Type: SprayMate 35D

Model:

Serial Number:

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Serial Number:

Strong Manufacturing Co., Inc.
2301 University Drive
P.O. Box 8068
Pine Bluff, AR 71602
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Owner's Manual For

Strong Manufacturing Company

SprayMate 35D

Preface

The SprayMate 35-D is specifically designed for the spray application of a specially formulated family of materials for manhole restoration. The SprayMate 35-D is a very versatile machine and can be used for other applications such as:

- Grouting
- Fireproofing
- Surface Bonding
- Acoustical Plasters
- Interior & Exterior Plastering
- Pumping Pool Lining

The intent of this manual is to promote the best use of the machine, providing component description, operation, trouble shooting and, most importantly, safety instructions.

This manual should be read thoroughly and understood by everyone responsible for the operation and maintenance of the machine. With proper care and maintenance, the machine will provide long and dependable service.

If trouble or questions arise concerning the SprayMate 35-D, please call or write:

Strong Manufacturing Co., Inc.
P.O. Box 8068
2301 University Drive
Pine Bluff, Arkansas 71611
Phone: 870-535-4753
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Model 35D SprayMate

Table of Contents

Safety

A. Hydraulics

1. Check to make sure that all hydraulic valves are in neutral or off position before starting power unit.

2. Never disconnect a hydraulic hose while power unit is running.

3. Remove battery cables when working on hydraulics.

4. Never reset a hydraulic relief to a setting greater than 2000 PSI.

5. Inspect all hydraulic hoses regulary for wear or soft spots. Replace hoseif either is found.

6. Replacement high pressure hoses should be rated for 2000 PSI or more.

7. Replacement low pressure hoses should be rated for 1000 PSI or more.

8. Use only a qualified hydraulic mechanic to work on hydraulic system or components.

9. When possible, replace all components with same parts as originally supplied with machine.

10. Keep hydraulic oil off hot engine components and exhaust because the oil will ignite at high temperatures.

Caution: Failure to observe the preceding warnings can result in severe bodily injury, including loss of limbs, loss of sight, and possible death!

B. Machinery

1. Read Operations Manual before using machine.

2. Read and observe all WARNING and CAUTION signs before starting engine.

3. Never remove any guard while engine is running.

4. When necessary to remove any guard, turn the key to stop the engine from running and disconnect the battery cables.

5. Never fill fuel tank while engine is hot.

6. Do not allow fuel to spill. If a spill occurs, wash away water and use an absorbent to soak up any that might have spilled onto the ground. If no absorbent is available, use dry Strong-Seal MS – 2.

7. Remove absorbent away from work area before starting engine.

8. Keep a fully charged fire extinguisher, of at least equal rating to the one supplied, on the machine at all times.

9. Never operate equipment with excessive loads, as this will cause overloading of machine components resulting in accelerated wear and possible personal injury.

10. Keep electrical shut-off switch mounted on mixer free of any concrete build up, making sure at all times that the switch is operating properly.

11. Inspect material hose daily for wear or damage. If necessary to replace, do so with hose of equal quality as that originally provided with machine.

12. Never point hose or nozzle toward anyone, particularly when spraying.

13. Never remove nozzle or disconnect hose without first running the material pump in reverse until pressure gauge reading is “0” PSI.

14. All personnel working around and operating the machine must wear protective clothing, safety glasses, dust mask and gloves.

15. Do not spray water on hot engine or machine components.

16. Always disconnect battery cables and remove battery when not in use.

17. Keep empty bags and other flammable materials away from engine, as they may ignite.

18. Loose clothing should not be worn on or around the machine when running.

19. Do not disconnect any hydraulic, water or air hose while the machine is running.

Caution: Failure to observe the preceding warning can result in severe bodily injury, including loss or limbs, loss or sight, and possible death!

C. Water System

1. Never connect to a water supply, such as a fire hydrant, without first opening valve and allowing water source to purge itself until clean water is present.

2. Do not transport machine at speeds in excess of 15 MPH with water in storage tank.

3. Drain water tank, water pump, water meter and all water lines if the potential of a freeze exists. All drains should be left open.

4. Never point high pressure sprayer wand toward anyone. Water is discharged at high pressures and can cause severe injury.

5. Be sure that all couplings on hose used to convey water from source to storage tank are tight and properly locked to mating connections.

6. Inspect all water hoses daily for weathering, cracks, cuts or for damage of any kind that may allow a hose to rupture or break.

Caution: Failure to observe the preceding warning can result in severe bodily injury, including loss or limbs, loss or sight, and possible death!

D. Air System

1. Refer to Quincey air compressor owner's manual before working on the air compressor.

2. All air lines should be rated for at least 150 PSI and have a minimum 2:1 safety factor.

3. Drain air tank daily.

4. Inspect all air hoses daily and replace if any show wear, cuts or breaks.

5. Do not kink air hose, as this can cause hose to rupture.

6. Do not point nozzle toward anyone, as the air stream is being discharged at high pressure and travels at high velocities which may result in injury should it strike someone.

7. Rinse off air tank pop off valve as frequently as necessary to prevent buildup. Pop off valve should blow air when ring on top is pulled up and stop when ring on top is let go (if air tank is pressurized). Check pop off valve function daily and replace immediately if it does not blow air when ring on top is pulled up.

Caution: Failure to observe the preceding warning can result in severe bodily injury, including loss or limbs, loss or sight, and possible death!

Section II

SprayMate 35-D

Components

Components

A. Engine (See Manual Drawing #86000601)

A 12 volt D.C. electric start, Diesel powered, Deutz Engine drives the hydraulic pump and air compressor. The Vickers variable volume hydraulic pump, which powers the mixer and material pump, is direct coupled to the output shaft of the engine. The air compressor and water pump are belt driven off the engine.

