



**INSTALLATION, OPERATION AND  
MAINTENANCE INSTRUCTIONS  
FOR  
MODEL 970 WEIGHFEEDER**

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Revised – October 12, 2001	Section on SCR taken out. It will be replaced with SCR designed for this job. VAH
Revised – November 26, 2003	Added remark in QED section regarding the controller. VAH

### **PROPRIETARY NOTE**

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## **SAFETY**

MERRICK manufactures units in a range of sizes. The following precautions are basic to all machinery and the principles apply to all MERRICK equipment, although the sizes differ.

No unusual hazards are associated with MERRICK equipment and controls. However, all machinery with electric drives and controls and moving parts requires the observance of basic precautions. Some of these principles bear repeating.

### **AS A GENERAL RULE:**

1. OBSERVE ALL STANDARD PRECAUTIONS WHICH PERTAIN TO MOVING MACHINERY.
2. OBSERVE ALL STANDARD PRECAUTIONS WHICH PERTAIN TO ELECTRIC DRIVES AND ELECTRICAL CONTROLS.
3. PAY PARTICULAR ATTENTION TO THE SPECIAL "CAUTIONS" AND "NOTES" WHICH OCCUR THROUGHOUT THIS MANUAL.

### **MECHANICAL PRECAUTIONS:**

1. When working on MERRICK equipment (whether for installation, cleaning, maintenance or lubrication) take positive steps to close off all infeeds and discharges. This is to prevent material from falling on personnel.
2. Use canvas tarpaulins to protect openings and to keep tools and loose parts from falling into machinery.
3. Take positive steps to prevent machinery from being started while personnel are at work. Main Disconnect Switches should be opened. MERRICK recommends that the boxes be padlocked by maintenance personnel who keep the keys in their possession while at work. Or remove fuses in the Main Disconnect Box and hang signs which indicate personnel are at work.
4. Do not attempt to remove chain guards and other protective elements of the equipment while machinery is being operated.
5. When work must be performed on machinery in motion, caution personnel to remove all loose clothing and jewelry such as rings, identification bracelets, etc.
6. Whenever possible do not allow personnel to work alone. There should be other people available to stop a machine in the event of a mishap and to summon help.
7. Always stop machinery before opening doors or inspection ports to prevent material from flying out of the enclosures.
8. Heavy components such as pulleys and motors must be cribbed or braced from below, or lashed from above, to prevent them from falling. When dismantling equipment, use good rigging procedures.
9. Stop machinery immediately in the event of unusual vibration, erratic operation, or runaway and uncontrollable motor speed.

10. Personnel working on machines should wear safety goggles, hard hats, steel-toe shoes and heavy gloves.

### **ELECTRICAL PRECAUTIONS:**

1. Before undertaking work on the electrical control or drive systems, open Main Disconnect Switches and lock boxes. Or remove the fuses in the Main Disconnect and attach a sign to the box indicating that work is in progress.
2. Verify that all necessary grounds called for in the wiring diagrams are in place and are solid. Do not disable or disconnect grounding.
3. When working in live areas (high voltage) always keep one hand clear of the machine, cabinet and other conductors to avoid the possibility of shock from one arm across the chest to the other.
4. Never impair the function of a fuse.
5. Never undertake electrical work when the floor is wet or flooded.

IF PERSONNEL ARE IN DOUBT ABOUT A PROCEDURE, CALL THE MERRICK CORPORATION, SERVICE DEPARTMENT.

## **STORAGE**

(NOTE SEPARATE INSTRUCTIONS FOR MECHANICAL AND ELECTRICAL)

### **MECHANICAL EQUIPMENT - STORED ON RECEIPT FROM FACTORY:**

- A. Storage up to 30 Days: Keep all equipment dry and store well above the ground. A warehouse is preferred. No other special precautions apply.
- B. Storage 1 to 12 Months:
  - 1. Grease-lubricated Gear Boxes: No special requirements.
  - 2. Oil-lubricated Gear Boxes: Fill the Gear Box completely with recommended lubricant and plug the Breathers.

