PACLINE™

OVERHEAD CONVEYORS

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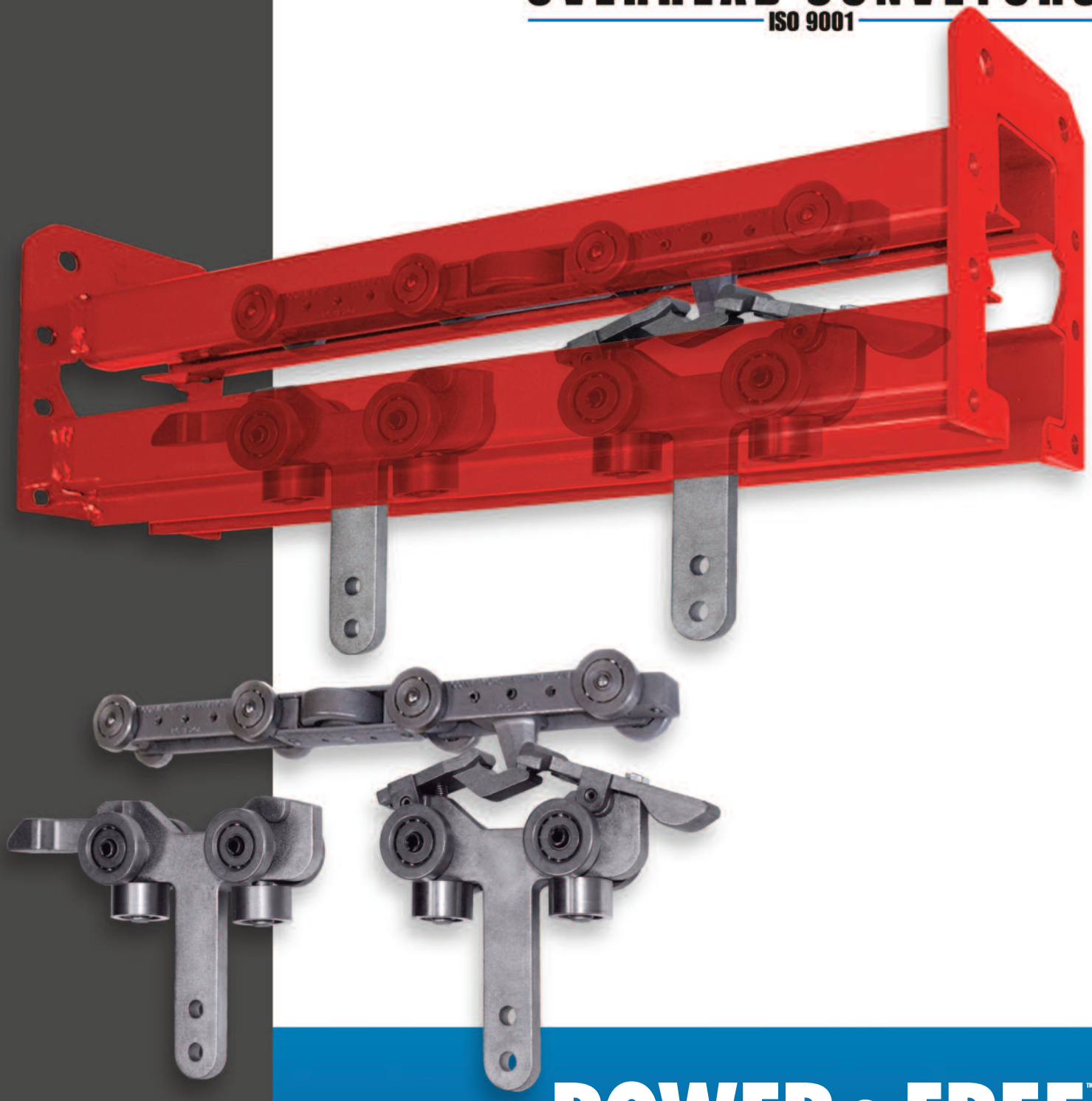

POWER & FREE™

MODEL S-310 & S-320 Conveyors

Installation and Maintenance Manual

PACLINE™
OVERHEAD CONVEYORS
WWW.PACLINE.COM

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1.1 SITE PREPARATION

All systems have been engineered to suit your specific application. A full set of drawings should have been provided. Please ensure that you adhere to these drawings. If you have any concerns, please contact your design engineer. If your system was designed by Pacline, please call toll-free 1-800-955-8860 and talk directly to our engineering department.

Prior to proceeding, check the following:

1. A full set of drawings is available.
2. Verify all parts and components with the packing list.
3. There are no damaged components from shipping.
4. All necessary services are available.
5. All tools and lifting equipment are available.

Proceed in the following order:

1. Marking Out the Floor:

With the conveyor layout drawing, mark out the conveyor path on the floor with chalk, checking clearance for load carriers and noting any obstructions which may need to be addressed.

a) Mark at least three reference axes which should be defined on the layout drawing.

b) For each floor support, sight the levels from base reference 0.00.

2. Erecting Floor Supports:

a) Supports must be level throughout. Sight the levels from base reference 0.00 and ascertain the shims required under each floor support.

b) Each floor support is complete and anchored to the floor.

c) Each bolted joint is tight and secure.

3. Installing the Track

a) Follow the route marked on the layout drawing, using track hanger clamps to support the track. The track can be hung from intermediate yokes field-welded to the track or from clamps, which attach to the power track. First put in support hangers at the pre-determined span, and a chalk line can be used to ensure straightness. Check the track with a level in both directions. Floor to track height elevations should also be regularly checked. Levelness is critical to the freeline track when accumulating trolleys.

b) Verify that the track section of a minimum one chain pitch length (8" or 20.32 cm) separates all opposing "S" horizontal curves in opposite directions and separates a horizontal curve from a vertical curve.

c) Standard track sections and curves supplied are carefully cut with true and square ends, but it will be necessary to site cut straight lengths of track to finish off each "leg". A small powered saw gives the best results, but a hacksaw may be used if the track is first scribed all round, using a square. ***All burrs, particularly on the inside faces, must be removed***. The section through a track curve may differ slightly from that of the straight track, and when making a "track to curve" connection, make sure that the bottom flanges, and the flange towards the "inside" of the curve do not form a "step". A small chamfer filed on the inside edges will help in producing a cleaner joint. The slot on horizontal curves is machined approximately 5/64" (2 mm) off the centre line towards the inside radius of the curve. A transition section

of track re-aligning the slot back to the centerline of the horizontal curve is welded at either end of each bend. This transition piece of straight track is at least 8" (20.32 cm) long (1 chain pitch length), which must be fitted between each horizontal curve, which changes in direction. This is also desirable between horizontal and vertical curves. This rule of thumb should be extended to the load bar length in the power and free track sections, so as to insure the smooth transition of the carrier through the layout, without "de-dogging" or jamming the free trolley.

d) The conveyor track is assembled with bolted style end plates, which is quicker and cleaner in appearance than welded track joints. No special welding technique is necessary when electric arc welding the track bolted end plates to shortened or cut track sections. Care must be taken not to burn through the track, or leave any protrusions on the inside surface which would not allow free passage of the conveyor chain and free trolleys. Care must also be taken that the inside faces of the track walls and bolted end plates are square with the track, before welding. 12 gauge welding rods are recommended. The end plate or yoke should first be tack welded and checked before final welding. For conformity and ease of installation PACLINE recommends that all of the track sections joints be assembled with bolted style end plates

e) All systems must have an inspection section fitted in the track layout. Longer systems should have one installed every 200 feet (61 m) throughout the system. The removable track side of this unit allows for chain examination, maintenance and fitting or removal of the chain, or for manual application of oil if an automatic lubricator is not used. It is recommended that the Maintenance Unit section be positioned as near to a track support as possible.

f) Where changes in conveyor elevation occur, the length of the inclined section of straight track (tight track bite) can be established by laying out the track components with a chalk line on the floor. (The layout drawing should have the elevation plan shown.)

g) Where possible, it is better to bolt these inclined sections together with their vertical curves, on the floor, then lift the complete assembly into position.

h) It is desirable to support at both the top and bottom of inclined sections in addition to regular support span requirements.

i) In the case of high temperature oven conveyors, a track expansion joint at the entrance and exit of the oven is essential. The track inside the oven should expand at the same rate as the oven since they are both constructed from steel. If the track is rigidly attached to the oven steel and cannot freely expand with the oven, then expansion joints will be required inside the oven.

j) ***When the track installation is complete, a cloth should be pulled through the complete layout. Remove and replace with a clean cloth at each inspection section.***

4. Pre-Assemble Components: Drive Unit, Chain, Take-Up Unit, Track and Lubricators:

a) In the correct orientation to the layout drawing.

b) Dry fit to the layout by laying components on the floor.

c) When possible, pre-assemble sections which are manageable to lift into position.

1.2 COMPONENT INSTALLATION

IMPORTANT:

- Ensure that each component is fully secured before mounting the next.
- Ensure that each component is level with the chain track.

Install in the following order:

1. Install the Drive Unit

a) The Drive Unit should be the first item to be installed. Four vertical hangers should rigidly support the Drive. If these hangers are long, they should be cross-braced with diagonal bracings taken outwards in both directions, particularly in direction of travel, to absorb chain-pull reaction. Make sure that the Drive Unit is the right way for correct direction of chain travel (indicated by an arrow), and also ensure that the unit is level in both directions.

b) Drive Units should always be located at the highest point above floor level in the system in the direction of travel. In a monoplane system if there is a concentrated complex of track curves, the Drive Unit should be positioned after these and not before. Drive Units should be positioned to always pull and never push.

c) Drive Units should always have a maintenance section fitted after it to allow access to "slack" chain.

d) Drive Units should be positioned a sufficient distance from a vertical or horizontal curve.

e) Drive Units should also be accessible for service and maintenance.

f) It is preferable to have a long straight run of track leading into the Drive Unit but not at the expense of the above.

g) Never locate the Drive Unit in or near an oven, spray booth, degreasing tank, or pretreatment plant, etc.

h) When installing a multiple Drive system, the relative position of each Drive to the other(s) is extremely important. The system layout should be reviewed by PACLINE engineering to do a "point-to-point" chain pull analysis in conjunction with the electrical load sharing control equipment.

i) The Power and Free chain is not reversible. The pusher dogs travel in one direction and the chain pin blocks pivot up for lubrication.

j) When installing **Speed Reducers**, make sure to use rigid mounting to maintain alignment. This is recommended to minimize bearing and gear wear caused by misalignment. Mounting of reducers on bases, subject to vibration, should be avoided.
NOTE: Nord gear motors are pre-lube sealed units. Remove shipping plug from breather hole and install air vent cap prior to operating. It may take many hours of running, under full load, for the gears to reach their highest efficiency. The gear may, if necessary, be put to work under full load immediately. However, it is better for the ultimate life of the gear to be run under gradually increasing loads (reaching the full load after about 20 to 40 hours). Reasonable precautions should be taken to avoid overloads in the early stage of running. Temperature rise on the initial run will be higher than the temperature eventually reached after the gear is fully run-in.

k) ***If for any reason the Drive has to be positioned at low level, or if in doubt please consult with Pacline engineering.***

2. Install the Take-Up Unit

a) Install the Take-Up Unit immediately **after** the Drive Unit keeping it as near as possible on the discharge side at the nearest low-level point of the circuit.

b) Suspend the Take-Up Unit from four hangers (six if the unit is 8 feet (2.4384 m) or wider). This should be cross-braced in a similar manner to the Drive Unit.

c) Avoid curves between the Drive Unit and Take-Up Unit. If absolutely necessary, a small variance from this is acceptable, but slightly more tension should be applied to the Take-Up Unit to compensate for this.

d) Try to avoid locating the Take-Up Unit immediately prior to a decline if loads to be conveyed are heavy. This may cause the Take-Up Unit to collapse allowing the conveyor chain to become slack. If this condition cannot be avoided, the Take-Up Unit should be of the self-locking type to prevent collapsing.

e) Never locate the Take-Up Unit in or near ovens, spray booths, degreasing tanks, pre-treatment plants etc.

f) With multiple Drive systems, it is common to have one chain Take-Up Unit immediately following each Drive. The Drive Unit designated the "master" unit would normally be followed by a standard spring loaded Take-Up Unit or perhaps an air type Take-Up Unit if length warrants this, and the slave Drive(s) would be followed by a manual screw type Take-Up Unit without springs or air. As with multiple Drives, please consult Pacline engineering for a system layout review.

g) Never locate the Take-Up Unit at high level, with the Drive at low level.

3. Secure Hangers

a) The support hangers should be clamped to the existing building structure (if possible). When it is determined that the conveyor track is correctly positioned and that it is straight and level in both directions then the hangers can be welded or clamped permanently in position. (Note: headers and hangers should be clamped to the building steel and not welded. Clamped connections are quicker and does not alter the strength of the existing building steel).

b) Although the track hanger clamps should securely grip the track when bolted together, it is advisable to put a small tack weld on one half, to prevent it moving.

4. Install Sway Bracing for Hangers

a) Sway bracing should then be fitted to prevent sway across the line of conveyor track. It is usually sufficient to cross-brace alternative hangers one way and the remainder in the other direction. The bracing will increase the rigidity of the track.

5. Insert the Chain and Lubricate

a) Ensure that the inside of track has been cleaned throughly, then insert a small piece of hand-lubricated chain into the track at an inspection section and manually pull this chain sample around the entire system as a final check for internal obstructions. Repair or replace any bad track joints.

b) The conveyor chain is hand packed in polythene bags. ***It is essential that cleanliness is maintained while fitting the chain into the conveyor track.*** The area can be kept clean with a drop sheet of industrial paper, plastic or cloth laid on the floor.

c) Each bag contains a link and four spare rivets. Join two or more lengths together using the connecting link, taking care that the bearing rivet is "peened" over sufficiently to stop the inner race of the bearing from rotating and also that the block rivets are well "peened" over so that they do not rotate in the side links but are consistent with the factory assembled blocks, to pivot freely on the rivet. A ball peen hammer and steel block are all that is necessary for hand riveting the chain connecting link.

d) Prior to insertion, the chain must be hand lubricated (unless it has been pre-lubricated by Pacline for an extra long run). If the conveyor chain is to be hand lubricated, this can be brush-applied at the time the chain is being fitted. Lubrication holes on the chain are on the top.

e) The flat face on the pusher is the leading edge (direction of chain flow).

f) During chain assembly, the bottom plates will need to be removed from the Drive Unit, so that the conveyor chain can mesh with the drive "dogs". The front face of the drive dogs should locate behind the radiused chain block, and the conveyor drive should not be run until the bottom plates have been re-fitted and tightly secured. When refitting ensure that there is no "step" at points where plates meet track.

g) Feed the chain into the track via an Maintenance Unit section or a Power and Free maintenance track unit, or at the Drive Unit with the bottom plates removed. The chain should be inserted in the direction of conveyor travel and pulled round with a rope tied to the first pendant, adding further lengths as you go. Several hundred feet can often be pulled around quite easily, but in very long systems, it may be necessary to move to another inspection section to complete the chain installation.

h) When making the last chain connection, the Take-Up Unit should be fully "collapsed" and as much slack chain as possible pulled out before connecting the two ends.

i) In most cases it will be necessary to cut the last length of chain and care should be taken that the last link is a vertical link (the same as either end of a standard 10' (3.048 m) length) to suit the connector which is a horizontal link.

j) **Make an initial adjustment of chain tension** to prevent the chain from "bunching" in the track. Take initial slack out of the chain by means of the spring loaded adjusting rods on the Take-Up Unit. 1/16" (1.5875 mm) gap between the spring coils represents approximately 200 lbs (90.7 kg) chain tension. 1/8" (3.175 mm) equals 100 lbs. (45.4 kg), etc.

h) The chain should be firm at all points around the system but not excessively tight. Verify tension downstream from the Drive Unit and in the low elevations of the layout.

j) Wind by hand, the motor fan (ensuring correct direction) and see if the conveyor chain moves freely in the track.

k) Check tightness of all nuts and bolts for the entire system.

6. Filling the Lubricators

a) Automatic shot type lubricators are recommended on systems that have high temperature ovens, or if there are degreasing and or pre-treatment washers, or if the system is long in length.

The lubricator is mounted on a short section of track. The lubricator should ideally be positioned at a point where the chain will be at its coolest and, if a second unit is fitted, this should be located immediately after a de-greasing or pre-treatment area.

The lubricator should be wired into the conveyor starter so that it is in operation at all times when the conveyor is running. For non-oven systems this is still recommended, although an isolator switch can be inserted between the lubricator and starter so that the lubricator can be manually switched on and off independently.

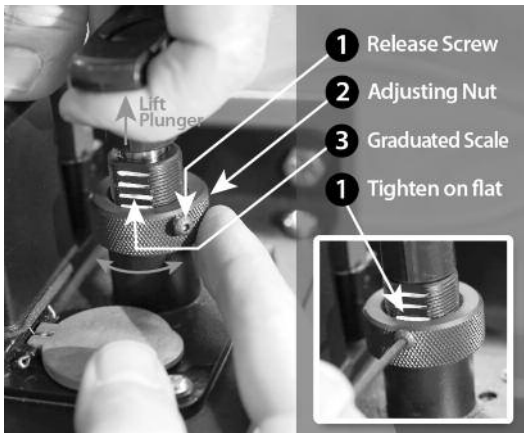
b) Reservoir capacity – 2.64 US gallons (10 litres). See Lubrication Information Guide on page 48.

LUBRICATOR UNIT (BRUSH TYPE)

a) The standard cycle time of the lubricator pump is two minutes. The volume of oil delivered is adjustable from 0.845 US fl oz (0.25 ml) per cycle. See below for adjustment.

b) **Procedure to Adust Pump Output**
First release screw (1) until the knurled adjusting nut turns freely. Adjust the nut (2) for the required volume output. The shaft (3) is graduated in 0.5 mil stops to assist in setting. After adjustment, the screw (1) must be carefully re-tightened. Do not over tighten.

NOTE: Before tightening the screw (1) ensure that the adjuster (2) is positioned so that the screw (1) is always tightened towards the flat graduated section of the shaft.



LUBRICATOR BRUSH UNIT (PULSED SHOT)

a) Fill the reservoir with lubricant. See Chain Lubrication Chart on page 49.

b) Refer to your PM Manual for lubricator information.

Priming the Pump:

a) Adjust the position of the valve so that the actuating roller is fully opened by contact with the conveyor load wheel but is not forced. The maximum travel of the wheel is 3/16" (.1875 mm).

b) The ram of the oil pump moves forward as the valve opens and back as it closes. At each actuation a slight 'knock' will be heard and felt at the reservoir as the ram contacts the end of the metering screw.

c) After a few cycles the oil should be observed in the translucent hose leading from the top of the pump block to the base of the distributor nozzles. This column of oil should move forward about 3/8"(0.9525 cm) each time the valve operates until it enters the base of the nozzles.

d) Continue to operate the valve until lubricant is seen to be ejecting from the oiler heads on to the brush on the chain.

Final Adjustments:

a) Once the conveyor is in service the amount of oil applied should be progressively reduced until the chain is running with its components just moist with oil but not dripping off.

b) Conveyor systems operating in high temperature environments may require the constant application of a suitable extreme-temperature lubricant, while those working in less arduous conditions may be lubricated intermittently – preferably by incorporating a solenoid valve and timer programmed into the lubricator.

7. Setting the Torque Limiter

After the conveyor has been installed and the power has been connected to the Drive motor, it is necessary to properly set the Drive Torque Limiter. The procedure outlined below is recommended.

Model 500 (Inline Drive) Model 700 (Sprocket Drive)

a) Loosen three cap screws until points are below surface of adjusting nut.

b) Loosen adjusting nut and re-tighten to finger tight condition. Make certain that the disc springs are properly centered in the pilot plate located beneath the adjusting nut.

c) Tighten set screw in adjusting nut so that it seats in either a groove or flat provided on Torque Limiter body – not on the body threads.

d) Tighten each of the three cap screws finger tight.

e) Alternately tighten cap screws half a turn and start conveyor. Slippage should occur.

f) Allow Drive to run for about 10 minutes to "break-in" the friction discs.

g) Stop motor. Loosen cap screws. Now loosen adjusting nut 1.5 turns. Repeat "c" and "d" above. Alternately tighten cap screws half turn until heads bottom out.

h) Start conveyor. If slippage occurs repeat "g" but tighten adjusting nut 1/4 turn. Continue this procedure until slippage stops.

i) Start loading conveyor. If slippage occurs repeat "h". Continue until conveyor is fully loaded.

j) Making an "alignment mark", one placed on the sprocket and the other on the friction disc and backup plate, can be used to check slippage. After stopping the Drive Unit, if the marks are not aligned, slippage has occurred. Repeat "h".

k) Repeat until no slippage is evident. Torque Limiter is now properly adjusted.

8. Pre Start-Up Check List

a) If the system is equipped with a lubricator, fill the reservoir. For the correct lubricant to use, refer to the Chain Lubrication Chart on page 49.

b) Check electrical connections to the motor.

c) Adjust the Torque Limiter to its lowest setting. See #7 - Setting the Torque Limiter in previous section.

9. Test Run

a) **Set conveyor to its lowest speed** by adjusting the VFD down in frequency or on remote control panel, if electrical variable speed fitted through the panel.

b) **Press starter button** and conveyor should run. If the motor is running and the chain does not move, see Torque Limiter Slippage on page 53.

c) Carry out several trial runs with the chain only.

d) Allow the conveyor to run for at least one hour, or in the case of long slow moving system, at least one complete circulation of the system before attempting to install carriers.

e) Install two consecutive carriers to the conveyor. At the slowest speed, physically follow these around the conveyor path to ensure that they clear each other around horizontal curves and inclines and that they also clear any possible obstructions.

f) After clearance has been established, install remaining carriers a few at a time. Then place loads on carriers for a full load test while watching movement along the layout and checking clearances on curves.

g) It may be necessary to adjust the Torque Limiter again during this test. See #7 - Set the Torque Limiter on page 7.

h) After a relatively short period of running, it may also be necessary to adjust the Take-Up Unit to compensate for chain wear-in or "stretch". See 2.12 in the Maintenance Section on page 10.

i) Speed adjustment via a VFD range of 5:1 can get obtained by electrical speed control.

j) If this system runs under extreme temperatures, make a trial run under these conditions and adjust chain as necessary.

10. Initial Run-In/Commissioning Period

a) After approximately 8 hours, the initial run-in period will be complete. Larger systems will take longer.

b) Do another chain inspection, adjust chain tension, top up lubricator(s), check all connections of the entire system and adjust the Torque Limiter if needed.

CAUTION

If your system runs in extreme conditions, i.e. high temperature ovens, spray units, degreasing or any other environments containing contaminants, the chain could become gummy and dirty. The chain should be pulled out of the system and thoroughly cleaned with solvent. It should be given a light coating of oil (same as in the conveyor lubricator) before reinstalling into the system. Do not allow the chain to be dragged around the floor while being pulled out of the system or re-installed. It is good practice to clean out the track by pulling through first a damp solvent saturated cloth, and then a dry rag before re-installing the chain. Blow out the track with a high-pressure air jet if necessary.

If the chain is not sufficiently dirty to warrant removal and cleaning, it should still be re-lubricated. Temporarily tighten the Torque Limiter so the system may be operated while it is being re-lubricated. Restore the Torque Limiter to its original setting after the chain is running freely again.

If the system is equipped with a brush type lubricator fill the reservoir temporarily, increase the oil feed. Make sure the solenoid is energized, and run the system for several chain revolutions, until oil begins to visually appear on the pusher dogs. Re-adjust the lubricator with recommended oil for continuous operation. See Chain Lubrication Chart on page 49.

c) Check the lubrication of the chain. It should be moist, or even wet, with oil.

d) Verify the chain tension once again, also oil levels, connections, and the adjustment of the Torque Limiter by referring to the Maintenance Section 2.25 Torque Limiter on page 12.

