PN ABR-499

LOCAL DEVELOPMENT II
URBAN PROJECT

Submitted to

USAID / CAIRO

Submitted by

WILBUR SMITH ASSOCIATES

in association with

PUBLIC ADMINISTRATION SERVICE

DEVELOPMENT CONSULTING OFFICE

DELOITTE AND TOUCHE

ENGINEERING AND GEOLOGICAL CONSULTING OFFICE

LOCAL DEVELOPMENT II
URBAN PROJECT

TRAINEE OPERATIONAL MANUAL

FOR

P.M. - ELGIN

PRESENTED TO

UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT
LOCAL DEVELOPMENT PROGRAM II URABN

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G E N E R A L D A T A

MODEL "V"

GENERAL DATA	
GENERAL DIMENSIONS	
WHEEL BASE	149" (3,789 MM)
OVERALL LENGTH	21' 8" (6,604 MM)
OVERALL WIDTH	8' 0" (2,438 MM)
OVERALL HEIGHT	9' 7" (2,921 MM)
CLEARANCE HEIGHT REQUIRED (DUMPING)	17' 6" (5,334 MM)
OUTSIDE TURNING RADIUS	24' 0" (7,315 MM)
SWEEPING PATH	
VACUUM NOZZLE ONLY	30" (762 MM)
VACUUM NOZZLE & SIDE BROOM	48" (1,219 MM)
VACUUM NOZZLE, SIDE BROOM & EXT. BROOM	96" (2,438 MM)
WEIGHT	
EMPTY WEIGHT	17,700 LBS. (8,028.72 KG)
FRONT AXLE	8,700 LBS. (3,946.32 KG)
REAR AXLE	9,000 LBS. (4,082.40 KG)
GROSS VEHICLE WEIGHT	28,000 LBS. (12,701.0 KG)
SYSTEM CAPACITIES	
SPRAY WATER SYSTEM	280 G (1,060 L)
FUEL TANK	50 G (189 L)
HYDRAULIC SYSTEM (REFILL)	56 QT (53 L)
AUX. ENGINE COOLING SYSTEM	
(GASOLINE ENGINE)	19 QT (18 L)
(DIESEL ENGINE)	16 QT (15 L)

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INSTRUCTIONS
SECTION I
DESCRIPTION AND OPERATION

CHASSIS

A base frame or tilt frame which supports all of the major components of the Model "V" sweeper is mounted on a truck chassis.

HOPPER

The hopper weldment is a self supporting shell structure of welded steel and contains internal air flow conducting panels and a baffled underfloor water tank. The forward section of this shell provides a housing for the auxiliary engine, exhaust fan, water pump, hydraulic pump, air compressor and belt drives. With the hopper in dumping position all units are exposed and easily accessible.

A sealed rear door which extends across the entire width of the hopper is raised hydraulically for dumping the load.

AUXILIARY ENGINE

A power unit engine provides power to drive the exhaust fan from a special power take-off assembly to a pulley mounted on the fan drive shaft. Compressed air, hydraulic, and spray water systems are also powered from this engine. A highly efficient dry type air cleaner with a pre-cleaner is provided as standard equipment for maximum engine protection.

COMPRESSED AIR SYSTEM

This system consists of an air compressor, compressed air tank, pressure gauge and pressure relief valve, electro-pneumatic valves, and compressed air cylinders.

Compressed air cylinders are used to position the vacuum nozzle, nozzle shutter valve, (up to V-556), nozzle gate valve, side broom and extension broom for sweeping and raise for transport. Electro-pneumatic valves, which control the air cylinders, are actuated by switches located on a control panel in the drivers compartment.

A pressure line from the auxiliary engine oil gallery supplies lubrication for the air compressor when mounted on the power unit. Oil returns to the engine crankcase. Filtered air is supplied to the air compressor through a hose from the auxiliary engine air filter system.

NOTE:

Machines with hydraulic brakes have the air compressor for the compressed air system mounted on the auxiliary engine.

Prior to D.O.T. 121 - Machines with air brakes use the air compressor supplied with truck (mounted on truck engine) for the air supply used in the compressed air system. If the pressure falls below 60 P.S.I. in the sweeper air system, a shut-off valve maintains adequate supply for the brakes.

Machines with D.O.T. 121 air brakes have a separate air compressor mounted on the auxiliary engine for the sweeper compressed air system.

HYDRAULIC SYSTEM

The hydraulic system is divided into two parts. On machines equipped with air brakes, the power steering pump on the truck engine supplies the hydraulic pressure to operate the hopper lift cylinder and the hopper door cylinder. Manually operated hydraulic control valves located on the right hand side of the machine activate these hydraulic cylinders. Machines equipped with hydraulic brakes had a small hydraulic pump mounted on the truck engine and was driven by a "V" belt from the crankshaft pulley which supplied the hydraulic pressure for the hopper lift and hopper door cylinders.

A tandem hydraulic pump mounted on the auxiliary engine powers the hydraulic motors on the side broom and the extension broom. Solenoid operated hydraulic valves control the hydraulic motors and are activated by the same switches that lower the side broom and extension broom.

Oil in the return line from the hydraulic cylinders passes through a 10 micron filter as it goes into the hydraulic oil reservoir.

Hydraulic oil, from the reservoir to the hydraulic oil pumps, passes through attainers inserted in the suction lines where they connect to the oil reservoir.

SPRAY WATER SYSTEM

A baffled under floor water tank in the hopper holds 280 U.S. gallons of water for the spray water system. Water from the tank passes through a strainer before it goes through the w ate pump. This strainer is located on the left side of the truck frame for accessibility when cleaning. A shut-off valve is provided to stop the water from flowing out of the tank when removing the strainer for cleaning.

A centrifugal water pump draws water from the under floor supply tank for the spray water system. This pump is belt driven from a pulley on the P.T.O. of the auxiliary engine. Since this pump runs constantly, when the auxiliary engine is running, a small volume return line from the pump to the water tank relieves excessive heat build up that might otherwise damage the pump or seals. It is important to check the water in the tank before sweeping as the centrifugal water pump should not run dry for more than 3 minutes.

Machines prior to Serial No. V-376 were equipped with a self priming positive displacement water pump. A protection device kept the impeller from burning if the pump should run dry for lack of water in the system.

A red indicator lamp on the control panel glowed when the water pump switch was turned on. If the pump shut off for lack of water this lamp would continue to glow indicating the pump switch was still on. As soon as there was water back in the system, the pump could be re-started by pushing the reset button. This pump must not run dry more than 30 seconds.

Excessive water pressure in this positive displacement pump used a pressure relief valve mounted at the pump to relieve the pressure and return it to the water tank.

Stainless steel spray tubes are mounted on both the front and back sides of the suction nozzle. The tubes have holes that match holes (spacing) in the suction nozzle and are mounted in such a manner as to produce a flat, fan-type spray inside the suction nozzle to control the dust.

These spray tubes on the suction nozzle replace individual spray jets that produced a cone shaped pattern inside the suction nozzle. The individual spray jets were replaced by the tubes machine serial No. V-367.

Spray jets are used in the area of the side brooms and the extension broom for dust control.

Solenoid operated valves control the water flow (on and off) to these spray tubes and spray jets. These valves are actuated by switches located on the control panel in the drivers compartment. Hand operated valves, one in the line to the extension broom spray jets and one in the line to the side broom spray jets, control the amount of water flowing to these areas.

SUCTION NOZZLE

A strong suction air stream, created by the vacuum developed in the dirt container (hopper) through the exhaust fan, picks up the dirt at the vacuum nozzle and is conveyed through the vacuum nozzle

hose into the hopper. The velocity of the dust and dirt laden air stream is greatly reduced upon entering the large hopper area and by being deflected down by baffle plates across the large cross-section of the hopper.

Dirt falls to the floor of the hopper and the air passes through a screen and duct at the top of the hopper into the exhaust fan and then is routed through an outlet duct into open air.

A hinged shutter on the forward side of the vacuum nozzle raises to allow accumulations of material or large objects in front of the nozzle to pass into the nozzle. Opening this shutter reduces the effective vacuum at the nozzle. Closing the shutter as soon as the material passes through, re-establishes the normal amount of vacuum and carries the material on into the hopper.

An automatic opening and closing shutter, as part of a redesigned suction nozzle, became effective at machine serial No. V-556. As material builds up in front of the nozzle, it forces the shutter to open up. As the material passes into the nozzle suction area the shutter drops down by gravity re-establishing the full suction action of the nozzle.

