

Installation, Operation, Maintenance Manual



NBS[®], NBS[®]30, NBS[®]90
Narrow Belt Sorter

NBS-AL-ALUMINUM RAIL
SORTERS

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Purpose

It is the intent of MHS Conveyor, through this manual, to provide information that acts as a guide in the installation, operation and maintenance of MHS Conveyor NBS sorters including NBS 30, NBS 90 and NBS 90SP.

This manual describes basic installation practices, assembly arrangements, preventive maintenance and assists in replacement parts identification.

This service manual is intended for use by personnel who are knowledgeable of installation and safe working practices on conveyor systems.

Not all applications and conditions can be covered; therefore, this manual is to be used **ONLY** as a guide.

If additional copies of this manual are needed or if you have any question concerning the conveyor please contact your Business Partner or MHS Conveyor Customer Support at 231-798-4547.

Equipment Warranty

MHS Conveyor warrants that the material and workmanship entering into its equipment is merchantable and will be furnished in accordance with the specifications stated.

MHS Conveyor agrees to furnish the purchaser without charge any part proved defective within 2 years from date of shipment or before the equipment has forty-one hundred (4100) hours of running use, whichever period is shorter, provided the purchaser gives MHS Conveyor immediate notice in writing and examination proves the claim that such materials or parts were defective when furnished. For drive components specific to XenoROL® (i.e. Xeno belts, slave Xeno belts, drive spools, standard and speed-up, and spacers), this warranty shall be extended to five years or ten thousand (10,000) hours of running use, whichever period is shorter, provided the conveyors are applied, installed and maintained in accordance with MHS Conveyor published standards. Other than the above, there are no warranties which extend beyond the description on the face hereof. Consequential damages of any sort are wholly excluded.

The liability of MHS Conveyor will be limited to the replacement cost of any defective part. All freight and installation costs relative to any warranted part will be at the expense of the purchaser. Any liability of MHS Conveyor under the warranties specified above is conditioned upon the equipment being installed, handled, operated, and maintained in accordance with the written instructions provided or approved in writing by MHS Conveyor.

The warranties specified above do not cover, and MHS Conveyor makes no warranties which extend to, damage to the equipment due to deterioration or wear occasioned by chemicals, abrasion, corrosion or erosion; Purchaser's misapplication, abuse, alteration, operation or maintenance; abnormal conditions of temperature or dirt; or operation of the equipment above rated capacities or in an otherwise improper manner.

All equipment and components not manufactured by MHS Conveyor carry only such warranty as given by the manufacturer thereof, which warranty MHS Conveyor will assign or otherwise make available to Purchaser without recourse to MHS Conveyor, provided that such warranty is assignable or may be made available.

IMPORTANT

For service on motors, reduction units, electrical components, controls, air or hydraulic cylinders, contact the local authorized sales and service representative of respective manufacturer. If none is available in your locality, contact the MHS Conveyor representative. MHS Conveyor will not be responsible for units that have been tampered with or disassembled by anyone other than the authorized representative of the respective manufacturer.

THERE ARE NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, EXTENDING BEYOND THOSE SET FORTH IN THIS STATEMENT OF WARRANTY.

Rev 04/08/2009

Warnings & Safety Instructions

Failure to follow the instructions, warnings, cautions (throughout this booklet) and warning labels (on the conveyor) may result in injury to personnel or damage to the equipment.

Your MHS Conveyor NBS Narrow Belt Sorter is powered by a motor and can be stopped only by turning off electrical power to the motor. As with all powered machinery, the drive and driven sprockets, chains, and pneumatically actuated devices present a danger. We have installed or provided guards to prevent inadvertent contact with these components along with warning labels to identify the hazards. **After maintenance, REPLACE guards immediately. Keep ALL warning labels clean and clear of any obstructions.**

Be sure to read and heed all Warnings. Warnings and Cautions are included throughout this manual and are defined as follows:

Warning ---- A notice which, if not followed, could result in serious injury to personnel.

Caution ---- A notice which, if not followed, could result in damage to equipment.

A thorough understanding and compliance with these Warnings and Cautions will greatly reduce the possibility of personnel injury or equipment damage.

Never remove, deface or paint over any labels. Any damaged label will be replaced by MHS Conveyor Corp. at no cost by contacting the Distributor Services Department.

WARNING

Do not perform maintenance on the conveyor until the start-up controls are locked out and cannot be turned on by any person other than the one performing the maintenance. If more than one member of a crew is working on the conveyor, **EACH CREW MEMBER MUST HAVE A LOCK ON THE POWER LOCK OUT.** The air pressure must be turned off to the work area. All pneumatic devices must be de-energized to prevent accidental cycling of the device.

Make sure personnel are clear of all conveyor equipment before restarting the system.

It is very important to instruct personnel in proper conveyor use including the location and function of all controls. It is important to establish work procedures and access areas which do not require any part of a person to be under the conveyor. It should be required that long hair is covered by caps or hair nets and the wearing of loose clothing or jewelry when working at or near the conveyor be prohibited.

Maintain enough clearance on each side of the unit for safe adjustment and maintenance of components. Provide crossovers at sufficient intervals to eliminate the temptation to climb over or under any conveyor. Prohibit riding or walking on conveyor by anyone.

WARNING

Before servicing or performing any work in the motor control panel, disconnect and lockout the main incoming service. If only the panel disconnect is off, the incoming side will still be hot.



Warning examples on conveyor frames.



Package Conveyors



 <p>Do Not Climb, Sit, Stand, Walk, Ride, or Touch the Conveyor at Any Time</p>	 <p>Do Not Perform Maintenance on Conveyor Until Electrical, Air, Hydraulic and Gravity Energy Sources Have Been Locked Out and Blocked</p>	 <p>Operate Equipment Only With All Approved Covers and Guards in Place</p>
 <p>Do Not Load a Stopped Conveyor or Overload a Running Conveyor</p>	 <p>Ensure That All Personnel Are Clear of Equipment Before Starting</p>	 <p>Allow Only Authorized Personnel To Operate or Maintain Material Handling Equipment</p>
 <p>Do Not Modify or Misuse Conveyor Controls</p>	 <p>Keep Clothing, Body Parts and Hair Away from Conveyors</p>	 <p>Remove Trash, Paperwork and Other Debris Only When Power is Locked Out</p>
 <p>Ensure That ALL Controls and Pull Cords are Visible and Accessible</p>	 <p>Know the Location and Function of All Stop and Start Controls</p>	 <p>Report All Unsafe Conditions</p>

POST IN PROMINENT AREA

Definition of Terms

<u>KEY WORD</u>	<u>ABBREVIATION</u>	<u>DESCRIPTION</u>
AIRBAG		Inflatable lifting device used in NBS30
BEARING	"BRG"	Low friction rotating or sliding device
BELT	"BLT"	Flexible load carrying surface or O-ring
BETWEEN-FRAME	"BF"	The distance between conveyor side frames
BRACKET	"BRKT"	Attachment between a main and another part
CHANNEL	"CH"	Structural side member of conveyor equipment
CONNECTOR	"CONN"	Adapts and holds two other parts together
CROSSMEMBER	"XM"	Holds channels apart in NBS bed sections
DIVERTER		NBS30 module
DRIVE	"DR"	Power unit at the discharge end of NBS sorter
ELEVATION	"EL"	Top-of belt height above base surface
ENCODER		Electrical distance counter used to track package location
ENDPULLEY	"E-PULL"	6" diameter roller at charge end of NBS sorter
EXTRUSION		Aluminum base that holds UHMW belt strips
FEET PER MINUTE	"FPM"	Speed sorter belts are traveling
FILTER / REGULATOR		Combination air pressure regulator / air filter
FLOOR STAND	"FS"	Name for conveyor bed support
FLOW CONTROL		Needle valve used to control airflow
FOOTPAD		Part used to distribute load from a jackscrew
GEARMOTOR	"GEARMTR"	One piece gear-reducer motor assembly
GUARD RAIL	"GR"	Angle or channel used to keep product on NBS
GUARD	"GRD"	Any part used to protect area for safety reasons
IDLER		Un-driven pulley used as a tensioning device
ITEM NUMBER	"IT #"	MHS-ERMANCO part identification number
JOB NUMBER	"C010 _ _ _ _"	Original factory tracking order number
KEY		Square locking device used on rotating shafts
KIT		Group of several parts with a single item number
LACED	"LCD"	The condition of a correctly installed lacing
LACING		Type or method of joining belts together (splice)
LIFT FRAME		The lifting structure of a NBS90 transfer
LIFT TABLE		Assembly that guides the NBS30 wheels upward
LOCKNUT		Self-locking fastener that resists vibration
LOCTITE		A thread-locking adhesive that resists vibration
LOOSE PARTS	"LP"	Individual parts that must be installed in the field
MULTI-BELT	"MBLT"	Another name that describes NBS equipment
MODULE	"MOD"	A self contained mechanical assembly
MOUNT	"MNT"	Part used to hold another, similar to a bracket
MOUNTING	"MTG"	Location and fasteners to attach a mount
MOTOR	"MTR"	Rotational power source usually using electricity
MUFFLER		Device used to reduce the noise of exhausted air
NATIONAL PIPE THREAD	"NPT"	Standard identifier for USA tapered pipe sizes
PHOTOEYE	"PE"	Optical sensing device used for product control
PLATE	"PL"	Flat piece of metal usually bolted on for strength

KEY WORD	ABBREVIATION	DESCRIPTION
PROGRAMMABLE		Self-contained programmable control unit that
LOGIC CONTROLLER	“PLC”	Can control several input and output devices
O-RING		Polyurethane cord belts of differing lengths
PULLEY		Roller described by diameter and body length
REDUCER	“RED”	A C-face motor mount right-angle worm gearbox
REFLECTOR		Target used to reflect a light back to a photo eye
REGULATOR	“REG”	Air device that reduces pressure to usable level
RETAINER		Part used to mechanically lock a part in place
ROLLER		Described by axle size and BF dimension
ROLLER CHAIN	“RC”	Roller link chain used for power transmission
SCANNER		A device that recognizes products by bar codes
SCHEMATIC		Line drawing of a electrical or pneumatic circuit
SCREW		A threaded fastener also called a bolt
SEAL		Sealing device on a rotating shaft or cylinder rod
SMART DISTRIBUTED		The name for a proprietary software / hardware
SYSTEM	“SDS”	Network control system marketed by Honeywell Inc.
SHAFT		Round steel rod described by diameter and length
SHEAVE		A grooved disc that guides a V-belt or O-ring
SHIM		Thin piece of metal, used to fill up a space
SKATEWHEEL	“SW”	2” diameter X 5/8” wide X 1/4” axle hole roller
SMILEY	“J”	(See standhead)
SOCKET	“SOC”	Hex shaped hole in an Allen screw
SOLENOID	“SOL”	An electrically operated multi-position air valve
SPACER		Thick washer or tube that a fastener passes thru
SPLICE		Area where similar materials are joined together
SPRING	“SPR”	Coiled wire device used for un-powered return
SPROCKET	“SPKT”	Wheel with shaped teeth that engage roller chain
SPUR		Transition bed between a diverter and exit lane
STANDHEAD		Pivoting bracket that attaches support to the bed
STARTER		Electrical relay that energizes the drive motor
TAG		Number that identifies unit in system lay-out
TAKEUP		Assembly used to remove slack from a belt / belts
TEE		A part with three connections locations
TENSIONER		A pneumatic, spring, or static take-up device
THREADED FULL LENGTH	“TFL”	Adjusting bolt used in take-up/tracking applications
TRANSFER	“TRNS”	NBS90 and NBS-SP module
ULTRA HIGH		Industry standard term for the hard milky white
MOLECULAR WEIGHT	“UHMW”	polyethylene used in wear strip applications
VALVE		An air shut-off or switching device
VENT		Small hole in gearbox to allow hot air expansion
WEARSTRIP		Low-friction material used to reduce rubbing wear
WELDMENT	“WLDMT”	Any part that requires welding in its manufacture
VFD		Variable Frequency Drive for motor speed control

Introduction to Narrow Belt Sortation

CONCEPT

The MHS Conveyor NBS Narrow Belt Sorter technology was developed to provide an economic alternative to existing sortation devices, as well as providing sorting options that were not easily available. This technology is similar to sorters that use wide flat load carrying belts and pop-up wheels to divert product but has eliminated many of the high cost / maintenance features associated with these sorters. Limitations on availability of bi-directional diverts, long divert lane center-line distances, as well as the high costs associated with the skilled labor required to install these wide belt units have been addressed with this new technology.

FEATURES AND BENEFITS

Features and benefits common to the NBS 30, NBS 90, and NBS 90SP technology include:

- Product is continuously carried on multiple narrow belts for smooth bump-free conveying and excellent tracking accuracy
- Narrow belts slide on low friction UHMW guides, resulting in reduced noise and virtually eliminating tracking problems
- Multiple narrow belts are progressively guided through the sorter to minimize belt tracking issues
- Narrow belts run flat and straight through NBS modules without snubbing or back-wrapping resulting in reduced horsepower requirements
- Simple user-friendly design allows ease of installation and maintenance
- Compact modular design of modules allows closer divert/transfer lane center distances
- Modularity and universal mounting of modules allows easy repositioning or reconfiguration in the field
- Gravity take-aways or spurs may be used in many applications to lower initial costs
- NBS technology costs less than conventional full width belt sorters in material as well as installation costs

NBS 30 AND NBS 30 WAVE™



- Simple 30 degree diverter design means less maintenance and higher uptime
- Diverters use proven true vertical lift for reliability, consistency and low cost
- High friction, diverter wheels with precision bearings for positive quiet sorting

NBS 90 AND NBS 90SP



- Separate drive within the transfer module allows a space saving single or bidirectional unit
- Coated rollers allow positive product acceleration and transfer rate
- Pickup of product "on the fly" allows maximized sort rate

NBS Application

NBS Selection Guidelines

Use NBS When:

- Medium to high speed sortation is required
- Product may be same size and weight, or mixed
- Product weight: 1-75 lbs, 1500 lbs. total load
- Product size: 6" X 9" Min -- 28" X 28" Max
- Ambient temperature is +35° to 100°F (50° to 100°F for NBS 30 WAVE™ Aligner.)

APPLICATION NOTES

1. Matching conveyor rates before and after NBS sortation are vital to proper application decisions.
2. The take-away lanes from NBS can be either skatewheel/gravity (used as a deceleration area), or powered conveyor, run at a speed, which can receive products as fast as they are released from the NBS.
3. The maximum divert rate for a NBS 30 is 100 CPM (18" X 18" cases moving at 300 feet per minute); for NBS 30 WAVE it is 150 CPM at 425 FPM; for NBS 90 it is 60 CPM, and single-direction, bi-directional rate it is 50 CPM.
4. When feeding NBS sortation, use a split metering belt to singulate individual products with a minimum gap of 18". For NBS 30 WAVE, minimum gap is 6".
5. For NBS30 justify all products along the divert lane side of the NBS sorter.
6. When the NBS over-all-length is over 100', an adjustable screw belt take-up unit must be installed to allow a greater degree of belt take-up than is available from the main NBS drive take-up.
7. The maximum length of a NBS sortation conveyor, including an adjustable screw belt take-up unit, is 150'. Max for NBS 30 WAVE is 100', subject to 500 lbs. max belt pull limit.
8. The gearmotors used for NBS drives are all VFD (variable frequency drive) rated.

CAUTION

The use of a VFD (VARIABLE FREQUENCY DRIVE) is required for NBS drive motor control. Ignoring this point may void the belt and motor manufacturer's warranty.

GENERAL CONSIDERATIONS

ELEVATION (TOB)

The minimum elevation at the discharge end of an NBS sortation line is 24". The drive unit is located there and requires a space 24" high by 60" long by the frame width. Extra room along side the drive should be provided to allow maintenance personnel access to either side of the drive unit.

DIVERT LOCATIONS

- The leading edge of the first divert module must be a minimum of 28" from the charge end of the sorter.
- The trailing edge of the last divert module must be a minimum of 70" from the discharge end.
- The leading edge of a 30° spur mounts 6" ahead (up stream) of the center line of an NBS 30 divert.
- The leading edge of a 30° spur mounts 13½" ahead (up stream) of the FOURTH roller on an NBS 30 WAVE divert.
- The location of a divert lane is centered or slightly downstream of the center line of the transfer rollers in a NBS 90 and a NBS 90SP.
- One NBS 90 transfer with rollers up to 45" in length can transfer to two or four separate lanes.
- A single direction transfer to two lanes is called a "Dual Transfer"
- A bi-direction transfer to two lanes each side is called a "Quad Transfer"

AVAILABLE DRIVE SELECTIONS

1	HP @ 60 FPM
1.5	HP @ 90 FPM
2	HP @ 120, 150, 180 FPM
2	HP @ 200, 220, 250, 300 FPM
3	HP @ 180, 200, 220, 250, 300 FPM
5	HP @ 250, 300 FPM
7.5	HP @ 300, 325, 375, 425 FPM

SORTER NOMINAL WIDTHS (# OF BELTS)

18" with 4 Belts on 3-1/2" Centers
25" with 6 Belts on 3-1/2" Centers
32" with 8 Belts on 3-1/2" Centers

Receiving & Site Preparation

GENERAL

MHS Conveyor NBS Narrow Belt Sorters are shipped in subassemblies. These subassemblies are packaged to guard against damage in shipment, when handled properly.

Examination immediately following unloading will show if any damage was caused during shipment. If damage is evident, claims for recovery of expenses to repair damage or replace components must be made against the carrier immediately. While unloading, a check must be made against the Bill of Lading, or other packing lists provided, to confirm full receipt of listed items.

CAUTION

TAKE CARE DURING THE REMOVAL OF EQUIPMENT FROM THE CARRIER. Remove small items and boxes first. Pull and lift only on the skid, not on the frame, crossmember or any part of the equipment. Be sure the skid is free of other materials which may be on top of or against the side of the skid to be removed.



PREPARATION OF SITE

After the conveyor is received, move it to the installation site or designated dry storage area as soon as possible. Clean up all packing material immediately before parts get lost in it. Loose parts should remain in the shipping boxes until needed.