### **OR**

Fill the Gear Boxes to operating level with a rust-preventative oil (NP-20 or equivalent). Plug the Breathers. At approximately one-month intervals, rotate the Input Shaft a sufficient number of times to insure that all internal components remain coated with oil.

- 3. Remove tension from drive belt (timing).
  - 4. Protect the Shafts and other exposed ferrous metal parts with a heavy-consistency grease and inspect or renew coating every six months.
  - 5. Slacken the Conveyor Belt fully.
  - 6. Install adequate amounts of desiccant in Feeders. A minimum of ten pounds is recommended. The more, the better.
  - 7. Remove all pressure from belt Scraper Blades (If furnished).
  - 8. Locate the Suspension in the raised (shipping) position.
- C. Storage Longer Than 12 Months: (Observe all of the above plus these additional precautions):
- 1. Change oil in Gear Boxes yearly.
  - 2. Remove all Conveyor Belts and store indoors on a large-diameter core to prevent the belt from taking a "set".

### **MECHANICAL EQUIPMENT - STORAGE FOLLOWING USE:**

(Observe all of the instructions for storage prior to use plus these additional instructions)

- A. Empty the machine completely of conveyed material.
- B. Neutralize units. Flush all surfaces with clean water and dry thoroughly.

- C. Remove rust as necessary. Touch-up all painted surfaces where necessary to cover all bare metal surfaces.

### **MECHANICAL OPERATION AFTER STORAGE:**

- A. Grease-lubricated Gear Boxes: Add half of the recommended quantity of new grease as shown in Lubrication Section of this manual.
- B. Oil-lubricated Gear Boxes:
  - 1. Drain the rust-preventative or operating oil completely.
  - 2. Flush unit with the recommended operating oil as shown in the Lubrication Section of this manual.
  - 3. When flushed clear, fill the unit to the proper oil level with the recommended lubricating oil.
- C. Reinstall and re-tension the Conveyor Belt.
- D. Re-grease all bearings.
- E. Remove desiccant.
- F. Reposition belt scrapers.

### **ELECTRICAL EQUIPMENT - STORED ON RECEIPT FROM FACTORY:**

- A. Storage Up to Six Months: Keep all equipment dry and well above the ground. A warehouse is preferred. If the equipment has been in transit for two months or longer, replace the factory-supplied desiccant before storing. The use of Evaporative Corrosion-Inhibitors is recommended but not required.
- B. Storage Longer Than Six Months:
  - 1. In a heated warehouse with temperatures ABOVE FREEZING.
    - a. All equipment must be kept dry. Vaporizing Corrosion-Inhibitors MUST be used inside all electrical enclosures and panels.
    - b. Replace all desiccants in the Spring and Fall, when the humidity is low.
    - c. Operate all electrical and electronic equipment at least once a year for a minimum of two to three hours, preferably during a low humidity season. Operate all switches at least ten times. Operate transformers and motors at least once a year and allow them to rise 20 degrees C (36 degrees F) above the ambient temperature. it is preferable to do this in the low humidity season.
  - 2. In a warehouse with temperatures BELOW FREEZING.
    - a. Prior to storage, remove all pen and ink elements from Recording Instruments, and thoroughly clean all inking mechanisms.

- b. Operate all electrical and electronic equipment for a minimum of two to three hours, preferably during a low humidity season. Operate all switches at least ten times. Operate transformers and motors at least once a year and allow them to rise 20 degrees C (36 degrees F) above the ambient temperature. It is preferable to do this during the low humidity season.
3. Outside Storage IS NOT RECOMMENDED. If it is unavoidable, then damage from dampness must be prevented. The use of Vaporizing Corrosion Inhibitors and Desiccants affords some protection. Equipment must be operated periodically as above.

### **ELECTRICAL EQUIPMENT - STORAGE FOLLOWING USE:**

- A. Clean all equipment and enclosures thoroughly inside and out.
- B. Remove rust as necessary. Touch up all painted surfaces as necessary to cover all bare metal surfaces.
- C. Observe instructions for storage and care of electrical equipment prior to use.
- D. Keep panels dry with anti-condensation heaters if possible.