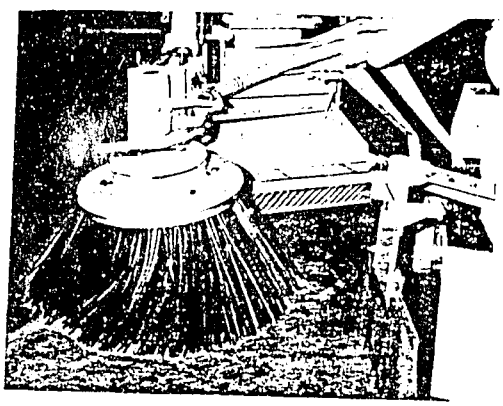

Fig.1

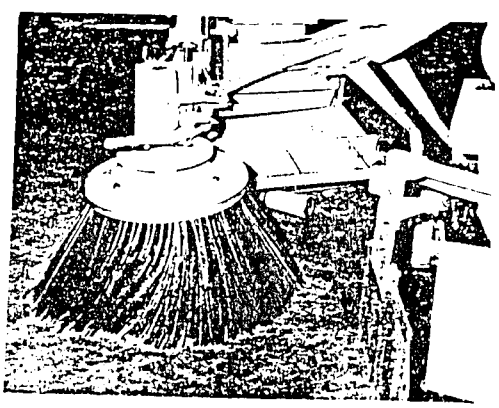

Fig.2

The above photos show the automatic shutter in normally closed sweeping position (Fig. #1) and raised position (pushed up by material accumulated in front, such as a tin can shown here) to allow the material to pass into the vacuum area of the nozzle (Fig. #2).

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Prior to V-556 the suction nozzle had a shutter that was opened and closed with a double acting air cylinder. The operator could open and close the shutter as needed with a switch on the control panel which activated this cylinder.

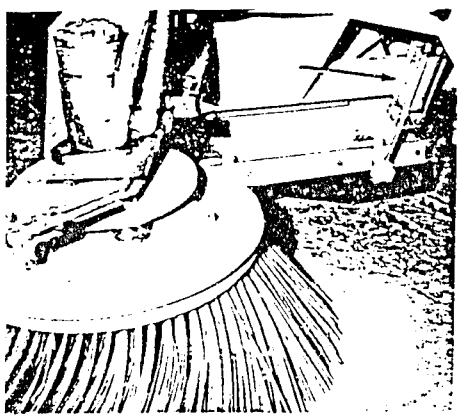

Fig. 3

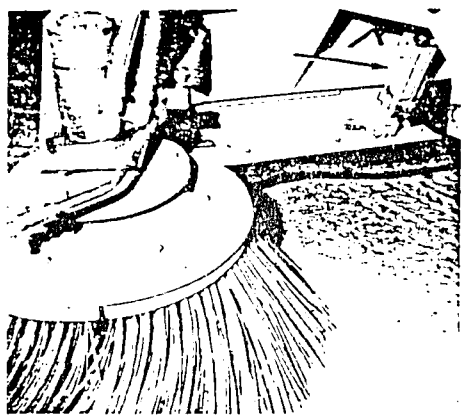

Fig.4

The air cylinder shown in Fig. #3 (arrow) keeps the shutter closed during sweeping. As material accumulates the operator opens the shutter as shown in Fig. #4 to let the dirt be picked up by the vacuum nozzle.

SIDE BROOM

The side broom is mounted on the suction nozzle draw bar assembly and is raised and lowered by a compressed air cylinder. A hydraulic motor mounted directly to the side broom drive shaft rotates the broom for sweeping. A single switch on the control panel both lowers and starts the broom rotating. As the rotating broom contacts the street, it automatically moves out into the gutter sweeping position by its own action. Material is then moved from the gutter into the area where it is picked up by the vacuum nozzle and conveyed into the hopper.

Sweeping pressure of the side broom is controlled by a pressure regulator valve located on the control panel.

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Adjustments are provided to see the side broom so that it produces a sweeping pattern similar to the shaded area of the side broom as illustrated in Fig. #5. If the broom is set too flat it will scatter the dirt in all directions. The dirt must be brought out of the gutter area into the path of the suction nozzle. The strip brushes prevent the dirt from being thrown beyond the area of the nozzle.

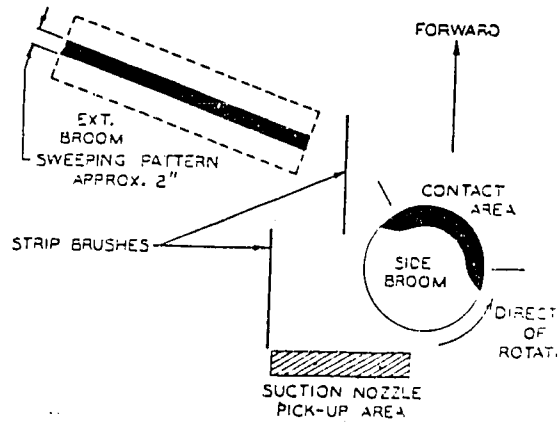

Fig. 5

EXTENSION BROOM

This broom extends the area covered by the suction nozzle on the side opposite the side broom.

This broom is pivoted to an angle for sweeping and the action is to windrow the dirt into the path of the suction nozzle. See Fig. #5. This broom does not have a control to vary the sweeping pressure, however, it does have an adjusting screw to limit the downward travel of the broom when it is lowered to sweeping position which controls bristle deflection.

A rubber deflector is mounted on the front of the extension broom to prevent dirt from being thrown out in front of the machine.

Shock absorbers, located on the broom mounting weldment and pivot frame weldment, link these two parts of the broom assembly together to reduce broom bounce or walking effect of the broom.
Weights may be added at the pillow block bearing end of the broom frame weldment to counter balance the weight of the hydraulic motor at the other end. This is to help reduce any tapering effect on the extension broom.

This broom is lowered and the hydraulic drive motor activated by a single switch on the control panel in the drivers compartment.

CONTROLS & ELECTRICAL SYSTEM

Power for operating the electrical components of the sweeper unit comes from the accessory terminal of the truck

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electrical system. Power for starting the auxiliary engine comes from the truck battery.

A single combination control and instrument panel is centrally located in the truck cab of the machine at the side of the operator. This unit effective with Serial V-556 contains the side broom pressure control valve (Fig. 6-Item #1), all of the electrical control switches (Fig. 6-Item #2) and instruments (Fig. 6-Item #3) to perform all of the sweeping functions of the machine.

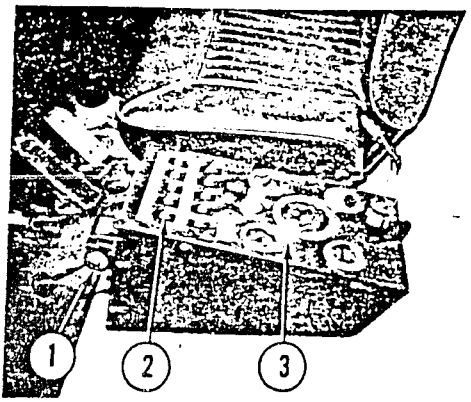

Fig. 6

Two circuit breakers located inside the control box, one on each side of the side broom pressure control valve, protect the electrical control circuits.

The ignition switch for the auxiliary engine is located on top of the instrument panel. A light next to the ignition switch glows to indicate when the auxiliary engine is running.

Instruments for the auxiliary engine include a tachometer, engine oil pressure gauge, engine water temperature gauge, air pressure gauge for the compressed air system and an engine hour meter. Ref. Fig. 6.

The throttle and choke controls for the auxiliary engine are located to the left of the center of the truck dash panel. A vernier type control is used for the throttle control of the auxiliary engine. It consists of three parts. See Fig.7.

1. Release button for quick adjustment and fast shut down.
2. Easy trip knob for Micro-adjustment has six turns per inch of linear travel.
3. Positive adjustment brake lets you select the right amount of friction to maintain precise settings regardless of vibration or governor back pressure. Only three quarters of a turn is required from

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"Hold" to "Release" positions. Brake also acts as a wiper to clean the sliding sleeve before it enters the control body.

4. Choke control-auxiliary engine.

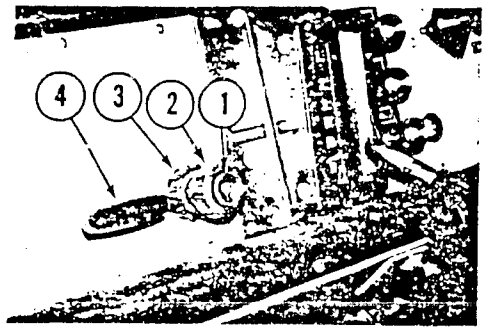

Fig. 7

To operate the throttle push in release button knob then pull knob out for quick throttle adjustment. Release push button. Knob may then be turned for fine adjustment of throttle, either right or left as needed.

