (5) (1) (1/2) (1) (2)

Sec. No. (P) (MG) (G) (W) (H) (FU) (DC)

Page No. ( ) ( ) ( ) ( ) ( ) ( ) ( )

End Item 9.

TYPE OIL FILTER USED:
ALLSTATE #4570

Maintenence of the Engine Driven Generator consists of periodic checks and tests, to keep the unit in perfect operating condition, ready for any emergency.

Storage batteries, through internal leakage even under the best of conditions, gradually lose their charge, and if allowed to remain idle over an extended period, are very apt to fail at a critical time, as well as deteriorating permanently through sulphation.

For this reason, the battery must be given a freshening charge every two or three weeks, and recharged until the electrolyte reaches its original gravity, which is in this case, 1215 to 1220. This is covered in maintenence proceedure.

The maintenance covers the care and cleanliness of the engine and generator, and it must be considered as a very important part of station operation, as although the EDG may never be needed, when it is needed, it is necessary that it be relied upon, and operate at the push of a button without having to perform maintenance on it at that time. It must be ready at any and all times.

ITEM 10 — 3RD WEDNESDAY

Inspect, Service and Test the Engine Driven Generator.

(a) "Basement": Tools and Cleaning Equipment needed for this Maintenance Work are:

Maintenance Tray #3. (Kept in Bin #3 in Spare Tube Room)

Set of Socket Wrenches Sizes $\frac{1}{4}$ to $\frac{3}{4}$ inches. (Kept in Drawer #6 of Workbench)

Set of Open End Wrenches. (Kept in Work Bench Display Board)

Gas Pliers. (Kept on Display Board of Workbench)

6 Ft. Folding Rule. (Kept ~~on Display Board of Workbench~~ work bench in garage)

Large and Small Screwdrivers. (Kept on Display Board of Workbench)

~~Bottle of Staffords Polish. (Kept on Display Board of Workbench)~~

~~Small Bottle of Bonmine. (Kept on Display Board of Workbench)~~

Supply of Clean Rags. (Kept in Drawer #2 & #3 of Workbench)

Red Plastic Oil Can with force feed. (In Maintenance Tray #2 which is kept ~~on~~ in Garage "~~Maintenance Bench" by Short Wave Equipment Shelves~~).

This Oil Can is filled with Pyroil treated Vacuoline "C" Oil.

50 Ft. A.C. Extension. ~~(Kept on Wire Rack in Basement)~~ in garage

Portable High Speed Blower. ~~(Kept on Maintenance Bench by Short Wave Shelves)~~ Steel Locker in garage

Flash Light. ~~(Kept on Display Board of Workbench)~~

Sheet of #000 Sandpaper. (Kept in Drawer #12 of Workbench)

(b) Outside Rear of Building: Proceed to the Outside Rear of the Building to the 275 Gallon Gasoline Tank located between Driveway and Basement Areaway. Note Fuel Gauge located on top of the tank.

If it registers less than three-quarters full, make entry in Book #12, WTBD Book,

Continued on Next Page.

ITEM 10 3RD WEDNESDAY

to refill tank from reserve supply.

Do Not refill Tank at this time.

Make sure that Valve "J7" is open by turning the Wheel Counter Clockwise.

It must remain open at all times except when working on the Auxiliary Tank.

Valve "J7" is located on the outlet feed pipe on left side of the Tank.

Check for Gasoline Leakage around the Valve Stem.

This will be indicated by reddish stains or drops of Gasoline.

If leakage is evident, tighten the Packing Nut at top of Valve slightly and clean stains and leakage with rag dipped in Benzine or Napth.

Cleaning leakage and Stains will permit future observation for leaks.

Adjacent to the valve is a filter bowl with a cross Handle at the top.

Turn this Handle two or three complete turns in either direction to clean Filter.

At the same time observe for stains indicating leakage of Gasoline.

Tighten screws holding top of filter, using a screw driver with moderate pressure.

Clean off stains & leakage with rag dampened with Benzine or Naptha.

Before leaving, look over entire tank, underneath, back and ends for any rust spots, leaks, etc.

If any rust is noted, make a Work Item in W.T.B.D. Book No. 12 to repaint tank where needed.

(c) "Engine Driven Generator Room": ~~Proceed to this Room and~~ Remove the Lead from the Positive Terminal of 6 Volt Storage Battery as a SAFETY MEASURE.

This will prevent another Technician from Starting the Engine during Maintenance.

(d) "Engine Driven Generator Room": ~~Proceed to the Auxiliary 15 Gallon Gas tank in this room.~~ 15 gal Auxilliary

Remove the cap from the top fitting of the Gas Tank.

This Tank is equipped with a float valve which maintains the Gasoline Tank at

Continued on next Page.

ITEM 10 3RD WEDNESDAY

approximately 7/8 Full.

Insert the wooden folding rule carefully through the opening at the top of the Tank until it strikes the bottom of the Tank.

If difficulty is experienced in reaching the bottom, move the rule slightly to the left or Right until it does go to bottom of the Tank.

Remove the rule from the tank and observe the level of gasoline indicated.

This level should be between 14 and 15 inches on the ruler.

More than 15 inches indicates a leaky float valve, and should be investigated by removing the entire top of the tank and noting if valve is leaking, or if float contains gasoline.

Less than 14 inches indicated a stoppage somewhere between main 275 Gallon Tank and Auxiliary Tank.

Before removing the float ball, if it is considered necessary, be sure to close Outlet Valve "J7" at Main Tank. in rear Areaway).

Consult Supervisor before making any adjustments inside of Auxiliary Tank.

Note any leakage at inlet and outlet of Tank.

Clean off any reddish stains which may appear around joints with a Rag dipped in Benzine or Naptha.

Cleaning Leakage Stains will permit future observations for future leaks.

(e) "Engine Driven Generator Room": Check that City Water Valve "I-7" is closed.

This Valve is located on the Brick Wall at the Engine Side of the Unit and beneath the Switch Box Assembly.

This Valve controls the flow of softened city water to the bottom of the Engine for supplimentary cooling when Engine is operated under load, and REGULATES THE AMOUNT OF Water flowing thru the radiator.

Continued on next Page.

ITEM 10 — 3RD WEDNESDAY

This valve is normally closed.

Check at this time to be sure it is closed, since leaving it open will result in dangerous pressure in the cooling system of the Engine, with the liklehood of forcing Radiator Cap loose and flooding the Basement floor when pressure is applied from the Pump Room.

(f) "Pump Room": Proceed to the Pump Room and Close Valve "C".

Valve "C" is located just inside the door to left of the Water Softener.

Make sure all other valves on the Water Softener Assembly are closed to prevent flooding the Pump Room Floor.

If the Still is not operating, or the Pond not receiving Water, open Valve "A" on the Water Softener.

This will admit city water to the Softner and pressure of approximately 100 Lbs will indicate on the gauge on side of Softener Tank.

Observe if any flow of water appears at any Point.

There should be none.

All Conditions appearing normal, fully open valve "H7".

This permits the flow of Water from the Softener to the Pipe Line which supplies Water to the Engine Radiator of the Engine Driven Generator.

With Valve "H7" open and Valve "I-7" closed, inspect the entire length of the pipe line, and all valve stems for leaks.

(g) "Engine Driven Generator Room": ~~Proceed to this Room and~~ Open the Rear Areaway Door so that the Overflow from the Engine Radiator may be observed.

Open Valve "I-7" gradually until a small stream is flowing from end of Overflow pipe into areaway drain.

Note that Cap on top of radiator is not leaking.

Observe hose connections of Engine Radiator around engine Water Pump, Cylinder

Continued on next Page.

ITEM 10

3RD WEDNESDAY

Head, Radiator, and all other points where water is used for possible leaks.

If any leaks are noted, tighten Connections.

Close Valve "I-7" and loosen radiator cap by twisting counter-clockwise to allow air to enter, so that the overflow pipe will empty.

This will prevent collapse of upper Radiator Hose Connection from suction of the Water leaving the overflow pipe.

Re-tighten the radiator cap.

Restore Valves in Pump Room to original Settings.

(h) "Engine Driven Generator Room": ~~Proceed to this Room and~~ perform the following maintenance on the Gasoline Engine:

Make sure that the Engine Speed Regulator Throttle is fully out and locked tightly.

This brass knob Throttle projects from the right side of the Radiator Shell, and is a hand control to allow slow speed of the Engine for observation, etc.

Check the Oil Level in the Engine Speed Governor..

It is located on the side of the Engine nearest the Wall.

This Governor operates the Throttle Automatically.

There is a metal tag hung on it marked "Danger, Oil Daily".

On the Front top of the Unit will be found an Oil Filler Cup with a Snap Cover.

At the rear bottom is a sight Oil Cup with a Snap Cover.

The Oil Level in the lower Cup should be 3/4 Full.

If it is less, add oil from the Red Plastic Oil can through the top filler Cup until the correct amount shows in the lower cup.

Do this slowly to allow time for the Oil to penetrate the inside of the "Governor Unit".

Continued on next Page.

ITEM 10 — 3RD WEDNESDAY

Proceed to the left side of the Gasoline Engine and remove the Bayonet type Oil Gauge which projects into the Engine Crank Case.

Wipe off the Gauge with a rgg and re-insert into the Crank Case.

Again remove gauge and note level indicated on the gauge.

It should be at the "Full" mark.

If less, add SAE 20 Oil until oil gauge indicates "Full".

SAE 20 Oil is kept in Transfile ~~#~~

Any standard grade of SAE 20 Oil may be used.

Place a few drops of oil into the cups of the Battery Generator and Starter Motor.

These oil cups are located on each end of both the Motor and Generator.

Wipe off all gasoline connections, carburetor, fuel pump with a rag dipped in Naptha or Benzine, removing any reddish stains or leakage left by escaping Gas.

Tighten all gas line connections with suitable Wrenches.

Use moderate Pressure and tighten with STEADY PULL. NEVER JERK.

Tighten the Screws holding top of Float Chamber of Carburetor with Screwdriver.

Tighten the Screws holding top of Fuel Pump with Screwdriver.

Do not use extreme force, merely make sure that they are Tight.

Note Glass sediment bowl~~s~~ at carburetor ~~and fuel pump~~.

If there is dirt in bottom of bowl~~s~~, remove ~~them~~ it and clean with rag dipped in Benzine or Naptha.

Check over all Oil Line Connections with open end wrench, tightening moderately where needed.

Wipe up all Oil Leaks under Crank Case, as indicated by spots on the Concrete Floor under the Engine.

Continued on next Page.

While the positive battery lead is still disconnected, inspect the wiring at the back of the instrument panel for loose connections, possible short circuits, etc. Use a suitable size screwdriver and check tightness of the ignition leads, starter relay leads, etc. This must be done with the battery lead off to prevent short circuits between the terminals on the back of the board. This item is important, as vibration will in time loosen the connections at this point.

ITEM 10 — 3RD WEDNESDAY

Check over the Crank Case Bolts with socket Wrenches.

These should be tight. DO NOT JERK - TIGHTEN WITH STEADY PULL.

Tighten all other Nuts, Bolts or Screws which can be reached with Wrenches or Screwdriver.

MAKE SURE THAT ALL TOOLS HAVE BEEN REMOVED FROM INSIDE ENGINE ENCLOSURE.

Then replace the Lead to the Positive Terminal of the Storage Battery and tighten same.

Put "ON" the 6 Volt "Ignition Switch".

This is a Toggle Switch mounted on the Instrument Panel just to left of "RPM" Indicator.

Press the "Starter Switch" which is located directly above the Ignition Switch on Instrument Panel.

This should start the Engine.

CAUTION: NEVER PRESS THE "STARTER SWITCH" WHILE THE ENGINE IS RUNNING, because this may result in damaging the teeth on Starter "R

The engine should start and attain full speed within 4 seconds after pressing the "Starter Switch".

The Fluorescent light fixture above the engine will attain full brilliancy within this time.

After the engine is running, observe all Water, Gasoline and Oil connections for leaks.

If leaks are noted, stop the Engine by putting"OFF" Ignition Switch, then wait until Engine has stopped before tightening to stop leaks.

It is too dangerous to work on Motor while it is running.

Continued on next Page.

ITEM 10 3RD WEDNESDAY

Aside from Personal Injury, a broken Gasoline Connection can start a Disastrous Fire through contact with a Hot Exhaust Pipe.

Also, note that the automatic Choke has opened after 4 minutes, as shown by small upright lever on Choke Unit being all the way to the rear - toward the Generator (May be moved by hand to check).

After the engine has run for five minutes, check the following:

Battery Charging Rate - - 5 to 25 Amperes

Water Temperature - - 180° Centigrade

Oil Pressure - - - - - 35 to 40 Lbs.

R. P. M. - - - - - 1200 RPM

Amps - A.C. - - - - - 0

(i) "Engine Driven Generator Room" - Generator: Note that the Rheostat on the A.C. Generator is at Minimum Resistance (Normally is Minimum), fully counter-clockwise - against the stop pin.

Observe action of Brushes on Exciter Generator, which is mounted on Top of the A.C. Generator.

Observe for Sparking, Chattering of Brushes, etc.

Ordinarily they need no attention, but if Sparking is noted, clean the Commutator with #000 Sandpaper.

Check driving belts by noting if there is any vibration or flapping of belts or any noise.

This applies to all belts on the Machine.

Look through the belt guard on the A.C. Generator to observe the Slip Rings and Brushes for Sparking.

DO NOT WORK ON THESE BRUSHES AT ANY TIME WITHOUT NOTIFYING SUPERVISOR.

Continued on next Page.

ITEM 10 3RD WEDNESDAY

If any sparking is noted, put "OFF" "Ignition Switch" and wait for Engine to fully STOP.

Remove the Belt Guard after Engine has stopped in order to reach these Brushes.

A Special Tool is being made to clean these slip rings and brushes.

(j) "Engine Driven Generator Room" - Engine: Shut off Engine by putting "OFF" "Ignition Switch".

Again disconnect Positive or Ground Lead of Battery to prevent accidental starting.

(k) "Engine Driven Generator Room" - Generator: Feel bearings of Exciter Generator and A.C. Generator for OVERHEATING.

They should be at room Temperature.

These bearings are sealed-in type and require lubrication only at long intervals.

Lubricate them only on assignment.

(l) "Engine Driven Generator Room" - Voltage Regulator: Remove cover of the Voltage Regulator, which is mounted on top of A.C. Generator.

It is held by two thumb nuts at top of cover.

Inspect the Contacts for signs of pitting.

This unit requires very little servicing.

After this regulator has been put into successful operation, nothing needs attention except the CONTACTS.

Here is what MUST be done to minimize Contact Maintenance and maintain Proper Operation of the Regulator.

Continued on next Page.

ITEM 10

Dress down the contacts with Automobile Distributor File every six weeks or oftener, depending on the hours of service and the Load on the Generator.
DO NOT REMOVE THE CONTACTS FOR FILING. Simply insert the file between the Contacts and press contacts together while filing.
File only enough to smooth off any rough spots.
Generator should be shut down, or the voltage brought to a low value by turning the knob of the Rheostat mounted on the frame of the Generator all the way to the Right. (See instruction book regarding servicing of Contacts with the Generator in Service).

Replace these contacts only when the Tungsten Contact has worn clear through to the Steel Backing.
Read Carefully the instruction book supplied with this regulator.
This book is kept in office Library.
If any abnormal conditions are noted, advise Supervisor before attempting any adjustments.
This unit normally requires servicing after the Generator has had six weeks of Continuous Operation.

(m) "Engine Driven Generator Room" - Cleaning: Use the High Speed Portable Electric Blower to clean dust from inside of A.C. Generator, 110 Volt D.C. Exciter Generator and Voltage Regulator.
Use Staffords Polish and cloth to dust off and polish top of Engine Frame, Coupling Guard, and all exposed portions of the frame.
Wipe dust and greasy deposits from the Cooling Fan, top of Engine, and all parts that can be seen and reached, using the xtension light for all operations.

Continued on next Page.

ITEM 10.

The Hydrometer reading should be approximately 1.25 per cell.

Enter reading of each cell in Chart which will be found in Book No. (6) Sec. No. (H) Page No. (31).

The correct procedure for reading the Battery Hydrometer is to compress the rubber bulb, insert nozzle into cell and release the bulb slowly until the Electrolyte is 3/4 way up the Glass Tube. Hold nozzle over opening of cell and lift the nozzle slightly above the surface of the liquid so that air may enter, thus relieving the vacuum within the Hydrometer.

This allows the Float to ride freely and indicates correct reading.

Air bubbles in the Solution changes the Specific gravity making it lighter.

Return Solution to the same cell from which it was drawn to avoid changing proportion.

Place Filler caps back after reading Specific gravity.

CAUTION: Never use the Cell Tester while caps are off Battery cells.

A Spark may cause a violent explosion within the cell.

Take the Allen Cell Tester, and press the points firmly against the terminals. of each cell in turn. For a cell in good condition, the reading is 1.8 Volts. This is "Test with Load".

Do not hold the Tester on the cell longer than is necessary to obtain readings.

Loosen the Knurled nut which is on the left side of this Tester, so that it does not touch the frame of the Tester.

Again apply the points to each cell in turn, and read the Voltage.

This is "Test without Load".

It should be 2.2 Volts for a fully charged Battery.

Enter all of these readings on Form in Book No. (6) Sec. No. (H) Page No. (31).

ITEM 10

If water is needed in Battery, as indicated by difficulty in drawing solution from cell, distilled water must be added, to bring the level to 1/8 inch above the hard rubber baffle plate on top of battery plates.

Before reading gravity after adding water it will be necessary to charge the battery to equalize the electrolyte.

After readings have been taken, clean off the top of the Battery with a slightly damp rag.

Wipe Terminals with a rag containing ordinary lubricating oil.

Discard any rags used for battery cleaning, as they will damage other equipment.

Connect the Red Positive Lead to Battery Terminal, making sure it is tightened firmly.

Put "On" "Ignition Switch".

Press "Starter Button" and after Engine has attained full speed note instrument readings, they should be the same as first reading, except the water temperature which requires a few minutes to attain 160 degrees F.

Shut down Engine.

Continued on next Page.

ITEM 10.

"A.C. Power Panel" Unit #1 (A): ~~Proceed to this Unit of 5 KW Auxiliary~~ 5 KW Complimentary Transmitter.

~~Transmitter.~~

On either side of the Filament Hour Meter, "M2A", on "A.C. Power Panel".

One marked "Ignition Switch", the other marked "Starter Switch".

Put "ON" the "Ignition Switch", then press "Starter Switch", momentarily to right.

The Engine should Start and attain full speed within 4 seconds, as indicated by the pilot light over the switch attaining full brilliance within that time.

Stop the Engine by putting "Ignition Switch" to "OFF" Position.

If it is necessary to Charge the Battery, a coil of twin #14 wire will be found on the Wire Rack in the Basement, tagged for charging "E.D.G. Battery". One one end is a heavy duty 2 prong plug with a Plus mark on one side.

On the other end are two battery clips - one with a Plus mark.

Take the roll of wire to the "Storage Room" (Garage), and put the plug in No. 1 Charger Receptacle on left side of battery table, with Plus mark on Red side of Receptacle. Put the other end of the coil through the Areaway grating into the Basement Areeway.

Continued on next Page

ITEM 10.

~~Proceed to~~ "Engine Driven Generator Room" ~~and~~ disconnect both ~~the Ground~~ or Positive Lead from the Storage Battery.

Put Battery Clips on the Battery Terminals, as marked.

Plus and Minus, being sure that neither of the clips touches the metal frame of the Engine to avoid short circuiting Charger.

Proceed to the "Storage Room" and turn "ON" Charger No.1 mounted on the wall over end of battery table.

This Charger has two knobs marked "Line" and "Coarse".

Turn the knob marked "Line" all the way Counter-Clockwise (Normally in this position).

Turn knob marked "Coarse" to # 3 on the dial. Within a few minutes the Charger will operate, and show between 5 and 7 Amperes on the Meter.

If the Meter should go hard over and the Charger shows signs of overload, the leads are not connected correctly to the battery, or the plug is reversed in the Receptacle.

Shut "OFF" the Charger and investigate at once.

(Merely reverse leads).

Continued on next Page.

ITEM 10.

It will require from 12 to 50 hours to fully charge the battery, depending on the condition of battery at the start.

Check at 8 or 10 hours intervals with the hydrometer until each cell reads 1.225 ~~or better.~~

Enter on 50 KW M.O.L. when placed on Charge, when inspected, and when taken off Charge.

Testing of Engine under load will be done on regular schedule as found in Book No. ( ) Sec. No. ( ) Page No. ( ) or on Special assignment by Supervisor.

Book No. ( ) ( ) ( ) ( ) ( ) ( ) (
Sec. No. ( ) ( ) ( ) ( ) ( ) ( )
Page No. ( ) ( ) ( ) ( ) ( ) ( )

End Item 10

Note: When charging the battery of the EDG from an outside source, both battery leads must be dis-connected, as the Tungar chargers are hot to ground. If only the ground lead of the battery is off, pushing the start button of the engine will burn out the 6 volt pilot lights, and also damage the ignition coil, as 110 volts will attempt to get through them to ground. Disconnect both leads for safety.

ITEM 10

TROUBLES - POSSIBLE CAUSES

ENGINE HARD TO START:

1. BATTERY

(a) Battery not fully charged.

(b) Loose battery terminals.

(c) Solution low.

2. MAGNETO:

(a) Worn brushes.

(b) Oil or water soaked.

(c) Coil damaged.

(d) Brushes sticking.

(e) Magnets weak.

(f) Condenser faulty.

(g) Points worn or pitted.

3. DISTRIBUTOR:

(a) Points worn or pitted.

(b) Points sticking.

(c) Oil or water soaked.