Prior to starting assembly of the conveyor, carefully check the installation path to be sure there are no obstructions that will cause interference. Check for access along the path

needed to bring in bed sections and components closest to the point where they are needed. It is often necessary to give the area along the system path a general cleanup to improve installation efficiency, access and accuracy.

PARTS INVENTORY & IDENTIFICATION

Each subassembly is shipped completely assembled except the bed joint splice plate/nuts which are shipped with other loose parts. Identify and separate the sorter subassemblies by type or tag number, for inventory and ease of locating during installation.

An identification label is attached to the inside of one side channel or on a crossmember, close to one end of each conveyor bed. This label contains: job number, part number, order number, tag number (if specified), assembler's initials and date of manufacture. On supports, the tag is located on the bottom side of the foot. On special devices it is located on a convenient flat surface that is not offensive to the appearance of the equipment but is still accessible for viewing. These numbers can be cross-referenced against the packing list. The illustrations in this manual and the part number stickers will assist you with your inventory.



Identification Label

Loose parts are boxed and shipped separately. You should have all conveyor sections and supports for a particular conveyor prior to installation. It is cost-effective to identify and procure any missing parts before they are needed for assembly. Small items like nuts and bolts are weigh-counted and packaged by size and type.

CAUTION

Do not remove finishing nails from rail ends. They keep the UHMW guides from sliding down to the discharge end.

General Procedures

The following procedures are to be used as guidelines only. Specific installation methods will vary somewhat depending on available equipment on site and each installer's preferences based on past experience.

WARNING

The Installation Supervisor must be experienced with conveyor and qualified in the mechanics of the equipment and enforce safe working procedures for the protection of the crew, customer, and customer's property.

DIMENSIONAL REFERENCE POINTS

The path of each conveyor in the system is determined by establishing a reference point at each end. The center line of the conveyor is established and a chalk line is snapped between these points.

Conveyors should be installed with the center line of the bed matching the center line of the conveyor path. Locate and mark the center of the crossmembers at each end of the conveyor. Use a plumb line or other acceptable means to ensure accuracy to the chalk line.

Always carry out a thorough check for any obstructions such as building columns, manholes, etc. It may be necessary to reroute the conveyor to avoid the obstruction. In this case it would be advisable to begin installation at this point, using the obstruction as a reference point (Datum), and install the sections in either direction as required.

All conveyor sections must be checked for squareness prior to installation as "racking" or being knocked out of square may have occurred during shipping and handling.

ELEVATIONS

All top-of-belt (TOB) heights should be installed in accordance with the elevations shown on the drawings. In addition, all sortation devices must be level across both the frame width and length. Leveling of the frames is best done using a rotating laser level along the length of the conveyor and a builder's level across the width.

After the first elevation is established at a critical point, the elevation of all other points shall be relative to this first point. Normal practice is to dimension the layout and measure elevations from the floor at each point of support.

As the conveyor system proceeds onto another floor or into another building or room, a new elevation will be measured from the floor at that point. This new elevation will then become the reference for subsequent elevations.

When installing an overhead system, the first elevation is measured from the floor and becomes the reference elevation point until a change in elevation is shown on the layout. Any new elevation is also measured from the floor and becomes the new reference point. The process is repeated each time an elevation change occurs.

CAUTION

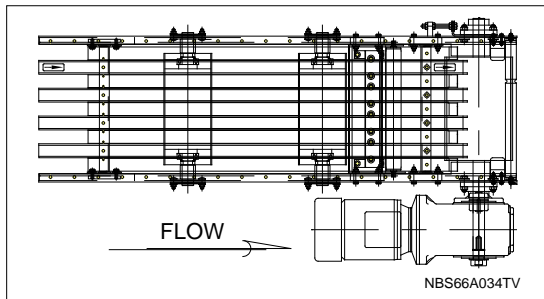
Consult the building architect or a structural engineer regarding ceiling loading or structural limitations of the building if any conveyor is ceiling hung.

COMPONENT ORIENTATION

Using your conveyor system layout drawing and the numbers on the I.D. tags on each component, position and orient the conveyor sections. You must know:

- The direction of product flow
- The elevation height
- The drive is positioned at the discharge end
- The end pulley is positioned at the charge end

IMPORTANT! Do not make alterations to the equipment without consulting with user's representative and MHS Conveyor. Unauthorized modifications to the equipment may impair its function, create a hazardous condition, affect its useful life and/or void the warranty.



Discharge end bed with product flow direction.

Supporting Arrangements

FLOOR SUPPORTS

Install bolts used to attach the standhead to the frame so the nut is on the bottom. Standhead bolts should be left finger tight while the conveyor is being assembled and aligned.

Floor supports are ordered by nominal height range, which is the dimension from the floor to top of the support. Conveyor elevations are shown on the layout by top-of-belt elevations. The difference between top of belt (TOB) and top of support is 7-5/8". This dimension must be subtracted from the TOB height to set support height.

It is important that conveyor frames be installed level. Floor supports will accommodate normal irregularities in the floor surface. Adjustment for elevation in floor supports is accomplished with metal-on-metal bolt clamping force. To achieve the support's stated load rating, it is necessary to tighten the elevation adjustment bolts (3/8" diameter) to 23 ft./lbs. of torque.

Supports should always be installed in the vertical position, and any variations due to conveyor pitch or floor slope will be compensated for in the pivoting standhead of the support.

ANCHORING

Anchoring in concrete floors is accomplished by drilling into the floor and inserting the suitable anchor bolt. The hole diameter and depth must be in accordance with the anchor bolt manufacturer's instructions.

Anchor intermediate floor supports with two anchor bolts, one through each support foot plate using at a minimum 3/8" diameter anchor bolts. For floor supports over 5' high or when supporting drives, use 1/2" diameter anchor bolts.

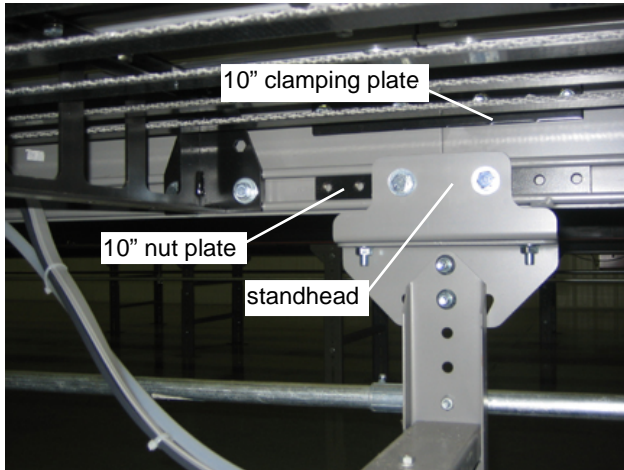
Stagger anchors from front hole on one side of the support, to rear hole on opposite side. Anchor bolts for equipment subject to impact loads should be a minimum of 1/2" in diameter.

WARNING

Place a bolt through the frame and support immediately with finger tight nut. This will prevent the frame from falling off the support, if bumped, and causing injury.

BED/SUPPORT CONNECTORS

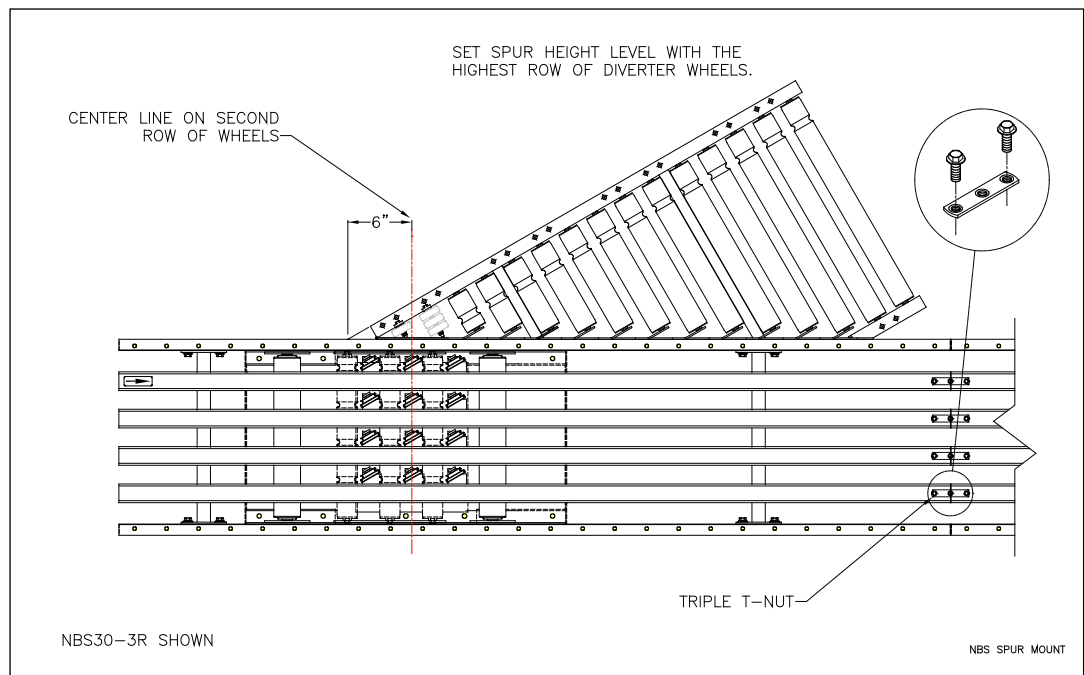
NBS can only be supported at bed joins. Adjoining beds are connected using 3/8" thick by 10" nut plate, 3/16" thick by 10" clamping plate and 3/8" hardware. These parts are shipped with other loose parts. Insert 10" nut plate halfway into the formed channel end of each bed. Then mount standhead support with two 3/8-16 X 1" hex head bolts with flat and lock washers. After that mount 10" clamp plate to channel ends with four 3/8-16 X 1" hex head bolts with nut, flat and lock washers (see picture below). It can be seen that a crossmember could be moved into the recessed area of the standhead support bracket if needed.



Maintaining the rigidity and flatness of the conveying surface is the end result of proper support installation.

ALUMINUM EXTRUSION T-NUT CONNECTORS

The aluminum extrusions that hold the UHMW belt guides are installed at the factory with tee bolts up through their mounting crossmembers. The placement of these extrusions is gauged precisely (2-5/16" center-to-center) so that the triple T-nut connectors between the extrusions line up at installation. The triple T-nut connectors are mounted, at the factory, flush with the ends of the aluminum extrusions on the discharge side of all NBS bed assemblies. These triple nut connectors should be extended half-way out of the extrusions before "plugging in" the next bed downstream during installation. After all bed components are installed, leveled and straightened the 5/16-18 hex head bolts used in the triple T-nut connectors should all be loosened, to straighten the aluminum extrusion joints and re-tightened.



Belt Installation

PRE-INSTALLATION

Belts, as shipped from MHS Conveyor, are cut to length with lacing installed. Rolls of belting should be stored on edge on a pallet (see belt below). Never leave a belt where it may absorb moisture. Remove any tight shipping banding immediately upon arrival. Lacing pins are taped inside the lacing on each belt.

The NBS conveyor should be completely installed and aligned before belt installation.

Remove the plexiglass side covers from the sides of the drive frame, exposing the take-up pulleys. Switch the take-up air switch to the un-tensioned position, raising the take-up pulleys to the minimum take-up position. Then remove or slide covers between the aluminum belt track extrusions so that the belt guide wheels are exposed. Do the same for each NBS 30 diverter and the charge end pulley.

Remove the o-ring from the o-ring driven gap roller.



BELT THREADING

Because NBS uses multiple narrow belts of long length, it will be most efficient to have two people working together during the threading process.

The belting must be uncoiled and laid out flat on the sorter, with the smooth black carrying surface up. The belts must not be allowed to twist along their length as they are installed. Start at the charge end (farthest from the drive) and feed all of the belts through together at the same time. Start the belts down between the gap roller and the end pulley. Guide the belts under the 5" diameter end pulley and up and over the 4" diameter snub pulley, before passing through the belt guide wheels.

All belts must pass over any return rollers positioned to minimize belt sag and through holes in crossmembers.

NBS 30 diverts use the moving narrow belts to drive the pop-up divert wheels. The narrow belts must pass over the first roller in the divert, under the next three rollers (six rollers on NBS 30 WAVE™), over the last roller and then between the belt guide wheels as they exit the diverter.

NBS 90 divert rollers fit up between the narrow belts.

Thread the belts through the drive unit using the diagram on the following page as a guide. The black PVC surface of the belt should be up and the rough surface rides in the UHMW tracks.

Mesh the loops of the lacing on one end of the belt with the loops on the other, so the sides of the belt are even, and install the lacing pin.

Because the different width sorters have different numbers of belts, the air pressure to properly tension the belts is different for each width.

BELT TRACKING

With the belts tensioned, "bump" the motor to be sure rotation is correct, the belts are running smoothly and maintaining their position. Most NBS conveyors do not require belt tracking. However, each conveyor should be checked at the charge and discharge ends to be sure the belts are floating in a neutral position not crowding the sides of the UHMW guide tracks. If the belts are out of their grooves or riding hard to one side adjustment can be made on the driven pulley jackscrew, at the discharge end, or the snubber roller in the end pulley assembly at the charge end, to realign them.

Reinstall the bottom pan on the end pulley assembly and access covers on the drive bed, NBS 30 diverter and charge end pulley.

BELT SPECIFICATIONS AND LACING

Belting:

- PVC 200 belt
- Width: 1-1/4" +/- 1/16"
- Thickness: .203" +/- .015
- Lace: Clipper U3RTS w/#3 point
- Lacing Pin: DSS093 x 1-1/8 +/- 1/32" long .093 "WHITE DURAPIN COATING" .048 304 stainless steel core



CAUTION

Only use the specified lacing and pin. Any substitution will result in premature belt failure.

For field repair chamfer belt corners, no more than 1/4". Belts to have six (6) hooks on one side and seven (7) hooks on the other for maximum strength.

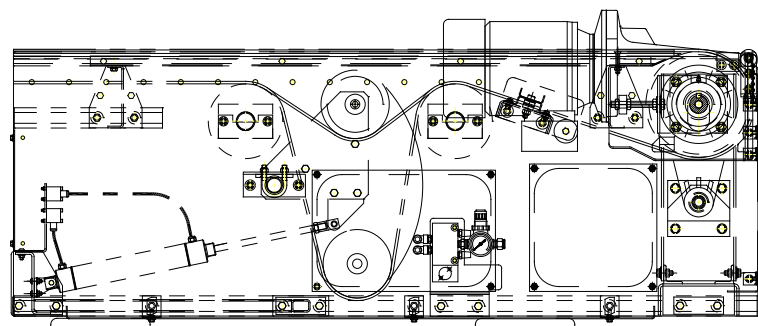
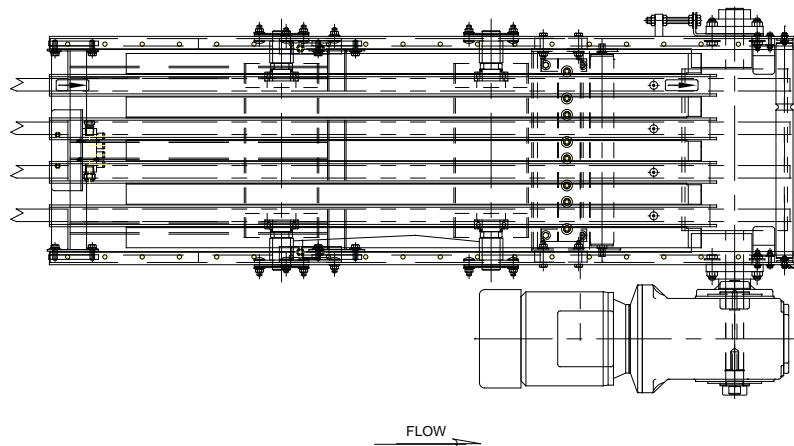
BELT REPLACEMENT

Replacement belts may be ordered by the original "P" part number marked on the belt or belt length can be determined by the following information.