CAUTION

Atmospheric conditions, moisture, lubricants, and surface corrosion affect the operating characteristics and capacity of Torque Limiters. The life of the friction facings on the Torque Limiter may be greatly reduced by rust on the center plate. *Due to this, regular maintenance of the Torque Limiter is urged.* See Maintenance Section 2.25 Torque Limiter on page 12.

Modifications

Please consult PACLINE engineering to review the system application and layout to ensure the Pacline equipment will satisfy the system requirements.

Pacline engineering will review the entire system, including carrier design, layout, speed, zone-to-zone controls and possible layout bottleneck problems for starving or chocking of carrier traffic through the zones.

It is not recommended to vary the chain speed while in operation as this can adversely affect the timing issues of carriers through the stops and switches, causing traffic flow issues (starving or choking).

Do not modify the layout, speed, carriers and distribution of carriers, volume or bulk of loads carried, without consulting with PACLINE engineering.

MAINTENANCE DOCUMENTATION

2.1 CHAIN

2.11 Chain Examination and Lubrication

For proper functioning the chain must be kept well oiled. Lubrication will be carried out in accordance with the following series of steps. See Chain Lubrication Chart on page 49.

DAILY

- Check the lubrication of the chain it should be moist with oil. If the chain has been allowed to dry out or become gummy the friction in the system will increase to the point of adding excessive chain pull which adds to wear on the system.

AT 200 HOURS

- Examine load carrying vertical bearings for wear.
- Examine horizontal side guiding bearings for wear.

AT 600 HOURS

- With an oil can or brush, lightly oil the sintered blocks and bearing rivets with the same lubricant in the conveyor lubricator.

AT 2000 HOURS

- Re-lube the free trolley load carrying bearings. The frequency of this operation can be considerably reduced or increased by the nature of the work conditions and atmospheric environment.

2.12 Chain Tension

AT 200 HOURS

- Check chain tension by pushing chain upwards on a straight section of track. Correctly tensioned chain should show some resistance. With the conveyor running, inspect the entire layout for signs of the chain 'bunching up' inside the track, indicating insufficient tension. This is usually most evident immediately downstream of the Drive Unit and at the lowest elevation of the circuit.
- **LIMIT OF TENSIONING:** Maximum play per 8"(20.32 cm) chain pitch = .04" (1.016 mm) (1/2 %)
- For Take-Up adjustment see 2.4 Take-Up and Expansion Units on page 12.

2.2 DRIVE UNITS

2.21 Inline Caterpillar Drive - Basic In-Line Drive Frame

ANNUALLY

- Check head shaft bearing lubrication. See Synthetic Multi-Purpose Grease information on page 49.

  The motor mounting base, slide ways and tensioning screws should be lubricated to avoid seizing due to rusting.

- Check Drive chain hold down rails.

  LUBRICATION -Apply grease with a soft brush to all faces of the hardened guide strips. WEAR - If the hold down rails show wear in excess of 1/16 " (1.5875 mm) these must be replaced.
- Check Drive chain assembly.

  LUBRICATION - Apply grease with a soft brush to the inside of the chain, and to the leading edge of the drive dogs. Also check the tightness of the drive dogs.

  Correct chain tension is maintained by adjusting the idler sprocket tension screws on each side of the Drive body.
- Check Drive Tail sprockets.

  WEAR - If play between sprocket and Drive or tension shaft is in excess of .04" (.04 mm) the oilite bushing must be replaced.
- Check free track sections for excessive wear.

Gearmotor Unit

AT 100 HOURS

- Check gearbox shaft seals.
- Reducer is sealed for life units.

2.22 Drive Unit - Basic Wheel Turn Drive

ANNUALLY

- Check head shaft bearing lubrication. See Synthetic Multi-Purpose Grease information on page 49.
- Check tensioner for wear on the nylon guide (reducer to head shaft driving chain.)
- Check for play in main shaft.
- Inspect thrust washer and bushings for wear.
- Inspect sprocket and profile ring for wear and play.
- Tighten all hardware.
- Grease rim of sprockets lightly. See Synthetic Multi-Purpose Grease information on page 49.

Gearmotor Unit

AT 100 HOURS

- Check gearbox shaft seals.
- Reducer is sealed for life units.

2.23 Drive Unit - Transmission Chain

AT 200 HOURS

- Check the tightness of the transmission chain between gearbox output shaft and Drive head shaft.

AT 2000 HOURS

- Apply oil with a soft brush to the inside of the chain. See Chain Lubrication Chart on page 49.

ANNUALLY

- Maintain in-line Drive Unit chain tension by sliding the gearmotor unit on the adjustable frame. With hand pressure, the chain slack should not exceed 1/8" (3.175 mm) and 3/16" (4.7625 mm).

ANNUALLY

- Wheel turn Drive Unit chain tension is maintained by the chain tensioner. Check for wear on the nylon guide, replace if necessary.

2.24 Drive Unit - Torque Limiter

AT 200 HOURS - 600 HOURS - 1000 HOURS - 2000 HOURS AND THEN ANNUALLY

- Inspect Torque Limiter for presence of oil, grease, moisture or corrosion on the driving surfaces.
- Check for proper setting of spring load. Clean and adjust as required, friction facings and bushings are the only parts that should normally require replacement. See Trouble Shooting Guide on page 50.

2.3 TAKE-UP AND EXPANSION UNITS

AT 200 HOURS - ADJUSTMENT OF TAKE-UP

- While the conveyor is running, proceed to turn evenly each of the nuts on the threaded rods, positioned on either side of the Take-Up Unit. Adjust first one section and then the other; continue in this way until the required tension is reached. *Any other method may result in deformation adversely affecting the proper function of the system.*
- When the full extent of tension adjustment is reached, adjustment may be restored to the initial state by removing one or two links from the chain.
  NOTE: Timing issues may happen if there is an odd pitch pusher dog.

AT 200 HOURS - 600 HOURS - 1000 HOURS - 2000 HOURS AND THEN ANNUALLY

- **C**heck the sliding elements. They must be kept lubricated in order to prevent any seizing up with rust.

  Lubricate threaded rod adjusters, if fitted. If components are in an area of destructive atmospheric conditions, i.e. heat, solvent etc., special attention must be paid to these components.

2.4 TRACK SECTIONS

ANNUALLY

- Visually inspect Track Sections, paying special attention to the horizonal and vertical inside curves, plus the Take-Up track included in the layout. (Any areas subject to destructive atmospheric conditions, i.e. heat, solvents, etc., must have special attention paid to them to maintain track integrity).

2.5 AIR STOP UNITS

BI-ANNUALLY

- Check seals on air cylinder.
- Check tightness of all hardware.
- Check that stop operates on signals. (I/O control logic.)
- Check free blade movement.
- Check blade for signs of wear, replace if necessary.
- Check blade height as it's position is critical to free trolley disengagement.

ANNUALLY

- Grease stop blade cam face. See Synthetic Multi-Purpose Grease information on page 49.
- Grease pivot points.
- Grease running face of tracks.

2.6 TRACK DIVERT SWITCH

ANNUALLY

- Check seals on air cylinder.
- Check tightness of all hardware.
- Check that track divert switch operates on signals. (I/O control logic.)
- Check free movement of tongue.
- Check alignment of tongue.
- Grease inner faces of free track. See Synthetic Multi-Purpose Grease information on page 49.
- Grease running face of track tongue.
- Grease running face of track.

2.7 LUBRICATION UNITS

Brush Type

DAILY

- Check level of oil in reservoir and replenish as necessary. Use correct lubricant. See Chain Lubrication Chart on page 49.
- Check conditions of applicator bushes and replace if worn.

Pulsed Shot

DAILY

- Check securing clamps and/or bolts. Examine all air and oil connections for leaks.
- Check tightness and alignment of the oil delivery pipes.
  Note: All lubrication dispensing nozzles to be positioned to apply the lubricant in the correct locations when actuated by the chain proximity switch on the lubricator.

Correct settings of the jets are as follows:

a) Load wheels (either side of track). Jets aligned on ball races of wheels.

b) Horizontal guide wheel: one jet is mounted above the track on the nozzle support casing. When the valve opens, the jet should be pointed at the horizontal guidewheel.

- Operate the lubricator and see that the oil 'shots' are striking the appropriate points as set out above, and that all the nozzles are unobstructed. Examine the conveyor chain and confirm that it is correctly lubricated. All wheels and bearing shafts should be free of corrosion and lightly coated with oil, without "drip-off".
- If either the actuating valve and the piston rod of the pump cylinder are not working, see the Trouble Shooting Guide on page 50.

2.8 FREE TROLLEYS

AT 500 HOURS

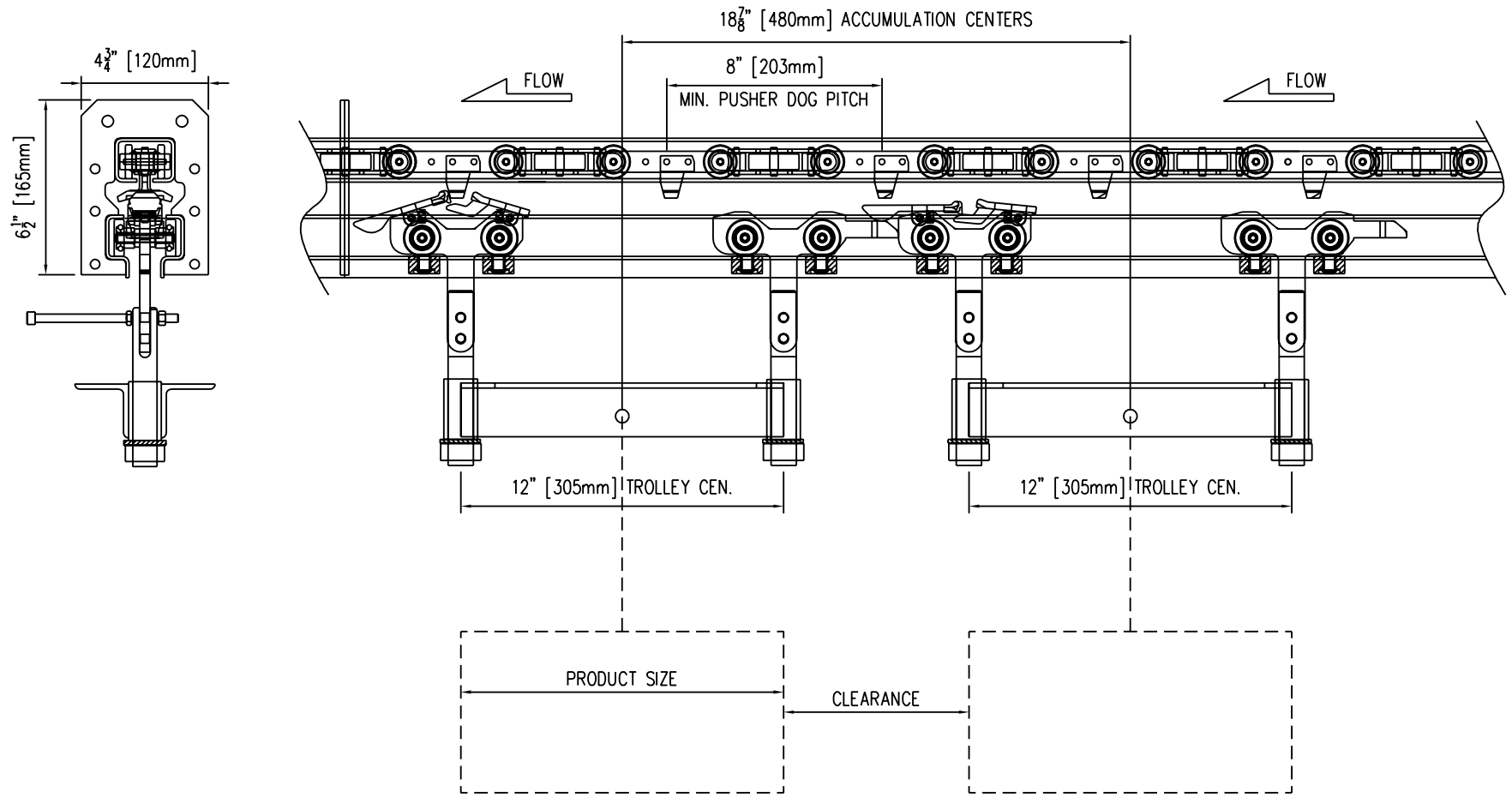
- Check free rotation of load carrying bearings.
- Check free rotation of side guide wheels.
- Check free movement of front and rear trolley flappers.
- Check trolley body for alignment.
- Check tightness of rivets.
- Check tightness of springs.
- Grease all bearings and pivots. See Lubrication Information Guide on page 48.
- Grease driving face of front flapper.
- Grease disengagement cam on rear trolley.

2.9 RECOMMENDED CONVEYOR SPARE PARTS

Part No.	Description	Drawing #
CH31-200	**CONVEYOR CHAIN**	201
CH31-200	SYSTEM 31 CHAIN X 10'0" (3.048 M) LG	
CL31-227	SYSTEM 31 CONNECTING LINK	
DG35-150	PUSHER DOG	
LR310-600	**LUBRICATOR UNIT (BRUSH TYPE)**	204
LB-0144	LUBRICATOR BRUSH	
FU-0145	FLOW UNIT IM28	
LR-0149	LUBRICATOR COIL	
PL-217	HIGH TEMPERATURE LUBRICANT	
PL-30	LOW TEMPERATURE LUBRICANT	
SP310-130	**STOP UNIT**	221
BE35-044	LHD STOP BLADE	
BE35-045	RHD STOP BLADE	
CY-1534	SMC CYLINDER COMPLETE	
ALL TYPES	**TRACK DIVERT SWITCH**	212
CY-1534	SMC 25mm BORE X 10mm STROKE	
FB-1504	E.T.P. BUSH	
WD310-932	L/H SWITCH TONGUE	
WD310-917	R/H SWITCH TONGUE	
BG-1503	GLACIER FLANGED BUSH	
BG-1502	GLACIER PLAIN BUSH	
DR35-371	**WHEEL TURN DRIVE UNIT**	202
NORD	GEARED MOTOR UNIT 1SI63	
SP-1473	19T ½ " (1.27 cm) PITCH DUPLEX PINION	
SP-1472	76T ½ " (1.27 cm) PITCH DUPLEX PINION	
SP-1474	TAPER-LOC BUSH 32 DIA	
SP-1475	TAPER-LOC BUSH 40 DIA	
CH-1010	½ " (1.27 cm) PITCH DUPLEX TRANSMISSION CHAIN 5.5	
CH-1011	½ " (1.27 cm) PITCH DUPLEX TRANSMISSION CONNECTING LINK	
CT-1470	ROSTA CHAIN TENSIONER	
CR-0214	TORQUE LIMITER BUSH	
TL-0067	TORQUE LIMITER 700 MZ	
DR31-3005	**INLINE DRIVE ASSEMBLY**	232
NORD	GEARED MOTOR UNIT 1SI63	
MC31-376	19T x ½" (1.27 cm) P SPROCKET	
PY-0046	100.PCD BI-LOC PULLEY REF182A0100	
PY-1331	132.PCD Bi-Loc PULLEY REF182A0132	
VB-0982	VEE BELT SPA 1300	
TL-0033	TORQUE LIMIMITER 500 M1 35B 10x8 TPR KEY	
CR-0212	500 M1 T/L CTR BUSH 0.480" (1.2192 cm) LG	
MC30-305	IDLER SPROCKET SPINDLE	230
WD31-338	CHAIN GUIDE C/W HARDENED RAIL	
WD31-310	CHAIN GUIDE	
BG-0002	ASAHI/FAB BEARING UCF 207	
MC31-3003	DRIVE DOG	
CH-0279	CHAIN 1" (2.54 cm) PITCH X 7 PITCHES PER DOG	
MC30-306	HEAD SHAFT	

2.10 PACLINE POWER & FREE (S-310) COMPONENT LIST

Part No.	Description	Drawing #
	GENERAL ARRANGEMENTS	
	S310 POWER & FREE – TRACK & CHAIN ARRANGEMENTS	200
TS310	S310 POWER & FREE – TRACK SWITCH ARRANGEMENTS	212
TR310	S310 POWER & FREE – TROLLEY ARRANGEMENTS	214
	TRACK AND CHAIN	
TK310-102	POWER & FREE STRAIGHT TRACK	218
CH310-200	CHAIN	201
MU310-140	MAINTENANCE UNIT	213
PG310-136	POWER & FREE BOLTED END PLATE (BRIDGE PLATE)	224
	VERTICAL CURVES	
VB310-CHART	24" RADIUS 30 DEGREE VERTICAL CURVE	220
TK310-164	SQUEEZE DOWN TRACK - INCLINE "TIGHT"	222
WD310-191	TRANSITION PIECE	223
	HORIZONTAL CURVES	
HB310-CHART	HORIZONTAL CURVES	207
	WHEEL TURNS	
WT35-8	8 TOOTH WHEELTURN	208
WT35-12	12 TOOTH WHEELTURN	209
WT35-14	14 TOOTH WHEELTURN	210
WT35-16	16 TOOTH WHEELTURN	211
	TAKE-UP ASSEMBLY (all 180 degree)	
TU310-508	600 RADIUS TAKE-UP ASSEMBLY – Complete	205
TS310-530	TENSION SLIDES	206
	DRIVE UNIT	
DR35-354-1	WHEEL TURN DRIVE (Motor Extra)	202
DR31-348	INLINE DRIVE UNIT (Motor Extra)	203
WD31-317	BASIC INLINE DRIVE UNIT (Motor Extra)	230/230A
DR31-3005	INLINE FIXED SPEED DRIVE UNIT (Motor Extra)	232/232A
	LUBRICATOR	
LR310-600	BRUSH LUBRICATOR WITH PUMP	204
	TROLLEYS	
TR310-XXX	SYSTEM 310 TROLLEYS	214
TR310	FREE TROLLEY H4 STD EXTENSION – 175mm	215
TR310-456	FREE TROLLEY H4 LONGER EXTENSION – 185mm	216
TR310	HJORT TROLLEY	219
LB310-100	LOAD BAR	217
	SWITCHES & STOPS	
TS310-XXXX	TRACK DIVERT SWITCHES	212
SP310-130	STOP UNIT - DOUBLE BLADE	221



TROLLEY & ACCUMULATION CENTERS SHOWN FOR REFERENCE ONLY
ACTUAL CENTERS WILL HAVE TO SUIT PRODUCT SIZE PLUS CLEARANCE

ITEM	PART NO.	DESCRIPTION	DWG. REF. NO.

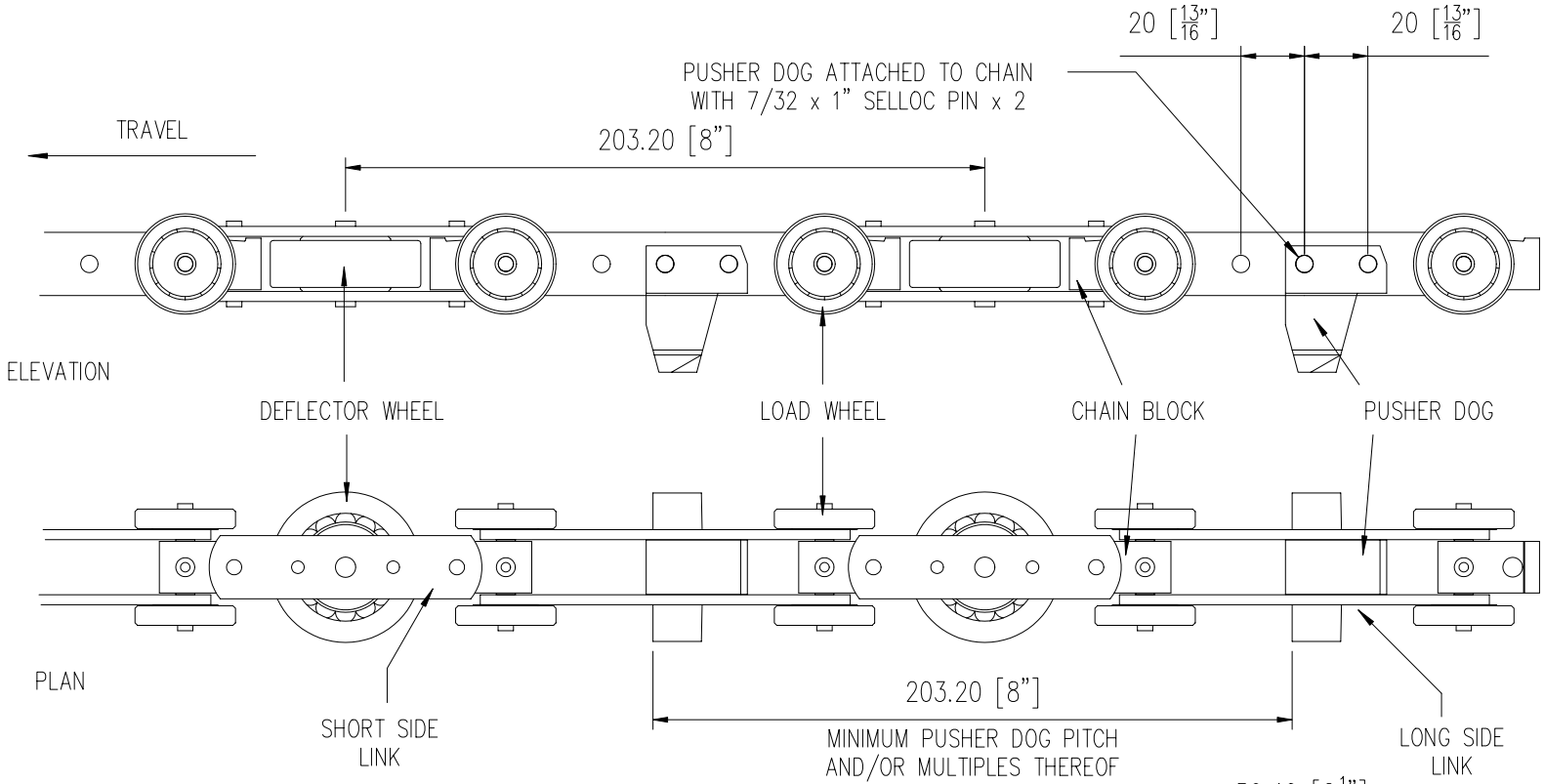
TORONTO **PACLINE** BUFFALO
OVERHEAD CONVEYORS
www.pacline.com

S310 POWER & FREE - ENGINEERING MANUAL

REV	DATE	DESCRIPTION	REV'D BY
B	FEB-2017	UPDATED ENGINEERING MANUAL	A.B.
A	07/01	INITIAL RELEASE	D.S.

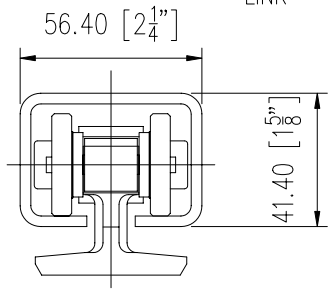
DRAWN BY	D.S.
DATE	JULY, 2001
APPR'D BY	
SCALE	NTS

DRAWING NAME: GENERAL ACCUMULATED ARRANGEMENT
PART NUMBER:
DRAWING NUMBER: 200
REV B



NOTE ! WHEN ASSEMBLING & INSERTING CHAIN , ENSURE OIL HOLES IN BLOCKS FACE UPWARDS

VIEW SHOWING CHAIN IN POWER TRACK



ITEM	PART NO.	DESCRIPTION	DWG. REF. NO.

