JAMES RICHARDSON INTERNATIONAL LTD.
SASKATOON NORTH

CLEANER MANUAL

ARTON CROSSING

INDEX

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CLEANING GRAIN

OBJECTIVES

The primary objective of the personnel on the cleaner Deck is to clean the maximum amount of grain in the least amount of time to meet export standards. At this time, that objective can be met by one-pass cleaning at maximum load.

This requires constant sampling of the grain flow, approximately every 20 minutes, and also every time a bin is opened.

The objective of maximum load one-pass cleaning also requires the Cleanerman to closely monitor his machines for any adjustments or corrections on a regular basis. Trough angles must be checked, scalpers cleaned, feed boxes cleared of obstructions, tailings and small seeds checked, etc.

The other primary objective of the personnel on the Cleaner Deck is good housekeeping. The indent cylinder machines will not function effectively if grain has been allowed to build up underneath the cylinders. Dust is a natural byproduct of handling grain, and it cannot be allowed to accumulate on spouting, the walls, or machines.

"Good Housekeeping is an integral part of everyone's job"

CLEANING GRAIN: GENERAL

The theory of seed separations is based on a difference in physical characteristics. In order to effect a seed separation, a difference in physical properties must exist, whether it is dimensional, shapes, specific gravity, or color. Seeds that do not differ in some physical way cannot be separated.

The most important or basic natural differences for seed separations are:

Weight, Length, Width, Thickness, and Special Shapes.

Machines are specifically designed to utilize these natural properties singly or in combination, according to required separations between the crop seed and undesirable contaminants.

1) Weight Separation -	Aspiration
2) Length Separation -	Disc or Indent Pocket
3) Width Separation -	Round Perforation
4) Thickness Separation -	Slotted Perforation
5) Special Shapes (Bk.Wht.) -	Triangle Perforation

(Probably the best example of a three dimensional seed is a kernel of corn, which is long, thin and wide).

With this information, we clean grain by removing dockage which is separable foreign material such as weed seeds, other grains, straw, chaff, and mice, etc. The cleaning process involves separating the dockage from the clean grain on the basis of length, width, thickness, weight or shape.

Most indent cylinder machines are equipped with a scalper-aspirator which combines a rotating cylindrical wire mesh with an air stream which passes through the falling grain stream. The former removes large foreign material such as wood, large straws, ice chunks, etc., while the air stream removes dust, leaves, and other light objects. Thus the grain is partially cleaned before it reaches the indent cylinders.

The cylinder machine separates kernels on the basis of length and removes short material from longer material. It consists of a series of long round cylinders stacked in tiers. The inner surface of each cylinder has thousands of small precise indents which act as cups to lift kernels of specific length. A trough and screw auger are located in each cylinder to collect and remove the separated kernels. The grain is fed into the top cylinder, and as it turns, each appropriately sized kernel is lifted by an indent. Long kernels are not lifted. Intermediate length kernels are lifted for part of a revolution and fall back into the main stream of grain. Short kernels of grain sit in the indents and are lifted the full height of the cylinder's rotation to fall into the trough.

Each cylinder has a part to play. The material separated from the clean grain is called screenings or tailings, of which several grades exist depending upon what is contained. Following removal from the clean grain stream, these screenings and tailings are further processed through the Reclaim System.

The Rotary machines are essentially screen machines that separate by thickness and width. The larger material passes over the screens and is discharged into the Cleaning Leg, while the smaller material is discharged into the Screenings Leg.

Principle of Weight Separation

Cleaning of seeds by the difference in weight or specific gravity is accomplished by Air Separators. The principle of separation by weight uses the characteristics of specific gravity or density and terminal velocity of the individual seed.

The terminal velocity of a particle is equivalent to the air velocity required to suspend it in a confined, rising air current.

Seeds with less terminal velocity than the velocity of the air, will be lifted, and conversely, seeds with greater terminal velocity than the velocity of the air will pass through the air stream. Terminal velocity varies with weight, shape, and surface roughness.

Thus, the determining factors for air separation are usually weight in relation to air resistance. Material which is more streamlined (less air resistance) in relation to weight will pass through the air stream. In very simple terms, heavy material passes through the air stream and light material, of less density, is lifted.

Air separators are incorporated with other cleaning machines or used as separate systems, such as Pneumatic Separators, Aspirators, Destoners, Air classifiers, and Cyclones.

Principle of Width and Thickness Separation

Once again, width and thickness separations are based on differing dimensions, i.e. according to a variation in the width or thickness of the material to be separated.

The following basic principles apply:

Width sizing by using round-hole openings, thickness

sizing by using slotted openings.

(See Illustration #3)

When using round-hole screens, seeds which are narrower than the diameter of the openings pass through ("throughs"), and seeds which are wider pass over the screen ("overs"). Similarly, when using slotted screens, the thin material passes through the slots and the thick material passes over.

Structurally, width and thickness separations can be made by a flat-screen type machine or by a cylindrical screen type machine.

CYLINDERS - PRINCIPLE OF OPERATION

Cylinder Separation

Aspirated grain moves through the top three splitting rows, and the first cylinder separations are made by lifting the seeds, small, and medium grain into the trough and spouted away from the cylinders to discharge locations at the rear of the machine. The tailings from the top three splitting rows are spouted to feed the bottom two oats row. An adjustable splitter spout (Part No. T2075) is incorporated into the feed spouting to allow equal loading of grain in the bottom two rows. In the bottom two oats rows the large grain is lifted into the inner trough and the oats, wheat heads and sticks are rejected. The large grain (liftings), and the oats (tailings) are spouted to floor level.

Trough Pointers

Pointers on each trough indicate the position of the grading edge of the trough.

Trough Handwheels

Handwheels are used to set the position of the cylinder troughs to obtain best separation. If too much long material is going into the trough, raise the grading edge of the trough. If too much short material is going into the trough, lower the grading edges.

Note: The pointer on each cylinder extension indicates the position of the trough grading edge.

Retarders

Each cylinder is equipped with a retarder which acts to dam up the grain discharge, thus assisting in the lifting of the shorter material. This adjustment can be adjusted by experience only. If the retarder is set too high, long material will wash into the trough, and if it is set too low, short material will discharge with the longer material (TAILINGS)

Tailings Splitting Spout

The tailings splitting spout (Part No. T2075) should be adjusted to obtain equal feed to both of the two bottom rows.

THE INDENT CYLINDER

The indent cylinder is designed primarily to make a separation by length, as is the disc type indent unit. But, you will see that there are other physical characteristics that enter into the separation made by the cylinder indent as well. In addition to the indent size, the cylinder utilizes the forces of gravity and centrifugal force. The particles to be removed from the mass are loaded into the indent by a combination of gravity and centrifugal force. After locating themselves in the pockets, they are retained by the centrifugal force to a point of the rotation of the cylinder where gravitational forces overtake, and the material discharges from the indent and is dropped or falls into a receiving trough where it is conveyed to a discharge spout. The smaller particles are placed in the trough and longer particles are discharged as "throughs". These pass out the far end of the cylinder, opposite from the feed and without being lifted by the indents.

For a particle to be lifted, its center of gravity must fall within the indent itself, otherwise it will tumble out. For some seeds the center of gravity is at, or near, the geometric centre, and at others, it is displaced greatly from this geometric point. Therefore, it will depend which way a seed orients itself in the indent as to whether or not is lifted, and the seeds must have the opportunity to enter the indent properly before being discharged as a "through". No matter what cylinder machine is used, there are five main sections or functional areas of the machine and each perform a definite part of the separation process.

1) THE CYLINDER

The cylinder is, of course, the main element in that it is the actual divider of the machine and all other parts which simply aid the cylinder in accomplishing its purpose. As stated earlier, the cylinder's function is to lift the smaller particles out of the grain mass the correct distance to most accurately and evenly make the desired separation.

The cylinder is simply a thin walled tube with indents formed from the inside to a shape approximating a hemisphere. The indent sizes are usually listed in 64's of an inch similar to screen sizes used in screen machines. There are no other figures or letters normally used to describe the indents, other than this diametrical number.

It has been stated that the first cylinder was fashioned out of a hollow log by drilling from the inside a series of shallow holes. Much progress has been made since this first attempt, but the basic principle still remains the same.

The modern cylinder, as we know it today, utilizes a special steel which is precisely punched by large mechanical presses to the desired indent. This is usually done on the flat in small size sheets, as the pressure required for the formation of these indents is very

great. These sheets are then welded on an automatic seam welder and rolled to form the tube and are then case hardened. It is this hardening of the cylinder that gives it extremely long lift. Were it not hardened, its life expectancy would be very short.

2) RECEIVING TROUGH

In different machines, the shape of the receiving trough varies somewhat, but the purpose remains the same--to accumulate the lifted particles and convey them to a discharge spout. This trough is adjustable in order to make the cut or the separation at the exact point of particle size variation desired. The separation is usually made within an area of 60 to 45 degrees ahead of the top dead centre of the cylinder. By proper adjustment of this trough very good flexibility of operation is possible, and we feel that it is this flexibility that gives the cylinder its definite advantage over competitive length separation equipment. Also this receiving trough is normally adjustable to the point that it can be dumped. This is extremely important when a unit of this type is used for seed cleaning and this allows the trough to be cleaned out.

3) THE LEVELER OR CONVEYOR

It is necessary in the cylinder to have some method of conveying the grain through the cylinder and to discharge the particles too large for the indents. There are actually several methods of accomplishing this.

When grain is placed in the rotating cylinder, it itself rotates in a mass, and therefore it is feasible that the small particles at the centre of this rotating mass, which has been nick-named "THE WALTZING KIDNEY", could pass through the machine without ever being exposed to the indented surface. The leveling mechanism should break up the core of this rotating mass as well as slowly conveying the grain and disturbing the rotation of the core. These are:

a) The use of a small screw conveyor which runs approximately in the centre of this rotating mass of grain.

b) The use of a stationary grain line blades which are used in the superior machines today.

Grain line blades are blades set at an angle projecting from the bottom of the pick-up trough and these very efficiently move the grain through the cylinder and break up the rotating mass in the process. They also aid greatly in the cleanout of the machine, when the trough is in the dump position.

4) THE RETARDER

This is most easily described as a dam at the discharge end of the cylinder, and it should be of the adjustable type. In order to be most accurate, the grain bank in the cylinder should be relatively uniform. without the retarder, the grain mass would be less at the discharge end of the cylinder due to the depletion of the smaller particles, which may result in surging of the grain bank.

By this we mean that the material will not roll as it should, but the entire mass will move or slide with the cylinder up to a point where friction will no longer support it, and then it all slides back in a single mass. this will also occur in the cylinder if it is insufficiently loaded. By retarding the discharge of the cylinder, grain depth can be built up to the desired level and maintained at that point where best operation occurs. the adjustment of the retarder will depend on the type of seed being processed. If the grain level was allowed to drop near the discharge end of the cylinder, inaccurate separation will result.

As the grain passes through the cylinder, we can readily see the following procedures taking place. The smaller particles are lifted out near the feed end of the machine, sometimes with more than one particle located in a single indent.

As the grain progresses though the cylinder, the slightly longer particles are lifted into the receiving trough. The toughest division always takes place near the discharge end after the small particles are depleted. If the cylinder was allowed to starve at the end, large particles will be lifted if the grain bank is not maintained at a proper level.

The indent size cannot accurately perform a length separation unless sufficient depth of material is present. The same retarder must also be designed so it can be removed or displaced so that the cylinder can be quickly and completely cleaned cut. This, of course, is especially true where cylinder indents are cleaning seed.

5) FEED TO THE INDENT CYLINDER

It is very important that the metering be constant if the separation to be accomplished is to be consistent. If the feed varies, all particles will not have the same length of time to be separated as did others. Also, with an uneven feed, your trough settings cannot be

accurate due to the fact that for a heavier feed trough settings should be lowered slightly and vice versa.

We now come to the actual operation of the cylinder indent, and of course, the first choice is the actual indent size required. As mentioned previously, the indents are sized in 64's or an inch similar to screens, and, in the case of the Northland Superior units, are available in indents from #4 to #36.

As you can see, these would cover the majority of small seeds and cereal grains. Having chosen the indent size required for the separation desired, the actual cylinder speed is of the next prime importance.

The average Northland Superior Cleaner utilizes a cylinder of 23" diameter and according to quite a long formula, the theoretical equilibrium speed of the cylinder is 55.5 rpm. At exactly this speed, material would cease to empty. However, several physical properties change our frictionless conditions by introducing friction of various amounts.

This friction is dependent on the shape of the seed, seed coat textures, size of seed, and moisture content. also the specific gravity of the seed has some effect on the separation. These frictional forces tend to cause particles to follow the circumferential travel further than calculated, so the speed must be reduced considerably below theoretically 55.5 rpm.

In actual operation cylinder speeds from 42 to 53 rpm are used, and as an example, we have fount that on wheat a top speed of 51 rpm is indicated.

Due to the fact that various seeds, moisture, and surface conditions require a different speed for optimum separations, it is desirable to have each unit equipped with a variable speed drive and this is now general practice in units that are being used for seed cleaning purposes. Whatever the motive power of the cylinder indent, it is of prime importance that the speed is constant. Any fluctuation in speed of the cylinder will affect the trough setting and separations radically.

Also, as mentioned previously, the trough adjustment should be such that the trough itself can be dumped into a clean-out position. This, of course, is a prime requisite if the unit is used for cleaning seed. The accuracy of the trough setting is also dependent to some degree on the actual diameter of the cylinder. As you can see, the larger the diameter of the cylinder, the more trough movement you have available within the operating range.

The 23" diameter cylinder, as used in the Northland Superior units, gives a good degree of accuracy to the trough setting and also, we feel, a reasonable capacity per cylinder.

The capacity per cylinder unit is dependent on three basic factors:

1) The number of pockets or indents per square foot area, and this is governed by the indent size.

2) The amount of cylinder surface that can be run under the grain bank in a given time, and this is relative to the indent length of the cylinder. The cylinders are manufactured in various lengths depending on the type of job required, but in the Northland Superior machines, the most common length is approximately 85".

3) The third factor governing capacity is the percentage of seed mass that must be lifted into the receiving trough.

Due to the side variety of the seed separations that are made on the cylinder indent, it is very difficult to give any statement as regards to capacity. It is possible it could vary anywhere between 25 5o just over 30 bushels per hour per cylinder.

You maỹ ask where in a cleaning line-up cylinder indent machines might be used, and to this we would say, any place where you have a length separation t make. Where a cylinder indent is used strictly by itself as a single purpose separator, it is usually used in a line-up after scalping, and quite often after width separation has been made.

It is common practice in seed cleaning plants, cleaning cereal grains, to use the cylinder machine equipped with a scalper aspirator, positioned first in the line-up. The theory behind this is that the cylinder machine will work very well having a high degree of separation to make.

Having it first in the line-up on cereal grains means that relatively clean product is able to go through the screen machine, or width separators, resulting in an increase in capacity from these units. It must be remembered that the cylinder indent is strictly a length grader and not an all purpose cleaner or separator. Any two seeds that are relatively the same length are same specific gravity will be impossible to separate on the indent.

The cylinder indent is relatively service free. One thing that should be made clear in order to eliminate some potential dissatisfaction with a new machine is that it will not operate properly until the indent surface has had an opportunity to become polished. Due to the increased friction of the unpolished surface, cylinder speeds may have o be reduced and/or trough settings raised.

It should also be pointed out that when cylinders are replaced or a machine is brand new, that in some instances, it is desirable to run a course grain, like barley, through the cylinders to absorb the oil that is used as a rust preventative for shipping purposes, or wash the cylinders in solvent. If a small dusty type seed is cleaned with the cylinders in this condition, it is quite possible that the indent pockets will become plugged. also, when the unit is handling an oil material such as flax, the indent may have a tendency to fill up with dust imbedded in the oil. This, the effective depth of the indent is lowered, and periodical scouring may be needed.

Compared to other methods of length separation of grain, the cylinder indent utilizing the case-hardened punched indent steel cylinder enjoys a relatively long life. As the cylinder indent wears, it will be necessary to lower the trough slightly and/or increase the speed slightly; because, as the pocket shoulder wears down, the degree of friction in the cylinder is less.

Cylinders will quite often made reasonable separations even when worn to a point of being perforated at the shoulder. the amount of grain or seed that can be put through any given cylinder is a difficult thing to pin down, due to the various soil conditions the grain is grown in, moisture content, and seed surface texture.

The lift of a cylinder on cereal grains will vary anywhere from one half million to two, or three million bushels. Where a unit is used first in the cleaning line-up, the cylinder life is less than it would be if it is further down the line due to the fact that all the sand, stones and abrasive material in the grain goes to the cylinder indent first.

The indent cylinder unit is no better than the operator running it, and if you will take the time to understand the operation of your unit and allow a reasonable amount of time after making adjustment; we are sure you will find that the indent cylinder--regardless of make--will do a job for you and will do this job with a minimum of attention and service for an extended period of time.

We trust this has given you a better understanding of the design and operation of one of your basic separating units.

STANDARD PACKAGE

Positive Feed Manifold

Units are custom designed to feed accurately from the aspirator air discharge chamber to the required number of Splitting Cylinder on the Cylinder Cleaner. All feed spouts have bolted, removable mild steel liners to insure the integrity of the manufactured parts.