### **ELECTRICAL EQUIPMENT - OPERATION AFTER STORAGE:**

#### General Instruction:

- A. When equipment has been stored at either high humidity and/or low temperatures, DO NOT APPLY POWER until the equipment has been allowed to stand at ambient conditions for a minimum of three hours.
- B. Remove all packing and protective materials.
- C. Remove all desiccants. Vaporizing Corrosion-Inhibitors may be left in the equipment only if this is permitted by local fire regulations.



## **INSTALLATION**

The Merrick Model 970/971 Feeder/Weigher is an extremely sensitive and precise weighing device that can be easily damaged by improper handling or operation. Please follow all instructions contained in this manual carefully. If you have any questions please consult the Merrick Customer Support Department at (904) 265-3611.

### **Un-Crating Feeder**

Do not push, pull or lift the feeder from any part of the Conveyor.

**IMPORTANT: FEEDER SHOULD ONLY BE LIFTED BY THE ENCLOSURE.**

**IMPROPER HANDLING CAN DESTROY THE LOAD CELL WHICH WOULD NOT BE COVERED BY WARRANTY. WHILE UNCRATING, BE SURE TO UNPACK ALL LOOSE ITEMS SUCH AS SKIRTBOARDS, HEAD END BELT SCRAPER AND FLEX CONNECTIONS AND INSTALL ON THE MACHINE.**

## **MECHANICAL INSTALLATION**

Study the customer assembly drawings that have been provided in the Section 10 of this manual before starting installation. Basic principles for installation of machinery must be observed.

**NOTE:** During shipment the Load Cell is protected by a red shipping bolt that supports the Weigh Deck and relieves the load and/or impact. This shipping Bolt must be left in place during installation and removed only when the machine is ready to be started up and placed in operation.

The Feeder must be properly supported and positioned plumb and on level flooring or on a platform free from significant movement or vibration. The standard Model 970 or 971 is typically equipped with vibration isolation mounting pads at the four corners of the enclosure. These vibration isolators are adjustable to allow for compensation for minor irregularities in the floor support.

Any loads such as Storage Hoppers or Bins must not be imposed on the machine or its supports. Connections to the machine should be made in such a way that no torque or twist is imposed.

Use flexible connections to connect any automatic fill devices or discharge spouts to the feeder.

Field wiring connections should be made only at the connection boxes provided, never make field wiring connections at any point on the floating frame of the feeder.

**CAUTION:** Never weld on the Feeder without taking proper precautions as severe damage to the load cell and/or electronics could result. Contact the Merrick Support Department prior to any such activity.

## **BELT TENSIONING**

The timing belt drive is factory preset to provide proper belt tension. To take-off the belt, merely depress the elastic preloaded tensioner and remove the belt. **Do not loosen the tensioner bolt** to remove the belt. If the belt is replaced and retensioning is required, adjust the elastic tensioner to 15 degrees on the scale at the base of the tensioner. **Do not overtension.** Overtension can cause belt breakage and bearing failure.

## **ELECTRICAL INSTALLATION**

Study the customer connection drawing that has been provided in the rear of this manual. Proper precautions and principles of electrical installation must be followed to ensure a safe and reliable operating piece of equipment.

Follow instructions on the connection drawings for wire size and type. Improper wiring could cause unreliable operation due to electrical noise, ground-loops, etc.

For information regarding the Micro-Processor Controller please see Section 5 of this manual.

## **START UP PROCEDURE**

1. Before starting make sure all connections are correct and machine is level.
2. Check for correct rotation of the conveyor. Belt should move over weighdeck from infeed to discharge. Reverse armature leads (A1-A2) if incorrect.
3. Remove the RED shipping bracket secured to the weigh deck.
4. Proceed to Calibration.

## **CALIBRATION**

### **BELT TRACKING (AUTO TENSION MODULE ADJUSTMENT)**

The normal position of the belt is within 1/4 inch of center at all times. Make belt-tracking adjustments only from the normal access side of the unit.