When starting the engine, be sure that all hydraulic valves are in neutral position and that mixer grate is in place. An electrical safety switch is mounted to the mixer in such a way that if the mixer grate is not in place, electrical current from battery cannot travel to ignition system and engine will not start. The engines are equipped with a glow plug to aid starting in cold weather. The glow plug is located on the box that holds the ignition switch. This button should be pressed and held 30-60 seconds before attempting to start the engine in cold weather.

A fuse box is mounted on the hydraulic tank support on the right side of the machine. The fuse box limits amperage to the water pump clutch, the electrical solenoid valve in the hydraulic system and the ignition switch. Replace fuses with the same amperage only (See Manual Drawing #86000586).

Notice

It is very important that all operators and maintenance personnel read the enclosed engine "Use – Maintenance Guide" for the Deutz Engine before starting the engine or working on the machine.

A Service Center Directory and spare parts sheet for the engine is included as a part of this manual.

Do not tamper with throttle settings. The maximum engine speed is adjusted not to exceed 2000RPM. The idle on the low side is set at 1000 RPM. If the engine runs outside of this range, the air compressor manufacturer's warranty will be voided.

B. Double Drum Mixer (See Manual Drawing #86000585)

The SprayMate mixer is a Strong Manufacturing patented Double Drum Mixer, Model Number 2D2.516, with a five cubic foot batch mixing capacity. The mixer consists of two counter rotating paddles turning within two interconnected drums. The paddles have a spiral lead to cause flow of mixed slurry toward discharge end.

A door is mounted on the discharge end of the mixer. The door can be raised, by use of a handle, to allow material to flow out of the mixer. The mixer must be running to discharge material because the spiral on the paddles carries the material to the discharge end and forces it through the gate when open.

The chain drive on the mixer should be checked for tightness after the first 5 days of operation and every 30 days thereafter. The chain tension is adjusted by loosening the idler sprocket locking nut and sliding the idler to obtain correct tension. The correct tension on the chain is obtained when there is ½ inch deflection in the slack side of the chain. After adjusting chain tension, operate the mixer and then check deflection again.

Paddles timing is very important with the Double Drum mixer in order to obtain the best blending action. The paddles should be timed 90 degrees apart from each other. When paddles require adjustment, loosen the idler sprockets. Rotate one of the paddles so that the blade of one paddles is one-half the distance from each of the two blades on the opposite paddle. This assures the best mixing action. Reattach the chain and adjust to proper tension.

At each end of mixer shafts is a packing chamber and a 4-bolt flange bearing. Inside the packing chamber is a stainless-steel sleeve and 5 sets of packing. A grease fitting on the bearing housing directs grease to these packings. This fitting is marked with a decal reading “grease twice daily”. Grease should be applied every four hours of operation to prevent build-up and hardening of the cement in packing. These packings should be greased no more than one shot per month. However, bearings and packing chamber must be removed and replaced when materials show at end of bearing. There is no adjustment to the packing. Always have mixer guard in place when operating mixer.

Note: The engine will not start without the mixer grate in place. A cut off switch breaks electrical power to the engine when the grate is removed.

C. Progressive Cavity Slurry Pump (See Manual Drawing #86000499)

The material pump is a Strong-Master, open throat, size #60 progressive cavity pump. The material pump forces the slurry through the material hose to a nozzle for spray application. The pump assembly consists of a rotor, stator, supply chamber, connecting rod and a drive assembly.

The slurry hopper holds the cement while it is waiting to be pumped. It also houses the connecting rod between the rotor and drive assembly. The connecting rod has a blade with bars welded onto it which moves the material into the intake of the pump.

The rotor is the rotating part of the pumping element and is chrome plated with lobes and turns inside the contoured stator. The rotation of the rotor inside the stationary stator moves material from one lob to the next making a seal for pressure and forcing material to the discharge end of the pump.

The stator fits over the rotor and screws into the supply chamber. A "U" bolts holds the stator in place. The rubber lining inside the stator is contoured to fit the lobes of the rotor.

The drive assembly aligns the drive shaft which turns the connecting rod that turns the rotor within the stator. It consists of two ball bearings and a packing chamber with 7 sets of fiber packing to keep material out of the bearings.

Shaft packing in the pump drive assembly requires greasing at least every two hours. This usually requires at least 2-3 shots of a good grade all-purpose grease.

When cement slurry is noticed leaking out of the drive assembly packing, tighten the two packing and retainer bolts (see manual drawing) until leakage is stopped.

Note: Tighten only enough to correct leakage. Overtightening will cause excessive wear on drive assembly components. If leakage cannot be corrected by tightening bolts, new packing is needed. Replace old packing with new (see manual drawing for packing arrangement).

During normal operation, the stator will wear. After excessive wear, the pump pressure will be insufficient to maintain a flow in the material hose to the spray nozzle. It will be necessary to change this by loosening stator clamp and unscrewing stator from material pump hopper assembly. To replace the rotor, remove stator and connecting pin between rotor and connecting rod inside holding hopper. To remove the pin, take a hammer and a punch and knock the pin retainer covering the pin off the rotor toward the connecting rod until pin is visible and remove with a punch, drive the pin out of the rotor.

Caution: Never run the material pump dry. Always have water or wet cement slurry in hopper when the pump is turning.

When installing a new rotor, be sure the band on the rotor completely covers the pin. Replace rubber grommet on end of connecting rod when reassembling to prevent material from getting into hub of the rotor and causing wear on the pin holes. Inspect connecting rod ends for wear and replace when worn.

Attached on the output end of the material pump is a bell reducer and pressure gauge assembly complete with a gauge. The pressure gauge reflects the pressure inside the material hose.

Caution: Never disconnect the nozzle, material hose, or pressure gauge assembly when any pressure is showing on this gauge. Bodily injury could occur if disconnected under pressure.