Aspirator Air Controls

All Northland Superior units have air controls to bleed in a control measure of air to allow maximum air lifting capability while not compromising other units on the same air line. Air is either drawn through the grain curtain or if it is not required it is proportionately brought in through the top of the Aspirator by a by-pass bleed in.

Aspirator Air Lifting Screw

The Discharge Screw has been designed with a "Pop off top" that will force the top to pop off if the Discharge Spout becomes plugged. A sensor can be mounted to this line to warn the cleaner operator of potential problems.

Aspirator Drives

Air lifting screws are driven by gear motors which in turn will drive the Scalper reels at a governed speed. The positive feeder is run from a separate motor requiring a variable frequency converter. All drives are low speed. Poly-chain Belt Drives assure low noise, long belt life and low maintenance.

Proper Drives

All Cylinder machines are now driven by a gear motor drive that operates a standard drive tube to run each bank of cylinders. Each bank of cylinders runs independently from the drive tube and can be disconnected and not affect the cleaning capacity or quality of the banks on either side. The units up to 4 high can be run off a single motor drive. The 5 cylinder high requires two separate drive motors. All poly-chain drive units over 6 cylinders are recommended to have soft start units placed with the starter controls. All drive components are standard stock items that are available through transmission retail outlets.

Cylinder Sprockets

All cylinders are driven by a poly-chain belt drive. The drive is located on the outside of

the cylinder end plates and spouting for quick repairs. In the case of a machine plugging and belts or drives failing, there are no end plates or spouting to remove to access the damage drive part. Removal of the guard exposes the drive so quick repairs can be made.

Cylinder Control

All Superior Northland Cylinders have individual trough controls with a locking mechanism to prevent vibratory turning. A pointer on the trough indicates the position of the grading edge of the trough. Each cylinder also comes with the Superior retarder blade which acts as a dam at the discharge end of the Cylinder, thus assisting in the lifting of the shorter material. without the retarder, the grain mass would be less at the discharge end of the Cylinder due to the depletion of the smaller particles, which may result in surging of the grain bank. This statement means that the material will not roll as it should and the entire mass will move or slide with the Cylinder up to a point where friction will no longer support it, and then it all slides back in a single mass. By retarding, the discharge of the Cylinder grain depth can be built up to the desired level and maintained at that point where best operation occurs.

The indent size cannot accurately perform a length separation unless sufficient depth of material is present. The retarder is also designed so it can be removed or displaced so that the Cylinder can be quickly and completely cleaned out. This is especially true where Cylinder indents are cleaning seed.

Dust Tight Spouting

The new style discharge spouts are assembled with snap cover inspection ports which prevent blow back dust emission from the machine. The superior quality inspection of the Kidney load is still maintained by lifting the snap cover and viewing into the Cylinder.

Cylinder Wear Bands

All case hardened Cylinders come with welded and caulked 12" wear bands on both the inlet and discharge end of the Cylinder. This will prevent premature leaking of the Cylinder while the indent pocket is still operational.

Heat Treated Indent Cylinders

All Cylinders are heat treated for hardness in an environmentally safe oven, not a cyanide bath. This oven unit supplies an equally hard surface with minimal Cylinder distortion, assuring symmetrically round Cylinders every time. It is this hardening of the Cylinder that gives it extremely long life.

Bearings

All Northland Superior Cylinder machines are equipped with Seal Master bearings. These units are pre-greased when assembled and installed at our factory. Since the speed on most of the bearings is from 52 RPM to a maximum of 250 RPM, the bearing units receive negligible wear. The friction roller bearings supporting the Cylinder units now have sealed roller bearings, eliminating the need for greasing. These bearing units have been in use for over two years now and new installations and overhauls without any type of problem. with the total package of sealed bearings and poly chain belts, the Northland Superior Cylinder Cleaner is now "Lube Free".

Screw Conveyors

All Screw Conveyors have the flighting mounted to set collars and then fastened to shafting by set screws. This has eliminated undercutting, poor welding and pre-mature shaft failure. The shafting is superior ground to assure strength and integrity in the drive components.

ROTARY SCREEN CLEANER

Without getting too technical, there are four variable functions that a Rotary Screen Cleaner should incorporate to ensure maximum capacity and efficiency. These variables are stroke or amplitude, angle of inclination or pitch, speed or frequency, and screening-media or screen cloth.

So the importance of these variable elements can be more fully understood, we will describe each briefly:

Stroke or Amplitude

Low amplitude does not disturb the mass sufficiently to create adequate stratification. This results in low efficiencies and necessitates use of a larger screen for a given capacity.

If the stroke is too great, particles bounce, causing mesh hopping. This results in inefficient utilization of the screening surface and poor overall performance.

The correct stroke for a product must be sufficient to provide good, rapid stratification. With good stratification, large particles rise and fine, small particles quickly settle to the surface of the screen presenting the maximum contact time on the screen for these particles.

Angle of Inclination

When the downward pitch is too shallow, material does not move down the screen fast enough and the bed becomes too deep for efficient separation.

A steep angle will cause the material to flow down the screen too rapidly, resulting in poor separation and low efficiency.

The correct downward pitch permits the material to flow across the entire screen area at a uniform rate, exposing all of the material to the entire screening surface. A 7 degree slope is satisfactory for most products. A steeper angle is sometimes required with products of low bulk density and poor flow properties.

Speed or Frequency

If the frequency of vibration is too low, the action becomes sluggish and does not impart sufficient snap to cause good stratification.

Conversely, high frequency will move the material too rapidly across the screen and particles do not have a change to drop through screen openings.

Screening Media

The proper screen cloth for a specific particle size separation will be that which provides maximum open area consistent with reasonable screen life.

Perforated Materials and Wire Cloth

When ordering, always state the amount of sheets required and type of material preferred. Many types of perforations are available, but amount the ones mentioned in this article, are the most common ones used in the Grain Industry.

Some of the following tips and illustrations will no doubt be beneficial for speed and accuracy in submitting your order.

1) **Types of Perforations, spacing and Patterns**:

   (a) **Rounds:** Straight, staggered, and diagonals (Illustration #1)

   (b) **Triangles:** Single or double spaced (Illustration #2)

   (c) **Oblongs or Slotteds:** End or side staggered, straight, diagonal, or herring-bone (Illustration #1, #3, and #4)

2) **Methods of Measuring Perforations and Wire Cloth:**

   (a) **Rounds:** Measured by their diameter in 64ths of an inch, generally with a flat gauge

   (b) **Triangles:** Measured from corner to corner in 64ths of an inch, or by the inscribed circle touching all three sides.

(c) **Oblongs or Slots:** Measured by a flat gauge for width and a ruler for length.

(d) **Wire Cloth:** Measured by the amount of "Wires" to the inch in one direction, and "Spaces" to the inch in the other direction.

3) **Type of Material**

Ex: Steel, zinc, copper, brass, etc. (Steel is most commonly used)

4) **Overall Size of Screens**

Ex: State size of <u>overlap</u> in inches if one is required, and if so, on which side of the screen.

5) **Number of Bars* on the Screen Frame**

The thickness of each, and the distance apart. (*Cross wooden stripping on framework)
For best production, the most common types of patterns used are:

ROUNDS: The staggered arrangement
SLOTTING OR OBLONGS: End staggered

TRIANGLES

Not including the Cuthbertson Method of numbering the sizes of the triangular openings in a perforated screen, the following are among the most common methods that are available to us for measuring this type.

(1) **Flat Gauge as in Illustration #6**

(2) **Actual corner to corner measure:** Accomplished with a ruler and a magnifying glass as in Illustration #7:, or, by holding the material to be measured up to the light and sliding a numbered gauge across the triangle until both corners are covered from the light,, #8.

(3) **The Inscribed Circle**: Using round gauge touching all three sides. Illustration #9.

As the flat gauge has a certain amount of thickness to the blade, it will not come into contact with the outer extremities of the opening thereby giving us an inaccurate reading according to true measurement.

The most accurate method is the inscribed circle which touches all three sides as in Illustration #9. This, however, is only done with a special round tapered micrometer gauge and is not always available.

The actual corner to corner measure is the most advisable for accuracy as illustrated in #7 and #8.

The following table will give an approximate comparison between the various means of measuring triangular openings:

Cuthbertson	Flat Gauge	Inscriber Circle	Actual Measurement
#5 1/2	~~7~~/64" 5 1/2	.083	9/64"
-	~~8~~/64" 6	.090	10/64:
#6	~~9~~/64" 6 1/2	.097	11/64"
#7	~~11~~/64" 7	.110	14/64"

Whatever means is employed in measuring a Triangular opening, always remember:

"It is extremely important that the method used in measuring a triangle perforation should also be included so that the recipient of the order is fully aware of the actual size required".

MEASURING TRIANGLE PERFORATIONS

ILLUSTRATION # 6

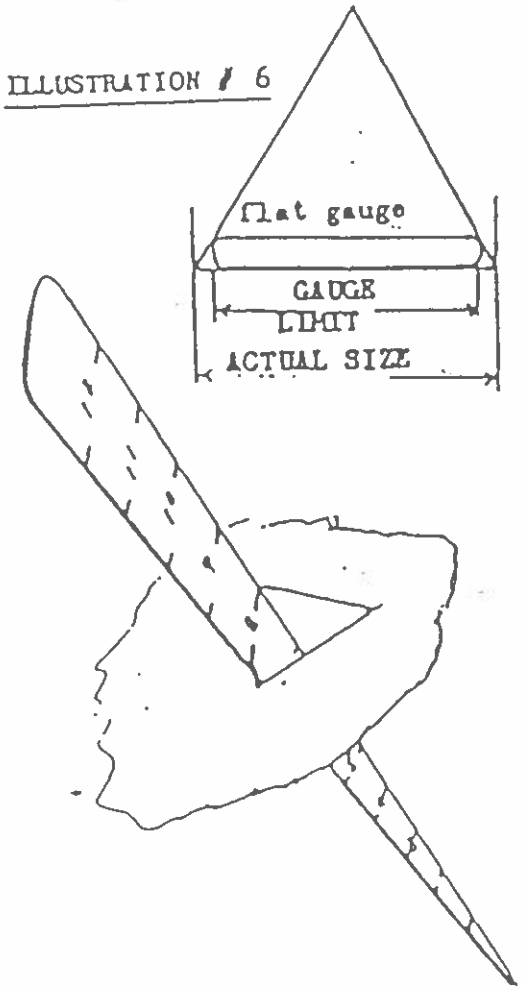


ILLUSTRATION # 8

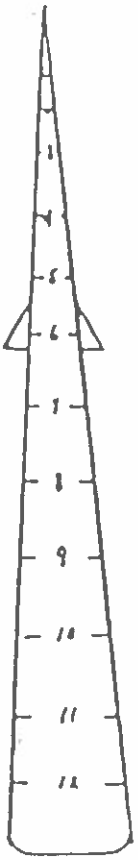


ILLUSTRATION # 7

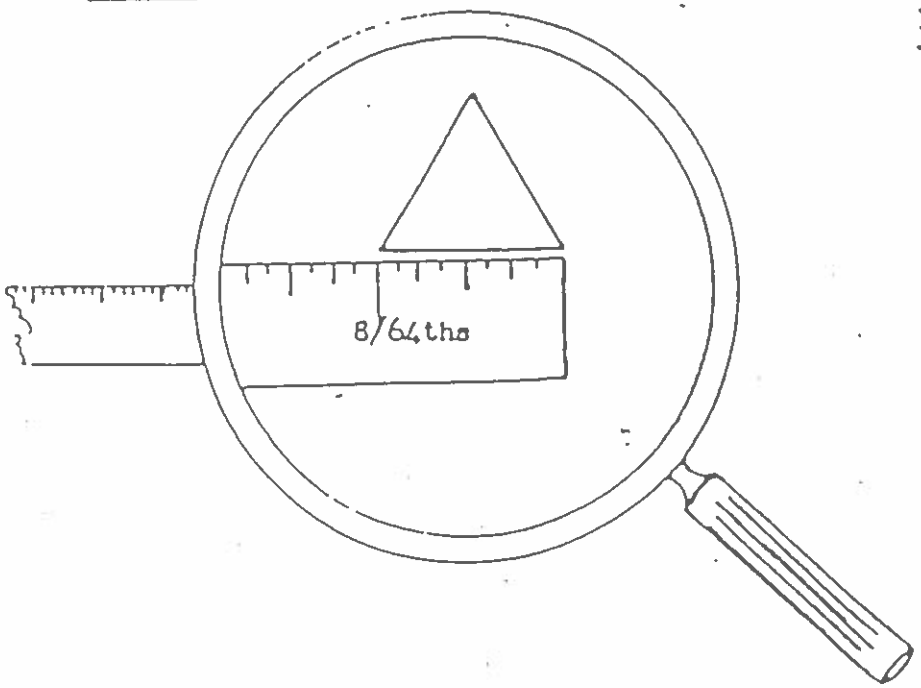
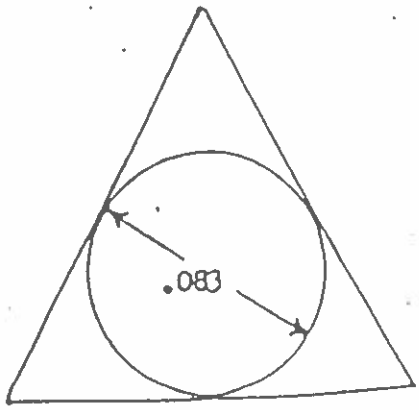


ILLUSTRATION # 9



BY-PRODUCTS

ASPIRATION

Principle of Operation

Grain products are introduced to the aspirator through the feed hopper and received by the feed gate which regulates the flow and directs the grain to the scalping reel. Sticks and large material are then rotated on the outside of scalping reel and directed towards the scalping discharge spout while grain and smaller objects fall through the reel towards the main product spout.

Before entering the spout, dust and lighter material are forced up by the air flow toward the settling chamber where they fall down due to pressure difference and get conveyed towards the settling chamber where they fall down due to pressure difference and get conveyed towards the settling discharge spout.

CYLINDER SEPARATION
NS B8 G17/4

Aspirated grain moves through the top splitting row, and the first cylinder separations are made by lifting the seeds, small, and medium grain into the trough and rejecting the longer grain (tailings).

The liftings are spouted away from the cylinders to discharge locations at the rear of the machine. The tailings from the top splitting row are spouted to feed the middle grader row. The throughs are spouted away from the machine and the overs are spouted either to the wheat or to the durum cylinder in the bottom row depending on the product.

In the bottom cylinder the final separation is done by separating the liftings (clean wheat or durum) from the tailings (wheatheads & stones).

GENERAL DESCRIPTION

The Northland Superior NS 22x88 P22 Rotary Cleaner is a parallel flow screen separator designed for high capacity grain separation.

A wide variety of screen sizes are available to meet individual requirements of separation. Basically, separation is accomplished by the thousands of screen perforations selecting kernels or seeds up to a predetermined diameter.

NOTE: For identification purposes, the right hand and left hand sides of the machine are determined by viewing the machine from the discharge end. The discharge end of the machine is always referred to as the front of the machine.

PRINCIPLES OF OPERATION

Rotary Screening
NS 22X88 P22

Grain is fed into a feed box and is divided equally into the upper and lower screen shoes of the rotary. Material moves down the inclined screen by a rotary motion. As the product moves through the machine, material falls through the first screen leaving behind larger material such as wheat heads and oats (overs). The material is screened once again, separating the good grain from smaller material and seeds (fines). The three products are then discharged at the discharge door.

GENERAL DESCRIPTION
NS D24

The Northland Superior Destoner is designed to separate materials having only slightly differing terminal velocities previously possible only with an air gravity table type separator.

PRINCIPLES OF OPERATION

Grain products are introduced to the aspirator through the feed hopper, and received by the feed roll which regulates the flow. Heavy material (stones, peas, nuts, bolts,, etc.) falls through towards the heavy material hopper. The rest of the material travels through the air column where it is separated into two different types due to pressure difference where they get discharged through the air lock discharge hoppers.

The 1st chamber usually receives the heavier lifting which is most frequently whole grain and wheat heads.

The 2nd chamber receives the fraction of the lifting containing wheat heads.

EASTERN THRESHER

OPERATION

The operation of the Eastern Thresher is essentially automatic and no adjustments are necessary.

The inner or rotating drum is fitted with flights arranged in a spiral on the periphery. These flights or cleats agitate the material and by virtue of their design convey the material to the discharge end of the unit.

The outer or stationary drum has similar flights. The clearance between the fixed and rotating cleats creates the threshing action. The spiral shape of the cleats moves the material through the unit.

The flights are manufactured with a hardened replaceable insert for ease of replacement.

Wheat Cleaning Flow

Dirty grain enters the primary Scalper Aspirator over the Indent unit. Rough material is scalped off with the 12 inch diameter Scalping Reel and fed evenly into the air chamber by a variable speed feeder. The aspirated product is then split evenly to the nine Splitting Cylinders of the NS-B15 Cylinder Cleaner. These Splitting Cylinders will lift the small and medium grain out of the machine to feed the Rotary Cleaner Aspirator for further cleaning. The larger grain, oats and heads will be discharged to the bottom two rows where the tailings will be discharged from the machine and spouted to the Reclaim System. The liftings of the fourth row are discharged to the clean grain bin and the tailings are spouted to the Reclaim System.