1. On Closed Models: A door is provided on the drive side to permit slackening for belt changes, or initial tension adjustments.
2. Set initial tension visually by observing the sag on the return side of the belt. The belt should sag about 1/4-inch and must be in firm contact with the Return Belt Scraper at the Tail Pulley. The belt should feel equally taut on both sides and the Lock Nuts on the Take-up Arms should be tight enough to keep the Tail Pulley from drooping.
3. Adjust Take-up Nuts one or two "flats" at a time. If the belt moves even with the end of the pulley, stop the machine. Reposition the belt and start tracking again. Tighten the Take-ups of the side the belt moves TOWARDS. This should stabilize the movement.

### **WEIGH MODULE ADJUSTMENT**

1. The Weigh Deck is supported on a three point suspension which consists of three adjustable alignment screws. Start the alignment by using the three alignment screws to lower the Weigh Deck to a point slightly below the two adjacent machined reference bars welded to the Conveyor Stringer Weldment. Use a precision straight edge laid across the two reference bars to position the Weigh Deck.
2. Using a 36 inches long precision straight edge, bridge the two reference bars with one end of the straight edge suspended over the entire length of the infeed slide pan (work around the infeed as can be accomplished). Then, slide the straight edge from one side of the conveyor weldment to

the other making sure that the straight edge is snug against the two reference bars. During this procedure, the straight edge can not touch any part of the infeed slide pan. The infeed slide pan should never be higher than the two reference bars. However, in some instances stainless steel can relieve stresses causing structural movement. If the infeed slide pan should become higher than the reference bars, it must be forged lower. If the reference bars are not higher than the infeed slide pan, the feeder will not be repeatable.

3. Using a precision straight edge, place the straight edge across the two reference bars at the near (to you) end of the Weigh Deck. Using the three alignment screws, raise the Weigh Deck until it touches the straight edge. Move the straight edge to the opposite end of the Weigh Deck and repeat the procedure. Move back to the original starting point and fine tune the alignment making sure that the Weigh Deck touches the straight edge but does not lift it. Again, move to the opposite end and repeat the procedure. Now, move the straight edge laterally across the reference bars from one end of the Weigh Deck to the other. Fine tune the elevation of the Weigh Deck until no part of the Weigh Deck surface is higher than the reference bars. If a precision alignment can not be achieved, it is better for the center of the weigh deck to be aligned to the reference bars and the ends of the Weigh Deck slightly lower (a few thousandths of an inch) than the reference bars. In no circumstances is it permissible for the ends of the Weigh Deck to be higher than the reference bars.
4. Using a feeler gauge, adjust the gap between the end of the overload screw and the mating flange on the Weigh Deck. The gap should be adjusted as follows: 6 KG load cell, 0.016" +/- 0.001"; 15 KG load cell, 0.010" +/- 0.001".

### **SHEAR GATE ADJUSTMENT**

The shear gate is adjusted simply by loosening two lock nuts and positioning. The gate should be positioned so that the bottom edge is the height up from the belt indicated on the specification sheet. The gate can also be used to gain some turn down, but always should provide a depth that is 3X the max material lump size.

### **SKIRTBOARD ADJUSTMENT**

The skirtboards should be adjusted so that there is a minimum clearance between the bottom edge and the belt. This is typically around 1/16" or slightly higher at the infeed and should rise to approximately 3/16" at the head pulley.

## **MECHANICAL DESCRIPTION**

The Merrick Series 970 Weighfeeder is manufactured for WET WASH DOWN applications as standard. This means that the unit is suitable for food grade applications where a water spray with or without a cleaning solution is used to clean the entire unit. The following guidelines should be followed when cleaning the unit:

1. Weighfeeders may be washed down regularly with water or cleaning solution. NEVER use steam to clean them.
2. Remove the belt for washdown.
3. Dry the unit and belt thoroughly before restarting after washdown. Remove excess water from the platforms and pulleys by wiping or with air jets.
4. Be careful to avoid Load Cell damage from direct streams of water, from strong solvents, (which may also attack bearings), or from contact with other parts.

The Weighfeeder can be supplied with a DC MOTOR, in which case it is used primarily in systems where rate of flow of material is controlled by varying the belt speed. In this application, the infeed is kept full so that a constant stream of material is delivered.

The Weighfeeder can be supplied with an AC MOTOR, in which case it is used primarily in systems where rate of flow need not be adjusted or is governed by other equipment in the system. This application is also known as "wild flow" and the unit is only a scale.