TORONTO **PACLINE** OVERHEAD CONVEYORS BUFFALO
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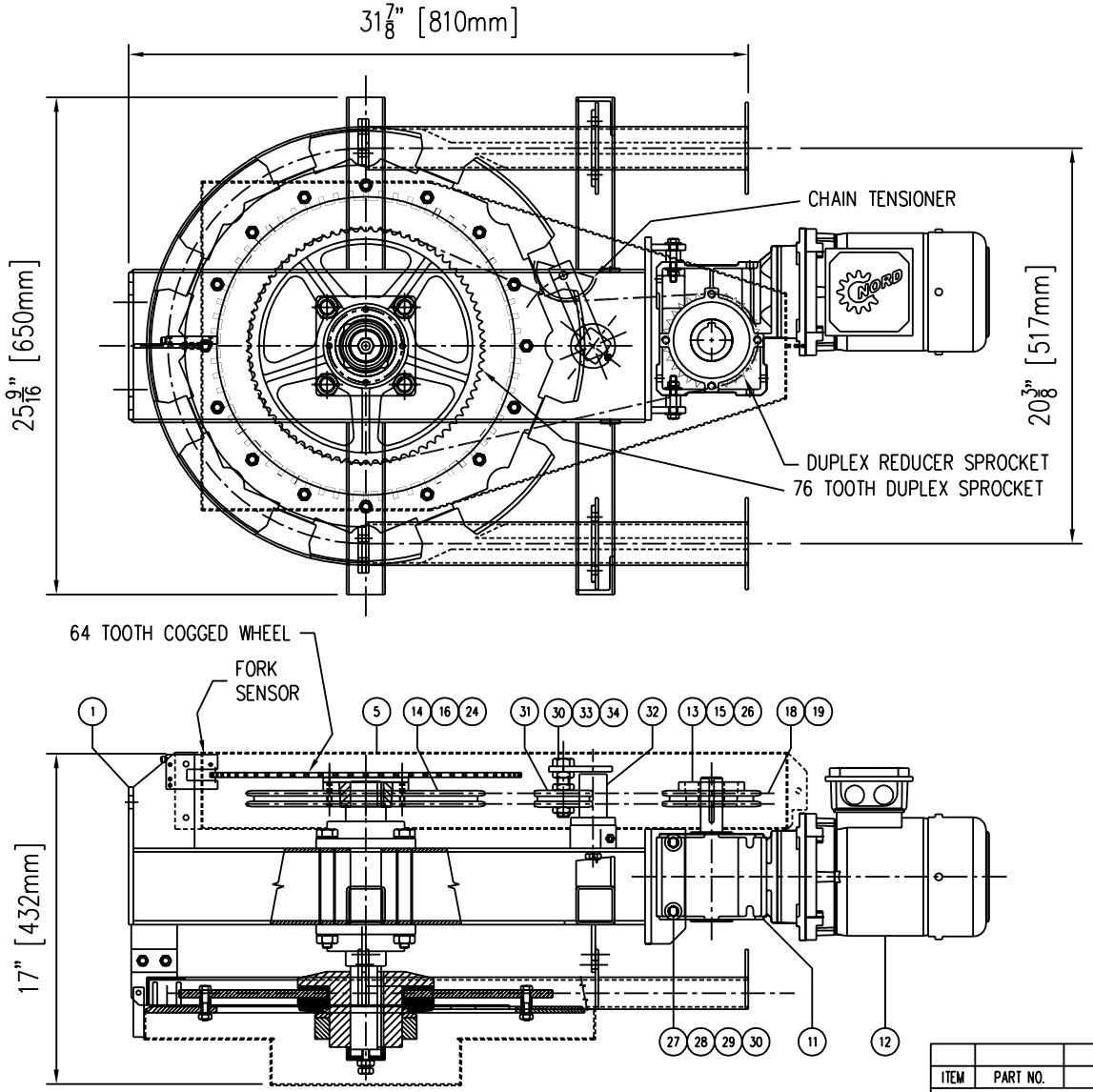
REV	DATE	DESCRIPTION	REV'D BY
A	07/01	INITIAL RELEASE	D.S.

DRAWN BY	D.S.
DATE	JULY, 2001
APPR'D BY	
SCALE	NTS

DRAWING NAME: S310 CHAIN

PART NUMBER: CH310-200 DRAWING NUMBER: 201 REV A



SEE DRAWING 202A
FOR BILL OF MATERIAL

ITEM	PART NO.	DESCRIPTION	DWG. REF. NO.

TORONTO **PACLINE** OVERHEAD CONVEYORS BUFFALO
www.pacline.com

S310 POWER & FREE - ENGINEERING MANUAL

REV	DATE	DESCRIPTION	REV'D BY
B	FEB-2017	UPDATED ENGINEERING MANUAL	A.B.
A	07/01	INITIAL RELEASE	D.S.

DRAWN BY	D.S.
DATE	JULY, 2001
APPR'D BY	
SCALE	NTS

DRAWING NAME: S310 WHEEL TURN DRIVE
PART NUMBER: DR35-3054
DRAWING NUMBER: 202
REV: B

ITEM	PART No	DESCRIPTION	QTY
34	NT-1687	M10 THIN NUT	3
33	BT-1842	M10 x 70 HEX HD SET SCREW	1
32	CT-1470	ROSTA CHAIN TENSIONER TYPE SE18	1
31	WD35-365	TENSIONER HEAD	1
30		5/16 LOCK WASHER	4
29		5/16 FLAT WASHER	8
28		5/16-18NC HEX NUT	4
27		5/16-18NC HHCS x 2" LG	4
26		0.250" KEY x 1.250" LG	1
25			
24	KS-0072	12mm x 8mm RECT. KEY x 32mm LG	1
23			
22			
21			
20			
19	CH-1011	1/2" P DUPLEX CHAIN CONNECTOR	1
18	CH-1010	1/2" P DUPLEX CHAIN x 5'-3" APPROX.	1
17			
16	SP-1475	2012 TAPER-LOC BUSH w/ø40mm BORE	1
15	SP-1474	1210 TAPER-LOC BUSHING w/1.125" BORE	1
14	SP-1472	76T DUPLEX SPROCKET w/2012 TL BORE	1
13	SP-1473	STD - 19T DUPLEX SPROCKET w/1210 TL BORE	1
12		NORD MOTOR	1
11	SK1SI63	NORD REDUCER	1
10			
9			
8			
7			
6			
5	GD35-366	CHAIN GUARD	1
4			
3			
2			
1	DR35-397	BASIC DRIVE UNIT	1

SEE DRAWING 202
FOR FOR ASSEMBLY

ITEM	PART NO.	DESCRIPTION	DWG. REF. NO.

TORONTO **PACLINE** OVERHEAD CONVEYORS BUFFALO
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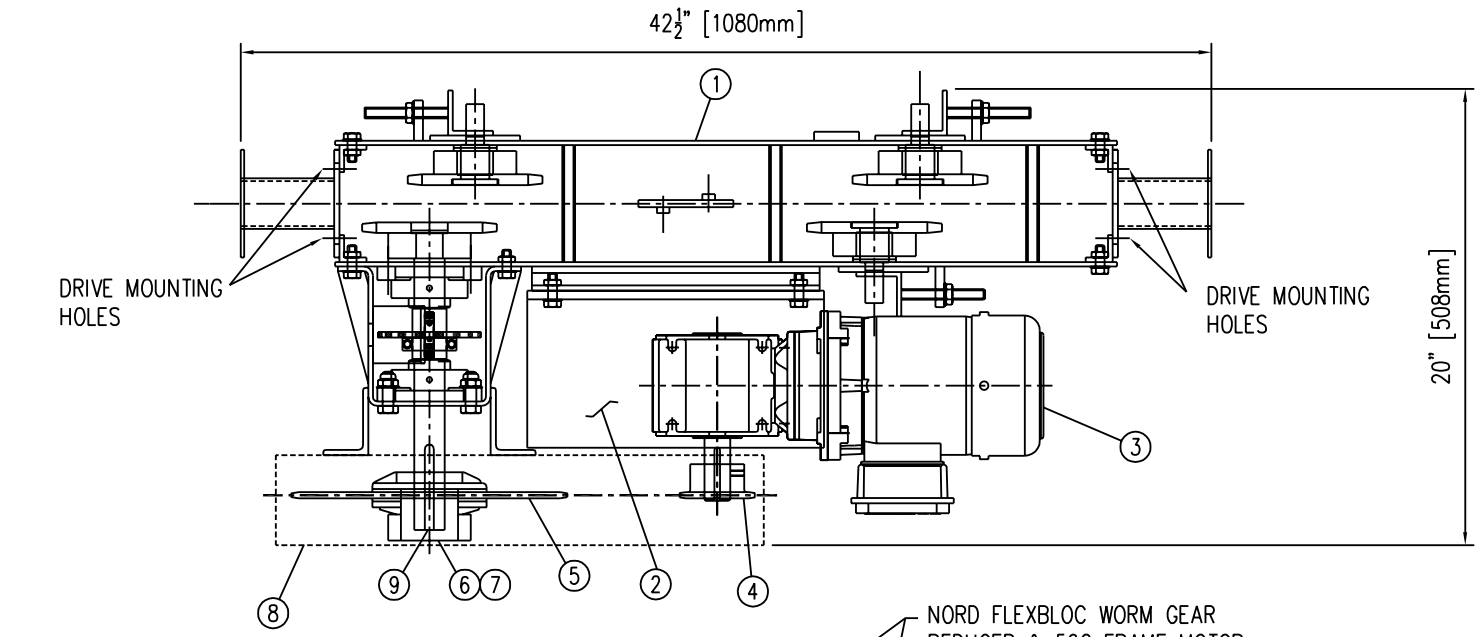
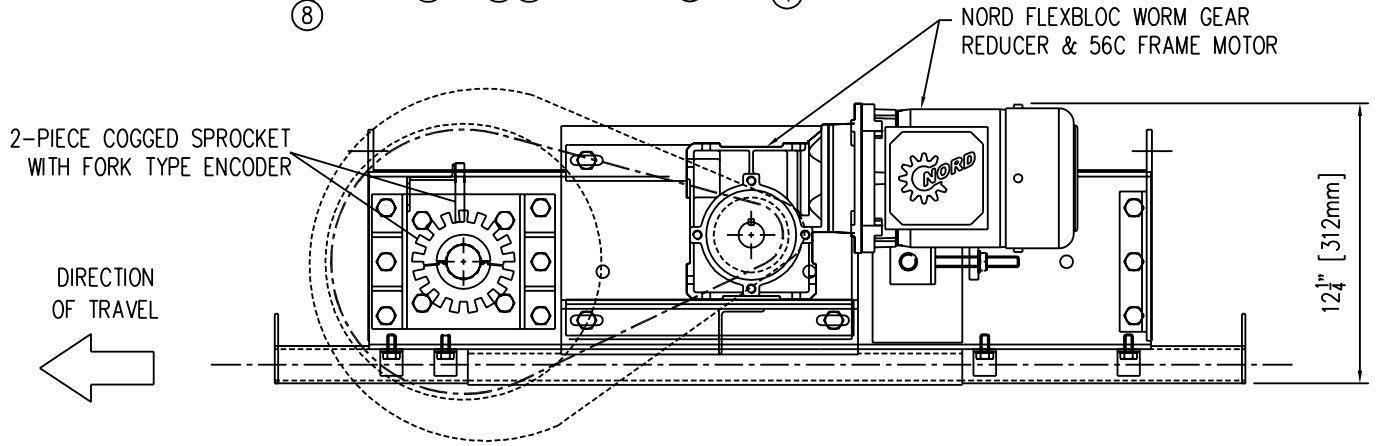
S310 POWER & FREE - ENGINEERING MANUAL

REV	DATE	DESCRIPTION	REV'D BY
B	FEB-2017	UPDATED ENGINEERING MANUAL	A.B.
A	07/01	INITIAL RELEASE	D.S.

DRAWN BY	D.S.
DATE	JULY, 2001
APPR'D BY	
SCALE	NTS

DRAWING NAME: WHEELTURN DRIVE BILL OF MATERIAL
PART NUMBER: DR35-3054
DRAWING NUMBER: 202A
REV: B





SEE DRAWING 203A
FOR BILL OF MATERIAL

ITEM	PART NO.	DESCRIPTION	DWG. REF. NO.

TORONTO **PACLINE** OVERHEAD CONVEYORS BUFFALO
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S310 POWER & FREE - ENGINEERING MANUAL

REV	DATE	DESCRIPTION	REV'D BY
B	FEB-2017	UPDATED ENGINEERING MANUAL	A.B.
A	07/01	INITIAL RELEASE	D.S.

DRAWN BY	D.S.
DATE	JULY, 2001
APPR'D BY	
SCALE	NTS

DRAWING NAME: S310 INLINE DRIVE - POWER ONLY
PART NUMBER: DR31-348
DRAWING NUMBER: 203
REV: B

ITEM No	PART No	DESCRIPTION	No REQ'D
1	WD31-317	BASIC DRIVE UNIT	1
2	WD31-3004	MOUNTING PLATE	1
3	SK1SI63	NORD GEAR - MOTOR & REDUCER	1
4		19T SPROCKET 1.125" BORE	1
5	PL-0031	76T SPROCKET C/W BUSH	1
6	TL-0033	T/LIMITER 500M1 35BORE 10x8 TAPER KEY	1
7	CR-0212	500M1 T/L CTR BUSH 0.480" LG SINTERED	1
8	WD30-356	DRIVE GUARD ASSEMBLY	1
9	KS-0035	10x8 GIB HEAD TAPER KEY 160mm LONG	1
	DT31-611	DRIP-TRAY	1
	CH-0032	CHAIN. 1/2" PITCH x 1 FOOT LONG	5
	CH-0038	CONNECTING LINK 1/2" PITCH CHAIN	1
	BT-0132	M10 x 35 HT HEX HD BOLT	4
	BT-0099	M10 x 30 HT HEX HD BOLT	4
	NT-0100	M10 SELF LOCKING NUT	8
	WR-0113	M10 O/D 21 T1.25 PLAIN STEEL	4
	BT-0094	M6 x 16 HT HEX HD SET SCREW	15
	BT-0174	M6 x 20 HT HEX HD SET SCREW	4
	WR-0108	M6 O/D 12.5 T0.8 PLAIN STEEL	19
	NT-0095	M6 PLAIN FULL NUT	16
	RT-0895	1/8 x 3/8 POP RIVET	4
	NE30-337	NAME PLATE FOR DRIVE	1
	GB-1786	KEYED SHAFT	1
	CP-1774	CIRCLIP	1

SEE DRAWING 203
FOR FOR ASSEMBLY

REV	DATE	DESCRIPTION	REV'D BY
B	FEB-2017	UPDATED ENGINEERING MANUAL	A.B.
A	07/01	INITIAL RELEASE	D.S.

ITEM	PART NO.	DESCRIPTION	DWG. REF. NO.

TORONTO **PACLINE** OVERHEAD CONVEYORS BUFFALO
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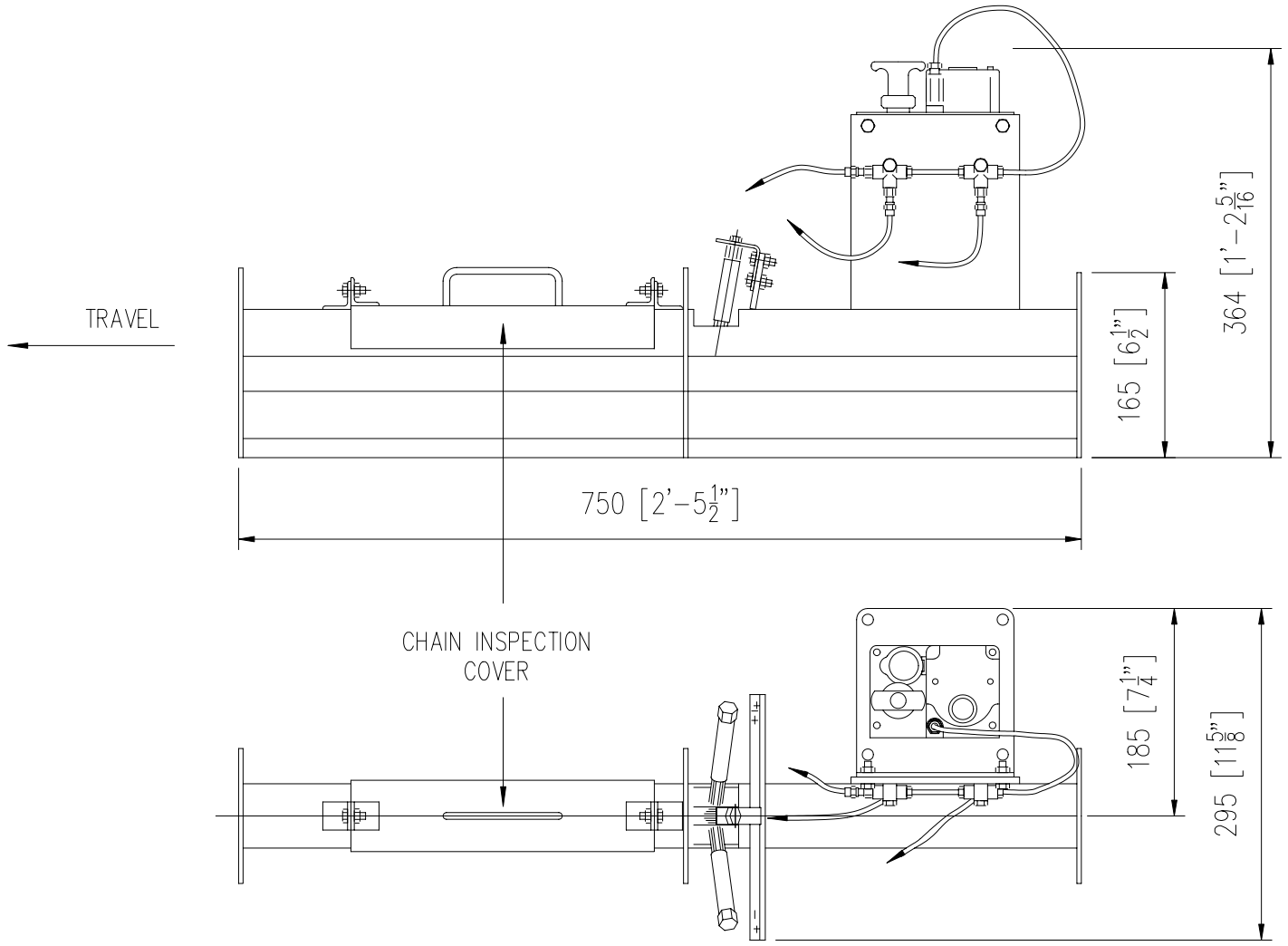
S310 POWER & FREE - ENGINEERING MANUAL

DRAWN BY	D.S.
DATE	JULY, 2001
APPR'D BY	
SCALE	NTS

DRAWING NAME: (PO) INLINE DRIVE BILL OF MATERIAL
PART NUMBER: DR31-3007
DRAWING NUMBER: 203A
REV B



ITEM	PART NO.	DESCRIPTION	DWG. REF. NO.

TORONTO **PACLINE** OVERHEAD CONVEYORS BUFFALO
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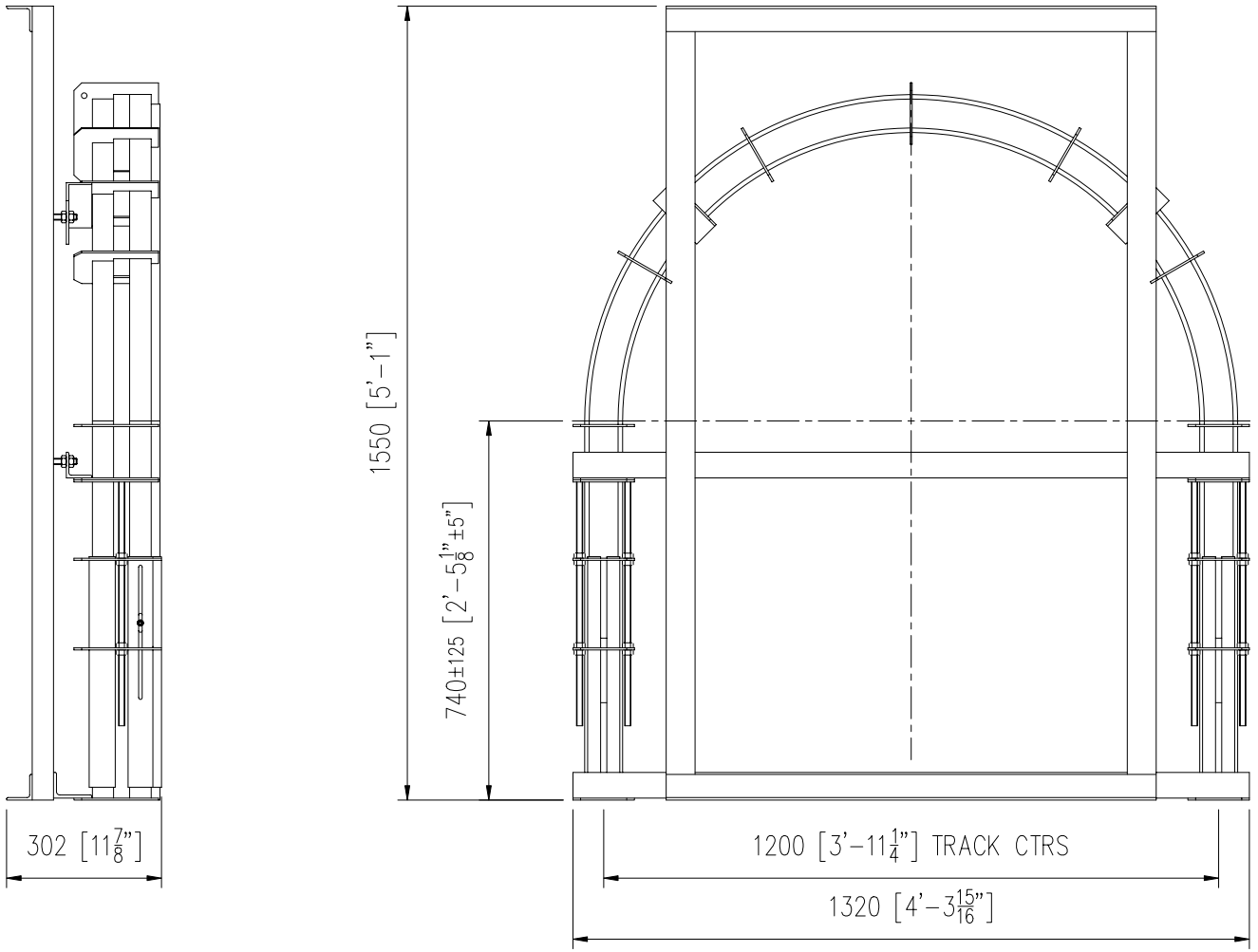
S310 POWER & FREE – ENGINEERING MANUAL

REV	DATE	DESCRIPTION	REV'D BY
A	07/01	INITIAL RELEASE	D.S.

DRAWN BY	D.S.
DATE	JULY, 2001
APPR'D BY	
SCALE	NTS

DRAWING NAME: S310 LUBRICATOR

PART NUMBER: LR310-600 DRAWING NUMBER: 204 REV A



ITEM	PART NO.	DESCRIPTION	DWG. REF. NO.