(d) Distributor cap shorted.

(e) Condenser faulty.

4. FUEL SYSTEM:

(a) No fuel in tank.

(b) Fuel flow obstructed.

(c) Air vent in fuel tank filler cap clogged.

(d) Fuel pump filter clogged.

Continued on next Page.

TROUBLES - POSSIBLE CAUSES.

FUEL SYSTEM: (Cont'd)

(e) Too much fuel. Carburetor flooded.

(f) Water in fuel supply.

(g) Improper fuel mixture.

5. MISCELLANEOUS:

(a) Loose or defective wiring.

(b) Spark plugs cracked or shorted by external dirt.

(c) Spark plugs fouled.

(d) Cables connected to wrong plugs or coated with paint.

(e) Throttle or governor valves loose on shafts.

(f) Intake manifold or gaskets leaking.

(g) Valves not seating.

(h) Improper timing of ignition or valves, improper tappet clearance.

(i) Muffler clogged.

EXCESSIVE SMOKE FROM EXHAUST:

1. Too much oil in crankcase.

2. Carburetor needle valve open too far.

3. Carburetor float sticking or leaking.

4. Lubricating oil too thin to seal piston rings.

5. Worn bearings, rings, cylinders and valve guides.

EXPLOSION IN MUFFLER:

1. Spark retarded.

2. Weak spark.

Continued on next Page.

TROUBLES - POSSIBLE CAUSES.

EXPLOSION IN MUFFLER: (Cont'd)

3. Valves not seating or out of time.

4. Exhaust valves warped.

5. Missing on one or more cylinders.

ENGINE OVERHEATING:

1. Lack of water.

2. Fan belt slipping.

3. Water hose obstructed.

4. Water hose collapsing.

5. Carburetor choke control partially pulled out.

6. Improper fuel mixture.

7. Radiator clogged.

8. Cylinders limed.

9. Improper ignition timing.

10. Valves leaking.

11. Oil badly diluted.

12. Lack of oil.

ENGINE LACKS POWER:

1. Valves warped or sticking.

2. Valve seats worn.

3. Cylinders or pistons badly worn or scored.

4. Piston rings weak or worn.

5. Piston rings sticking.

Continued on next Page.

ITEM 10

TROUBLE - POSSIBLE CAUSES.

ENGINE LACKS POWER: (Cont'd)

6. Improper fuel mixture.

7. Improper timing of ignition or valves.

8. Muffler clogged.

9. Governor or throttle levers loose on shafts.

10. Oil badly diluted.

11. Air cleaner requires cleaning.

12. Fuel not suited to engine.

ENGINE KNOCKS:

1. Excessive carbon deposits in combustion chambers.

2. Loose main bearing.

3. Loose connecting rod bearing.

4. Valve tappet clearances too great.

5. Valves not free in guides.

6. Worn pistons, piston pins or cylinders.

7. Engine overheated.

8. Tight pistons or pins.

9. Loose flywheel

10. Lack of oil or water.

11. Worn timing gears.

12. Spark advanced too much.

13. Fuel not suited to engine. Octane rating too low.

Continued on next Page.

TROUBLES - POSSIBLE CAUSES.

ENGINE MISSING:

1. Spark plugs fouled.
2. Spark plugs cracked or shorted by external dirt.
3. Improper spark plug gap.
4. Defective wiring.
5. Ignition breaker points sticking.
6. Improper breaker point gap.
7. Faulty condenser.
8. Cylinder head gasket leaking.
9. Intake manifold or gaskets leaking.
10. Valves warped or broken.
11. Valves or tappets sticking.
12. Valve tappets improperly adjusted.
13. Valve springs weak or broken.
14. Dirt or water in fuel system.

EXPLOSION IN CARBURETOR OR INTAKE MANIFOLD:

1. Fuel mixture too lean.
2. Valves or tappets sticking.
3. Intake valve springs weak or broken.
4. Intake valves warped or broken.
5. Intake tappets set too close.
6. Incorrect timing of ignition or valves.
7. Intake manifold or gaskets leaking.

Continued on next Page.

ITEM 10.

TROUBLES - POSSIBLE CAUSES.

EXPLOSION IN CARBURETOR OR INTAKE MANIFOLD: (Cont'd)

8. Cylinder head gasket leaking.

POOR COMPRESSION:

1. Valves not seating.
2. Valves or tappets sticking.
3. Valve tappets set too close.
4. Valves incorrectly timed.
5. Weak valve springs.
6. Piston rings sticking, weak or worn.
7. Loose or cracked spark plugs.
8. Cylinder head gasket leaking.
9. Oil too thin to seal piston rings.
10. Scored or worn pistons or cylinders.

FAULTY CARBURETION:

TROUBLES - POSSIBLE CAUSES.

MOTOR STALLS OR RUNS IMPROPERLY:

1. Gasoline tanks empty.
2. Leaks in tubing connections
3. Split or broken tubing.
4. Plugged tubing.
5. Bent or kinked tubing.
6. Air lock in fuel pump.
7. Valve plug loose.
8. Dirty valves.
9. Carburetor floods.
10. Carburetor without gas.
11. Warped or worn valves.
12. Clogged screen.
13. Worn or torn diaphragm.
14. Twisted or distorted diaphragm.
15. Broken or worn rocker arm, spring, link or pin.

FUEL PUMP LEAKS GASOLINE:

1. Loose tube connections.
2. Loose cover screws.
3. Worn pull rod gasket permits gasoline to leak through vent hole in body.
4. Fractured fuel pump body or top cover.

ITEM 10.

TROUBLES - POSSIBLE CAUSES.

INSPECTION OF FUEL PUMP WHILE ON ENGINE:

PROCEDURE:

1. Fuel pump is inspected for leaks and for improper functioning while installed on engine.

Inspection for leaks is visual.

Leaks are most likely to occur around top cover screws.

2. Inspect glass bowl for water bubbles or sediment.

Impurities settle and are therefore visible at bottom of glass bowl.

Remove bowl and inspect screen for dirt clogged mesh.

3. Disconnect fuel pump to carburetor tubing.

Crank engine with starting motor or with hand crank.

If pump is functioning properly, gasoline will spurt from pump.

4. Connect pressure gauge in line between pump and carburetor.

Run engine at idling speed and check output pressure, which will range between 5 and 6 pounds if pump is operating properly.

If too high, place additional gasket between pump body and crankcase.

TROUBLES - POSSIBLE CAUSES

LOW GENERATOR OUTPUT:

(a) Fully charged battery.

(b) High resistance in battery.

(c) High resistance wiring.

(d) Dirty commutator.

(e) Worn brushes.

(f) Regulator setting incorrect.

NO OR UNSTEADY GENERATOR OUTPUT:

(a) Dirty commutator.

(b) Worn brushes.

(c) Shorted or grounded circuit.

(d) Loose or open connection.

(e) Regulator inoperative.

HIGH GENERATOR OUTPUT:

(a) High resistance wiring.

(b) Low battery.

(c) Overheated battery.

(d) Shorted or grounded field circuit.

(e) Regulator inoperative.

NOISY GENERATOR:

(a) Loose mounting.

(b) Worn armature.

Continued on next Page

TROUBLE - POSSIBLE CAUSES

NOISY GENERATOR: (Continued)

(c) Worn bearings.

(d) Worn commutator.

NO SPARK AT SPARK PLUGS:

(a) Faulty primary circuit.

(b) Faulty secondary circuit.

STARTING MOTOR DOES NOT OPERATE:

(a) Discharged battery.

(b) Open circuit.

(c) Inoperative Switch.

(d) Worn brushes.

(e) Dirty commutator.

(f) Grounded circuit.

(g) Loose connections.

(h) Bendix inoperative.

STARTING MOTOR TURNS TOO SLOW:

(a) Discharged battery.

(b) High resistance connections.

(c) Worn Brushes.

(d) Dirty commutator.

(e) Loose connections.

(f) Worn bearings.

(g) Misalined bearings.

(h) Engine oil too heavy.

VOLTAGE REGULATOR

DESCRIPTION AND CONSTRUCTION:

(a) The voltage regulator unit is a combination circuit breaker, current limiting regulator, and voltage regulator. These three units are mounted on the same base, but each performs a separate and distinct function.

(b) The circuit breaker acts as an automatic switch between the generator and battery. When the generator is running fast enough to charge the battery, the circuit breaker closes and connects the generator to the battery. When the generator stops, the reverse current caused by the battery discharging through the generator causes the circuit breaker to open and disconnect the generator and battery, thus preventing further discharge.

(c) The voltage regulator unit is designed to limit the voltage of the charging system to a predetermined value that has been found to be the most efficient for the electrical apparatus on the truck. It consists of an electromagnet and a set of contacts. The opening and closing of these contact poihts alternately inserts and removes a resistance in the generator field circuit, and controls the voltage output in conjunction with the current output controlled by the current regulator. This unit is set to permit the battery to maintain a state of charge necessary for the operation of the electrical equipment.

TESTS OF INSTALLED VOLTAGE REGULATOR:

(a) EQUIPMENT:

1 - Ammeter, 0 to 20 or 50 scale, with 1-ampere scale division.

2 - Carbon Tetrachloride.

3 - File, No. 6 American Swiss cut contact.

Continued on next Page

VOLTAGE REGULATOR

TESTS OF INSTALLED VOLTAGE REGULATOR: (Continued)

(a) EQUIPMENT:

4 - Gage, feeler, 0.015 in.

5 - Pliers, long-nosed.

6 - Tape, manila.

7 - Thermometer.

8 - Tool, spring tension adjusting, ST-283.

9 - Voltmeter, 0 to 20 scale, with 1-volt scale divisions.

(b) PROCEDURE:

(1) INSPECTIONS. Before any work is done on the voltage regulator, the following check must be made, and any difficulties found corrected:

(a) Are wires from the generator to the regulator properly connected?

(b) Does generator perform without the regulator in the circuit?

(c) Are the proper generator and regulator units being used? Part numbers are found on the name plates of the units.

(d) Is battery properly charged? Battery condition affects voltage regulator operation. If the battery is in a discharged condtion, substitute a fully charged battery of the same type and capacity before testing the voltage regulator.

(e) Are there any high resistance connections in the charging circuit? The connections must be inspected for poorly soldered terminals, and loose or corroded connections.

(f) If there any voltage drop? The drop in voltage should be measured between

Continued on next Page

VOLTAGE REGULATOR

(b) PROCEDURE: (Continued)

the following points and the high resistance eliminated if the readings are in excess of the values noted. These tests are made while the generator is charging 10 amperes.

Generator "A" terminal to regulator "A" terminal - 0.1 volt maximum.

Generator "F" terminal to regulator "F" terminal - 0.05 volt maximum.

Battery terminal to regulator "B" terminal - 0.1 volt maximum.

Battery ground post to regulator base - 0.03 volt maximum.

Generator frame to regulator base - 0.03 volt maximum.

(2) TEST CIRCUIT BREAKER:

(a) Disconnect the wire from the regulator "B" terminal. Connect one ammeter lead to the regulator "B" terminal and the other ammeter lead to the lead removed from this terminal. Connect one voltmeter lead to the regulator "A" terminal and the other voltmeter lead to the regulator base.

(b) The thermometer should be placed so that its bulb is approximately 2 inches from the side of the voltage regulator. It must not touch the voltage regulator. Remove the voltage regulator cover by taking out the screws and breaking the seal. Disconnect the lead from the regulator "F" terminal, and insert a variable resistance (3 amp 50 ohm capacity) between the lead and the regulator terminal. Run the generator at 1,000 revolutions per minute. Insert all the resistance in the field circuit; then slowly reduce the resistance, noting the voltage reading

Continued on next Page

VOLTAGE REGULATOR

(2) TEST CIRCUIT BREAKER: (Continued)

just before the change caused by the closing of the circuit breaker. This reading should be 13.0 to 13.75 volts. Next, set the charging rate to 8 or 9 amperes and reduce the charging rate by inserting resistance in the field circuit. Note the voltage just before the change caused by the spring of the cricuit breaker. This reading should be 8.2 to 9.3 volts.

(c) To adjust the closing voltage; bend the lower spring hanger. Increasing the spring tension increases the voltage at which the contacts close, while decreasing the tension lowers the closing voltage. To adjust the opening voltage raise or lower the stationary contact by expanding or contracting the contact bracket. Keep the contacts perfectly alined. Increasing the contact gap increases the voltage at which the contacts open, while decreasing the gap lowers the voltage. Do not adjust the brakcet so that the contact gap with the contacts open is less then 0.015 inch minimum.

(d) If the voltage will not build up, check the generator field circuit by grounding the regulator "F" terminal to the regulator base while operating at idling speed. Increase the generator speed slowly, noting whether the voltage rises. Be careful not to operate at too high a speed as there is no control of the output when operating in this manner and the generator fields may be burned. Do not allow the voltage to increase beyond 16 volts, and do not operate in this manner for any length of time. If the voltage builds up, it indicates an open field circuit in the regulator.

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VOLTAGE REGULATOR

(2) TEST CIRCUIT BREAKER: (Continued)

If the voltage will not build up, it indicates a grounded or open armature circuit or an open field circuit in either the generator or wiring harness. If the voltage regulator is at fault it should be removed and checked thoroughly.

(3) TEST VOLTAGE REGULATOR:

(a) After the circuit breaker has been checked and adjusted, replace the regulator cover and change the voltmeter lead from the regulator "A" terminal to the regulator "B" terminal. Remove the variable resistance from the field circuit. Start the engine and run the generator at a speed of approximately 2,500 revolutions per minute (equivalent to engine speed for 28 miles per hour). Operate at 8 to 9 amperes output for 15 minutes with the truck hood up. Adjust the output by turning on light or accessories so as to keep the unit operating at 8 to 9 amperes. After the units have been thoroughly warmed, read the thermometer; then stop the engine. Restart the engine and bring the speed up to the above figure and adjust the output by turning the lights on or off as needed to obtain the 8 to 9 amperes output. Read the voltmeter which should be within the limits tabulated below for the temperature as read at the time of testing.

Temperature F	50	60	70	80	90	100	110	120
Volts	14.59	14.54	14.50	14.46	14.42	14.37	14.33	14.29
Allowable variation plus or minus 0.30 volts								

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VOLTAGE REGULATOR

(3) TEST VOLTAGE REGULATOR: (Continued)

(b) To adjust the voltage regulator operation, bend the lower spring hanger to change the spring tension. Increasing the tension increases the voltage at which the unit operates, while decreasing the tension decreases the operating voltage. After each adjustment replace the cover; then take a flash reading by stopping the engine, then restarting. Bring the engine quickly up to the operating speed and adjust the current (2,500 generator revolutions per minute, 8 to 9 amperes) before reading the voltmeter.

(c) Stop the engine and use the starting motor with the ignition turned off for 10 to 15 seconds; then restart the engine and operate it at a speed equivalent to 25 to 30 miles per hour. Read the ammeter which should show a charging rate of 16.0 to 18.0 amperes.

(4) ADJUST CURRENT REGULATOR:

(a) Adjustment of the current regulator armature spring tension is accomplished by bending the lower spring hanger. Increasing the tension increases the amperage at which the unit operates, while decreasing the tension lowers the operating amperage. After each adjustment, replace the regulator cover. Take a flash reading by stopping the engine and noting the amperage output immediately after restarting.

(b) If the meter readings are unsteady during the above tests on the voltage and current regulator, it is an indication of burned or dirty

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VOLTAGE REGULATOR

(4) ADJUST CURRENT REGULATOR: (Continued)

contacts. If necessary, clean the contacts with a very fine contact file (No. 6 American Swiss Cut file), filing lengthwise and parallel to the regulator armature. After filing, clean the contacts by drawing a strip of clean manila tape, wet with CARBON TETRACHLORIDE, between the contacts. Repeat with dry tape to remove any residue. After filing or cleaning the contacts, check the operating voltage and amperage of the unit as previously described.

VOLTAGE REGULATOR REMOVAL:

(a) EQUIPMENT:

Screwdriver, 1/4 inch.

Tape, friction.

(b) REMOVE VOLTAGE REGULATOR:

Remove terminal screw from "B" terminal of regulator. Wrap tape around the battery lead terminal to prevent its touching any part of the truck or engine which would cause a direct short circuit of the battery. Remove the leads from the other terminals and then take out the mounting screws. The regulator can then be taken to the bench for repair.

VOLTAGE REGULATOR INSPECTION (AFTER REMOVAL):

(a) EQUIPMENT:

Battery, 12-volt.

Copper, soldering.

Glass, magnifying.

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VOLTAGE REGULATOR

VOLTAGE REGULATOR INSPECTION (AFTER REMOVAL): (Continued)

Ohmmeter.

Probe, test.

Screwdriver.

(b) PROCEDURE:

(1) Voltage Regulator.

(a) Use a magnifying glass, and inspect for evidence of burning or abnormal high temperature at the coil, contacts, insulation, external terminals or any other point.

(b) Inspect for loose connections which result from poor soldering.

(c) Inspect for loose nuts on the bottom of the 3 magnet cores, loose rivets or screws. All nuts and screws must have lock washers.

(d) Inspect for loose contact points.

(e) Inspect for misalinement of contact points.

(f) Inspect for bent armature either at the contact of hinge end. (The armature should be perfectly straight from one end to the other.)

(g) Inspect for bent field yoke.

(h) Inspect for bent armature hinges.

(i) Inspect for reversed armature bimetal hinges on the circuit breaker unit. (when correctly installed the brass side must be up.)

(j) Inspect for stripped or crossed threads on any screw or nut.

(k) Inspect for corrosion due to salt or acids.

(l) inspect for broken ground strap.

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VOLTAGE REGULATOR

VOLTAGE REGULATOR INSPECTION (AFTER REMOVAL): (Continued)

(m) Inspect for bent or distorted armature spring. In case of doubt it is recommended that the springs be replaced.

(n) Inspect for correct armature springs on proper units. The springs are identified as follows:

Voltage regulator . . . . . 14 1/2 turns

Current regulator . . . . . 10 3/4 turns

Circuit breaker . . . . . 12 3/4 turns

(o) Inspect for broken or altered carbon resistors.

(p) Inspect for broken gasket.

(q) Inspect connectors.

(2) CHECK RESISTANCES:

(a) Connect the battery to the regulator "A" terminal and to the regulator base. Feel the circuit breaker armature to determine whether the coil is attracting the armature. If no attraction is felt the coil is open and the circuit breaker unit should be replaced. Feel the voltage regulator armature to determine whether the coil is attracting the armature. If no attraction is felt, the voltage regulator winding is open and the voltage regulator should be replaced. Disconnect the battery from the regulator.

(b) Melt the solder and disconnect the voltage regulator lead from the circuit breaker filed yoke. Measure the resistance from this lead to the regulator base. If this resistance is not between 43.7 and 49.3 ohms, the voltage regulator must be replaced.

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VOLTAGE REGULATOR

(2) CHECK RESISTANCES: (Continued)

(c) With the ohmmeter, measure the resistance from the circuit breaker field yoke to the regulator base. If the resistance is not between 111 and 125 ohms, the circuit breaker unit must be replaced.

(d) Remove the carbon resistors from the underside of the unit, and inspect them carefully for cracks. Measure their resistance with the ohmmeter. The resistor marked 30 should measure 28 to 32 ohms and the resistor marked 60 should measure 57 to 63 ohms. Replace any defective resistor and reassemble them on the regulator, making sure they are in their correct position.

(3) CHECK CONTINUITY AND GROUNDS:

With test probes, consisting of a lamp in series with 2 points and a battery on the lighting circuit, check as follows:

(a) From "A" terminal to the base. If the lamp lights, it indicated a grounded series circuit.

(b) From "B" terminal to the base. If the lamp lights, it indicates a grounded "B" terminal.

(c) From "F" terminal to the base. The lamp should be lighted to indicate a continuous field circuit. Open the current regulator contacts with the fingers. The lamp should go out or dim. Open the voltage regulator contacts by hand and the lamp should go out. If the lamp fails to light in the first case, it indicates an open field circuit. If the lamp fails to go out when either set of contacts is opened, it indicates that the contacts are shorted or that the

Continued on next Page

VOLTAGE REGULATOR

(3) CHECK CONTINUITY AND GROUNDS: (Continued)

connections between the units are incorrect.

(d) From the voltage regulator "A" to "B" terminals. If the lamp lights, it indicates a short between the "B" stationary contact and the yoke. Hold the contacts closed and the lamp should light, indicating no open in the series circuit. NOTE: If any incorrect condition or faulty part is found during the above inspection, correct the fault or replace the part.

(4) CLEANING CONTACTS:

Air, compressed.

Carbon Tetrachloride.

File, contact.

Tape, manila.

(a) Insert the file between the contacts and file lengthwise and parallel to the armature. File enough to remove all burning or projections from the contacts, but it is not necessary to remove a crater completely. After filing, vlow off the dust with clean dry air.

(b) Wet a strip of manila tape in Carbon Tetrachloride, and draw this strip between the contacts. After the wet tape, use a clean dry piece to remove any residue.

VOLTAGE REGULATOR DISASSEMBLY:

(a) EQUIPMENT:

Copper, soldering.

Screwdriver. Wrench, open-end, 3/8 in.

Continued on next Page

VOLTAGE REGULATOR

VOLTAGE REGULATOR DISASSEMBLY: (Continued)

(b) PROCEDURE:

(1) REMOVE CARBON RESISTORS:

SCREWDRIVER.

From the underside of the unit, remove 4 Resistor screws and lift off 4 Lock washers, 4 plain washers, the 30 ohm Carbon Resistor and the 60 ohm Carbon Resistor.

(2) REMOVE CIRCUIT BREAKER UNIT:

Copper, soldering

Wrench, Open-end 5/8 in.