The lifting product receives a second aspiration over the Rotary Aspirator and is fed evenly to the two shoes of the Rotary Cleaner. In the P33 model, the top screen discharges clean grain while small wheat, buck wheat, broken grain, canola and refuse fall through the double buck screen. The thrus product then passes over a round hole screen removing any canola and refuse from the small wheat, broken and buck wheat product. The buck wheat and broken product are discharged to the Reclaim Machine for further processing.

The round hole thrus are then dropped to a wire screen to remove the refuse from the salvaged canola product. The salvaged canola product will then be binned. The refuse is sent to the screenings bin.

The broken grain product from the Rotary and Tailings off the Cylinder are elevated and fed to a Scalper Aspirator over the Reclaim Combo Cleaner. The product is fed to two top splitting Cylinders where wheat, seed and broken grain are sent to the bottom (fourth) row. The wheat heads, wild oats and large grain are tailed to the third tri-bar sizer row. The sizer removes the wild oats as thrus discharging it to screenings. The overs being wheat heads and large grain are spouted to the proper indent, in the third row, where the wheat is lifted from the heads and spouted to clean grain.

The wheat head tailings are fed to the Destoner for stone and pea removal and then to the Thresher. This product is then reintroduced to the by-product leg for recleaning and removal of the wheat.

The tailings of the second row seed Indent are spouted to clean grain. The liftings of this Indent will be large broken grain such as buckwheat and round seeds, which will be spouted to the Fines Bin.

MAINTENANCE / LUBRICATION

GENERAL

To assure continued satisfactory operation of the Northland Superior machines, perform the periodic maintenance described in this section. In general, this covers cleaning, lubrication and a few miscellaneous preventative maintenance checks. The recommended intervals are based on average use of the machine. If the machine is operated continuously for extended periods of time, reduce maintenance intervals accordingly.

Do not perform any maintenance on the Machine while it is operating. Always be sure the Machine Motor is turned off.

DAILY MAINTENANCE

1) Clean grain and dust accumulations from areas around machine. Excessive accumulation of dirt can lead to operational difficulties.

WEEKLY MAINTENANCE

1) After first week of operation, check set screws on all bearings, sprockets, and pulleys for tightness. Inspect rest of machine for loose nuts and bolts and tighten as necessary.

2) Apply light oil to controls and all other moving parts.

MONTHLY MAINTENANCE

1) Check HTD belts for proper tension. (Refer to HTD drive installation sheet at end of this manual).

SIX-MONTH MAINTENANCE - ROTARY CLEANER

1) Lubricate sealed type flange bearings on shafts with high quality medium pressure bearing grease. Use a minimum amount (1 or 2 shots) to prevent damage to bearing seals. Do not over grease these bearings to prevent seal failure.

PERIODIC MAINTENANCE

Periodically check all nuts and bolts for tightness. check sprockets and pulleys for drive alignment and set screw tightness

CAUTION

In sub-zero weather, it is desirable to start machine and allow it to run empty for 10 - 15 minutes prior to feeding product into machine.

When stopping machine, shut off spouts feeding the machine and let it run until there is no grain load in the cylinders. **NEVER START MACHINE WITH A HEAVY LOAD OF GRAIN IN THE CYLINDERS.** Damage to drive components and/or shafts may occur. If for any reason the machine is shut down when loaded, the cylinders must be cleaned out before restarting machine.

GREASE

A **lithium** base grease conforming to a high grade #2 consistency is used. This medium viscosity, low torque grease is **RUST INHIBITED and WATER RESISTANT.** Its temperature range is -30 degrees F to +200 degrees F with intermittent highs of +250 deg. F.

* Also refer to SEW EURODRIVE MANUAL # 4875M for commissioning and service instructions for the gear reducer on the cylinder machine main drive.

Any guards removed during installation should be replaced in their proper positions before operating the machine.

SEQUENCE OF OPERATION

The following paragraphs describe the general sequence of operation applicable to the B-25 Cylinder Machine. The actual control setting can be determined by experience only, and it is recommended that the operator maintain a record of control settings for various products as an aid for future operations.

INITIAL START-UP - DRY RUN

Before introducing the main product to the machine, run it with no load for 15 - 20 minutes. During this dry run check rotation of shafts. Refer to General Arrangement Drawings for proper shaft rotation. If rotation is not correct, reverse the electrical connections to the motor.

INITIAL START-UP OPERATION

1) Set all cylinder trough levels.

2) Move all retarders approximately three inches into opening.

3) Before opening feed spout to the machine, make sure that the aspirator feed gate is in zero position.

4) Start machine motors.

5) Open feed spout to the machine.

6) On initial start-up, start product flow slowly. Machine will not reach maximum capacity until all cylinder indents are polished.

OPERATING ADJUSTMENTS

1) Check separation in cylinders and adjust trough handwheels as required to achieve desired separation.

2) Adjust retarders in each cylinder to obtain optimum separation.

3) Tailings splitting spout (Part No. T2075) should be adjusted to obtain equal feed to both of the bottom rows.

CAUTION

When changing product and / or control settings, wait at least three minutes to observe effects of control changes. This enables the new product to pass completely through the machine before making further control adjustments.

WARNING: DO NOT STOP MACHINE WHEN FULL OF GRAIN

Northland Superior Supply Co. Ltd.

Recommended Spare Parts List

Machine: NS-B15 Multi-Cylinder Length Separator

Qty. Req. Per Mach	Part No.	Description	Unit Price	Total
2	A1075	Bearing Assembly 1 11/16"	$146.34	$ 292.68
2	A1076	Bearing Assembly 1 5/16"	87.54	175.08
2	A2077SB	Friction Roller Assembly	80.11	160.22
1	T2446	14M-2100-20 Belt	135.67	135.67
1	T2799	14M-1750-37 Belt	219.82	219.82
1	T2907	14M-1960-20 Belt	125.37	125.37
1	T2921	14M-1960-37 Belt	230.13	230.13
1	T3218	14M-1567-20 Belt	111.62	111.62
1	T4239	14M-3136-37 Belt	343.47	343.47
1	T5803	14M-2380-68 Belt	498.00	498.00

Machine: NS-33x88-P33TS Rotary Screen Machine

1	T4277	8M-2840-36 Belt	$145.97	$145.97
1	T5592	Screen Frame Assy 44x54 Dis.	500.00	500.00
1	T5593	Screen Frame Assy 44x54 Middle	500.00	500.00
1	T5594	Screen Frame Assy 44x54 Feed	500.00	500.00
1	T5601	Screen Frame Assy 44x54 Dis.	500.00	500.00
1	T5602	Screen Frame Assy 44x54 Middle	500.00	500.00
1	T5603	Screen Frame Assy 44x54 Feed	500.00	500.00

Machine: NS-12x84 OC GFG Open Circuit Aspirator

1	A1076	Bearing Assembly 1 5/16"	$ 87.54	$ 87.54
1	T3029	8M-1440-21 Belt	49.81	49.81
1	T5360	8M-2000-21 Belt	65.26	65.26

Machine NS-B6/G17-2 Combination Cleaner

Qty. Req. Per Mach.	Part No.	Description	Unit/Price	Total
2	A1075	Bearing Assembly 1 5/16"	$ 146.34	$ 292.68

2	A1076	Bearing Assembly 1 5/16"	87.54	175.08
2	A1077SB	Friction Roller Assembly	80.11	160.22
1	T2446	14M-2100-20 Belt	135.67	135.67
1	T2799	14M-1750-37 Belt	219.82	219.82
1	T2907	14M-1960-20 Belt	125.37	125.37
1	T3022	8M-1000-21 Belt	39.51	39.51
1	T3217	14M-1400-37 Belt	197.49	197.49
2	T3242	Friction Roller Assembly	74.97	149.94
1	T3482	Bearing Assembly 1 7/16"	98.56	98.56
1	T4080	14M-2800-37 Belt	328.00	328.00
1	T5276	14M-2660-20 Belt	168.28	168.28
1	T5475	8M-896-21 Belt	36.06	36.06

Machine: NS-DS-24 CC Destoner

1	A1076	Bearing Assy 1 5/16" c/w 11 5/16 Flange	$ 87.54	$ 87.54
1	T5162	A60 Belt	9.76	9.76
1	T5445	B63 Belt	12.41	12.41

Machine: Eastern Thresher NS-ET-16

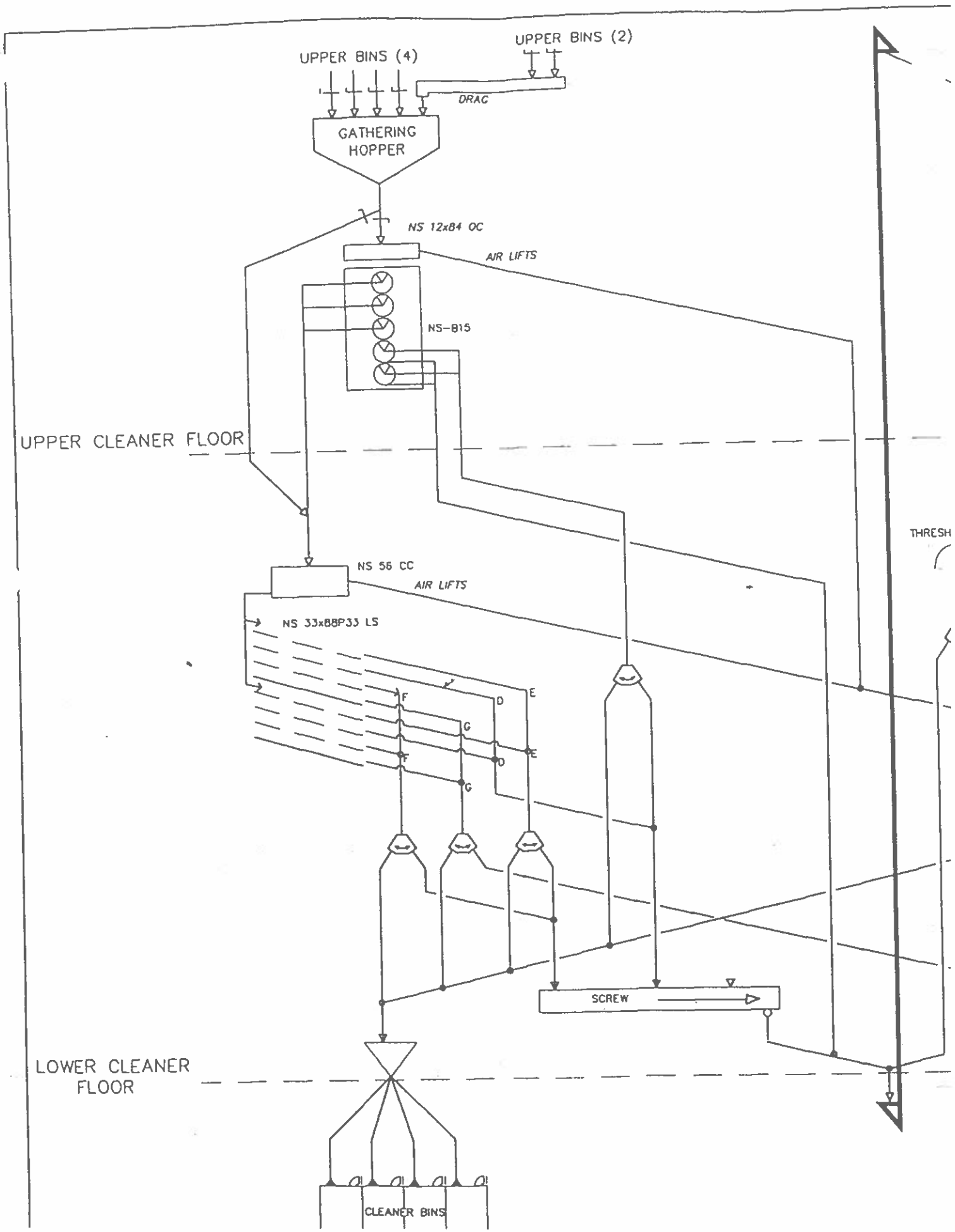
1	T2665	Belt	$144.25	$ 44.25
2	T4673	Split Pillow Block Bearing SNH22517 x 2 15/16"	350.98	350.98

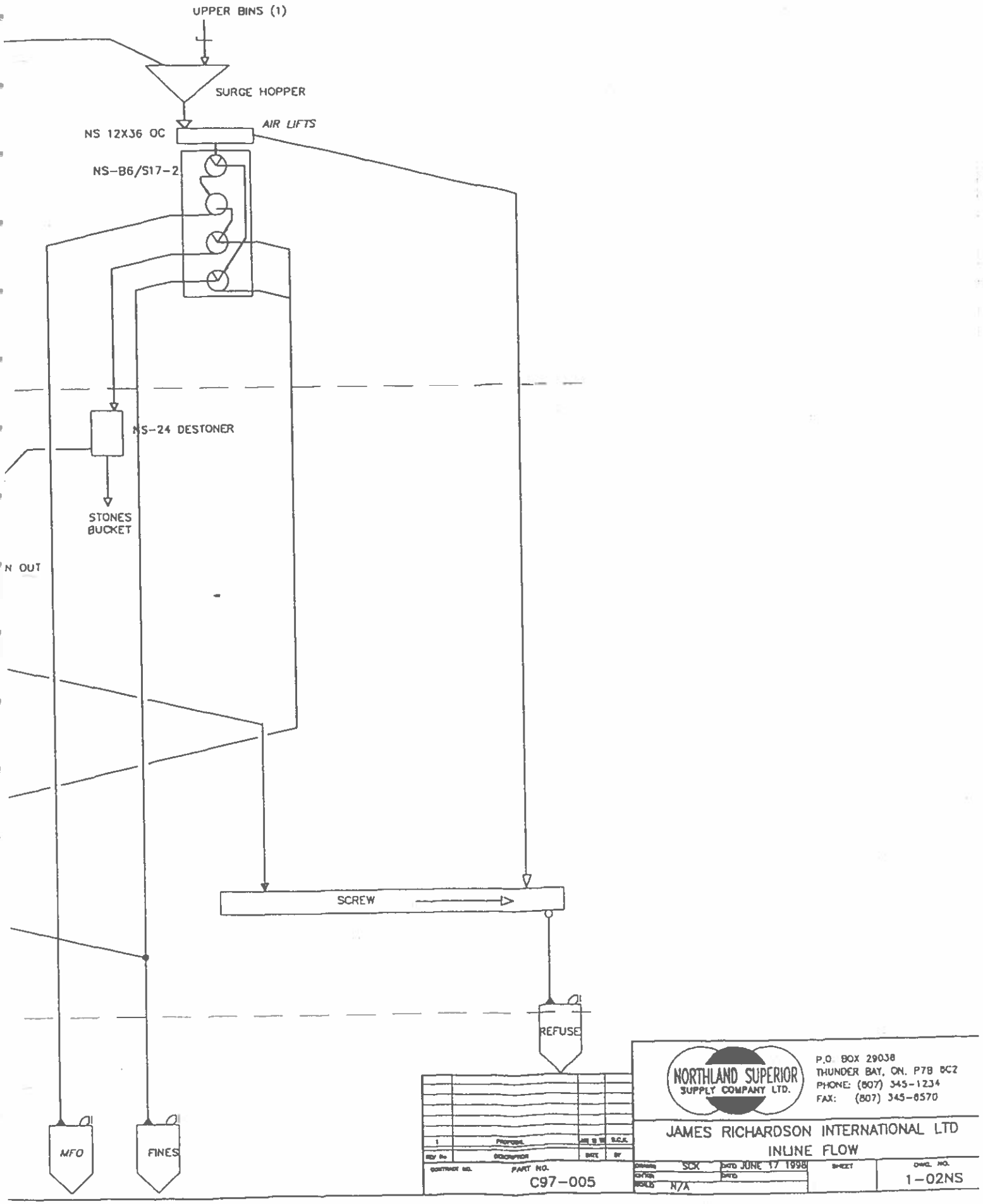
Machine: NS-HC56 CC GFG High Capacity Closed Circuit Aspirator

2	A1075	Bearing Assembly 1 11/16"	$146.34	$ 292.68
1	A1076	Bearing Assembly 1 5/16"	87.54	87.54
1	T6140	V-Belt	11.53	11.53

TROUBLE SHOOTING

PROBLEM	CAUSE	ACTION
Load too small	Feed gates not open wide enough	Open feed gates to recommended settings.
	Obstruction at feed gates	Close slide to feed box, clear scalpers of any obstacles. or Open feed gates until obstruction drops through.
	Feed box not filling	(i) Open bin as wide as possible or (ii) Close bin and check inside pot for any obstructions.
	Centre cylinders full, bottom cylinders small load	Raise trough of splitting cylinders to acheive even split.
	Dead or tough/damp grain	Open another bin of same grade to act as feeder. Do not open 2nd bin so wide that it cuts off first bin.
	Obstruction in bin.	Open bin valve as much as possible. Check bin with light when empty.
Wild Oats/Wheat Heads in sample	Uneven split, not enough large grain to bottom cylinders.	Raise splitting trough for an even split.
	Wheat heads/wild oats picked up in trough of bottom cylinders,	Raise troughs in bottom cylinders.
	Small load to machines	See above
Whole grain in Screenings	Trough in seed cylinders picking up whole grain	Raise settings on seed cylinders.