TORONTO **PACLINE** OVERHEAD CONVEYORS BUFFALO

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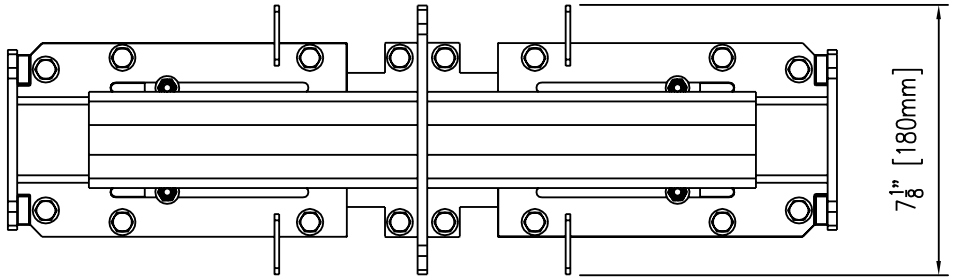
S310 POWER & FREE – ENGINEERING MANUAL

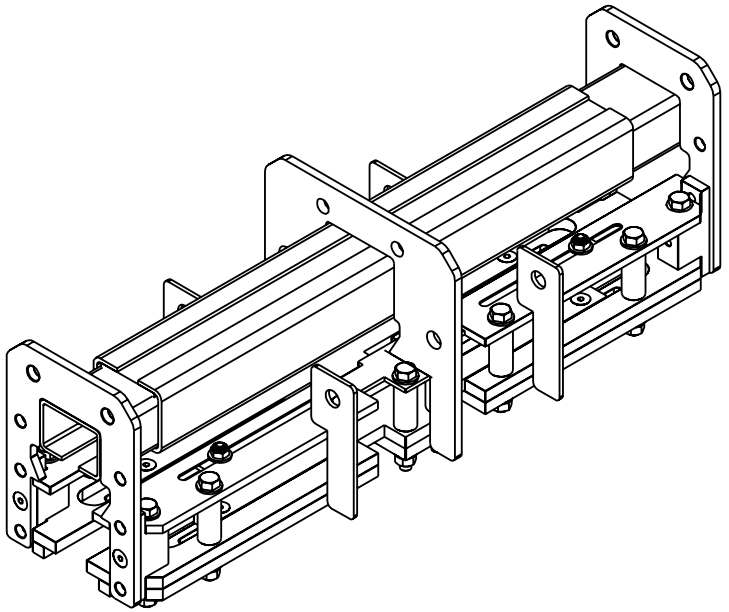
REV	DATE	DESCRIPTION	REV'D BY
A	07/01	INITIAL RELEASE	D.S.

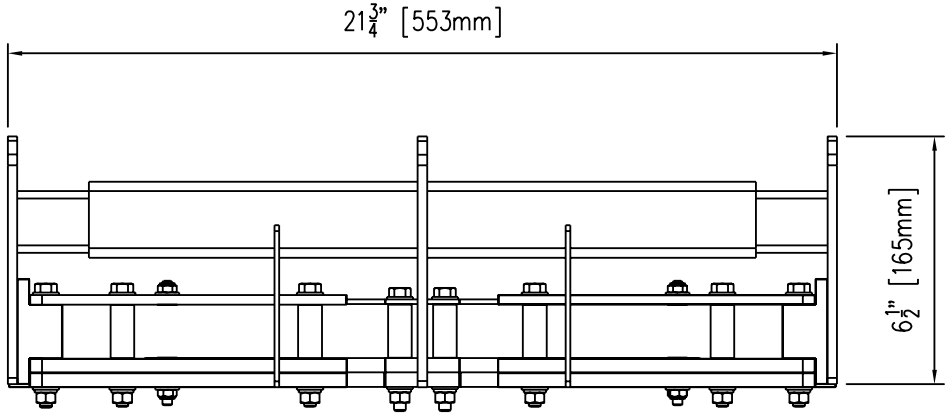
DRAWN BY	D.S.
DATE	JULY, 2001
APPR'D BY	
SCALE	NTS

DRAWING NAME: S310 TAKE-UP UNIT

PART NUMBER: TU310-508 DRAWING NUMBER: 205 REV A







ITEM	PART NO.	DESCRIPTION	DWG. REF. NO.

TORONTO **PACLINE** OVERHEAD CONVEYORS BUFFALO

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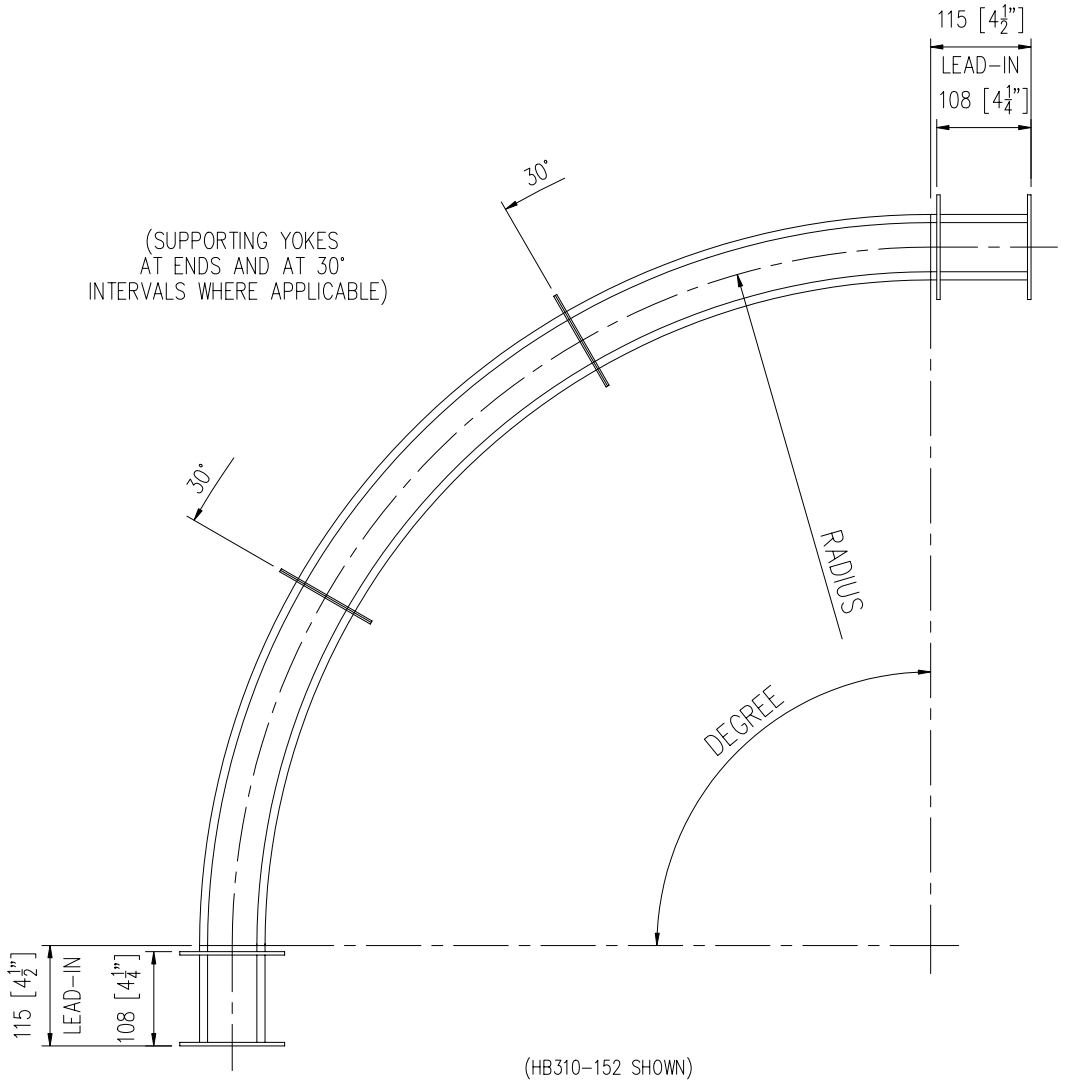
S310 POWER & FREE - ENGINEERING MANUAL

REV	DATE	DESCRIPTION	REV'D BY
B	FEB-2017	UPDATED ENGINEERING MANUAL	A.B.
A	07/01	INITIAL RELEASE	D.S.

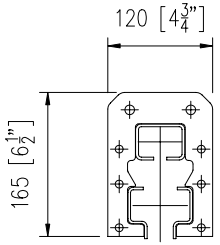
DRAWN BY	D.S.
DATE	JULY, 2001
APPR'D BY	
SCALE	NTS

DRAWING NAME: S310 TAKE-UP SLIDES

PART NUMBER: TS310-530 DRAWING NUMBER: 206 REV B



(HB310–152 SHOWN)



PART No	DEGREE	RADIUS
HB310–103	15°	600mm 24" NOM (23⅝" ACTUAL)
HB310–104	30°	
HB310–105	45°	
HB310–106	60°	
HB310–107	90°	
HB310–138	120°	
HB310–108	180°	
HB310–148	15°	800mm 32" NOM (31½" ACTUAL)
HB310–149	30°	
HB310–150	45°	
HB310–151	60°	
HB310–152	90°	
HB310–154	180°	
HB310–1010	15°	1000mm 39" NOM (39⅜" ACTUAL)
HB310–1011	30°	
HB310–1012	45°	
HB310–1013	60°	
HB310–1014	90°	
HB310–1015	180°	

ITEM	PART NO.	DESCRIPTION	DWG. REF. NO.

REV	DATE	DESCRIPTION	REV'D BY
A	07/01	INITIAL RELEASE	D.S.

TORONTO **PACLINE** OVERHEAD CONVEYORS BUFFALO
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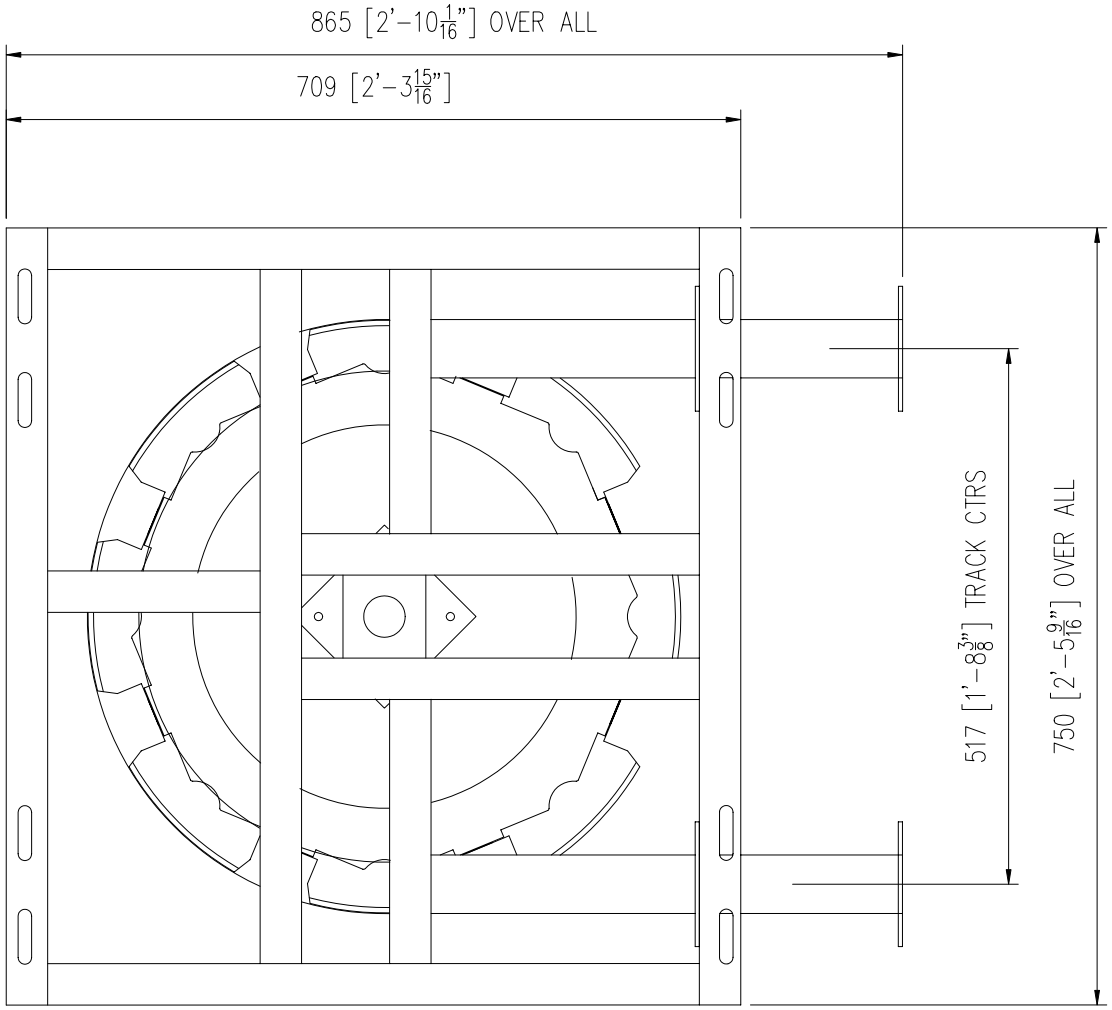
S310 POWER & FREE – ENGINEERING MANUAL

DRAWN BY	D.S.	DRAWING NAME:	S310 HORIZONTAL CURVES	
DATE	JULY, 2001			
APPR'D BY		PART NUMBER:	SEE CHART	DRAWING NUMBER: 207 REV A
SCALE	NTS			



ITEM	PART NO.	DESCRIPTION	DWG. REF. NO.

TORONTO **PACLINE** OVERHEAD CONVEYORS BUFFALO

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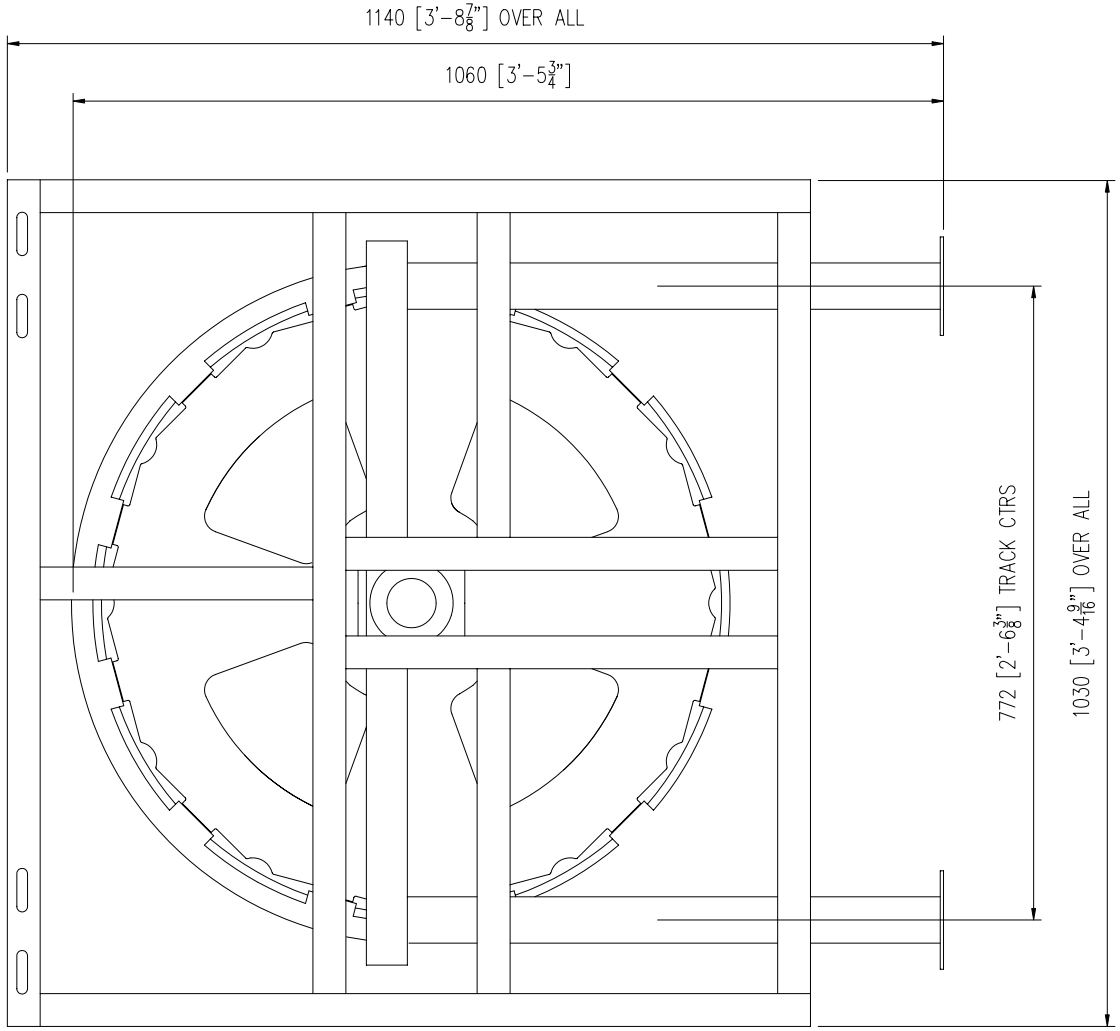
S310 POWER & FREE – ENGINEERING MANUAL

REV	DATE	DESCRIPTION	REV'D BY
A	07/01	INITIAL RELEASE	D.S.

DRAWN BY	D.S.	DRAWING NAME:	S310 8 TOOTH WHEELTURN		
DATE	JULY, 2001				
APPR'D BY		PART NUMBER:	WT35-8	DRAWING NUMBER:	208
SCALE	NTS				REV A



ITEM	PART NO.	DESCRIPTION	DWG. REF. NO.

TORONTO **PACLINE** OVERHEAD CONVEYORS BUFFALO

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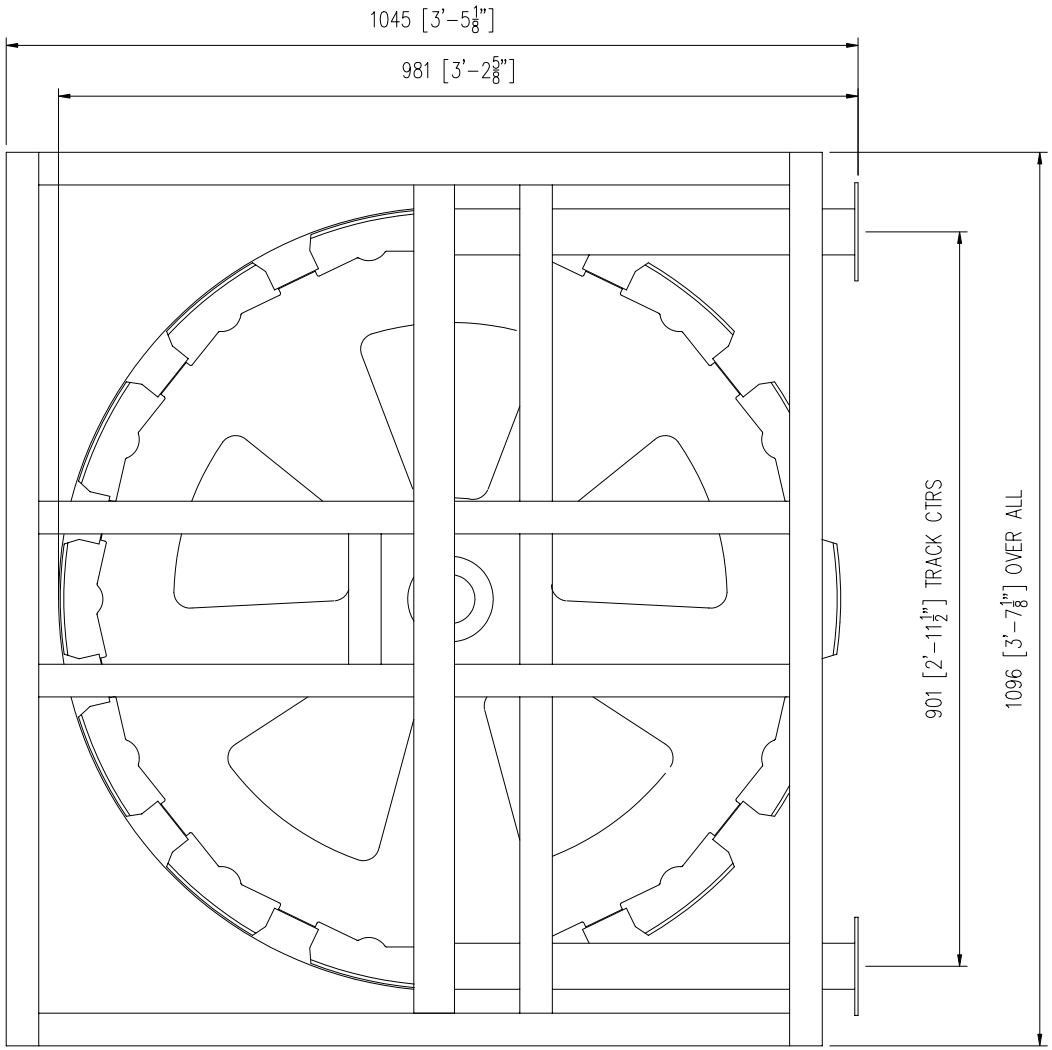
S310 POWER & FREE – ENGINEERING MANUAL

REV	DATE	DESCRIPTION	REV'D BY
A	07/01	INITIAL RELEASE	D.S.

DRAWN BY	D.S.
DATE	JULY, 2001
APPR'D BY	
SCALE	NTS

DRAWING NAME: S310 12 TOOTH WHEELTURN

PART NUMBER: WT35-12 DRAWING NUMBER: 209 REV A



ITEM	PART NO.	DESCRIPTION	DWG. REF. NO.

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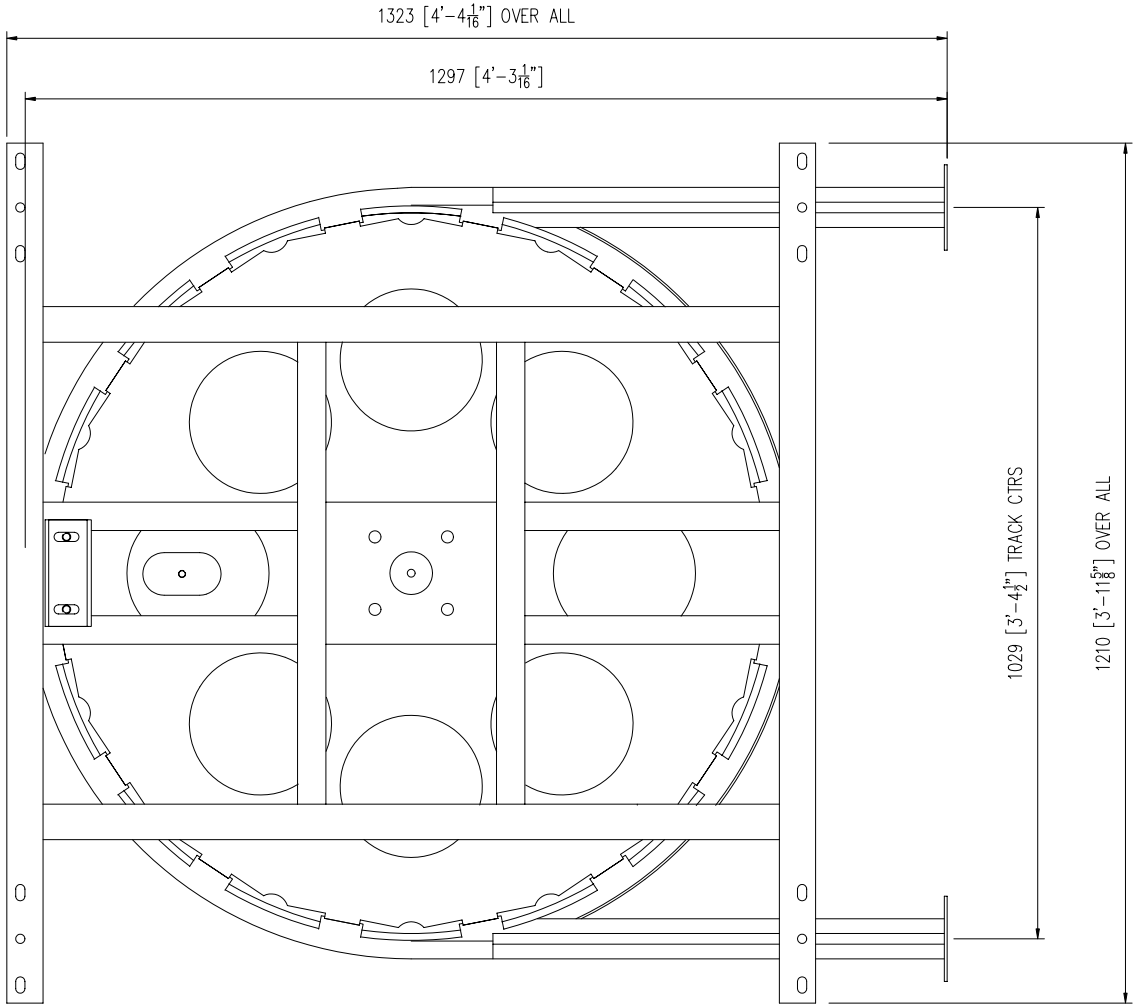
REV	DATE	DESCRIPTION	REV'D BY
A	07/01	INITIAL RELEASE	D.S.