The brake or lock may then be turned in the direction as indicated to hold the throttle setting.

For fast shut down push in on release button and knob to close the throttle. It is not necessary to release the brake, however, to open the throttle again it is necessary to release the brake. Do not try to pull out the throttle knob without releasing the brake.

PREPARATIONS FOR SWEEPING

1. Perform routine maintenance common for motor vehicles such as checking oil, cooling water and fuel for prime mover as well as the auxiliary engine. Refer to maintenance instructions of truck chassis and auxiliary engine.

2. Fill the water tank for the spray water system. Open hydrant valve to clear the water of sediment. Connect filling hose to hydrant. Open hydrant valve and fill the water tank until water flows from the overflow pipe. Shut off hydrant and disconnect fill hose. Roll up fill hose and replace on storage pin under body (right hand side back of suction nozzle hose).

3. Start auxiliary engine, let it warm up and build up pressure in the compressed air system. Check tachometer for idling speed of 1000 R.P.M. With compressed air in the system, locking pins retaining the nozzle and brooms can be removed and the machine is ready for sweeping.

   Action of the nozzle and brooms is controlled by switches on a panel in the drivers compartment. When the switch for the nozzle or a broom is switched on, its red lamp will light up and the respective unit will take its working position. The broom will move to its sweeping position and start rotating. When the switch is turned off, the red lamp will go out and the respective unit will return to its non-working or "up" position.

Spray water to the vacuum nozzle, extension broom, and side broom is also controlled by individual switches.

SWEEPING

1. Bring auxiliary engine up to sweeping speed, 2500 R.P.M. maximum for gas engine (2200 R.P..M. max. for diesel engine). For light sweeping the engine speed may be reduced to 2000 R.P.M. for gas engine (1800 R.P.M. for diesel engine) and still have effective sweeping. The lower speeds tend to increase engine life and help dust control.

2. Shift transmission to low gear, whether it is a manual shift or automatic transmission, and shift the two speed rear axle to low range for normal sweeping.

3. Switch on sweeping components, such as the suction nozzle and brooms, as they are required.

4. Add spray water, according to the weather or other sweeping conditions, and proceed with sweeping.

   Brooms may be engaged or disengaged at any time during the sweeping operation.

   In case large quantities of leaves are to be removed from the gutter, the extension broom must not be used.

   Vary sweeping speeds according to sweeping conditions such as material to be swept, heavy or light accumulations and wet or dry pavement.

DUAL NOZZLES AND SIDE BROOMS

Machines equipped with dual nozzles and side brooms are designed to sweep with either right hand or left hand nozzle but not both at the same time.

A toggle switch, located on top of the instrument panel, controls the switch-over from right hand sweeping to left hand sweeping or the reverse.

What ever sweeping components are being used on one side will be put into action on the other side and the extension broom will swivel automatically when this switch-over is made. The sweeping set up will be duplicated on the opposite side with no other switching or adjustments with the possible exception of the side broom which may have to be adjusted for sweeping pressure.

SPECIAL HINTS FOR SWEEPING

Large obstacles in the gutter should be avoided. Loose wire for instance, should be placed into a container by hand as wire twisted around the broom bristles is difficult to remove.

The operator should pay special attention to vibrations and unusual noises emanating from the exhaust fan. Vibration caused by foreign matter on the impeller blade can cause severe damage.

When interrupting the sweeping and with the broom in the raised position, the exhaust fan must be kept running for about 10 second to insure that all sweepings still contained in the vacuum hose are cleared away into the dirt container.

While sweeping, the broom can be observed through the large mirror mounted at the right hand side of the drivers compartment. For night sweeping a light trained on the side broom area makes it possible to see this broom action.

NOTE: The back up light switch in the truck transmission activates the solenoid valve which automatically raises the vacuum nozzle when the truck transmission is shifted into reverse. This is a safety feature which prevents damage that might occur by backing up the machine with the nozzle down. When sweeping on inclines, do not let the machine roll back with the nozzle and brooms down.

DISCHARGING THE LOAD

1. Sweeping finished:

   a. Shut off spray water (switches).
   b. Raise brooms and vacuum nozzle (switches).
   c. Reduce the auxiliary engine R.P.M. to idle.
   d. Secure locking pins for transport.

2. Emptying of dirt container:

   The machine should be parked on level and solid ground for dumping.

   a. Keep truck engine running.

   b. Increase auxiliary engine speed to 1500 R.P.M. to maintain vacuum to prevent water leakage when unlocking the hopper door.

   c. To open the hopper door, slide the door lock handle (stored in the drivers compartment) on the lock shaft at the right rear side of the hopper and turn to unlock the over center manual lock.

d. Reduce the auxiliary engine R.P.M. to idle.

e. To open the rear discharge door, actuate the manual hydraulic valve located near the right hand rear fender. When the hopper door is raised, latch the safety lock on the door to prevent the door from lowering.

f. Actuate the lever of the hydraulic valve located behind the drivers compartment on the right hand side to raise the hopper into dumping position. Make sure that it reaches its full dump position then put the safety bar in place. Should some of the load remain stuck in the hopper, it can be released by using the hand scraper provided.

g. After the load has been completely discharged, clean the seal area around the edge of the door and also clean off the rubber gasket in order that the door will reseal when closed. The wash down hose may be used for this purpose. (The auxiliary engine must run approximately 1500 R.P.M. to have enough water pressure to use the wash down hose.

h. Before lowering the hopper, the safety bar must be returned to its initial position. If this should not release because of hopper weight on the safety bar, raise the hopper briefly and the bar can be moved. Then actuate the valve lever to lower the hopper to its original position.

i. To close the hopper door, the rear hydraulic valve must be actuated release the safety latch, then the door can be closed. Lock it manually with the door lock handle.

WASH-DAWN (SUGGESTED PROCEDURE)

A very important step in a good sweeper maintenance program is a daily wash-down after sweeping. Best results are obtained when using a high pressure hose which will break loose large or packed accumulations of dirt.

Open the rear discharge door and raise the hopper to the full extent and make sure the safety bar is in place. Wash out the entire hopper and check two areas in particular. One area that must be cleaned is the screen inside the hopper at the top where the air passes from the hopper to the fan duct. Another area where dirt may accumulate is on the back panel (inside) over the rear door. Make sure the rear door seal is clean.

Disconnect the 11" dia. hose from the vacuum nozzle and check inside for any build up of dirt inside the nozzle. This dirt may build up in heavy sweeping conditions and must be cleaned out.

Check and clean seals at the top of the gate valve and at the top of the exhaust fan. These must be clean and form a tight seal when the hopper is down.

Wash out dirt around side broom and extension broom areas.

Before lowering the hopper, return safety bar to its retainer. If this is not easily removed, actuate the hydraulic valve to raise the hopper. This will take the load off the safety bar, then it can be moved, lower the hopper and close the rear door. The balance of the machine can then be washed down.

INSTRUCTIONS
SECTION II
ADJUSTMENTS & MAINTENANCE

ENGINE

Engine maintenance includes servicing those engine components that may affect engine performance. For proper performance and economy all procedures detailed in the engine service instruction manual that comes with every machine should be followed as prescribed. This includes both the truck engine and the auxiliary engine.

AIR CLEANER

The auxiliary engine is equipped with a pre-cleaner, a dry type air cleaner with a separate safety element and an automatic dust unloader.

A transparent bowl on the pre-cleaner (see Fig.8) provides a quick visual check of the dust level in the bowl. It is easily removed for cleaning by removing one thumb screw on the top. lift off the metal cover and plastic bowl for cleaning. This should be checked frequently during heavy dusty sweeping.

A fully tested and highly efficient dry type air cleaner is standard equipment on every sweeper. The construction of this air cleaner provides a safety feature in that it will not by-pass dirt-laden air to the carburetor when the element is dirty, but it will choke down the air supply to the carburetor to the point where the engine will lose power or stop altogether until the element is cleaned or replaced.