UPPER BINS (4)
UPPER BINS (2)
DRAC
GATHERING HOPPER
NS 12x84 OC
AIR LIFTS
NS-815
UPPER CLEANER FLOOR
THRESH
NS 56 CC
AIR LIFTS
NS 33x88P33 LS
F
G
D
E
SCREW
LOWER CLEANER FLOOR
CLEANER BINS



1	PROPOSAL	MB, G.W.	S.C.K.
REV No.	DESCRIPTION	DATE	BY

CONTRACT NO. | PART NO. C97-005

NORTHLAND SUPERIOR SUPPLY COMPANY LTD.
P.O. BOX 29038
THUNDER BAY, ON. P7B 6C2
PHONE: (807) 345-1234
FAX: (807) 345-6570

JAMES RICHARDSON INTERNATIONAL LTD

INLINE FLOW

DRAWN	SCK	DATE JUNE 17 1998	SHEET
CHKD		DATE	DWG. NO. 1-02NS
WORLD	N/A		

NOTES:

	ROTARY	ASPIRATOR
1- MACHINE NET WEIGHT = EMPTY -	14,000 LBS	4,000 LBS
PLUGGED -	21,000 LBS	5,500 LBS

2- FOR RECOMMENDED AIR LIFTINGS SPOUT FLEXIBLE CONNECTION SEE DWG. A2836.

3- ALLOW 1" SPACE FOR GROUTING AND OR SHIMMING UNDER ROTARY AND ASPIRATOR SUPPORT STAND LEGS.

4- THE DRAWING SHOWS ROTARY MACHINE WITH STANDARD DOOR SWINGS. OPPOSITE DOOR SWINGS AVAILABLE ON REQUEST. PLEASE SPECIFY ON ORDER.

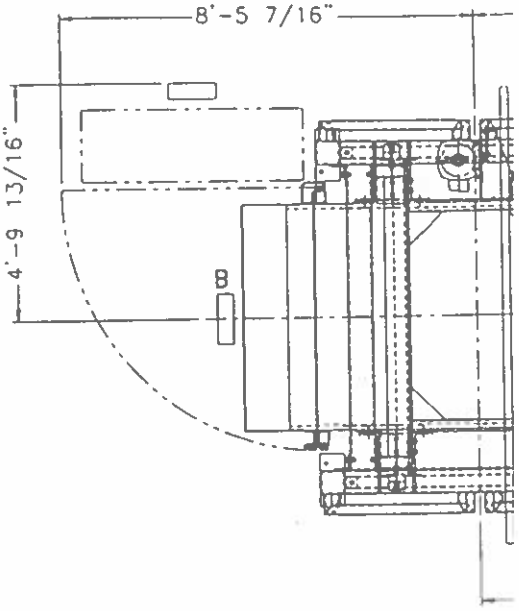
5- AIR LIFTINGS DISCHARGE SPOUT CAN BE LOCATED ON THE RIGHT SIDE - AS SHOWN, OR ON THE OPPOSITE SIDE.

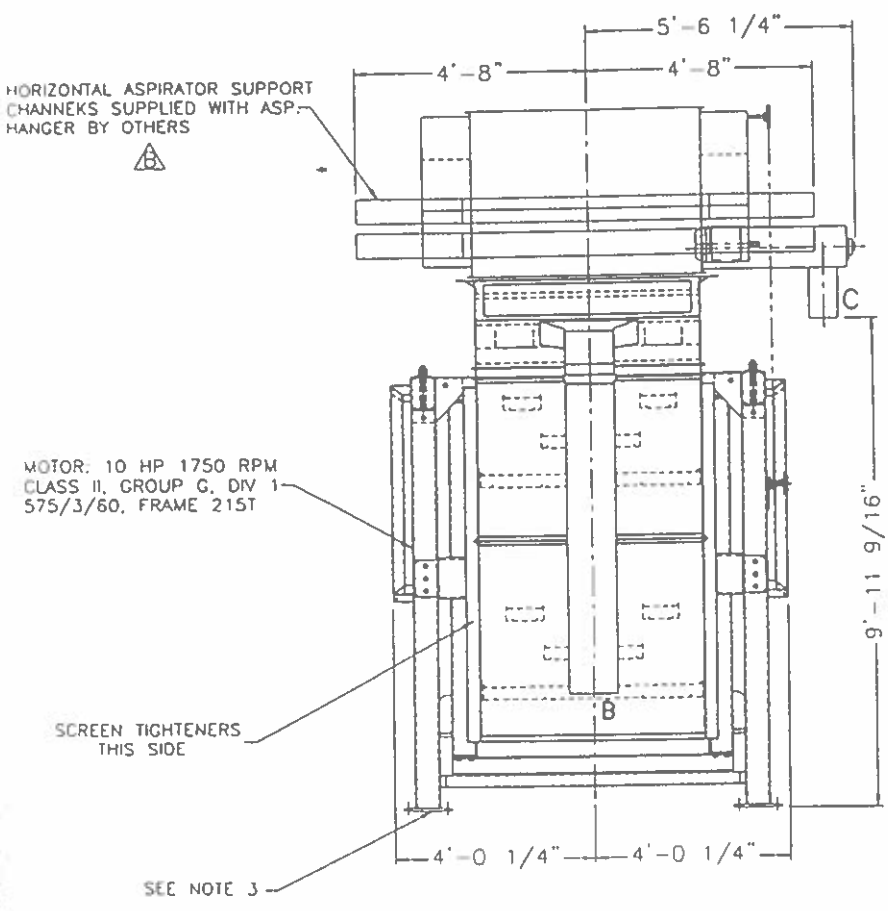
6- AIR DAMPER AND GRAVITY GATE CONTROLS CAN BE INSTALLED ON THE RIGHT SIDE - AS SHOWN, OR ON THE OPPOSITE SIDE.

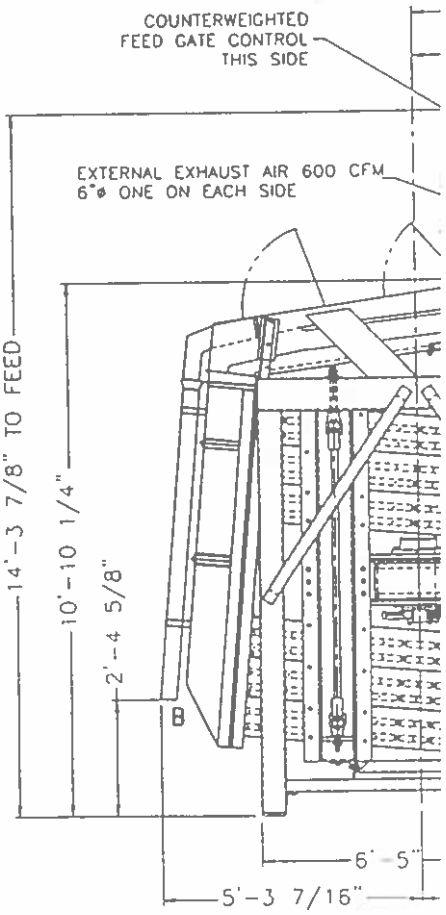
7- ANCHORS TO BE POURED IN PLACE. EPOXY ANCHORS OR THROUGH BOLTS. WEDGE ANCHORS NOT ACCEPTABLE.

8- TOTAL ASPIRATOR EXHAUST AIR REQ'D - 1200 CFM - 600 CFM/SIDE.

9- TOTAL ROTARY EXHAUST AIR REQ'D - 500 CFM.

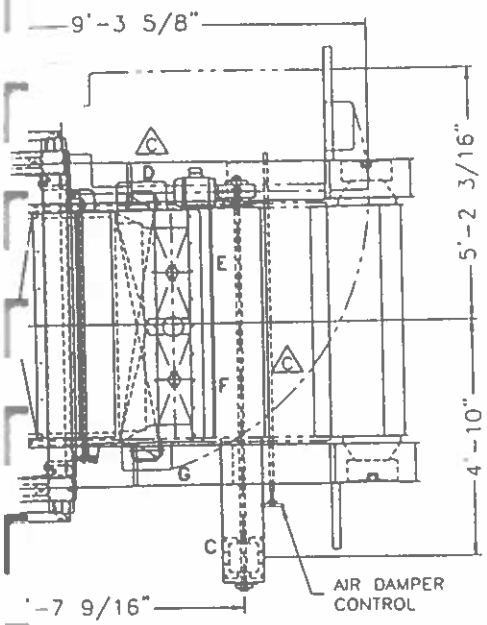


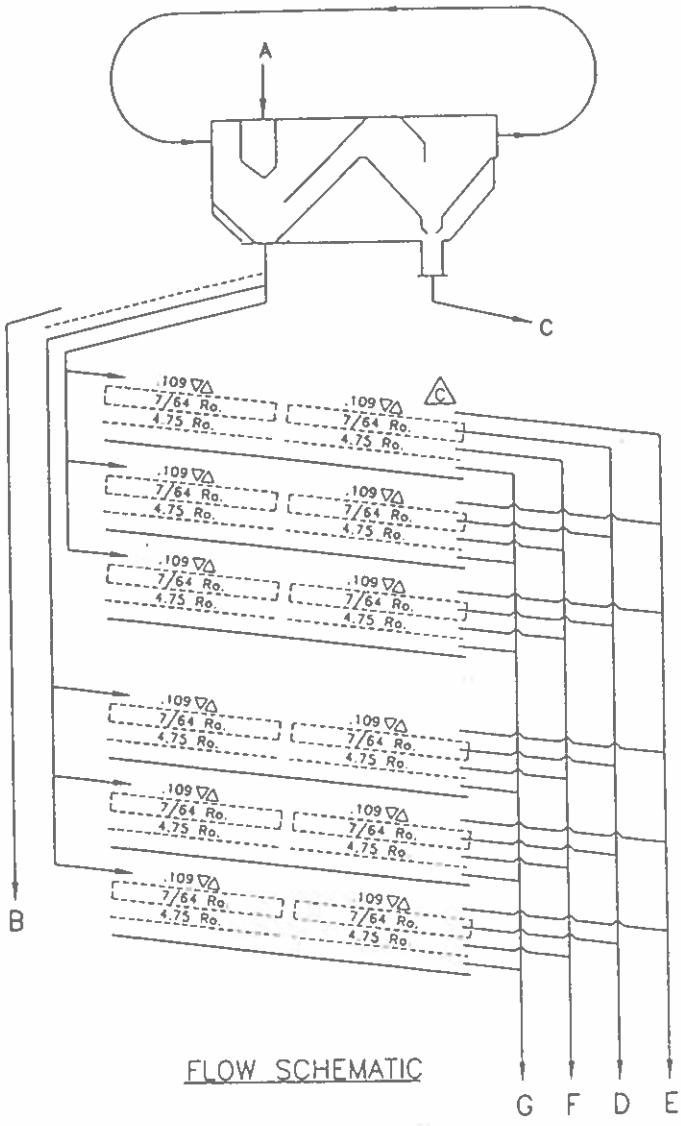




SITE	
SASKATOON	NS-
LAMONT	NS-

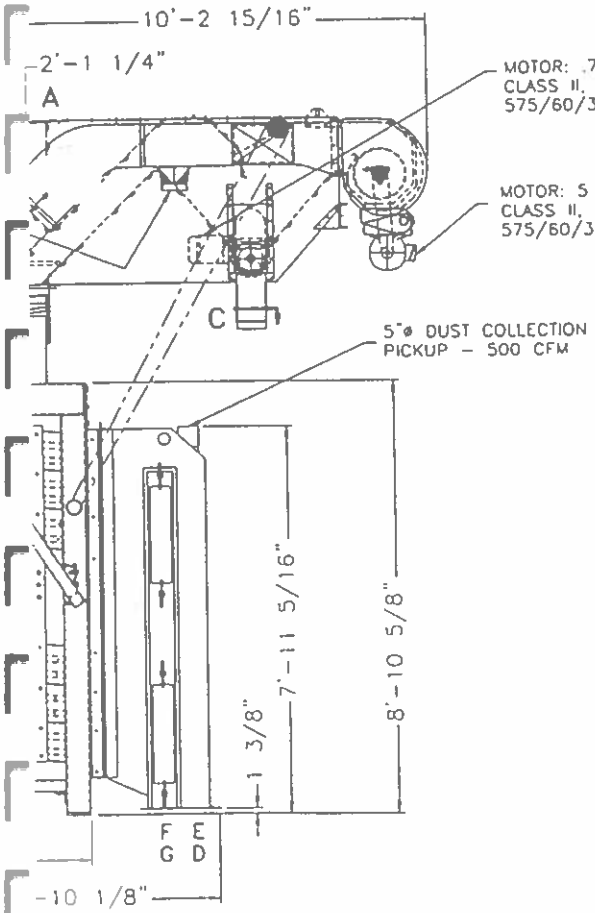
DISCH	DESCRIPTION
A	PRODUCT INLET
B	ROUGH SCALPINGS
C	AIR LIFTINGS
D	CLEAN GRAIN
E	SCALPINGS
F	FEED SCREENINGS
G	FINES





FLOW SCHEMATIC

G F D E



SEE DRAWINGS 570483-2 FOR FOOTPRINT & DISCHARGE SPOUTING PLAN

JRI - PIONEER GRAIN

	JOB #	S/N	ASPIRATOR	JOB #	S/N
3TS	570483	RC293	HC 56C.C.-G.F.G.	570488	A450
3TS	570483	RC294	HC 56C.C.-G.F.G.	570488	A451

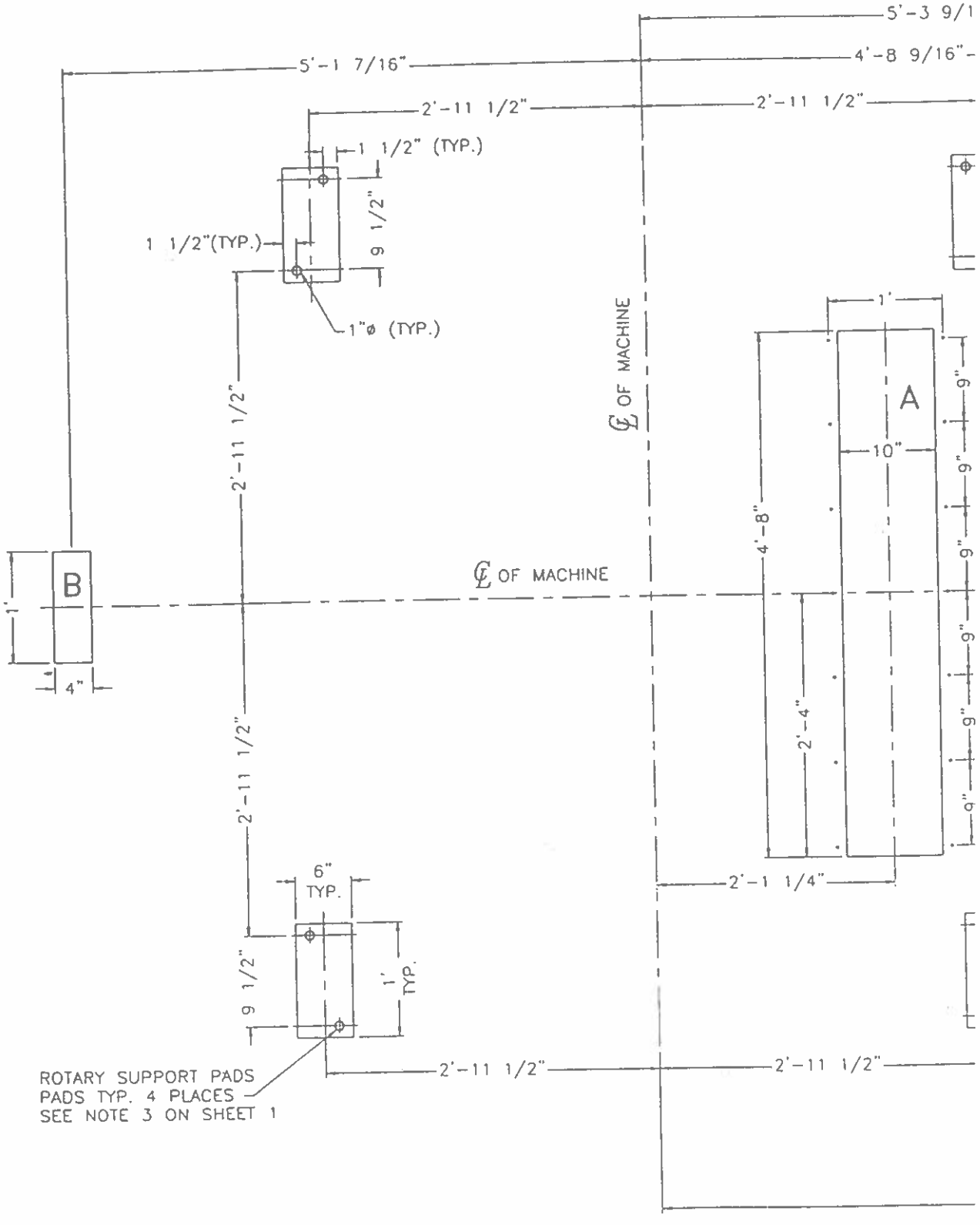
REV No	DESCRIPTION	DATE	BY
C	ROTARY CHANGED TO P33TS MODEL	NOV 15/96	T.O.
B	LOW SCREW & DISCH. DOOR CHANGED ASPIRATOR SUPPORT STAND REMOVED	AUG 21/96	T.O.
A	ROLLAWAY SITE REMOVED	AUG 12/96	T.O.