1. The 3' drive bed requires 6'-5" (77")
2. The 5' drive bed requires 10'-8" (128")
3. The 18" end pulley bed 3'-0" (36")
4. NBS 30 diverters require 3/8" each
5. NBS 30 WAVE diverters require 3/8" each
6. NBS 90 transfers require 0" each
7. Auxiliary take-up requires 1'-4" (16")
8. The 5' air take-up bed requires 10'-3" (123")
9. All other beds require 2 times their length.
10. The 6' drive bed requires 16'-0" (192")

NOMINAL WIDTHS (# OF BELTS)

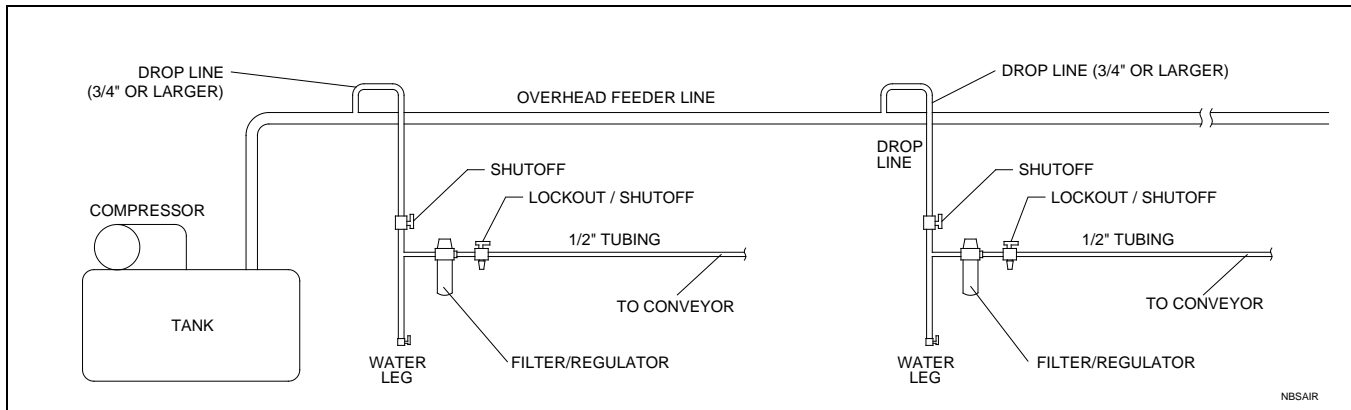
- 18" with 4 Belts on 3-1/2" Centers
- 25" with 6 Belts on 3-1/2" Centers
- 32" with 8 Belts on 3-1/2" Centers



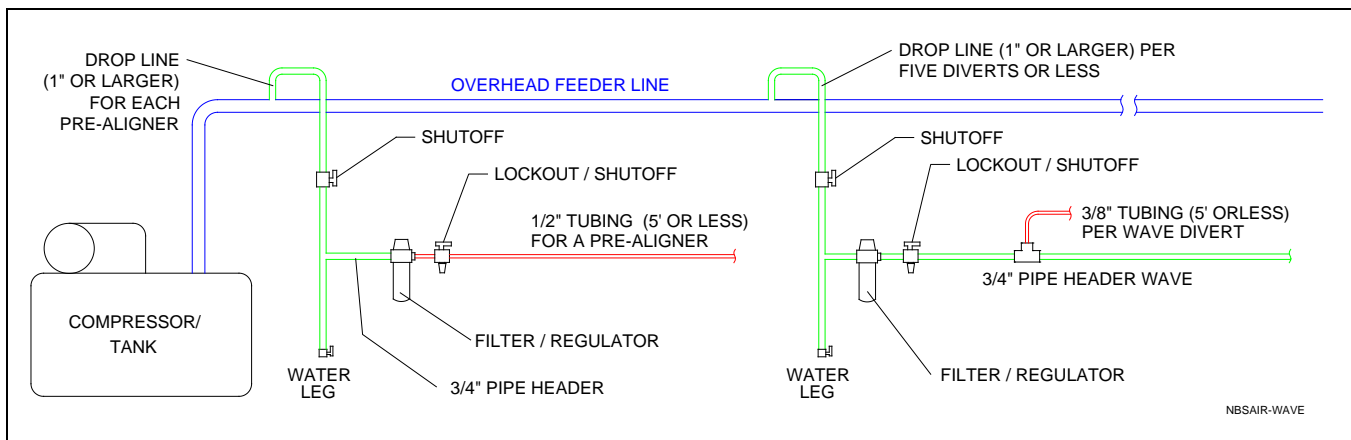
5' DRIVE BED (18NBS SHOWN)

NBS66A034A

Air Supply Requirements



Suggested requirements for NBS sorter and diverts



Suggested requirements for NBS WAVE™ sorter, aligner and diverts

GENERAL

Every conveyor system is unique, with its own specific requirements. Therefore, the following is a general guide.

MAIN FEEDER: Air velocity through the main feeder piping can be kept smooth with lower losses using large diameter pipe with minimum bends and restrictions. Standard weight black pipe or copper is suitable for plumbing the compressed air overhead to all points of use.

AIR DROPS: MHS Conveyor recommends using 3/4" pipe on air drops for high flow and low pressure loss on all sorters except WAVE sorters NBS 30-3R, 5R, 90. The drop is terminated with a drain at the bottom. A tee located prior to the drain branches off to the conveyor. This branch line must contain a lockout/shutoff. A shutoff must also be located in the drop before the branch tee. OSHA Rule 29, CFR1910.147 requires energy sources (air drops) be turned off and capable of being locked or labeled with a warning tag. NBS 30 WAVE™ sorters should be fed with 3/4" tube along length of conveyor.

AIR DROPS AND HEADERS FOR WAVE DIVERT

The NBS WAVE divert and aligner require higher air capacity than the NBS 30 or NBS 90 divert. As six rows of divert wheels must fire within a fraction of a second, the "burst" air capacity must be adequate or sluggish and inconsistent divert action will result. We recommend the following minimum air plumbing of the WAVE divert and aligner:

- 1" air drop and 3/4" black pipe or copper header for every 5 WAVE diverts. 3/8" polyethylene tubing can be plumbed to each divert from the 3/4" header provided the length does not exceed 5'. DO NOT plumb more than one divert with the 3/8" poly tube.
- 1" air drop and 3/4" black pipe or copper header for each aligner. 3/8" poly tube can be run from the 3/4" pipe or copper tube to each solenoid bank on the aligner. The length of each poly tube must not exceed 5'.
- MHS Conveyor can provide a standard 3/4" filter regulator for each drop. The part number is 1103388.

Note: NBS pneumatic systems does not require lubrication. Lubrication may affect the valving operation and cause sluggish or erratic operation.

Important: If your air compressor uses synthetic oil, a coalescing filter plus a regular filter of 5 micron is required. Synthetic oils will shrink the seals in pneumatic devices and valving.

CAUTION

All air lines must be thoroughly blown out (of all debris) and the regulator must be set as required before connecting air to the NBS.

CAUTION

NBS 30 WAVE™ diverters must not be operated above 55 PSI. Exceeding this may damage unit.

PNEUMATIC REQUIREMENTS

1. Maximum conveyor length each way from regulator is 80'. Locate regulator in center of conveyor, if possible, for maximum efficiency.
2. Overhead feeder line pressure to be 100 PSI minimum
3. Low pressure switch to be set at 90 PSI
4. In high humidity or low temperature, use air dryer
5. Use 5 micron filter
6. Lockout/shutoff valve to be provided by air system installer
7. Regulators pressure set to unit requirements:

NBS

- | | |
|-----------------------------|-----------|
| • 5' drive with air take-up | 50-55 PSI |
| • 6' drive with air take-up | 80-85 PSI |
| • 30° diverter | 50-55 PSI |
| • 30° WAVE diverter | 40-45 PSI |
| • 90° transfer | 50-55 PSI |

NBS SP

- | | |
|----------------|-----------|
| • Air take-up | 50-55 PSI |
| • 90° transfer | 45-50 PSI |

FORMULAS

NBS 30 3-row diverts are actuated by a single air bag.

The air consumption per divert is calculated by:

$.028\text{CF (cubic feet)} \times \text{CPM (cycles per min.)} = \text{SCFM (Standard Cubic Feet / Minute)}$

NBS 30 5-row diverts are actuated by two air bags.

The air consumption per divert is calculated by:

$.054\text{CF (cubic feet)} \times \text{CPM (cycles per min.)} = \text{SCFM (Standard Cubic Feet / Minute)}$

NBS 30 WAVE™ diverters are actuated by six (6) air cylinders.

The air consumption per divert is calculated by:

$.010\text{CF (cubic feet)} \times \text{CPM (cycles per min.)} = \text{SCFM (Standard Cubic Feet / Minute)}$

NBS 30 Aligners are actuated by twelve (12) air cylinders.

The air consumption per divert is calculated by:

$.020\text{CF (cubic feet)} \times \text{CPM (cycles per min.)} = \text{SCFM (Standard Cubic Feet / Minute)}$

NBS 90 transfers are actuated by a single air cylinder.

The air consumption per divert is calculated by:

$.054\text{CF (cubic feet)} \times \text{CPM (cycles per min.)} = \text{SCFM (Standard Cubic Feet / Minute)}$

NBS 90SP transfers are actuated by a single air cylinder with a 2" bore and 1/2" stroke.

The air consumption per transfer is calculated by:

$.0092\text{CF (cubic feet)} \times \text{CPM (cycles per min.)} = \text{SCFM (Standard Cubic Feet / Minute)}$

Adding together the air requirements of all diverts and transfers connected to one regulator will give total air flow requirements for that NBS air system.

Air Line Connections

SOURCE AIR CONNECTION

Select the best position along the conveyor to connect the source air from a drop line. Ideally the regulator should be centrally located along the sorter and should not be more than 80' from the furthest diverter/transfer or drive.

Attach the filter/regulator assembly to the bottom flange of the side frame using the mounting bracket supplied with the kit.

The source air line that distributes air to the diverters/transfers should be 1/2" hose that is rated to handle a pulsating 60psi line pressure. MHS Conveyor part number 89000572 TUBING, URETHANE 1/2 OD is available for this purpose.

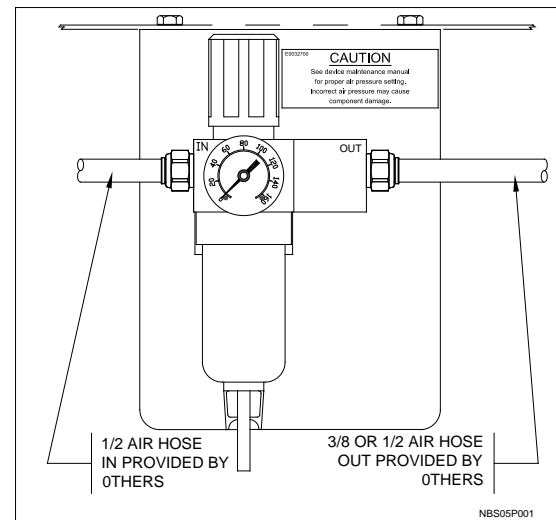
Cut into the supply line along the sorter bed and install the source air line tee fitting (89000640). Connect the source air line between this fitting and the filter/regulator output.

The hose size at each diverter/transfer is 3/8 OD and the source air line can be tapped at each location using a 89000431 1/2"-3/8"OD Barbed Tee, and required length of 89000585 TUBING, POLYETHYLENE 3/8OD,CLR.

LOW PRESSURE AIR SWITCH

The installation of an air pressure switch in the NBS air supply circuit, to detect a drop in air pressure below required levels, is recommended. If pressure drops below approximately 40 PSI, the conveyor system should shut off.

It is recommended that this air switch be located either at the furthest end of the source air line away from the regulator or at the pneumatic belt take-up located in or near the drive bed at the discharge end of the sorter.



CAUTION

Do not use a lubricator. When replacing filter/regulator bowl, lightly lubricate seal with mineral oil. Do not use synthetic oils such as esters or silicones. DO NOT get oil inside filter/regulator bowl.

CAUTION

The function of the low pressure air switch is to protect the drive pulley and the NBS narrow belts from being damaged from slipping under load in the event of an air pressure disruption. Loss of air pressure may also cause diverter / transfer jams.

SOLENOIDS

For the sake of simplicity only two different solenoids are used to actuate either NBS 30 diverters or NBS 90 transfers, and that difference is in control voltage only. The NBS 30 WAVE™ diverter is actuated by a 6-station valve bank, and is only offered in 24VDC.

Both models use spring return, 4-way solenoids with a DIN electrical connector, mounted on the outside, opposite the discharge direction of the diverter/transfer.

The lift mechanism of the NBS 30 is spring returned and the 4-way solenoid is plumbed as a 2-way solenoid using three ports and plugging the "B" & "EB" ports.

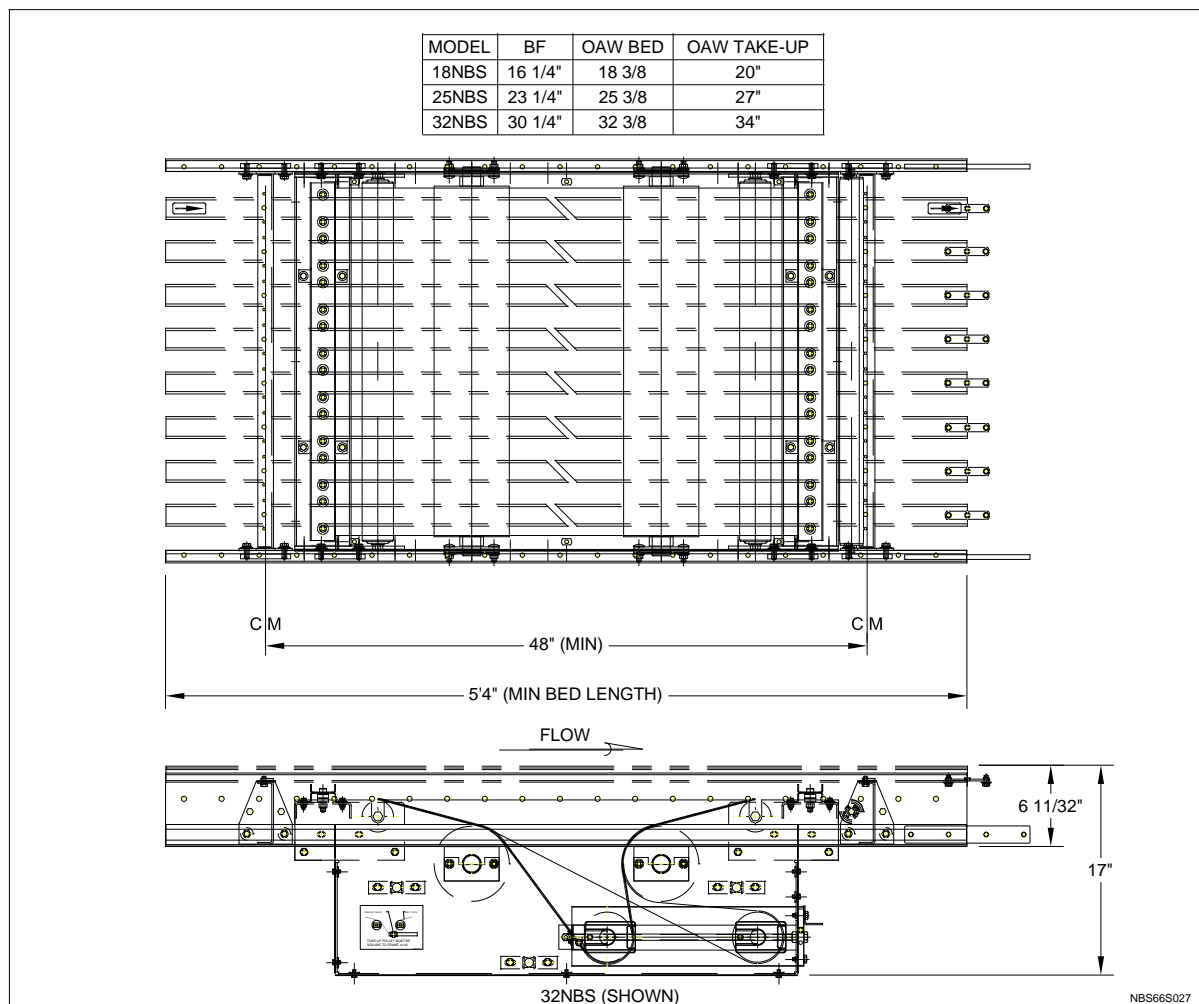
The lift mechanism of the NBS 90 is powered in both directions and has combination needle-valve / exhaust mufflers installed in ports "EA" & "EB" that are used to adjust actuation speeds.

Solenoids in both models are plumbed such that the diverter/transfer is normally in the down position and raises on solenoid activation.

The MHS Conveyor part numbers for replacement solenoids are:

E0038769 VALVE,SMC 4-WAY 24VDC DIN CONN
E0038770 VALVE,SMC 4-WAY 110VAC DIN CONN
1112928 VALVE,NBS30W 6-STATION 24V
(FOR NBS 30 WAVE DIVERT)
1112929 VALVE,NBS30WP 12-STATION 24V
(FOR NBS 30 WAVE ALIGNER)
1112930 VALVE,NBS30W 24V SINGLE VALVE ONLY
(FOR NBS 30 WAVE Divert and WAVE ALIGNER)
1109704 MANIFOLD,ASY NBS30-12R 4-STATION 24V
E0038769 VALVE, SMC 4-WAY 24VDC DIN CONN
1109705 MANIFOLD,ASY NBS30-12R 4-STATION 110V
E0038770 VALVE,SMC 4-WAY 110VDC DIN CONN
(FOR NBS30-12R)

Auxiliary Screw Belt Take-up



For NBS sorters that are 100' to 150' long, an auxiliary screw belt take-up should be installed to add to the take-up capacity of the standard NBS take-up, which is located in the 5' drive bed. The amount of stretch that a set of belts might develop is dependent on the unit loads of the products conveyed and the passage of time. The standard NBS take-up is designed to individually tension each belt within a limited range of belt length mismatch. NBS narrow belting is expected to stretch less than 2% of its original length, which the standard take-up is able to handle for 100' or less of sorter length. The take-up screws on the auxiliary screw belt take-up should always be tightened or loosened together to keep the take-up pulley square with the belt's path. As with all belt equipment, the ease of tracking a belt is dependant upon the attention that is paid to keeping all rotating members square to the belt's travel path.

Electrical

GENERAL

WARNING

All electrical controls must be installed, wired and connected by a licensed electrician only.

All motor controls and wiring must conform to the National Electrical Code as published by the National Fire Protection Association and approved by the American National Standards Institute, Inc. In addition, since specific electrical codes vary from one area to another, be sure to check with the proper authorities before starting the electrical wiring.

The electrical voltage of the motor will be stamped on the metal nameplate. This voltage should be checked to see that it matches your available voltage. Many motors, both single phase and three phase, are dual voltage. Consult the wiring diagram on the motor for the proper connections. If a three-phase motor on a single direction conveyor runs the wrong direction, two of the three leads must be switched to reverse rotation.

WARNING

Do not connect the motor to any other voltage than stamped on its metal nameplate.

Consult the wiring diagram on the inside cover of the starter and push-button station for the proper electrical connections.

Three-phase drives require transformers to reduce the push-button and control circuit to 115 volts. If primary voltage is changed, the transformer must be changed according to the wiring diagram found on the transformer.

NOTE

All control equipment is covered by the original manufacturer's equipment warranty.

NEMA type enclosure ratings are as follows:

NEMA 1 - Indoor use, provides protection against contact with internal components. Suitable for use in warehouse and distribution environments.

Gasketed NEMA 1 - Same use as NEMA 1, but with additional protection against dust and dirt.

NEMA 3 - Outdoor use, designed to keep out rain and dust.

NEMA 4 - Indoor and outdoor use, designed to keep out rain and dust.

NEMA 12 - Indoor use, provides protection against dust, dirt and oil seepage and dripping of noncorrosive liquids. Suitable for use in industrial environments.

NEMA 13 - Indoor use, provides protection against dust, dirt, sprayed oil and noncorrosive liquids.