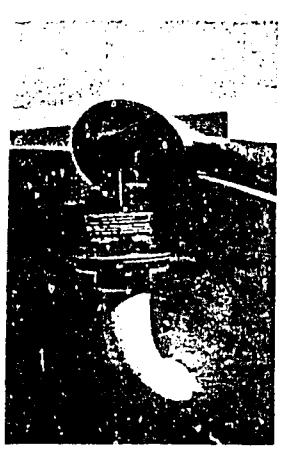

Fig. 8

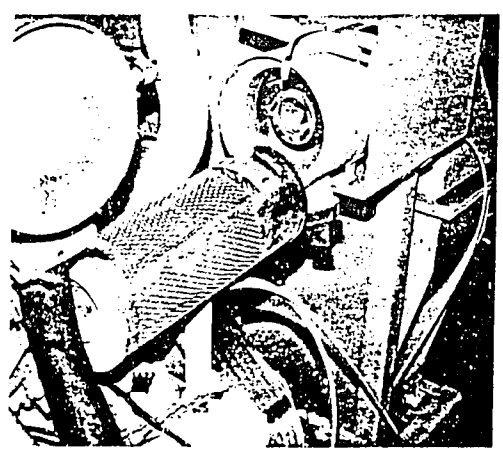

Fig. 9

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The air cleaner is equipped with a safety element system and an automatic dust unloader. The rubber tip of the dust unloader should be checked frequently to make sure nothing obstructs the passage of air and dirt exhausting from the filter.

The inner or safety element is replaced annually or every 1000 hours as routine maintenance. This may be sooner if the sweeper is used constantly in extremely dirty conditions. No attempt should be made to clean this element.

The outer element may be cleaned and reused. Life expectancy of this element is about 12 washings with a proper and regular service program. Steps for cleaning the outer filter element are as follows:

1. Take out element (Fig. 9) and tap gently against the palm of your hand to remove the loose dirt and dust.

2. Wash by repeated dipping in cool or lukewarm water with a small amount of a mild, non-sudsing detergent.

3. Rinse in cold water and let it dry for at least eight hours before using. If a hose is used to rinse, do not exceed 40 p.s.i. water pressure.

Washing is the preferred method of cleaning as it removes more dust and soot and restores the element to almost new conditions. Checking the element with a light will give a good indication of the actual condition of the element.

Cleaning the element with compressed air is not considered an entirely satisfactory method. Some dust will remain in the element causing more frequent servicing of the element. This method should be used only as a temporary measure until sufficient time is available to clean the element by washing.

DO NOT ATTEMPT TO CLEAN THE ELEMENT BY BEATING OR RAPPING AGAINST A HARD SURFACE: THIS WILL DAMAGE THE ELEMENT.

An element cleaning tool (I.H. part # 407073R1 -- John Deere # AR62377) for use with compressed air (under 30 p.s.i.) is available from your construction equipment dealer. It will do a faster and more efficient job of removing dust than a regular air gun or nozzle.

1. Carefully tap side or end of element against the palm of your hand to remove loose dirt.

2. Direct clean, dry compressed air up and down the pleats on the "CLEAN SIDE" of the element. Always direct the compressed air opposite the normal operating air flow through the element.

3. Inspect the element for damage. The slightest rupture requires replacement of the filter element.

Inspect for faulty or damaged gaskets (replace if necessary) when installing element. Inspect and tighten all air cleaner system connections.

ENGINE P.T.O.

The auxiliary engine power take-off drive and pulley assembly should not require servicing. Bearings are sealed and no provision is made to lubricate. The drive pulley is keyed to the drive shaft and retained with a clamp plate and one 1 1/2"hex. head cap screw and lock washer in the end of the shaft. See P.T.O. illustration in group 6-4 of the parts book section.

To remove the drive shaft bearings or drive discs in the power take-off assembly, the blower and the air cleaner must be moved before the drive pulley can be removed. After the pulley has been removed, take out the hole plug in the flywheel housing and remove the drive disc screws through this hole. Remove the screws around the flywheel housing and pull out the complete P.T.O.assembly.

The reason for this method of assembly is that the large bearing is pressed on to the drive shaft and cannot slide off the shaft by simply removing the retaining ring.

EXHAUST FAN

The pillow block bearings on the exhaust fan shaft should be lubricated once a week. It is recommended that Mobilux #2 grease or equal be used. This grease is available from E.S. Co., part number 5009701.

Check the seal No. 1 - Fig. 10 at the top of the fan for signs of air leakage. This should be kept clean and seal properly to maintain vacuum at the suction nozzle.

Seal No.2 makes the connection between the pre-cleaner and the air cleaner. It also must be kept clean and form a good seal to help maintain the efficiency of the air cleaner.

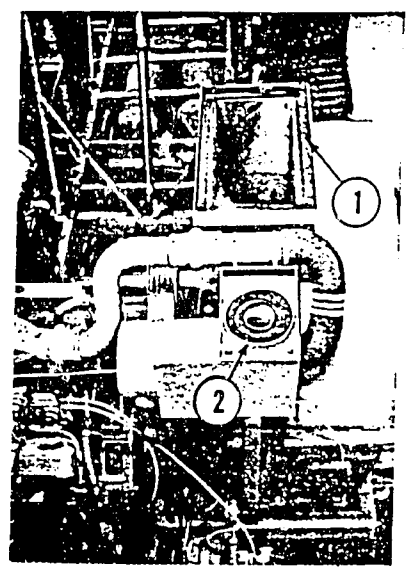

Fig.10

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Inspection cover plates are provided on the rear and side of the fan housing. These may be removed to check for dirt or foreign material that may have collected inside of the fan.

Special attention must be given to vibrations or unusual noises emanating from the exhaust fan.

1. Vibrations can be caused through a foreign body (for instance a glove, rag, or sticky dirt on the impeller blade) by which the impeller can be badly damaged.
2. Unusual noise can be caused by excess speed. Over-speed can damage the impeller. The auxiliary engine should be run at 2500 R.P.M. Max. (V-8 engine and 2200 R.P.M. Max. Diesel) for sweeping, this gives the impeller an operating speed of 3422 R.P.M. (max.) which is a ratio of 1.369:1 through the belt drive pulleys.
3. If the unusual noise is caused through alteration of the governor setting and results in a decrease of impeller speed, the vacuum at the suction nozzle will be reduced.
4. Vibration may occur particularly during fall sweeping when leaves are picked up.
5. The impeller should be inspected for wear weekly. Excessive wear (one third of the vane material worn away), weld separations or holes in vanes could result in fan failure or disintegration.

ADJUSTMENT OF FAN BELTS

A five belted powerband is used to drive the exhaust fan effective with mach. Serial no. V-606. The idler pulley assembly contains a calibrated spring designed to exert the proper tension on the fan drive belt.

The idler pulley adjustment is shown in Fig. 11 The calibrated adjusting spring is located inside the collar (Item #1). To make the proper tension adjustment, a plain washer (Item #2) is assembled on the adjusting bolt against the spring.

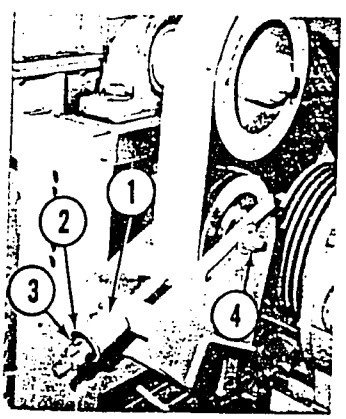

Fig. 11

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An adjusting nut (Item #3) is then drawn up against the washer and tightened until the spring is compressed to the exact length of the collar. A lock nut is then drawn up against the adjusting nut to maintain the adjustment. The pulley shaft (#4) is then tightened. The belt should be readjusted after the first 50 hours of operation and every 1000 hours of operation thereafter. The belt should be adjusted more often if it appears to loosen or show wear.

A six belted power band was used to replace a matched set of six "V" belts prior to machine serial No. V-565 and was used up to V-606. Tension of this belt should be adjusted to the point where it can be deflected approximately 1/2 inch with thumb pressure on each side of the belt half way between the drive and driven pulleys of the fan.

SUCTION NOZZLE

The rubber strips at the rear and sides of the lower part of the suction nozzle and the shutter at the front form the air seal between the nozzle and the street. Check these for excessive wear, replace if damaged.

To adjust or check the adjustment of the suction nozzle the sweeper must be parked on a level floor or pavement, particularly the area under the suction nozzle assembly when lowered and out in sweeping position.

The top edge of the nozzle side plate (see No. 1-Fig.12) should be 6 7/8 inches from the ground at the rear and 7 inches from the ground at the front. The nozzle support wheels should be in trailing position. Both sides of the nozzle.

The rear height adjustment is made by adding or removing shims at point No. 2 - Fig. 12, both trailing wheels. Where extremely uneven streets or low gutters are common a third trailing wheel may be added between the two existing ones to reduce wear on the nozzle and rubber strips.