(a) Remove Circuit Breaker Magnet core nut, Lock washer, Resistor bracket and plain washer from bottom of Circuit Breaker Magnet core.

(b) Unsolder shunt winding ground connection where it is soldered to base.

(c) Unsolder Voltage Regulator lead where it is soldered to Circuit Breaker field yoke.

(d) Unsolder and unclinch Circuit Breaker series coil connection where it is connected to current regulator coil.

(e) Lift Circuit Breaker unit off base.

(3) REMOVE CURRENT REGULATOR UNIT:

Copper, soldering

Wrench, Open-end 3/8 in.

(a) Remove stationary contact screw, remove Lock washer and plain washer from outside of connector from "F" terminal, and remove insulating washer,

Continued on next Page.

VOLTAGE REGULATOR.

(3) REMOVE CURRENT REGULATOR UNIT: (Continued)

Contact bracket and bracket insulation from inside of connector, from the "F" terminal.

(b) Unsolder and unclinch Current Regulator winding where it is soldered to Circuit Breaker series coil connection, unsolder and unclinch Current Regulator winding where it is soldered to "A" terminal to Current Regulator winding connector.

(c) Remove Current Regulator Magnet core nut, Lock washer, Resistor bracket, and insulating washer from bottom of Current Regulator Magnet core.

(d) Lift Current Regulator Unit off base.

(4) REMOVE VOLTAGE REGULATOR UNIT:

Copper, soldering
Wrench, Open-end 3/8 in.

(a) Remove screw, Lock washer, plain washer, insulating washer, and connector from Voltage Regulator (Large Hole), and remove contact bracket and bracket insulation.

(b) Unsolder Voltage Regulator lead from Circuit Breaker field yoke.

(c) Remove Voltage Regulator Magnet core nut from underside of Unit, and lift off lock washer, plain washer, and insulating washer.

(5) REMOVE ARMATURE SPRINGS:

(a) Unhook Current Regulator Armature spring, Voltage Regulator Armature spring, and Circuit Breaker Armature spring.

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ITEM 10.

VOLTAGE REGULATOR.

(6) REMOVE COVER GASKET:

(a) Remove cover gasket from base.

VOLTAGE REGULATOR ASSEMBLY:

(a) EQUIPMENT:

Copper, soldering.

Solder.

Screwdriver.

Wrench Open-end 3/8 in.

(b) PROCEDURE:

(1) INSTALL CURRENT REGULATOR UNIT:

Copper, soldering.

Screwdriver.

Wrench, Open-end 3/8 in.

(a) Install Current Regulator Unit on base. Install on bottom of current Regulator Magnet core the insulating washer, Resistor bracket, lock washer, and Current Regulator Magnet core nut. Do not tighten the nut.

(b) Clinch and solder Current Regulator winding to "A" terminal of Current Regulator winding connector.

(2) INSTALL CIRCUIT BREAKER UNIT:

Copper, soldering.

Solder.

Wrench, Open-end 3/8 in.

(a) Install Circuit Breaker Unit on base so that shunt winding ground connection is inserted through the hole in the base.

Continued on next Page.

VOLTAGE REGULATOR.

INSTALL CIRCUIT BREAKER UNIT: (Continued)

(b) Install plain washer, Resistor bracket, Lock washer, and circuit Breaker Magnet core nut. Make certain pin on Circuit Breaker field yoke is in its hole.

(c) Solder shunt winding ground connection to the bottom side of base.

(d) Clinch Circuit Breaker series coil connection on Current Regulator coil, and solder Circuit Breaker series coil connection. This solder connection must be a low resistance connection.

(3) INSTALL VOLTAGE REGULATOR:

Copper, soldering.

Solder.

Wrench, Open-end 3/8 in.

(a) Install Voltage Regulator on base and install insulating washer, plain washer, lock washer, and Voltage regulator Magnet core nut. Do not tighten nut.

(b) Thread Voltage Regulator lead through Current Regulator field yoke and Circuit Breaker field yoke, solder end of lead to Circuit Breaker field yoke.

(4) INSTALL CARBON RESISTORS.

Screwdriver.

Wrench, Open-end 3/8 in.

(a) Install end of Resistor bracket.

(b) Install 50 ohm Carbon Resistor on bracket mounted on Current Regulator Magnet core. Install plain washers, lock washers and Resistor screws. Do not tighten screws.

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VOLTAGE REGULATOR.

(4) INSTALL CARBON RESISTORS: (Continued)

(c) Tighten Current Regulator Magnet core nut left loose in step (1) (a) above, being careful not to break 30 ohm Carbon Resistor.

(d) Install end of Resistor bracket, and then install 60 ohm Carbon Resistor on bracket mounted on Voltage Regulator Magnet core. Install plain washer, lock washer, and resistor screws.

(e) Tighten Voltage Regulator Magnet core nut left loose in step (3) (a) above.

(f) Tighten Resistor screws.

(5) INSTALL CURRENT REGULATOR CONNECTOR:

(a) Install following parts on contact side of Current Regulator in order listed.

(b) Bracket insulator, Contact bracket, then connector from "F" terminal, insulating washer, connector from Voltage Regulator (Small Hole), Plain washer, Lock washer, Screw.

NOTE: Insulating washer must be turned so it fits into hole in connector from "F" terminal

(6) INSTALL VOLTAGE REGULATOR CONNECTOR:

(a) Install following parts on contact side of Voltage Regulator in order listed.

(b) Bracket insulation, Contact bracket, Connector from Current Regulator, Insulating washer, Plain washer, Lock washer, Screw,

CONTINUED ON NEXT PAGE.

ITEM 10.

VOLTAGE REGULATOR

(6) INSTALL VOLTAGE REGULATOR CONNECTOR: (Continued)

NOTE: Insulating washer must be turned so it fits into hole in connector from Current Regulator (Large Hole).

TESTS AND ADJUSTMENTS OF ASSEMBLED VOLTAGE REGULATOR:

(a) EQUIPMENT:

Gage, Circuit Breaker core gap, 0.031 to 0.034 in., ST - 281-9.

Gage, Current Regulator and Voltage Regulator core gap, 0.048 to 0.052 in., ST - 281-7.

Gage, thickness 0.012 in.

Gage, thickness 0.015 in.

Lamp, test, 12 Volt.

Pliers, long-nosed.

Screwdriver.

Tool, contact adjusting, ST - 282.

(b) PROCEDURE:

(1) Adjust Circuit Breaker Armature air gap, with Armature against the stop, insert flat Gage ST-281-9 between the Armature and core.

Hold Gage as near to hinge end as possible and adjust Armature stop so the 0.031 inch Gage will fit easily and the 0.034 inch Gage will not enter core gap

(2) Adjust Current Regulator and Voltage Regulator Armature air gap to approximate value.

Insert pin Gage ST-281-7 on point side and next to brass Armature stop pin.

Continued on next Page.

VOLTAGE REGULATOR

TESTS AND ADJUSTMENTS OF ASSEMBLED VOLTAGE REGULATOR: (Continued)

Hold Armature down against the Gage, being careful not to touch the contact spring.

Raise or lower the stationary contact bracket with tool ST-272, so contacts are just touching.

Tighten stationary contact bracket screw after asjusting.

(3) Adjust contact point alinement of Current and Voltage Regulator, with long-nosed pliers, bend the stationary contact bracket so contacts are alined and make full face contact.

(4) Adjust the Armature air gap of the Current and Voltage Regulator.

Connect a 12 Volt Battery and a 12 Volt Lamp in series with the "F" terminal and the regular base.

Loosen stationary contact bracket slightly so it can be moved but will not slide out of place.

Insert a 0.051 inch gage between Armature and core on the contact side of Brass Armature stop pin.

Press down on Armature, being careful not to touch contact spring.

Raise stationary contact by prying with tool ST-282 until the light goes out, then tap the top of bracket lightly with the tool until the instant the light goes on.

Keep contacts alined while adjusting gap.

Tighten stationary contact holding screw and recheck setting.

To recheck, insert 0.048 inch Gage between Armature and core on Contact side.

Continued on next Page.

VOLTAGE REGULATOR

TESTS AND ADJUSTMENTS OF ASSEMBLED VOLTAGE REGULATOR: (Continued)

And next to Armature pin.

Press down on Armature, and the light should go out.

Insert 0.051 inch Gage and light should stay lighted when Armature is held down.

(5) Check contact gap on Current and Voltage Regulator.

With 0.012 inch feeler Gage, check gap between the contacts when Armature is held against core.

Too small a gap indicates a faulty assembly, and Unit should be replaced.

(6) Check contact gap on Circuit Breaker.

With 0.015 inch thickness Gage, check the gap between contacts when Armature is against stop.

The gap may be more than the 0.015 inch minimum, but should not be set less than this dimension.

Make sure contacts are perfectly alined for full face contact when making this adjustment.

(7) Assemble the Armature springs on the spring brackets, making sure they are down in the holding grooves.

The different springs used are as follows:

Circuit Breaker . . . . . 12 3/4 turns.

Current regulator . . . . . 10 3/4 turns.

Voltage Regulator . . . . . 14 1/2 turns.

Continued on next Page.

VOLTAGE REGULATOR.

TESTS AND ADJUSTMENTS OF ASSEMBLED VOLTAGE REGULATOR: (Continued)

(8) Assemble cover gasket and cover, and install on regular Unit.

VOLTAGE REGULATOR INSTALLATION:

(a) EQUIPMENT:

Lead, jumper.

Screwdriver.

(b) PROCEDURE:

If bench testing apparatus is available, it is advisable to install the regulator on the test panel and make the electrical adjustment with the bench equipment, however, the adjustments can be made on the Truck if bench equipment is not available.

To install regulator on the bench or on the truck, mount regulator firmly and tighten mounting screws.

Make sure there is a good ground connection between regulator base and dash, or test panel.

Connect the Generator Armature lead to regulator "A" terminal,and connect the Generator field lead to regular "F" terminal.

Connect the Battery lead to regulator "B" terminal.

After all connections.are made, polarize the Generator with the Battery by using a short jumper lead from regulator "B" to "A" terminals.

A few second is all that is necessary to polarize the Units.

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ITEM 10.

VOLTAGE REGULATOR.

ADJUSTMENTS OF INSTALLED VOLTAGE REGULATOR:

(a) EQUIPMENT:

Ammeter, 0 to 20 Ampere scale.

Phone, head.

Screwdriver, 1/4 in.

Thermometer.

Tool, spring tension adjusting ST-283.

Voltmeter 0 to 20 Volt scale.

(b) PROCEDURE:

(1) Connect Ammeter in series with Regulator "B" terminal and Battery lead. Connect one Voltmeter lead to regulator base and the other Voltmeter lead to regulator "A" terminal.

Place Thermometer so that it is approximately 2 inches from the regulator but not touching the regulator.

Remove regulator cover with tool ST-283, bend lower spring hanger on all 3 Units so there is a slight tension on Armature springs.

Start the Generator and run it at 2,500 Generator revolutions per minute.

Bend Voltmeter spring bracket so Voltmeter reads approximately 14.5 Volts.

Apply a load to the Battery at 17 Amperes or more.

This may consist of a bank of standard headlight bulbs or a Carbon pile Rheostat.

Bend lower spring hanger on Current Regulator so Ammeter reads 16 to 18 Amperes.

Continued on next Page.

VOLTAGE REGULATOR.

ADJUSTMENT OF INSTALLED VOLTAGE REGULATOR: (Continued)

(2) CIRCUIT BREAKER:

Stop the Generator; then start again and increase speed slowly, noting Voltage reading just before the change caused by the closing of the Contacts.

Adjust this setting by bending lower spring hanger on Circuit Breaker Unit.

After each adjustment stop the Generator; then restart, slowly bringing up the speed.

Adjust spring tension so contacts close between 13.0 and 13.75 Volts.

After the Circuit Breaker closing Voltage is set, increase Generator speed so Generator charges at a rate of 8 to 9 Amperes; then reduce speed, noting Voltage reading just before the change caused by the opening of the Contacts.

Adjust this setting to 8.2 to 9.3 Volts by raising or lowering the stationary Contact.

Increasing the Contact gap decreases the point opening Voltage, while decreasing the Contact gap raises the opening Voltage.

Do not adjust gap to less than 0.015 inch, and keep Contacts perfectly alined when adjusting height of Stationary Contact.

The contact height or point gap is adjusted by expanding or contracting the Bridge supporting the Contact.

As an aid in indicating the exact instant of opening or closing of the Contacts, a high resistance headphone (2,000 ohms or higher) can be connected

Continued on next Page.

ITEM 10.

VOLTAGE REGULATOR.

ADJUSTMENT OF INSTALLED VOLTAGE REGULATOR: (Continued)

(2) CIRCUIT BREAKER:

between the "A" and "B" terminals of the Regulator, and then taking the reading just as the click caused by the opening or closing of Contacts is heard.

(3) VOLTAGE REGULATOR:

Run the Generator at approximately 2,500 revolutions per minute, and adjust the output to 8 to 9 Amperes by connecting a lamp or Carbon pile load across the Battery.

With the cover on the Unit, operate at this output for 15 minutes, to bring the Unit up to normal operating temperature.

Stop; then restart the Generator, bringing it quickly up to 2,500 revolutions per minute.

Adjust the current to 8 to 9 Amperes and read Voltmeter.

This reading should be as tabulated below for temperature, as read at time of testing.

Temperature F	50	60	70	80	90	100	110	120
Volts	14.59	14.54	14.50	14.46	14.42	14.37	14.33	14.29
Allowable variation 0.30 Volts.								

To adjust Voltage to above specifications, remove cover and bend lower spring hanger with tool ST-285.

After each adjustment replace the cover and take a flash reading by stopping Generator and noting Voltage after starting.

Continued on next Page.

ITEM 10.

VOLTAGE REGULATOR.

(3) VOLTAGE REGULATOR: (Continued)

Adjust speed to approximately 2,500 revolutions per minute, and the Current to 8 to 9 Amperes before reading Voltage.

(4) CURRENT REGULATOR:

Run Generator at 2,500 to 3,000 revolutions per minute and connect a load on the Battery at 17 Amperes or more.

This load may consist of a bank of headlight bulbs or a Carbon pile Rheostat.

Read Ammeter, which should show a charging rate of 16 to 18 Amperes.

To adjust Current to above specification, remove cover and bend lower spring hanger to change Armature spring tension.

After each adjustment replace cover and note Ammeter reading after stopping and then restarting the Generator.

(5) FINAL CHECK:

After Regulator is adjusted, operate at 8 to 9 Amperes output for 5 minutes with cover on; then check each Unit for correct operating specifications, and make any final corrections necessary.

Connect a Head Phone from the "F" terminal to ground and listen to the sound of the opening and closing of the Regulator Contacts which should be cleaned.

ITEM 10.

GENERAL CARE OF GENERATOR.

PROTECTION:

The machine should be protected car fully against moisture both before and after erection.

Water or Steam from leaking pipes, rain, snow or condensation from the atmosphere should be excluded.

It is particularly important to keep the windings dry since moisture lowers the insulation resistance and increases the likelihood of a breakdown.

If a machine is brought from cold surroundings into a warm room, it should be kept covered until its temperature has risen to room temperature so as to prevent condensation on the windings and other parts.

Care should be taken in transporting and handling the machine to see that the windings are not damaged.

A blow upon any part of the windings is liable to injure the insulation and result in a burnout of a coil.

The Generator is connected 3 phase star with the neutral lead brought out.

UNBALANCED VOLTAGE AND SINGLE PHASE OPERATION:

The ability of a Generator to operate on unbalanced Voltage or, in the extreme case, to operate single phase, depends largely on the design of the Amortisseur or damper windings.

Single phase operation produces heavy currents in the damper windings, if there is one, which may cause overheating in a machine not designed for such operation.

Continued on next Page.

GENERAL CARE OF GENERATOR.

UNBALANCED VOLTAGE AND SINGLE PHASE OPERATION: (Continued)

If there is no damper winding, the field current required for a given load is increased to such an extent that the output is seriously limited.

Operation with unbalanced load has the same effect as single phase operation but in a less degree.

For machines not designed for single phase operation, 20 to 30 percent of normal current single phase is usually safe.

Higher values may be permissible if the damper winding is liberal.

The degree of unbalanced polyphase operation that is permissible depends likewise on the design of the individual machine.

In any case of unbalancing of more than five percent at full load, it is advisable to watch the temperature of all parts closely.

COLLECTOR RINGS AND BRUSHES:

(a) SPARKING:

If sparking between the brushes and the Collector Rings occur, the following points should be checked:

1. Brush pressure.

   It may be that the pressure on the Brushes is insufficient to make them follow the Ring surface.

2. Brushholder Vibration.

3. Brush Chatter.

4. Oil Vapor.

Continued on next Page.

ITEM 10.

GENERAL CARE OF GENERATOR.

(a) SPARKING: (Continued)

5. Collector Ring Rough.

6. Spotted Rings.

This has been cured in certain cases by the use of a more abrasive Brush.

(b) SELECTIVE ACTION BETWEEN BRUSHES:

This is generally aggravated by any of the causes of sparking at the Brushes and if the same remedies are applied, it can generally be improved.

THE RINGS:

Should be maintained smooth and true.

Grind or turn them if necessary to restore a smooth and true surface.

Occasionally ring trouble will arise from a ring not being of uniform hardness, so that it wears unevenly.

Such a Ring should be replaced.

Collector Ring trouble is seldom due to high current density as the maximum current density, 40 Amperes per square inch or less, is well below the maximum density specified for the Brushes.

The Brushes should be light in weight, with a fairly high current capacity, and should contain a slight amount of abrasive material.

A suitable grade is furnished with the machine, and for the best results this grade should always be used.

THE BRUSHES:

Should make good contact with the slip rings along the whole face of the Brush.

Continued on next Page.

GENERAL CARE OF GENERATOR.

THE BRUSHES: (Continued)

If necessary grind the new Brushes in with fine sandpaper.

Maintain a free sliding fit between the Brushes and the Brush holder by cleaning both thoroughly when necessary.

There are two collector Rings made of Bronze Alloy.

Brushes supplied on these machines are metal graphite and should have a Brush pressure of approximately 3 lbs. per square inch.

There are two Brushes per ring.

OPERATION AND CARE OF BALL BEARINGS:

Quietness and life of Ball Bearings depend largely on cleanliness and proper lubrication.

INSPECTION:

1. When the Generator is installed, make certain that the rotor turns easily, particularly if the Generator is not installed until some months after being shipped.

2. Never open the Bearing housing under conditions which would permit entrance of dirt.

3. External inspection of the Generator at the time of the first greasing soon after it is put into operation will determine whether the Bearings are operating quietly and without undue heating.

Further inspection will not be necessary except at infrequent intervals, probably at greasing periods.

Continued on next Page.

GENERAL CARE OF GENERATOR.

INSPECTION: (Continued)

4. If practicable, it is desirable for the most satisfactory service, to open the Bearing housings once a year, or after every 5,000 hours operation, to check the condition of the Bearings and grease.
If difficult to inspect the pulley or pinion and bearing, the condition of the Bearing at the opposite end will usually be representative of both.

5. If grease deterioration has occurred or if dirt has gained ent ance to the housing, the Bearing and housing parts should be thoroughly cleaned out and new grease added.

GREASE LUBRICATION AND REGREASING:

Ordinary cup greases are not satisfactory for the lubrication of Bearings because of their great tendency to deterioration under the severe churning action of the Bearings.

The properties of an ideal Bearing grease are listed below:

1. Melting point or dropping temperature about 300 degrees Fahrenheit (By the Ubbelonde method).
2. Smooth, Homogeneous mixture (Buttery texture).
3. No dirt, abrasive or fillers.
4. Low alkali content.
5. No acid or corrosive matter.
6. Minimum free oil or seperation in storage.
7. Maximum resistance to drying, gumming, or oxidation.

Under average conditions of temperature, a grease of medium consistency should be used.

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ITEM 10.

GENERAL CARE OF GENERATOR.

DO NOT OVER LUBRICATE:

A small amount of lubricant is essential, sufficient to maintain a film of lubricant over the surface of the Balls and races.

Too much grease will cause churning, overheating and grease leakage.

If grease leakage occurs the Bearing has been overfilled; or the grease used is not suitable for the particular application.

If high pressure guns are used, great care should be used to avoid Over-lubrication.

When shipped from the factory, grease lubricated Ball Bearings have sufficient grease of the right grade to last for a limited period.however, a charge of grease should be added soon after the Generator is put in operation, and thereafter at suitable intervals, as determined by experience.

As a guide, it is suggested that grease should be added every three months of operation.

If experience indicates that these quantities result in a surplus of grease in the bearing, the quantity should be reduced or the greasing periods lengthened or both.

The ideal condition is that the Bearing housing be from 1/3 to 1/2 full of grease.

New grease is introduced at the side of the Bearing farthest from the body of the Generator.

Continued on next Page.

GENERAL CARE OF GENERATOR.

DO NOT OVER LUBRICATE: (Continued)

A sufficient charge will force the old grease through the rolling members and out a partially restricted escape port during operation.

A surplus grease sump below Bearing is supplied and it should be kept empty at all times.

Excess grease is removed from the sump through pipe plug openings.

Periodic greasing and cleaning of the surplus grease sump will prevent damage to the Bearings from deterioration grease and will reduce or eliminate the need for Bearing overhaul.

CLEANLINESS:

Since Ball Bearings are sensitive to small amounts of dirt, they must be protected at all times, If necessary to disassemble the Bearing housing, first thoroughly remove all dirt from adjacent parts, so no dirt will fall upon the Bearing or interior of the housing.

Cover the Bearing and interior of the housing with clean wrapping material if they are to be left dismantled and exposed.