SAFETY GUIDELINES

WARNING

All safety devices, including wiring of electrical safety devices, shall be arranged to operate in a "fail safe" manner. That is, if power failure or failure of the device itself would occur, a hazardous condition must not result.

The following are basic conveyor control safety guidelines for common controls equipment.

START-UP WARNING HORN - Ideally, all conveyors should be within sight of the conveyor start push-button. This allows the operator to verify that no one is on the conveyor or would be in danger if the conveyor were to start up.

If all conveyors being started cannot be seen from the start push-button location, then an audible warning device is required. It could be a horn, buzzer or bell unique to that conveyor for that location. It must be loud enough to be heard at any point on the conveyor being started. It should sound for the duration of five seconds after the start push-button is pushed, prior to the conveyor starting. Any auxiliary equipment such as vertical lifts, turntables, etc. must be included in the warning circuitry.

All conveyor sections that stop and restart automatically should be marked with appropriate signs or labels. Order CEMA label CHR930002.

START PUSH-BUTTON - Start push-button must be the flush type or guarded such that inadvertently leaning against them will not actuate them. They should be provided with a legend plate clearly defining which conveyors will be started.

STOP PUSH-BUTTON - Stop push-button should be the extended type such that any contact with it is sufficient to stop the conveyor. They should have a legend plate defining which conveyors will be stopped.

OPERATOR CONTROLS - Additional operator controls should be designed into the system with the same guidelines that go into start and stop push-button, depending upon their function. Devices which are repeated on multiple control stations, such as emergency stops, should be located at the same relative location on each station. All operator controls shall be clearly marked or labeled to indicate the function controlled.

EMERGENCY STOPS - All locations where an operator must work directly at the conveyor or areas of high pedestrian traffic must be protected by an emergency stop. Operators should not have to leave their position to actuate the emergency stop.

For protection of equipment or product, emergency stops may be located throughout a system such that it is possible to shut down the system. The location will depend on likely observation points and areas with special devices and interfaces between equipment.

Emergency stops can be of the push-button or cable operated switch type. The push-button type should be a red, mushroom head, maintained push-button which requires resetting after it is actuated. Cable operated switches should trip by pulling the cable and require resetting at the switch.

An emergency stop normally stops all conveyors in the system. Very large systems may involve dividing a system into zones of control based on proximity of personnel, safety hazards, walls, obstacles, etc.

WARNING

Before restarting a conveyor which has been stopped because of an emergency, an inspection of the conveyor must be made and the cause of the stoppage determined. The starting device must be locked out before any attempt is made to correct the cause of stoppage.

CONTROLS LOGIC - Solid state controls logic devices, such as programmable controllers, are used extensively for conveyor control. They are very reliable, but a hardware failure or software bug could cause the device to function erratically. For this reason, start circuits, warning horn circuits and emergency stops should usually be configured using conventional relay logic.

SAFETY SWITCHES - All conveyor control cabinets and motors must be provided with safety (or disconnect) switches. These switches must have provisions for padlocking. As required for maintenance, equipment should be locked in the off position.

SPECIAL DEVICES - Special devices and equipment such as vertical lifts, turntables, high speed conveyors, etc. all have unique design and safety requirements. These must be examined in each case to determine what the requirements might be.

Controls Engineering quotation is available upon request. Please contact MHS Conveyor Customer Support.

Commissioning of Equipment

GENERAL

Commissioning of the equipment can best be defined as the final adjustments and test of the installed equipment required for its proper operation. The need for commissioning is inherent, since the individual components of equipment are brought together at the installation site to operate as a system.

Mechanical and electrical commissioning are most often carried out simultaneously. Commissioning must simulate the actual operation of the system as closely as possible to demonstrate the ability to perform reliably at the specified rate in the prescribed operational sequence.

During the Commissioning Phase, it is necessary to load the equipment with product to be conveyed, which provides the means of detecting those areas requiring adjustment. Personnel will be required to support operational functions. This may serve as part of operator training and familiarity with the system. During the commissioning activity, special attention should be directed toward personnel safety. No unnecessary risks should be taken that would endanger the safety of any personnel. All personnel must familiarize themselves with all safety features of the system such as emergency stops and motor disconnects.

MECHANICAL STATIC CHECKOUT

(No power to the conveyor.)

1. The belt tension air pressure must be set to the correct pressure setting, which is dependent on sorter width. Air pressure higher than required can cause belt failure.
2. Listen for air leaks after air pressure is turned on.
3. Check the plumbing of the solenoids.
4. Follow the belt path through the entire conveyor. The belt must be threaded through the drive per the diagram in the Belt Installation section, all of the belts must be captured between the grooved guide pulleys at each diverter location, and no belt should be threaded under a crossmember (belt path labels are attached at each diverter location from the factory).
5. Visually inspect the installation. Is the conveyor straight? Is the conveyor reasonably level from side to side? From end-to-end?
6. Check guard rail clearance to product.
7. Eliminate all catch points.
8. Check conveyor elevations.
9. All bolts and set screws tight.
10. Check product clearance to overhead structures.
11. Simulate all operational functions with actual product.
12. All guards in place with proper clearance.
13. All OSHA required guards in place on walkways, catwalks, ladder-ways, floor openings, etc.
14. All labels and warning signs in proper place, unobstructed.

MECHANICAL DYNAMIC CHECKOUT

(Power to the conveyor, but no product on it.)

1. Turn the motor on. With the belt moving make sure each belt has proper tension.
2. Actuate each diverter solenoid manually.
3. Check the belt tracking.

WARNING

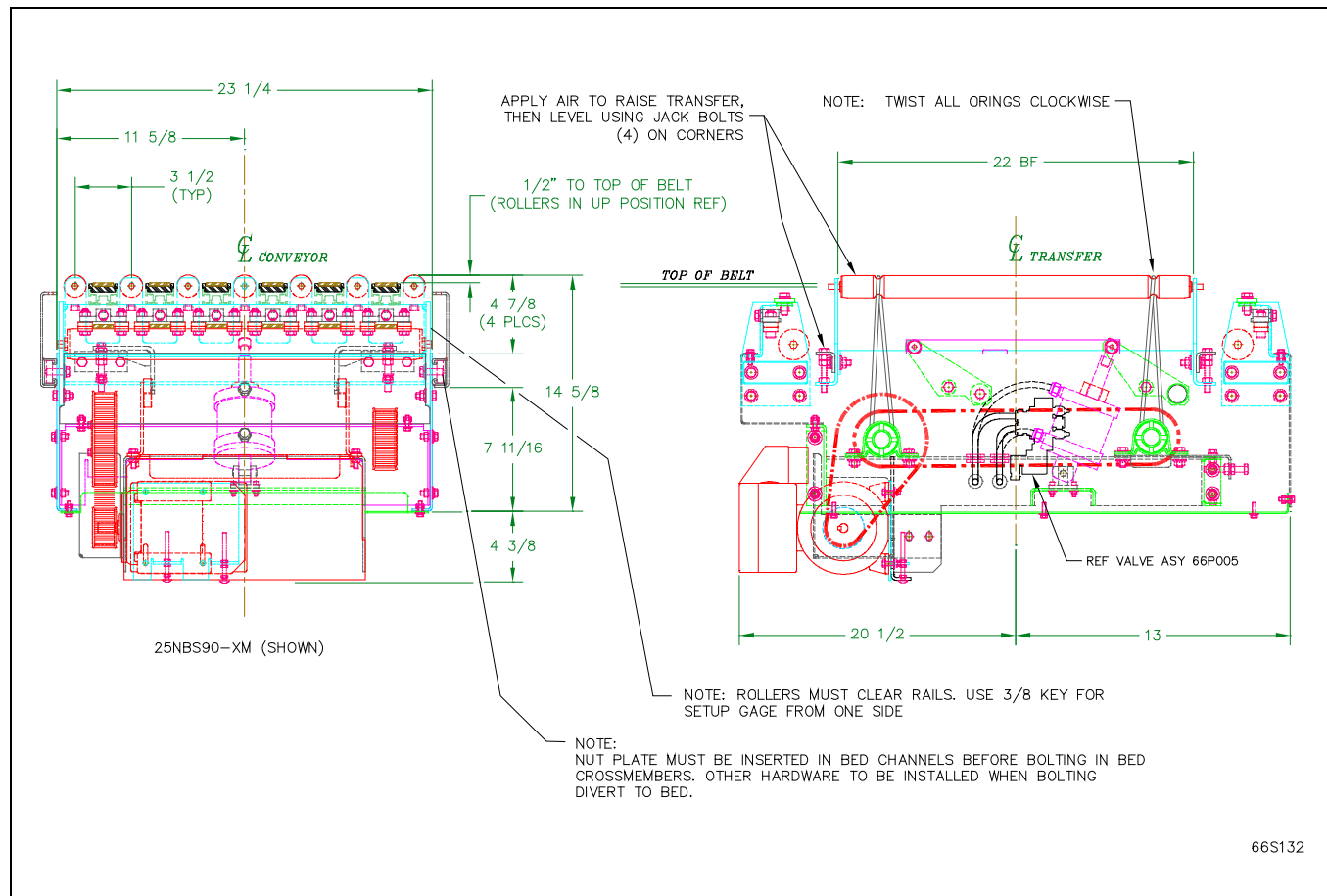
NBS 90 Transfer motors must be controlled to run on demand ONLY!
Motors running continuously will cause component failure.

NBS 90 Transfer Roller Adjustment Procedure

NBS 90 transfers are assembled as a stand alone unit that is inserted into an NBS bed section. The height of the roller is set by the use of a setting gauge, and adjustment is performed at each of the four corners of the unit on the assembly bench. When the unit is inserted into the bed and secured into place, the roller heights are within our assembly tolerance of $\pm 1/32"$. Depending upon the speed of the sorter, weight of the product, and condition of the transferred product's bottom surface, slight adjustments of the transfer rollers' heights may be necessary to effectively transfer these products.

Adjustment in the field is performed by the following steps:

1. Determine which corners need height adjustments. This can be determined by placing a straight edge across the sorter belts and measuring the distance from the bottom of the straight edge to the top-of-roller at each transfer corner. If the transfer rollers can be forced into their up position, the straight edge can be placed on the roller surfaces and the measurements can be made down to the belt surfaces. (The roller mounting forks are usually in their full up adjusted position, and lowering the roller height is usually the easiest way to adjust.)
2. Remove the two flat orange end guards from both ends of the transfer (this will allow access to the four adjustment locations).
3. The roller mounting forks have $3/4"$ long slots in their faces and are clamped between the jack bolt angle and the longitudinal crossmember that separates the two forks.
4. Loosen the two hex head cap screws in the corner that is being adjusted as well as the jam nuts on the jack screw. Use the jack screw jam nut that moves the fork in the direction necessary. Repeat this procedure on each corner that needs adjustment.
5. When transfer roller are all parallel to the sorter belt surfaces, tighten all fasteners and replace the guards.



Preventive Maintenance

GENERAL

The key to ensuring the expected return on investment is to protect against premature failure with a well-planned program of preventive maintenance.

Preventive maintenance programs examine what may fail and then formulate action plans which will prevent failure or downtime. This kind of maintenance includes lubrication and replacement or repair of parts before failure but after expected life has been attained.

Preventive maintenance will save expensive downtime and wasted energy. It will increase the life of components. Along with preventive maintenance, there should be a record-keeping system. You must know what problems you have had in the past and when different components were serviced.

A visual and audible inspection should be taken every day. You can see if a chain is loose, oil leaking, sprocket worn; or you can hear a faulty bearing, noisy chain or any other noise that might indicate a problem. When something major goes wrong with some component, records should be kept to see if a pattern to the problem occurs.

All personnel working in close proximity to the conveyor should inform maintenance or their supervisor of any unusual noise.

WARNING

Do not perform maintenance on the conveyor until the startup controls are locked out and cannot be turned on by any person other than the one performing the maintenance. If more than one member of a crew is working on the conveyor, EACH CREW MEMBER MUST HAVE A LOCK ON THE POWER LOCK OUT. The air pressure must be turned off to the work area. All pneumatic devices must be de-energized to prevent accidental cycling of the device.

Make sure personnel are clear of all conveyor equipment before restarting the system.

GEARMOTOR

The drive unit should be checked monthly. Check the gearmotor for leaking seals. Check the gearcase for proper oil level and add the approved oil for your particular unit. Check for overheating, vibrations and dirt buildup.

Each Nord gearmotor is supplied from the factory with the correct grade and quantity of lubricant for the specified mounting position. Under special circumstances such as high or low ambient temperatures optional oils should be used.

CHAINS AND SPROCKETS

Chains and sprockets should be checked monthly. Look for correct alignment. In time, set screws may loosen and allow the sprockets to become misaligned. Use a straight edge held parallel to both sprockets to check alignment. Shift one of the sprockets if the straight edge shows it is necessary.

WARNING

REPLACE ANY CHAIN GUARD REMOVED in order to adjust, check or lubricate chain and sprockets. Guards are furnished and installed to prevent personal injury during operation; maintain them on the unit.

Keep the chain clean and lubricated. Chains may be cleaned by wiping with a rag soaked in nonflammable cleaning solvent.

Lubrication of roller chains is essential to effectively minimize metal-to-metal bearing contact of pin-bushing joints of the chain. Oil should be applied to outside plate and inside plate edges, since access to pin-bushing area is

possible only through clearances between the outside plates and the inside plates. Oil applied on the center line of the rollers cannot reach pin-bushing joints.

A good grade of non-detergent petroleum base oil is recommended. Heavy oils and greases are generally too stiff to enter and fill the chain joints. The Lubrication Guide indicates the proper lubricant viscosity for various surrounding temperatures.

WARNING

Do not use gasoline or kerosene for cleaning. Use nonflammable solvent only.

During the monthly check, look for damaged or worn links in the chain and wear spots on sprockets. If either the chain or sprockets are worn, then both must be replaced and the cause of wear corrected.

Chains should be tightened until there is 1/2" total movement at center of span (1/4" each way of center).

ROLLERS

All rollers used in NBS equipment have precision, sealed lubed for life bearings and do not require maintenance. Periodically removing the rollers has an added benefit of distributing the wear on the bearing inner race by rotating the axle to a new position. If a defective roller bearing is found, replace the roller.

Do not allow tape, banding, shrinkwrap, etc. to build up on roller or pulleys. This can cause rollers to jam and the belt to mistrack. If this is a common occurrence due to the product packaging, clean up on a regular schedule.

WARNING

Use a blunt object to remove rollers from frame. A screwdriver or similar pointed object could slip and cause injury.

AIR SYSTEM

The best preventive maintenance for any air operated device is clean air. Always be alert for air leaks anywhere in the system and correct promptly. Check all air line filter bowls weekly for accumulated water and drain if necessary. Check for proper PSI settings on air regulators.

MAINTENANCE SCHEDULE CAUTION

**Check to confirm tools and foreign objects have not been left on or inside the conveyor.
Check to confirm all loosened parts have been retightened.
Check to confirm all guards have been installed.**

WARNING

**Prohibit riding on conveyor by anyone.
Think before making any adjustments. It may prevent an injury. Remember, all moving components are potentially dangerous.
Protect yourself from unexpected starts when working on a stopped unit by locking and tagging the control panel or disconnect switch that supplies power to the unit.**

MOTOR CONTROLS

Inspection (Semi-Yearly)

WARNING

Before servicing or performing any work in the motor control panel, disconnect and lockout the main incoming service. If only the panel disconnect is off, the incoming side will still be hot.

Excessive overheating is indicated by discoloration of components. Most often, these symptoms are a sign of loose connections. If left uncorrected this can eventually cause arcing between components, leading to destruction of the controls. It is normal to find the interior of the control cabinet very warm when it is first opened.

The condition of contacts must be checked on all contactors and starters that show signs of overheating. Make sure that they are free of dust and are not excessively pitted or burned. When badly burned or worn, the contacts must be replaced.

In the course of inspecting contact condition, spring pressure should be checked. As contact surface wears down, spring pressure can be lost because of the overheating. Contact spring resiliency can usually be detected by fingertip pressure.

Check for faulty door gaskets especially when there are excessive deposits of foreign materials. Particular attention should be given to conductive deposits because they can cause flashovers and premature component failure when allowed to collect to any great extent. Either reposition or replace defective gaskets and clean the control cabinet.

CAUTION

Avoid touching components until they have had time to cool. Some may still be hot.

Check all overload settings on motor controls. Check for loose wiring and tighten as required.

CLEANING

When cleaning a control cabinet, it is best to use a vacuum cleaner rather than compressed air. A vacuum cleaner removes rather than redistributes dust and dirt. Compressed air can damage and displace relay contacts and springs.

NBS Maintenance Checklist

1. End Pulley Assembly

- a) Examine end pulley assembly. Remove any residue clinging to end pulley, and end pulley snubber.
- b) Check to see if belt is tracked correctly thru lower belt guide wheels. Examine guide wheels for wear. Replace any wheels that are excessively worn.
- c) Remove any residue or build up of fibers between UHMW track at joints.

2.) Intermediate Bed Assembly

- a) Remove any residue or build up of fibers between UHMW track at joints.
- b) Remove any residue or build up on carrier rollers.

3.) Drive Assembly

- a) Examine drive pulley for excessive lagging wear.
- b) Remove any residue built up on drive pulley.
- c) Check to see if belt is tracked correctly thru lower belt guide wheels. Examine guide wheels for wear. Replace any wheels that are excessively worn.
- d) Examine belt guide feeder rollers. Remove any residue built up on rollers.
- e) Examine individual take up wheels for wear. Clean off any build up on wheels.
- f) Examine take up snubber pulleys. Clean off any residue built up on pulleys.
- g) Check chain tension. An over tensioned chain will cause excessive gearbox noise

4.) Divert Assembly (NBS30)

- a) Replace missing or excessively worn tires.
- b) Remove any residue or fiber that has built up in drive groove of divert wheels.
- c) Check to see if all orings for driving divert wheels are in place. Replace all missing or worn orings. (Note: there are two O-rings used to drive each divert wheel. One clear colored oring which transmits power from drive roller to lower idler, and one black colored oring which transmits power from lower idler to divert wheel)
- d) Check to see if belt is tracked correctly thru lower belt guide wheels. Examine guide wheels for wear. Replace any wheels that are excessively worn.
- e) Examine divert snubbers, and drive rollers for residue build up. Clean off any residue.
- f) Check to see that all wheel brackets are tight. Replace any missing hardware, and tighten any loose hardware.