The pressure gauge registers the amount of pressure required to pump the material through the hose. When pumping the same slurry at a constant consistency, through the same length of the same setting. By utilizing this pressure gauge, the mixture (material to water ratio). When the pressure reading increases the slurry is dryer; when the pressure reading decreases, the slurry is wetter.

When new, the pump will generate pressures of 200 PSI to 400 PSI. As the pump wears, the capacity to produce the pressure will reduce. When the pump is turning, materials are not discharging from hose and pressure is constant at 200 PSI or less, this is an indication of wear and a new stator or rotor or both may be required.

With stator removed, inspect the rotor to see if it shows wear as evidenced by the chrome plate being worn off. When this occurs, both rotor and stator should be replaced. Otherwise, replacing the stator is all that is required to bring pump back into good operating condition.

D. Water System (See Manual Drawing #86000584)

The water system consists of a storage tank assembly, belt driven water pump, 1" manual reset water meter, and hydraulically powered pressure washer. (See manual for pumps service.)

A 200 gallon water storage tank is part of the water system. It may be filled from a fire hydrant. A 25 foot section of 1" hoses is used to connect to a fire hydrant and to the storage tank. A fire plug adaptor is required to attach to the special threads of the fire hydrant. The adaptor must have a 1" quick coupler connection on the outlet side of the adaptor. A fire hydrant wrench is needed to open and close the fire hydrant valve.

An on/off switch mounted on the mixer controls the 12 volt D.C. electric clutch on the belt driven water pump. The electric clutch engages when the switch is turned on, thus driving the water pump. The switch should be turned off whenever water is not needed or the storage tank is empty.

Always drain water from machine at the end of the day to prevent freezing and excessive corrosion.

E. Spray Nozzle

The spray nozzle converts the flow of materials being pumped into a spray pattern. The air line on the hose connects to the spray nozzle. The air breaks up the flow of materials from the nozzle into a spray pattern when spray tip and cap are in place. The spray pattern can be adjusted by opening or closing the air control valve on the nozzle to achieve the desired pattern. Always open the air control valve slowly.

Items affecting the spray pattern are:

1. Flow of materials
2. Amount of air to disperse
3. Size of tip
4. Consistency of mix

In operation, some of the preceding items may need to be adjusted to give the best results. Generally, large droplets of mixture are sprayed out when low air pressure and large tip openings are used. If excessive rebounding of materials is occurring during operation, it is probably because the air control valve is opened too far.

The ½" tip opening is the smallest size bore or opening in the system and is usually where a plug occurs. If a lump or foreign material lodge in the tip, the flow of materials will cease and pressure in hose system will build.

Caution: Never point a nozzle toward anyone, and have all personnel removed to a distance of 10 feet while spraying.

F. Hose

The hose system consists of 1 inch material hose in various lengths to which has been banded a single air hose. The hose is equipped with quick couplings for easy and fast coupling. The material hose has a working pressure of 600 PSI (pounds per square inch) which is greater than the pump is capable of producing. When hoses are in good working condition, there is no danger or rupturing; however, they should be inspected daily to see that there are no cuts or abrasions. Should damage appear, the hose should be replaced, as a hose rupturing under pressure is dangerous and can cause bodily injury including loss of eye or limb.

The air hose conveys air to the nozzle. This air is used to break up the flow of material when spraying. This hose has been coupled so that the correct connection is made when coupling. Hose should be inspected daily for damage as a leaking air hose can cause problems.

G. Air System (See Manual Drawing #86000583)

The air compressor is powered by the engine of the machine. The air compressor produces 10.7 CFM (cubic feet per minute) of free air. A small collecting tank receives the generated air. The compressor is equipped with an unloader which is factory set to limit the maximum pressure the air compressor will produce to 90 PSI. The unloader also has a low limit setting which will restart the air compressor to pumping air when the pressure drops to 80 PSI.

The reservoir has a pop-off valve as an additional precaution should the air compressor unloader fail. The pop-off valve prevents the reservoir from building up pressure which could result in the reservoir rupturing.

Becuase of the large volume of air required to atomize the material, low air pressure gauge readings while spraying are not necessarily an indication of an equipment problem. Refer to the Trouble Shooting section if material will not spray.

H. Trailer (See Manual Drawing #86000581)

The trailer is equipped with necessary lights, hitch, electric brakes and safety chains to make it road-worthy. The lights attach to the towing vehicle by way of a 6-way female flap lock (supplied with trailer).

The machine weight is approximately 5200 pounds. The trailer tires have a maximum gross weight of 8000 pounds. Both axles are equipped with electrically controlled brakes.

A ball type hitch is used on the trailer. Only use a 2 5/16 inch ball to tow the trailer. Attach the safety chains to the towing vehicle frame first by crossing the chains under the trailer hitch and then by wrapping chain around the towing vehicle frame as many times as required to allow only enough slack in the chain for turning.

Attach the electrical pig-tail, for the trailer to ensure they are working properly.

Check tire inflation as required. For the tires to carry the weight that is required of them, inflate to 55 PSI. If tire pressure is either too high or too low, over-heating will occur and shorten the life of the tires.

Always replace tires with the same type and load rating supplied with the trailer. For proper wheel bearing life, never overload the trailer. Pack the wheel bearings every 10,000 miles using a good grade of wheel bearing grease.

I. Hydraulics (See Manual Drawing #8600578)

Reservoir

A 45 gallon hydraulic reservoir stores the hydraulic fluid that is pumped to power the hydraulic motors powering the mixer and materials pump. The reservoir stores the hydraulic fluid that is pumped to power motors powering the mixer and materials pump. The reservoir allows air to settle out of the fluid and dissipates heat from the oil. A combination level indicator and temperature gauge allows visual monitoring of oil level and temperature.