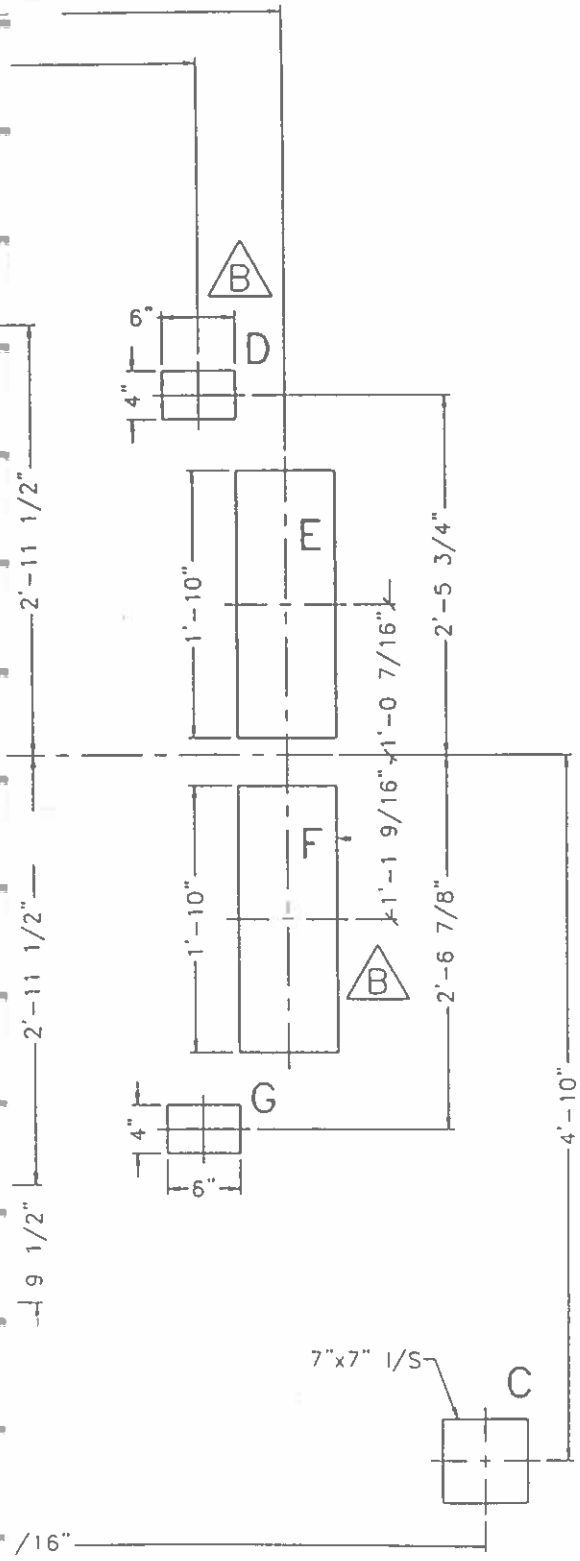
CONTRACT NO. PART NO.

NORTHLAND SUPERIOR SUPPLY COMPANY LTD.
P.O. BOX 29036
THUNDER BAY, ON. P7B 6C2
PHONE: (807) 345-1234
FAX: (807) 345-6570

NS-33x88P33TS c/w HC56C.C.G.F.G ASP.
GENERAL ARRANGEMENT

DRAWN	T.O.	DATE	JULY 7/98	SHEET	DWG. NO
CHKD		DATE		1 OF 2	570483-1
SCALE	1/2"=1'-0"				


5'-3 9/1
5'-1 7/16"
4'-8 9/16"
2'-11 1/2"
2'-11 1/2"
1 1/2" (TYP.)
1 1/2"(TYP.)
9 1/2"
1"ø (TYP.)
℄ OF MACHINE
1'
A
10"
4'-8"
9"
9"
9"
9"
9"
9"
2'-4"
2'-11 1/2"
B
1'
4"
℄ OF MACHINE
2'-11 1/2"
6"
TYP.
9 1/2"
1'
TYP.
2'-1 1/4"
2'-11 1/2"
2'-11 1/2"
ROTARY SUPPORT PADS
PADS TYP. 4 PLACES
SEE NOTE 3 ON SHEET 1



NOTE:
SEE DWG. 570483-1 FOR DOOR SWINGS

REV No	DESCRIPTION	DATE	BY
B	ROTARY CHANGED TO P33TS MODEL DECK, F & B CHANGED	NOV 14/98	T.O.
A	ASPIRATOR SUPPORT STAND REMOVED	JUE 21/98	T.O.

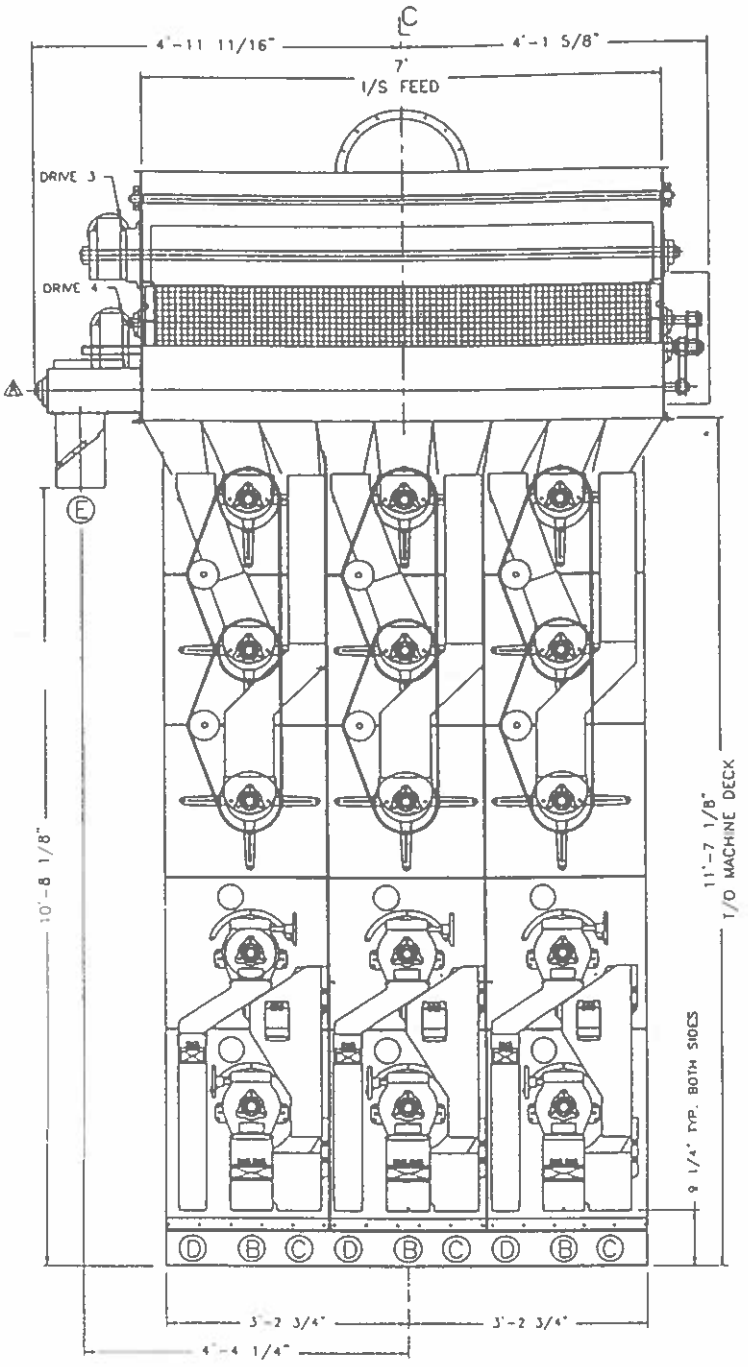
COMPANY NO. PART NO.

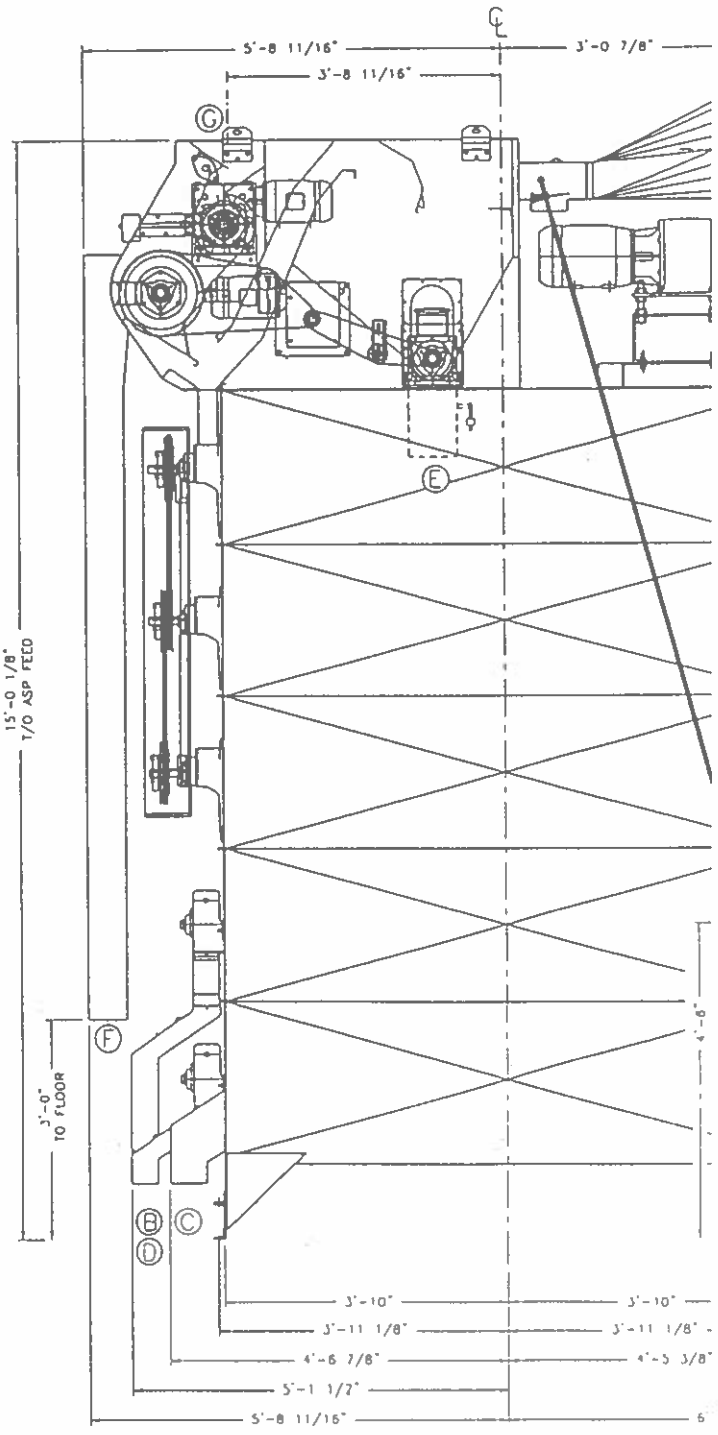
NORTHLAND SUPERIOR SUPPLY COMPANY LTD.
P.O. BOX 29036
THUNDER BAY, ON. P7B 6C2
PHONE: (807) 345-1234
FAX: (807) 345-6570

NS-33x88P33TS ROTARY CLEANER FOOTPRINT AND DISCHARGE SPOUTING PLAN

DRAWN	T.O.	DATE	JULY 7/98
CH'KD		DATE	
SCALE	1 1/2"=1'-0"	SHEET	2 OF 2
DWG NO.	570483-2		

DRIVE	DESCRIPTION	
DRIVE 1	7 1/2 HP., 1750 RPM, 575/60/3, CLASS II, GROUP G, DIV 1, 215TC, MOTOR c/w REDUCER	SEE NOTE '1'
DRIVE 2	5 HP., 1740 RPM, 575/60/3, CLASS II, GROUP G, DIV 1, 184TC, MOTOR c/w REDUCER	SEE NOTE '1'
DRIVE 3	2 HP., 1720 RPM, 575/60/3, CLASS II, GROUP G, DIV 1, 145TC, MOTOR c/w REDUCER	SEE NOTE '2'
DRIVE 4	1 1/2 HP., 1710 RPM, 575/60/3, CLASS II, GROUP G, DIV 1, 145TC, MOTOR c/w REDUCER	





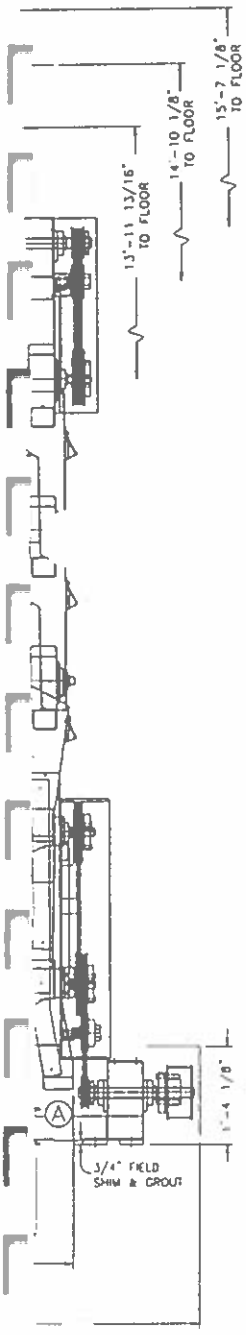
SITE	CYL
SASKATOON	NS
LAMONT	NS

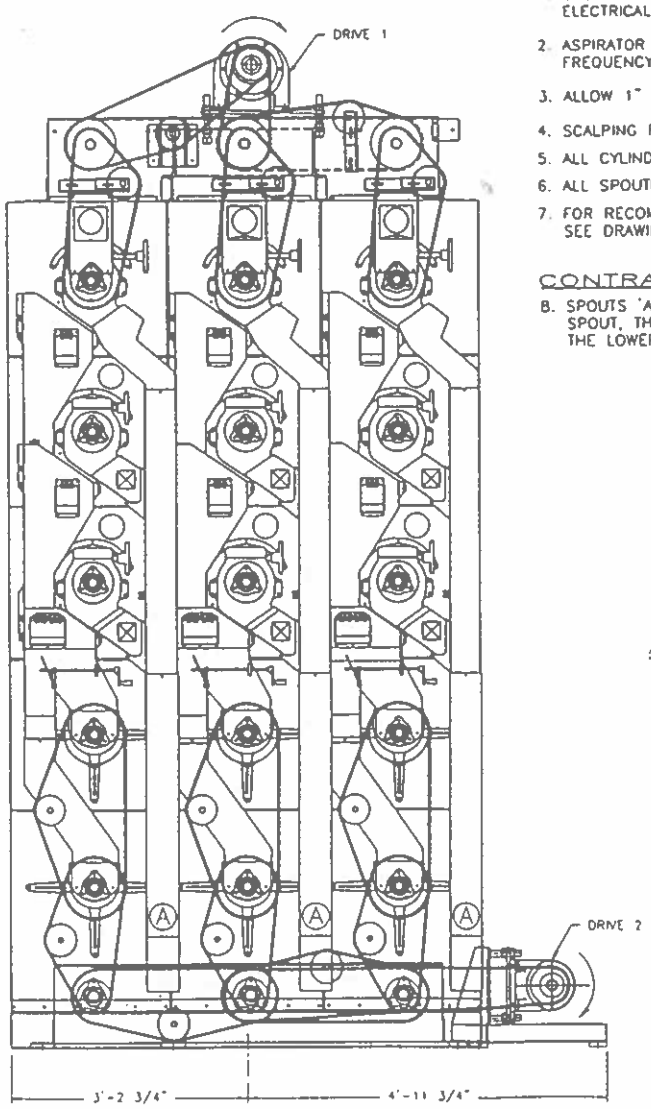
MACHINE DISCHARGES

DISCH.	DESCRIPTION
A	LIFTINGS - SMALL & MED GRAIN
B	LIFTINGS - CLEAN GRAIN
C	TAILINGS - OATS/WHEAT HEADS ETC
D	LIFTINGS - CLEAN GRAIN
E	AIR LIFTINGS
F	ROUGH SCALPINGS
G	ASP. FEED
H	AIR DISCHARGE DAMPEN TO SUIT (6500 CFM)

WEIGHT:		EMPTY	FULL
	CYLINDER CLEANER	12,500 LBS	17,500 LBS
	ASPIRATOR	4,000 LBS	4,750 LBS

DETAIL 1



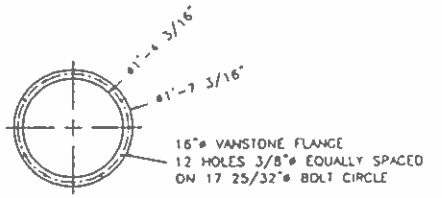


NOTES:

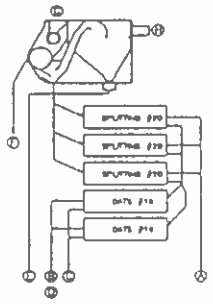
1. CYLINDER DRIVE MOTORS MUST BE CONNECTED TO SOFT START ELECTRICAL CONTROLS. (SUPPLIED BY OTHERS)
2. ASPIRATOR FEED ROLL MOTOR MUST BE CONNECTED TO VARIABLE FREQUENCY CONTROLS (SUPPLIED BY OTHERS)
3. ALLOW 1" UNDER MACHINE FOR SHIMS & GROUT
4. SCALPING REEL MESH IS 7/8" x 7/8" C.C.
5. ALL CYLINDERS TO HAVE 12" WEAR BANDS ON DISCHARGE END.
6. ALL SPOUTING TO BE LINED WITH 10 GA. MILD STEEL LINERS.
7. FOR RECOMMENDED AIR LIFTINGS SPOUT FLEXIBLE CONNECTION SEE DRAWING No. A2836.