S310 POWER & FREE – ENGINEERING MANUAL

DRAWN BY	D.S.	DRAWING NAME:	S310 14 TOOTH WHEELTURN		
DATE	JULY, 2001				
APPR'D BY		PART NUMBER:	WT35-14	DRAWING NUMBER:	210
SCALE	NTS				REV A



ITEM	PART NO.	DESCRIPTION	DWG. REF. NO.

TORONTO **PACLINE** OVERHEAD CONVEYORS BUFFALO

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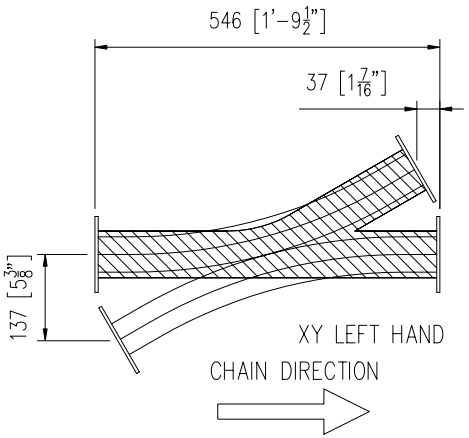
S310 POWER & FREE – ENGINEERING MANUAL

REV	DATE	DESCRIPTION	REV'D BY
A	07/01	INITIAL RELEASE	D.S.

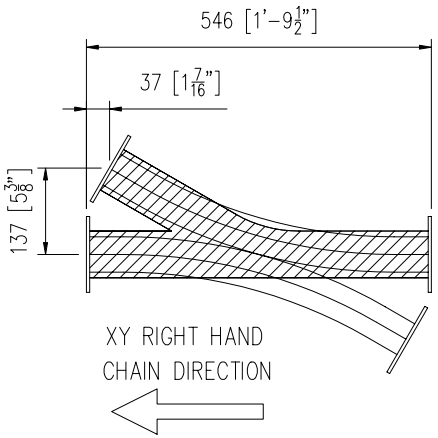
DRAWN BY	D.S.
DATE	JULY, 2001
APPR'D BY	
SCALE	NTS

DRAWING NAME: S310 16 TOOTH WHEELTURN

PART NUMBER: WT35-16 DRAWING NUMBER: 211 REV A



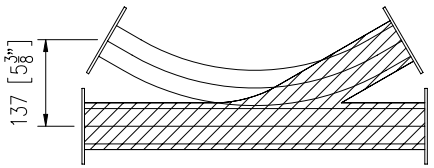
XY LEFT HAND
CHAIN DIRECTION



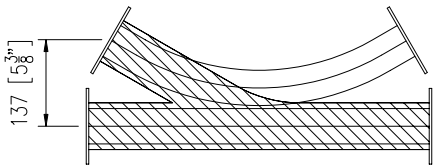
XY RIGHT HAND
CHAIN DIRECTION

PART NUMBER DESIGNATION				
POWER TRACK		HANDING RIGHT/LEFT		
X	X	R	C	
Y	Y			
K	K	L	D	
I	I			
	FREE TRACK		TYPE (CONVERGING DIVERGING)	

EG. "KYRC"
"K" TYPE POWER TRACK
"Y" TYPE FREE TRACK
"R" RIGHT HANDED
"C" CONVERGING

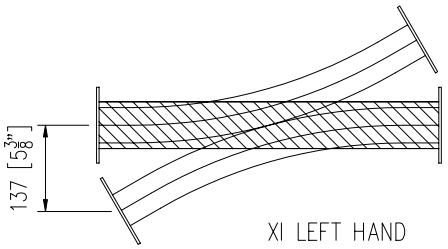


KY LEFT HAND
CHAIN DIRECTION

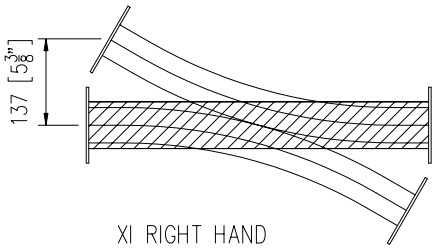


KY RIGHT HAND
CHAIN DIRECTION

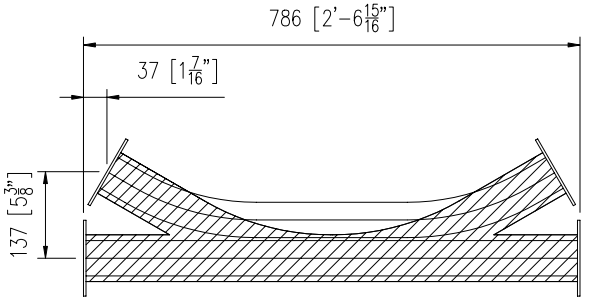
MULTIPLE SWITCHES AVAILABLE
SEE LEGEND ABOVE FOR COMBINATION
ALL SWITCHES SHOWN IN PLAN VIEW.
SHADED AREA DENOTES FREE TRACK, WHICH
IS BENEATH THE POWERED CHAIN TRACK



XI LEFT HAND
CHAIN DIRECTION



XI RIGHT HAND
CHAIN DIRECTION



KK LEFT/RIGHT HAND

ITEM	PART NO.	DESCRIPTION	DWG. REF. NO.

REV	DATE	DESCRIPTION	REV'D BY
A	07/01	INITIAL RELEASE	D.S.

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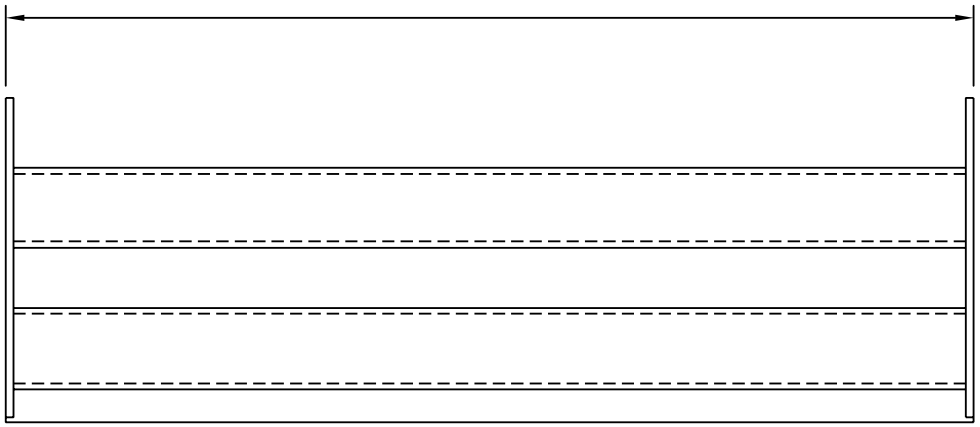
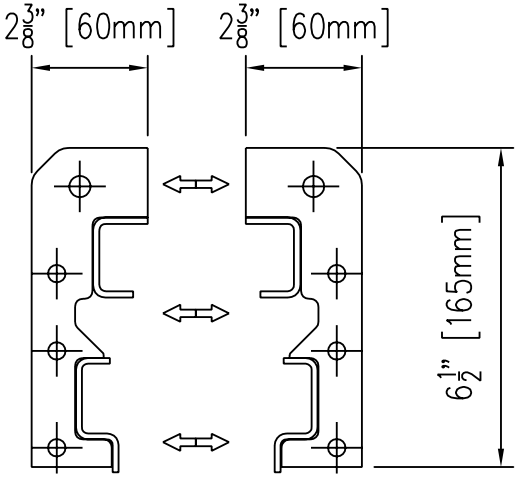
S310 POWER & FREE – ENGINEERING MANUAL

DRAWN BY	D.S.	DRAWING NAME:	TRACK SWITCH GENERAL ARRANGEMENTS
DATE	JULY, 2001		
APPR'D BY		PART NUMBER:	TS310
SCALE	NTS	DRAWING NUMBER:	212
		REV	A





TRACK & YOKES ARE CUT IN HALF
TO FORM A SPLIT MAINTENANCE UNIT.
EITHER SIDE CAN BE REMOVED.

POWDER COATED SAFETY YELLOW
FOR QUICK IDENTIFICATION

ITEM	PART NO.	DESCRIPTION	DWG. REF. NO.

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S310 POWER & FREE - ENGINEERING MANUAL

REV	DATE	DESCRIPTION	REV'D BY
B	FEB-2017	UPDATED ENGINEERING MANUAL	A.B.
A	07/01	INITIAL RELEASE	D.S.

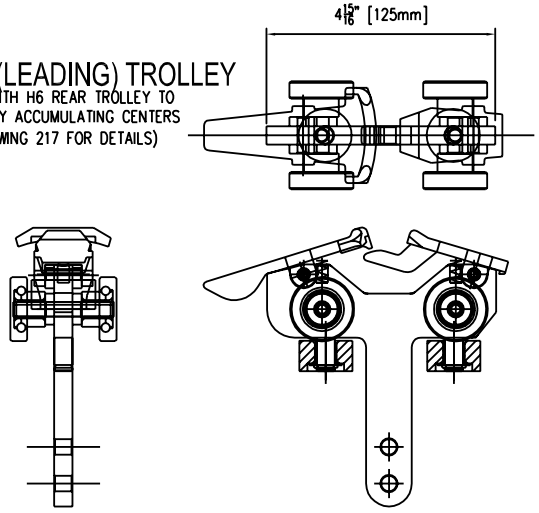
DRAWN BY	D.S.
DATE	JULY, 2001
APPR'D BY	
SCALE	NTS

DRAWING NAME: S310 MAINTENANCE UNIT

PART NUMBER: MU310-140 DRAWING NUMBER: 213 REV B

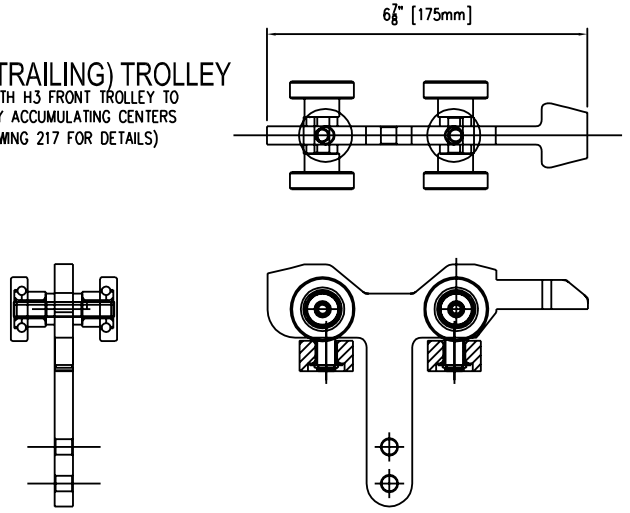
H3 - FRONT (LEADING) TROLLEY

COMBINED WITH H6 REAR TROLLEY TO ACHIEVE ANY ACCUMULATING CENTERS (SEE DRAWING 217 FOR DETAILS)



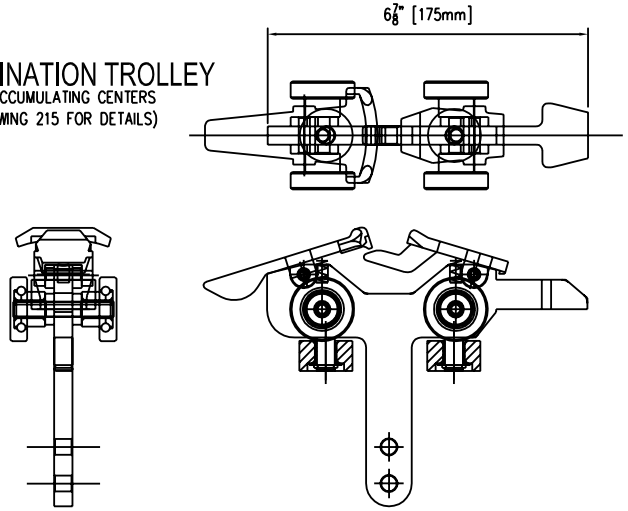
H6 - REAR (TRAILING) TROLLEY

COMBINED WITH H3 FRONT TROLLEY TO ACHIEVE ANY ACCUMULATING CENTERS (SEE DRAWING 217 FOR DETAILS)

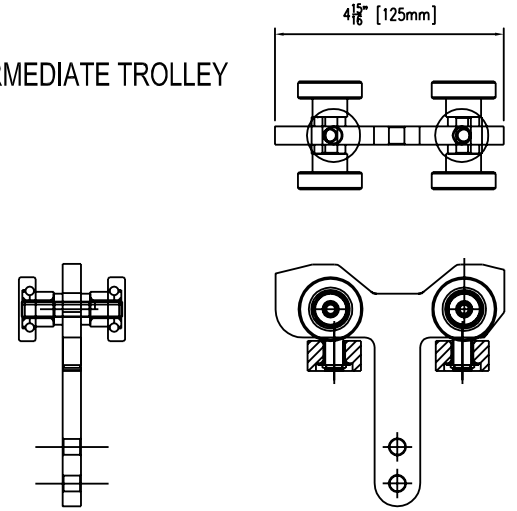


H4 - COMBINATION TROLLEY

175mm ACCUMULATING CENTERS (SEE DRAWING 215 FOR DETAILS)



H2 - INTERMEDIATE TROLLEY



ITEM	PART NO.	DESCRIPTION	DWG. REF. NO.

TORONTO **PACLINE** OVERHEAD CONVEYORS BUFFALO

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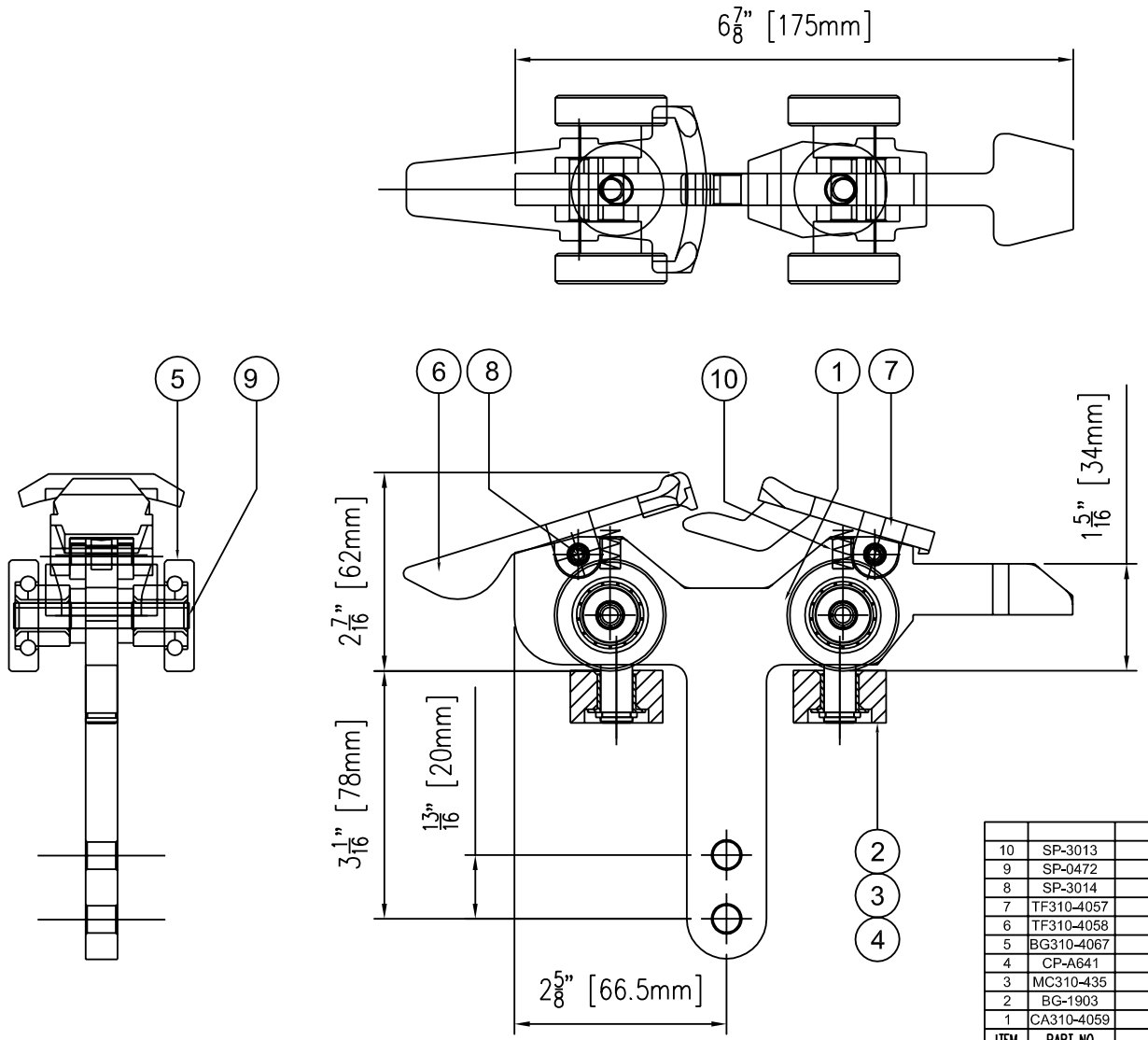
REV	DATE	DESCRIPTION	REV'D BY
B	FEB-2017	UPDATED ENGINEERING MANUAL	A.B.
A	07/01	INITIAL RELEASE	D.S.

S310 POWER & FREE - ENGINEERING MANUAL

DRAWN BY	D.S.	DRAWING NAME:	S310 TROLLEYS ARRANGEMENTS		
DATE	JULY, 2001				
APPR'D BY		PART NUMBER:	TR310	DRAWING NUMBER:	214
SCALE	NTS				REV B



ITEM	PART NO.	DESCRIPTION	QTY	DWG. REF. NO.
10	SP-3013	INV 221 DG SPRINGS STAINLESS?	2	
9	SP-0472	Ø8x55mm SELOCK PIN	2	
8	SP-3014	Ø6 x 35 SPIROL PIN	2	
7	TF310-4057	REAR FLAPPER	1	
6	TF310-4058	FRONT FLAPPER	1	
5	BG310-4067	TROLLEY BEARING	4	
4	CP-A641	D1400-0100 CIRCLIP	2	
3	MC310-435	HORIZONTAL ROLLER	2	
2	BG-1903	GLACIER BUSH REF FM8 1012DU	2	
1	CA310-4059	CAST TROLLEY BODY	1	

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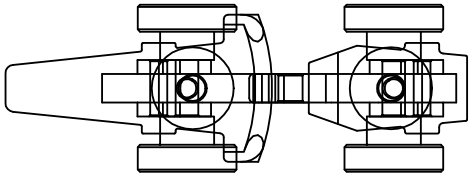
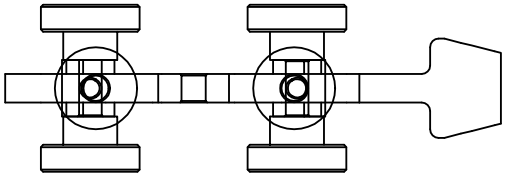
REV	DATE	DESCRIPTION	REV'D BY
B	FEB-2017	UPDATED ENGINEERING MANUAL	A.B.
A	08/01	INITIAL RELEASE	D.S.

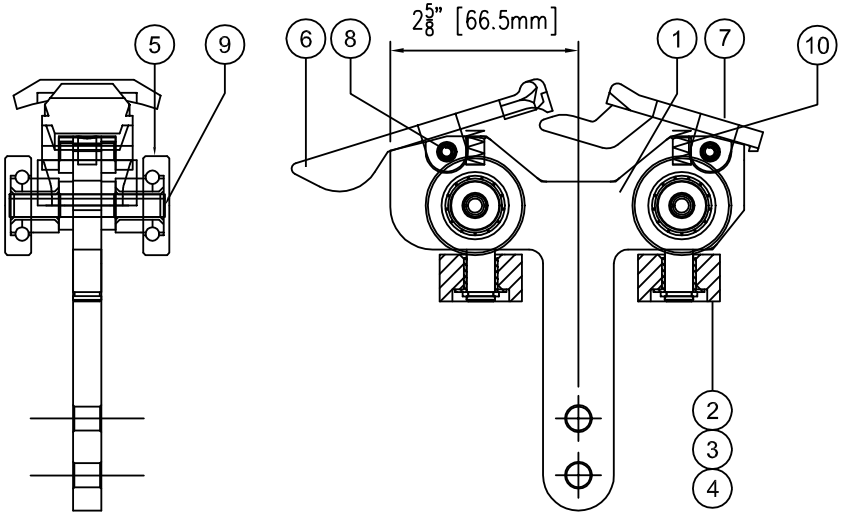
DRAWN BY	D.S.	DRAWING NAME:	S310 H4 STANDARD TROLLEY	
DATE	AUG, 2001			
APPR'D BY		PART NUMBER:	TR310-4066	DRAWING NUMBER: 215
SCALE	NTS			REV B

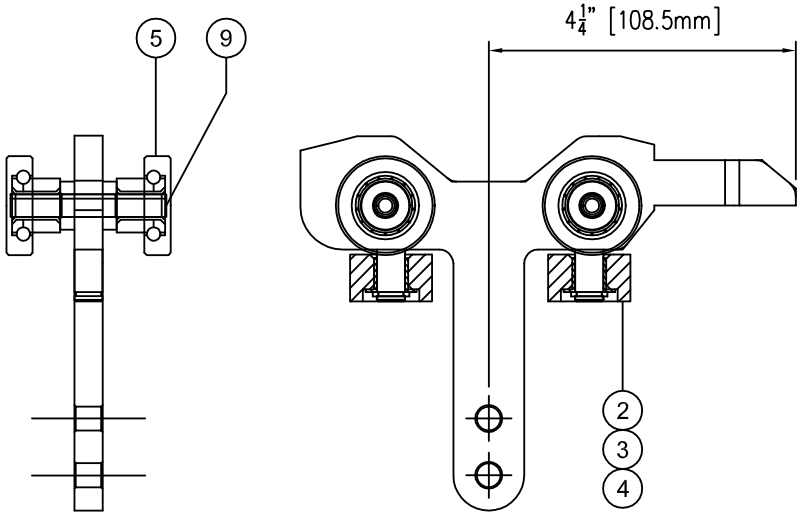
CAST LEADING
TROLLEY H3
TR310-4070



CAST TRAILING
TROLLEY H6
TR310-4069







ITEM	PART NO.	DESCRIPTION	QTY	DWG. REF. NO.
11	--	ASSEMBLY	1	
10	SP-3013	INV 221 DG SPRINGS STAINLESS	2	
9	SP-0472	ø8x55mm SELOCK PIN	2	
8	SP-3014	ø6 x 35 SPIROL PIN	2	
7	TF310-4057	REAR FLAPPER	1	
6	TF310-4058	FRONT FLAPPER	1	
5	BG310-4067	TROLLEY BEARING	4	
4	CP-A641	D1400-0100 CIRCLIP	2	
3	MC310-435	HORIZONTAL ROLLER	2	
2	BG-1903	GLACIER BUSH REF FM8 1012DU	2	
1	CA310-4059	CAST TROLLEY BODY	1	

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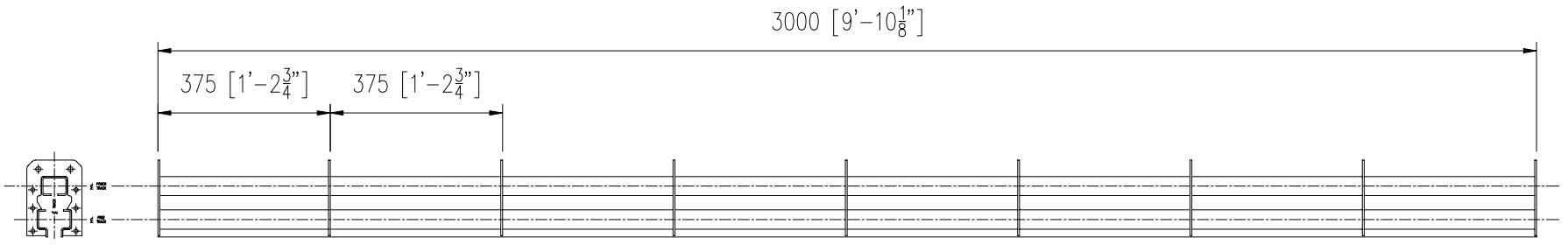
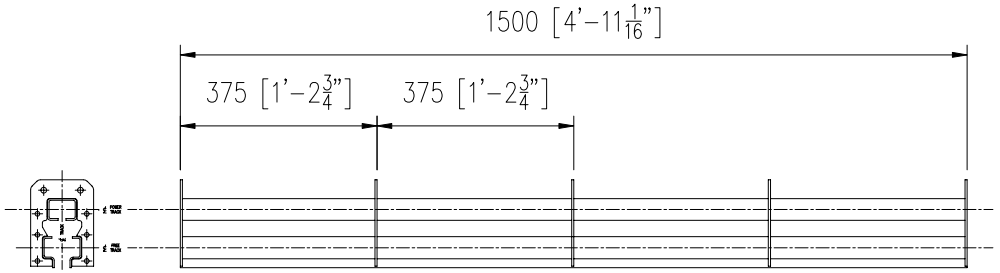
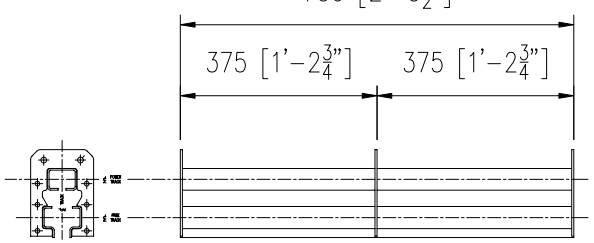
S310 POWER & FREE - ENGINEERING MANUAL

REV	DATE	DESCRIPTION	REV'D BY
B	FEB-2017	UPDATED ENGINEERING MANUAL	A.B.
A	07/01	INITIAL RELEASE	D.S.