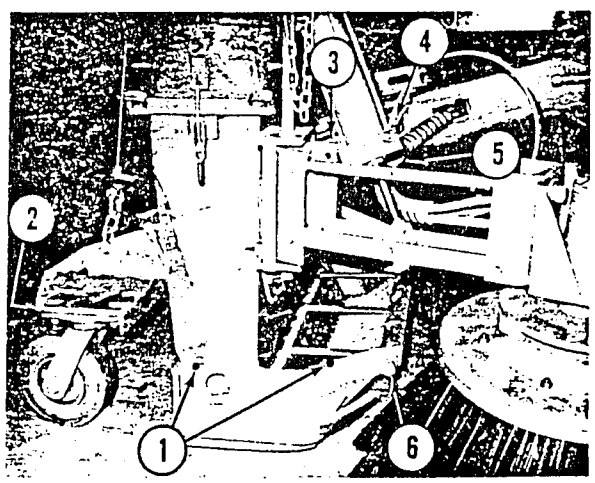

Fig. 12

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To adjust the front part of the nozzle, loosen the pivot bolt No. 3 and the adjusting bolt # 4. Set the front of the nozzle side plate to the 7" dimension, tighten the pivot and adjusting bolts. Draw the set screw No. 5 up against the nozzle arm and tighten the locknut to help hold the front adjustment.

The rubber strip at the rear of the nozzle should touch the ground. The strip in front of the rear strip should clear the ground by one quarter inch. The side rubber strips should also clear the ground by one half inch.

The automatic shutter adjusting nut is item No.6 - Fig. 12. Turning this nut will increase or decrease the tension of the spring in this assembly to counter balance the weight of the shutter. To adjust, remove the cotter pin, turn the hex. nut until the shutter raises, then back off the tension just enough to allow the shutter to close completely. Replace the cotter pin. This adjustment is made after checking to see that no accumulation of dirt or foreign matter is causing binding or that parts are not broken or distorted in the assembly.

The shutter for the suction nozzle on machines prior to V-556 is a rubber strip mounted on a hinged frame on the forward side of the nozzle and should clear the ground by 5/8 inch in the normal sweeping (or down) position.

To adjust the clearance of the shutter rubber from the ground an adjusting screw on the pivot bar (No. 1-Fig. 13) will raise and lower the front end of the nozzle frame. This increases or decreases the clearance of the shutter from the ground as the rear end of the frame is fixed and pivots on the axles of the trailing wheels.

The rubber strip on the rear of this nozzle assembly has slotted mounting holes to provide for adjustment. It should clear the ground by 1/8 inch minimum for average sweeping.

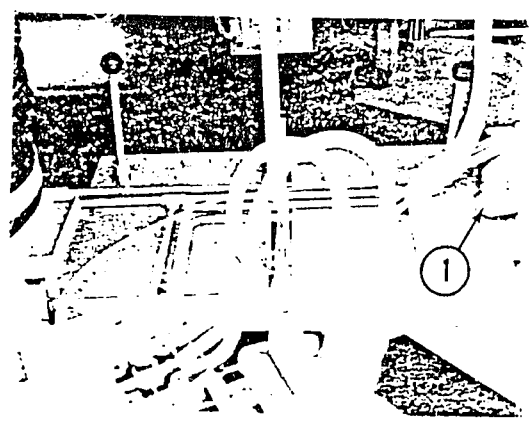

Fig. 13

Two strip brushes mounted on the nozzle frame restrict the dirt thrown by the gutter broom to the suction nozzle area. Rods extending above the nozzle frame with adjust. collars provide the adjustment to compensate for wear on the brush toward the inside

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of the nozzle frame. The mounting hooks that secure the front strip brush can be moved up or down in slots in the mounting bracket to compensate for brush wear. (See Fig. 13).

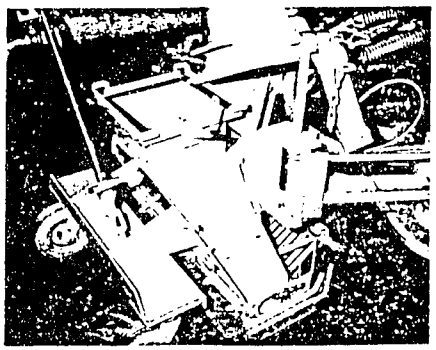

Fig.14

Check inside the nozzle (Fig. 14) during wash-down by removing the hose connector from the nozzle and remove any material that might have accumulated inside the nozzle. Check the spray water tubes to make sure they are not clogged. Before replacing the hose connector, check the seal on the suction nozzle for possible air leaks.

Also check the seal around the gate valve assembly (Fig. 15), at the top of the gate valve and at the suction nozzle hose connection for air leaks.

Fig.15

Any air leaks in this area can greatly reduce the sweeping efficiency of the machine.

When the suction nozzle is lowered and moves out to sweeping position, the distance it moves out is limited by the stroke of the nozzle lift cylinder as seen in Fig. 14. It is the extended rod on the back side of the suction nozzle assembly.

On machines prior to Serial No. V-556 the suction nozzle was mounted on frame. This frame when lowered and moved out to sweeping position moved 10 inches away from the truck frame. The arrow heads in Fig. 16 shows where the 10 inches was measured. An adjustable stop bolt on the pivot bar of the nozzle frame assembly limited the movement of the guide arm weldment. This controlled the distance the nozzle frame would move away from the truck frame.

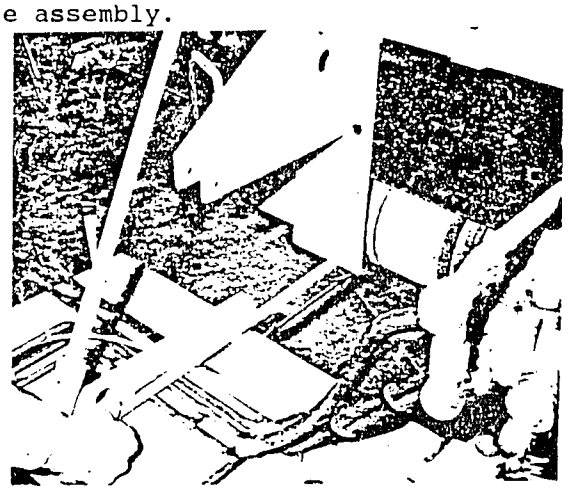

Fig. 16

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SIDE BROOM

The distance that the side broom pivots out from the machine for sweeping is preset at the factory with the redesign of the suction nozzle and side broom assembly starting with Serial No. V-556. Stop blocks are welded into the assembly to limit the distance the side broom will pivot, both in and out. There is no adjustment. Pivot points have oilite bearings to eliminate a need for grease fittings.

Prior to V-556 the greatest distance the side broom was set to travel out was 19 inches from the outside edge of the nozzle frame to the center of the side broom hydraulic motor. This is indicated in Fig. 17. Adjustment was made with hex. head screws on the back side of the linkage support weldment used as stops against the pivot block weldment. See Group #12-Fig. B.

All pivot points on the side broom assembly prior to V-56 had "Fiberglide" liners. An exception to this was a few machines that had grease fittings added (two) to the side broom pivot shaft. The purpose of these were to be able to purge out any water or other contamination which would prevent the side broom to swing out free and easily to its full extended sweeping position.

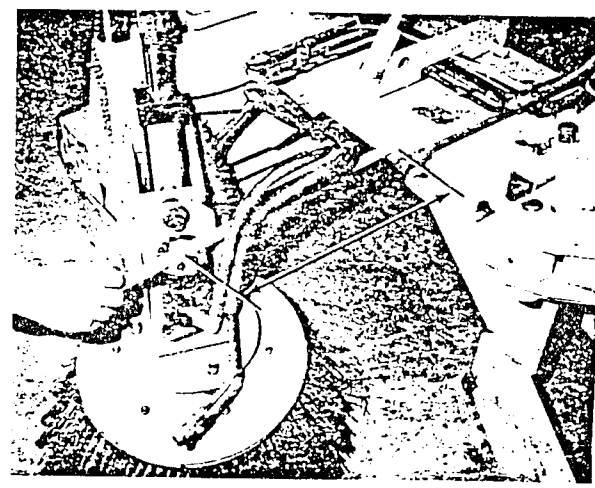

Fig. 17

To adjust the side broom to obtain the sweeping pattern similar to the illustration in Fig. 5-P.27, pull out the safety retaining pins for the nozzle air cylinder, nozzle drawbar, and side broom. Next get these components out and down to the full extent of their sweeping positions.

