

Operating Instructions
for
THE OLIVER MODEL 30
Gravity Separator



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OLIVER MODEL 30 Gravity Separator

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-INTRODUCTION-

CONGRATULATIONS! You have just purchased a well built machine that can earn substantial profits for you, if you take time right now to understand the Oliver Gravity Separator and how it works. The operating instructions manual contains information that both experienced and inexperienced gravity operators will want to read. Please take a few minutes to read the instructions to help eliminate many of the problems frequently encountered.

Keep in mind at all times the Oliver Gravity Separator is not a "cure all" for the processor's problems. The gravity separator is a specialized piece of equipment designed to separate particles of a similar size that differ in weight. Oliver Gravity Separators should not be used as a cleaning machine to remove dust, dirt and other refuse. The gravity separator should not be used as a sizing machine. Screeners can do this job more efficiently. In all processing situations, the best results are obtained on the gravity when the product has been thoroughly pre-cleaned and sized, using the proper equipment for those purposes. Under these conditions, the gravity separator is able to show what it can really do!

INSTALLING YOUR GRAVITY SEPARATOR

Your Model 30 Oliver Gravity was operated on test blocks for a minimum of two hours. During and after this operation, the drive assembly and controls are checked to insure that they will operate satisfactorily when you set them up and punch the switch.

UNCRATING YOUR OLIVER

Although your Oliver is built to give you years of service, it can be damaged while uncrating. First the top of the crate should be removed, then the sides. After the top and sides are removed, the Oliver Gravity can be removed from the bottom of the crate by removing the four 3/8" bolts located in the mounting flanges of the machine. While removing the crate, do not lay anything on the separating deck. A good separation is not possible, if the deck is damaged. Also, be careful not to puncture the filter screens on the sides of the machine. If the filter screens are damaged, dirt and other foreign material may be sucked into the machine and plug the deck.

Immediately after uncrating your Oliver Gravity, inspect for carrier damage. If damage is evident, it was caused in transit and a claim should be filed with the carrier.

FOUNDATION REQUIREMENTS

A solid level foundation is required for your Oliver Gravity. False vibrations from flooring can ruin the separation quality of the machine. A six inch slab of concrete is ideal but not essential. Many customers operate Oliver Gravities on wooden floors with no problems. If your floor is insecure, please contact the factory for recommendations.

When locating your Gravity, be sure that you leave adequate clearance to operate the controls and to remove the deck for changing or cleaning. To operate the controls and provide normal maintenance, a minimum of 30 inches clearance is recommended. The deck can be removed from any side. Normally, a space approximately equal to the dimensions of the deck is adequate for deck removal. Please refer to the dimensional sheet for these specs.

If your 30 is equipped with Oliver's Portable Base following is the proper way to use it.

Be sure that the machine is fastened securely to the portable base. To move the machine around, merely loosen the jam nuts at all four corners and screw the 3/4 inch bolts out until the base is resting on the casters. Now the machine can be moved to any location. To operate the gravity on the base after it has been moved, screw the 3/4 inch bolts down until the base is elevated slightly. The casters should clear your floor by approximately 1/2 inch. When this has been accomplished, level all four sides of the base. If leveling is required, merely adjust the 3/4 inch bolts in or out. Then lock the jam nuts at all four corners. The gravity can now be turned on. If excessive vibration is present, one or more of the 3/4 inch bolts will need re-adjustment.

ELECTRICAL CONNECTION

After your Gravity is mounted on a secure foundation, you are ready to make the necessary electrical connections. If a motor is installed at the factory it will be wired for 60 cycle, 220 volt, three phase power. If your power supply is different from this, please inform the factory well in advance of the shipping date so the motor can be correctly installed.

CLEAN AIR SOURCE

Some customers need to bring in clean outside air rather than drawing dusty plant air into the machine through the side filters. For this purpose, we supply an air nipple which can be used to bring air into the machine. It can be installed by merely removing a filter and replacing it with the air nipple. The air nipple may be installed in any of the filter openings, but best results will be obtained using the opening on the feed end of the machine. Connect your ductwork to the air nipple and run it to your clean air source. Do not use duct work of smaller diameter than the air nipple that came with your machine. We recommend that the duct work be kept shorter than 20 feet; otherwise use a booster fan. The clean air source should have a filter area not less than the area of the deck surface of your machine.

THE DECK

The most important part of any gravity separator is the deck, because it is the separating surface. The deck consists of a carefully constructed frame; an undercover, which develops the air pattern; and a screen or cloth overcover, which is the surface the separation takes place on.