If dirt or deteriorated grease is found in the housing or Bearing, the parts should be thoroughly cleaned with Carbon tetrachloride (Avoid allowing this liquid to remain on adjacent Generator windings).

In some cases, it may be necessary to entirely remove the Bearing from the shaft in order to clean it properly.

Continued on next Page.

GENERAL CARE OF GENERATOR.

MECHANICAL DAMAGE:

1. In mounting or removing Bearings, pressure should be applied only against the inner race, always using a sleeve or other intermediate piece if mounting or removal is accomplished by hammer blows.

Cover Bearing carefully during these operations if there is a danger of flying particles getting in amongst the Balls.

Never attempt to remove a Ball Bearing by exerting pressure against the outer race, as the Bearing may be seriously damaged.

In mounting or removing pulleys, couplings or pinions the Bearing must not be subjected to axial pressure, especially hammer blows as when these accessorits are driven on the shaft with a mallet.

Any pressure of this kind should be taken by supporting the opposite end of the shaft against a stop of some kind.

SPARE PARTS:

The electrical spare parts on this set consist of exciter and Generator Brushes.

When Brushes have worn to the place that correct spring pressure cannot be obtained, new Brushes should be installed.

When new Brushes are installed, follow instructions as listed under "Brushes".

Continued on next Page.

VOLTAGE CONTROL UNIT.

The Generator-Regulator is an Electromagnetic device for controlling the Generator output to meet all conditions of operation, load, and Battery.

There are three seperate Units in the Regulator, the Cut-out Relay, the Voltage Regulator, and the Current Regulator.

The functions of the three Units in the Regulator are as follows:

(1) CUT-OUT RELAY:

The Cut-Out Relay closes the Circuit between the Generator and the Battery when the Generator Voltage has built up to a value sufficient to force a charge into the Battery.

The Cut-Out Relay opens the Circuit when the Generator slows or stops and Current begins to flow back from the Battery into the Generator.

The Cut-Out Relay consists of two windings, a shunt winding and a series winding, assembled on a single core, above which is positioned an Armature.

The shunt windings consist of many turns of fine wire, and is connected across the Generator.

The series winding consists of a few turns of heavy wire designed to carry full Generator output, and it is connected into the Charging Unit.

The Armature carries points which are positioned above matching stationary points.

When the Generator is not operating, the Armature is held away from the winding core by spring tension and the points are seperated.

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ITEM 10.

VOLTAGE CONTROL UNIT.

(1) CUT-OUT RELAY: (Continued)

As soon as the Generator begins to operate at a speed sufficient to produce enough Voltage to charge the Battery, this Voltage, which is impressed on the Relay windings, creates enough magnetism to overcome the Armature spring tension and closes the points.

So long as the Generator charges the Battery, the points are held closed. But when the Generator slows or stops so that Current flows from the Battery to the Generator, the points open.

They open because the series winding magnetic field reverses as the Current in it reverses so that the two windings no longer help each other, but their magnetic fields buck, causing such a reduction of the total magnetic field that the Armature spring tension can pull the Armature away from the winding core and seperate the points.

(2) VOLTAGE REGULATOR:

The Voltage Regulator prevents the line Voltage from exceeding a pre-determined value and thus protects the Battery and other electrical Units in the system from high Voltage.

One characteristic of Batteries is that as either the specific gravity or charging rate increases, other conditions being the same, the Battery terminal Voltage increases.

If the terminal Voltage is held constant as the Battery comes up to charge (specific gravity increases), the charging rate will be reduced.

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ITEM 10.

VOLTAGE CONTROL UNIT.

(2) VOLTAGE REGULATOR: (Continued)

The Voltage Regulator performs this job of holding the Voltage constant and it consequently protects the electrical system from high Voltage and the Battery from Overcharge.

The Voltage Regulator consists of a pair of points, one positioned on an Armature, the other semi-stationary and the Regulator windings assembled on a single core.

As the Voltage in the system increases due to increased Generator output, or to the Battery approaching a charged condition, the magnetic attraction of the windings for the Armature increases.

The Armature spring tension normally holds the Regulator points closed, and the Generator field Current is closed through these points.

With the points closed in this manner, the Generator output can increase to a high value, and can cause, under the above mentioned conditions, a high Voltage.

When the Voltage reaches a pre-determined value, the magnetic attraction on the Regulator Armature is sufficient to overcome the Armature spring tension and pull the Armature toward the winding core.

This opens the points,causing a resistance to be inserted into the Generator field Circuit.

Resistance in the Generator field Circuit immediately causes a reduction of the Generator output, with a consequent reduction of Voltage.

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VOLTAGE CONTROL UNIT.

(2) VOLTAGE REGULATOR: (Continued)

Reducing the Voltage, however, reduces the magnetic pull on the Armature, so that almost at once the Armature is released and the spring tension closes the Regulator points.

This permits an increased output and Voltage, so that the points are again opened.

This cycle is repeated very rapidly so that the Voltage is held to a constant value and the output is reduced to just what is required by the connected electrical load and the condition of charge of the Battery.

(3) CURRENT REGULATOR:

The Current Regulator limits the Generator output to a safe value.

It is, in effect, a Current limiting device which operates when the Generator output has increased to its safe maximum and prevents the Generator from exceeding this value.

The Current Regulator consists of a pair of points, one positioned on an Armature, the other semi-stationary, and Regulator windings assembled on a single core.

As the Current output of the Generator reaches the value for which the Current Regulator is adjusted (the maximum specified output of the Generator), the magnetic strength of the Current windings is sufficient to overcome the spring tension holding the Regulator points closed.

They open, and cause a resistance to be inserted into the Generator field Circuit.

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VOLTAGE CONTROL UNIT.

(3) CURRENT REGULATOR: (Continued)

This causes a reduction of the Generator output.

However, as soon as the output falls below the value for which the Current Regulator is set, the magnetism becomes insufficient to hold the points open, they close, and permit the Generator output to increase again.

This cycle is repeated very rapidly (from 50 to 300 times per second), preventing the Generator output from exceeding its specified maximum.

NOTE:

Either the Current Regulator or the Voltage Regulator may operate at any one time, but both never can operate at the same time.

When the Battery is low and the load requirements are high (many accessories turned on) The Current Regulator operates to prevent the Generator from exceeding its specified maximum and the Voltage Regulator does not operate because the Voltage does not reach a value sufficient to cause it to operate.

When the Battery begins to come up to charge, and electrical accessories are turned off, the Voltage begins to increase and reaches a value at which the Voltage Regulator begins to operate.

The Generator output consequently begins to taper off so that output is below a value at which the Current Regulator would operate.

Consequently, only the Voltage Regulator operates under this condition.

TROUBLE SHOOTING AND GENERAL SOLUTIONS.

IGNITION SYSTEM:

NOTE:

To locate trouble in the ignition system, a systematic checking procedure should be used.

It should be remembered that many other components in the engine enter into engine operation and that it will be often necessary to perform a complete engine tune-up if trouble is experienced, so that not only ignition, but all other components, will be checked.

It sometimes happens, however, that there is neither time nor instruments available to make a complete analysis of the equipment and under these conditions it may be desirable to attempt a quick check in an effort to locate the trouble so that temporary corrections can be made.

Turn on ignition switch and use starting motor in an attempt to start Engine.

If starting Motor cranks the engine slowly or not at all, then the trouble is probably due to a rundown Battery, defective cables or connections, defective starting motor, or some engine condition which prevents the development of normal cranking speed.

If starting Motor cranks the engine at normal speed, but engine does not start, remove high tension lead from one spark plug and hold lead terminal about 3/16" from engine block.

A good spark should occur when the engine is cranked.

If spark does occur, the ignition primary and secondary circuit are probably all right and the trouble is possibly due to an out of time condition or to some other trouble in the engine such as Carburetion, etc.

Continued on next Page.

TROUBLE SHOOTING AND GENERAL SOLUTIONS.

IGNITION SYSTEM: (Continued)

If a spark does occur, check dash Ammeter while cranking.

If the Ammeter shows a small reading which fluctuates during cranking the primary Circuit is probably all right and the secondary Circuit should be considered as not delivering the spark due to a defective coil, wiring, Condenser, cap or rotor.

If there is no Ammeter reading which does not fluctuate at all during cranking, the contact points are so out of adjustment that they do not open, or the primary Circuit is grounded either in the coil or the wiring.

BATTERY:

LOW SPEED OF STARTER. Not sufficiently charged. Check with Hydrometer to learn condition.

COIL:

ENGINE MISSING. Tighten loose connections.

SPARK PLUGS:

POOR ENGINE PERFORMANCE. Clean Plugs, inspect for cracked porcelain, and readjust points to the correct gap.

DISTRIBUTOR:

LOSS OF ENERGY IN THE PRIMARY CIRCUIT.

RESISTANCE IN CIRCUIT. Tighten all loose connections, replace defective leads, replace burned contact points, replace coil or switch.

DEFECTIVE CONDENSER. Test on Condenser tester and if faulty replace, do not attempt to repair.

Continued on next Page.

TROUBLE SHOOTING AND GENERAL SOLUTIONS.

DISTRIBUTOR: (Continued)

DISCHARGED BATTERY. Recharge or replace.

GROUNDED CIRCUIT IN COIL WIRING OR DISTRIBUTOR TERMINALS: Replace coil, Check wiring and terminal.

LOSS OF ENERGY IN THE SECONDARY CIRCUIT.

DEFECTIVE HIGH TENSION WIRING. Replace as necessary. Do not repair.

DEFECTIVE CONNECTIONS IN HIGH TENSION CIRCUIT. Tighten connections and check for opens and grounds.

FOULED, CRACKED, OUT OF ADJUSTMENT PLUGS. Repair or replace as conditions warrant.

HIGH TENSION LEAKAGE ACROSS COIL HEAD, DISTRIBUTOR CAP OR ROTOR. Clean parts with a rag dampened in carbon tetrachloride. If leakage still occurs, replace necessary parts.

DEFECTIVE IGNITION COIL. Replace coil.

OUT OF TIME:

WRONG TIMING. Retime engine.

DISTRIBUTOR BEARING WORN. Replace part and if a bent shaft has caused this condition, replace shaft.

MAGNETIC SWITCH:

GROUNDED COIL. Using a test lamp and prod, place one prod on one of the insulated coil terminals and the other one on the switch case. If light lights, the coil is grounded. Do not attempt to repair faulty coils, replace the coil or install new switch.

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ITEM 10.

TROUBLE SHOOTING AND GENERAL SOLUTIONS.

STARTING MOTOR:

NOTE: Usually there is no exact procedure for positively determining on the vehicle whether or not the starting motor is at fault when the starting motor cranks the engine slowly or not at all.

Yet some idea of the location of trouble may be obtained by watching the operation of the equipment with the headlights turned on.

It must be remembered that failure of the starting motor to crank the engine normally may be due to a low Battery, bad connections, defective cables, defective starting motor, low temperature, or to faulty conditions within the engine itself.

A quick check may be made to find the approximate location of trouble by turning on the lights and operating the starting motor.

One of three things will happen.

The lights will go out, the lights will dim, or the lights will stay bright with no cranking action.

LIGHTS GO OUT:

DEFECTIVE CONNECTION IN THE CIRCUIT BETWEEN THE STARTING MOTOR AND BATTERY:

Clean and tighten the connections and replace any defective cable.

NOTE: In an emergency starting may sometimes be accomplished by wiggling the Battery connections so a better connection is temporarily established.

LIGHTS DIM:

ADDED BURDEN OF CRANKING ON THE BATTERY CAUSES VOLTAGE TO DROP OFF:

Continued on next Page.

TROUBLE SHOOTING AND GENERAL SOLUTIONS.

LIGHTS DIM: (Continued)

Check Batter and then investigate for excessive current drain such as: heavy oil, tight bearings, pistons, etc., in engine, frozen or tight bearings or loose screws which allow armature in starter to drag.

LIGHTS STAY BRIGHT:

OPEN CIRCUIT BETWEEN THE STARTING MOTOR AND BATTERY. Examine Circuit and magnetic switch for opens and repair.

OPEN CIRCUIT WITH STARTING MOTOR. Tighten brush leads, replace worn brushes. Turn down in a lathe or undercut the mica of a dirty, gummy, burned or high mica commutator.

In an emergency, it may be possible to get started provided the trouble is due to a dirty or gummy commutator, by sanding the commutator with a piece of number 00 sandpaper.

If the starting motor still does not operate, tests must be made for open windings in the field or armature.

Place one test lamp prod on the insulated field winding lead and the other on ground.

If the test lamp lights, the field windings are all right, at least as far as open windings are concerned.

Should the lamp not light, isolate the trouble to a particular field coil by testing across each winding seperately.

Replace the faulty coil.

Test the armature for open windings with a test lamp or on a growler.

Repair winding or replace armature as necessary.

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TROUBLE SHOOTING AND GENERAL SOLUTIONS.

OPEN CIRCUIT WITH STARTING MOTOR: (Continued)

NOTE: Never operate starting motor more than 30 seconds at a time without a pause of several minutes to allow the unit to cool off.

If the starting motor is considered to be defective and the trouble (Brushes, Commutator, or connections) is not readily apparent, the starting motor should be removed from the vehicle for the no load and torque tests.

No load test. - Connect the starting motor in series with a Battery of the specified Voltage and an Ammeter capable of reading several hundred Amperes. If an R.P.M. indicator is available, read the armature R.P.M. as well as the current draw with the unit running free speed or no load.

Torque test. - Torque testing equipment is required for conducting a stall torque test of the starting motor.

The torque developed, current draw, and voltage are checked together.

INTERPRETATION OF NO LOAD AND TORQUE TESTS:

LOW FREE SPEED AND HIGH CURRENT DRAW WITH LOW DEVELOPED TORQUE. Check the following:

(1) Armature drag caused by tight, dirty, worn bearings or loose field poles.

(2) Grounded Armature or field.

(3) Shorted Armature.

FAILURE TO OPERATE WITH HIGH CURRENT DRAW. Direct ground in switch, at terminal or brushes or frozen shaft bearings which prevent Armature turning.

FAILURE TO OPERATE WITH NO CURRENT DRAW. Check the following:

Continued on next Page.

ITEM 10.

TROUBLE SHOOTING AND GENERAL SOLUTIONS.

FAILURE TO OPERATE WITH NO CURRENT DRAW. (Continued)

(1) Open field circuit.

(2) Open Armature coil.

(3) Broken or weakened brush springs, worn brushes, high commutator mica or other conditions which would prevent good contact between brushes and commutator.

LOW NO-LOAD SPEED WITH LOW TORQUE AND LOW CURRENT DRAW. Check for following:

(1) Open field.

(2) High internal resistance due to worn brushes, dirty commutator, weak or worn brush springs, and other causes of poor contact between brushes and commutator.

(3) Defective leads or connections.

HIGH FREE SPEED WITH LOW DEVELOPED TORQUE AND HIGH CURRENT DRAW.

Shorted fields.

It is difficult to detect shorted fields with ordinary testing instruments, since the field resistance is originally low.

If shorted fields are suspected, install new fields and check for improvement in performance.

GENERATOR:

NOTE: If abnormal operation of the Generator Regulator system is noted, it is first necessary to determine whether it is the Generator, the Regulator, or some other component of the electrical system which is at fault.

The procedure for making this determination is covered in the section on Regulators.

Continued on next Page.

TROUBLE SHOOTING AND GENERAL SOLUTIONS.

GENERATOR: (Continued)

If the Generator is at fault, further attention should be given it, as outlined in following paragraphs.

NO GENERATOR OUTPUT:

STICKING BRUSHES. Clean brush holders and brush arms; replace arms if bent. Replace brushes and brush springs if required.

GUMMED COMMUTATOR. Wipe with clean cloth slightly dampened with carbon tetrachloride or similar solution.

BURNED COMMUTATOR. Turn down and under-cut mica.

NOTE: Test points connected in series with test lamp and a source of electricity are required for following checks:

GROUNDED ARMATURE CIRCUIT. Raise and insulate grounded brush from commutator and check with test points from the Armature terminal to frame. If the lamp lights, indicating ground, raise other brush and check commutator and terminal separately to locate ground.

GROUNDED FIELD CIRCUIT. Disconnect field lead from field frame (Removing screw and lock washer) and test with test points from the field terminal to frame.

If test light lights, indicating field is grounded, connection must be made not only on the Generator but Regulator also.

OPEN FIELD CIRCUIT. Check with test points from the field terminal to the disconnected lead clip.

If light does not light, field circuit is open.

Heads which have broken or connections which have become loose to produce

Continued on next Page.

TROUBLE SHOOTING AND GENERAL SOLUTIONS.

OPEN FIELD CIRCUIT: (Continued)

this condition may be resoldered (Rosin flux).

If open circuit is caused by conditions inside a field winding, replace field.

SHORTED FIELD CIRCUIT. Connect Battery and Ammeter in series with the field circuit to determine how much current the field draws.

Normal field draw with a 6 Volt Battery is 1.7 - 1.9 Amperes.

If a shorted field is found, replace the field and check the Regulator contact points.

OPEN ARMATURE CIRCUIT. If commutator bars are not too badly burned; resolder leads in riser bars (Rosin flux), turn commutator down and under-cut mica.

EXCESSIVE GENERATOR OUTPUT:

Usually results from a grounded generator field, either internally or in Regulator.

Opening field circuit by disconnecting lead from field terminal of Regulator or Generator with the Generator operating at a medium speed will determine which unit is at fault.

If output drops off, Regulator is causing condition.

If output remains high, field is grounded either at pole shoes, leads, or field terminal.

UNSTEADY OR LOW GENERATOR OUTPUT:

LOOSE DRIVE BELT.	TIGHTEN.
STICKING BRUSHES.	Clean
LOW BRUSH SPRING TENSION	Adjust.
DIRTY COMMUTATOR	Turn down and under-cut mica.

Continued on next Page.

TROUBLE SHOOTING AND GENERAL SOLUTIONS.

NOISY GENERATOR:

LOOSE MOUNTING.	Tighten.
DRIVE PULLEY.	Adjust.
WORN BEARING.	Replace.
IMPROPERLY SEATED BRUSHES.	Reset by using brush seating stone.
BENT BRUSH HOLDER.	Replace.

VOLTAGE CONTROL UNIT.

Determining Whether Trouble Exists - The dash Ammeter should show a fairly high reading immediately after starting until some minutes of operation, after which the Ammeter reading should begin to drop to a lower value, if the Battery is in a charged condition.

If the Ammeter shows little or no change to the Battery although the Battery is known to be in a low state of charge (as shown by slow cranking motor operation, dim lights, or weak operation of other electrical equipment), then further checking to locate the trouble is required.

Likewise, if the Ammeter continues to read high, even though the Battery is known to be in a charged condition (as shown by snappy fast cranking motor operation or normally bright lights), then further checking to locate the trouble is required.

The most accurate way to determine the state of charge of the Battery is to use a Hydrometer.

LOW BATTERY WITH LOW CHARGING RATE:

DEFECTIVE WIRING OR LOOSE CONNECTIONS. Replace defective wiring and tighten loose connections between the Generator and Regulator and between the

Continued on next Page.

TROUBLE SHOOTING AND GENERAL SOLUTIONS.

DEFECTIVE WIRING OR LOOSE CONNECTIONS. (Continued)

Regulator and Battery.

This condition causes excessive resistance in the charging circuit which in turn cause Regulator to operate as though the Battery were fully charged, even though it may be in a discharged condition.

GENERATOR NOT PRODUCING FULL OUTPUT: Eliminate Regulator from the system by momentarily connecting a jumper lead from Regulator Armature to field terminals with all electrical accessories turned off.

If Generator output comes up then Regulator may be considered as source of trouble.

Install new Regulator and improvement in performance noted.

CAUTION: Under the above conditions a good Generator can produce a very high output, consequently, extreme care must be taken to avoid operating The Generator for more than a second or two - just long enough to see if it can produce a high current output.

GENERATOR NOT PRODUCING ANY OUTPUT: Check cut-out relay points as to whether or not they are closing.

They may not be closing due to high closing Voltage setting or to a defective winding.

CHARGED BATTERY WITH HIGH CHARGING RATE:

HIGH VOLTAGE REGULATOR SETTING. If instruments are not available to make further checks, replace Regulator and check for improvement in performance. (Reduction of Generator output as Battery comes up to charge).

Continued on next Page.

TROUBLE SHOOTING AND GENERAL SOLUTIONS.

HIGH VOLTAGE REGULATOR SETTING. (Continued)

NOTE: In tropical climates where high temperature exist, it may sometimes be found that a normal Voltage Regulator setting may cause high charging rate to the Battery.

This is due to a Battery characteristic whereby the Battery resistance or counter-voltage suffers from reduction with high temperatures.

Under such conditions, the Voltage Regulator setting may be reduced to as low as 7.1 Volts although this should not be done unless it is considered absolutely necessary to relieve Battery overcharging.

The cut-out relay setting must also be reduced so that it will still be below the Voltage Regulator setting.

Reduce cut-out relay closing Voltage to 6.5 Volts when the Voltage Regulator setting is reduced as low as 7.1 Volts.

If the cut-out relay setting is not reduced , the Voltage setting may be lower than the cut-out relay, with the result that the Voltage Regulator would operate before the cut-out relay, and prevent the Voltage from increasing to a value sufficient to close the cut-out relay.

Do not make these reductions in Voltage settings in localities where cold weather is experienced, since this would cause the Battery to be undercharged.

CAUTION: In any checking of the Regulator, care must be taken to avoid closing the cut-out relay contact points by hand with the Battery connected. Closing the cut-out relay points by hand would allow a heavy current to flow from the Battery to the Generator.

Continued on next Page.

TROUBLE SHOOTING AND GENERAL SOLUTIONS.