CONTRACTORS NOTE:

8. SPOUTS 'A' CAN'T BE PERMANENTLY CONNECTED TO CONTRACTORS SPOUT, THEY MUST BE REMOVEABLE TO ALLOW FOR SERVICING IF THE LOWER DRIVE BEAM.



AIR DISCHARGE TRANSITION
DETAIL 1



FLOW SCHEMATIC

NORTHLAND SUPERIOR SUPPLY COMPANY LTD.
P.O. BOX 29036
THUNDER BAY, ON. P7B 6C2
PHONE: (807) 345-1234
FAX: (807) 345-6570

JRI - PIONEER GRAIN

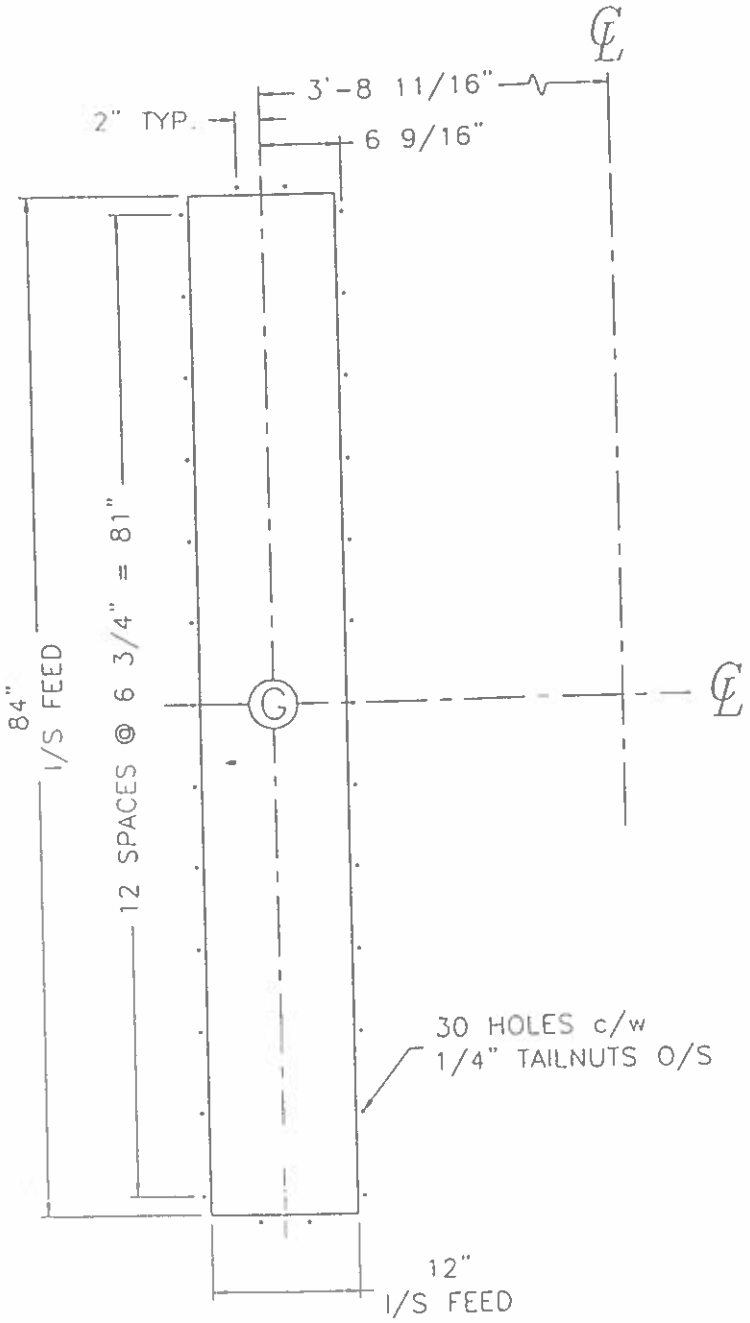
JOB #	S/N	ASPIRATOR	JOB #	S/N
570484	B536	NS-12x84 O.C.	570482	A435
570484	B537	NS-12x84 O.C.	570482	A436

REV'D	DESCRIPTION	DATE	BY
A	REV'D "C" TO UP & UPDATED S/N	AUG 31, 98	DRS

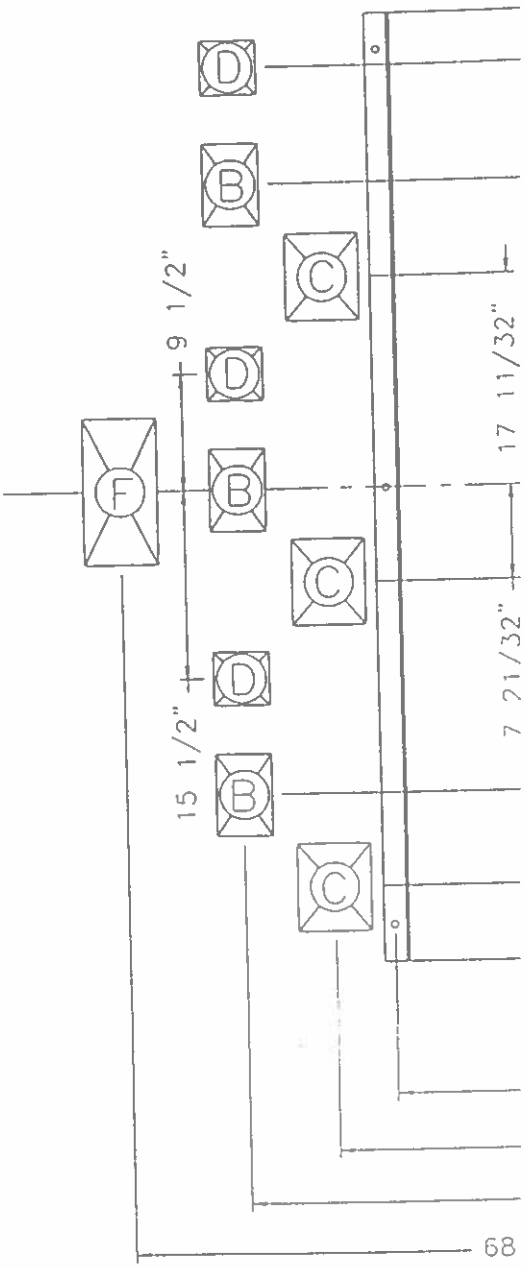
CONTRACT NO. PART NO.

NS-B15 CYLINDER CLEANER c/w NS-12x84 O.C. SCALPER ASPIRATOR

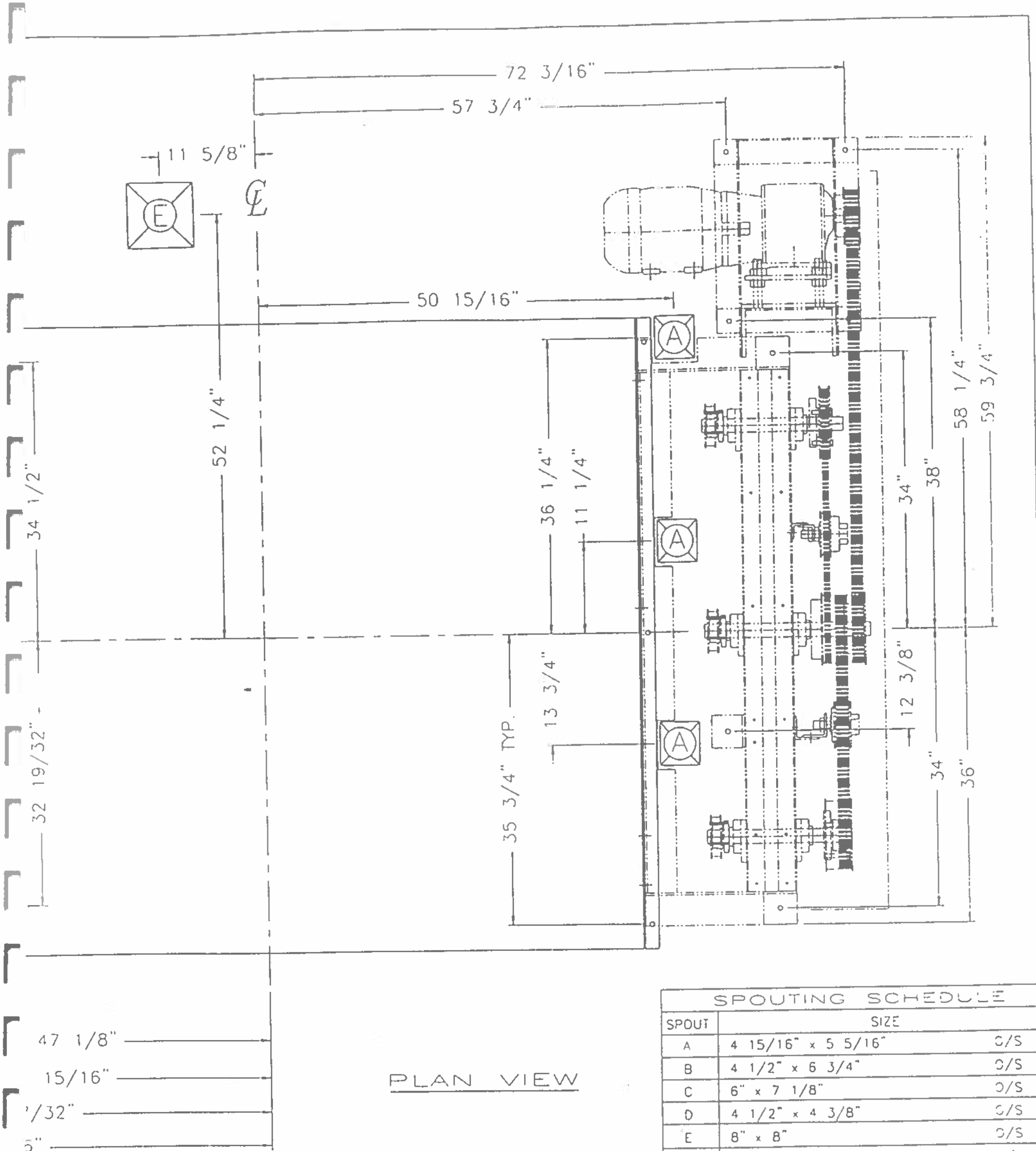
DRAWN	S.S	DATE	JULY 31/ 98	SHEET	DWG NO
CHKD		DATE		1 OF 2	570484-1
SCALE	3/4"				



ASPIRATOR FEED
REMOVED FOR CLARITY



SITE	CY
SASKATOON	NS
LAMONT	NS



PLAN VIEW

SPOUTING SCHEDULE		
SPOUT	SIZE	
A	4 15/16" x 5 5/16"	O/S
B	4 1/2" x 6 3/4"	O/S
C	6" x 7 1/8"	O/S
D	4 1/2" x 4 3/8"	O/S
E	8" x 8"	O/S
F	12" x 6"	O/S
G	84" x 12" - SEE DETAIL THIS DWG	

NORTHLAND SUPERIOR SUPPLY COMPANY LTD.
P.O. BOX 29036
THUNDER BAY, ON, P7B 6C2
PHONE: (807) 345-1234
FAX: (807) 345-6570

JRI - PIONEER GRAIN

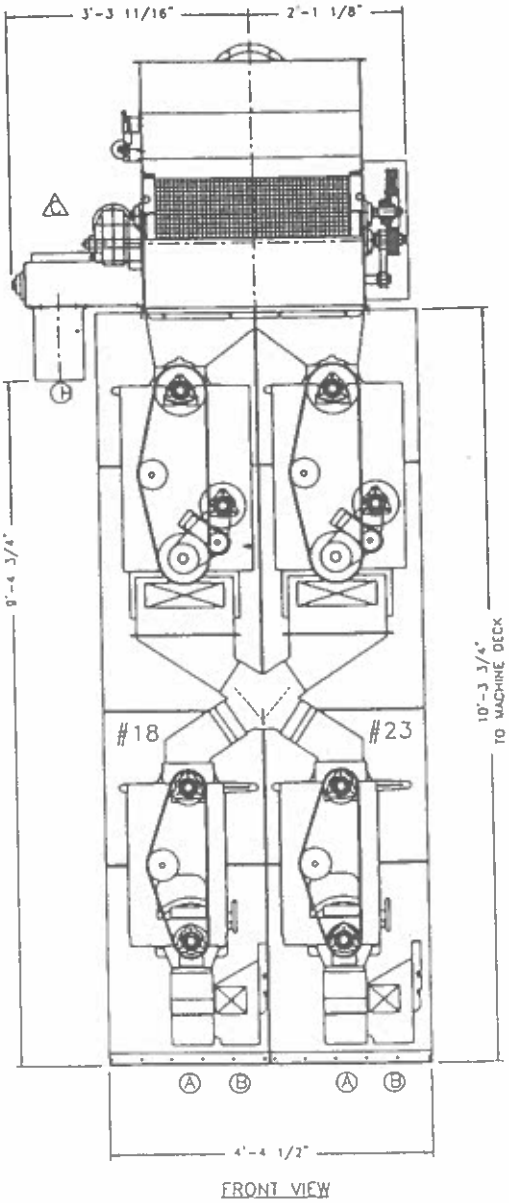
JOB #	S/N	ASPIRATOR	JOB #	S/N
570484	B536	NS-12x84 O.C. F.R.	570482	A435
570484	B537	NS-12x84 O.C. F.R.	570482	A436

REV No	DESCRIPTION	DATE	BY
A	REVISED E' TO LH & UPDATE S/N		

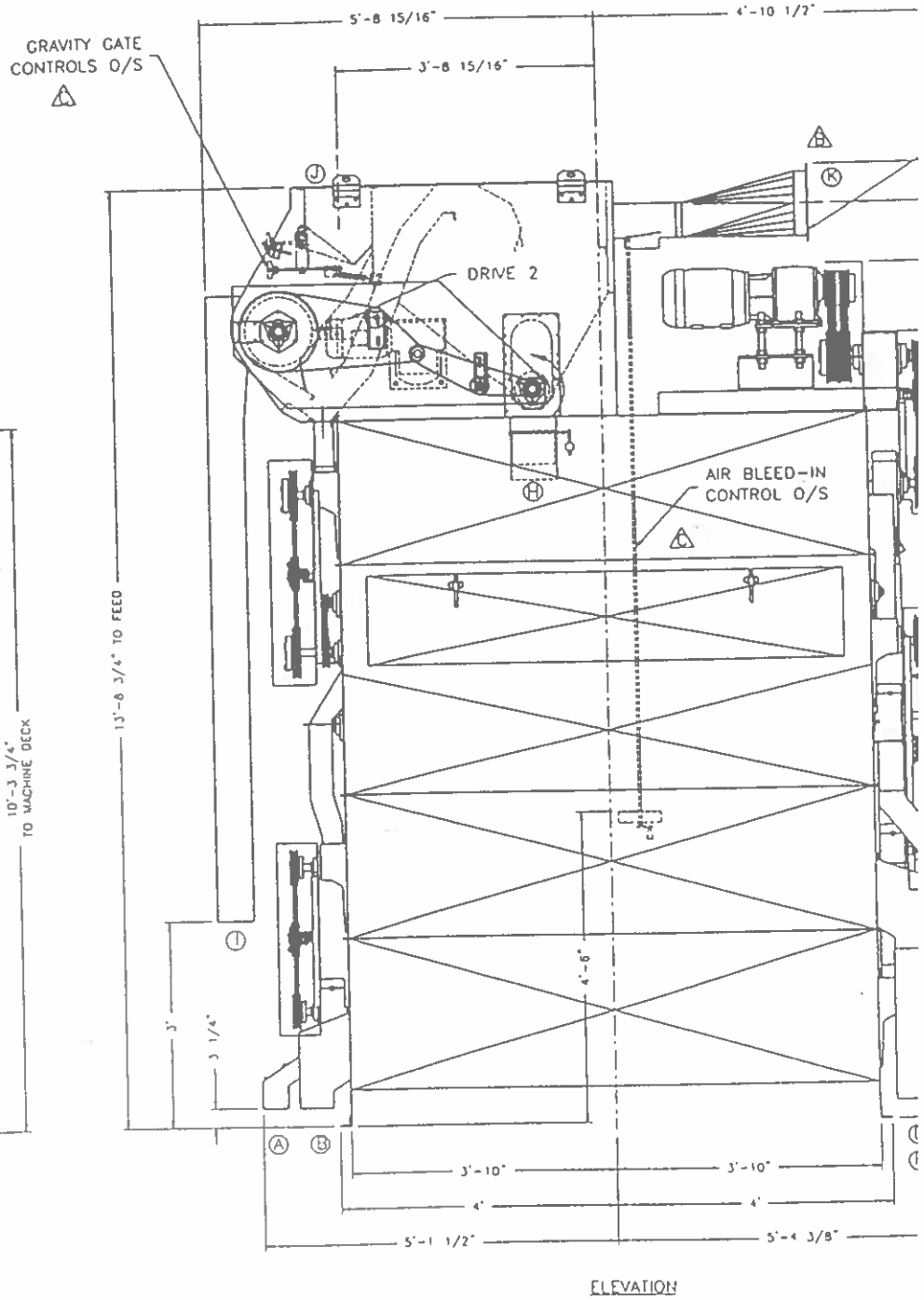
CONTRACT NO. PART NO.