5.) Transfer Module (NBS90)

- a) Remove any residue or build up on transfer rollers.
- b) Check tension of both timing belts. (Drive and jump belts)
- c) Check height of transfer rollers above the belt top surface. Check the plane passing over the transfer rollers for level and parallelism to belt surfaces. Replace any missing hardware, and tighten any loose hardware.

6.) Encoder

- a) Remove any residue or buildup on encoder wheels.

Maintenance Schedule

Periodic maintenance intervals shown may vary with load, speed, hours of daily operation, ambient temperature, humidity, etc. Intervals can be established by fairly frequent maintenance at first, then lengthen the intervals as justified by observation of need based on history. The following is based on 5 days per week, 8 hours per day under normal conditions.

Daily

- Listen to everything for unusual noises or vibration.
- Visually inspect to see that conveyor sections are clear and free of debris.
- Check to see that all safety guards are in place.
- Check any oil leakage.
- Check any unusual noises or vibration.
- Check for loose bolts or parts.
- Check air filter bowls for accumulated water.
- Listen for air leaks.

Weekly

- Inspect bearings, gear reducers and motors for excessive noise or heat.
- Clean breather cap on gear motor (if used).
- Check operation of all electrical controls.
- Inspect motor mounting bolts.
- Check for proper PSI on air regulators.

WARNING

Prohibit riding on conveyor by anyone.

Think before making any adjustments. It may prevent an injury. Remember, all moving components are potentially dangerous.

Protect yourself from unexpected starts when working on a stopped unit by locking and tagging the control panel or disconnect switch that supplies power to the unit.

Monthly

- Check air filters for cleanliness.
- Clean chains and sprockets and lubricate with SAE 30 weight oil or equivalent. (Check chain tension and tightness of all adjusting screws.)
- Check drive unit for leaking seals and oil level in gearcase (if applicable), unusual noises, vibration and stress cracks.

Semi-Yearly

- If dry sounding, lubricate unsealed bearings in rollers with light oil. Check free spin of rollers.
- Drain and flush gearcase after each 2,500 hours of normal operation or at least every 6 months (if applicable).
- Grease motor shaft bearings.
- Inspect and clean motor control centers.
- Grease regreasable bearings.

Yearly

- Change oil in gearboxes.
- Inspect tightness of all nuts and bolts on units. Readjust and, if necessary, retighten.

- Check for plumb and level. Shims have been known to vibrate out from under supports in isolated incidents.
- Touch up paint that has been chipped. Unpainted surfaces will rust.
- Inspect for stress/fatigue cracks in frame and supports.

CAUTION

Check to confirm tools and foreign objects have not been left on or inside the conveyor.
Check to confirm all loosened parts have been retightened.
Check to confirm all guards have been installed.

Repair Procedures

WARNING

Do not perform maintenance on the conveyor until the startup controls are locked out and cannot be turned on by any person other than the one performing the maintenance. If more than one member of a crew is working on the conveyor, EACH CREW MEMBER MUST HAVE A LOCK ON THE POWER LOCK OUT. The air pressure must be turned off to the work areas.

Make sure personnel are clear of all conveyor equipment before restarting the system. Do not use gasoline or kerosene for cleaning. Use nonflammable solvent only.

CHAIN & SPROCKETS

Lubrication of roller chains is essential to effectively minimize metal-to-metal bearing contact of pin-bushing joints in the chain. Oil should be applied to outside and inside plate edges, since access to the pin-bushing area is possible only through clearances between the outside plates and the inside plates. Oil applied on the center line of the rollers cannot reach pin-bushing joints.

Chain drives should be protected against dirt and moisture. Oil supply should be kept free of contamination. A good grade of non-detergent petroleum base oil is recommended. Heavy oils and greases are generally too stiff to enter and fill the chain joints. The following table indicates the proper lubricant viscosity for various surrounding temperatures.

Temperature Degrees F	Recommended Lubricant
20 to 40	SAE 20
40 to 100	SAE 30
100 to 120	SAE 40
120 to 140	SAE 50

Inspection includes:

1. Lubrication check for dirt, grit, or chips and clean if necessary by soaking chain in nonflammable cleaning solvent
2. Sprocket alignment (see following text)
3. Wear on the inner surfaces of the roller chain link plates
4. Sprocket tooth wear
5. Chain tension (see following text)
6. Set screw tightness (5/16-18 at 13 ft./lbs. & 1/4-20 at 6 ft./lbs.)

SPROCKET ALIGNMENT

1. Loosen sprocket.
2. Align loose sprocket to the other by laying a straight edge across their faces or along the chain.
3. Retighten the loose sprocket.

CHAIN TENSION

Chain should be checked for excessive slack, if the chain is running close to the tips of the sprocket teeth. This can be checked by lifting the chain away from the large sprocket, making sure the chain is in mesh with the sprocket teeth. Excess clearance is conclusive evidence that the chain has elongated in pitch and no amount of tension adjustment will keep it properly meshed with the sprocket teeth. Continued operation will quickly destroy the sprocket teeth which otherwise may be good. If the sprocket is still serviceable, replace the chain.

TENSION ADJUSTMENT

1. Loosen mounting bolts of tension.
2. Increase tension up to 1/2" of total slack (1/4" each way of center).
3. Turn adjusting bolts on gearbox plate or move gearbox in mounting slots until there is 1/2" total chain slack.
4. Retighten all bolts after checking alignment.

If a chain should break or fail due to overload, neglect or accident, those portions of the chain which appear to remain intact are, in all probability, damaged and subject to early failure if continued in service. Replace the entire chain and sprockets.

REDUCERS/GEARMOTORS

NBS drive units use gearmotors which are properly filled at the factory with sufficient lubrication for their mounting position. A mineral oil based lubrication (Mobilegear 630) is the standard lube supplied. An optional synthetic lube is also available that is compatible with the standard lube (Mobilgear SHC630).

Disassembly/assembly procedure as follows:

1. Remove necessary guards to access maintenance areas.
2. Disconnect drive chain from drive sprockets by removing the master link.
3. Disconnect any electrical connection.
4. Remove reducer or gearmotor.
5. Perform required maintenance.
6. Reverse procedures for assembly.
7. After all fasteners are tight, double check chain tension and sprocket alignment.
8. Replace all guards.

Regularly inspect all gearbox reducers to guarantee maximum performance.

1. Tightness of bolts and screws
2. Correct alignment of shaft and couplings
3. No major oil leaks
4. No excessive heating
5. No unusual vibration or noise

Enclosed gear drives (except those tagged as prelubricated) require filling to the proper oil level before operating as indicated. Equivalent lubricants should conform to AGMA Standard Specification No. 250.03 applying to the AGMA Lubricant Number indicated for the required ambient range. Service life and efficiency of gears and bearings will be affected by oxidation or contamination of oil used. Improved performance will be obtained by periodic lubrication at regular intervals of approximately 2,500 hours of operation or six months, whichever comes first.

WARNING

Do not perform maintenance on the conveyor until the startup controls are locked out and cannot be turned on by any person other than the one performing the maintenance. If more than one member of a crew is working on the conveyor, EACH CREW MEMBER MUST HAVE A LOCK ON THE POWER LOCK OUT. The air pressure must be turned off to the work area. All pneumatic devices must be de-energized to prevent accidental cycling of the device.

SOLENOID VALVES

In order to minimize downtime, it is normally not feasible to repair malfunctioning electrical or valve components while leaving the conveyor unusable. Spare components should be kept in stock for emergency replacement. If feasible, the part may be repaired later to replace maintenance stock. Items which cannot be readily repaired or are questionable should be replaced. Components under warranty should not be repaired except in an emergency.

WARNING

Before removing a valve or other pneumatic component, shut off and exhaust the entire pneumatic circuit and shut off and lockout electrical supply.

SENSING SWITCHES

Sensing switches are of two types:

retroreflective photoeye and proximity switch.

Adjust the retroreflective type as follows:

1. Determine what sizes of target the photoeye must sense.
2. Adjust for the worst case, usually smallest item, by loosening photoeye mounting nut and aligning while making sure photoeye has unobstructed view of reflector.
3. Move the target in and out of the field of detection to ensure that the photoeye energizes and de-energizes.

Adjust the proximity type as follows:

1. Loosen proximity switch mounting bolt and adjust sensing switch so that the product passes directly in front of the switch face, as close to the switch face as possible without making contact.
2. Check that the proximity switch energizes and de-energizes as the product passes in front of the switch face.
3. Tighten the mounting bolt.

Parts Identification

This section is used to identify parts that may require replacement during the life of the sorter.

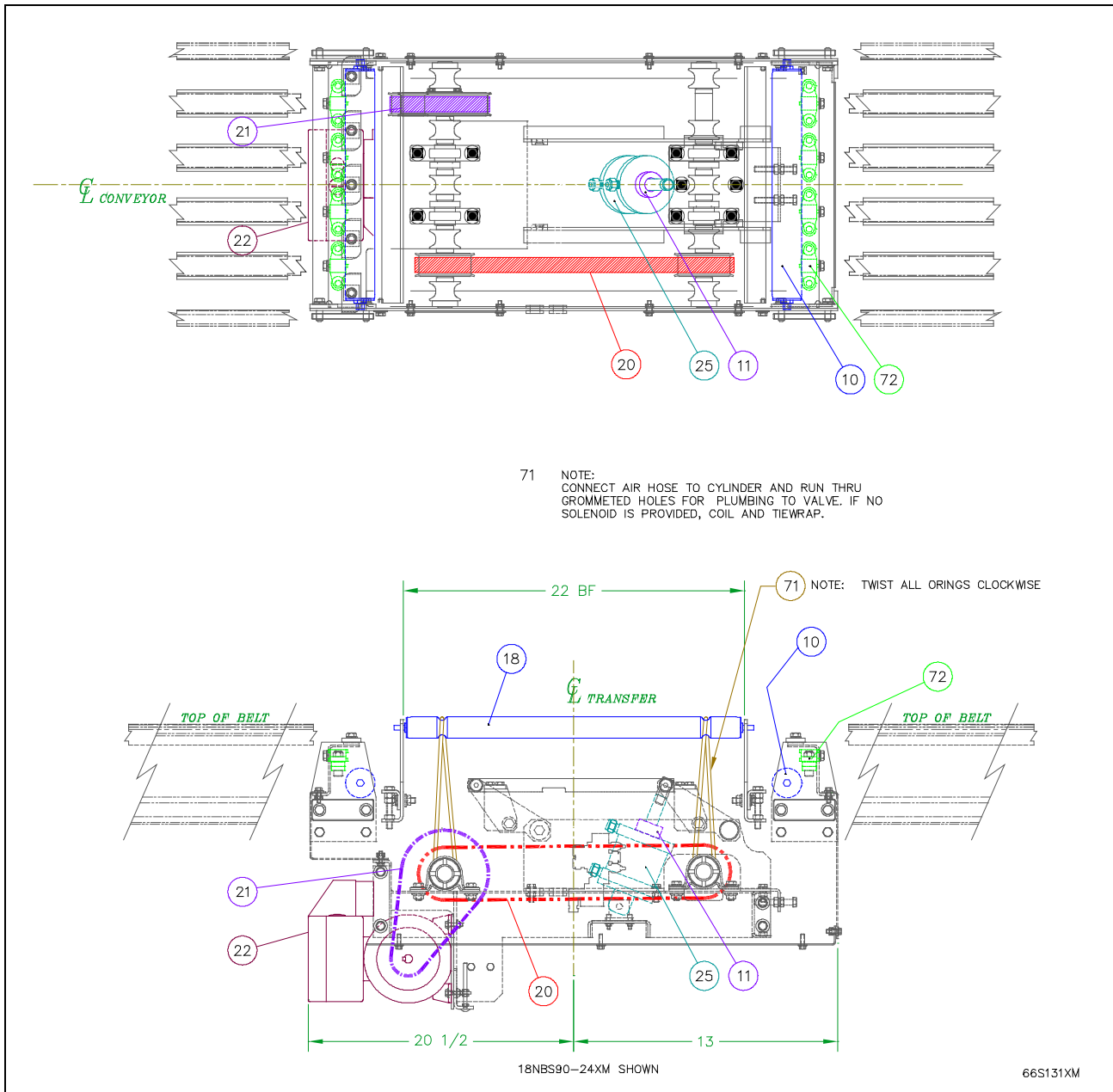
Parts which specifically pertain to NBS 30, NBS 90, & NBS 90SP are included with illustrations.

A "Recommended Spare Parts List" is published for all conveyor orders of \$10,000 or more. This spare parts list is sent to the purchaser approximately (2) weeks after the order is received. It includes part numbers, description, pricing and recommended quantities to be kept for maintenance.

If you are unable to locate this document (order under \$10,000 and not sent) another may be obtained by contacting MHS Conveyor Customer Support at 231-798-4547.

To identify a part and its part number, refer to the assemblies and devices on the following pages. Determine the balloon number for the required part and reference the composite parts list.

Parts Identification - NBS 90 Transfer



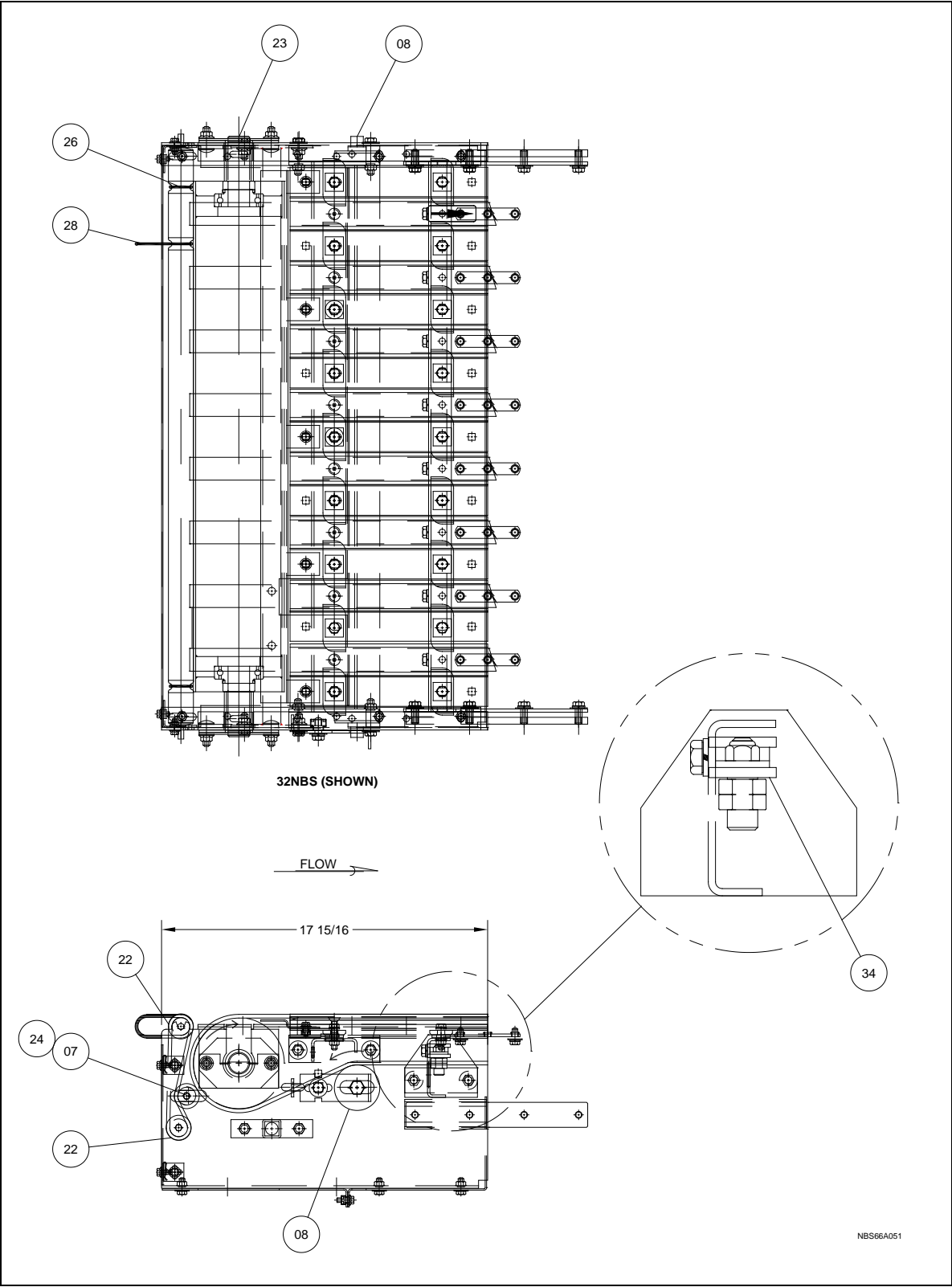
NBS 90-24 XM Transfer - Replacement Parts

Replacement Part Numbers and Quantites for NBS90-24 Transfer Widths						
				<u>18NBS90</u>	<u>25NBS90</u>	<u>32NBS90</u>
		TRANS, _ _ NBS90-24 24V/230V XM		1100827	1103541	1103549
		TRANS, _ _ NBS90-24 24V/460V XM		E0043010	1103539	1103547
		TRANS, _ _ NBS90-24 110V/230V XM		1100828	1103542	1103550
		TRANS, _ _ NBS90-24 110V/460V XM		1100826	1103540	1103548
<u>BALLOON</u>	<u>ITEM #</u>	<u>DESCRIPTION</u>	<u>QTY</u>			
10		ROLLER,RET _ _ NBS90	2	E0043031	1100985	1100986
11	E0001867	BUMPER,URETHANE 3/4"THK 90A	1			
18	E0038632	ROLLER,24NBS TRANS		5	7	9
19	E0001530	ORING,83A NBS 7/32 X 19-7/16"		10	14	18
20	90531120	BELT,HTD 1120-8M-30	1			
21	90530600	BELT,HTD 600-8M-30	1			
22	E0001403	MTR,EURODRIVE MOVIMOT.5HP 460,				
22	E0001404	MTR,EURODRIVE MOVIMOT.5HP 230,				
25	E0001594	CYL,AIR	1			
71	E0040722	VALVE,4WAY 24V DC W/FITTINGS	1			
71	E0040723	VALVE,4WAY 110V AC W/FITTINGS	1			
72	E0039089	BLOCK,ASY BELT GUIDE		4	6	8