HIGH VOLTAGE REGULATOR SETTING. (Continued)

This current might weld the points together, and cause the Generator to be seriously damaged before leads could be disconnected.

THE FOLLOWING IS TO BE STRICTLY ADHERED TO:

(1) Report any unusual noises to your Supervisor and leave comments on Routine Report.

(2) Do not crank engine with starter motor more than 30 seconds at any one time as overheating and damage may result.

Motor Current idle is 80 Amperes at 11.2 Volts.

Motor Current stalled is 670 Amperes at 5.35 Volts.

(3) Do not apply full load to engine until it is warmed up.

(4) Do not flush engine with kerosene as it ruins oil.

(5) Do not run Battery charging Generator with Battery connected from Generator unless the field lead is taken off otherwise excessive high Voltage will result, burning out pilot lights and possibly damaging Generator.

ITEM 11.

Clean and service floor Washing and Waxing machine.

Clean and service Electric Vacuum Cleaner.

Clean and service Electric Drill Press.

Clean and service Lathe.

(a) "Transmitter Room" - Loading Platform: Clean and service floor Washing and Waxing machine.

Procedure: 1ST Wednesday Item No. (8) Paragraph No. (o)

Pages No. ( ) to No. ( ).

(b) "Basement": Proceed to gather tools required to perform remaining portion of this item.

Whisk Broom (Kept in Storage Room)

Small Screw Driver (Kept on Display Board of Basement Work Bench)

Portable Electric Blower (Kept on "Maintenance Bench" in Basement)

Piece of 000 Sand Paper (Kept in drawer #12 in Basement Work Bench)

Bottle of Carbon-Tet (Kept on Basement Work Bench)

Can of "Vacuoline" Type "C" Oil (Kept in Maintenance Tray #2 on "Maintenance Bench")

Dust Pan and Brush (Kept on "Maintenance Bench" in Basement)

Open end Wrench (Kept on Basement Work Bench)

(c) "Basement": Proceed to Basement, Clean and service Electrolux Electric Vacuum Cleaner.

When not in use, it is stored on "Maintenance Bench" near "Short Wave Shelves".

Place Vacuum Cleaner on Work Bench.

Unscrew and remove hose connector from end plate.

Hold end over Waste Basket and lift opposite end up in the air.

This will allow all dirt to drop out.

Release the catches on end plate of dust compartment, then lift end plate off.

Continued on next Page

ITEM 11.

Carefully remove the Dust and Bag and empty all dirt and dust in the Waste Basket.

Wipe out interior of Vacuum Cleaner and both sides of dust compartment end plate with a rag dipped in Naptha.

Replace the Bag and End plate.

Fit latches over raised edge on end plate then lock them into place.

Release the catches on end plate of Motor compartment, then lift end plate off.

Use cloth loop to remove the Filter Pad then clean it with a Whisk Broom.

It it can not be cleaned, replace it with a new one.

CAUTION: Never use any cleaning fluid to clean Filter, it is scented with Cedar Oil.

New Filters are kept in Transfile No. 6

Use small screw driver to remove bolts holding the shield over motor compartment.

Lift the shield off.

Use portable Electric Blower to clean all dust and dirt out of motor.

Loosen, then remove the 2 bakelite brush retainer caps.

Lift brushes out of holders.

There are 2 brushes.

Each brush is fitted with spring and pigtail as a single unit.

Clean brushes with a rag dipped in Carbon-Tet.

Wrap a small piece of cloth about blade of small screw driver, dip in Carbon-Tet and clean out inside of brush holder.

Renew brushes that measure 3/8 inch or less.

New brushes are kept in Transfile No. 95

Replace Brushes and screw on bakelite retainer caps.

Clean commutator as follows:

Connect Vacuum cleaner to 115 Volt A.C. Convenience outlet beneath Work Bench.

Continued on next Page

ITEM 11.

Put "ON" the A.C. Switch, then put it "OFF".

Press sand paper against Commutator a few seconds, until it is Clean and Bright.

Avoid too much cleaning.

Again, Snap "ON" and "EFF" the 115 Volt Supply Switch. Dip a cloth in Carbon-tet and press against the commutator to Clean off Residue.

Bearings are Oil-Impregnated Bronze and need no oiling.

Tighten connection on Motor Switch.

Replace Rubber Ring Gasket around the Outside Edge of the Motor Shield.

Replace Motor Shield with large cut outslot over Switch, push through holes in shield to line-up mounting Bolts, then tighten with small screw driver.

Replace Metal End Plate over Motor Compartment.

Place the Catches in holding holes and Latch them in place.

Wipe off entire outer case of cleaner with rag dipped in Naptha.

Clean the Rubber A.C. Cord with rag dipped in Carbon-Tet.

Repair any cuts or breaks in this Rubber Cord and cover them with friction Tape.

Book No. (1) ( ) ( ) ( ) ( ) ( )
Sec. No. (MG) ( ) ( ) ( ) ( ) ( )
Page No. ( ) ( ) ( ) ( ) ( ) ( )

Continued on Next Page.

ITEM 11.

(d) "Basement": Clean and Service Electric Drill Press.

This Drill Press is permanently screwed down to the Basement Work Bench.

This Drill Press is driven by an Electric Motor of 1/4 Horse Power.

Lift up Cap on top Bearing Oil Pipe and pour in about 10 drops of oil.

Lift up Cap on bottom or lower bearing oil pipe and pour in about 10 drops or oil.

Avoid too much oiling of either bearing.

Too much oil in Top Bearing will run down into this Motor.

This is an Induction Type Motor, having no Brushes or Collector Rings.

Normally this motor needs no further maintenance.

Remove this "Turn Down" Grease cap on top of large motor gear.

Fill with Gargoyle Type "BRB" #1 Grease.

Turn Grease cap clockwise 2 or 3 turns to force grease into Bearing.

Turn Drill placing lever counter-clockwise to lower the Drill Chuck.

Put a few drops of "Vacuoline" Type "C" oil in oil hole on part of the Spindle Shaft.

Put a few drops of oil on rag and wipe outside of the Spindle Shaft.

Turn Drill placing lever clockwise to raise the Drill Chuck.

Wipe top of Spindle Shaft with Oily Rag.

"Feel" the Tension of the Driving Belt.

It should be just loose enough to pull it out one inch.

Tighten or loosen this belt by moving the Motor Pulley Forward or toward Rear.

To move the Pulley toward the Rear, tighten the square headed bolt just below the hinge.

Continued on next Page

ITEM 11.

To move the Pulley to the front, loosen the Bolt.

Dust off entire Drill Press.

Wipe off Motor Frame and Drill Press with a rag dipped in Carbon-Tet.

Book No. ( ) ( ) ( ) ( ) ( ) ( )

Sec. No. ( ) ( ) ( ) ( ) ( ) ( )

Page No. ( ) ( ) ( ) ( ) ( ) ( )

(e) "Basement": Clean and service Lathe.

This Lathe is permanently screwed down on the Basement Work Bench.

It is driven by a 1/4 Horse Power Electric Motor.

Brush all dust, dirt and metal chips into metal can beneath Lathe.

Use blade of small screw driver to clean dirt out of all oil holes.

Wipe off entire Lathe Motor and Pulleys with dry cloth. Clean and polish Bed Plate of Lathe with crocus cloth (rubbing lengthwise). Move the Lathe adjustments to right, then to left, so that the entire Bed Plate may be cleaned.

Clean residue from Bed Plate with rag dipped in Carbon-Tet.

Put a few drops of oil on a rag to lightly coat the Bed Plate, then wipe over entire Lathe.

Pour a few drops of oil in both Motor Bearing oil holes.

Use screw driver blade to remove dirt from oil holes on both ends of large pulley shaft, then pour a few drops of oil in. These Bearings are fitted with oil wicks. (It takes several minutes for the oil to absorb).

Lift up hinged caps on oil openings on both right and left Pulley Bearings on the Lathe.

Put a few drops of oil in all Oil Holes on the Lathe. Put a few drops of Oil on Gears.

Tighten all Bolts and Nuts with steady even pull. Pour a few drops of Oil on a clean rag and clean the Chuck, Adjustment Wheels and Controls.

Continued on next page.

ITEM 11.

Test movement of Chuck jaws.

If they do not move freely, use the Chuck wrench to remove jaws and clean threads with cloth dripped in Naptha.

Put few drops of oil on jaws and reassemble them.

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Sec. No. ( ) ( ) ( ) ( ) ( ) ( )

Page No. ( ) ( ) ( ) ( ) ( ) ( )

End Item 11.

ITEM 12

Service and clean the following 5 KW Transmitter Rotating Equipment.

Make Entry on Proper Form in Book No. (6) Sec. No. (E) Pages No. (199 to 210).

14 Volt D.C. - 1600 Volt D.C. Filament and Plate Motor Generator "MG1P" (One Motor Drives 2 Generators).

22 Volt D.C. Filament Motor Generator "MG2P".

250 Volt D.C. Bias Motor Generator "MG4P".

Distilled Water Pump "M01P".

(a) "Basement": Proceed to the Basement and gather all Maintenance and Cleaning Equipment needed for performance of this Item.

Procedure: See Wednesday Item No. (5) (a) Pages No. (24 to 25).

(b) CAUTION: Before beginning Maintenance Work

Procedure: Same as Item No. (5) (b) (Wednesday) Page No. (25). except as follows:

Proceed to "AC Power Panel" Unit #1 (A) of the 5 KW Transmitter and put "OFF" the 230 Volt A.C. "Power Supply" Switch "D4A".

Before working on a machine, put "OFF" the 230 Volt A.C. Motor Switch mounted on each Motor.

When all servicing and cleaning work is finished on that machine, put "ON" the 230 Volt A.C. "Power Supply" Switch which is mounted on the Motor Frame.

Do this to avoid having more than one machine out of service at a time, this making it easier to quickly place the 5 KW Transmitter in service in an emergency.

(c) "Outline of Step Method" for Maintenance of Rotating Machinery":

STEPS #1 to #22 INCLUSIVE: Procedure: Same as Item No. (5) (c) (Wednesday) Pages No. (26 to 27).

Continued on Next Page

ITEM 12

(d) "Basement": Proceed to the Basement, service and clean 5 KW Transmitter 14 Volt D.C. - 1600 Volt D.C. Filament and Plate Motor-Generator "MG1P". The Motor-Generator is mounted on the Common Concrete Platform in Main Basement marked "Auxiliary 5 KW Transmitter Motor-Generators".

Group all Maintenance and cleaning equipment within easy reach.

The Motor of "MG1P" is an Inductive Type Motor, having no Commutator and no Brushes.

Put "OFF" "230 Volt AC Motor Switch" "D1P" which is mounted on the Motor Frame.

STEP #1: Check Brush Spring Pressure (Generators)

Use large Screw Driver to loosen the 2 Locking Bolts on Right and Left Sides of the 14 Volt DC Generator Commutator Guard.

Lift up on the Right and Left Spring Latches, holding guards in place.

Lift off both top and bottom halves of this guard.

"14 Volt DC Generator": Use the Fishermans Scale, placing the "Weighing-Clip" around the Brush Spring arm just above the point where it rests against the Brush.

Slowly pull out on the Fishermans Scale until the Spring Arm begins to move AWAY FROM THE BRUSH.

The number of pounds indicated on the Fishermans Scale is the Brush Spring Tension.

Correct Brush Spring Tension: Minimum 2 Lbs. Maximum 3 Lbs.

If tension is less than minimum, increase same by placing the curved Spring adjustment end in the next notch, producing more tension on the Brush Spring Arm.

Measure Brush Spring Tension.

If the curved Spring adjustment end is in the last notch, providing maximum tension, but same measures less than 2 Lbs, replace with a new Brush Spring

New Brush Springs are kept in Transfile No. 98 .

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ITEM 12

"1600 Volt Generator Commutator #1": Procedure same as for 14 Volt D.C. Generator outlined in this item, except that Brush Spring Pressures are: Minimum 2 Lbs, Maximum 3 Lbs.

"1600 Volt Generator Commutator #2": Procedure same as for 14 Volt D.C. Generator outlined in this item, except that Brush Spring Pressures are: Minimum 2 Lbs, Maximum 3 Lbs.

STEP #2: Check Brush Positions.

14 Volt D.C. Generator: Procedure: See Wednesday Item No. (5) (d) Page No. (29) Step No. (2), except the following:

Correct clearance of Brush Holder is 1/16 inch from Commutator.

As viewed from the Generator end, there are 4 Brushes on left side and 4 Brushes on right side.

Each Brush Holder holds 2 Brushes with a thin Metal Separator between them.

Outer Brush Holder on Right side is secured to the armsso that outer edge of Brush is 1/8 inch in from outer edge of the Commutator.

The next Brush Holder on Right side is secured to the Arm so that Brush Holders are 1/2 inch apart.

Outer Brush Holder on Left side is secured to the Arm so that outer edge of the Brush is 3/8 inch in from outer edge of the Commutator.

The next Brush Holder on Left side is secured to the arm so that Brush Holders are 1/2 inch apart.

As will be observed, this staggers the Brushes covering nearly all of the Commutator Surface, thus preventing excessive Wear of Sections of Commutator.

Observe that the Brush "Rocker Arm" is in correct position as will be evidenced by the mark on "Rocker Arm" and generator casting being in alignment.

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ITEM 12

Procedure: See Wednesday Item No. (5) (d) Page No. (32)
Step No. (6), except the following:
Conduits to both the 14 Volt DC and 1600 Volt DC Generators end in large Rectangular boxes fitted with covers.
Merely remove bolts to take covers off for inspection or maintenance work.

STEP #7: Clean Motor thoroughly, blowing dirt from Windings and wipe commutators and Brushes.
Procedure: See Wednesday Item No. (5) (d) Page No. (33)
Step No. (7).

STEP #8: Check Motor Foot Bolts, Shield Bolts, Coupling, Gear and Journal Set Screws, and "Keepers".
Procedure: Wednesday Item No. (5) (d) Pages No. (33)
Step No. (8), except Motor Generator Couplings are fitted with Leather Discs instead of Fabric Discs.
There are 2 Coupling Shields instead of one.

STEP #9; #10, #11: Procedure: See Wednesday Item No. (5) (d)
Pages No. (34) to (35) Steps No. (9) (10) (11).

STEP #12: Check clearance between Shaft and Bearings of Sleeve Bearing Motors dto determine if Bearings are worn.
Procedure: See Wednesday Item No. (5)(d) Page No. (35)
Step No. (12), except the following:
"MG1P" is a 6 Bearing Machine, 2 Bearings for the Motor and 2 Bearings for each Generator.

Continued on next Page.

ITEM 12

It will not be possible to check outside Bearing on Motor or Outside Bearing on 14 Volt Generator.

Remove Caps from ends of Castings and Visually inspect for excessive wear.

STEP #13: Clean out undercut slots in Commutator.

14 Volt D.C. Generator: Note: It is not necessary for 22 Volt D.C. Motor-Generator "MG2P" nor 250 Volt D.C. Motor-Generator "MG4P" to run while Commutators of 14 Volt-1600 Volt D.C. Motor-Generator "MG1P" are being cleaned.

Put "OFF" the 230 Volt A.C. Supply Motor Switch "D2P" and "D4P".

Both Switches are mounted on Brackets secured to those Motors.

Start the Motor of "MG1P" as follows:

Proceed to 5 KW Transmitter "AC Power Panel" and put "ON" "AC Supply" Switch "D4A".

Push "Master Control" "Start" Button Switch "D3A".

Put "ON" 230 Volt AC Motor Switch "D1P" of Motor-Generator "MG1P".

Wait until machine reaches full speed.

Place "Ideal Polishing Stone" lightly on the Commutator to remove any glazing or scum.

Fold Canvas into a pad about 3 inches square and press against commutator.

Be sure that there are no loose threads on Canvas Pad.

While Machine is running, observe if ALL Oil Rings on both ends of the Motor and both ends of each Generator are revolving, thus carrying oil to Bearings Surfaces.

Stop the Motor by pushing the "Master Control" "Stop" Button "D3A".

Put "OFF" the 230 Volt A.C. Motor Switch "D1P" of Motor Generator "MG1P".

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ITEM 12

Wait until the machine has completely stopped before proceeding.

Use A.C. Portable Blower to blow all copper dust and other Residue from Generator Commutator, Armature, and Frame.

Clean Slots of the Commutator with Special Tool made from Hack Saw Blade.

Merely place the Sharp edge of the cleaning tool in the Slot and pull it back through the Slot to remove Carbon Brush Particles, Dust, Dirt and other residue.

Avoid too much cleaning of the slots, since this cuts away the Mica Insulation between commutator Segments.

Begin at the inside end of the slots and clean toward the outer edge of the commutator.

The Slot being cleaned should be on top, just to the right of the top metal frame member.

Rotate the Armature as each slot is cleaned, until all slots are cleaned.

1600 Volt DC Generator: CAUTION: DO NO WORK ON EITHER COMMUTATOR OF 1600 VOLT DC GENERATOR "MG1P" AND DO NOT TOUCH EITHER COMMUTATOR WHILE MACHINE IS IN MOTION.

At operating Speed, there is 800 Volts DC on each commutator.

Guards must always be over commutators when machine is operated.

Use a small piece of #000 Sandpaper to clean each commutator.

Merely rotate armature of machine BY HAND.

Clean residue from commutators with a clean cloth dipped in Carbon-tet.

From undercut slots as outlined.

Continued on next Page.

ITEM 12

STEP #14: Examine Connections of Commutator and Armature.

Procedure: See Wednesday Item No. (5) (d) Page No. (37) Step No. (14), except as follows:

This applies to the 14 Volt D.C. Generator and both Commutators and Armature of the 1600 Volt D.C. Generator.

STEP #15: Inspect Armature Bands.

Procedure: See Wednesday Item No. (5) (d) Page No. (37) Step No. (15) except the following:

This applies to the 14 Volt D.C. and 1600 Volt D.C. Generators.

STEP #16: Drain, wash out, and renew oil in Sleeve Bearings.

This does not apply, except on 1st Wednesday of ~~the Month.~~ Jan & July.

Procedure: See Wednesday Item No. (8) Page No. (140).

STEP #17 & #18:

17. Check Grease in Ball or Roller Bearings.

18. Clean out and renew Grease in Ball or Roller Bearings. / 2nd Wednesday in Jan & July.

These 2 Steps do not apply.

Motor Generator "MG1P" has Sleeve Bearings.

STEP #19: Test Insulation Resistance.

This does not apply unless in emergency or autorized by Supervisor.

Procedure: See Wednesday Item No. (5) (l) Page No. (93).

STEP #20: Check operating Speed(s).

This does not apply.

Procedure: See Wednesday Item No. (5) (m) Page No. (96).

Continued on next Page.

ITEM 12

STEP #21: How to Treat a Hot Bearing.

This does not apply.

Procedure: See Wednesday Item No. (5) (n) Page No. (100).

STEP #22: Principles of Commutators - Brush Holders - Brush Pressures - Current Collectors.

This does not apply.

Procedure: See Wednesday Item No. (5) (o) Page No. (102).

STEP #23: Wipe off Brushes and inside of Brush Holders with dry Cloth

Replace all 14 Volt - 1600 Volt D.C. Generator Brushes in proper Brush Holders.

Grasp the curved adjustment end of the Spring, push it away from Brush Spring Arm and place it in the 3rd notch.

As outlined in Step #1, use Fishermans Scale to adjust Spring Pressures to correct value.

STEP #24: Check level of Oil in Sight Cups - 3/4 full is correct.

When Motor is idle, do not fill oil cups to the top.

There are 2 Oil Level Sight Cups on the Motor, one on each end of the Shaft.

There are 2 Oil Level Sight Cups on the 14 Volt DC Generator, one on each end of Shaft and 2 Oil level Sight Cups on the 1600 Volt DC Generator, also on each end of the shaft. Do not oil. except as directed in Jan & July.

STEP #25: Inspect "Tel-Temp" for looseness.

To tighten, merely twist entire "Tel-Temp".

Wipe off celluloid face of the instrument with slightly damp cloth.

Continued on next Page.

ITEM 12

Wipe all copper dust from around Brush Yokes of Both 14 Volt DC And 1600 Volt DC Generator Armatures.

Wipe off insides and outsides of Expanded Metal Generator Commutator Compartment guards with cloth dipped in Naptha or Benzine.

Replace the expanded Metal Guards on the 14 Volt DC Generator and 1600 Volt DC Generator Brush Compartments.

Line up the Metal Guards with locking bolts in slots of top and bottom Guards.

Replace Latches and lock them tightly.

Tightening Latches will pull the metal guards tightly around the Generator Commutator Compartments.

Clean Motor Frame, Generator Frame, and Main Base Frame with cloth dipped in Carbon-tet.

Polish Motor Frame, Generator Frames and Main Base Frame with Staffords Polish.

Wipe off entire platform around "MG1P" with rag dipped in Carbon-tet, then polish with Staffords Polish.

Sweep Floor around Motor-Generator Platform to avoid tracking dust and dirt throughout the Plant.

Remove 14 Volt Filter Condenser Fuses "F1.1P" and "F1.2P" and test them on Basement "Fuse Tester Rack".

These fuses are located in Metal Cabinet adjacent to 14 Volt Filter Choke

Replace fuses if they test good, or put in new ones of correct size if they test "Blown".

Check Connections to 14 Volt Filter Choke and Capacitors "C1.1P" & "C1.2P".

Observe amount of Sediment and Precipitation in Condenser "C1.1P" & "C1.2P".

Clean porcelain tops with Staffords Polish.

Continued on next Page.

ITEM 12

Wipe sides of glass jars with slightly damp cloth.

CAUTION: NEVER START MOTOR-GENERATOR "MG1P" UNTIL EVERY NUT, BOLT, OR LOCK WASHER IS ACCOUNTED FOR, OR UNTIL OTHER EQUIPMENT IS REMOVED FROM THE MACHINE.