On the discharge end of the deck are mounted two cutting fingers, which are adjustable to channel different fractions of the finished product according to their value.

THE FIVE ADJUSTMENTS

All gravity separators have five variable adjustments that must be properly adjusted and balanced to obtain optimum separations. These are: feed rate, end raise, side tilt, eccentric speed and air control. We will discuss the controls for each of these variables in turn.

FEED RATE

The product should always be a steady uniform flow, free of surges and within the capacity of the machine.

A feed rate that is too fast will overload the deck causing an adverse separation. The material on the deck will appear sluggish and not flow across the deck properly.

A feed rate that is too slow will result in a deck that is not completely covered. When the deck is not covered the air escapes through the uncovered portions instead of flowing through the material to be separated.

END RAISE

End raise is the amount of the angle of the deck from the feed end to the discharge end. End raise determines the amount of time the product is exposed to the separating surface, and is closely related to the feed rate. On the Model 30 the amount of end raise can affect the separation efficiency. For normal operation the end raise can be set at 50%.

SIDE TILT

Whereas feed rate and end raise were closely associated with capacity, side tilt is more closely associated with the quality of separation. In general, side tilt should be kept at the maximum possible. Too little side tilt will cause the product to be shifted to the heavy side or high side of the deck. Too much side tilt will cause the material to be shifted to the light side or low side of the deck.

ECCENTRIC SPEED

Eccentric speed is the frequency of linear oscillation of the separating deck. Too much speed will cause material to be shifted towards the heavy or high side of the deck. Too little speed will result in a shift of the material towards the light or low side of the deck plus the material will appear very sluggish on the deck.

Eccentric speed and side tilt are closely related and should be adjusted together. Initially side tilt should be set at maximum. Then speed should be increased until material begins to flow up the deck. Then speed and side tilt should be balanced to obtain a near uniform depth across the surface of the deck.

Electronic tachometers are available as an optional feature. These are valuable in recording the operating RPM of the machine at any given time.

AIR

Proper air adjustment is the most important factor of the gravity separator operation. The primary purpose of the airflow in the gravity is to create a vertical stratification of the product. Proper adjustment of the air and the other controls will cause the material to be separated into grades of increasing density across the discharge end of the machine.

With the air flow set properly, the lighter material will be lifted to the top. As the material becomes stratified, the heavier material will remain on the deck surface. Through the vibrating action of the deck the heavy material will then be carried to the high side of the deck. Lighter material floating on top of the heavy material will not be in contact with the deck surface and will flow down to the light or low side of the deck. Air must be correctly adjusted to obtain proper stratification. Too much air will cause the material to be lifted clear of the deck and no separation will occur. Too much air will also cause a "remixing" of the stratified material resulting in a poor separation. Too much air is evident when there is bubbling and boiling action present as the material travels down the deck.

Too little air also will have an adverse affect on your separation. This condition will cause the material to appear very sluggish. Lighter material will not move to the top and little or no separation will occur.

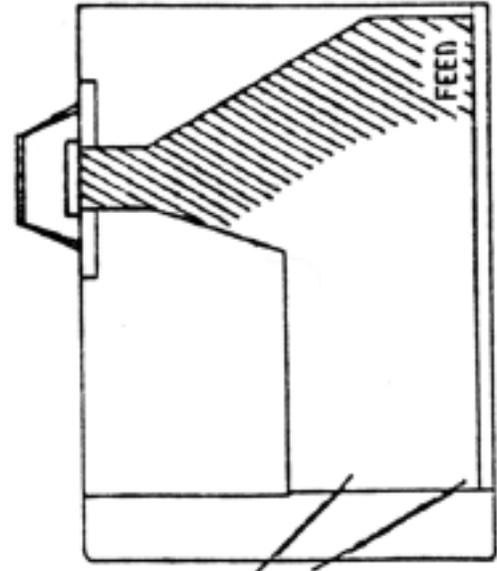
All five of these adjustments are related to one another and a change on one will have an affect on the others. A thorough knowledge of the purpose of each control and experience gained during operation of the machine will enable you to obtain a precise separation.