NBS 90-30 XM Transfer - Replacement Parts

Replacement Part Numbers and Quantities for NBS90-30 Transfer Widths						
				<u>18NBS90</u>	<u>25NBS90</u>	<u>32NBS90</u>
		TRANS, __ NBS90-30 24V/230V XM		1101003	1103545	1103553
		TRANS, __ NBS90-30 24V/460V XM		1101001	1103543	1103551
		TRANS, __ NBS90-30 110V/230V XM		1101004	1103546	1103554
		TRANS, __ NBS90-30 110V/460V XM		1101002	1103544	1103552
<u>BALLOON</u>	<u>ITEM #</u>	<u>DESCRIPTION</u>	<u>QTY</u>			
10		ROLLER,RET __ NBS90	2	E0043031	1100985	1100986
11	E0001867	BUMPER,URETHANE 3/4"THK 90A	1			
18	E0038633	ROLLER,30NBS TRANS		5	7	9
19	E0001530	ORING,83A NBS 7/32 X 19-7/16"		10	14	18
20	90531440	BELT,HTD 1440-8M-30	1			
21	90530600	BELT,HTD 600-8M-30	1			
22	E0001403	MTR,EURODRIVE MOVIMOT.5HP 460,				
22	E0001404	MTR,EURODRIVE MOVIMOT.5HP 230,				
25	E0001594	CYL,AIR	1			
71	E0040722	VALVE,4WAY 24V DC W/FITTINGS	1			
71	E0040723	VALVE,4WAY 110V AC W/FITTINGS	1			
72	E0039089	BLOCK,ASY BELT GUIDE		4	6	8

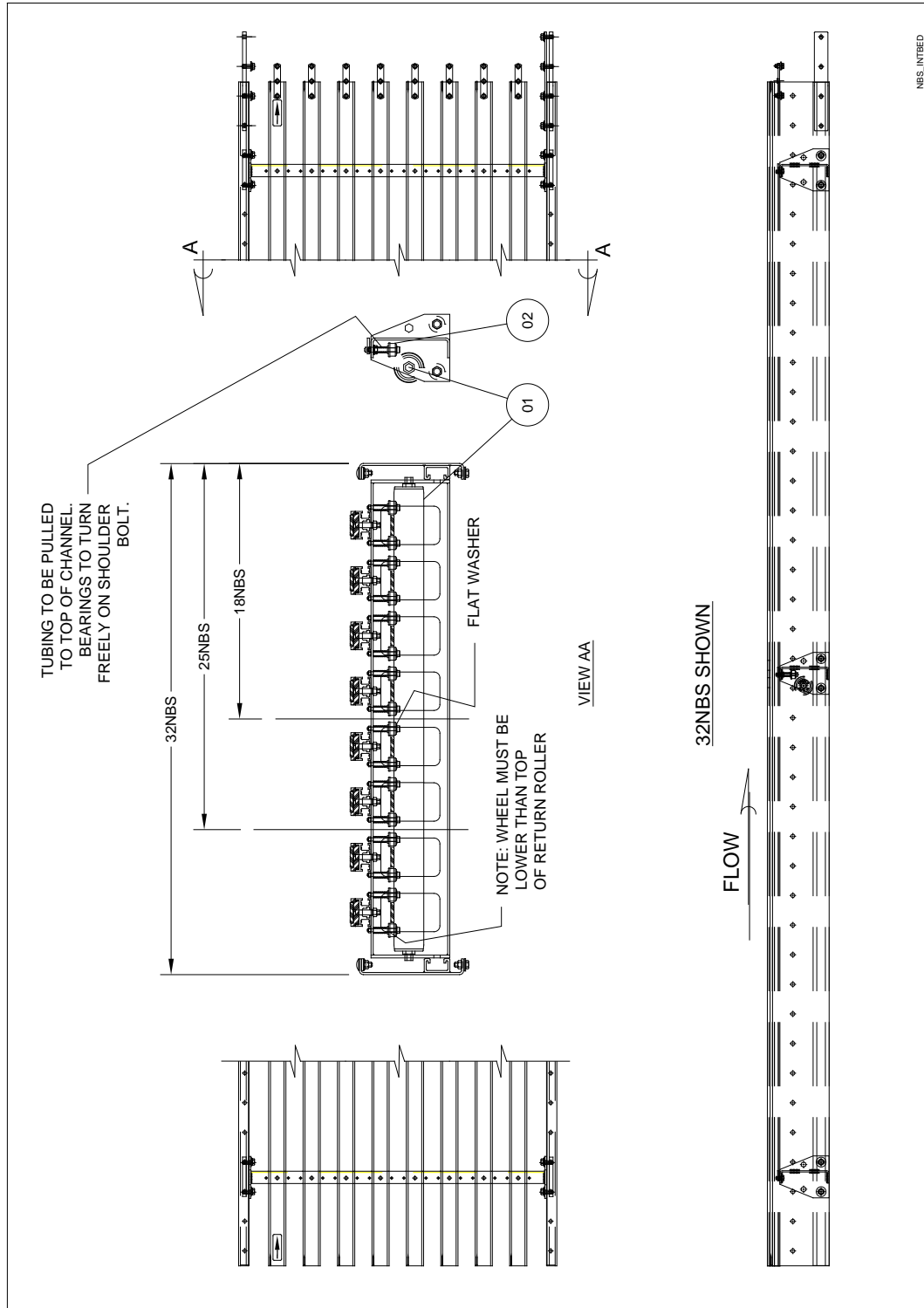
Parts Identification - NBS End Pulley



NBS End Pulley- Replacement Parts

Replacement Part Numbers and Quantities for NBS Endpulley Widths						
				<u>18NBS</u>	<u>25NBS</u>	<u>32NBS</u>
		ENDPULLEY,5"ASY __NBS		E0040901	E0040902	E0040903
BALLOON	ITEM #	DESCRIPTION	QTY			
22		ROLLER,SLV __ NBS ENDPULLEY	2	E0041070	E0041071	E0041072
24		ROLLER,IDLER __ NBS ENDPULLEY	1	E0041073	E0041074	E0041075
07	E0002716	ROLLER,SLIDE .11/32 HEX	2			
08		PULLEY,ASY 2.5DIA __ NBS	1	E0040908	E0040909	E0040910
23		PULLEY,ASY 5" DIA __ NBS C-FF	1	E0040823	E0040824	E0040825
26	90530019	ORING,83A 3/16 X 12-1/2	2			
28	E0001299	ORING,83A 5/32 X6-1/4"ST TRANS (ONLY USED FOR TWO NBS's IN LINE)	1			
34	E0039089	BLOCK,ASY BELT GUIDE		4	6	8

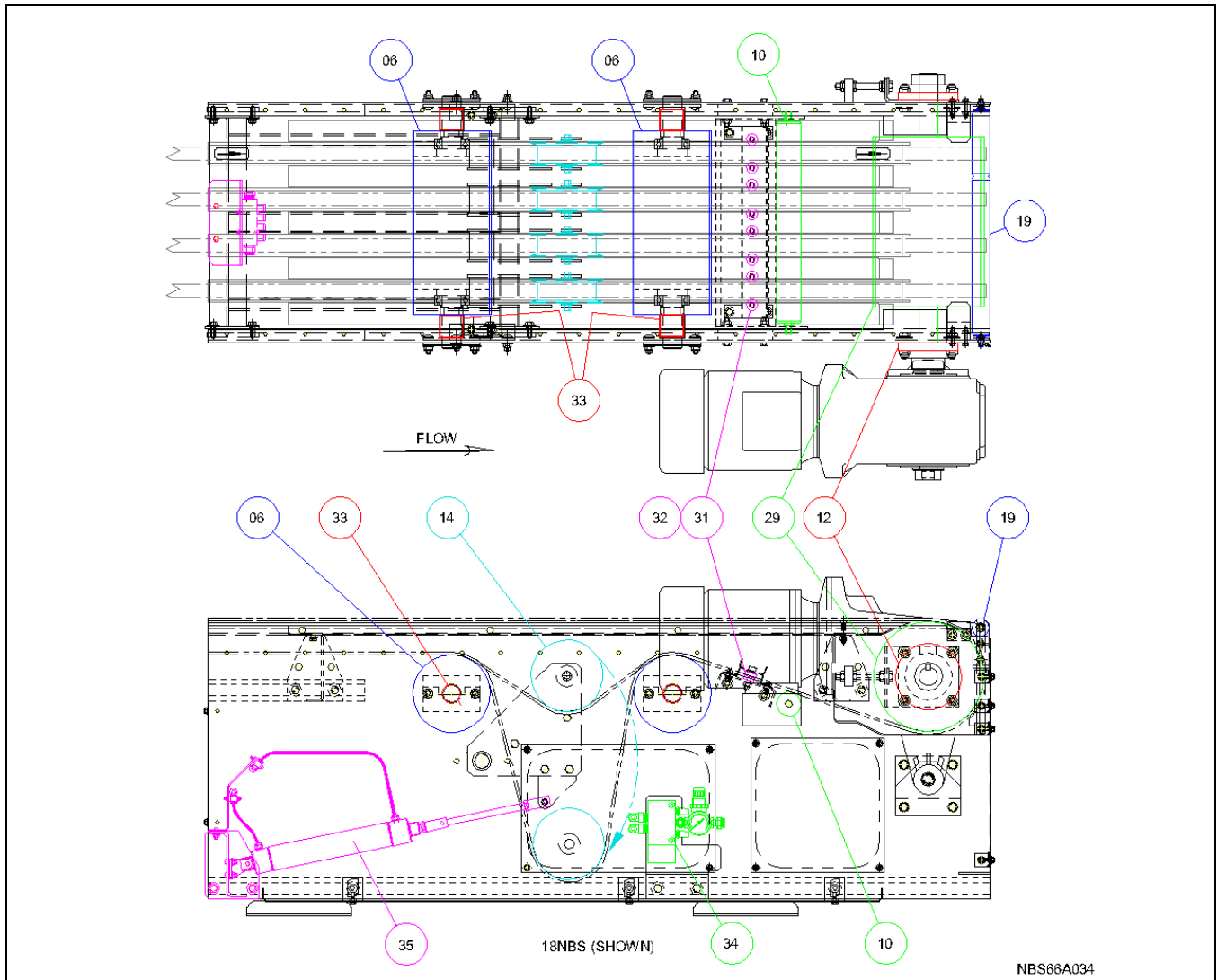
Parts Identification - NBS Intermediate Bed



NBS Intermediate Beds - Replacement Parts

Replacement Part Numbers and Quantities for NBS 10' Long Intermediate Bed Widths						
				18NBS30	25NBS30	32NBS30
		BED, _ _ NBS-I X 10'0"		E0001891	E0001608	E0001168
BALLOON	ITEM #	DESCRIPTION	QTY			
01		ROLLER,RET _ _ NBS 1.9 PRBG	1	E0001155	E0001156	E0001157
02	90050002	BRG,ROLLER 7/8"TRIGGER		8	12	16

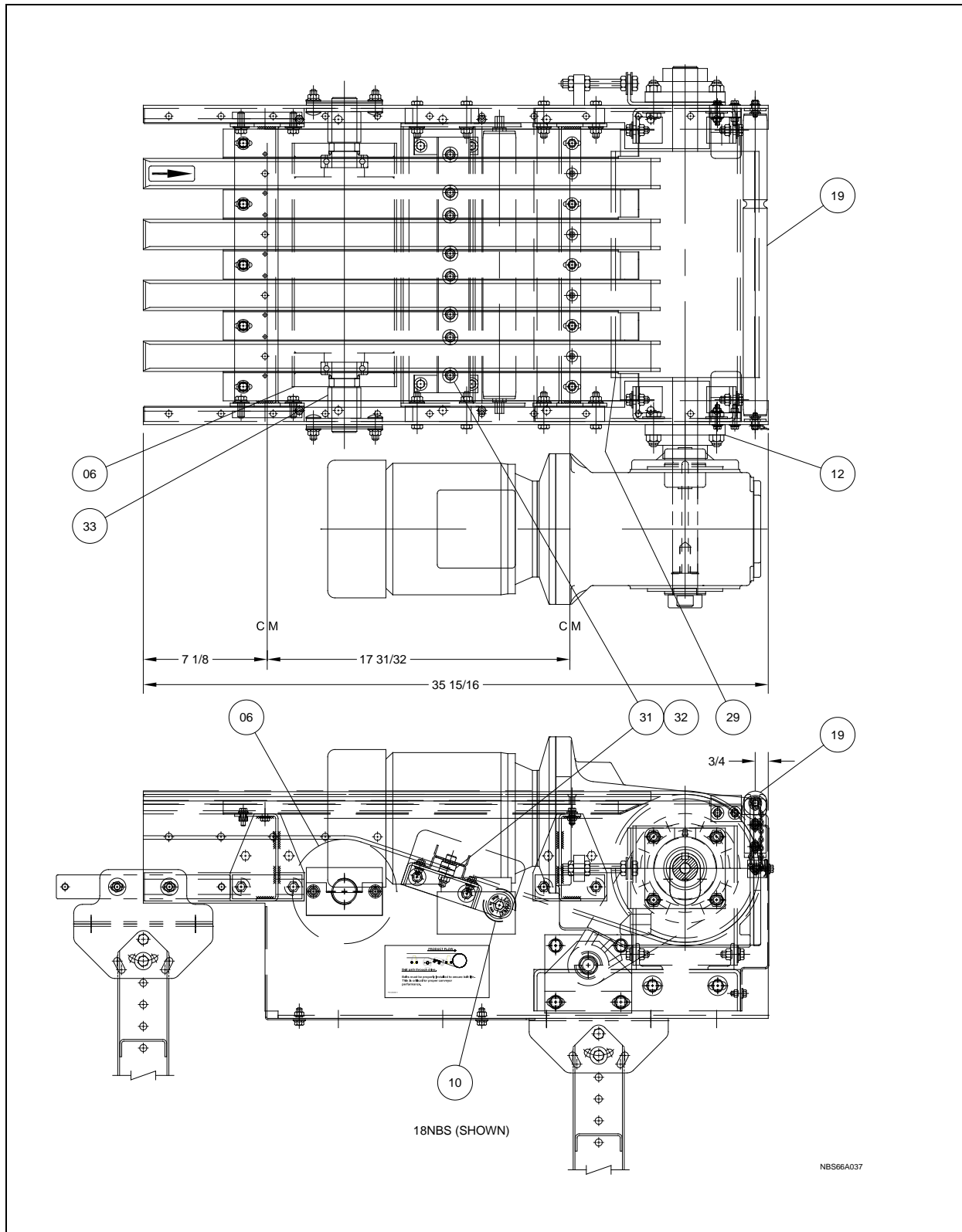
Parts Identification - NBS Drive 5' Bed



NBS Drive 5' Bed - Replacement Parts

Replacement Part Numbers and Quantities for NBS Drive Bed Widths						
				<u>18NBS</u>	<u>25NBS</u>	<u>32NBS</u>
		BED, _ _ NBS 8" DIRECT DR X 5'0" RH		E0003572	E0004000	E0004517
<u>BALLOON</u>	<u>ITEM #</u>	<u>DESCRIPTION</u>	<u>QTY</u>			
06		PULLEY,ASY 6"DIA _ _ NBS C-FF	2	E0001274	E0001275	E0001276
10		ROLLER,RETURN _ _ NBS 1.9 PRBG	2	E0001155	E0001156	E0001157
12	E0002728	BRG,FLANGE 4BOLT	2			
14	E0001560	WHEEL,ASSEMBLY NBS		4	6	8
19		ROLLER,GAP _ _ NBS	1	E0001337	E0001340	E0001343
29		PULLEY,8"DIA DIRECT _ _ NBS	1	E0004508	E0004509	E0004510
31	90050111	BRG, 7/8 OD X 9/32 WIDE		16	24	32
32	E0002333	WASHER, 1/2 OD X 1/32 THICK		24	36	48
33	E0001295	SPACER,6"PULLEY STOP 1-1/2"PVC	4			
34	E0004377	AIR,REGULATOR ASY _ _NBS TAKEUP	1			
35	E0004275	CYL,AIR		4	6	8