The fluid level should be kept between the low and high mark. When the oil level is below the "low" mark, add Mobil AW 46 hydraulic fluid or an equal until it reaches the high mark, being sure not to fill beyond this level. Oil level too low will allow temperature of oil to rise, which will break down the hydraulic fluid and cause damage to hydraulic components. Oil levels too high will not allow space for air trapped within the cycled fluid to escape. This will cause damage to hydraulic components.

Oil temperature should not exceed 140 degrees Fahrenheit during normal and continuous operation. Should oil temperature remain above 140 degrees or a problem exists in the system with some outlines procedures to follow for problem identification. The hydraulic fluid should be changed once problem causing heat has been corrected.

A sump strainer is mounted inside the tank to pre-clean or strain the oil prior to entering the hydraulic pump. This prevents any foreign debris from damaging the close tolerance hydraulic components.

If the sump strainer becomes clogged, the hydraulic pump will cavitate or run dry and cause severe damage in just a matter of seconds. An increase in noise from the hydraulic when operating under a "No Load" mode, is an indication that pump is cavitating. The machine should be shut down immediately and sump strainer cleaned per instructions in Section IV, part A.

A return line filter assembly is mounted to the exterior of the tank and filters all hydraulic fluid before it reenters the reservoir. It is recommended that hydraulic fluid and filter cartridge be changed anytime the strainer is replaced.

Pump System

Hydraulic fluid flows from the material pump control circuit to the mixer circuit.

A 12 volt D.C. operated directional control valve is used to control pump rotation. With the top electrical control switch in the "manual" position, the bottom switch is used to select pump rotation. The center position of the bottom switch is off. By turning this switch to the left the pump will run in the "Forward" direction and pump product, generating pressure.

With the switch turned to the right position, the pump will run in the reverse. This allows reducing pumping pressure to "0" PSI and should be done each time the pump is stopped. By switching the top switch in the forward position, the pump start/stop is controlled by the remote switch which fits on the nozzle man's belt. The nozzle man cannot reverse the pump.

The machine operator can stop the pump at any time by switching the top selector switch to the "manual" position and by turning the bottom switch to the center "off" position.

Caution: Do not plug line between hydraulic pump and pressure relief valve. If this is done, the pump housing will explode because of high pressure capability of the hydraulic pump.

When hydraulic pump is replaced, always check and adjust the relief valve before operating.

Relief Valve

The hydraulic pump forces the fluid through a pressure relief valve whose pressure setting has been adjusted to allow the system to produce only enough pressure to do the work. The pressure setting of the SprayMate 35 – D is 2000 PSI. Should pressure requirements exceed 2000 PSI, the relief valve diverts the oil back to the reservoir. If operating requirements remain 2000 PSI or less, the hydraulic oil flows through the relief valve to operate the various hydraulic control valves and motors.

The hydraulic main relief can be reset by disconnecting and capping the bottom hose entering the mixer motor. A plug should be inserted into the mixer motor to avoid excess loss or oil. The cap and the plug are both ½ inch pipe fittings. Start the engine. Adjust the pump completely using the blue handwheel on the hydraulic pump. Adjust the main relief using a screw driver until the pressure gauge mounted on the mixer reads 2000 PSI. Unplug the mixer and reconnect the hose.

Caution: Never adjust pressure relief valve to a higher setting than 2000 PSI.

When replacing hoses, use only hoses with the same S.A.E. rating and size supplied with equipment. Use hoses which are already coupled for national pipe thread. A water hose clamp arrangement will not withstand the pressure the hydraulic system is capable of producing.

Check for kinks or collapsed hoses in the circuit, especially the suction with equipment. Use hoses which are already coupled for national pipe thread. A water hose clamp arrangement will not withstand the pressure the hydraulic system is capable of producing. Check the handwheel adjustment on the hydraulic pump. If the indicator is on “0”, the hydraulic pump will not pump any oil. If on “4”, the hydraulic pump will pump maximum volume of oil. Set the indicator on “2” (normal operating setting)

Note: The handwheel control on the hydraulic pump has two sets of numbers from “0” to “4”. The numbers “0” to “4” on the top scale are used on this machine.

Hydraulic Hoses

All hoses should be check periodically for any indication of leakage or failure. The hydraulic pump suction hose running from the hydraulic reservoir to the hydraulic pump should be checked regularly for any signs of deterioration of development of "soft" spots which will collapse and block off flow of oil to hydraulic pump resulting in severe damage to it.

Most hydraulic problem are a result of dirty oil or oil that has lost its viscosity. The hydraulic fluid should be changed when a color change is noticeable. Dark oil is dirty and should be changed.

Notice

1. When changing hydraulic components, take care to keep the system clean of any foreign debris.

2. When trouble in a hydraulic system exists, refer to the "Trouble Shooting Section" labeled Hydraulics, which is included in this manual or call Strong Manufacturing.

Section III

SprayMate 35 – D

Operation

Operation

A. Machine Set-Up

Upon arrival at the job site, water supply and accessibility of getting materials to the machine must be taken into consideration when selecting a set up site. Locate the trailer of ground level and downhill from manhole, if possible.

Once machine is set up for operation and prior to connecting water or air supply, check to be sure that all guards are in position, the mixer and hopper are free of any foreign objects and that all control valves are is neutral position.

Note: Remove all foreign objects, such as set material, rocks, tools, etc. from the mixer before connecting battery cables and starting engine.

Daily Maintenance Required before operating Machine:

Hydraulic Fluid

The hydraulic tank has a site glass that has a high and low scale. If the hydraulic oil level is below the low mark, remove filter cap and replenish oil supply until oil level is at the high mark. Mobil AW 46 petroleum base Hydraulic fluid is used with this system.

Water Supply to Machine

Always fill storage tank with potable water only. One source of potable water is the fire hydrant. To establish flow of water from the storage tank to the water meter it may be necessary to bleed air from the transfer pump by opening the petcock at the base of the pump. Remember, never run the water pump dry.