PLAN VIEW
NS-B15 c/w NS-12x84 O.C. F.R. ASPIRATOR

DRAWN	S.S.	DATE JULY 31/ 98	SHEET	DWG NO
CH'KD		DATE	2 OF 7	570484-2
SCALE	1 1/2"=1'			



FRONT VIEW



ELEVATION

NOTE: SEE SHEET 2 OF 2 FOR SPOUTS LOCATIONS AND DIMENSIONS.

SITE
SASKATOON
LAMONT

DRIVE	MOTOR
DRIVE 1	7 1/2 HP., 1800 RPM, 213TC FRAME 575/60/3, CL II, GRP G, DIV 1
DRIVE 2	1 HP., 1800 RPM, 56C FRAME 575/60/3, CL II, GRP G, DIV 1

DISCHARGE	PRODUCT
A	SEEDS & FINES
B	CLEAN WHEAT / DURUM
C	REFUSE
D	TO THRESHER
E	CLEAN DURUM
F	TO THRESHER
G	CLEAN WHEAT
H	AIRLIFTINGS
I	SCALPINGS
J	ASPIRATOR FEED
K	AIR DISCHARGE 2250 CFM

NOTES:

	EMPTY	LOADED
1- WEIGHT: CYLINDER MACHINE	8,000 LBS	12,400 LBS
ASPIRATOR	1,350 LBS	2,000 LBS
	9,350 LBS	14,400 LBS

2- 7.5 HP. MAIN DRIVE MOTOR MUST BE CONNECTED TO SOFT START ELECTRICAL CONTROLS. (SOFT START CONTROLS SUPPLIED BY OTHERS)

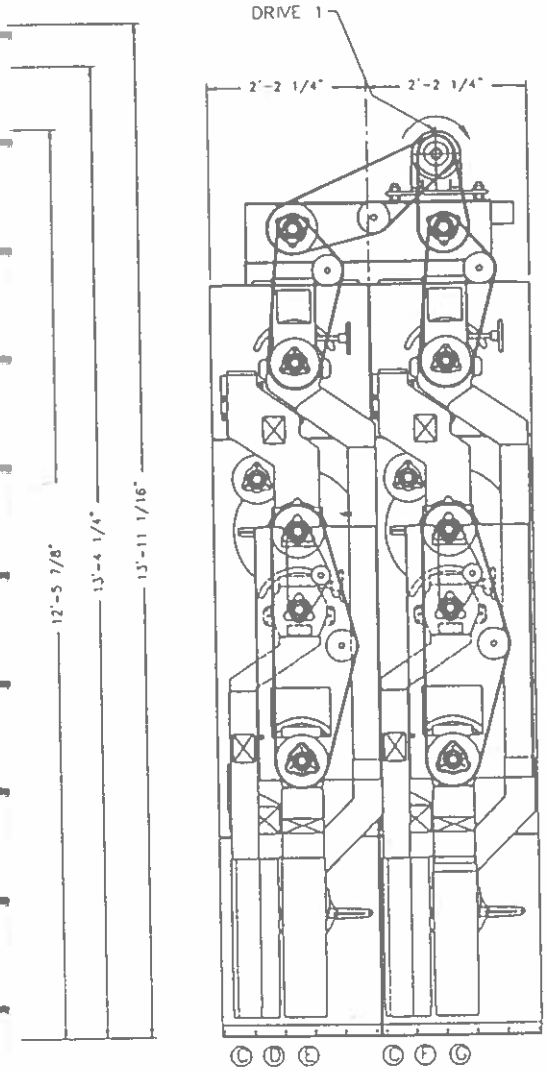
3- SCALPING REEL MESH IS 7/8" x 7/8" CENT. TO CENT.

4- SPOUTING LINED WITH 10 Ga. MILD STEEL REMOVABLE LINERS AT IMPACT AND HIGH WEAR POINTS.

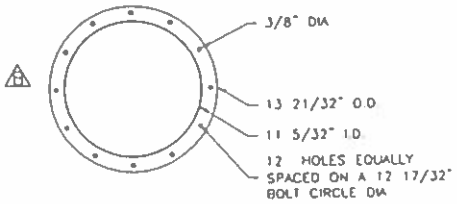
5- AIR LIFTINGS DISCHARGE SPOUT IS 8"x8" O/S CONTRACTOR INSTALLED SPOUT MUST REMAIN CLEAR OF DISCHARGE SPOUT H TO INSURE PROPER OPERATION OF COUNTER WEIGHTED DOOR. SEE DWG. A2836 FOR RECOMMENDED FLEXIBLE CONNECTION DETAIL.

6- ALLOW 1" SPACE FOR GROUTING UNDER THE MACHINE.

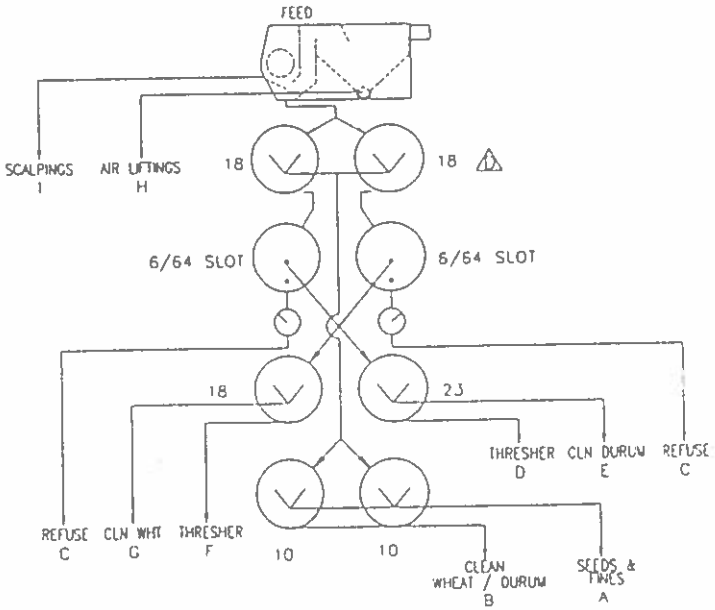
SEE DETAIL "A"



REAR VIEW



DETAIL "A"
N.T.S.



LOOKING AT FRONT OF THE MACHINE

JRI - PIONEER GRAIN

JE	JOB #	S/N	ASPIRATOR	JOB #	S/N
7-2	570485	G170	12x36 O.C.G.G.	570481	A430
7-2	570485	G171	12x36 O.C.G.G.	570481	A431

REV No	DESCRIPTION	DATE	BY
D	CHANGED TOP ROW INDENT TO #10	SEPT. 26/96	T.S.R.
C	CHANGED HANDING AS PER REQUEST	AUG. 21/96	T.S.R.
B	CHANGED AIR DISCH. TO 11" WAKESTONE	AUG. 16/96	T.S.R.
A	CHANGED ASP. DESC./REMOVED SPTS.	AUG. 11/96	T.S.R.

CONTRACT NO. PART NO.

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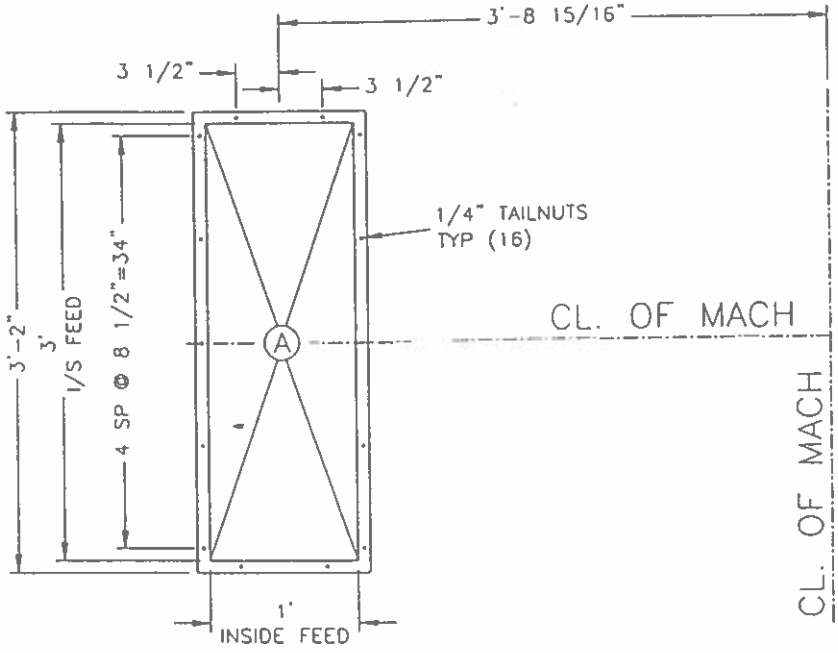
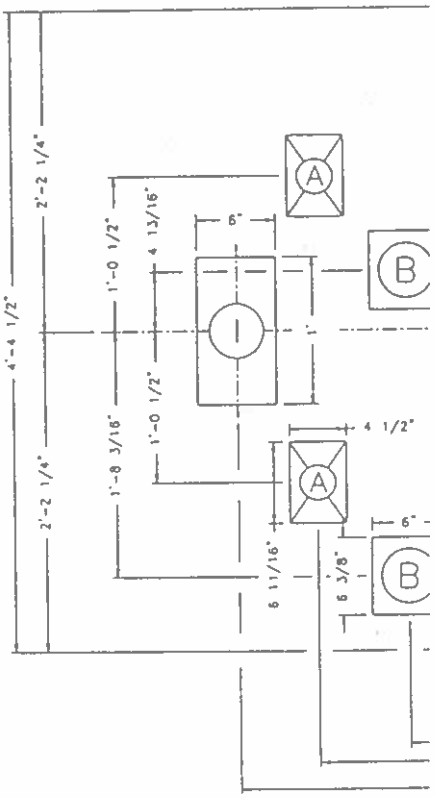
P.O. BOX 29036
THUNDER BAY, ON. P7B 6C2
PHONE: (807) 345-1234
FAX: (807) 345-6570

NS-B6 / G17-2 c/w 12x36 G.G. ASP.
RECLAIM INDENT / TRI-BAR GRADER

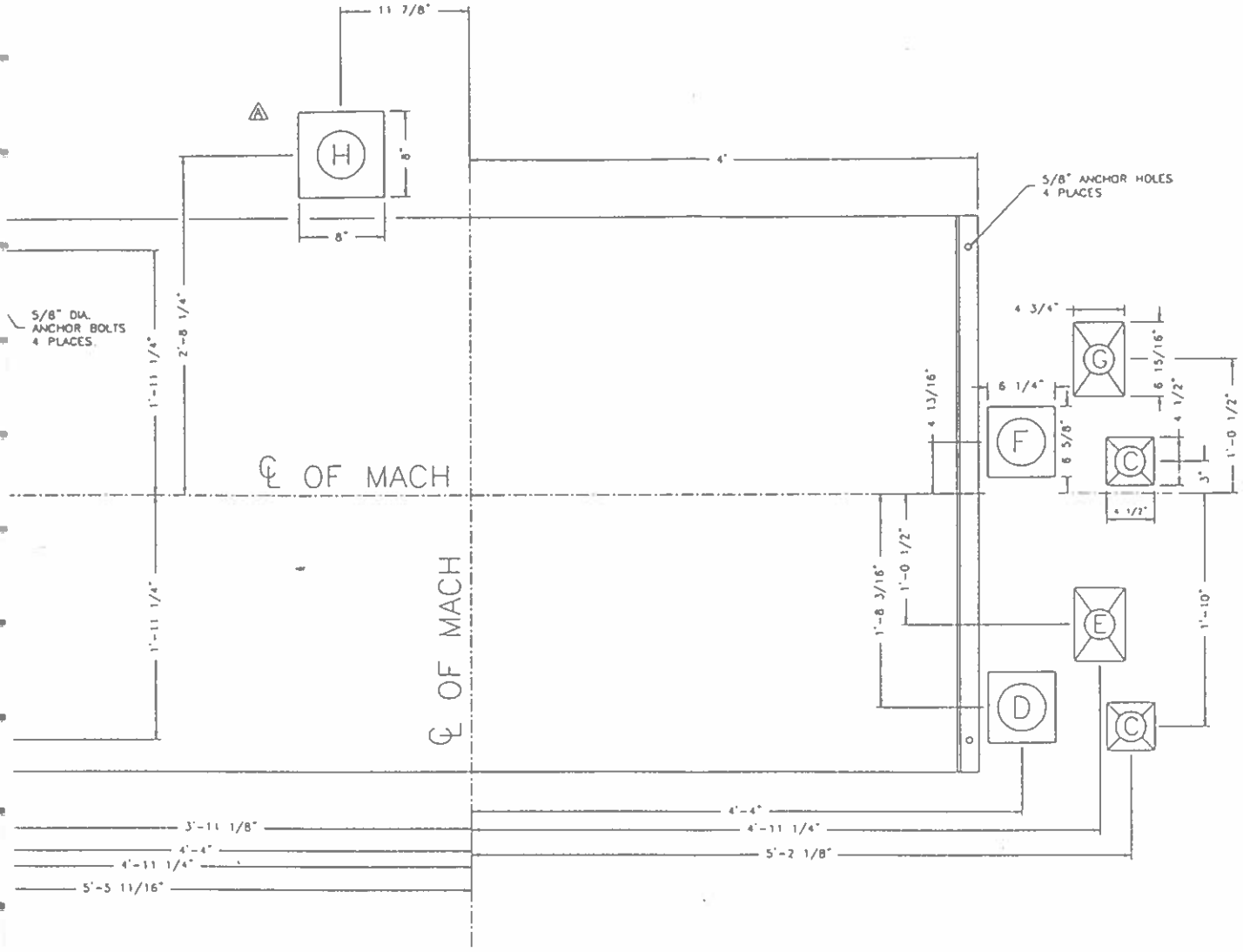
DRAWN	T.S.R.	DATE	JULY 7/96	SHEET	DWG NO
CHKD		DATE		1 OF 2	570485-1
SCALE	3/4"=1"				





ASPIRATOR FEED
MOVED FROM PLAN
VIEW FOR CLARITY.

ALL DIMENSIONS O/S MEASUREMENTS	
A	6 11/16" x 4 1/2"
B	6 3/8" x 6"
C	4 1/2" x 4 1/2"
D&E	6 5/8" x 6 1/4"
E&C	6 15/16" x 4 3/4"
H	8" x 8"
I	6" x 12"
J	48" x 12"



REV no	DESCRIPTION	DATE	BY
A	CHANGED HANDING AS PER REQUEST	AUG. 11/98	T.S.R.

CONTRACT NO. PART NO.