The series 970 is available in three belt widths: 6", 12", & 24".

The series 970 is constructed of stainless steel except for certain areas where FDA approved materials such as Delrin, Buna-N, or Teflon are used. (See component terminology & description.)

The series 970 is an enclosed feeder with three access doors. The door arrangement allows for easy access to the main conveyor as well as easy removal of the main conveyor for cleaning and maintenance.

## **COMPONENT TERMINOLOGY & DESCRIPTION**

The following is a list and description of the major components in a series 970 feeder showing the standard terminology used for each part

**ENCLOSURE MODULE** - Housing which supports all other feeder components. Constructed entirely of stainless steel. Peripheral components included in this module are: The drive shaft bearing assembly including the quick disconnect coupling, the skirtboard mounting clips, and the lexan doors.

**DRIVE MODULE** - Consists of an electric motor, a speed reducer, 2 timing pulleys, a timing belt, an idling tensioning pulley with tensioner,

**NOTE:** Premature failure of any drive component probably indicates that the unit has been overloaded. Review the application/installation or call Merrick's Customer Service Department for advice.

**NOTE:** Before starting any new unit, make a visual inspection of the drive to ascertain that no misalignment has occurred in shipping. Make corrections if necessary. Then run the unit at full speed to determine if it runs quietly. If it does not, check further for misalignments

WEIGH MODULE - This is the main weighing unit and is designed to be adjusted separately from the main conveyor and then installed using a one point suspension. The weigh bridge consists of a load cell, 2 reference bars, a weigh deck and a support frame. For information on properly adjusting the weigh module please refer to the calibration section of this manual.

**IMPORTANT NOTE:** Take great care to protect the Load Cell. It can be damaged by shocks sustained by hitting something if the Weighdeck is allowed to swing. Always use the Red shipping bolt under the Weighdeck to protect the Load Cell when working on the conveyor.

AUTO TENSION MODULE - This unit is responsible for tensioning and tracking the belt. It is made up of the tail pulley, the DSP, tracking screw take-ups, tension weight bracket, pulley scraper and return belt scraper and bearings for tail pulley. For information on properly adjusting the auto tension module please refer to the calibration section of this manual.

INFEED MODULE - This directs the flow of material from the customers supply onto the belt and protects the belt from unnecessary abrasion. It protects the belt by reducing the pressure of the material against the belt. By keeping the material away from the Skirtboards it helps to prevent material from wedging between the belt and the Skirtboards. The material is forced into a certain profile using the shear gate so that the drive components can be sized to give the proper capacity. The infeed has seal strips in contact with the belt to prevent leaking from the material flow. The infeed also has hangers for one end of the skirtboards. Three sizes are available and are selected on the basis of the quantities of materials to be handled and the desired rate of flow. All units in the Model 970 series are equipped with an Adjustable Shear Gate which controls the depth of the material on the belt. The Shear Gate must be adjusted at start-up. See details in calibration section of this manual.

CONVEYOR MODULE - This module consists of the stringer weldment, including the attachment for the weigh module one point suspension and the inlet slider pan, the lagged head pulley with drive pin and the 2 head pulley bearings.

The conveyor module, weigh module, auto-tension module and belt are combined to form the main conveyor assembly. This assembly can be removed from the enclosure intact for service and cleaning. The optional conveyor access extensions (if purchased) make this very simple and easy.

ELECTRICAL MODULE - The electrical module consists of the electronics and wiring on the feeder. It shows the wiring from the load cell and DSP to the QED board. It also shows the wiring for the quick disconnects used.

SKIRTBOARDS: These are flared and raised towards the discharge end to relieve pinching of the material on the belt. The flare is fixed. However, the height is adjustable. Check the height by observation. The height is adjusted through a system of slotted mounting clips at the discharge end. The Skirtboards can be removed easily, as the mount with keyed holes which fit over studs at each end.

## **BELT SCRAPERS**

There are three scrapers in the system.