Final Machine Set-Up – (Bell Reducer)

Apply grease to the threads of the bell reducer. This unit screws in place onto the threaded stator. Check threads to assure that they are clean and I good shape. Check bell reducer making sure it is clean and free of any dry material or foreign debris. Take care not to cross thread components when attaching. Using a pipe wrench, tighten bell reducer securely onto stator. Make sure that gasket seat is clean in quick coupler on bell reducer and that the gasket is in place.

Pressure Gauge Assembly

Check pressure gauge assembly making sure it is clean and free of foreign debris. Open camlock handles of the 2-inch female quick coupler attach to the bell reducer and attach pressure gauge assembly to the bell reducer.

Nozzle Control and Operation

The plastic spray tip inserts into the nozzle head and the cap must be fully threaded in place with at least 3 full threads into cap. The spray tip must be inserted into the nozzle head and "seated" in order for the cap to thread onto the spray nozzle head.

Caution: A dust mask, goggles, and protective gloves must be worn at all times by the nozzle operator when spraying.

Caution: Always open air control valve slowly. Do not open all the way until air pressure has subsided.

Material and Air Hose Assembly

Roll out and couple together the minimum amount of hose required for application. At all times keep hose length to a minimum. With engine running, determine that air flow is to the end of the hose. With air line connected at the machine, connect the air line fitting at the discharge end of the hose and the nozzle together. Slowly open the air control valve on the nozzle until air is discharged, then close valve. If no air is exhausted, refer to the "trouble shooting" section at the end of this manual. Correct problem and establish air flow.

Mixer Controls

The mixer is powered by a hydraulic motor. The hydraulic control valve that starts and stops the mixer is also a speed control valve.

By pulling the valve lever UP, the mixer paddles rotate. The paddle speed can be changed by turning the black knob on the control valve counter clockwise (faster) or clockwise (slower). A paddle speed of 40 RPM (revolutions per minute) is recommended.

Caution: At no time should the mixer be in operation without first verifying that the mixer is clear of any foreign objects or debris; and most importantly that all guards are in place.

Note: The machine will not operate without the mixer grate in place.

The paddle rotation is stopped by moving the control valve lever all the way to the DOWN position. Should paddles not rotate, refer to the "Trouble Shooting" section at the end of this manual.

Pumping Controls

The material pump is powered by a hydraulic motor. The start/stop and reversing of pump rotation is controlled by a 12 volt D.C. operated hydraulic control valve.

With the top switch in the manual position, the machine operator can start, stop and reverse the pump.

- The center position is "off".
- To the left or forward position is "on".
- To the right or reverse position is "reverse" and the pump runs backwards.

With the top selector switch in the "remote" position and the bottom switch in the "forward" position, the nozzleman has ability to start and stop the pump with the switch which attaches to belt.

The nozzleman cannot reverse the pump, the machine operator must switch the top switch to the manual position & turn the bottom switch to the reverse position.

The machine operator is in full control and can stop the pump at any time by switching the top switch to the "manual" position and the bottom switch:

- 1st to reverse
- 2nd to stop position

The machine should run the pump in reverse every time the pump is stopped. Only after nozzle back pressure has dropped to 0 PSI should the pump be switched from reverse to off.

Caution: Never operate pump without slurry or water in hopper. Running the pump dry will cause excessive wear on the stator.

Setting Hydraulic Pump for Operation

With engine running, turn handwheel on hydraulic pump until hand is pointing at "2". This initial setting may be increased or decreased to increase or decrease material pumping rate.

High Pressure Sprayer (Hydraulically Powered)

Some machines have been provided with high pressure washers that are hydraulically powered. Pulling on the control valve handle starts the high-pressure sprayer and pushing the control valve handle stops the sprayer. For optimum sprayer pressure the handwheel on the hydraulic pump should be set at "4".

To set the sprayer pressure relief the hydraulic pump should be turned up completely "4". With the pistol grip on the nozzle squeezed, screw the black hand knob on the sprayer down until the pressure gets to the desired setting.

The sprayer pressure relief should never be set above 1500 PSI.

B. Mixing Procedure for a Two Bag Batch

Prior to Mixing and Spray Applying Materials

The mixer speed should be set and discharge hose should be wet before mixing material. Start engine as previously outlined. With paddles turning and mixer door closed, discharge approximately 4 gallons od water into the mixer. Adjust the mixer speed until water does not splash out. At this point, proper mixing speed is obtained. Attach hose to end of the pump discharge. Do not attach nozzle. Open mixer door and discharge all water from mixer into holding hopper. Run pump is forward direction until water level in hopper is one inch below agitator blade. Turn the pump off and open the tarp door on the holding hopper to let the excess water out. Uncouple the hose from the pump and, starting at one end, progressively elevate the hose until all of the water is walked out of the hose. Reconnect material hose.

Pumping Operation

With slurry in hopper and material hose connected to pressure gauge, start material pump running in the forward direction.

Watch pressure gauge closely while pumping slurry through hose and establishing flow. Should the pumping pressure rise suddenly, stop material pump immediately. Run the pump in reverse until pressure gauge registers "0" PSI.

Put pump in neutral position and refer to "Trouble Shooting" section at the end of the manual to determine how to establish flow.

With a consistent mix of material reaches the hose discharge, stop the pump and reverse it until pressure gauge registers "0" PSI.

Couple the spray nozzle to the material hose and air hose. Hold the nozzle over the materials hopper. With air valve closed, engage pump control valve to forward position until material is discharged, then stop and reverse pump.

With flow established, pump slurry into the hopper through the nozzle until a uniform mix is being discharged. Stop the pump and run in reverse until pressure gauge registers "0" PSI. Take nozzle and hose to the work area.

Should the flow of materials at nozzle stop abruptly during operation, this is a sure sign of a plug.