START UP AND OPERATION

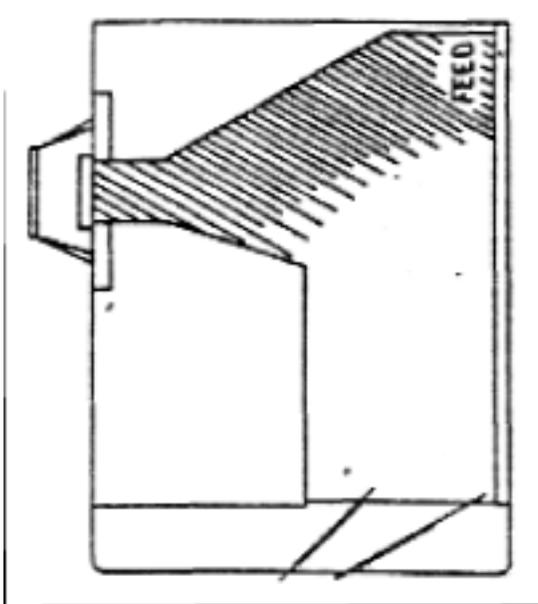
To operate the Oliver Model 30 Gravity Separator, initially make the following adjustments:

Close the feed hopper and see that it is filled with product. Adjust the end raise to 1/2. Set the side tilt at or near maximum. Set the eccentric speed at a minimum setting. Set the air control at a minimum setting.

With the machine running, open the feed gate slightly. When starting the separation, a very slow feed rate is important. After the deck is covered and the separation is occurring, the feed rate can be increased.

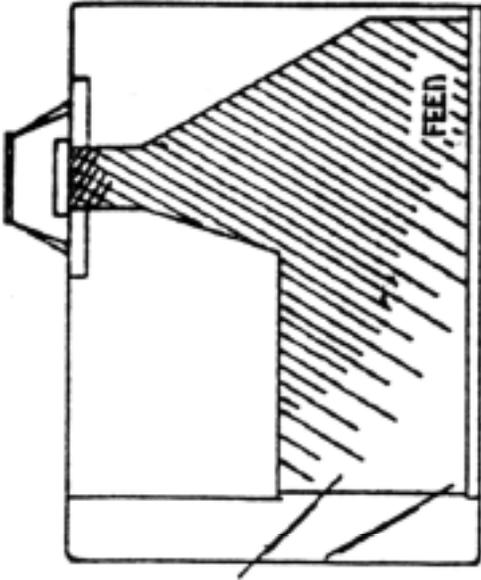


Open the feed gate



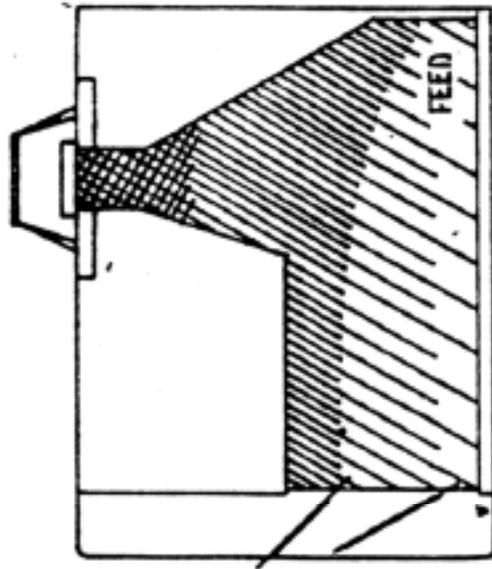
Increase the air slightly

After a slow, steady feed rate is established, balance the side tilt and eccentric speed controls so that the material flows away from the feeder, and down the deck. As the deck continues to fill, it will be necessary to increase the air to obtain the correct pattern. Care should be taken not to increase the air too much. If a boiling action is noted, and the material is noticeably deeper on the light or low side of the deck, the air should be reduced.



Allow the deck to fill

It should be noted here that a precise separation will not occur until the deck is completely covered. This is natural and is due to large air losses through the uncovered portion of the deck. Once the deck has become completely covered, the air pattern will right itself and final adjustments can be made.



Correct deck pattern while in operation

10 MOST FREQUENT PROBLEMS

From conversations with processors over a period of years, we have compiled a list of the ten problems most generally encountered when setting up a new machine. We list problems below with some suggested solutions.

FANS RUNNING BACKWARDS-At least half of the problems with new machines can be traced to backwards rotation of the fans. If it seems insufficient air is the problem, check the fan rotation. When viewed from the feed end, rotation should be clockwise on the standard left hand machine.

BLINDED DECKS-If there is insufficient air and the fans are running correctly, remove the deck and clean it. The deck can be cleaned best by blowing the dirt and chaff out from the top downward, while the gravity is running.