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PHONE: (807) 345-1234
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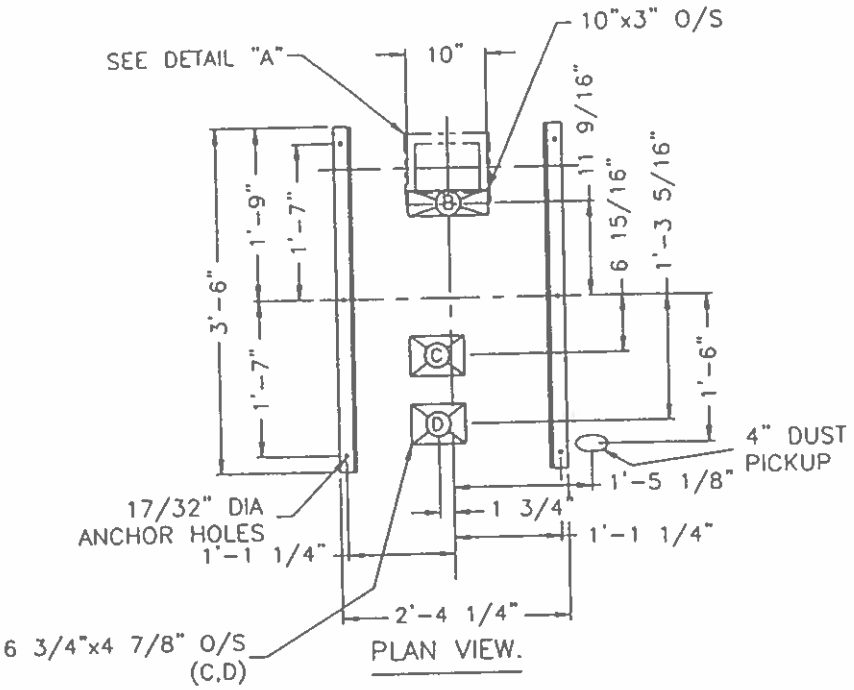
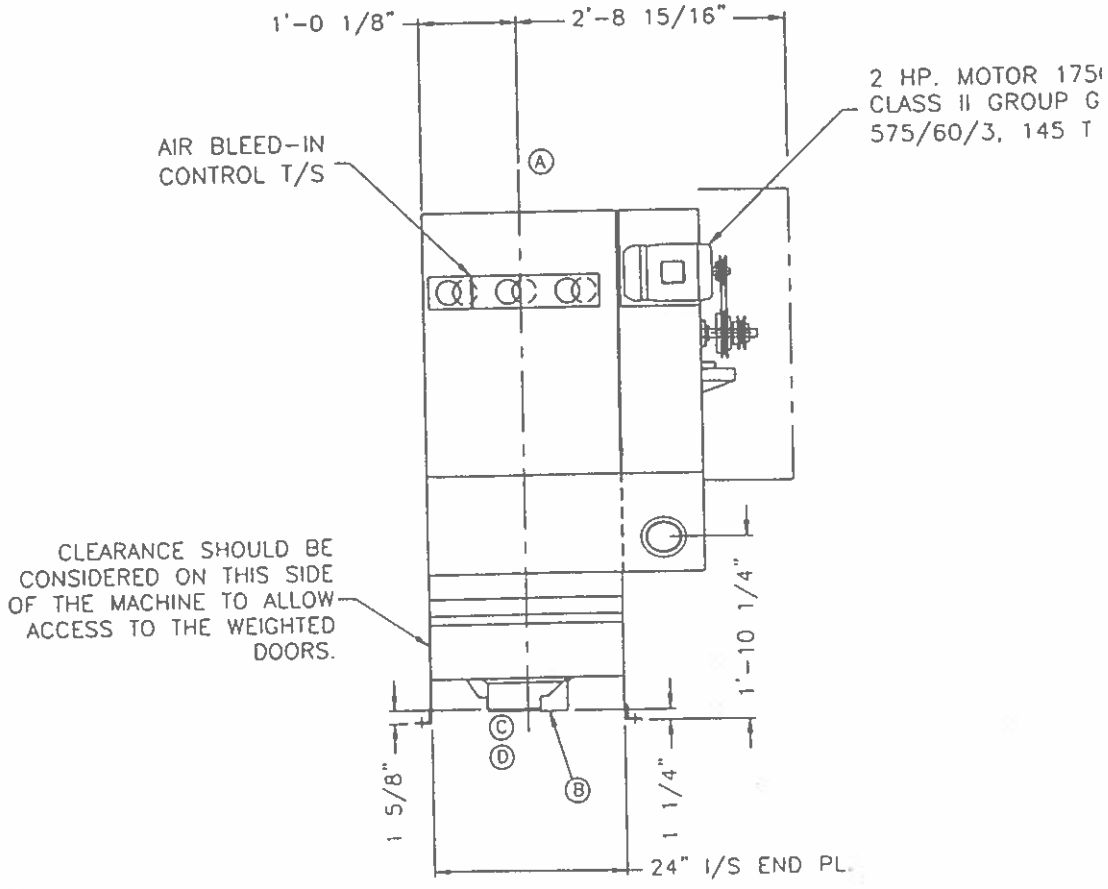
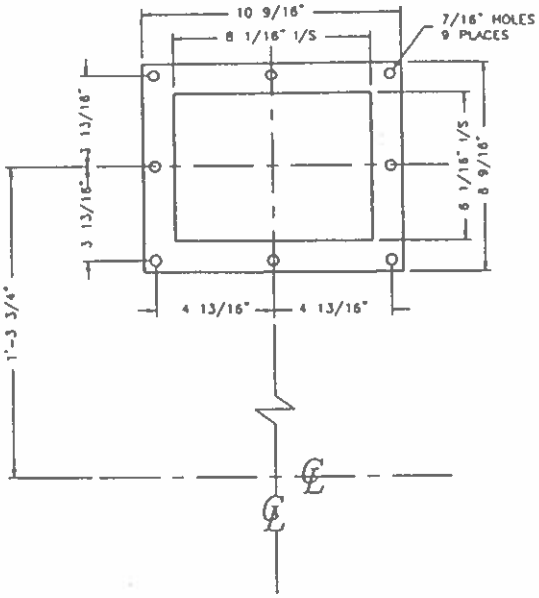
NSB6/G17-2 C/W 12X36 G.G. ASP.
PLAN VIEW

DRAWN	T.S.R.	DATE: JULY 7/98	SHEET	DWG. NO.
CHKD		DATE:	2 OF 2	570485-2
SCALE	1 1/2"=1"			


SEE DETAIL "A"
10"
10"x3" O/S
11 9/16"
6 15/16"
1'-3 5/16"
3'-6"
1'-9"
1'-7"
1'-7"
1'-6"
4" DUST PICKUP
1'-5 1/8"
17/32" DIA ANCHOR HOLES
1'-1 1/4"
1 3/4
1'-1 1/4"
2'-4 1/4"
6 3/4"x4 7/8" O/S (C,D)
PLAN VIEW.


1'-0 1/8"
2'-8 15/16"
2 HP. MOTOR 175
CLASS II GROUP G
575/60/3, 145 T
AIR BLEED-IN CONTROL T/S
A
CLEARANCE SHOULD BE CONSIDERED ON THIS SIDE OF THE MACHINE TO ALLOW ACCESS TO THE WEIGHTED DOORS.
1'-10 1/4"
C
D
B
1 5/8"
1 1/4"
24" I/S END PL

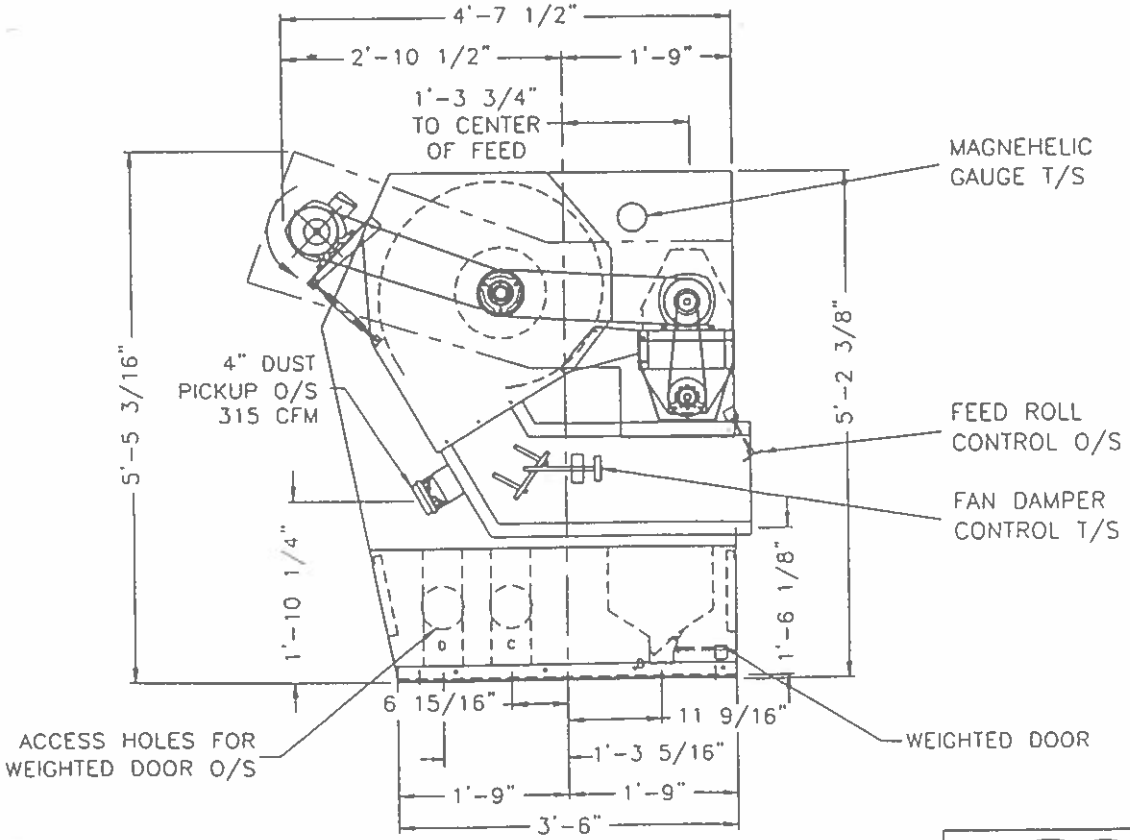
	PRODUCT
A	FEED HOPPER
B	STONES
C	HEAVY LIFTINGS
D	LIGHT LIFTINGS



DETAIL A
NOT TO SCALE

WEIGHT: 1,800 LBS EMPTY
2,500 LBS FULL

ALLOW FOR 1" GROUTING
UNDER MACHINE



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JRI-PIONEER GRAIN

SITE	MACHINE	JOB #	S/N
SASKATOON	NS-DS-24 C.C.	57-0486	A440
LAMONT	NS-DS-24 C.C.	57-0486	A441

REV No	DESCRIPTION	DATE	BY
A	REVISED SIZE	AUG. 31/98	T.S.L.

CONTRACT NO. PART NO.

NS-DS24CC DESTONER CLOSED CIRCUIT
GENERAL ARRANGEMENT

DRAWN	CA.	DATE: JULY 7/98	SHEET	DWG NO.
CH'KED		DATE:	1 OF 1	570486-1
SCALE:	1"=1'-0"			

GENERAL TROUGH SETTINGS

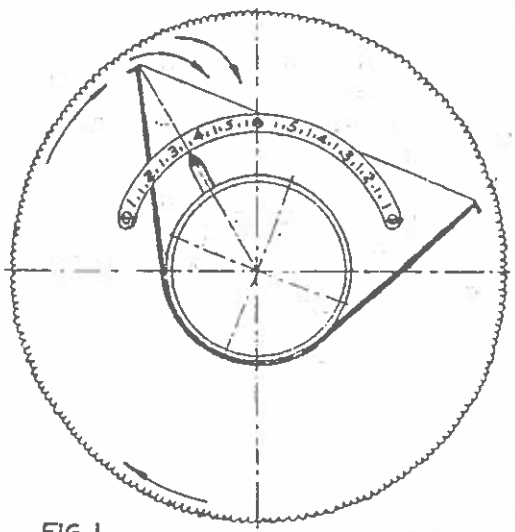

FIG. 1
SEPARATING POSITION

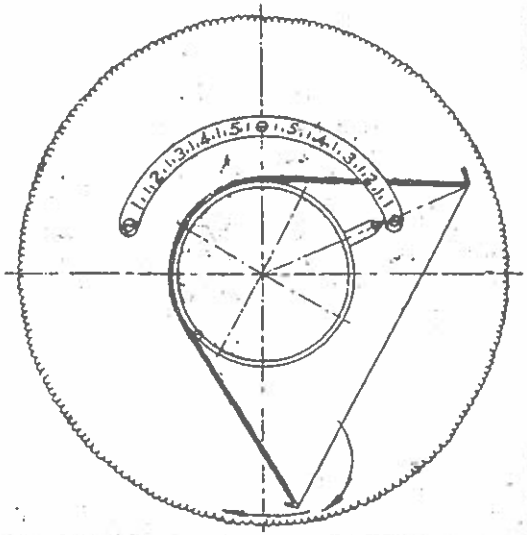

FIG. 2
DUMPING POSITION

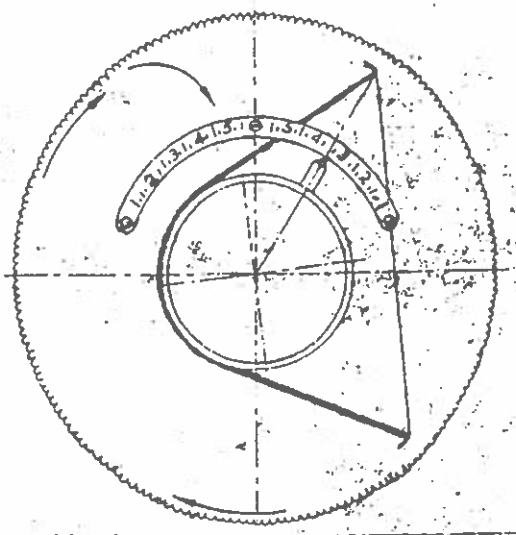

FIG. 3
CLEANOUT POSITION

UPPER

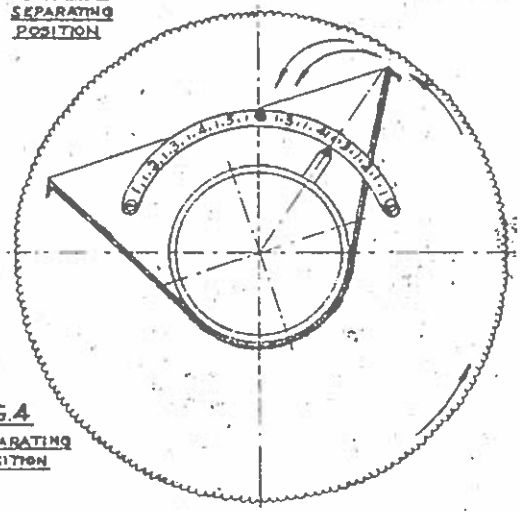

FIG. 4
SEPARATING POSITION

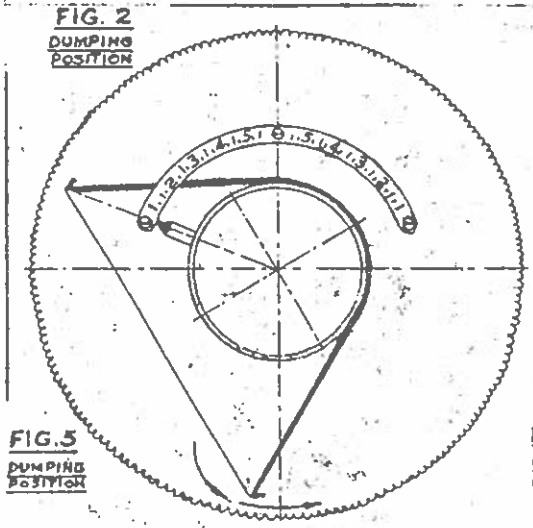

FIG. 5
DUMPING POSITION

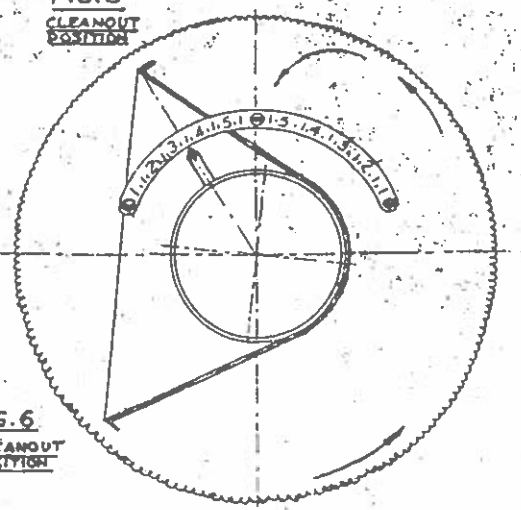

FIG. 6
CLEANOUT POSITION

CENTER & LOWER

FIG. 1. SHOWS UPPER OR SPLITTING CYLINDER TROUGH IN SEPARATING POSITION. CLEANING RANGE 1 TO 5.

FIG. 2. SHOWS UPPER OR SPLITTING CYLINDER TROUGH IN DUMPING POSITION.

FIG. 3. SHOWS UPPER OR SPLITTING CYLINDER TROUGH IN POSITION FOR CLEANING OUT.

FIG. 4. SHOWS CENTER AND LOWER CYLINDER TROUGH IN SEPARATING POSITION. CLEANING RANGE 1 TO 5.

FIG. 5. SHOWS CENTER AND LOWER CYLINDER TROUGHS IN DUMPING POSITION.

FIG. 6. SHOWS CENTER AND LOWER CYLINDER TROUGHS IN POSITION FOR CLEANING OUT MACHINE.

NOTE: ALL ADJUSTMENTS AT DISCHARGE END OF CYLINDERS.