The machine operator must keep constant watch of the hose pressure gauge. If a sudden rise in pressure occurs or if pump pressure exceeds 200 PSI., immediately stop hose pressure registers "0" PSI. Wait for at least 30 seconds to be sure that pressure remains at "0". If not, then continue running pump in reverse until pressure remains at "0".

To clear a plug, aim the nozzle into a bucket after reaching zero hose pressure as described above. Turn off air control valve. Remove the metal cap and plastic tip from nozzle and rinse with water. Remove any lumps or foreign material from nozzle and reinstall metal cap and plastic tip.

C. Daily Clean Up

The following is the recommended procedure for clean-up of machine, material hose and spray nozzle after operation has been completed for the day.

Throughout the day, the machine operator has sufficient time to keep exterior of machine clean of any excessive buildup of material caused by spillage during the mixing operation. A pressure sprayer should be used to keep exterior of the machine clean and for machine clean up at the end of the day.

Machine Clean Up

With mixer empty of material, discharge door closed and paddles turning, empty about 5 gallons of water into the mixer. At the same time, use a high-pressure washer to spray water through mixer grate onto any material buildup inside. Do not remove mixer grate with machine running. Wash material build up off inside of mixer and paddles with the high-pressure sprayer.

Discharge water from mixer into hopper while containing to pump. The nozzle operator should continue spraying until materials become too wet to stay on the wall. The machine operator should warn nozzle operator when water is being pumped. When nozzlemen sees wet material, he should stop the pump. The pump should be run in reverse until the pressure gauge assembly registers “0” PSI.

Once assured of this, the spray nozzle and hose should be brought to the machine for clean-up. Disconnect spray nozzle for clean-up. The discharge end of material hose must be taken to an area where washout water can be discharged.

The mixer operator should pump remaining water out of the hopper through hose until agitator blade is visible. Place all control valves in neutral position and stop engine. Tag the engine to make sure other parties are aware that the engine has intentionally been stopped. Open discharge door on bottom of hopper and drain out remaining water.

Remove mixer and hopper grates and wash thoroughly with the high-pressure washer. Using a scraper, if necessary, to remove any set materials that cannot be removed by washing. With components clean, replace all grates and start engine. Engine will not start without mixer grate

in place. Add water to mixer paddles turning and flush all materials out into the hopper and out the discharge door. Rinse out hopper until clean. Close discharge door on hopper and fill with clean water.

Disconnect material hose, pressure gauge assembly and bell reducer. Clean out bell reducer, pressure gauge assembly and reconnect to pump.

Clean Up of Material Hose

Saturate the sponge ball provided with the machine with water and insert it into the male quick coupler on pressure gauge assembly. Recouple material hose to the pressure gauge assembly. With water in hopper, run pump until sponge comes out discharge end of hose. Repeat as many times as necessary until clear water comes out preceding the sponge.

After hoses are clean, roll up and couple the ends of the hose and air line together to protect fittings. Wash exterior of machine and material hose off with high pressure sprayer.

Cleaning of Spray Nozzle

Open air valve and blow out any materials that might have collected in the air line.

Caution: Point air stem toward ground. Do not look at or point at other people. Material will blow out under pressure and may cause injury.

Once air stem is clean, remove cap and tip. Wash nozzle, cap and tip thoroughly. Apply thin coat of grease on threads of nozzle cap. Reassemble and store nozzle in a safe place.

After all clean up, daily maintenance on machine should be done. Then, shut down machine, put all valves in neutral, remove mixer grate and disconnect battery cables.

Section IV

SprayMate 35 – D

Machine Maintenance

Machine Maintenance

Note: No work of any kind should be done on machine without stopping engine, putting all valves in neutral and removing mixer grate.

A. Hydraulics

Hydraulic return line filter should be changed once a month. Replace with Strong part #0620220.

Hydraulic fluid should be changed after first six months of 500 hours or operation, whichever occurs first. Thereafter change hydraulic fluid once a year. Disconnect suction line, drain oil and reconnect line. Replace with 45 gallons Mobil AW 46 or equal. The hydraulic filter should be changed when oil is changed.

Before adding new fluid, remove sump strainer located at bottom of tank. Remove reservoir cover – strainer is then accessible. Unscrew sum strainer, wash it with a good cleaner, and inspect it for breaks in screen. If breaks or tears appear, replace strainer with Strong part #1922321.

A routine inspection of hydraulic hoses for cuts, weathering, bulging and leaks is required.

Replacement of any damaged hoses should be done immediately and before the machine is used again. Replacement high pressure hoses should be designed to work at or above 2000 PSI. Return line hoses should be designed to work at 1000 PSI.

B. Mixer

The greasing of the four zerks on the mixer that are marked "Grease Twice Daily" require strict enforcement. I inject three shots of a good grade all-purpose grease into each fitting each time they are serviced. These fittings are used to grease the packing mounted behind the mixer bearings. This grease prevents the slurry inside the mixer from getting to and ruining the bearings.

Note: At no time should the mixer operate more than 4 hours without greasing.

The mixer drive chain can be too tight as well as too loose. Adjust tension so that chain will deflect ½" by pressing down firmly with the thumb. Chain tension is adjusted by loosening the

nut on the idler sprocket and with a pry bar or hammer, move idler sprocket down until proper tension is achieved.

Chain should be oiled lightly once a week.

Keys and taper lock bushing Allen screws should be inspected at least once a week to determine condition of keys and to make sure that all Allen screws are tight.

The mixer paddles must be properly timed and in phase, at all times. Occasionally, the chain slips on the sprockets and cause the paddle to get out of time.

To get paddles back in time, loosen the mixer chain idler assembly. Turn one of the paddles by hand until the blade on one is halfway between two blades on the other paddle. Reposition and tension the chain.

The rubber wipers on the paddles clean the inside of the mixer. The wipers will wear and require replacing. The rubber is attached to the paddles by bolts and a metal backing plate. Remove the bolts and backing plate. With the new wipers in place, insert the bolts through backing plate, paddle blade and bolt in place.