DIRTY AIR FILTERS-The air filters on the side of the machine are designed to screen out the dirt in the air before it can enter the machine. If they become plugged, the fans cannot pull enough air through them to provide proper separation. The air filters can be cleaned by removing them from the machine and gently tapping them on the floor. A more effective method is to remove them and blow them down with compressed air.

INADEQUATE FOUNDATIONS-Oliver Gravities must be attached to a secure foundation. A weak foundation will lower the quality of the separation because the foundation absorbs some of the vibrating action of the gravity.

OPERATING AT TOO MUCH CAPACITY-Often merely lowering the capacity slightly, will greatly improve the separation. Capacity is usually dependent on the standards to be met and the quality of material being fed onto the machine. Quality and capacity are inversely related. That is, increasing capacity usually lowers quality; and decreasing capacity usually improves quality.

LOOSE CLAMPS-Loose clamps are not a common problem, but they occur more often than they should. Loose clamps usually occur when an operator makes an adjustment and fails to tighten the clamps sufficiently. The result of loose clamps is false vibrations. This immediately causes an adverse condition on your separation.

USING THE WRONG DECK COVER-Deck covers are the portion of the machine that actually makes the separation. Without friction between the deck cover and the product, no separation will occur. Therefore, a deck cover must be chosen that will perform well with your specific product. Generally, the cover should have a rough surface texture and the openings should be as large as possible without allowing the material to fall through.

BELTS SLIPPING-Belts commonly slip on new equipment. New belts have a tendency to stretch slightly and should be checked frequently during the first couple weeks of operation. To check a belt, turn off the power to the machine. Then apply pressure to the belt midway between the two pulleys. There should be no more than a 1/2" deflection.

ATTEMPTING TO SEPARATE COMMODITIES UNSUITABLE FOR SEPARATION-This is a very rare problem because normally a gravity will make some improvement in any product lot. However, a gravity is a specialized machine designed to separate particles of varying density and similar sizes. If material does not fall into that classification, then it probably cannot be separated on a gravity.

WRONG ADJUSTMENT-This is most commonly a problem with new operators. The solution is usually more experience. Do not be afraid to adjust the machine. Make an adjustment. Wait a couple of minutes to determine the effect. Then decide if it is good or bad, then try something else for further improvement. Remember to make all adjustments in small increments. It is better to approach the final setting through several small steps than to make one adjustment that might be too much.

Finally, if you cannot get the separation you want, please call the factory (303/254-6371). Our staff will be happy to give you the approximate settings to separate your product on your machine. If you have specific questions or problems, let us know. We would be glad to share our thoughts on the subject with you.

For the convenience of our customers, we maintain a laboratory service where we can process your sample. There is no charge and all samples will be returned upon your request. If you have a sample you would like to have tested, just call us. Then we can discuss your problem and determine how much of a sample is needed for testing. If you like, we can arrange the test dates so you can be present during the test.

SEPARATION RESULTS

Many customers ask us how we can determine when we are getting the most from a gravity separator. This is an extremely difficult question to answer because not all people want to accomplish the same thing by operating their gravity. We manufacture gravity separators to make a separation based on particle density. To do this, it is first necessary that the product be cleaned and properly sized. Since size, shape and weight of the product directly effect the separation, it is imperative that the product be classified according to size and shape before attempting to make a separation on the basis of weight.

The most positive method of testing to determine the effectiveness of a gravity is through the use of a Density Test, whether measuring in Pounds per Bushel, Pounds per Cubic Foot, Gram per Cubic Centimeter or Kilogram per Cubic Meter. By using this test, determine the difference in bulk weight per unit volume between the heavy and light product. The gravity should be set to obtain the maximum weight difference between the light and heavy products. The test weight of the heavy, middle and light fractions should be recorded along with the machine settings necessary to obtain this. This gives a written record of the operation of the gravity and the settings necessary to obtain that particular separation. These can be used as a reference when processing similar products in the future.

MAINTENANCE

Your Oliver Gravity Separator is designed to give years of trouble-free service. However, as with all equipment, periodic maintenance is required to keep it in top condition. The following is a list of some areas that can be problems, if they are not checked.

DECKS

The deck of your gravity is that portion of the machine that actually contacts the material and makes a separation. To maintain optimum separation, the deck should be checked frequently and cleaned or repaired as needed. Even in a very clean atmosphere, the dust and dirt will build up on the underside of the deck. This causes restriction of air flow through the deck and will eventually plug the deck completely. When the deck becomes plugged, it is necessary to remove the deck from the machine and clean it. The best method of cleaning the deck is to use compressed air blowing through it, both from the topside and bottom side. Thoroughly clean the entire deck. A partially cleaned deck will again become plugged sooner. To check if a deck is clean, place a light on a drop cord under it. If the deck is clean, you should be able to see light through every opening of the deck cover. Dirty areas will show up as dark spots and should be cleaned more thoroughly.