1. THE TAIL PULLEY SCRAPER: This acts to control build-up of material on the Tail Pulley. It has slotted holes which permit its adjustment relative to the pulley. Adjust the blade so it is straight, that is, parallel to the pulley, and set so it is close - but not touching - the pulley. Be sure to adjust the scraper so it is parallel to the axis of the pulley and the spacing at the ends is equal.
2. THE TAIL END BELT SCRAPER: This is located at the Tail Pulley and removes material to keep it from recirculating. Be sure this is clean and in firm contact with the belt.

3. THE HEAD END BELT SCRAPER: This assures unloading of the belt. Both Belt Scrapers may cause belt mistracking if they become damaged. Inspect them periodically for proper operation.

## **CLEANING AND MAINTAINING THE CONVEYOR ASSEMBLY**

1. Turn off all power to the unit at the Main Disconnect.

**CAUTION:** NEVER service or attempt to clean unit until all power has been cut off. This is both to avoid possible electric shock and to avoid catching a limb or clothing in moving parts.

2. Remove the Skirtboards by lifting them vertically until the wide parts of the key-shaped holes can be lifted clear of the mounting studs.
3. Disconnect the load cell and the DSP at their quick disconnects.
4. Remove the two stringer locking lugs.
5. If purchased, screw the extension rods on the stringer support rods in place of the stringer locking lugs. Slide the conveyor out.

**IMPORTANT NOTE:** Take great care to protect the Load Cell. It can be damaged by shocks sustained by hitting something if the Weighdeck is allowed to swing. Always use the overload protection screw provided to (see drawing N41941 in section 10) protect the Load Cell.

### NORMAL MAINTENANCE

The Conveyor Assembly of the Weighfeeder requires virtually no maintenance except keeping it clean. It must be cleaned regularly, the frequency depending on the type of material being handled and the amount of dust it generates. The best way to clean without removing the conveyor assembly is with an air hose, and with most materials it can be done about once a week. Vacuum can also be used effectively. Since material may pile up on the enclosure, this may require cleaning more frequently. If cleaning is done without removing the conveyor assembly, be sure the main disconnect is OFF before inserting hands.

**IMPORTANT NOTE:** Refer to the certified installation drawings when mounting the unit. Do not impose structural loads at the infeed and discharge connections. Always check the infeed before starting the unit to be sure that the infeed chute has not been jammed down onto the belt. The unit must be isolated from plant vibration for accuracy and long load cell life.

## **SPARE PARTS FOR SERIES 970**

As a general rule Merrick advises maintaining a spare parts stock equal to 25 percent of the possible requirements.

For example, a complete set of spares is advised for one to four machines, two sets for five to eight machines, etc.

### SHELF LIFE

MECHANICAL PARTS - have an unlimited shelf life when properly stored.

ELECTRONIC PARTS -generally have a shelf life of five years. Merrick recommends that modular electronic parts be rotated in use. For example, machines which use printed circuit cards should have the cards exchanged with spares yearly, the cards removed then going into the spare stock. New parts should be ordered to replace spare parts in stock longer than five years. When cards are replaced, recalibration is recommended.

PARTS WITH BATTERIES - have a shelf life of one year and should be replaced yearly.

#### UNIT REPLACEMENT

On some unitized or modular items, Merrick advises maintaining one complete unit, both for spare parts and as a test fixture, for each four machines.

If a machine malfunctions, the entire module can be replaced, reducing down-time to a minimum. The damaged module can be returned to Merrick for repair.

Often the source of trouble in a machine can be located quickly by replacing complete modules, one at a time. This is especially effective in locating trouble in micro-computer or digital controls, speed sensors, totalizers, and SCR motor controllers. Often the cost of a complete spare unit is less than the total cost of the parts. There is a saving in the labor of trouble-shooting, as well.

#### START-UP SPARES

Parts which can fail when energized are considered start-up spares.

#### OPERATING SPARES

Parts which are subject to wear rather than instant failure are considered operating spares.

Merrick recommends that the following items be kept as spares:

1. Load Cell
2. DSP
3. Drive Belt
4. Conveyor Belt
5. QED Board
6. Infeed Seals

#### PARTS RETURNED TO THE FACTORY FOR REPAIR

Some parts, idlers for example, cannot be repaired and must be replaced when worn out. Some other parts cannot be repaired in the field. These are usually printed circuit boards and other electronic components.