The seals located in the housing behind the bearings will wear and need replacing. An indication of wear is when cement appears in bearings. Remove sprockets and bearings. Pull seal housings off paddles. Remove old seals. Refer to Manual for instructions on how to install new seals. The stainless-steel sleeve should be changed at the same time.

The grease fittings on bearings not marked "Grease Twice Daily" are for greasing the bearings only and require 1 shot of grease, every 150 hours of service.

C. Pump

An adjustable packing gland is a part of the pump drive assembly. When leakage starts appearing through the packing, tighten the packing gland evenly from both side by turning the nuts on each side of the packing chamber, tighten until leakage stops, but Do Not overtighten as unit will run

hot. When packing gland bottoms out, new packing is required. Refer to pump section of manual for instructions on how to change packing.

Pins and connecting rod wear wit use. An indication is slack in connecting rod. Follow procedure outlined in Pumps sections to change components.

The pump components wear and will need replacement. An indicator of worn pump parts is failure to produce pump pressure, or more noticeably, output at end of the hose will drop considerably with the same setting on hydraulic pump. Remove stator following procedure outlined in pump section.

Rotor needs replacing when wear mark shows on chrome. Refer to Pump section for procedure to change rotor.

D. Material Hose & Air Lines

Hose and couplings require daily inspection, making sure hose gaskets are in good shape and in place.

Hose should be inspected for cuts, weathering and soft spots. Replace with hose of equal specifications.

Air line couplings should be thoroughly cleaned and oiled regularly.

Check air lines daily for cuts, leaks, and weathering. Replace with hose of equal specifications.

E. Spray Nozzle

Caps and nylon tips must be kept clean. A light coat of grease should be applied to the nozzle cap. The inside of the nozzle head must be kept clean so that the nylon tip can seal against the shoulder.

F. Water System

Water system should be drained daily to protect from freezing in cold weather. Remove inlet water line and open all valves and allow system to drain. Open drain valve on water pipe below pump. Open drain valve in pump casing. Open drain valve in water meter. Leave all drains open.

G. Air System

The air reservoir should be drained daily. The air compressor intake filter should be cleaned weekly. The compressor oil should be checked daily and maintenance performed as recommended in the air compressor maintenance book.

Section V

SprayMate 35 – D

Trouble Shooting

Trouble Shooting

Problem: Material Plugs at Nozzle

Probable Cause	**How to Determine**	**Solutions**
Nozzle tip too small	With pump and air off, determine if blockage is at tip.	Change to a larger tip.
Loose or partially set materials in machine components	Check inside mixer, mixer grate, blender pump throat, bell reducer, pressure gauge, hose and nozzle for build-up is present, it will flake off and cause plugging at nozzle.	Clean machine thoroughly at end of day with stiff brush. Hose down frequently during the day.
Lumps in material	Open bag and check for hardened lumps of material before dumping into mixer.	Discard lumpy materials.
Materials too old or improperly stored	Check each connection for leak. A small leak at fitting will cause materials to dry & plug.	Replace with fresh material & store in a dry warehouse. Do not stack bags on concrete floor. Store away from wall.
Leaks at connection	Check each connection for leak. A small leak at fitting will cause materials to dry & plug.	Tighten fitting. Replace worn gaskets always put pump in reverse & remove pressure from line when shut down.
Materials setting in hose.	Materials will be hardening, entire length of hose.	Keep fresh materials in pump and hoses.

Note: If none of the preceding solve problem, contact Strong Manufacturing Co., Inc.

Trouble Shooting

Problem: Engine will not Operate

Probable Cause	How to determine	Solution
Mixer grate not in place.	Observation	Put grate in place. Refer to Engine Manual – Trouble Shooting

Problem: Not enough air at nozzle to disperse materials at nozzle

Probable Cause	How to determine	Solution
Nozzle tip not sealing against shoulder in nozzle barrel	Check inside of nozzle barrel for debris or material. Also. Check shoulder for nicks or gouges.	Clean or replace nozzle. Also, clean nozzle cap.
Air pressure too low	Check tank pressure gauge to verify tank pressure is at least 80 PSI with no air being discharged from tank.	Adjust unloader. Refer to air compressor manual. Do not set for more than 90 PSI tank pressure.
Intake air filter clogged.	Remove intake air filter, look for build-up of dirt on outside of filter.	Blow filter clean with air. Blow from inside out. Replace filter.
Leak in air line or fittings	Listen for sound of escaping air.	Tighten fitting, cut out and replace air line that has leak.
Lines partially plugged. Material back-up partially set in nozzle air stem.	Remove air line from nozzle, visually check for material in air line. Check air line elbow.	Open air petcock and blow material out of air line and with a rod clean air line. Check each air connection to see if open.

Note: If none of the preceding solves the problem contact Strong Manufacturing Co., Inc.

Trouble Shooting

Problem: Mixer will not turn

Probable Cause	**How to determine**	**Solution**
Control valve handle in off position	Visually check to determine if lever is in up position.	Pull handle up.
Mixer chain loose or off sprocket	Remove chain guard & inspect if chain deflects more than 1", or if chain is odd sprockets, refer to "Solutions".	Replace chain on sprockets & tighten chain to ½" deflection.
Stripped keys	Remove guard, check keys.	Replace keys.
Hydraulic oil not being pumped/control set too low	Visually check position of indicator on hydraulic pump "0-4".	Turn handwheel & raise lever to position 3.
Speed control knob turned too low	Check knob position.	Turn knob to right or clockwise until paddles rotate.
Foreign object obstructing paddle movement	Visually inspect.	Remove or clean obstruction.
Hydraulic relief valve setting too low	Check pressure setting.	Increase to proper setting.
Faulty drive motor	Check motor for noise or excessive pressure at gauge.	Repair or replace motor.