To check the angle of the side broom laterally, use a protractor head set at a 6_o angle. Place on top of the side broom plate parallel to the truck chassis. The bubble of the protractor head should indicate level. If it does not, loosen locknut on turnbuckle rod (Item No. 1 in Fig. 18) and turn rod in the direction that will bring bubble to level point as indicated in Fig. 18. Tighten locknut on turnbuckle.

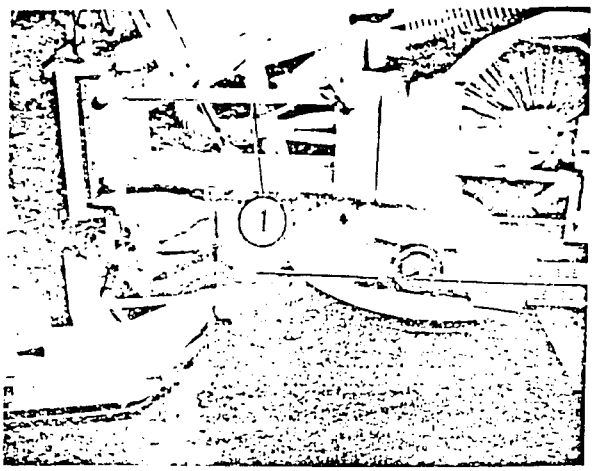

Fig. 18

To check the angle of the side broom horizontally, place the protractor head set at a 6_o angle on top of the side broom plate at right angle to the truck chassis. The bubble should indicate level in this position as indicated in Fig. 19. If it does not, loosen the adjusting screw nut (Item No. 2 in Fig. 19) and tilt broom

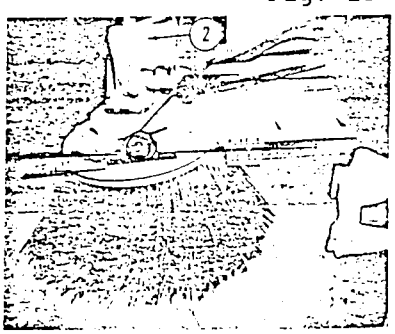

Fig. 19

assembly to bring the bubble to level point. Tighten nut on adjusting screw. The angle may be increased for extreme "crown" of pavement. (Maintain side broom pattern as, Fig. 5).

To remove the side broom segments there are three nuts and bolts in each of the two segments that have to be removed. The segments can be removed for servicing without removing the mounting disc.

To replace the rubber shock mounts between the side broom mounting disc and the broom segment mounting disc, first remove the broom segments, then remove the broom mounting disc from the shock mounts and then the shock mounts may be removed from the upper broom mounting disc.

If the side broom hydraulic motor has to be removed for servicing, remove the broom segments. Loosen the set screw in the hub in the side broom

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mounting disc. It is not necessary to separate the mounting disc and the broom segment mounting disc as these can be removed as an assembly. Reach up underneath and remove a single 1/4 hex, head cap screw with a socket wrench (see Fig. 20). This will permit the complete mounting disc assembly to drop down and be removed.

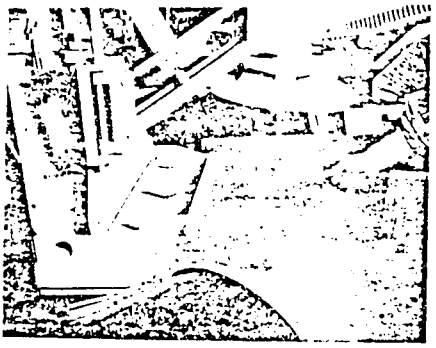

Fig. 20

EXTENSION BROOM

The ground pressure of the extension broom should make a pattern 1 1/2 to 2 1/2 inches wide the full length of the broom on level ground.

Broom adjustment should be made with the machine parked on a level flat surface. A stop screw (Item # 1 - Fig. 21) limits the downward movement of the broom consequently sets the sweeping pattern. Downward pressure comes from gravity or weight of the broom itself.

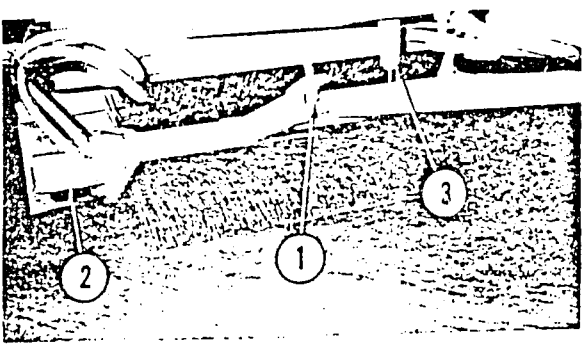

Fig. 21

Other items shown in Fig. 21 are the hydraulic motor (No. 2)

which rotates the broom and one of the 2 shock absorbers (No. 3) which helps to stabilize the movement of the broom.

Weights have been added to the broom end opposite from the hydraulic motor. These weights (Item # 1 - Fig. 22) are bolted on and different amounts may be added or removed to counter balance the weight of the hydrolic motor at the other end.

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To remove the extension broom itself, first remove the two bolts holding the pillow block bearing (Item # 2- Fig. 22) to the frame. Next remove the three hex. head screws (Item # 3 - Fig. 22) in the idler shaft weldment and remove the idler shaft and bearing from the broom core as an assembly. The bearing need not be removed from the idler shaft.

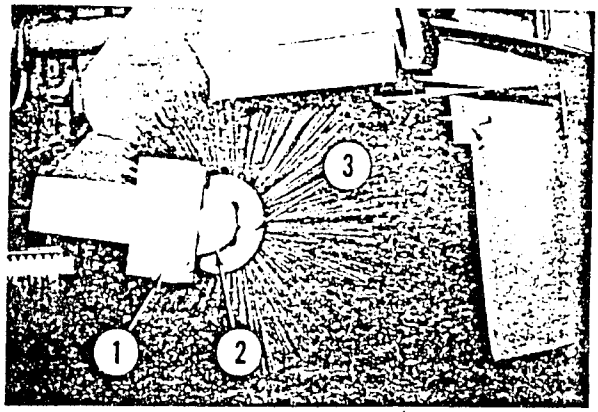

Fig. 22

The extension broom and core assembly can be pulled out for refilling or replacing with a new broom assembly. Note: When reassembling the broom core, make sure the square drive bushing on the hydraulic motor shaft seats properly in the square drive hole in the extension broom core before reassembling the idler shaft and bearing.

COMPRESSED AIR SYSTEM

The air compressor, mounted on the auxiliary engine and driven by "V" belts from the crankshaft, supplies air to the air cylinders in the compressed air system. Filtered air is supplied to the compressor from the auxiliary engine air cleaner by using an adapter and hose. (See Fig. 23).

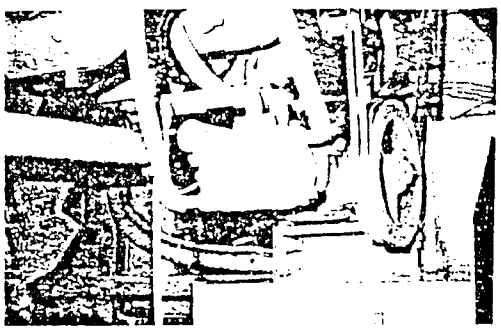
Fig. 23

Oil to lubricate the compressor is drawn from the engine crankcase, circulated through the compressor crankcase and returned to the auxiliary engine.

The water for the compressor cooling system is drawn from the auxiliary engine cooling system.

These three systems must be checked periodically,when the compressor is running, to make sure there are no leaks. Also the compressor drive should be checked for alignment, belt tension, and mounting bolts must be tightened securely and evenly.

After 3000 hours, the compressor should be disassembled and all parts thoroughly cleaned and inspected. Repair or replace all worn and damaged parts or replace compressor with a factory reconditioned repair - exchange unit.

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The air reservoir is provided with a drain cock on the bottom to drain any accumulation of water in the tank. Open the pet-cock weekly to drain the water, more often if the humidity is high.

Machines from Serial No. V-201 to V-279, from V-376 to V-426, and from V-556 and on were and are equipped with an air filter in the compressed air line between the air reservoir and the manifold. This filter traps dirt particles and water that might otherwise get into the air valves and cause damage or sticking.

A daily visual check of the transparent bowl will show how much dirt and water has accumulated and when it should be cleaned.