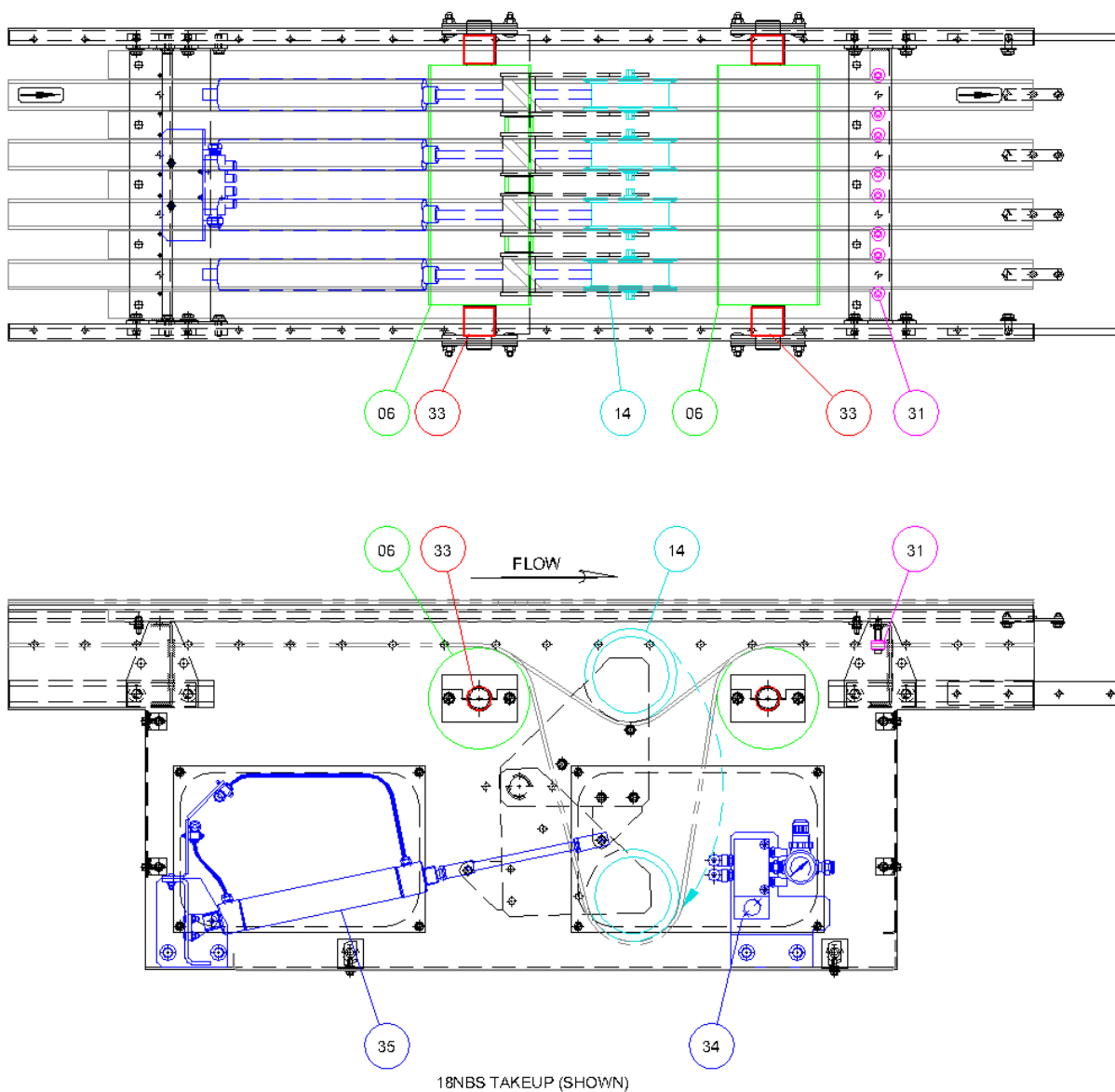
Parts Identification - NBS Drive 3' Bed



NBS Drive 3' Bed - Replacement Parts

Replacement Part Numbers and Quantities for NBS Drive Bed Widths						
	Note: Less Independent Belt Take-up					
				<u>18NBS</u>	<u>25NBS</u>	<u>32NBS</u>
		BED, __ NBS 8" DIRECT DR X 3'0" RH, LOW PROFILE		E0032458	E0032459	E0032460
<u>BALLOON</u>	<u>ITEM #</u>	<u>DESCRIPTION</u>	<u>QTY</u>			
06		PULLEY,ASY 6"DIA __ NBS C-FF	2	E0001274	E0001275	E0001276
10		ROLLER,RETURN __ NBS 1.9 PRBG	2	E0001155	E0001156	E0001157
12	E0002728	BRG,FLANGE 4BOLT	2			
19		ROLLER,GAP __ NBS	1	E0001337	E0001340	E0001343
29		PULLEY,8"DIA DIRECT __ NBS	1	E0004508	E0004509	E0004510
31	90050111	BRG, 7/8 OD X 9/32 WIDE		16	24	32
32	E0002333	WASHER, 1/2 OD X 1/32 THICK		24	36	48
33	E0001295	SPACER,6"PULLEY STOP 1-1/2"PVC	2			

Parts Identification - NBS Take-up 5' Bed

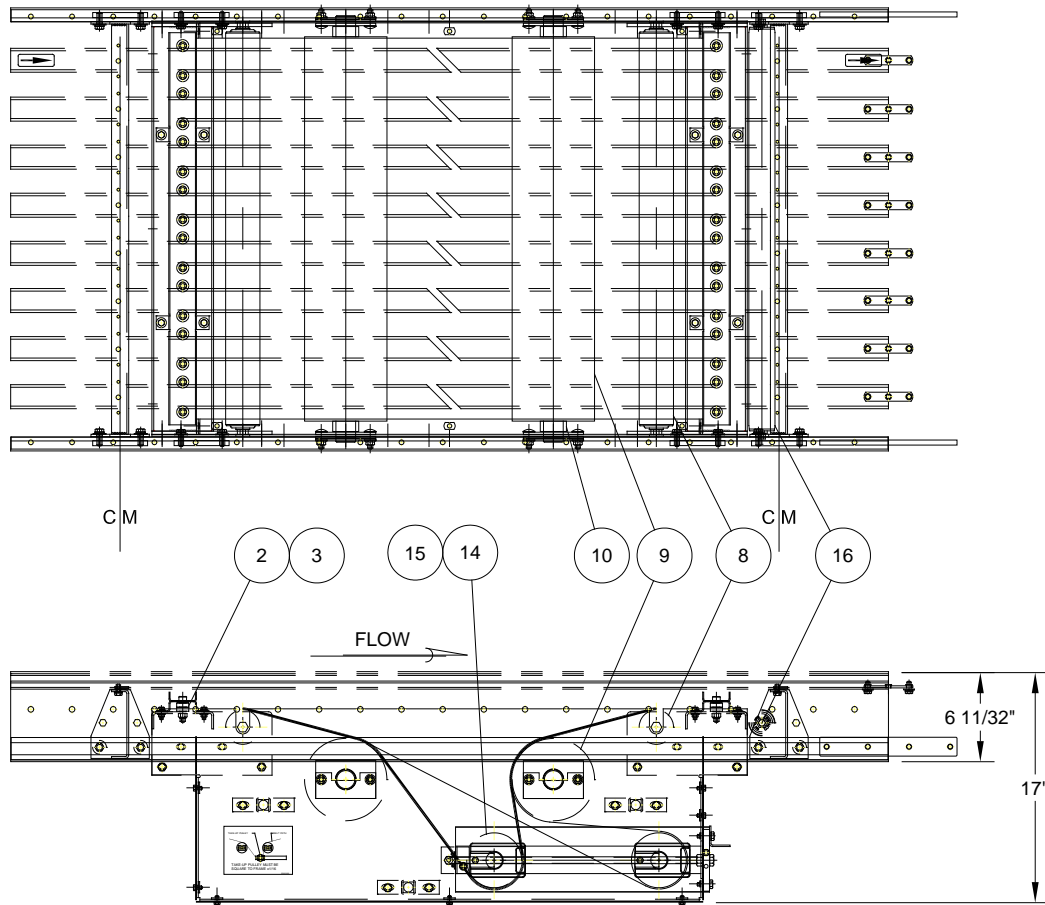


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NBS Take-up 5' Bed - Replacement Parts

Replacement Part Numbers and Quantities for NBS Take-up Bed Widths						
				<u>18NBS</u>	<u>25NBS</u>	<u>32NBS</u>
		BED, _ _ NBS TAKEUP X 5'0", INDEPENDENT BELT TAKE-UP		E0009861	E0009862	E0009863
<u>BALLOON</u>	<u>ITEM #</u>	<u>DESCRIPTION</u>	<u>QTY</u>			
06		PULLEY,ASY 6"DIA _ _ NBS C-FF	2	E0001274	E0001275	E0001276
14	E0001560	WHEEL,ASSEMBLY NBS		4	6	8
31	90050002	BRG, 7/8" TRIGGER		8	12	16
33	E0001295	SPACER,6"PULLEY STOP 1-1/2"PVC	4			
34	E0004377	AIR,REGULATOR ASY _ _NBS TAKEUP	1			
35	E0004275	CYL,AIR		4	6	8

Parts Identification - NBS Auxiliary Take-Up



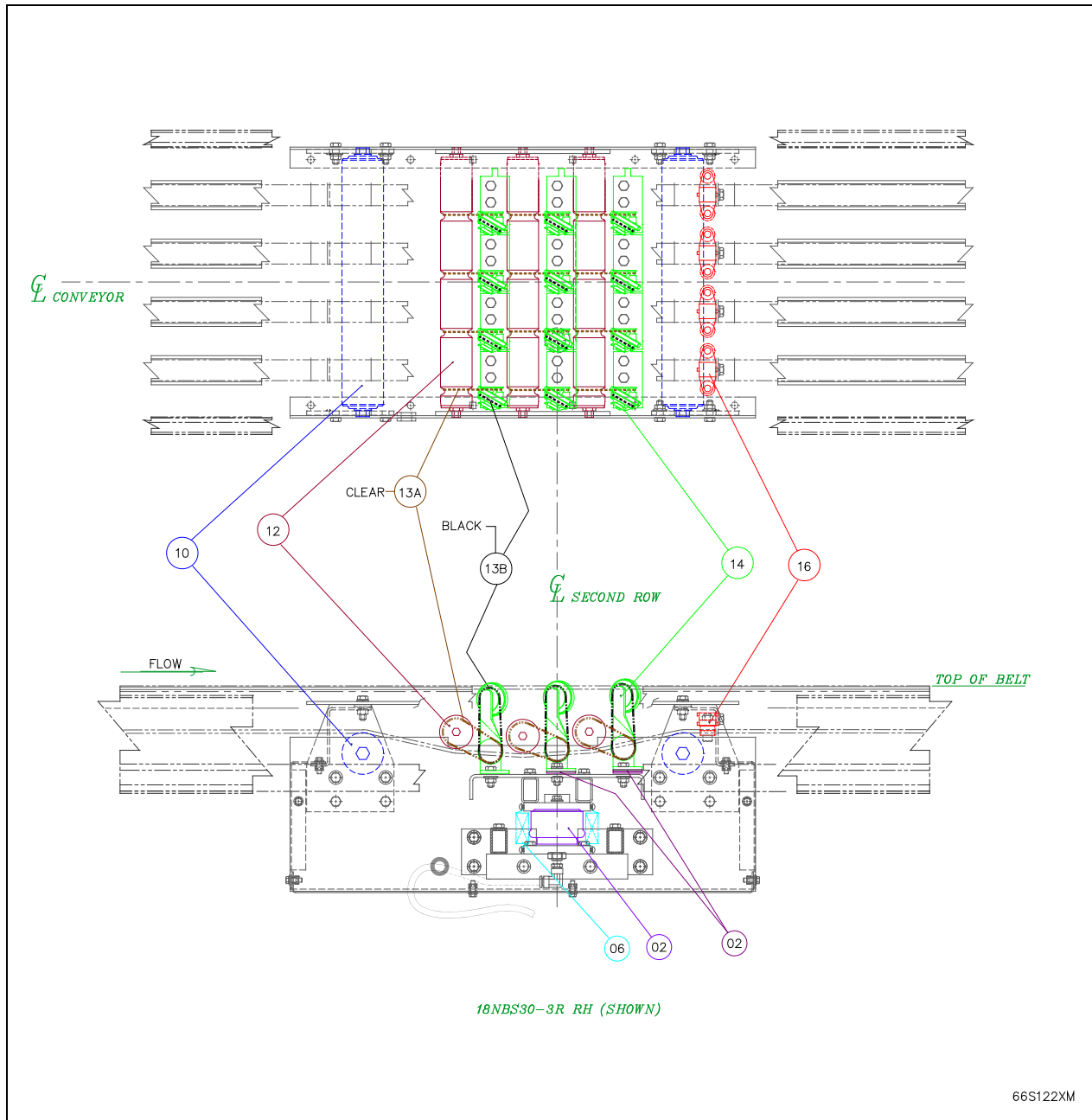
32NBS (SHOWN)

NBS66S027A

NBS Auxiliary Take-Up - Replacement Parts

Replacement Part Numbers and Quantities for NBS Auxiliary Take-up Widths						
				<u>18NBS</u>	<u>25NBS</u>	<u>32NBS</u>
		ASY,AUXILIARY TAKE-UP __NBS		E0001659	E0001660	E0001661
<u>BALLOON</u>	<u>ITEM #</u>	<u>DESCRIPTION</u>	<u>QTY</u>			
02	E0050111	BRG, 7/8 OD X 9/32 WIDE		16	24	32
03	E0002333	WASHER, 1/2 LD X 1/32 THICK		24	36	48
08		ROLLER,SNUBBER __ NBS30	2	E0001209	E0001210	E0001211
09		PULLEY,ASY 6" DIA __ NBS C-FF	2	E0001647	E0001648	E0001649
10	E0001657	SPACER,6"PULLEY STOP 3/4"PVC	4			
14		PULLEY,ASY 4" DIA __ NBS C-FF	1	E0001650	E0001651	E0001652
15	E0001658	SPACER,4"PULLEY STP 11/16"PVC	2			
16		ROLLER, RETURN __ NBS 1.9 PRBG	1	E0001155	E0001156	E0001157

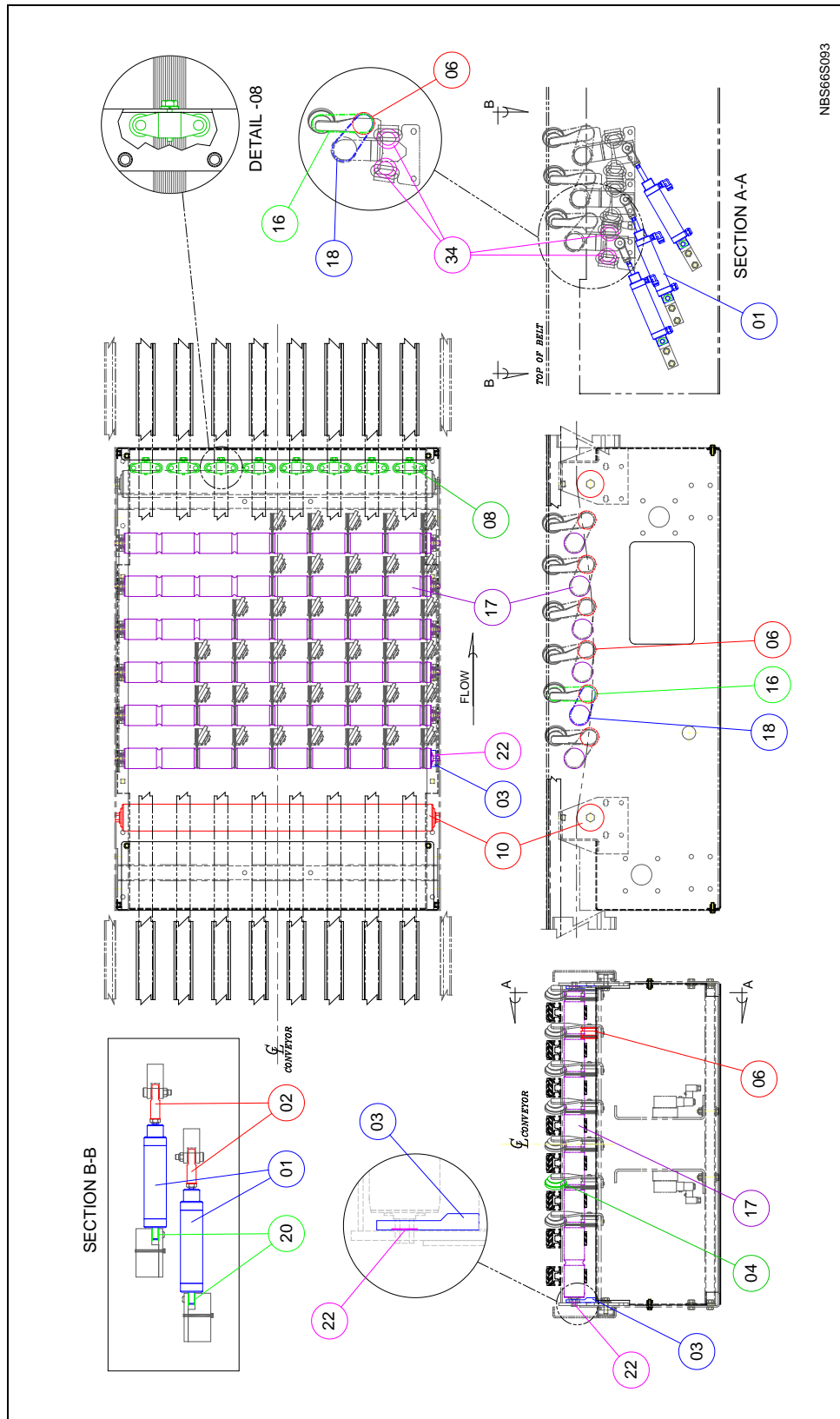
Parts Identification - NBS 30 3R Diverter Assembly



NBS 30 3R Diverter - Replacement Parts

Replacement Part Numbers and Quantities for NBS30 Diverter Widths						
				<u>18NBS30</u>	<u>25NBS30</u>	<u>32NBS30</u>
		SORTER,ASY _ _ NBS30 3R RH 24VOLTS		E0043074	E0043070	E0041013
		SORTER,ASY _ _ NBS30 3R LH 24VOLTS		E0043072	E0041015	E0040997
		SORTER,ASY _ _ NBS30 3R RH 110VOLTS		E0043075	E0043071	E0041014
		SORTER,ASY _ _ NBS30 3R LH 110VOLTS		E0043073	E0041016	E0041012
<u>BALLOON</u>	<u>ITEM #</u>	<u>DESCRIPTION</u>	<u>QTY</u>			
	E0001244	VALVE,ASY NBS30 24V	1			
	E0001433	VALVE,ASY NBS30110V	1			
02	90000025	AIRBAG,	1			
06	90800265	SPRING,EXT 3/4OD X 2"LG .085W	4			
10		ROLLER,SNUBBER _ _ NBS30	2	E0002690	E0002691	E0002692
12		ROLLER,_ _NBS30 PRBG WHL SORTER	3	E0002693	E0002694	E0002695
13A	E0001238	ORING,83A 1/8 X 8" CLEAR		8	12	16
13B	E0001239	ORING,83A 1/8 X 9-1/4" BLACK		8	12	16
14	E0001443	BRACKET,ASY NBS30 WHEEL LH		8	12	16
14	E0001444	BRACKET,ASY NBS30 WHEEL RH		16	24	32
16	E0039089	BLOCK,ASY BELT GUIDE		4	6	8
20	E0001232	SHIM,WHL BRKT NBS30		7	9	12