Note: If none of the preceding solves the problem contact Strong Manufacturing Co., Inc.

Trouble Shooting

Problem: Excessive heat – Hydraulics

Probable Cause	**How to determine**	**Solution**
Worn parts in hydraulic pump and/or hydraulic motors.	Measure oil temperature; should not exceed 150 degrees F. If thermometer is not available, place hand on storage tank – 130 degrees F is uncomfortable to touch.	Determine problem by following procedures on pages 35 and 36.
Oil too thin & breaking down, causing excessive slippage.	Check color & consistency.	Change oil.
Worn valve & parts or broken "O" rings causing a by – pass.	Motor operates sluggish or will not turn at low pressure.	Replace worn parts.
Oil level too low	Check sight gauge.	Replace oil.
Operating pressure too high	Check pressure gauge.	Eliminate some of the load. Reduce material hose length or add water to mix.
Water contaminated oil	Check oil for discoloration.	Change oil.

Note: If none of the preceding solves the problem contact Strong Manufacturing Co., Inc.

Trouble Shooting

Problem: Motors fail to turn at proper speed

Probable Cause	**How to Determine**	**Solution**
Excessive pressure	Check pressure on gauge; if above 2000 PSI on the pump or 1550 PSI on the mixer, the oil is going over relief valve.	Remove excess load. Hoses may be plugged or dry mix in mixer. Unplug hose or add water to mixer.
Worn parts.	Pressure check the system. See Hydraulics "Trouble Shooting". Check pressure on gauge; if pressure is below 2000 PSI, system is not maintaining proper pressure thus loss of power.	Check components outlined per following for worn or bad components.
Foreign object in mixer	Visually check.	Remove obstruction and clean mixer.

Note: If none of the preceding solves the problem contact Strong Manufacturing Co., Inc.

Problem: Hydraulic motors fail to turn

Probable Cause	**How to determine**	**Solution**
Hydraulic not being pumped/pump control set too low.	Visually check position of indicator on hydraulic pump "0-4".	Turn handwheel and raise lever to position 3.
Control valve not directing flow	Some pressure to motor but insufficient to turn motor.	Check control valve as outlined in Trouble Shooting Procedures. Make sure valve handle is in "up" position.
Hydraulic pump not performing properly	No pressure on gauge.	Engine not at full throttle. Pull throttle out all the way & lock in position. (Check engine speed)

Note: If none of the preceding solves the problem contact Strong Manufacturing Co., Inc.

Problem: Hydraulics

If trouble in the hydraulic system exists, it is recommended that a qualified hydraulic mechanic make the following checks:

To check the hydraulic pump & pressure relief valves.

Start the power supply and operate controls. If system is not operating properly, turn the engine OFF and disconnect the hydraulic hose between the main pressure relief valve and the mixer directional control hydraulic valve. Plug this hose with a high-pressure pipe fitting and gauge. Start engine while watching pressure gauge. If the pressure gauge reading is 2000 PSI or more, the hydraulic pump is operating properly. If the pressure reading is more or less than 2000 PSI, adjust the pressure relief valve to 2000 PSI setting. This is done by removing the chrome acorn nut on the pressure relief valve, loosening the lock nut and turning the exposed threatened stud in or out, using a screw driver. Clockwise rotation increases pressure and counterclockwise rotation decreases pressure. One-quarter of a rotation either direction should make a noticeable change in the pressure gauge reading. When attempting to decrease the pressure to 2000 PSI and this cannot be achieved, replace the pressure relief valve. If attempting to increase the pressure to 2000 PSI and this cannot be achieved, turn the engine OFF and disconnect the hose at the relief valve that does not lead to the control valve but goes to the return tank.

Caution: When the motor is started, hydraulic fluid may flow out of this opening at a high pressure, so stay clear of this flow and keep everyone clear.

With the pressure relief valve adjustment screwed in (clockwise) all the way (done in preceding step when pressure could not be obtained), start the motor. If oil flows from this disconnected hose, the relief valve is defective and should be replaced. If oil did not flow from this disconnected hose and the pressure gauge reading did not reach 2000 PSI, the hydraulic pump is worn and should be replaced. With components listed to this point operating properly, turn motor OFF and reattach the disconnected hose to the relief valve and reattach the plugged hose to the mixer control valve.

To check the hydraulics to operate mixer.

Move switch for the material pump to OFF, rotate the flow control knob on the Cross mixer control valve, counter-clockwise to "O" – OFF. Start power source. The pressure reading should be between 0-5—PSI. If higher than 500 PSI, replace flow divider. If reading is between 0-5—PSI and system does not operate properly, disconnect and plug the one of the hoses between the Cross valve and the hydraulic motor which drive the mixer. With the switch for the material pump of OFF and the knob on the flow divider on "O" – OFF, start the power source. Rotate the lever from "0" – "10" and back to "0" instantly, while watching pressure gauge. The pressure should reach 2000 PSI. If not, replace the flow driver.

After reconnecting the hose to its original position, if pressure reaches 1800 PSI but mixer hydraulic motor will not run or runs at an unstable speed, replace the hydraulic motor on the mixer.

If problem still exists, contact a qualified hydraulic mechanic, or Strong Manufacturing, for assistance.

Manual Drawing List

Serial No.

Unit Type: SprayMate 35 – D

Drawing Number	**Description**
86000603	Master Assembly SprayMate 35-D (Deutz)
86000585	Mixer Assembly 35C & 35D
86000499	#60 Pump Assembly
86000601	Power Train Assembly 35-D (Deutz)
86000578	Hydraulic Plumbing Assembly 35-D
86000584	Water System 35-D
86000583	Air Tank Assembly 35-D
86000581	Wiring Trailer Assembly 35-D
86000570	Remote Control System
86000572	Control Box – Pump Control
86000579	Fuel Tank Assembly
86000586	Fuse Box Assembly
86000602	High Pressure Washer Assembly