Always contact the Merrick Spare Parts Department before returning a part for repair. When parts are received at the factory, Merrick will first determine whether the part can be repaired, and will then quote a price and delivery time. Work will not be undertaken without an order from the customer. If the item cannot be repaired, Merrick will advise you of this.

#### FOR FURTHER INFORMATION

Please contact the Merrick Spare Parts Department. Parts specialists will be happy to advise you.

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**NOTE:** Merrick maintains complete files on every machine it builds. Always refer to the Merrick Machine Serial Number in all correspondence or phone calls. Parts specialists can then have fast access to the drawings and bill of material for the machine.



## **DIGITAL SPEED TRANSMITTER**

### **MODEL DSP - 701**

#### **GENERAL DESCRIPTION**

The MERRICK DSP-701 is a Digital Speed Transmitter which detects Belt Speed directly on Feeders, using the Tail Pulley. The DSP-701 Unit is driven by an idling member, assuring a true belt speed signal which is independent of belt slippage, breakage, etc.

The assembly consists of an Incremental Shaft Encoder mounted to the Tail Pulley Shaft and Anti-Rotation Brackets. The Shaft Encoder has a plug and socket with a wire harness.

The "Pulse Per Revolution" of the Encoder is 1000.

#### **INSTALLATION**

A hole is provided in the Tail Pulley Shaft into which the shaft of the unit is fitted. A set-screw is provided to hold the unit in place and a post prevents the housing from rotating.

#### **MAINTENANCE**

Check the DSP - 701 periodically for cleanliness and freedom of rotation. In normal use, no other maintenance is required.

Reference drawing M17021

**QUADRATURE ENCODER/DECODER ASSEMBLY  
MODEL QED  
(QED is used only with MC<sup>2</sup> Controller)**

The MERRICK Quadrature Encoder/Decoder assembly (QED) is used as a smart interface between optical speed encoders and the MC<sup>2</sup> family of controllers. Typical applications are on Belt Scales and Belt Feeders. Because of the special features of the QED, it is normally used with two-channel encoders capable of providing quadrature output<sup>i</sup>, although single channel units may also be used. The encoder used must generate a TTL compatible pulse train output. The QED supplies 5 volts DC for excitation of the encoder.

The primary function of the QED is to filter out pulses from the encoder that represent backward travel of the belt and transmit only pulses that represent forward travel. It also provides a means of turning off pulses transmitted to the MC<sup>2</sup> controller (used in calibration of the machine) and serves as a junction box between the load cell at the machine and the MC<sup>2</sup> controller.

Refer to the Connection Diagram supplied with your equipment for instructions on proper connection of the encoder to the QED and the QED to the MC<sup>2</sup> controller. An explanation of the jumper settings on the QED and their functions now follows.

### **Jumper J1, Direction Detect**

For installations with quadrature encoders, the placement of this jumper is critical to proper operation. The options for this jumper are: LH (left hand), NDD (no direction detection), and RH (right hand). To determine the proper hand of the speed encoder, use these guidelines:

Place yourself, or visualize yourself, facing the encoder or speed pickup. If the encoder or speed pickup is driven in a clockwise direction by forward motion of the belt, place Jumper J1 in the RH (right hand) position. If the encoder is driven in a counter-clockwise direction by forward motion of the belt, place Jumper J1 in the LH (left hand) position.

For example, on a machine that has a tail-pulley driven encoder, Jumper J1 will properly be placed in the RH position if the encoder is on the right end of the tail-pulley, viewed as if standing at the tail-pulley and looking down the belt towards the head-pulley. See Figure 1 for an illustration of this arrangement.

**Note: For single channel encoders, place Jumper J1 in the NDD (no direction detection) position.**

### **Jumper J2, Number of Pulses Prior to Recording Forward Direction**

Before the QED transmits pulses resulting from forward belt travel, it discards pulses from backward travel. The setting of Jumper J2 controls the number of forward pulses that must be received after receiving a backward pulse before forward pulses are transmitted.