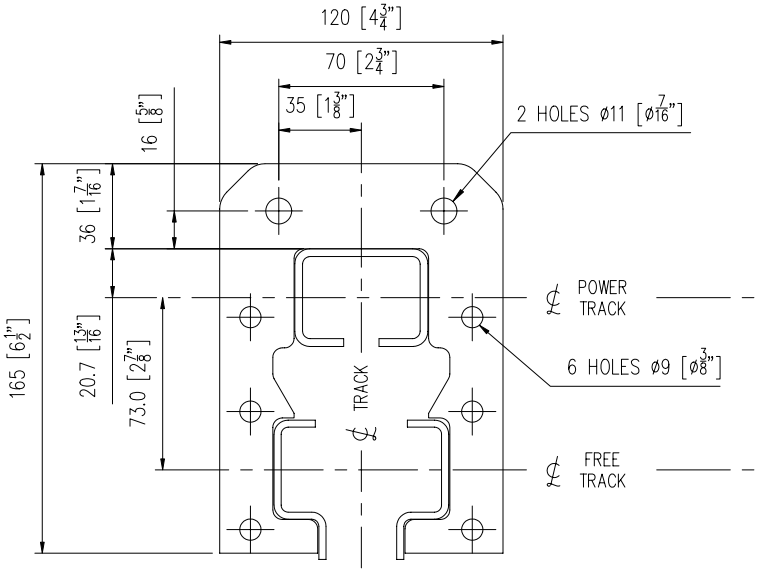
DRAWN BY	D.S.	DRAWING NAME:	S310 H3 & H6 TROLLEYS
DATE	JULY, 2001		
APPR'D BY		PART NUMBER:	TR310.4069/70
SCALE	NTS	DRAWING NUMBER:	217
		REV	B







STANDARD POWER & FREE TRACK LENGTHS AVAILABLE- 3000MM, 1500MM, 750MM, (0-750MM TO ORDER)



ITEM	PART NO.	DESCRIPTION	DWG. REF. NO.

TORONTO **PACLINE** OVERHEAD CONVEYORS BUFFALO

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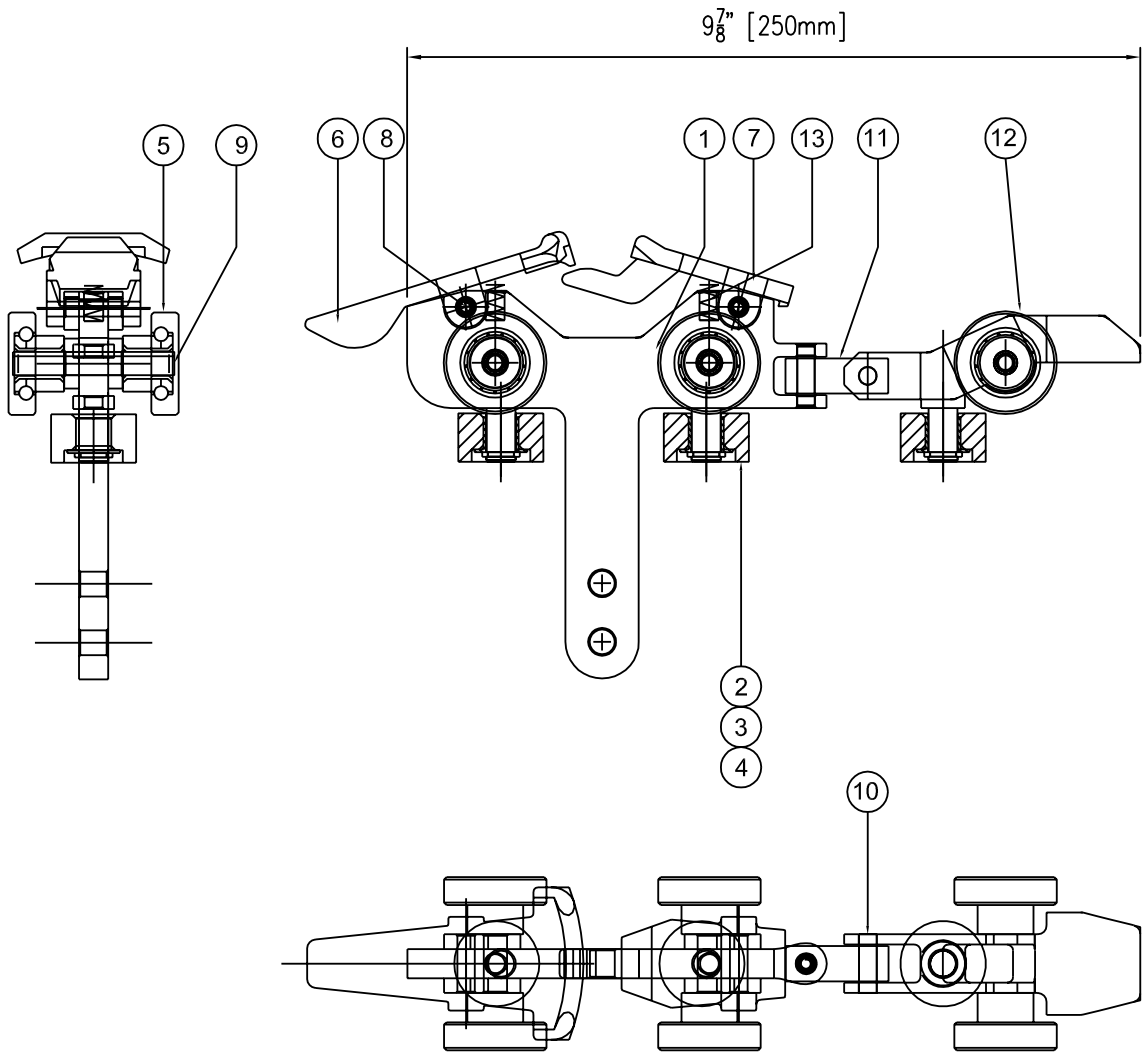
S310 POWER & FREE - ENGINEERING MANUAL

REV	DATE	DESCRIPTION	REV'D BY
A	07/01	INITIAL RELEASE	D.S.

DRAWN BY	D.S.
DATE	JULY, 2001
APPR'D BY	
SCALE	NTS

DRAWING NAME: S310 TRACK

PART NUMBER: TK310-102 DRAWING NUMBER: 218 REV A



ITEM	PART NO.	DESCRIPTION	QTY	DWG. REF. NO.
13		INV 221 DG SPRINGS STAINLESS?	2	
12	MC310-4068	250mm REAR CAST CAM	1	
11	MC310-4062	REAR CAM LINK BLOCK	1	
10		ø6 x 20 SPIROL PIN	3	
9		ø8 x 55mm SELOCK PIN	2	
8		ø6 x 32 SPIROL PIN	2	
7	TF310-4057	REAR FLAPPER	1	
6	TF310-4058	FRONT FLAPPER	1	
5	BG310-4067	TROLLEY BEARING WIDE	6	
4	CP-A641	D1400-0100 CIRCLIP	3	
3	MC310-435	HORIZONTAL ROLLER	3	
2	BG-1903	GLACIER BUSH REF FM8 1012DU	3	
1	CA310-4060	CAST TROLLEY BODY	1	

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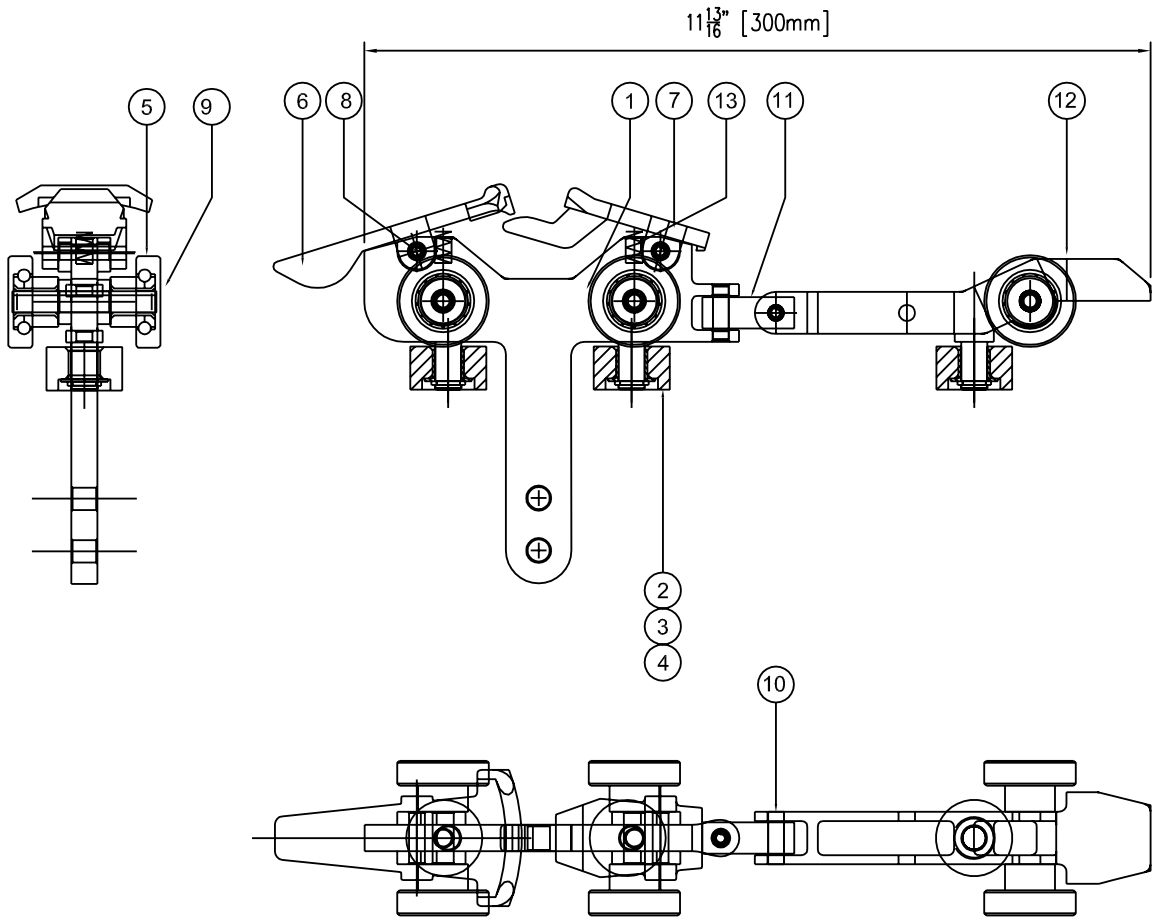
S310 POWER & FREE - ENGINEERING MANUAL

REV	DATE	DESCRIPTION	REV'D BY
B	FEB-2017	UPDATED ENGINEERING MANUAL	A.B.
A	07/01	INITIAL RELEASE	D.S.

DRAWN BY	D.S.
DATE	JULY, 2001
APPR'D BY	
SCALE	NTS

DRAWING NAME: 250mm ARTICULATING TROLLEY
PART NUMBER: TR310-4065
DRAWING NUMBER: 219A
REV: B



ITEM	PART NO.	DESCRIPTION	QTY	DWG. REF. NO.
13		IN 221 DG SPRINGS STAINLESS?	2	
12	CA310-4061	300mm REAR CAST CAM	1	
11	MC310-4062	REAR CAM LINK BLOCK	1	
10		ø6 x 20 SPIROL PIN	3	
9		ø8 x 55 SELOCK PIN	2	
8		ø6 x 35 SPIROL PIN	2	
7	TF310-4057	REAR FLAPPER	1	
6	TF310-4058	FRONT FLAPPER	1	
5	BG310-4067	TROLLEY BEARING	6	
4	CP-A641	D1400-0100 CIRCLIP	3	
3	MC310-435	HORIZONTAL ROLLER	3	
2	BG-1903	GLACIER BUSH REF FM8 1012DU	3	
1	CA310-4060	CAST TROLLEY BODY	1	

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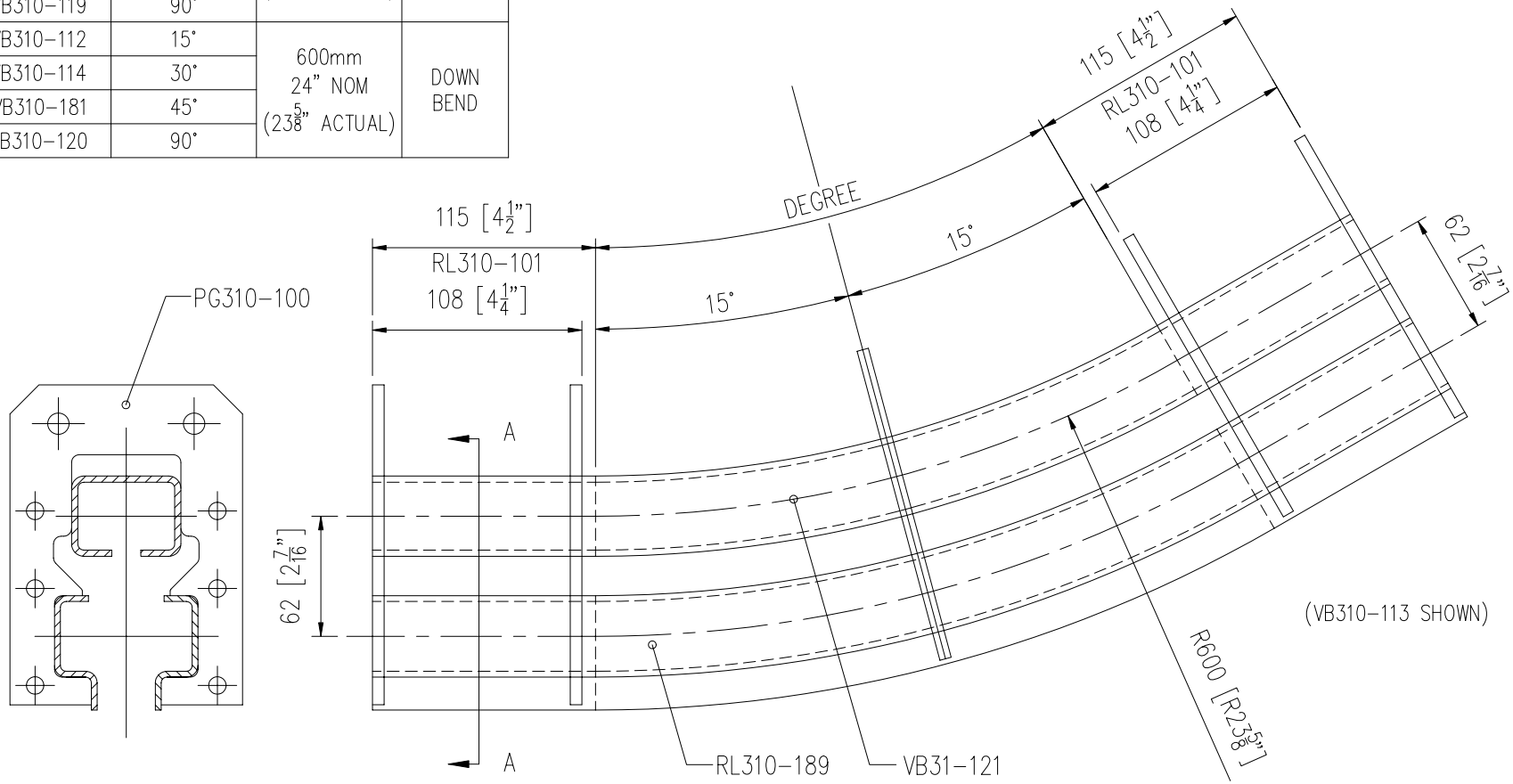
REV	DATE	DESCRIPTION	REV'D BY
B	FEB-2017	UPDATED ENGINEERING MANUAL	A.B.
A	07/01	INITIAL RELEASE	D.S.

DRAWN BY	D.S.	DRAWING NAME:	300mm ARTICULATING TROLLEY		
DATE	JULY, 2001				
APPR'D BY		PART NUMBER:	TR310-4064	DRAWING NUMBER: 219B	REV B
SCALE	NTS				

PART No	DEGREE	RADIUS	TYPE
VB310–111	15°	600mm 24" NOM ($23\frac{5}{8}$" ACTUAL)	UP BEND
VB310–113	30°		
VB310–180	45°		
VB310–119	90°		
VB310–112	15°	600mm 24" NOM ($23\frac{5}{8}$" ACTUAL)	DOWN BEND
VB310–114	30°		
VB310–181	45°		
VB310–120	90°		



SECTION A–A

ITEM	PART NO.	DESCRIPTION	DWG. REF. NO.

TORONTO **PACLINE** OVERHEAD CONVEYORS BUFFALO
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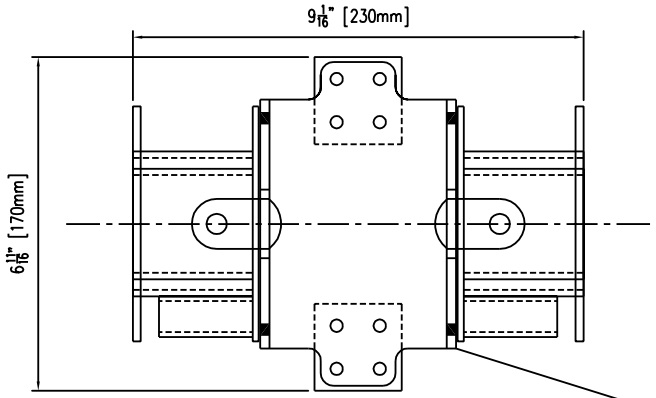
REV	DATE	DESCRIPTION	REV'D BY
A	07/01	INITIAL RELEASE	D.S.

S310 POWER & FREE – ENGINEERING MANUAL

DRAWN BY	D.S.	DRAWING NAME:	S310 VERTICAL CURVE	
DATE	JULY, 2001			
APPR'D BY		PART NUMBER:	SEE CHART	DRAWING NUMBER: 220
SCALE	NTS			REV A

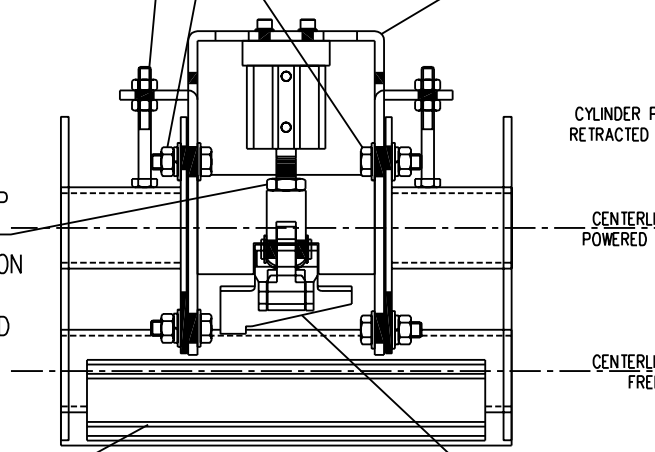


NOTE 1:
PRELIMINARY 'FACTORY' ADJUSTMENT OF THE STOP IS MADE BY LOOSENING THE BOLTS WHICH HOLD THE BRACKET IN PLACE AND USING THE ADJUSTING SCREW TO MOVE THE BRACKET UP OR DOWN. ALL BOLTS ARE THEN RETIGHTENED.

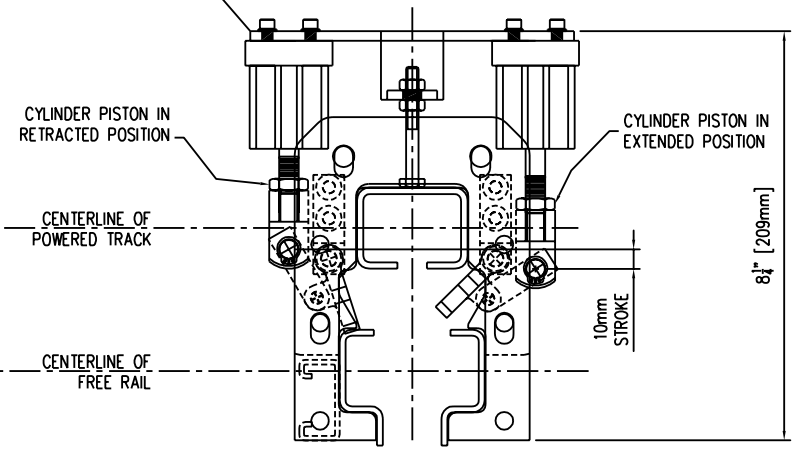
NOTE 2:
FINE 'FIELD' ADJUSTMENT OF THE STOP BLADE IS MADE BY LOOSENING THE CYLINDER NUT AND WINDING THE PISTON ROD IN OR OUT TO SUIT.
PLEASE ENSURE NUT IS RETIGHTENED WHEN POSITION IS FINALIZED

NOTE 3:
UNISTRUT USED TO MOUNT SKI-BAR ACTUATOR & LIMIT SWITCH ASSEMBLY

NOTE 4:
THE STOP BRACKET SUB-ASSEMBLY IS FABRICATED SO THAT IT CAN BE MOUNTED TO ANY EXISTING TRACK FLANGE. THIS MEANS ADDITIONAL STOP UNITS CAN BE INSTALLED IN THE FUTURE, IF REQUIRED.
A UNISTRUT RAIL (WELDED TO FREE TRACK), WILL ALSO BE NEEDED FOR THE STOP TO MOUNT THE SKI-BAR & LIMIT SWITCH ASSEMBLIES.