Even though precautions have been taken to provide clean dry air going into the solenoid operated air valves it has been found that occasionally one of these valves may stick. If this occurs several things may be tried initially to free the plunger such as (1) tap the valve with something solid such as a screw driver handle, (2) check the solenoid coil circuit for continuity, and (3) disconnect the air pressure line to the coil and squirt a small amount of a silicone type lubricant into the valve. Reconnect the air line and operate the valve.

If the above things do not work, the valve may have to be taken apart and cleaned with compressed air. The "o" rings at each end may have to be replaced if they appear to be leaking or the spool may have to be replaced. Check also for a weak return spring and again check the solenoid coil.

Machines with Serial No. V-279 to V-376 had an oil lubricator in the compressed air system instead of the air filter. It was located on top of the compressed air reservoir in the out-put pressure line. It provided a method for lubricating the air control valves and cylinders.

To fill, remove one of the large fill plugs and fill with oil to the level mark on the bowl. Use high quality S.A.E. #20 motor oil. To avoid over-lubrication the needle valve adjusting screw should be turned clockwise until seated and backed off or cracked just enough to allow oil to flow through. The oil levels in the bowl should be checked weekly. (One fill should last approximately one week). The oil level should never be allowed below the end of the dip tube in the bowl.

When cleaning, wash parts with denatured alcohol and clean bowl and sight glass <u>only</u> with household soap.

HYDRAULIC SYSTEM

A single hydraulic pump (mounted on the truck engine and driven by a "V" belt from the crankshaft pulley) supplied the hydraulic oil pressure to operate the hopper tilt cylinder and the rear hopper

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door cylinder. The use of this pump was discontinued and replaced by using the power steering pump (already on the truck engine) for this power source on machines with air brakes. The power steering pump and the integral hydraulic relief valve in the steering gear box are connected to the main hydraulic oil system and uses the same filtered oil supply as do the hydraulic motors. The relief valve maintains a pressure of 1500 P.S.I. in this part of the hydraulic circuit in order to raise the hopper with a load and open the hopper door. Oil from this circuit passes through a 10 micron filter when it returns to the oil reservoir. A by pass valve in the filter will let oil pass straight through when the back pressure exceeds 20 P.S.I.

The filter element in the 10 micron filter should be replaced after the first 50 hours of operating time on a new machine. It is recommended that a new filter element be installed when changing oil in the hydraulic system semi-annually.

A new element should be installed by hand. First apply a firm of oil to the gasket and hand turn until the gasket contacts the filter head. Tighten one quarter turn only and check for leaks.

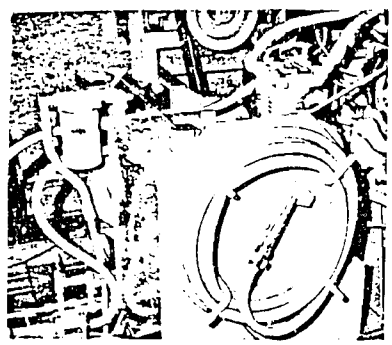

Fig. 24

Oil from the reservoir to the dual hydraulic pump and to the power steering pump passes through strainers located in the suction lines where they connect to the oil reservoir. These strainers should be inspected and cleaned when the hydraulic oil is changed, semi-annually.

To inspect and clean, disconnect the suction lines at the oil reservoir, after the hydraulic oil has been drained, and pull out the strainers.

A dip stick is incorporated in the filter plug to check the oil level in the reservoir. With the hopper in the raised position, the oil level should be maintained to the full mark on the dip stick. (See Fig. 24).

To refill the hydraulic oil reservoir after draining and cleaning, will require approximately 15 gallons of oil. Refill to the full mark on the dip stick.

A tandem oil pump driven by the auxiliary engine supplies the power for the hydraulic motors. One section powers the side broom hydraulic motor and the other section powers the extension broom hydraulic motor. (Fig. 25).

The hydraulic pumps should be checked periodically for belt drive alignment and tension, also for any oil leaks such as hose fittings and seals on the pumps.

Fig. 25

SPRAY WATER SYSTEM

The strainer in the spray water line from the water tank to the water pump is shown in Fig. 26. It should be removed and cleaned as required or at least once a week.

Water from the strainer goes to a centrifugal pump. This pump is driven by a "V" belt from a pulley on the auxiliary engine P.I.O. and runs whenever the auxiliary engine is running. It is mounted on the auxiliary frame but the centerline of the pump inlet is approximately three inches above the bottom of the water tank. A check valve is placed in the water line from the tank to the pump. This valve prevents water from flowing back to the tank from the pump, thus maintaining the pumps' prime.

A small return line from the out put side of the centrifugal pump to the water tank keeps the water circulating through the pump when the pump is running and the water valves are closed. This prevents overheating and damage to the pump.

At Serial No. V-606 an alternator to boost the electrical requirements, when the electrical components are running, was mounted on top of the centrifugal water pump and is driven by the same "V" belt that drives the water pump.

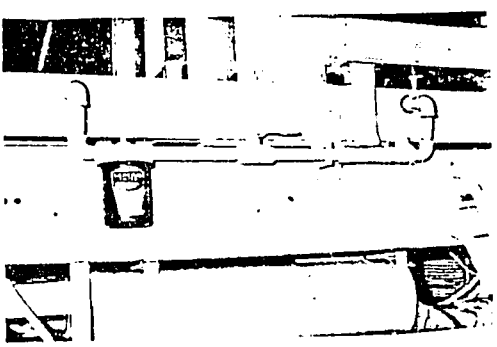

Fig. 26

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This is shown with the pump in Fig. 27. If the auxiliary engine is a diesel engine the alternator is mounted on the fan end of the engine instead of on the water pump.

Prior to V-376 a self priming positive displacement pump located above the power take-off end of the auxiliary engine. The pump was equipped with an electromagnetic clutch unit and a vacuum switch which automatically disengaged the pump should it start to pump air. This was a protection device to keep from burning the impeller. The pump must not run dry for more than 30 seconds.

Fig. 27

A pressure valve is placed in the line at the water pump. (See Fig. 28 which shows the pump, vacuum switch, and relief valve). A pipe tee with a plug is provided at the relief valve to put in a pressure gauge for setting pressure in the system with a gauge in the line and the auxiliary engine running at a fast idle the pressure should read 35-40 P.S.I.

Adjustment of the pressure may be made by removing the acorn cap from the valve, turn the slotted screw in (clockwise) to increase the pressure or out (counter-clockwise) to decrease the pressure.

Fig. 28

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OUTSIDE STORAGE (COLD WEATHER)

Precautions should be taken when storing a machine outside in freezing weather. The following is a list of things that must be done to prevent damaging equipment.

1. Water tank drain valve - open and leave open.

2. Water filter - remove cup and filter element, leave out for storage.

3. Open valve from water tank to filter.

4. Remove cover from positive displacement pump-remove bottom square head plug from centrifugal pump for drainage -- leave out for storage.

5. Solenoid valve caps and screens - leave out (3 on standard machine and 5 on dual).

6. Open wash down valve.

SERVICING WATER PUMP - (Positive displacement pump W/elec. clutch)

1. Remove end cover screws, end cover and gasket.
2. Remove impeller, grasping hub with water pump pliers.
3. Loosen can screw and remove cam. (Clean off Permatex).

SEAL REPLACEMENT ONLY

a. Insert a screw driver in each opening of drain area between shoulder of shaft and seal seat. Using lever action against seal seat force seal forward into impeller bore.

b. Using a stiff wire or welding rod approximately 1/8 dia. bend a 1/4" long right angle on two 6" lengths and using in same manner as screw driver, forces seal out of seal bore completely.

   If seal will not come completely out of bore, grasp outside of protruding portion with long nose pliers and pull out.

c. Remove seal and seal gasket with hooked wire.

   Note: Be careful not to scratch the shaft while removing seal or seal seat.

d. Clean shaft and install new seal seat and gasket assembly with gasket inward, over shaft and down against the shaft shoulder. Moisten with water (do not use oil or grease) to ease assembly and use care not to scratch the seal seat face.

e. Slide seal over shaft, with carbon inward, and press into seal bore until flush with bottom of body impeller bore.

REASSEMBLY

1. Install wear plate in body bore aligning slot in wear plate with dowel pin in body.

2. Permatex screw heads, top side and back end of cam and install in body with cam screw.

3. Lubricate impeller bore with a light coat of Marfax 2 HD grease or equivalent and install impeller. Start impeller into bore with a rotary motion, until splints engage, then push into bore.