STEP #26: Make no test of "MG1P" at this time.

Wait until ALL Motor-Generators and Distilled Water Pump are serviced.

If only 14 Volt-1600 Volt DC Motor-Generator "MG1P" is serviced, proceed to test it as part of entire 5 KW Transmitter Test per Book No. (5) Sec. No. (D) Pages No. (1) to (5) and No. (28) to (33), Items 1 to 33.

Book No.	(9)	(9)	(2)	( )	( )	( )
Sec. No.	(K)	(I)	(C)	( )	( )	( )
Page No.	( )	( )	( )	( )	( )	( )

ITEM 12.

(e) "BASEMENT": Service and clean 5 KW Transmitter 22 Volt D.C. Generator "MG2P".

This Motor Generator is mounted on the common Concrete Platform in main Basement marked "Auxiliary 5 KW Transmitter Motor Generator". Group all maintenance and cleaning equipment within easy reach. Proceed to A.C. Power Panel of 5 KW Transmitter & put "OFF" the 230 Volt "A.C.Power Supply" Switch "D4A". (Remained off id Wednesday Item No. (12) Paragraph (d) was completed). Put "OFF" the 230 Volt A.C. Motor Switch "D2P". The Motor of "MG2P" is an induction Motor, having no commutator and no Brushes.

STEP #1 to #24: Procedure is the same as that listed in Paragraph (d) 50 KW Transmitter 20 Volt D.C. Motor Generators "MG1P" or "MG2P" Wednesday Sec. No. (E) Item No. (5) Pages No. (27 to 43) except as follows:

STEP #1: Check Brush Spring Pressure.

Use large Screw driver to loosen the 2 locking Bolts on Right and Left sides of 22 Volt D.C. Generator Commutator Guard. Lift up on the Right and Left spring latches, holding guards in place. Lift off both top and bottom halves of this guard.

Correct Brush Spring Tension: Minimum __ Lbs; Maximum __ Lbs.

If unable to adjust Brush Spring Pressure within limits, replace with a new Brush Spring.

New Brush Springs are kept in Transfile No. 98

Continued on Next Page.

ITEM 12.

STEP #2: Check Brush position, correct clearance of Brush Holder is 3/32 inch.

As viewed from Generator End, there are 2 Brushes on Left side & 2 Brushes on the Right side.

Each Brush Holder holds 2 Brushes with a thin metal Seperator between them.

Each double Brush Holder is secured to the arm so that Brushes ride on Commutator 1/4 inch in from the outer edge of the Commutator.

STEP #4: Inspect Commutator Clamping Ring for signs of looseness, rough or worn Mica edges.

This does not apply.

There is no Clamping Ring on this Commutator.

STEP #13: Clean out undercut Slots in Commutator.

NOTE: It is not necessary for 14 Volt-1600 Vold D.C. Motor-Generator "MG1P" nor 250 Volt D.C. Motor-Generator "MG4P" to run while Commutator of 22 Volt D.C. Motor Generator "MG2P" is being cleaned.

Put "OFF" the 230 Volt A.C. Supply Switches "D1P" & "D4P".

Both Switches are mounted on Brackets secured to those Motors.

Start the Motor of "MG2P" as follows: Proceed to 5 KW Transmitter "A.C. Power Panel" & put "ON" 230 Volt A.C. "Power Supply" Switch "D4A" "Master Control" "Start" Button Switch "D3A".

Put "ON" the 230 Volt A.C. Motor Switch "D2P" of Motor Generator "MG2P".

Continued on Next Page.

Steps 16-17-18 same as entered in pencil Sec (E) page 183.

ITEM 12.

Wait until machine reaches full Speed then proceed as outlined.

When this step is finished, push Master Control "STOP" Button Switch "D3A".

Put "OFF" A.C. "Power Supply" Switch "D4A".

Put "OFF" the 230 Volt A.C. Motor Switch "D1P".

STEP 25: Inspect "Tel-Temp" for looseness.

To tighten, merely twist entire "Tel-Temp".

Wipe off celluloid Face of the Instrument with slightly damp Cloth.

Wipe off Copper dust from around Brush Yoke of Armature.

Wipe off insides and outsides of Expanded Metal Generator Commutator Compartment Guards with Cloth dipped in Naptha or Benzine.

Replace the Expanded Metal Guards on the Generator.

Line up the Metal Guards with Locking Bolts in Slots of Top and Bottom Guards.

Replace Latches and lock them tight.

Tightening Latches will pull the Metal Guards tightly around the Generator Commutator Compartments.

Clean the Motor Frame, Generator Frames and Main Base Frame with Staffords Polish.

Wipe off entire Platform around "MG2P" with a rag dipped in Carbon-tet, then polish with Staffords polish.

Sweep the Floor around Motor Generator Platform to avoid tracking dust and dirt throughout the Plant.

Continued on Next Page.

ITEM 12.

Remove 22 Volt Filter Condenser Fuses "F2.1P"N& "F2.2P" and test them on Basement "Fuse Tester Rack".

These Fuses are located in Metal cabinet adjacent to 22 Volt Filter Choke ____

Replace Fuses if they test good or put in new ones of correct size if they test "Blown".

Check connections to 22 Volt Filter Choke ___ & Capacitors "2.1P" & "C2.2P".

Observe amount of Sediment and Precipitation in Condensers "C2.1P" & "C2.2P".

Clean Porcelain Tops with Staffords Polish.

Wipe Sides of Glass Jars with slightly damp Cloth.

CAUTION: Never start Motor Generator "MG2P" until every Nut, Bolt? or Lock Washer is accounted for or until other equipment is removed from the Machine.

STEP #26: Make no test of "MG2P" at this time.

Wait until ALL Motor-Generators and Distilled Water Pump are serviced.

If only 22 Volt D.C. Motor-Generator "MG2P" is serviced, proceed to test it as part of entire 5 KW Transmitter test per Book No. (5) SEC. No. (D) Pages No. (1) to (5) and No. (28) to No. (33) Items 1 to 33.

NOTE: ~~spare~~ MG3P 22 Volt D.C. Filament Motor Generator "MG3P" is ~~in use for a week~~ checked same as reg machine MG2P, proceed to service and clean it as outlined for Motor Generator "MG2P".

Book No. (9) (9) (2) ( ) ( ) ( )
Sec. No. (K) (I) (C) ( ) ( ) ( )
Page No. ( ) ( ) ( ) ( ) ( ) ( )

ITEM 12

(f) "Basement": Service and clean 5 KW Transmitter 250 Volt D.C. Motor-Generator "MG4P".

This Motor-Generator is mounted on the Common Concrete Platform in the Main Basement marked "Auxiliary 5 KW Transmitter Motor-Generators".

Group all Maintenance and cleaning equipment within easy reach.

Proceed to "A.C. Power Panel" Unit #1 (A) of 5 KW Transmitter and put "OFF" the 230 Volt A.C. "Power Supply" Switch "D4A".

(Remained "OFF" if Wednesday Item No. (12) Paragraphs (d) (e) were completed).

Put "OFF" the 230 Volt A.C. Motor Switch "D2P".

The Motor of "MG4P" is an Induction Motor, having no Commutator and no brushes.

STEPS #1 to #23: Procedure is the same as that listed in Paragraph (d) 50 KW Transmitter 20 Volt D.C. Motor Generators "MG1P" or "MG2P". Wednesday Sec. No. (E) Item No. (5) Pages No. (27) to (45), except as follows:

STEP #1: Check Brush Spring Pressure.

Brush Spring Pressure is not adjustable.

Brush, Spring and Pig Tail connector are put together as a single unit.

STEP #2: Check Brush Position.

The Position of the Brush Holders are not adjustable.

Each Brush Holder is fixed at 1/8 inch from Commutator.

There are 2 Brushes, mounted in 2 Holders diamatrically opposite each other.

Continued on next Page.

ITEM 12

STEP #3: Check Brushes and renew any that are worn within.1/8 inch of Metal Rivet.

Use medium size Screw driver to loosen, then remove the Brush Retainer Cap from outside of each Brush Holder.

Pull Spring and Brush out of Holder.

Measure Brush with Steel Rule.

Renew any Brush measuring 3/8 inch or less.

New Brushes are curved to fit the Generator Commutator, requiring no "Seating". Merely place Brush with curved face to fit Commutator.

New Brushes are kept in Transfile # 95.

STEP #4: Inspect Commutator damping ring for signs of looseness, rough or worn Mica edges.

This does not apply.

There is no Clamping Ring on this Generator Commutator.

STEP #10: Check Air Gap.

Visually check clearance between Generator armature and the 2 Field Pole surfaces.

Clearance must be the same between Armature and each Field Pole to prevent Armature from striking Pole.

When Air Gap is insufficient, one or both Generator Sleeve Bearings is worn and must be renewed.

STEP #12: Check clearance between Shaft and Bearing of sleeve bearing Motor to determine if Bearings are worn.

Continued on next Page.

ITEM 12

Procedure: See Wednesday Item No. (5) (g) Step No. (12)

Page No. (65)

STEP #13: Clean out undercut slots in Commutator.

NOTE: It is not necessary for 14 Volt - 1600 Volt DC Motor Generator "MG1P" nor 22 Volt DC Motor-Generator "MG2P" to run while Commutator of 250 Volt DC Motor-Generator "MG4P" is being cleaned.

Put "OFF" the 230 Volt A.C. Supply Switches "D1P" and "D2P".

Both Switches are mounted on Bracket secured to these Motors.

Start the Motor of "MG4P" as follows:

Proceed to 5 KW Transmitter "A.C. Power Panel" Unit #1 (A) and put "ON" 230 Volt A.C. "Power Supply" Switch "D4A".

Push "Master Control" "Start" Button Switch "D3A".

Put "ON" 230 Volt A.C. Motor Switch "D4P" of Motor-Generator "MG4P".

Wait until machine reaches full speed then proceed as follows:

Place small piece of #000 Sandpaper on Commutator through opening in left end of Generator as near to Left Brush as possible.

This is the Positive or "Grounded" Terminal.

Cleaning on the Left Side will avoid an Electrical Shock from 250 Volts D.C.

Exert pressure wiping back and forth across Commutator until Commutator is Clean and Bright.

Clean residue from Commutator with a Clean cloth dipped in Carbon-tet.

Proceed to 5 KW Transmitter "AC Power Panel" and put "OFF" 230 Volt A.C. "Power Supply" Switch "D4A".

Push Master Control "Stop" Button Switch "D3A".

Put "OFF" 230 Volt A.C. Motor Switch "D4P"

Steps 16-17-18 change oil only Jan 1st & July 1st
Wed. each year.

Continued on next Page.

4TH WEDNESDAY

ITEM 12

STEP #24: Check level of oil in Sight Cups - 3/4 full is correct.

When Motor is idle, do not fill Oil Cups to the Top.

There are 2 Oil Level Sight Cups on the Motor, one on each end of the Shaft.

There are no Oil Level Sight Cups on the Bearings of the Generator.

Add oil to both Motor Bearings through the Covered opening on top of the Bearing Housing to raise level of oil in Sitht Cups to 3/4 Full.

Oil both Generator Bearings through small oil Holes on ends of Motor Frame.

Add Oil at openings until oil stops being absorbed into bearing.

Wipe excess oil from around Oil Hole. & middle of machine, dust

Only oil 1st wed each Jan & July.

STEP #25: Inspect "Tel-Temp" for looseness.

To tighten, merely twist entire "Tel-temp".

Wipe off Celluloid Face of the instrument with slightly damp cloth.

Clean Motor Frame, Generator Frame and Main Base Frame with cloth dipped in Carbon-tet.

Polish Motor Frame, Generator Frame and Main Base Frame with Staffords Polish.

Wipe off entire Platform around "MG4P" with a rag dipped in Carbon-tet, then polish with Staffords Polish.

Sweep the floor around Motor Generator Platform to avoid tracking dust and dirt throughout the Plant.

STEP #26: Make no test of "MG4P" at this time.

Wait until ALL Motor-Generators and Distilled Water Pump are serviced.

If only 250 Volt D.C. Motor Generator "MG4P" is serviced, proceed to test it as part of entire 5 KW Transmitter Test per Book No. (5) Sec. No. (D) Pages No. (1) to (5) and No. (28) to (33) Items No. (1) and No. (33).

Continued on next Page.

MG5

ITEM 12

NOTE: If Spare 250 Volt D.C. Bias Motor-Generator "MG5P" ~~is in use for a~~ Feed, proceed to service and clean it as outlined for Motor-Generator "MG4P", except as follows:

This Motor is not an Induction Type.

This Motor is oiled in same manner as the Generator.

This Motor has 4 Brushes equally spaced around the Commutator.

They are the same type as Generator Brushes.

The Generators of Bias Machine "MG4P" and "MG5P" are exactly alike. & both

Book No. (9) (9) (2) ( ) ( ) ( )

Sec. No. (K) (I) (C) ( ) ( ) ( )

Page No. ( ) ( ) ( ) ( ) ( ) ( )

and to be oiled not used on Jan & July only.

ITEM 12

(g) "Pump Room": Service and clean 5 KW Transmitter Distilled Water Pump "M01P".

This Motor Driven Pump is mounted on a Concrete Platform to the Right of the "Distilled Water Storage Rack".

Group all maintenance and cleaning equipment within easy reach.

Proceed to "AC Power Panel" Unit #1 (A) of the 5 KW Transmitter and put "OFF" the 230 Volt A.C. Power Supply Switch "D4A".

(Remained "OFF" if Wednesday Item No. (12) Paragraphs (d) (e) (f) were completed.

Put "OFF" the 230 Volt A.C. Motor Switch "D6P".

The Motor of "M01P" is an Induction Motor having no commutator and no brushes.

STEPS #1 to #5: These do not apply.

This is an Induction Type Motor.

STEPS #6 to #22: Procedure same as that listed in Paragraph (g) 50 KW Transmitter Distilled Water Pump "M03P" and "M04P" Wednesday Sec. No. (E) Item No. (5) Pages No. (62) to (75), except as follows:

STEP #8: Check Motor Foot Bolts, Coupling, Gear and Journal Set Screws, and "Keepers".

Coupling between Motor and Pump is not Bolted.

There are 2 Studs on the Motor side and 2 Studs on the Pump side.

A strip of Leather is woven between the Studs so that Studs touch Leather and not each other.

Merely check coupling for "Play".

Too much "Play" will cause excessive Vibration

The remedy is to replace the Leather.

Continued on next Page.

ITEM 12

STEP #23: Clean corrosion from pump Gland Studs with a Wire Brush. Place a few drops of Oil on each of the Stuffing Gland adjusting Studs to delay Corrosion.

STEPS #24 & #25: Procedure same as that listed in Paragraph (g) 50 KW Transmitter Distilled Water Pumps "M03P" and "M04P" Wednesday Sec. No. (E) Item No. (5) Pages No. (62) to (73).

If it is necessary to change pump packing, see procedure listed in paragraph (g) 50 KW Transmitter Distilled Water Pump "M03P" and "M04P" Wednesday Sec. No. (E) Item No. (5) Pages No. (62) to (73).

NOTE: If Spare 5 KW Transmitter Distilled Water Pump "M02P" is in use for a week, proceed to service and clean it as outlined for 5 KW Pump "M01P", except as follows:

The Motor is exactly like the 5 KW Transmitter 250 Volt DC Motor Generator "MG5P" and should be serviced by same procedure as Wednesday Item No. (5) Paragraph (f) Page No. (57).

STEP #26: Put all 230 Volt A.C. Motor Switches "ON" as listed:

Switch No. "D1P" - "MG1P"

Switch No. "D2P" - "MG2P"

Switch No. "D4P" - "MG4P"

Switch No. "D6P" - "M01P"

Proceed to "A.C. Power Panel" Unit #1 (A) and Test 5 KW Transmitter as outlined in Book No. (5) Sec. No. (D) Pages No. (1) to (5) and No. (28) to (33) Items No. (1) and No. (33).

Continued on Next Page.

W O R
OPERATING MANUAL

"Plant & Equipment Maintenance"

BOOK No. (6)
SEC. No. (E)
PAGE No. (198)
4TH WEDNESDAY

ITEM 12

Book No.	(1)	(9)	(9)	(2)	( )	( )
Sec. No.	(W)	(K)	(I)	(C)	( )	( )
Page No.	( )	( )	( )	( )	( )	( )

End Item 12

5 KW Transmitter - 14 Volt - 1600 Volt D.C. Motor Generator "MG1P"

WESTERN ELECTRIC

GENERATORS "MG1P"

	1600 Volt	14 Volt
MODEL:	72641	76929
TYPE:	CY 54	RC 24
	SHUNT WOUND	SHUNT WOUND
AMPS:	1.5	55
VOLTS:	1600	16
SPEED:	1750	1750
NO.:	1491815	1494692
K.W.:	2.4	

MOTOR "MG1P"

W.E. INDUCTION MOTOR

MODEL:	47321
TYPE :	KT750
FORM :	C
PHASE:	3
CYCLES:	60
AMPS :	13.8
VOLTS:	220
SPEED:	1750
H.P.:	5
NO.:	4650587

ITEMS 8 - 12

5 KW Transmitter - 1600 Volt D.C. Motor Generator "MG1P"

MOTOR

1946

DATE	1/1/43	8/3/43	12/9/44	4/30/45	9/29/46	10/25
SIGN	DL	RS	DL	RS	DL	DL
TYPE OIL	Vac C	Vac C	Vac C	Vac C	Vac C	Vac C
ADDED	Yes	Yes	Yes	Yes	Yes	Yes
RENEWED	no	No	—	—	—	—
TYPE COUPLING	Leather	Leather	"	Leather	"	"
CONDITION	OK	OK	OK	OK	OK	OK
RENEWED	—	6	0	—	-	-

GENERATOR

DATE	1/1/43	8/3/43	12/9/44	4/30/45	9/29/46	10/25
SIGN	DL	RS	DL	RS	DL	DL
TYPE BRUSHES	GE	GE	GE	GE	GE	GE
NO. BRUSHES	4	4	4	4	4	4
NO. ADDED	0	0	0	0	0	0
TYPE BRUSH SPRINGS	GE	GE	GE	GE	GE	GE
NO. SPRINGS	4	4	4	4	4	4
NO. RENEWED	0	0	0	0	0	0
TYPE BRUSH HOLDERS	GE	GE	GE	GE	GE	GE
NO. HOLDERS	4	4	4	4	4	4
NO. RENEWED	0	0	0	0	0	0
TYPE OIL	Vac C	Vac C	Vac C	Vac C	Vac C	Vac C
ADDED	Yes	Yes	Yes	Yes	Yes	Yes
RENEWED	—		—	—	—	—

ITEMS 8 - 12

5 KW Transmitter - 14 Volt D.C. Generator "MG1P".

GENERATOR

DATE	1/1/43	8/3/43	12/9/44	4/30/45	9/29/46	11/29/46
SIGN	[illegible]	RS	[illegible]	RS	[illegible]	[illegible]
TYPE BRUSHES	GE	GE	GE	GE	GE	GE
NO. BRUSHES	8	8	8	8	8	8
NO. RENEWED	0	0	0	0	0	0
TYPE BRUSH SPRINGS	GE	GE	GE	GE	GE	GE
NO. SPRINGS	8	8	8	8	8	8
NO. RENEWED	0	0	0	0	0	0
TYPE BRUSH HOLDERS	GE	GE	GE	GE	GE	GE
NO. HOLDERS	8	8	8	8	8	8
NO. RENEWED	0	0	0	0	0	0
TYPE OIL	Vac O	Vac C	Vac	Vac C	Vac O	Vac O
ADDED	Yes	Yes	Yes	Yes	Yes	Yes
RENEWED	—		—	—	—	—

ITEMS 8 - 12

5 KW Transmitter - 22 Volt D.C. Motor Generator - "MG2P"

"MG2P" - MOTOR

W.E. INDUCTION MOTOR
MODEL: 402533
FORM: C
CYCLES: 60
VOLTS: 220
AMPS.: 8.6
SPEED: 1740.
NO.: 4797760
H.P. : 3.5
TEMP.: 50° C.
PHASE: 3

"MG2P" - GENERATOR

MODEL: 76261
TYPE: RC27A
FORM: A 38
COMPOUND WOUND
VOLTS: 24
AMPS.: 85
SPEED: 1800
NO.: 1508441
K.W.: 2.04
TEMP.: 50° C.