SIDE VIEW



END VIEW

ITEM	PART NO.	DESCRIPTION	DWG. REF. NO.

TORONTO **PACLINE** OVERHEAD CONVEYORS BUFFALO
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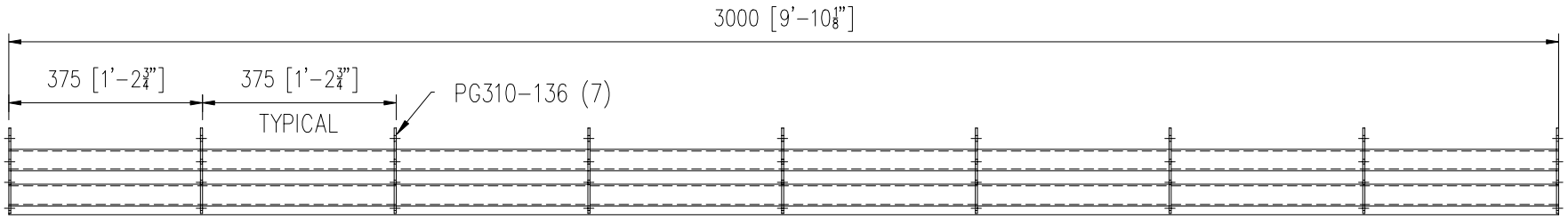
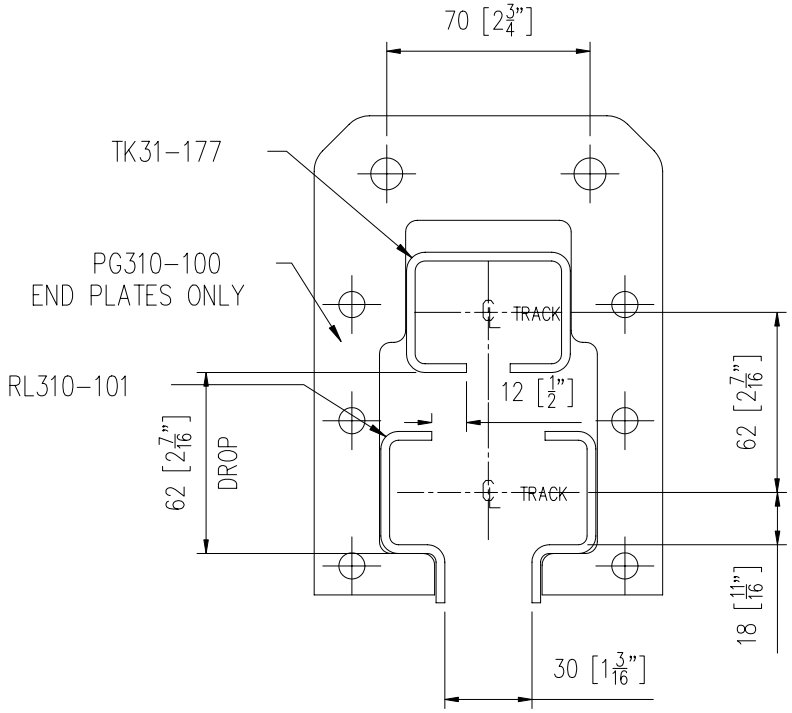
S310 POWER & FREE - ENGINEERING MANUAL

REV	DATE	DESCRIPTION	REV'D BY
B	FEB-2017	UPDATED ENGINEERING MANUAL	A.B.
A	07/01	INITIAL RELEASE	D.S.

DRAWN BY	D.S.	DRAWING NAME:	S310 DOUBLE BLADED STOP UNIT		
DATE	JULY, 2001				
APPR'D BY		PART NUMBER:	SP310-130	DRAWING NUMBER: 221	REV B
SCALE	NTS				





ITEM	PART NO.	DESCRIPTION	DWG. REF. NO.

TORONTO **PACLINE** OVERHEAD CONVEYORS BUFFALO

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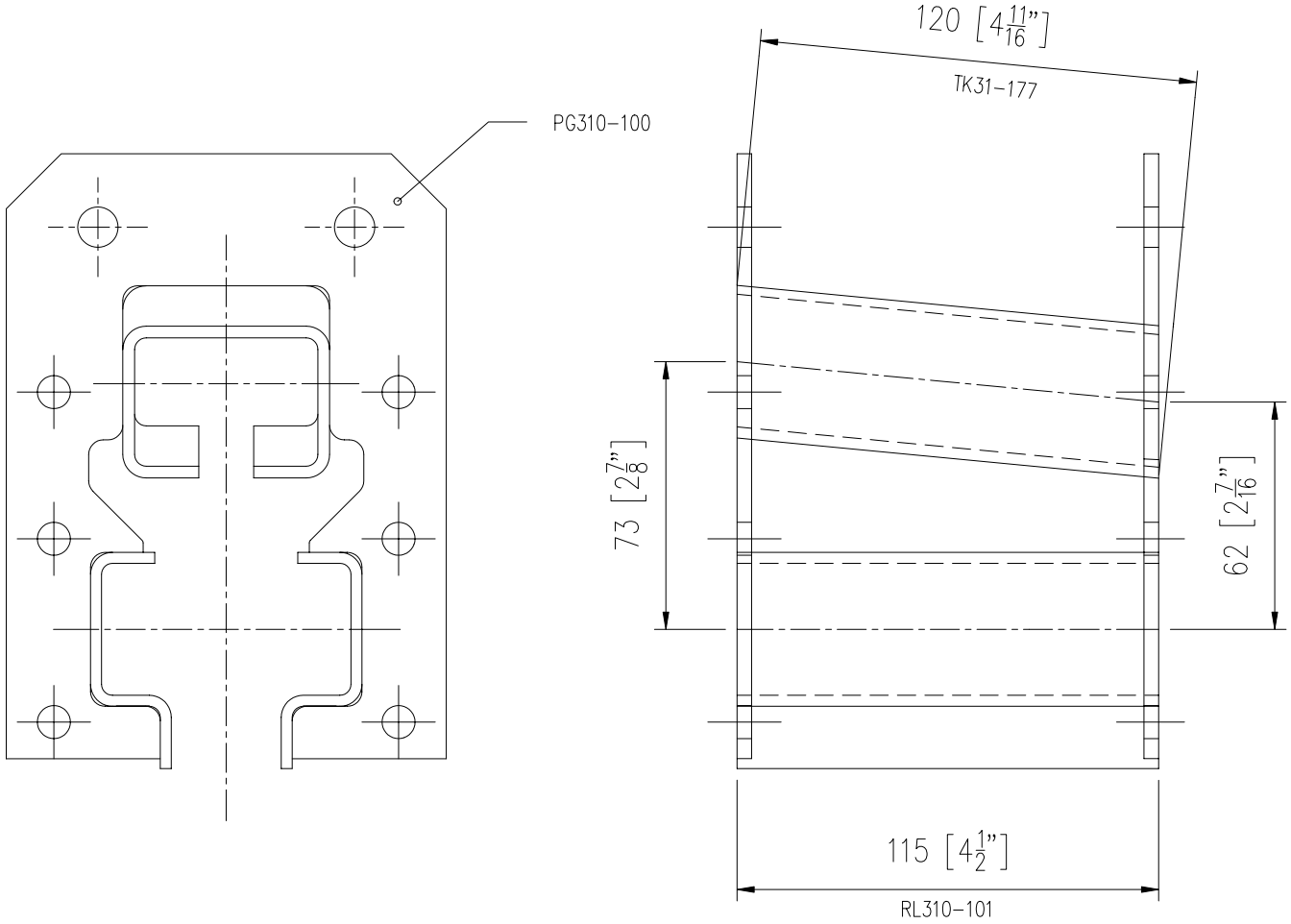
REV	DATE	DESCRIPTION	REV'D BY
A	07/01	INITIAL RELEASE	D.S.

S310 POWER & FREE – ENGINEERING MANUAL

DRAWN BY	D.S.
DATE	JULY, 2001
APPR'D BY	
SCALE	NTS

DRAWING NAME: S310 SQUEEZE DOWN TRACK

PART NUMBER: TK310-164 DRAWING NUMBER: 222 REV A



ITEM	PART NO.	DESCRIPTION	DWG. REF. NO.

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S310 POWER & FREE – ENGINEERING MANUAL

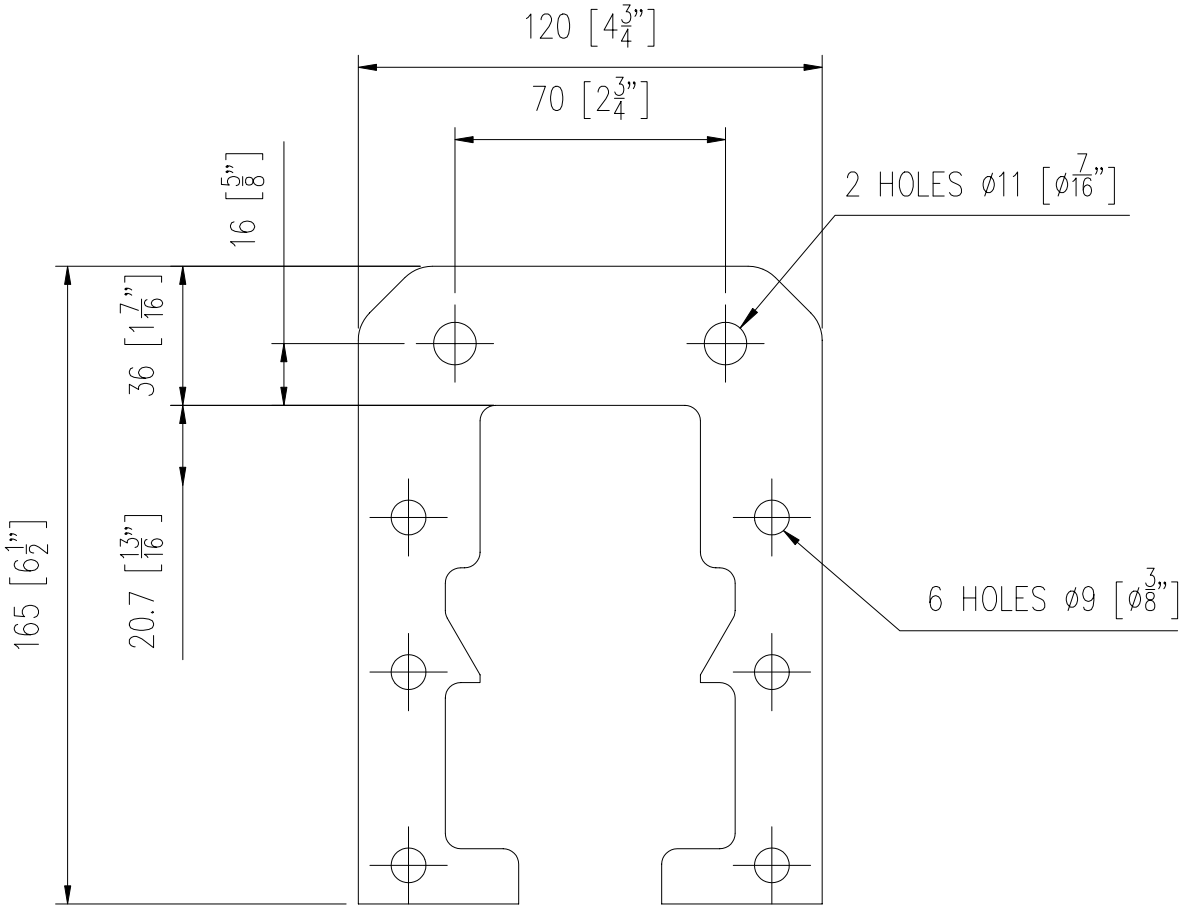
DRAWING FOR CONCEPT PURPOSES ONLY
DIMENSIONS MAY VARY

REV	DATE	DESCRIPTION	REV'D BY
A	07/01	INITIAL RELEASE	D.S.

DRAWN BY	D.S.
DATE	JULY, 2001
APPR'D BY	
SCALE	NTS

DRAWING NAME: S310 TRANSITION PIECE

PART NUMBER: WD310-191 DRAWING NUMBER: 223 REV A



ITEM	PART NO.	DESCRIPTION	DWG. REF. NO.

TORONTO **PACLINE** OVERHEAD CONVEYORS BUFFALO

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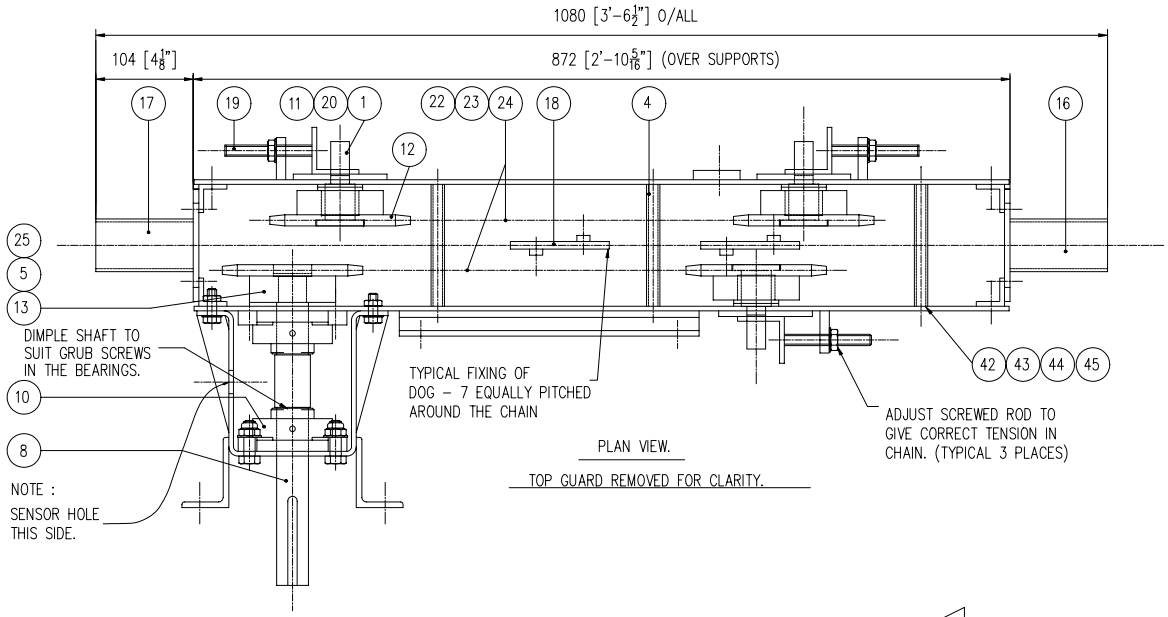
S310 POWER & FREE – ENGINEERING MANUAL

REV	DATE	DESCRIPTION	REV'D BY
A	07/01	INITIAL RELEASE	D.S.

DRAWN BY	D.S.
DATE	JULY, 2001
APPR'D BY	
SCALE	NTS

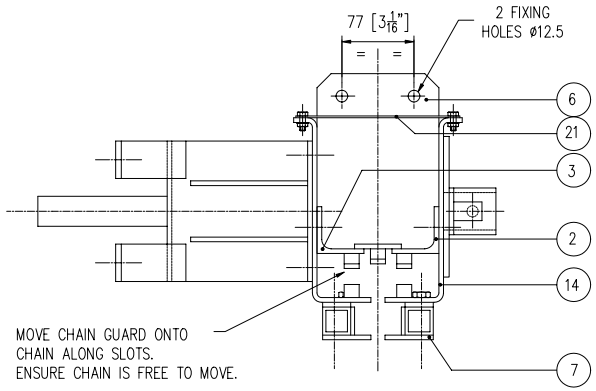
DRAWING NAME: S310 BOLTED ENDPLATE

PART NUMBER: PG310-136 DRAWING NUMBER: 224 REV A

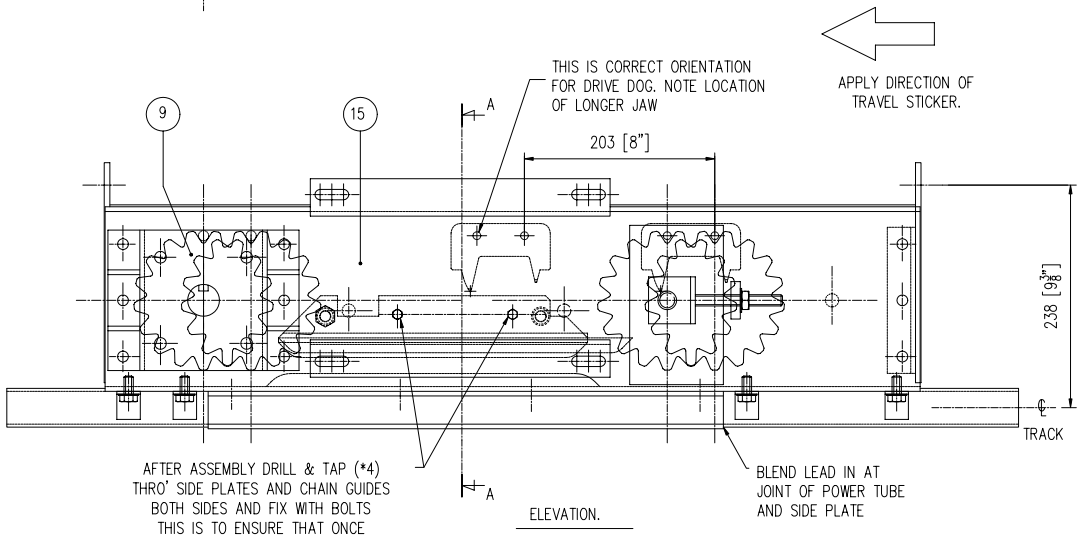


PLAN VIEW.

TOP GUARD REMOVED FOR CLARITY.



SECTION A-A



ELEVATION.

SEE DRAWING 230A FOR BILL OF MATERIAL

ITEM	PART NO.	DESCRIPTION	DWG. REF. NO.

REV	DATE	DESCRIPTION	REV'D BY
A	07/01	INITIAL RELEASE	D.S.

TORONTO **PACLINE** OVERHEAD CONVEYORS BUFFALO

www.pacline.com

S310 POWER & FREE - ENGINEERING MANUAL

DRAWN BY	D.S.	DRAWING NAME:	S310 BASIC INLINE DRIVE		
DATE	JULY, 2001				
APPR'D BY		PART NUMBER:	WD31-317	DRAWING NUMBER: 230	REV A
SCALE	NTS				

ITEM No	PART No	DESCRIPTION	No REQ'D
1	MC30-305	IDLER SPROCKET SPINDLE	3
2	WD31-338	CH. GUIDE C/W HD DN RAIL	1
3	WD31-310	CHAIN GUIDE	1
4	WD31-344	SIDE PLATE SPACER	3
5	MC31-342	SPKT RETAINING WASHER	1
6	PG31-301	END PLATE	2
7	PG31-302	BOTTOM PLATE	2
8	MC30-306	DRIVE SPINDLE	1
9	WD30-314	BEARING MOUNTING	1
10	BG-0002	ASAHI/FAG BRNG UCF 207	2
11	BG-0003	OILITE BUSH FBM 23x30 LG	3
12	MC31-305	17T DRIVEN SPROCKET	3
13	MC31-333	17T SPROCKET DRIVER	1
14	WD31-315	SIDE PLATE R.HAND	1
15	WD31-316	SIDE PLATE L.HAND	1
16	WD31-339	LONG POWER TUBE	1
17	WD31-340	SHORT POWER TUBE	1
18	MC31-3003	DRIVE DOG	7
19	WD30-316	SPROCKET TENSIONER	3
20	MC30-336	32.5I/Dx48O/Dx3thk WASHER	3
21	WD31-313	TOP GUARD	1
22	PN-0278	EXT BRNG PIN LINK NO165	14
23	CH-0279	CHAIN 1"PITCHx7 PITCHES	14
24	CP-0280	'E' CLIP REF.1500/7	14
25	KS-0036	8x7 RECT' KEY x 28 LG	1

ITEM No	PART No	DESCRIPTION	No REQ'D
26	BT-0068	M12x30 HEX HD SET SCREW	4
27	NT-0131	M12 PLAIN FULL NUT	6
28	BT-0099	M10x30 HEX HD BOLT	3
29	NT-0012	M10 PLAIN FULL NUT	6
30	WR-0113	M10x21O/D T1.25 P.WASHER	6
31	WR-0184	M10x16O/D T2.5SQ SP.WASH	22
32	NT-0091	M12 SELF LOCKING NUTS	8
33	NT-0617	M20 SELF LOCKING NUTS	3
34	WR-0010	M12x24O/D T1.6 P.WASHER	10
35	BT-0513	M10x20 SKT HD CAP SCREW	1
36	WR-0007	M20x37O/D T2 P.WASHER	3
37	BT-0261	M10x25 SKT HD CAP SCREW	8
38	SP-0462	M3x16 SELLOC PIN	4
39	BT-0090	M12x40 HEX HD BOLT	8
40	WD30-343	DRIVE SUPPORT FEET	2
41	BT-0098	M10x25 HEX HD SET SCREW	20
42	SR-0286	M10 SCREWED ROD x 170 LG	3
43	NT-0012	MIO FULL NUT	6
44	WR-0184	10 DIA SPRING WASHER	6
45	WR-0113	10 DIA PLAIN WASHER	6

SEE DRAWING 230 FOR ASSEMBLY

ITEM	PART NO.	DESCRIPTION	DWG. REF. NO.

TORONTO **PACLINE** OVERHEAD CONVEYORS BUFFALO

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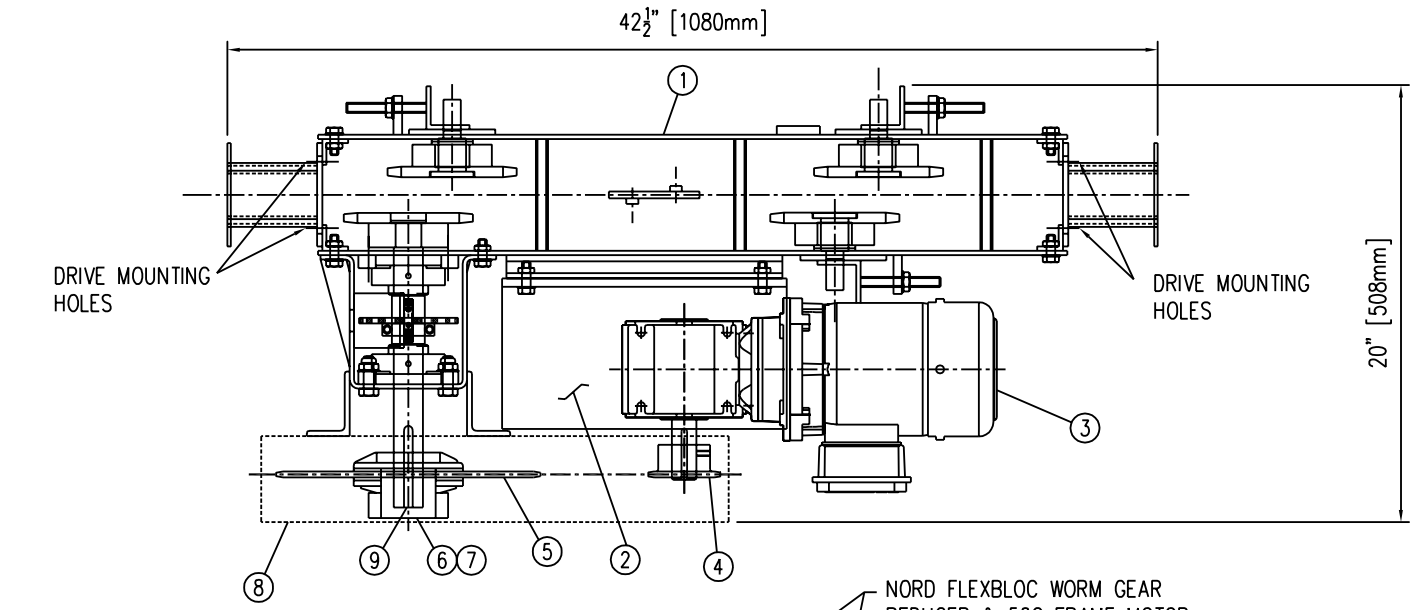
S310 POWER & FREE – ENGINEERING MANUAL

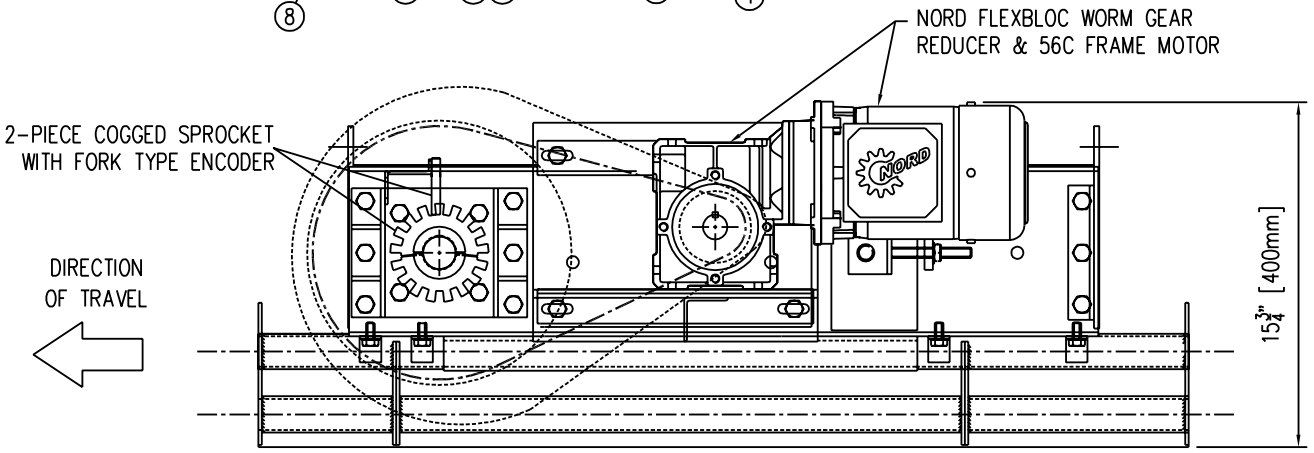
REV	DATE	DESCRIPTION	REV'D BY
A	07/01	INITIAL RELEASE	D.S.