4. Install gasket and end cover, secure with end cover screws.

CLUTCH DATA - WATER PUMP

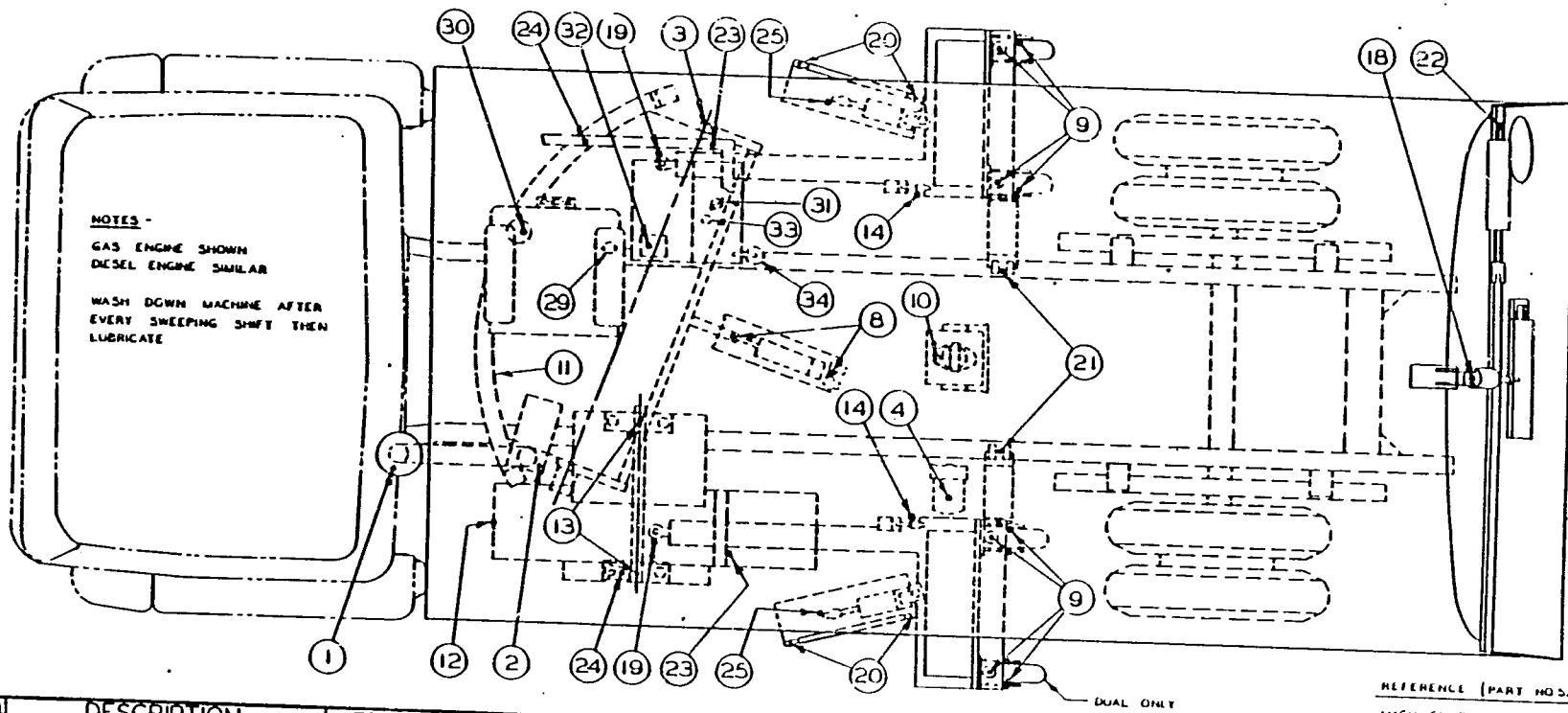
The clutch has been adjusted at the factory. When properly installed, it will require no further adjustments. The clutch is self adjusting for wear and unless mechanical or electrical difficulties are experienced will not require service. If the clutch has failed to operate, check the electrical circuit to be sure that voltage is available at the field lead wire. NEVER install a 6 volt clutch on a 12 volt system or vice versa. If necessary voltage is available and the clutch is inoperative, remove it from the pump and return it to the factory. DO NOT attempt to make any mechanical adjustments on the clutch.

OVERLOAD INDICATOR

The overload indicator (Mach Ser. V-191) is set at the factory and should not require further adjustment.

To change the indicator setting, adjust the relative position of the overload indicator arm to the differential housing by moving 1/4 nuts on the adjusting screw. The indicator light should come on when the G.V.W. is 27,000 lbs.

ELGIN LUBRICATION CHART - MODEL V



REFERENCE (PART NO.S.)
MACH. CHART - 1020508
WALL CHART - 1020509

NO.	DESCRIPTION	FREQ.	SERVICE
1	PRE-CLEANER - AIR FILTER	DAILY	CHECK & CLEAN IF NEEDED
2	ELEMENT - AIR FILTER	DAILY	CHECK, WASH, OR REPLACE IF NEEDED
3	BEARING - EXTENSION BROOM SHAFT	DAILY	LUBRICATE - LITHIUM BASE GREASE #2
4	FILTER SCREEN - SPRAY WATER	DAILY	CHECK & CLEAN
5			
6			
7			
8	ROD END - EXT. BROOM AIR CYLINDER	WEEKLY	LUBRICATE - LITHIUM BASE GREASE #2
9	CASTER WHEEL PIVOTS & BEARINGS	WEEKLY	LUBRICATE - LITHIUM BASE GREASE #2
10	HYD. HOPPER LIFT CYL. PIVOT BEARINGS	WEEKLY	LUBRICATE - LITHIUM BASE GREASE #2
11	UNDERSIDE ARC - SWIVEL EXT. BR. - DUAL	WEEKLY	WIPE ON - LITHIUM BASE GREASE #2
12	EXHAUST FAN IMPELLER	WEEKLY	CHECK FOR WEAR
13	BEARINGS - EXHAUST FAN SHAFT	WEEKLY	LUBRICATE - ARMVAC - 781 #2 GREASE
14	ROD END (AIR SHUTTER ACCESSORY)	WEEKLY	LUBRICATE - LITHIUM BASE GREASE #2
15			
16			
17			
18	PIVOT END - HOPPER DOOR HYD. CYL.	MONTHLY	LUBRICATE - LITHIUM BASE GREASE #2

NO.	DESCRIPTION	FREQ.	SERVICE
19	ROD END - DRAW BAR	MONTHLY	LUBRICATE - LITHIUM BASE GREASE #2
20	ROD ENDS - SIDE BROOM ARM	MONTHLY	LUBRICATE - LITHIUM BASE GREASE #2
21	ROD ENDS - NOZZLE LIFT CYLINDER	MONTHLY	LUBRICATE - LITHIUM BASE GREASE #2
22	HYD. CYLINDER (WANDERING HOSE MOD.)	MONTHLY	LUBRICATE - LITHIUM BASE GREASE #2
23	FILTER - WATER SOLENOID VALVES	MONTHLY	CHECK & CLEAN IF NEEDED
24	FILTER BOWL - AIR SOLENOID VALVES	MONTHLY	CHECK & CLEAN WITH KEROSENE
25	ROD END - SIDE BROOM LIFT CYLINDER	MONTHLY	LUBRICATE - LITHIUM BASE GREASE #2
26			
27			
28			
29	ENGINE OIL (AUXILARY)	50 HOURS	CHANGE - A.P.I. CLASS SE,CC (#20 SAE)
30	FILTER - AUXILARY ENGINE OIL	100 HOURS	REPLACE
31	HYDRAULIC OIL	SEMI-ANNUALLY	CHANGE - MOBIL OIL SAE #10W OR EQUIV.
32	SCREEN (INSIDE HYD. OIL RESERVOIR)	SEMI-ANNUALLY	CLEAN & INSPECT
33	BREATHER - HYDRAULIC OIL RESERVOIR	SEMI-ANNUALLY	CLEAN & RINSE WITH ENGINE OIL
34	FILTER ELEMENT - HYDRAULIC OIL	SEMI-ANNUALLY	REPLACE
35			
36			

FOR LUBRICATION AND SERVICE OF TRUCK, SEE [illegible] OPERATORS MANUAL

30

TRAINER MANUAL

OPERATION AND MAINTENANCE INSTRUCTIONS
FOR
HEAVY TRUCK "NASR"

UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT
LOCAL DEVELOPMENT PROGRAM II URBAN

SUBMITTED BY

WILBUR SMITH ASSOCIATES
in association with

PUBLIC ADMINISTRATION SERVICE
DEVELOPMENT CONSULTING GROUP

DELOITTE AND TOUCHE
ENGINEERING AND
GEOLOGICAL CONSULTING
OFFICE