"MG3P" - MOTOR

W.E. INDUCTION MOTOR
MODEL: 65A882
FORM: CL
PHASE: 3
VOLTS: 220
AMPS.: 9
SPEED: 1750
NO.: FG 623
H.P.: 3.5
TEMP.: 50° C.
K.S.: 5112

"MG3P" - GENERATOR

MODEL: 46A809
TYPE: CD 55
FORM: AL
COMPOUND WOUND
VOLTS: 24
AMPS.: 85
SPEED: 1750
NO.: 1596253
K.W.: 2.04
TEMP.: 50° C.
K.S.: 5112

ITEMS 8 - 12

5 KW Transmitter - 22 Volt D.C. Motor-Generator "MG2P"

MOTOR

DATE	1/1/43	8/3/43	12/9/44	4/30/45	9/29/46	10/25 1946
SIGN	[illegible]	RS	[illegible]	RS	[illegible]	[illegible]
TYPE OIL	Vac C	Vac C	Vac C	Vac C	Vac C	Vac C
ADDED	Yes	Yes	Yes	Yes	Yes	Yes
RENEWED	—	—	—	—	—	—
TYPE COUPLING	Leather	Leather	"	Leather	"	"
CONDITION	OK	OK	OK	OK	OK	OK
RENEWED	—	—	—	—	—	—

GENERATOR

DATE	1/1/43	8/3/43	12/9/44	4/30/45	9/29/46	10/25
SIGN	[illegible]	RS	[illegible]	RS	[illegible]	[illegible]
TYPE BRUSHES	GE	GE	GE	GE	GE	GE
NO. BRUSHES	4	4	4	4	4	4
NO. RENEWED	0	0	0	0	0	0
TYPE BRUSH SPRINGS	GE	GE	GE	GE	GE	GE
NO. SPRINGS	4	4	4	4	8	8
NO. RENEWED	0	0	0	0	0	0
TYPE BRUSH HOLDERS	GE	GE	GE	GE	GE	GE
NO. HOLDERS	4	4	4	4	8	8
NO. RENEWED	0	0	0	0	0	0
TYPE OIL	Vac C	Vac C	Vac C	Vac C	Vac C	Vac C
ADDED	Yes	Yes	Yes	Yes	Yes	Yes
RENEWED	—		—	—		—

ITEMS 8 - 12

5 KW Transmitter - 22 Volt D.C. Motor Generator "MG3P"

MOTOR

1947

DATE	10/25	11/29				
SIGN	JE	JE				
TYPE OIL	Vac	Vac				
ADDED	1Pt	1Pt				
RENEWED	—	—				
TYPE COUPLING	Leather	Leather				
CONDITION	OK	OK				
RENEWED	—	—				

GENERATOR

DATE	10/25	11/29/46				
SIGN	JE	JE				
TYPE BRUSHES	JE	JE				
NO. BRUSHES	8	8				
NO. RENEWED	0	0				
TYPE BRUSH HOLDERS	JE	JE				
NO. HOLDERS	8	8				
NO. RENEWED	0	0				
TYPE BRUSH SPRINGS	JE	JE				
NO. SPRINGS	8	8				
NO. RENEWED	0	0				
TYPE OIL	Vac	Vac				
ADDED	1Pt	1Pt				
RENEWED	—	—				

ITEMS 8 - 12

5 KW Transmitter - 250 Volt D.C. Motor Generator "MG4P"

"MG4P" - MOTOR

W.E. INDUCTION MOTOR
MODEL: 58 A 18
TYPE : KT 914
FORM : C
PHASE: 3
VOLTS: 220
AMPS: 2.33
CYCLES: 60
SPEED: 1735
H.P. : 3/4
TEMP: 40° C
NO.: 4754171

"MG4P" - GENERATOR

MODEL: 30415
SHUNT WOUND
TYPE : SD
FRAME: 1256
K.W. : .15
VOLTS: 250
AMPS: .6
SPEED: 1725
TEMP.: 50° C
KS : 5060 AF

Generator armature rewound by Vernon Bros 6/5/45-

"MG5P" - MOTOR

MODEL : 26156
TYPE: RSA
FRAME: 1455
PHASE: 1
CYCLES: 60
VOLTS: 110/220
AMPS.: 7.7/3.8
TEMP: 50° C
K.S. : 5060 AF

"MG5P" - GENERATOR

MODEL: 30415
TYPE: SD
SHUNT WOUND
FRAME: 1256
AMPS.: .6
VOLTS: 250
SPEED: 1725
NO.: AE

Spare new armature installed 6/5/45-

Gen case 43° C
Temps. after 24 hour run.

ITEMS 8 - 12

5 KW Transmitter - 250 Volt D.C. Motor-Generator "MG4P"

MOTOR

DATE	1/1/43	8/3/43	12/9/44	4/30/45	9/29/46	10/25
SIGN	AL	RS	AL	RS	AL	AL
TYPE OIL	Vac C	Vac C	Vac C	Vac C	Vac C	Vac C
ADDED	Yes	Yes	Yes	YES	NO	Yes
RENEWED	—			—	-	-
TYPE COUPLING	Leather	Leather	"	Leather	"	"
CONDITION	OK	OK	OK	OK	OK	OK
RENEWED	—		-	—	-	-

GENERATOR

DATE	1/1/43	8/3/43	12/9/44	4/30/45	9/29/46	10/25
SIGN	AL	RS	AL	RS	AL	AL
TYPE BRUSHES	GE	GE	GE	GE	GE	GE
NO. BRUSHES	2	2	2	2	2	2
NO. RENEWED	0	0	0	0	0	0
TYPE BRUSH HOLDERS	FIXED	FIXED	"	FIXED	"	"
NO. HOLDERS	2	2	2	2	2	2
NO. RENEWED	0	0	0	0	0	0
TYPE BRUSH SPRINGS	Integral with brush	Integral with brush	"	INTEGRAL with Brush	"	"
NO. SPRINGS	2	2	2	2	2	2
NO. RENEWED	0	0	0	0	0	0
TYPE OIL	Vac C	Vac C	Vac C	Vac C	Vac C	Vac C
ADDED	Yes	Yes	Yes	YES	Yes	Yes
RENEWED	—		—			—

ITEMS 8 - 12

5 KW Transmitter - 250 Volt D.C. Motor-Generator "MG5P"

MOTOR

DATE	1/1/43	8/3/43	12/9/44	4/30/45	9/29/46	10/25
SIGN	AL	RS	AL	RS	AL	
TYPE OIL	Vac C	Vac C	Vac C	Vac C	Vac C	Vac C
ADDED	NO	NO	—	YES	NO	NO
RENEWED	—	—	—	—	—	—
TYPE COUPLING	Leather	Leather	—	Leather	"	"
CONDITION	OK	OK	—	OK	OK	OK
RENEWED	—	—	—	—	—	—

GENERATOR

DATE	1/1/43	8/3/43	12/9/44	4/30/45	9/29/46	10/25
SIGN	AL	RS	AL	RS	AL	AL
TYPE BRUSHES	GE	GE	GE	GE	GE	GE
NO. BRUSHES	2	2	2	2	2	2
NO. RENEWED	0	0	0	0	0	0
TYPE BRUSH HOLDERS	FIXED	FIXED	"	FIXED	"	"
NO. HOLDERS	2	2	2	2	2	2
NO. RENEWED	0	0	0	0	0	0
TYPE BRUSH SPRINGS	Integral with Brushes	Integral with Brush	"	INTEGRAL with Brush	"	"
NO. SPRINGS	2	2	2	2	2	2
NO. RENEWED	0	0	0	0	0	0
TYPE OIL	Vac C	Vac C	"	Vac C	Vac C	Vac C
ADDED	—	—	"	YES	NO	NO
RENEWED	—	—	"	—	—	—

5 KW Transmitter Distilled Water Pumps "M01P" - "M02P"

WESTERN ELECTRIC
INDUCTION MOTORS

"M01P"	"M01P"	"M02P" (SPARE)
MODEL #:	58 A 18	26156
TYPE:	KT 914	RSA
FORM:	CL	
CYCLES:	60	60
AMPS:	2.33	9.6
VOLTS:	220	110/220
SPEED F.L.:	1735	1735
H.P. :	3/4	3/4
CONT. TEMP. :	40° C.	40° C.
NO. :	DJ 7199	AF

ITEMS 5 - 8 - 9

5 KW Transmitter Distilled Water Pump "MO1P"

MOTOR

DATE	1/1/43	8/3/43	12/9/44	4/30/45	9/29/46	10/25
SIGN	AL	RS	JL	RS	AL	JL
TYPE OIL	Vac C	Vac C	Vac C	Vac C	Vac C	Vac C
ADDED	NO	NO	NO	YES	NO	YES
RENEWED	—		—	—	—	—

PUMP

DATE	1/1/43	8/3/43	12/9/44	4/30/45	9/29/46	10/25
SIGN	AL	RS	JL	RS	AL	JL
TYPE GREASE	BRB	BRB	BRB	BRB	BRB	BRB
ADDED	YES	YES	NO	YES	NO	YES
RENEWED	—	—	—	—	—	—
TYPE PACKING	Garlock	Garlock	"	Garlock	Garlock	Garlock
CONDITION	OK	OK	OK	OK	OK	OK
RENEWED	—	—	—	—	—	—
TYPE COUPLING	Leather	leather	"	leather	"	"
CONDITION	OK	OK	OK	OK	OK	OK
RENEWED	—	—	—	—	—	—

ITEM 13.

Clean and Service all portable Electric Drills.

Clean and Service large "Propeller Circulater" type Fans and all portable Electric Fans.

Clean and Service portable Electric Polisher.

Clean and Service Rotating Beacon Motor and Light.

Clean and Service Electric Grinder.

Clean and Service Electric Band Saw.

(a) "Basement": Proceed to gather all tools and cleaning equipment necessary for performance of this item.

Small screw driver. (Kept on Display Board on Work Bench)

Medium size screw driver. (Kept on Display Board on Work Bench)

5/8 inch open end Wrench . (Kept on Display Board on Work Bench)

3/4 " #" " " (" " " " " " ")

Drip Pan (kept in basement).

Supply of Kerosene (kept in Storage Room).

Bottle of Carbon-tet (kept on Display Board of Work Bench).

Can of Gargoyle "B R B" #1 Grease (kept on "Maintemance Bench" in Basement).

Oil Can filled with "Vacuoline" Type "C" Oil.

(b) Clean and Service the Portable Electric Drills.

Black and Decker 1/4" Junior Type "A".

When not in use it is kept in Drawer #11 of Basement Work Bench.

Place the Drill on the Work Bench to service.

Fill the Drip Pan half full of Kerosene.

Unscrew the Slotted Bakelite Brush Retainer Caps on either side of the Motor Housing near the Handle End.

Continued on Next Page.

ITEM 13.

Lift Brushes out of Holders.

There are two Brushes.

Each Brush is fitted into Spring and Pigtail as a Single Unit.

Clean Brushes with a Rag dipped in Carbon-tet.

Wrap a small piece of Cloth around blade of a small screw driver, dip in Carbon-tet and clean out inside of Brush Holder.

Renew Brushes that measure 3/8 inch or less.

New Brushes are kept in Transfile No. 95.

Do not Replace Brushes at this time.

Loosen, then remove the 3 machine screws holding gear case to Motor Frame.

This is on end nearest the Drill Chuck.

Hold the machine with Chuck downward to avoid losing any of the small parts.

Remove the Gear Case.

Observe that there is a small Ball Race Thrust and Bearing, placed between two heavy duty Steel Washers on the Top End of the Chuck Shaft.

Remove these Washers and Bearing and place in the Pan of Kerosene.

Remove the combination "Idler" and Reduction Gear and put into the Pan of Kerosene.

Observe the aluminum plate through which the small driving gear on the armature shaft projects. It is mounted on the end of the Motor Housing from which the Gear Case has been removed.

Gently, tap edges of this disk with handle of a small screw driver to loosen it, then Remove it together with the Armature.

CAUTION: Exercise care when Cleaning Commutator not to damage the fine wire connections to segments.

Continued on Next Page.

ITEM 13.

Clean Commutator with a small piece of 000 Sand Paper. (Rotate Commutaor by Hand).

Clean Residue from Commutator with Cloth Dipped in Carbon-tet. (Rotate Commutator by Hand).

If Commutator cannot be cleaned by this method, it may be turned down in the Leathe. Per Book No. ( ) Sec. No. ( ) Page No. ( ).

Wipe outinside of Motor Case with a Clean Cloth dipped in Carbon-Tet.

Carefully wipe off armature with Cloth dipped in Carbon-Tet.

Replace the Armature and End Plate, reversing procedure from that of taking it apart.

Observe the Notch filed into one of the 3 Lugs on the End Plate.

This Notch matches with a Notch in the Motor Housing to insure getting it in the correct position.

Clean grease out of Gear Case with a rag.

Remove the small parts from the Can of Kerosene and wipe off with a Dry Cloth.

Apply a small amount of grease to ball bearings, and between the two steel washers, and place all 5 on the end of the Chuck Shaft.

Put a little grease on the Shaft of the "Idler" Gear and put it back into place in the Gear Case.

Put about 2 table spoonsfull of Grease in the Gear Case and distribute it around the gears.

Carefully replace the Gear Case and Chuck noting that Ball Bearing and Washers remain in place on the Chuck Shaft.

The Notch filed in the Lug of the Motor Head must Line Up into that on the

Continued on Next Page.

ITEM 13.

Gear Housing.

Line up the Chuck with the "ON" and "OFF" Switch on the Handle of the Motor.

Replace the 3 screws which hold the Gear Housing and End Plate, and Tighten them.

While tightening note that there is no bending. If there is, take apart and re-assemble.

Replace brushes in Brush Holders.

Replace Bakelite Brush Retain Caps and Tighten them.

Wipe off entire outside of Housing Gear Case and Chuck with rag dipped in Carbon-Tet.

Clean Rubber-Covered Service Cord with Cloth dipped in Carbon-Tet.

Apply a few drops of oil to the Felt Wick, located on left side, near the handle.

Allow oil to soak in for a few minutes, then wipe off excess oil.

Observe that Chuck Key is seccured to Rubber Service A.C. Cord.

Tighten connections on the A.C. Plug.

Hold the machine with chuck up and drop one drop of Oil into Center of Chuck.

Connect Plug in 115 Volt Outlet and Test the Portable Drill for Normal Operation.

Book No.	(/)	( )	( )	( )	( )	( )
Sec. No.	(M/G	( )	( )	( )	( )	( )
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ITEM 13.

Black & Decker Special 1/2" Drill:

When not in use it is kept in Drawer #11 of Basement Work Bench.

Place the Drill on the Work Bench to Service it.

Fill the Drip Pan Half Full of Kerosene (same Kerosene used for 1/4" drill may be used).

Use Screw Driver to loosen and remove the screws on Head of the Motor, near the handle.

Lift off the Motor Head. This will expose the Motor Brushes and Grease Cup to view.

Unscrew the Grease Cup.

It contains a Spring with a Felt Wick attached.

Remove the Wick, then Wipe off all Grease with rag dipped in Kerosene.

Clean out Inside of the Grease Cup with rag dipped in Kerosene.

Fill Grease Cup 1/2 full of Grease, then pour five drops of Oil into the Grease Cup.

Set Grease Cup on flat end.

Lift up the Springs which hold the Motor Brushes in place, then use blade of Small Screw Driver to Remove the Brushes.

Clean Brushes with a rag dipped in Carbon-Tet.

Wrap a small piece of cloth about the blade of a small screw driver, dip in Carbon-tet and clean out Inside of Brush Holder.

Renew Brushes that measure 3/8 inch, or less.

New Brushes are kept in Transfile No. 95

Do not Replace Brushes at this time.

Loosen, then remove the 4 machine screws holding the Head of the Motor to Frame.

Continued on Next Page.

ITEM 13.

Remove the Gear Case and Chuck.

Note that the Ball Thrust Bearings for the Chuck are contained in the Gear Housing and Cannot be Removed.

Remove the "Idler" Reduction Gear.

Remove the End Plate of the Motor together with the Driving Gear and Armature.

Exercise Care when Cleaning the Commutator not to damage the fine Wire Connections to Segments.

Clean the Commutator with # 000 Sand Paper (Rotate Armature) Wipe out.

Wipe out the Inside of the Motor Case with Cloth dipped in Carbon-Tet.

Clean off Outside of Brush Holders with Rag dipped in Carbon-Tet.

Wipe out all Grease from the Gear Case and Re-Pack with Fresh Grease.

Replace the Armature and End Plate to the Motor.

Replace the Gear Housing and Chuck.

Line up Mounting Holes and Replace Screws.

Tighten all Screws with Steady Pressure.

Replace the Felt Wick in the Grease Cup.

Put Felt Wick into Oil Hole, then Screw the Grease Cup in until Felt Wick rests against Shaft.

Use a small screw driver to Lift up the Brush Springs, then, Replace the Brushes.

Replace Motor Head.

It can be put on in Only One Position.

Replace screws and Tighten them . Clean 115 Volt A.C. Rubber Service Cord with rag dipped in Carbon-Tet.

Tighten Connectors in Plug. Wipe off entire Ouside of the Housing, Gear Case, Chuck, with rag dipped in Carbon-Tet.

Wipe all Grease from around the Chuck with Dry Cloth.

Continued on Next Page.

ITEM 13.

Hold Machine with its Chuck Up and drop a Few Drops of Oil into Center of Chuck.

Connect Plug in 115 Volt A.C. Outlet and Test this Portable Drill for Normal Operation.

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ITEM 13.

(c) "Basement": Clean and Service Large "Propeller Circulator" type Fans and all Portable Electric Fans.

Perform this portion of Maintenance Item Only when Fans are in Service.

"Propeller Circulator" Fan #1 is normally kept in the Basement for use there or may be brought to Main Transmitter Room.

This is an induction type Motor having no Brushes, Commutator or Slip Rings.

Disconnect Fan from A.C. Supply.

CAUTION: Wait until Fan has Completely Stopped.

Clean all parts of the Motor, Fan Guards, Fan Blades, Standard and Supporting Base with a Cloth dipped in Naphtha or Kerosene.

Use Open-End Wrench to Tighten Locking Bolt on Fan Blades.

Use Screw Drivers and Wrenches to Tighten all Mounting Screws and Bolts.

Both Motor Bearings are Packed with Felt Oil Retainers.

There are 2 Oil Holes on each Bearing, one on each side.

Insert Spout of Force-Fed Oil Can in each hole to inject a small quantity of Oil. Wipe off excess Oil.

Tip Fan over on its Side and Apply a few Drops of Oil to each Coaster Bearing and Swivels. Place Fan Upright.

Wipe off the Rubber Covered Service Cord with rag dipped in Carbon-Tet.

Tighten Connections on A.C. Plug."Propeller Circulator Fan # 2"

"Propeller Circulator Fan # 2": This Fan is kept in the Transformer Vault.

CAUTION: Do not work on this Fan While it is in the Transformer Vault. Ask another technician to help you to Remove Out into Main Basement.

This is an Induction Type Motor having no Brushes, Commutator or Slip Rings.

Procedure is the same as for Fan #1 Except that Motor is fitted with hinged

Continued on Next Page.

ITEM 13.

cover Oil Caps.

Merely Lift up Cover and pour a small quantity of Oil into each Cup.

Book No. ( ) ( ) ( ) ( ) ( ) ( )

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ITEM 13.

"Portable Electric Fans": Perform this portion of Maintenance Item, only when Fans are in Service.

Take each Portable Electric Fan to the Basement to Service and Clean.

Place Fan on Work Bench.

If the Fan has Brushes, Loosen, then remove the Fibre Brush Retainer Caps from ends of Brush Holders and Lift out Brushes.

Clean Brushes with Cloth dipped in Carbon Tet.

Wrap a small piece of Cloth about the blade of a small screw driver, dip in Carbon Tet. and Clean Inside of Brush Holder.

Replace Brushes that measure 3/8 inch or less.

Do not put Brushes back at this time.

Remove both Grease Cups - merely unscrew them.

Loosen the mounting Bolts, then Remove Fan Blade Guards.

Loosen Set Screw, then lift Fan Blades from Motor Shaft.

Loosen, then remove the Nuts on ends of Mounting Studs.

Pull long studs out of Motor Case.

Lift End Plate off blade side of the Motor.

Loosen large nut on end of Oscillating Mechanism.

Remove End Plate from Rear of Motor.

Lift Armature out of Motor Case. Wipe on Inside of Motor Case with a Cloth dipped in Carbon Tet.

Clean Commutator with a piece of # 000 Sand Paper.

Wipe residue off Commutator with Cloth dipped in Carbon Tet.

Replace Armature.

Continued on Next Page.

ITEM 13.

Replace End Plates, lining up holes.

Replace and Tighten Nuts on ends of Mounting Studs.

Pull Felt Wicks out of Grease Cups.

Clean Old Grease Off Felt Wicks. Clean Old Grease out of Grease Cups.

Wash end of Felt Wicks in Carbon Tet.

Fill Grease Cup 1/2 full.

Replace Felt Wick in Grease Cup, with Spring End in the Cup.

Turn Fan Upside down, then put 2 or 3 drops of Oil in Shaft Bearing.

Replace Grease Cups, Carefully placing Felt Wicks against Bearing.

Exercise Caution not to double up the Wicks.

Screw Grease Cups into Threaded Openings.

Replace Motor Brushes.

Replace, then tighten the Fibre Brush Retainer Caps.

On Oscillating Fans, the Bearing is Lubricated at the End where the Oscillating Mechanism is located.

Merely unscrew the Cover from the Gear Housing.

Put a small amount of Grease and 2 or 3 drops of Oil in the Housing, then, replace Cover.

If the Fan has an Exposed Outside Oscillator Arm, put a few drops of Oil on Bearings.

If the Fan does not have Brushes, Do Not Take End Plates Off Motor Case to Service.

Use Portable High-Speed Blower to Clean all dirt from Inside of Motor Housing, then Service and Grease as above.

If Fan has Oil-Lubricated Bearings, such as are in Center Antenna Coupling

Continued on Next Page.

ITEM 13.

House.

Put 3 or 4 drops of Oil in each Oil Hole.

Replace Fan Blades, Tighten Set Screw.

Replace Fan Blade Guard, Lining up Mounting Holes on ends of Studs.

Replace Locking Nuts, then tighten them.

Inspect rubber or fabric covered service cord for Breaks or Loose Connections.

Repair or Replace this Cord.

Tighten Connections on Plug, Motor, Rheostat and Switch.

Rheostat and Switch are in Base of Fan Standard.

Wipe off Cord with Cloth dipped in Carbon Tet.

Put a small amount of Stafford's Polish on a Cloth.

Wipe off entire outside of Fan, Base, Motor, Blades, Guard, etc. with Stafford's Polish.

After Fan is Cleaned and Serviced, Replace it in the room which it was removed.

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ITEM 13.

(d) Clean and Service Portable Electric Polisher.