Because decks are in direct contact with the material being separated, they are subjected to abrasive wear. Inspect your decks frequently for wear. As a deck wears out, the surface becomes smoother and it becomes more and more difficult to move the heavier product out from under the lighter fraction. Normally, when the wires of the deck overcover are worn halfway through, it is time to replace it. If the overcover is worn completely through, there is danger of ruining the undercover which develops the air pattern. All Oliver decks with wire overcovers are built with a perforated undercover. As long as the undercover is not damaged, it is not necessary to replace it.

When rebuilding the deck, always inspect the deck thoroughly. Look at the underside of the deck and inspect the ribs for cracks. If the ribs are cracked, it will be necessary to tear down the deck completely to replace them. Inspect the undercover for damage. If the overcover is to be replaced, be careful not to damage the undercover when removing the overcover. It is best to place the deck on two sawhorses with a light underneath. By looking through the screen toward the light, you will easily be able to locate the ribs for nailing purposes. Always stretch the screen overcover tightly. Tight screens give better separation results. Finally, inspect the deck trim, discharge aprons, rails, and riffles; and replace what is needed.

Riffles are the horizontal metal pieces running across the top surface of the deck. Riffles assist heavy particles in working uphill by trapping them behind the riffle and allowing the light material to flow on over. Riffles are replaced in the same manner as the deck cover, with a riffle lying over each of the ribs.

DRIVES

There are three sets of belts and sheaves in your Oliver Gravity. They are: the main drive belts or fanbelts; the idler belt from the fanshaft to the vari-speed unit/ and the eccentric belt from the vari-speed to the eccentric shaft. New machines should be checked very frequently for the first few weeks because new belts tend to stretch as they are broken in. To check belt tension, turn off the machine. Then apply pressure to the outside of the belt midway between the two sheaves. The belt should deflect approximately 1/2 inch.

The eccentric belt, from the vari-speed to the eccentric shaft, has a shaft running through it. The shaft must be removed to install a new belt. For this reason, a spare belt is installed around the shaft on all new machines. When the original belt wears out, merely remove the spare belt from its mountings and slip it in place of the original. If the second belt wears out at a time when you are processing and you do not wish to stop the machine for the length of time required to install a new belt, you can replace it with a link belt. However, this is a temporary measure; and it is recommended that the link belt be replaced with standard V belts when it is convenient. Proper tension is maintained on the eccentric belt by the spring action in the vari-speed unit. There is no manual adjustment. If the eccentric belt slips, it is an indication that the vari-speed unit is defective.

BEARINGS

Your Oliver gravity has several bearings to support the fanshaft and the eccentric shaft. These bearings are all standard sizes and are readily available. There is a tendency for the set screws to loosen on the bearings in a new machine. This problem is more prevalent in the colder climates. However, check the set screws on all bearings before the machine is started. After the machine has run 8 to 10 hours, it should be shut down and the set screws checked again. Another check should be made after the machine has operated 100 to 150 hours.

All bearings are sealed at the factory. Over the years, we found that premature bearing loss was often due to "overgreasing" rather than bearing failure itself. Overgreasing damages the bearing seals which in turn cause the bearing to fail in a short time. However, if you feel confident in your maintenance program, the grease inlet caps can be removed and grease fittings can be installed. Each bearing should be greased with 1 or 2 shots of grease only on an annual basis.

A bad bearing will normally be detected by hearing a rumbling noise in the machine or by feeling an unusual vibration. To determine if a bearing is actually defective, run the machine for at least 30 minutes. Then, **TURN OFF THE MACHINE**. Touch the bearing surface. If the bearing is excessively hot, it is probably bad and must be replaced.

ORDERING REPAIR PARTS

Oliver Manufacturing Company maintains a complete card file on all of its machines. All Oliver machines have a serial number. When ordering parts, to insure that you receive the correct parts, be sure to include the serial number of your machine. Serial number tags are located on the airchest opposite the feeder.

In addition to the serial number, include the model number of the machine and whether it is a right or left hand machine.

Shipping takes place as soon as possible after the order for parts has been received. The fastest, cheapest method of shipping will be used unless otherwise specified. If you have a special problem or cannot locate some of the required information, please contact us (303) 254-6371. We will work with you to provide you with what you need as quickly and as cheaply as possible.