DRAWN BY	D.S.
DATE	JULY, 2001
APPR'D BY	
SCALE	NTS

DRAWING NAME: INLINE DRIVE BILL OF MATERIAL

PART NUMBER: WD31-317 DRAWING NUMBER: 230A REV A





SEE DRAWING 231A FOR BILL OF MATERIAL

ITEM	PART NO.	DESCRIPTION	DWG. REF. NO.

TORONTO **PACLINE** OVERHEAD CONVEYORS BUFFALO

www.pacline.com

S310 POWER & FREE - ENGINEERING MANUAL

REV	DATE	DESCRIPTION	REV'D BY
B	FEB-2017	UPDATED ENGINEERING MANUAL	A.B.
A	07/01	INITIAL RELEASE	D.S.

DRAWN BY	D.S.
DATE	JULY, 2001
APPR'D BY	
SCALE	NTS

DRAWING NAME: S310 INLINE DRIVE

PART NUMBER: DR31-3007

DRAWING NUMBER: 231

REV B

ITEM No	PART No	DESCRIPTION	No REQ'D
1	WD31-317	BASIC DRIVE UNIT	1
2	WD31-3004	MOUNTING PLATE	1
3	SK1SI63	NORD GEAR - MOTOR & REDUCER	1
4		19T SPROCKET 1.125" BORE	1
5	PL-0031	76T SPROCKET C/W BUSH	1
6	TL-0033	T/LIMITER 500M1 35BORE 10x8 TAPER KEY	1
7	CR-0212	500M1 T/L CTR BUSH 0.480" LG SINTERED	1
8	WD30-356	DRIVE GUARD ASSEMBLY	1
9	KS-0035	10x8 GIB HEAD TAPER KEY 160mm LONG	1
	DT31-611	DRIP-TRAY	1
	CH-0032	CHAIN. 1/2" PITCH x 1 FOOT LONG	5
	CH-0038	CONNECTING LINK 1/2" PITCH CHAIN	1
	BT-0132	M10 x 35 HT HEX HD BOLT	4
	BT-0099	M10 x 30 HT HEX HD BOLT	4
	NT-0100	M10 SELF LOCKING NUT	8
	WR-0113	M10 O/D 21 T1.25 PLAIN STEEL	4
	BT-0094	M6 x 16 HT HEX HD SET SCREW	15
	BT-0174	M6 x 20 HT HEX HD SET SCREW	4
	WR-0108	M6 O/D 12.5 T0.8 PLAIN STEEL	19
	NT-0095	M6 PLAIN FULL NUT	16
	RT-0895	1/8 x 3/8 POP RIVET	4
	NE30-337	NAME PLATE FOR DRIVE	1
	GB-1786	KEYED SHAFT	1
	CP-1774	CIRCLIP	1

SEE DRAWING 231
FOR FOR ASSEMBLY

REV	DATE	DESCRIPTION	REV'D BY
B	FEB-2017	UPDATED ENGINEERING MANUAL	A.B.
A	07/01	INITIAL RELEASE	D.S.

ITEM	PART NO.	DESCRIPTION	DWG. REF. NO.

TORONTO **PACLINE** OVERHEAD CONVEYORS BUFFALO
www.pacline.com

S310 POWER & FREE - ENGINEERING MANUAL

DRAWN BY	D.S.	DRAWING NAME:	INLINE DRIVE BILL OF MATERIAL		
DATE	JULY, 2001				
APPR'D BY		PART NUMBER:	DR31-3007	DRAWING NUMBER: 231A	REV B
SCALE	NTS				

LUBRICATION INFORMATION GUIDE

Correct lubrication of the conveyor system is an important issue and cannot be overstressed. Experience has shown that proper lubrication of the conveyor systems is critical to extend the life of the entire system.

The Chain Lubrication Chart on page 49 will help you choose the correct lubricant and grease to use.

There are many factors that effect lubrication recommendations, some of these are as follows:

- Oven Temperature (if any)
- Humidity
- Speed of chain
- Oil viscosity and ambient temperature
- Process vapors (alkali fumes, steam, solvent vapors, etc.)
- Load on chain
- Length of chain
- Atmospheric contaminants such as rust, dust, lint, paint over spray, etc.

Operational reliability and trouble free service of high performance conveyor equipment depends on correct selection and permanent use of high quality specialized lubricants. The recommended lubricants listed on page 49 are proven integral machine elements and have been selected to provide extended lubrication intervals under extreme conditions.

IMPORTANT

- Failure to comply with the recommended lubricants could result in voiding of equipment warranty.
- Mixing of lubricants must be avoided and may result in reduced performance.
- Lubricants should be applied in the quantities specified to prevent over lubrication and environmental contamination.
- Lubrication intervals are dependant on service conditions, operating hours, design construction and environmental conditions. Each conveyor installation must be reviewed individually and lubrication intervals determined in accordance with operating conditions.

There is no such thing as an all purpose lubricant that will satisfy each individual application. It is necessary for the end user to accept the responsibility for providing their own lubricant and set up their own lubrication maintenance procedures. Information on recommended lubricant can be seen on page 49.

In general, short conveyor systems operating with light loads under normal temperatures require moderate lubrication, which can be applied manually or with a brush type lubricator. It is recommended, however, that shot type lubricators be used on long lines or when operating the system through paint booths, washers, ovens, etc.

In addition to the conveyor chain, the Drive Unit requires periodic lubrication. Gear reducers are generally sealed for life, but each one should be checked prior to starting a new conveyor. In-line Drive chains and sprockets should be periodically lubricated. It is recommended to use the same lubricant that is used for the conveyor chain to avoid incompatibility problems. Placing the conveyor chain lubricator on the in-feed side of the Drive Unit may offer the in-line Drive chain adequate coverage.

The sliding members of the Take-Up Unit require greasing at periodic intervals. It is not recommended to locate the Take-Up in an area below 30°F (-1.11°C) or above 190°F (87.7°C).

Lubricant specifications are divided into three stages, depending on operating temperature. These stages, however, are simply general recommendations and may vary depending on the layout and application of the conveyor. For unusual applications or complicated layouts, please consult Pacline to recommend the most suitable lubricant.

CHAIN LUBRICATION CHART

Temperature Range	0°F – 100°F (-17.7°C – 37.7°C)
Lubricant Number	**PL-30**
Description	This is a high quality standard duty chain lubricant designed to cling to metal parts to prevent dripping onto products being conveyed.
Specifications	SAE 30 Viscosity: 700 at 100°F (37.7°C) High flash point 383°F (195°C)
Temperature Range	100°F – 450°F (37.7°C – 232.2°C)
Lubricant Number	**PL-217**
Description	Manufactured from diester based synthetics and contains "moly". Protects against rust and corrosion while helping to maintain a clean surface. High polarity keeps the lubricant on the chain and prevents dripping.
Specifications	SAE 50 Viscosity: 856 at 100°F (37.7°C) High flash point 480°F (295°C)
Temperature Range	**450°F – 800°F (232.2°C – 426.6°C) – CONSULT PACLINE**

SPEED REDUCER LUBRICATION CHART (For non-sealed units)

Lubricating oil must have a viscosity sufficient to reduce friction and allow the speed reducer to operate smoothly under high load and impact. Consult table below for the choice of lubricant. Where a wide temperature range is expected, the synthetic oil EXXON SHC 629 is recommended. Please advise Pacline engineering when operating the reducers under special conditions such as high or low speed, high temperature, or heavy loads.

Room Temperature F	Room Temperature C	Operating Temperature F	Operating Temperature C	Oil Grade	Texaco	Shell	Exxon	
-22 to 32	-30 to 0	under 158	under 70	80W90	Mepora 150	Omala 150	Spartan EP 150	
		158 to 212	70 to 100	80W110	Mepora 320	Omala 320	Spartan 320	SHC
32 to 77	0 to 25	under 158	under 70	80W110	Mepora 320	Omala 320	Spartan 320	
		158 to 212	70 to 100	80W110	Mepora 320	Omala 320	Spartan 320	
Over 77	Over 25	under 158	under 70	80W140	Mepora 460	Omala 460	Spartan 460	629
		158 to 212	70 to 100	80W140	Mepora 460	Omala 460	Spartan 460	

SYNTHETIC MULTI-PURPOSE GREASE

Super Lube® Grease is a patented synthetic NLGI grade 2 heavy-duty, multipurpose lubricant with PTFE. Synthetic base fluids and the addition of PTFE micro powders combine to form a premium lubricant that provides longer life protection against friction, wear, rust and corrosion. Machinery lasts longer, downtime is reduced, and productivity is increased. Super Lube® is compatible with most other lubricants and will not run, drip, evaporate or form gummy deposits, and will not melt or separate.

Super Lube® is Food Grade, rated H-1 by the USDA and NSF for incidental food contact. It is an excellent Dielectric and operates over a temperature range from -45° to 450° F.

TROUBLE SHOOTING GUIDE

SYMPTOM	COMPONENT	PROBABLE CAUSE	REMEDY
EXCESSIVE WEAR ON INSIDE OF HORIZONTAL TURNS	TRACK	EXCESSIVE CHAIN TENSION.	SEE EXCESSIVE CHAIN TENSION BELOW.
		FROZEN OR SLUGGISH HORIZONTAL GUIDE BEARINGS.	REMOVE BEARINGS FROM CONVEYOR AND CLEAN OR REPLACE
CHAIN TAKE-UP SLUGGISH OR FROZEN	TAKE-UP	DRY OR DAMAGED EXPANSION JOINTS.	LUBRICATE IF DRY AND REPLACE WITH NEW EXPANSION JOINTS IF DAMAGED.
		EXCESSIVE CHAIN TENSION.	ADJUST TAKE-UP TENSION.
		BEARING MISALIGNED OR FROZEN WITH DIRT AND GREASE RESIDUE.	CLEAN THROUGHLY AND RELUBE FOR FREE TRAVEL.
EXCESSIVE CHAIN BEARING AND CHAIN PIN WEAR	CHAIN	LACK OF LUBRICATION.	LUBRICATE CHAIN AND BEARINGS.
OR		SLUGGISH OR FROZEN BEARINGS.	REMOVE BEARINGS FROM CONVEYOR AND CLEAN OR REPLACE
EXCESSIVE CHAIN TENSION		CONVEYOR OVERLOAD	PACLINE CONVEYORS ARE DESIGNED TO ACCEPT TEMPORARY OVERLOADS, BUT CANNOT CONTINUOUSLY OVERLOAD. ENSURE CONVEYOR LOADING DOES NOT EXCEED THE DESIGN LOAD.
EXCESSIVE SLACK CHAIN	CHAIN	CHAIN GROWTH THROUGH NORMAL WEAR	IF TAKE-UP IS FULLY EXTENDED, REMOVE LINKS OF CHAIN (IN SOME APPLICATIONS IT IS REQUIRED THAT A SET LENGTH OF CHAIN BE REMOVED).
			CHECK MAINTENANCE MANUAL AND CONSULT PACLINE ENGINEERING DEPARTMENT IF UNSURE.
LAPPING OR PULSATING CATERPILLAR DRIVE CHAIN IN THE DRIVE UNIT	DRIVE	DRIVE CHAIN TOO LOOSE	ADJUST DRIVE TAKE-UP UNIT UNTIL CHAIN IS SNUG; DO NOT REMOVE ANY LINKS OF CATERPILLAR CHAIN.
		OVERLY WORN CHAIN DOGS NEEDING REPLACEMENT	REPLACE DRIVE DOGS AND ALSO REPLACE CATERPILLAR CHAIN IF REQUIRED.
EXCESSIVE CHAIN SURGE	CHAIN	EXCESSIVE SLACK CHAIN	SEE EXCESSIVE SLACK CHAIN.
		SLUGGISH OR FROZEN BEARINGS	REMOVE BEARINGS FROM CONVEYOR AND CLEAN OR REPLACE
		CAUSE UNKNOWN	CONSULT PACLINE ENGINEERING DEPARTMENT
DECREASE IN CONVEYOR SPEED	DRIVE	CONVEYOR CHAIN PULL IS EXCESSIVE	SEE EXCESSIVE CHAIN TENSION ABOVE.
			CONSULT PACLINE ENGINEERING DEPARTMENT
EXCESSIVE NOISE IN REDUCER	DRIVE	REQUIRES LUBRICATION	FILL REDUCER WITH OIL TO LEVEL PLATE OR IF NEEDED CHANGE OIL
		OIL LEAK	TIGHTEN ALL BEARINGS CAPS AND PIPE PLUGS AND ADD LUBRICATION
		WORN OR BROKEN GEAR	DISASSEMBLE REDUCER AND REPLACE DAMAGED GEAR OR REPLACE REDUCER
DRIVE STOPPED	DRIVE	OVERLOAD LIMIT SWITCH	LOCATE AND ELIMINATE CAUSE OF OVERLOAD AND RESTART CONVEYOR.
		POWER FAILURE	CHECK POWER SUPPLY
MOTOR RUNNING HOT	DRIVE	CONVEYOR CHAIN PULL EXCESSIVE	SEE EXCESSIVE CHAIN TENSION ABOVE.
			INSPECT ELECTRICAL WIRING AND CONTROLS AND CHECK MOTOR BRAKE (IF APPLICABLE)
CONVEYOR STOPS OPERATING	VARIABLE SPEED CONTROLLER	OVERLOAD CONDITION	CHECK SETTABLE PARAMETERS IN VARIABLE SPEED CONTROLLER
			CHECK FOR JAMMED CHAIN / CARRIERS
			CHECK CHAIN FOR LUBRICATION

ADDITIONAL TROUBLE SHOOTING NOTES

Chain is Jammed

1. A slight cocking of one or two chain pendants is evidence of a jammed condition and it may be confirmed by manually jogging Drive in reverse less than 6". The chain will give a definite "jump" as the jammed link releases. A common cause of this type of jam is slack chain and the Take-Up may be fully extended. Adjust the Take-Up springs so that there is a gap of approximately 3/16" (4.7625 mm) between coils. If this does not free the chain, or if the Drive stalls again, examine the system for further problems, as it is possible for this type of jam to be the result of another problem elsewhere in the system.
   Warning: Reversing conveyor chain more than 12" can result in damage to stop units, trolleys or other components.
2. Make sure that the chain is not jammed at the Drive Unit. Then pull tight by manually operating the Drive in the normal direction of travel until the Torque Limiter slips.
3. As you move along the system, test the tension in the chain by attempting to move the pusher dogs. "Upstream" from the Drive, the chain will tend to be tight until the obstruction is reached. "Downstream" from the Drive, the chain will tend to be loose up to the obstruction.
4. Pusher dogs caught on slight misalignments at track joints. This type of problem usually manifests itself and is corrected during system commissioning. This problem may suddenly appear in an older system when a jammed pusher dog catches on a misalignment that was out of the normal path of travel. A good way to check for this type of jam is to tap the chain on both sides of every track joint with a light hammer. The chain will "jump" when the caught pusher dog is freed. Filing or grinding the misaligned track will correct this problem.
5. Foreign objects such as a small screw, nut, etc., inserted somehow in the track slot. This type of jam is often very difficult to detect unless the foreign object happens to protrude past the slot. It can be cleared by operating the Drive in the forward direction until the offending object drops out.
6. Worn track slot. Occasionally the track slot, particularly in the vicinity of a horizontal or vertical curve will become worn by constant action of the chain pusher dog to the extent that the chain wheels begin to drop into the slot and jam. This is usually due to a misaligned slot in the adjacent curve. Since all chain track curves are hardened on the inside curve, the curve itself will show very little wear. Examine the curve to see if the chain pusher dogs consistently rub hard on one side of the slot or the other. If so, the best thing to do to correct this condition completely is to replace both the curve and the adjacent worn straight track. A sure sign of curve slot misalignment is a raised burr along one edge of the slot. Another cause of slot wear is excessive side thrust on pusher dogs or load carriers due to unbalanced loads or careless loading or unloading of the system. Often a simple freeline anti back up or guide will correct slot wear at load and unload areas, while improved supervision is required to assure balanced loading.
7. Sometimes the Torque Limiter will slip intermittently without completely stalling. The result will be a surging chain. It is often possible to diagnose the cause of the problem by analyzing the frequency of the Torque Limiter slippage. Refer to Torque Limiter Slippage on page 52.
8. If the Torque Limiter slips with the same frequency that a load fixture or carrier passes any one point in the system, this is almost proof positive that the load fixtures themselves are catching or binding somewhere in the system.
9. If the system is unevenly loaded, you may find the Torque Limiter slipping only when there are heavy loads on the inclines while the declines are empty or lightly loaded. This is one instance where it may be necessary to tighten the Torque Limiter, providing other conditions such as Take-Up Unit adjustment and chain lubrication have been thoroughly checked and are satisfactory.
10. Improperly peened chain rivet. Since the chain is shipped in 10' (3.048 m) lengths and joined together in the field by means of a splice rivet, it may be that the head of the splice rivet was not properly peened down. The rivet thus would extend out too far and may catch on a slight irregularity inside the track,

usually at a joint. This type of jam will release when you tap an adjacent pusher dog with a light hammer. Hang a wire or other identifying mark on the pusher dog and run the Drive until that portion of the chain reaches the Drive or a track Maintenance Unit section, where it can be examined and repaired or replaced.

11. Broken chain. If the chain breaks cleanly, the location of the break can be easily discovered. Sometimes, however, only one side plate of the pair will fracture, or a rivet will pull out on one side only, and the broken side will dig into the track. This type of break is evident by unnaturally cocked pusher dogs. In either case, the damaged portion of the chain must be moved around the system to the Drive or to a Maintenance Unit section and repaired. The best way to do this is to grip the next pusher dog "upstream" from the break with a pair of vise grip pliers and pull hard on it in the normal direction of travel, trying to keep it aligned, while someone else "jogs" the Drive a couple feet at a time toward the nearest Maintenance Unit section or to the Drive.

Loads Not Moving

A few of the possible causes of jammed loads are:

1. Improper loads on system, loads or carriers caught on each other at vertical or horizontal track curves or catching on obstructions in tight clearance areas.
2. Load or carriers caught on obstructions due to excessive swing at some point in the system. Usually some form of simple guarding will prevent this happening again.
3. Broken or bent load fixtures or carriers caught in tight clearance areas. Load carriers should always be kept in good repair.
4. Jams caused by push carts, hand or lift trucks, skid pallets, boxes, etc., left in the path of conveyor travel. Guards, or at least lines painted on the floor, will help keep problem areas clear.
5. Load carriers jammed on conveyor guards. The most frequent causes of this is allowing spilled loads to accumulate in the underguarding. Good housekeeping and correcting the cause of spillage will eliminate this.
6. Ladders, scaffolding and other maintenance equipment left in the conveyor path.
7. Damaged trolleys (flappers, wheels, etc).

Lubricator Unit Problems

Conveyor brush type lubricators have only two moving parts – the actuating valve and the piston rod of the pump cylinder.

If these are not working, check:

1. That the cylinder is working: remove the metering screw and insert a thin rod to contact the end of the pump ram. Actuate the valve and forward movement of the ram should be felt – if not, either the valve or the cylinder is defective. If the latter, do not attempt to dismantle it from the pump block, but return either the pump unit alone or the complete reservoir and pump assembly to PACLINE, who will replace it at a nominal cost. (Free, within the 12-month warranty period).
2. If the valve and pump unit are working but no oil is being ejected, the non-return valve or the delivery pipe is probably obstructed by dirt.

Torque Limiter Slippage

The following is a recommended checklist of the more common causes of Torque Limiter slippage:

1. If the conveyor system should suddenly stall for some undetermined reason, check the Drive immediately. If the motor is running but the Drive sprocket is not turning, the Torque Limiter is slipping.

   AT THIS POINT DO NOT TIGHTEN THE TORQUE LIMITER! THIS IS THE LAST THING TO DO. TURN OFF THE DRIVE IMMEDIATELY.

   Clutch slippage should be kept to the absolute minimum. If the motor is running and the chain does not move, check the Torque Limiter fitted to the transmission chain wheel on the Drive Unit head shaft, to see if this is "slipping". If so switch off, remove the chain guard and adjust each of the three set bolts located and equally spaced round a brass ring. Make only small incremental adjustments, trying the conveyor between adjustments until it moves. Then give a further quarter turn to each bolt. Normally this adjustment should not be necessary until loads are placed on the system.

2. It is worthwhile making alignment marks, one on the chain wheel sprocket and the second would be on the torque limiter itself. If these move relative to each other, "slip" has occurred. The ideal setting for the Torque Limiter is to allow for slip to take place if any slight overload is applied to a fully loaded system. This protects the equipment in case of a "jam".

   ATTENTION: The mechanical Torque Limiter is designed to protect the chain, but not the carrier or the product. The friction in the Torque Limiter may be sufficient to damage the product or the carrier, without stopping the conveyor. (If fitted with an electronic overload protection, refer to the instruction manual.)

3. Sometimes the Torque Limiter will slip intermittently without completely stalling. The result will be a surging chain. It is often possible to diagnose the cause of the problem by analyzing the frequency of the Torque Limiter slippage. Refer to Torque Limiter Slippage on page 53.

4. If the Torque Limiter slips with the same frequency that a load fixture or carrier passes any one point in the system, this is almost proof positive that the load fixtures themselves are catching or binding somewhere in the system.

5. If the system is unevenly loaded, you may find the Torque Limiter slipping only when there are heavy loads on the inclines while the declines are empty or lightly loaded. This is one instance where it may be necessary to tighten the Torque Limiter, providing other conditions such as Take-Up Unit adjustment and chain lubrication have been thoroughly checked and are satisfactory.

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June 2017