Use Screw Driver to Loosen, then Remove the Large Screw with Slotted Head at the top pf the Gear Housing.

This will allow the Brass Pipe connection to be raised clear of the Collar on which it rests.

Loosen, then remove the 4 screws holding the Gear Housing to the Frame of the Motor.

Loosen, then remove the Fibre Brush Retainer Caps from ends of Brush Holders.

Lift Out both Brushes.

Brush Spring and Pigtail are connected together as a Single Unit.

Clean Brushes with a rag dipped in Carbon-Tet.

Wrap a piece of Cloth about the blade of a small screw driver, dip in Carbon-Tet and Clean out Inside of Brush Holders.

Remove Gear Housing from Motor Frame and Withdraw the Armature.

Gear Housing and Bearings are Permanently Lubricated and need no further Attention.

Clean out Inside of Motor with a rag dipped in Carbon-Tet.

Tighten the Buffing Wheel in the Shaft as follows:

Use 3/4 inch Open End Wrench to hold Shaft, then turn wheel Clock-wise.

CAUTION: Exercise Care not to Damage Wire Connections to Commutator Segments.

Clean Commutator using # 000 Sand Paper.

Clean residue from Commutator with a rag dipped in Carbon-Tet.

Replace the Armature (Reverse the removal procedure).

Replace Brushes in Brush Holders.

Replace Fibre Brush Retainer Caps on Brush Holders abd Tighten them.

Replace the Gear Housing to Frame of Motor, Line up Mounting Holes and Replace 4 Screws and Tighten them.

Continued on Next Page.

ITEM 13.

Replace the Brass Pipe Connection on the Collar.

Replace the Large Slotted Screw at Top of the Gear Housing.

Polish Reservoir is on Rear End of Motor.

To fill, merely unscrew Large Cap, Pour in Polish and Replace Cap.

To use, merely Press Thumb Nut on rear of Motor until same is running which will release polish through Center of Lamb's Wool.

Clean 115 Volt A.C. Service Cord with rag dipped in Carbon-Tet.

Tighten Connections on the Plug.

Wipe off entire Outside of Motor Housing and Handle with Cloth dipped in Carbon-Tet.

Connect Plug in 115 Volt A.C. Outlet and Test the Portable Polisher for Normal Operation.

Book No.	(/)	( )	( )	( )	( )	( )
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ITEM 13.

(e) Clean and Service Rotating Beacon Motor and Light.

Proceed to Engine Driven Generator Room and put "OFF" "Rotating Beacon" Switch #17.

Light and Motor operating mechanism are located on roof of Main Transmitter Building.

Tools required to perform this maintenance are:

Can of "Vacuoline" type "C" oil.

Alemite Grease Gun.

Large Screw Driver.

Medium Screw Driver.

Pair of Gas Pliers.

Pair of Long Nose Pliers.

Piece of .000 Sand Paper.

Bottle of Carbon-Tet.

Supply of Clean Rags.

Bottle of "Windex".

Proceed to roof of Main Transmitter Building.

Use screw driver to loosen screws holding the 3 large Metal Plate Covers on the 3 sides of the Base supporting the Light. Screws remain held in the covers.

Remove all 3 covers, exposing to view the entire mechanism that rotates the Beacon Light.

Oil holes on Motor Bearings are difficult to reach.

Each oil hole is fitted with a ball held in place by a small spring to keep foreign matter out of the oil hole.

Locate oil hole by sense of "Feel".

Use point of small screw driver to depress ball.

Pour a small amount of oil into each oil hole.

Wipe off entire outside of Motor with clean cloth dipped in Carbon-Tet.

Continued on next page.

ITEM 13.

This is an "Induction Type Motor" having no brushes or collector rings.

On the outside of the bracket supporting the yoke of the Rotating Beacon, there is an Alemite Fitting with a metal cover over it.

Remove the metal cover and grease the bearing with Alemite Grease Gun. (About 4 or 5 operations of the Grease Gun Handle).

Put Grease on the Worm Gear and Worm.

Put a few drops of oil on the Worm Gear and Worm.

Lift Brushes out of holders.

Wipe off Brushes with rag dipped in Carbon-Tet.

Wrap cloth around blade of screw driver, dip in Carbon-Tet and clean inside of Brush Holders.

Brushes are copper composition type and need no renewing unless badly burned or damaged.

Clean brush bearing surfaces with 000 Sand Paper.

Clean off residue with rag dipped in Carbon-Tet.

Wipe off all dirt and oil from parts within the base.

Loosen all wing nuts about the outer edge of the Lamp.

Turn holding cleats away and open hinged cover of Lamp Housing.

Inspect Lamp Switching mechanism for loose connections or damage.

Tighten all loose connections.

Clean inside and outside of Lamp Red Lens with "Windex".

If "Windex" is not available, use wet cloth. (Water).

Close Lamp Housing, replace cleats and tighten locking wing nuts.

Line up gaskets, then replace 3 covers on base.

Replace and tighten screws.

Proceed to "Engine Driven Generator Room" and put "ON" the "Rotating Beacon Switch" #17.

Proceed back to roof of Main Transmitter Building and test Beacon Lamp.

Clean Photo Electric Cell with cloth dipped in Carbon-Tet.

Continued on next page.

ITEM 13.

Cover Photo Electric Cell with hand or a piece of cloth for a few seconds.

Observe that Beacon Lamp is illuminated and rotating.

Beacon Lamp should be extinguished and stop ratating within a few minutes after the Photo Electric Cell is uncovered.

Book No. (1) (2) (1) ( ) ( ) ( )

Sec. No. ( ) ( ) ( ) ( ) ( ) ( )

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(f) Clean and Service Electric Grinder.

This is an "Induction Type Motor" having no Brushes, Commutator or Collector Rings.

Motor is fitted with "Sealed In" Ball Bearings to prevent entrance of grit and dirt.

It is necessary to take the Motor apart to grease the Bearings.

Use small screw driver to loosen the Set Screws, then remove the Grinding Wheel Guards.

Set screws are located at the top and rear of each Guard.

Hold right Grinding Wheel firmly, then use open end wrench to loosen and remove the locking nut holding the wheel on the shaft. (Turn nut counter clockwise).

Remove retaining washer and paper washer.

Remove grinding wheel, inside paper washer and steel washer.

Remove left Grinding Wheel the same as the right Grinding Wheel. (Turn Nut Clockwise).

Loosen, then remove the 2 nuts on the Holding Studs on the right side of Motor Casing,

Withdraw the 2 Long Studs used to hold both end plates on Motor.

Gently tap right end plate to loosen it.

Remove right End Plate.

Carefully remove the Rotor.

Clean out inside of Motor Case with rag dipped in Carbon-Tet.

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ITEM 13.

Both Bearings are attached to the Rotor Shaft.

Wash old grease out of Ball Bearings with Kerosene and Paint Brush.

Wipe Bearings with clean cloth.

Apply small amount of grease to both Ball Bearings filling in spaces between balls.

It is not necessary to remove the left End Plate unless difficulty is experienced in replacing the Rotor.

If the left End Plate is removed, Gently tap the End Plate to free it.

This plate has wires attached to it, which are connected to the Automatic Starting Device.

Care must be exercised not to change the relative position of these wires, not to put any strain on them.

Exercise Extreme Care in replacing the Bearings in the End Plates, as thin Steel Washers are used on the Motor Shaft for spacers and they are easily damaged by forcing them into place.

Insert the Long Studs from the left side.

Replace nuts on right ends of Studs and tighten them.

Turn Rotor by hand.

It should turn freely and have approximately 1/4 inch "End Play".

Replace left and right Grinding Wheels in reverse order to that of their removal.

Tighten locking nuts.

Replace both Grinding Wheel Guards.

Replace the 2 set screws on each Guard.

Test Guards to be sure they are firmly in place.

"Put" on the 115 Volt A.C. Supply Switch mounted on base of Grinder.

Run it a few minutes to be sure it is in order.

ITEM 13.

(g) Clean and Service Electric Band Saw.

CAUTION: TO AVOID RISK OF PERSONAL INJURY WHILE WORKING ON THE BAND SAW, PULL PLUG OF RUBBER SERVICE CORD OUT OF 115 VOLT A.C. CONVENIENCE OUTLET.

Motor is Single Phase A.C. "Induction Type", having no Brushes, Commutator or Collector Rings.

It is fitted with a Centrifugal Type Starter Ring, requiring very little attention.

Best method of servicing Motor is to remove it and take to the Basement Work Bench.

Lift Wooden Guard Frame from the Band Saw Base.

Remove the Drive Belt from the Motor pulley.

Loosen, then remove the 2 screws holding the Metal Cover over the Motor Terminal Strip.

Lift off the cover.

Disconnect wires from the Terminals. Use 3/8 inch open end wrench to remove the nuts from 4 mounting bolts on the base of the Motor.

Lift Motor out of the frame and take to Basement Work Bench.

Loosen the 2 set screws in each Pulley.

Use small Gear Puller, kept in Drawer #8 of Basement Work Bench, to remove both Pulleys.

Loosen, then remove the nuts on ends of mounting studs on right End Plate of Motor.

Withdraw 4 long studs from the left End Plate.

Gently tap End Plates and lift them off the Motor.

Remove the Rotor.

Use Portable Blower and clean all dust, dirt and sawdust from the Motor Case.

Wipe out the inside of the Motor Case with rag dipped in Carbon-Tet.

Bearings are "SKF" (Sealed In Type).

Inspect connections and automatic Starter.

Continued on next page.

ITEM 13.

In the event the Automatic Starter appears to be burned or pitted, it will be necessary to remove all of the wiring attached to the End Plate.

This will require extreme care to avoid damaging the parts of the Starter and should not be done without consulting the Supervisor.

Proceed to clean and adjust Starter per Book No. ( ) Sec. No. ( ) Page No. ( ).

Replace Rotor in Motor Frame.

Replace End Plates lining up mounting holes.

Replace 4 long studs through the left side.

Replace, then tighten nuts on mounting studs.

Replace Pulleys on both ends of Shafts.

Replace set screws and tighten them.

Use screw driver to remove the small set screws on top of each Motor Bearing on the outside of Motor Housing and put 2 or 3 drops of oil in each opening.

This is all the lubrication needed and prevents drying out of the grease.

Replace the set screws.

Take Motor back to the Storage Room and replace it in the Band Saw, with name plate on the left side.

(Reversing the position of the Motor will reverse the rotation of the Saw).

Line mounting holes up and replace four mounting bolts.

Replace nuts (loosely).

Replace the Pulley.

Hold Motor with just enough tension on the Belt, then use open end wrench to tighten all mounting nuts.

Belt should have small amount of slack.

Connect Feed Wires to Motor Terminals.

Replace the Metal Cover over Motor Terminals, tightening mounting bolts.

Bearings of the Saw Wheels are permanently sealed, requiring no lubrication

Continued on next page.

ITEM 13.

Small guide wheels are also permanently sealed.

Put a few drops of oil on the adjusting screw at the top of the Saw Assembly.

The Saw Blade is adjusted when a new blade is put in and needs no further adjustment at this time.

Proceed to test Band Saw.

CAUTION CAUTION CAUTION

Replace the plug in the 115 Volt Convenience Outlet.

Put "ON" A.C. Switch.

It is located on the under side of the top shelf mounting base just above the Motor.

Run the Motor a few minutes, cut a piece of wood to test it.

Put "OFF" A.C. Power Supply Switch, then remove plug from A.C. Outlet.

Procedure to Change Saw Blades:

Tools required:

Large screw driver. (Kept on display board of Basement Work Bench).

Pair of Gas Pliers. (" " " " " " " ").

Pull plug from 115 Volt A.C. Convenience Outlet.

Normally Blades are changed when they become dull or damaged.

Never use a Dull Blade, as the excessive pressure needed, pushes the blade back against the Guide Wheels, damaging both the Blade and Wheels.

Always replace a Dull Blade.

Located on front of the Saw Table is a steel Bar, held to the table by 2 machine bolts and nuts.

Remove the bolt on the right side , being careful not to lose the bushing, which holds the Bar away from the table.

Loosen, then remove the 2 large Knurled Nuts and the Bushings which hold the upper Guard.

Remove the Guard.

Continued on next page.

ITEM 13.

Loosen, then remove the 2 large Knurled Nuts and the Bushings which hold the lower Guard and Lamp Bracket.

This Guard cannot be completely removed on account of the Lamp Cord.

Set Guard down beside the Saw Frame.

At the top of the upper Guard is a Knurled Nut.

Turn this knob clockwise to lower the upper wheel to provide enough slack to permit removal of the Saw Blade.

Carefully lift the Saw Blade out through the slot in the Saw Table. Fold Blade into 3 loops, tie it in 2 or 3 places to keep it from springing out into one loop.

New Blade is folded in 3 loops also.

New Blades are kept in Drawer No. 4 of Basement Work Bench.

Open Blade into 1 loop.

Place Blade through the slot in the Saw Table with teeth facing the front.

Hang Blade on upper Wheel.

Place Blade on lower wheel so that when the upper wheel is raised, the Blade will be in the center of both the lower and upper wheel rims.

Blades vary a trifle in length.

It may be necessary to raise or lower the upper wheel to fit.

Raise upper wheel by turning the Knurled Screw counter Clockwise until the Blade is under slight tension.

Turn top wheel slowly by hand, observing that the Blade enters the slots in the Guides, both top and bottom.

Observe that Blade is free of obstructions.

If Blade is not free, proceed as follows:

Loosen set screws that hold the square brass guide blocks that rest against each side of the Saw Blade.

Loosen set screws on both top and bottom Guides.

Pull Brass Blocks free of the Blade.

Continued on next page.

ITEM 13.

Loosen the Thumb Screws that hold the 2 small steel wheels in place behind the Blade on top and bottom Guides.

Push Guide Wheels all the way to the rear.

Tighten the Saw Blade until tight enough to vibrate, when plucked like a violin string.

Do not tighten excessively as that would damage the Rubber Rims of the Wheels and put extra strain on the Wheel Bearings.

Turn Wheel by hand and observe that the Blade runs in the center of the upper wheel.

Adjustments for "Tracking" is made with a Thumb Screw on the back of the upper Wheel Bearing.

Loosen the locking nut and turn the thumb screw slowly to the right or left until the Saw Blade tracks in the center of the wheel rim. (Keep turning the upper wheel by hand while doing this).

Tighten the Wing Nut to lock the Set Screw.

Slide the upper small steel wheel forward until it just touches the back of the Saw Blade and then back it off the thickness of a piece of paper. (.003 Inch).

The Blade should not touch the small steel wheel when the Saw is running idle.

Adjust the lower steel wheel the same as the top steel wheel.

Move the square brass block of the upper guide on the right side until it touches the side of the Saw Blade.

It should cover the entire width of the Blade, except the teeth.

If this does not occur, the steel wheel must be loosened and pushed back, then the entire Guide loosened by means of the Thumb Screw and moved back or forward until the Brass Block is in the position indicated.

Again adjust the small Steel Guide Wheel to just clear the back of the Blade and lock it in place.

Continued on next page.

ITEM 13.

Move Brass Block on the left side to press against the Blade.

The Blade must slide between the 2 Brass Blocks without any side play.

Adjust the lower guide by the same procedure.

Replace the lower Guard, tightening Wing Nuts.

Replace the upper Guard, tightening Wing Nuts.

Replace the machine screw Bushing and Nut in the Bar at the front of the Saw Table.

Turn large Saw Wheels a few times by hand to make sure the Saw Blade is clear.

Caution: Only a few seconds of operation with the Blade out of adjustment, will ruin the teeth.

Put plug on end of Rubber Service Cord into 115 Volt A.C. Convenience Outlet.

Put "ON" 115 Volt A.C. Switch and cut a small piece of wood to test the Saw.

Observe when cutting, the Blade will bear against the Steel Guide Wheels, which will then revolve freely.

Put "OFF" A.C. Switch.

Pull plug out of A.C. outlet.

NEVER OPERATE THE BAND SAW WITH THE GUARDS REMOVED. A BLADE MAY BREAK AND FLY OFF CAUSING PERSONAL INJURY.

Book No. (/) ( ) ( ) ( ) ( ) ( )

Sec. No. (MG) ( ) ( ) ( ) ( ) ( )

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(h) "Basement": Take apart Motor Blower "M06P" and thoroughly clean and service inside of Motor.

Procedure same as Wednesday Item No. (5)Page No. ( ) except the following.

Motor Frame is held together by 4 long stud screws.

Hold slotted end of studs on right side and remove nuts from left side.

Right side has 115 Volt A.C. Toggle Switch mounted on it.

Continued on next page.

ITEM 13.

Pull long studs out of the Motor Frame.

Insert screw driver in slot between left End Plate and Main Frame.

Gently pry End Plate off Motor.

The Automatic Starter is attached to the Rotor.

The Switch of the Starter is attached to the Motor End Plate which must remain in place.

It is not necessary to remove the right End Plate.

Remove the Rotor.

Take Motor and Rotor Housing outdoors and clean Rotor and inside of Motor Housing with a cloth dipped in Naptha.

Pour a small amount of Naptha on the Rotor and Starter Switch, then brush off the dirt with a clean Paint Brush.

Wait until all Naptha has evaporated before reassembling the Motor.

Replace the Rotor in the Motor Housing, put left End Plate back on Motor .

Line up mounting holes and replace long studs.

Replace and tighten nuts on ends of studs.

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End Item 13.

ITEM 14.

Remove the Type 700-A Crystal Boxes #1 and #2 from 50 KW Transmitter, inspect, then clean connections. Caution: Handle gently, do not turn, keep upright at all times.

(a) "Oscillator-Modulator Unit" #2 (D): Proceed to the front of this Unit, Open Glass Front Window, remove Type 700-A Crystal Box #1, inspect then clean all contacts on Terminal Strip on bottom of Crystal Box.

CRYSTAL #2 must be in service before proceeding to service 700-A Crystal Box #1. If it is not, place Crystal Selector Switch "D12D" to position #2. Inspect, then clean all contacts on Terminal Strip between the Supporting Tracks on the "Oscillator-Modulator Unit". This may done quickly while on the air.

Loosen, then unscrew thumb nuts on Glass Front Window of "Oscillator-Modulator Unit" #2 (D).

Open Glass Front Window.

Loosen Wing nut on Link Switch "D3D".

Lift Link over the stud and push it slightly side ways to permit removal of Crystal Box #1.

The 700-A Crystal Box is mounted in the Oscillator Unit in such a way that it may be inserted in position or removed through the Glass Front Window in the panel.

The 700-A Crystal Box rests on two metal tracks with stop pieces to hold box in place.

Take screw driver and loosen bolt heads on ends of the two tracks and twist movable stops away, then gently pull Crystal Box straight out.

Set Crystal Box carefully on bottom, do not place on side.

Continued on Next Page.

ITEM 14.

DO NOT JAR CRYSTAL BOX.

Clean contacts on bottom of Type 700-A Crystal Box with Crocus Cloth.

Hold Box up to see if contacts are clean and bright.

If they are not, clean again.

Clean residue from contacts with cloth dipped in Carbon-tet.

Clean contacts of terminal strip in Oscillator-Modulator Unit between the supporting tracks with Crocus Cloth.

CAUTION: Clean one contact at a time, cleaning from Front to Rear, not Left to Right.

This will avoid getting a small electric shock.

Inspect Contacts.

They should be Clean and Bright.

If they are not, clean them again.

Clean residue from contacts with cloth dipped in Carbon-tet.

Carefully replace Crystal Box #1 in supporting tracks and push it to Rear, then twist movable stop pieces into place and tighten locking bolts.

Replace Link Switch "D3D", tighten wing nut, and note that heater current is "ON" as will be evidenced by indicator light "E1D" lighting. (Flashing on and off periodically). Check frequency after about 3 minutes per Book No( ) Sec No( ) Page No( ) Instruction here.

Wait 30 minutes after replacing Crystal Box #1 then place Crystal Selector Switch "D12D" to Crystal #1. only if frequency Beat is not more than 6 cycles off.

Measure Transmitter Frequency, if it is OK, (Within 4 Cycles), proceed to clean contacts of Crystal Box #2 by same procedure as Crystal Box #1 was cleaned.

NOTE: The two 700-A Crystal Boxes, mounted in the "Oscillator-Modulator Unit"

Continued on Next Page.

ITEM 14.

Are interchangeable.

When Transmitter is operating, both 700-A Units are Oscillating, but output is taken from only ONE, depending upon which position Selector Switch "D12D" is in. Oscillator Grid Currents of both Crystal Boxes may be measured while station is on the air, by merely pushing button "D7D" or "D10D".

THESE OSCILLATORS ARE CALIBRATED AND SEALED.

The Small Dial on the left side of the Box labelled "FREQUENCY" may be used to make small adjustments of the Crystal Frequency.

NO ALTERATIONS OF THESE DIALS MUST BE MADE BY THE TECHNICIAN PERFORMING THIS MAINTENANCE WORK UNLESS SPECIFICALLY ORDERED TO DO SO.

The following are Normal Voltage readings with 700-A Crystal Box in Service and oscillating by exercising care when placing voltmeter prods on Terminals on Bottom of Crystal Box:

Terminals 3 (+) and 7 (−) --- Plate Voltage -------------- 162 Volts.

Terminals 1 (+) and 4 ---Filament Voltage -------------- 4.3 Volts.

Terminals 5 (−) and 6 (+) ---Crystal Heater Voltage ---------- 85 Volts.

Book No.	(1)	(1.3)	(1.[illegible])	( )	( )	( )
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END ITEM 14.

With Box removed from transmitter:
Bottom of box terminals 6 & 7 mercury column thermostat, open no heat, closed, heating. Terms 5 & 7 measured at 500 Ω (heater resistance)
normal grid current when operating .3 mil