For normal operation with a quadrature encoder, place Jumper J2 in the 4 (four forward pulses after a backward pulse) position. For installations with a lot of vibration, it may be necessary to use position 8.

**NOTE: For single channel encoders, the position of Jumper J2 is not important, but it must be installed in one of the two positions for the QED to function.**

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<sup>i</sup>Note: Quadrature output refers to two channels being sent simultaneously, but 90° apart (out of phase). This type of output allows detection of direction as well as distance.

## J

### **umper J3, Double or Not Double**

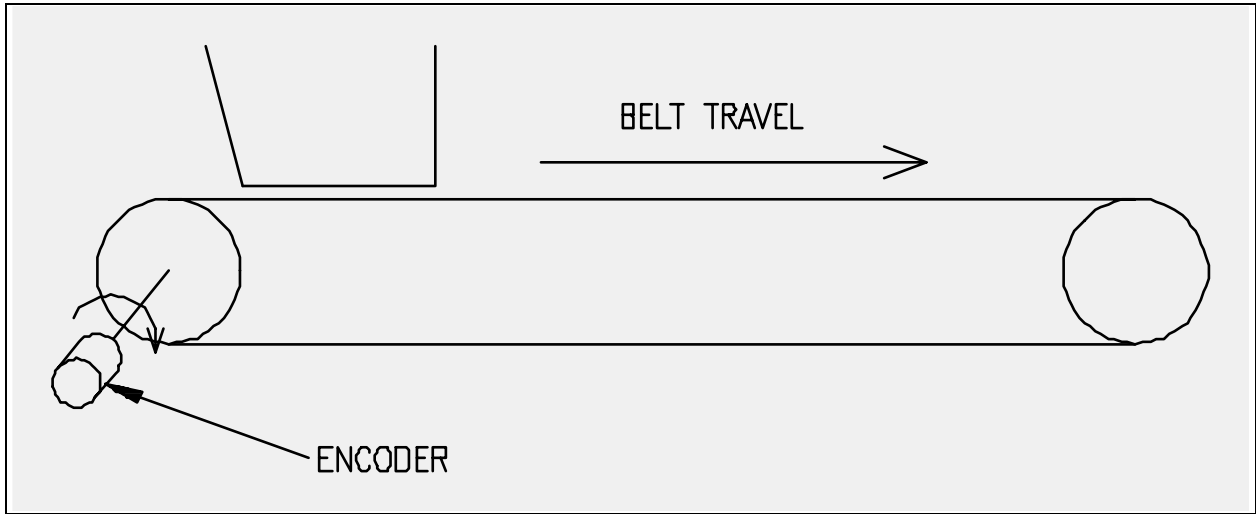
This jumper allows the option of using the speed pulses directly as received from the encoder or of doubling their frequency. The usual position is DBL over scored (not doubled). You should only use the DBL (double) position after consulting with MERRICK.

**NOTE:** That for all encoders, this jumper must be installed in one of the two positions for the QED to function.

### **Switch SW1, Pulses On/Off**

This switch allows the operator to control the transmission of pulses to the MC<sup>2</sup> controller. In the OFF position pulses are not transmitted regardless of belt movement. In the ON position, pulses are transmitted normally. This feature is used during start-up and calibration of the machine.

Note that there are two terminals on the QED labeled SW that expand this feature. A normal single pole-single throw (SPST) switch connected across these terminals will duplicate the function of SW1. In this way, an operator can remotely locate a switch temporarily for ease of calibration. Note that SW1 must be in the ON position for the remote switch to function properly.



**Figure 1**

**Illustrates Right Hand Mounting of Encoder  
for Direction Detect Jumper Setting**

## **FEEDER LUBRICATION INSTRUCTIONS**

### **HEAD AND TAIL PULLEY BEARINGS**

The head and tail pulley bearings are shielded and not sealed for life. These bearings are supplied from the factory with grease suitable for food applications. For continuous feeder operation, Merrick recommends that these bearings be lubricated every five weeks. The customer may use any quality bearing grease suitable for his application. Merrick uses Synthetic Polymer Food Grade Grease, USDA Code H-1 approved.

### **SPEED REDUCER**

Refer to vendor information in Section 9 of this manual.