Parts Identification - NBS 30 WAVE™ Diverter Assembly

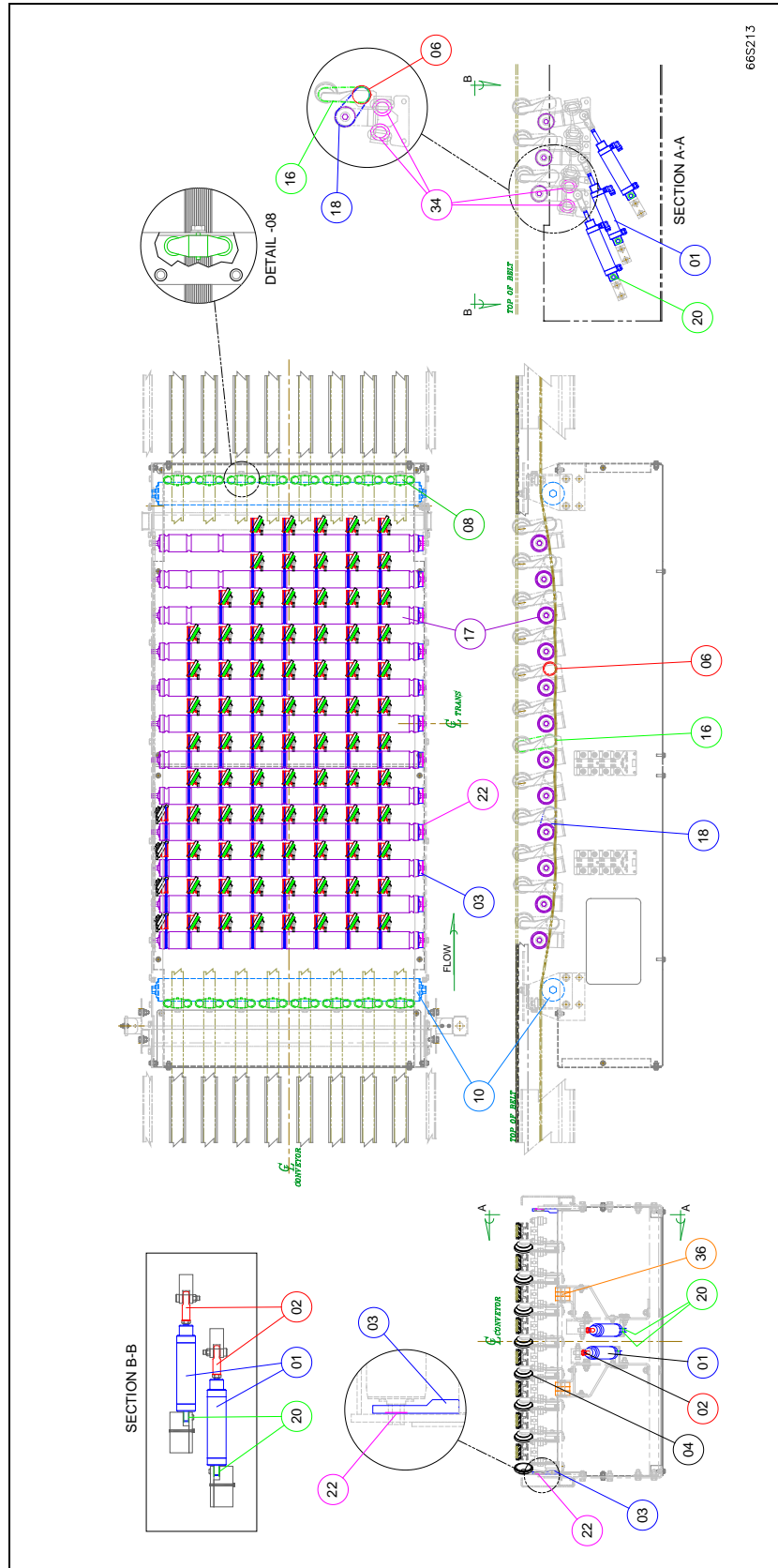


NBS 30 WAVE™ Diverter Assembly - Replacement Parts

Replacement Part Numbers and Quantities for NBS 30 WAVE™ Diverter Widths						
				18NBS30W	25NBS30W	32NBS30W
BALLOON	ITEM #	DESCRIPTION	QTY			
	1112928	VALVE,ASY NBS30W 6-STATION 24V	1			
	1112930	VALVE, 4-WAY 24V (REPLACEMENT) (SINGLE VALVE FOR REPLACEMENT ONLY)				
1	E0033930	CYL,AIR 1-1/8"B X 2" stk	6			
02	1106764	ROD,END SPHRCL 3/8"ID X 3/8"ROD	6			
03	E0033897	PL,ASY PIVOT BLOCK NBS30W	2			
04	E0005801	WHEEL,ASY NBS30 MOLDED TIRE		23	33	37
06	E0001233	WHEEL,ASY IDLER NBS30		23	33	37
08	E0039089	BLOCK,ASY BELT GUIDE NBS XM MTD		4	6	8
10		ROLLER,SNUBBER__ NBS30	2	E0002690	E0002691	E0002692
16	E0001239	ORING,83A 1/8 X 9-1/4" BLACK		23	33	37
17		ROLLER, __ NBS30 PRBG WHL SORTER	6	E0031810	E0031811	E0031812
18	E0001238	ORING,83A 1/8 X 8" CLEAR		23	33	37
20	1101423	WASHER,DELRIN .75000 X .385 ID	12			
22	E0033910	WASHER,DELRIN 1.500 OD X .506 ID	24			
34	E0033912	BUMPER,RADIAL	12			
	1792D8BVT8D	DEVICENET, COMBINATION BLOCK 8IN/8OUT	1			
*	1792CBFM	CABLE BASE, FLAT MEDIA (FOR USE W/SYSTEM COMMANDER™)	1			
*	1792CB18	CABLE BASE, ROUND CABLE (FOR STAND-ALONE DIVERT CONTROL)	1			
	1112971	HARNESS, SOLENOID CONNECTOR	3			
*	E0039096	CABLE, PE RETRO-REFLECT (STANDARD)	1			
*	1101452	CABLE,PE PROX (OPTIONAL)	1			
*	VL183F3840	PE, RETRO-REFLECT (STANDARD)	1			
*	WT183P420	PE, PROX (OPTIONAL)	1			

* Depends on chosen control option. See 66E001.

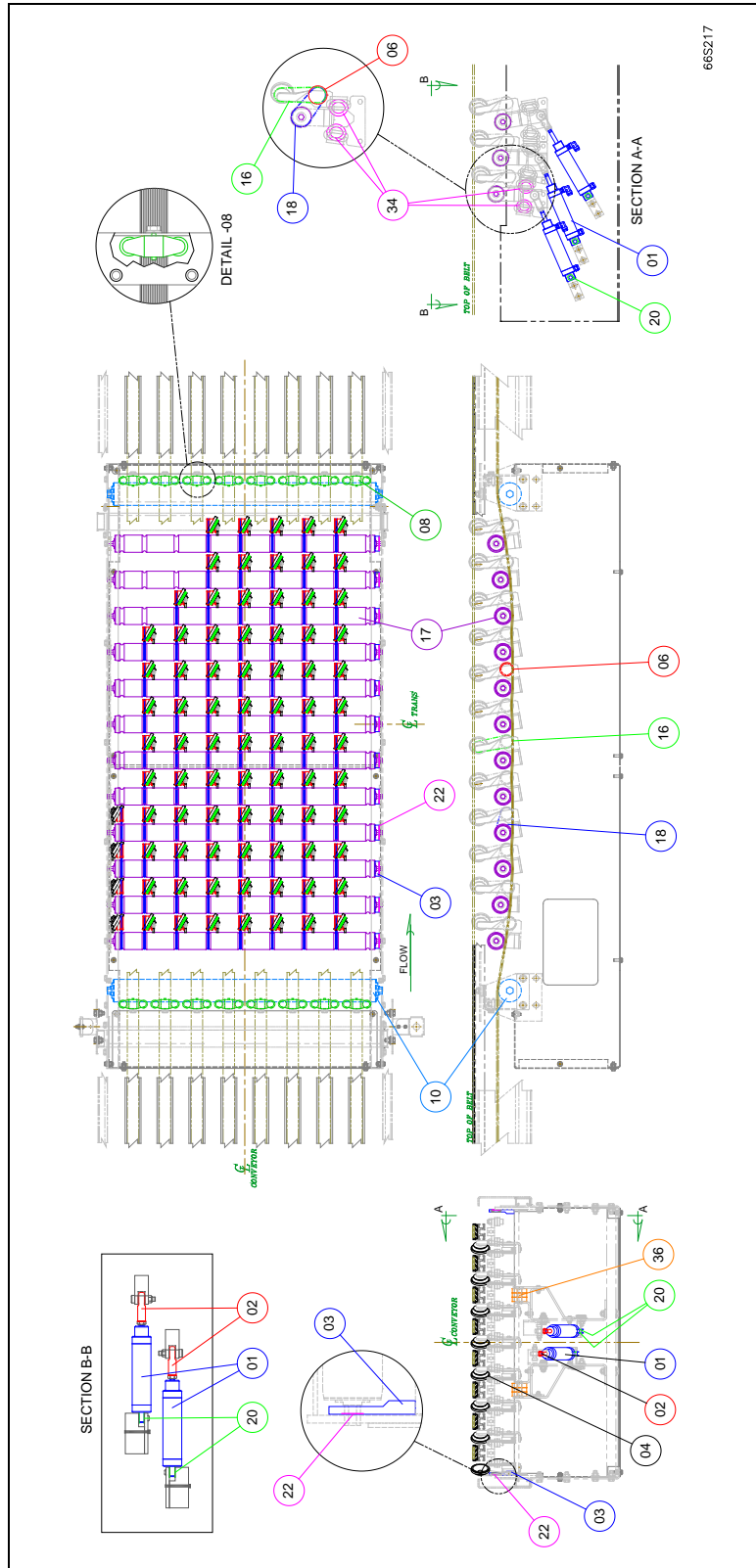
Parts Identification - NBS 30 WAVE™ Aligner Assembly



NBS 30 WAVE™ Aligner - Replacement Parts

Replacement Part Numbers and Quantities for NBS30WP Aligner Widths					
				25NBS30	32NBS30
BALLOON	ITEM #	DESCRIPTION	QTY		
	1112929	VALVE,ASY NBS30WP 12-STATION 24V	1		
	1112930	VALVE,4-WAY 24V (REPLACEMENT) (SINGLE VALVE FOR REPLACEMENT ONLY)			
01	E0033930	CYL,AIR 1-1/8" B X 2" STK	12		
02	1106764	ROD,END SPHRCL 3/8" ID X 3/8" ROD	12		
03	E0033897	PL,ASY PIVOT BLOCK NBS30W	2		
04	E0005801	WHEEL,ASY NBS30 MOLDED TIRE		60	83
06	E0001233	WHEEL,ASY IDLER NBS30		60	83
08	E0039089	BLOCK,ASY BELT GUIDE NBS XM MTD		12	16
10		ROLLER,SNUBBER __NBS30	2	E0002691	E0002692
16	E0001239	ORING,83A 1/8 X 9-1/4" BLACK		60	83
17		ROLLER,__NBS30 PRBG WHL SORTER	12	1101771	1101772
18	E0001238	ORING,83A 1/8 X 8" CLEAR		60	83
20	1101423	WASHER,DEL RIN .750 OD X .385 ID	24		
22	E0033910	WASHER,DEL RIN 1.500 OD X .506 ID	48		
34	E0033912	BUMPER,RADIAL	24		
36	1101780	BEARING,ROLLER 1/2 ID	24		
	1792D8BVT8D	DEVICENET,COMBINATION BLOCK 8IN/8OUT	2		
*	1792CBFM	CABLE BASE,FLAT MEDIA (FOR USE WITH COMMANDER SYSTEM™)	2		
*	1792CB18	CABLE BASE,ROUND CABLE (FOR STAND-ALONE DIVERT CONTROL)	2		
	1112971	HARNESS,SOLENOID CONNECTOR	6		
*	E0039096	CABLE,PE (RETRO-REFLECT)	2		
*	1101452	CABLE,PE (PROX)	2		
*	VL183F3840	PE,RETRO-REFLECT	2		
*	WT183P420	PE,PROX	2		
* Depends on chosen control option. See 66E002.					

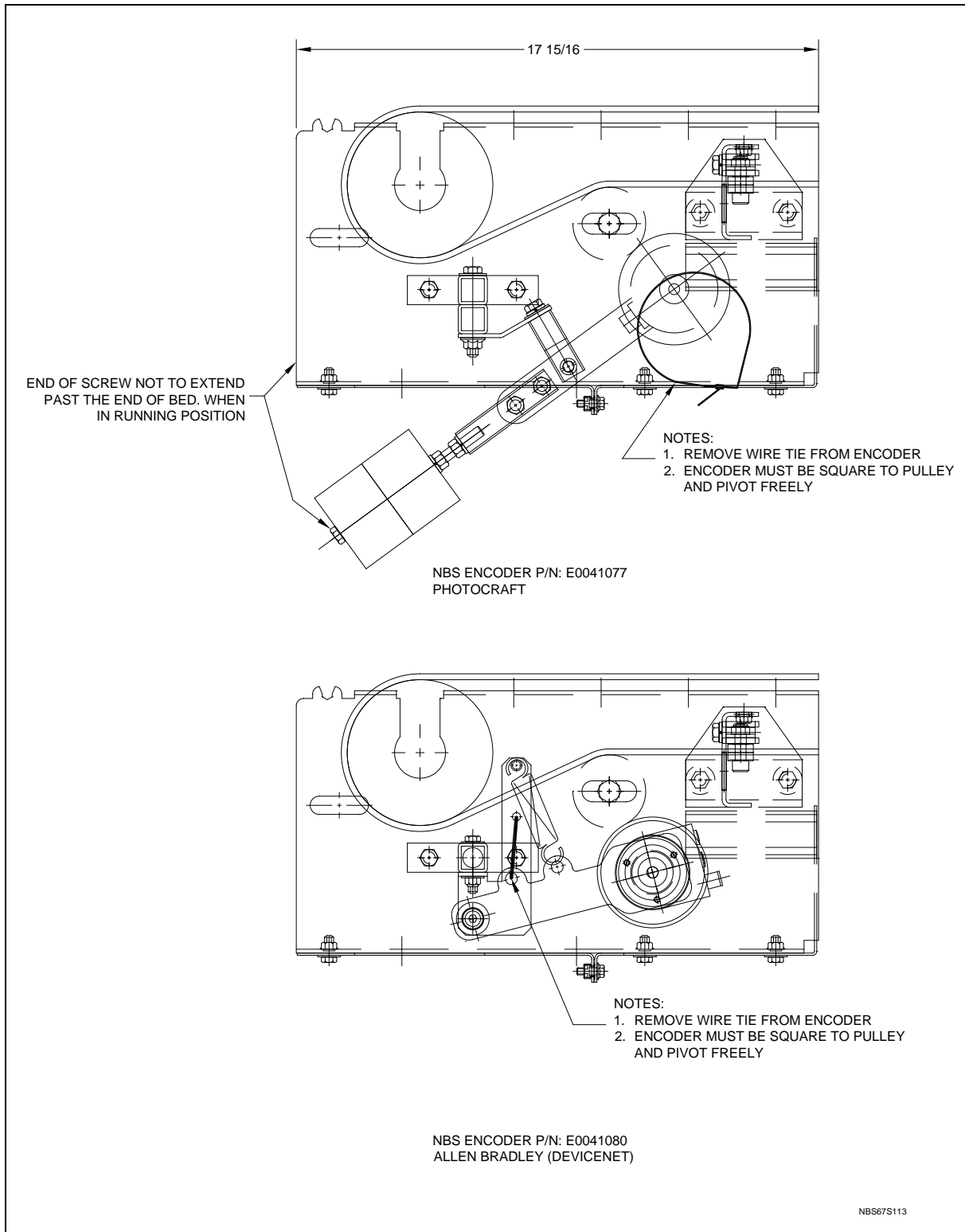
Parts Identification - NBS 30 12R Aligner Assembly



NBS 30 WAVE™ Aligner - Replacement Parts

Replacement Part Numbers and Quantities for NBS30-12R Aligner Widths					
				25NBS30	32NBS30
BALLOON	ITEM #	DESCRIPTION	QTY		
	1109704	MANIFOLD,ASY NBS30-12R 4-STATION 24V	1		
	E0038769	VALVE,4-WAY 24V (REPLACEMENT) (SINGLE VALVE FOR REPLACEMENT ONLY)			
	1109705	MANIFOLD,ASY NBS30-12R 4-STATION 110V	1		
	E0038770	VALVE,4-WAY 110V (REPLACEMENT) (SINGLE VALVE FOR REPLACEMENT ONLY)			
01	E0033930	CYL,AIR 1-1/8"B X 2"STK	12		
02	1106764	ROD,END SPHRCL 3/8"ID X 3/8"ROD	12		
03	E0033897	PL,ASY PIVOT BLOCK NBS30W	2		
04	E0005801	WHEEL,ASY NBS30 MOLDED TIRE		60	83
06	E0001233	WHEEL,ASY IDLER NBS30		60	83
08	E0039089	BLOCK,ASY BELT GUIDE NBS XM MTD		12	16
10		ROLLER,SNUBBER __NBS30	2	E0002691	E0002692
16	E0001239	ORING,83A 1/8 X 9-1/4" BLACK		60	83
17		ROLLER,__NBS30 PRBG WHL SORTER	12	1101771	1101772
18	E0001238	ORING,83A 1/8 X 8" CLEAR		60	83
20	1101423	WASHER,DELIN .750 OD X .385 ID	24		
22	E0033910	WASHER,DELIN 1.500 OD X .506 ID	48		
34	E0033912	BUMPER,RADIAL	24		
36	1101780	BEARING,ROLLER 1/2 ID	24		

NBS Encoder Assembly



MISSION

To meet or exceed all customer expectations by providing the highest quality products and services, on time, at exceptional value, in an environment which promotes safety and personal development.



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