INSTRUCTION MANUAL

"MTS"
TANDEM
TWO IDLER
BELT SCALE

MILLTRONICS, INC.
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ARLINGTON, TEXAS 76011
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PL-296

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MILLTRONICS MTS SCALE

CONTENTS

SECTION 1.0

MTS TANDEM TWO IDLER BELT SCALE

The following data is provided as a quick reference and as a double check on the correctness of the design values for your application. These values are to be input (programmed) into the MTS Scale at start-up. If it becomes necessary to change these values, please insert new value in the appropriate space provided below. In addition, please forward a copy of this page to Milltronics, Inc., Arlington, Texas, so that we may have an updated record.

MILLTRONICS JOB NUMBER_____S/N_____

CUSTOMER NAME_____P.O._____

INSTALLATION DATE_____

-DESIGN CONSTANTS (AS SHIPPED)-	-DESIGN CONSTANTS (REVISED)-
MAX RATE (TPH)_____	MAX RATE (TPH)_____
MAX SPEED (FPM)_____	MAX SPEED (FPM)_____
MAX LOAD (LB/FT)_____	MAX LOAD (LB/FT)_____
IDLER SPACING (FT)_____	IDLER SPACING (FT)_____
BELT LENGTH (FT)_____	BELT LENGTH (FT)_____

TEST LOAD TYPE (TEST WEIGHT, TEST CHAIN OR ELECTRONIC):_____

TEST LOAD EQUIV (LB/FT)_____	TEST LOAD EQUIV (LB/FT)_____
NUMBER OF TEST WEIGHTS_____	TOTAL WEIGHT_____

TOTALIZER REGISTRATION IN UNITS/COUNT (MINIMUM):

LOCAL_____/COUNT	LOCAL_____/COUNT
REMOTE_____/COUNT	REMOTE_____/COUNT
ANALOG OUTPUT_____	ANALOG OUTPUT_____

SECTION 2.0

INTRODUCTION

The MILLTRONICS TANDEM SCALE, Model MTS, has been designed for quick and easy installation into a belt conveyor used for conveying dry bulk solids. Used in conjunction with the Milltronics Compuscale II, the MTS measures the rate of material being conveyed for process control purposes and totalizes the weight for accurate process output and control.

SECTION 3.0

PURPOSE

This manual provides the information needed to understand, install, operate and maintain the Milltronics MTS Scale. It should be read, in conjunction with Applications Guide PL-264, before attempting to apply the scale to a conveyor system.

SECTION 4.0

SCALE SPECIFICATIONS

MECHANICAL

- Belt Widths: 18 to 60 inches (CEMA standard conveyors)
- Drop-in Depth: 6.5 inches, standard
  5.5 inches, heavy duty
- Length (along stringer): 9 inches per scale
- Test Weights: 17.8 lbs. each
- Finish: durable industrial orange enamel

ELECTRICAL CHARACTERISTICS

Load Cell Specifications:

Non-linearity	0.03% of rated output
Hysteresis	0.02% of rated output
Non-repeatability	0.01% of rated output
Safe Overload	150% of rated load
Output	2 mV/V nominal

Power Requirements:

- Load cell excitation provided by the Compuscale or Computer Input Amplifier.
- Speed Sensor excitation provided by the Compuscale.

TEMPERATURE CONSIDERATIONS

Operational	-40 deg. F to 140 deg. F
Temperature Compensation	-4 deg. F to 140 deg. F

MTS Scales with non-standard belt widths, mounting brackets, stainless steel construction, or special coatings can be obtained on special order.

Refer to Instruction Manual PL-261 for specifications of the Compuscale II integrator, or PL-297 for specifications of the Computer Input Amplifier.

SECTION 5.0

FEATURES OF THE MODEL MTS SCALE

The Milltronics Model MTS Scale features a compact, unitized construction ready to install in a conveyor system using the existing idlers. It is required that the flanges of the idlers be removed prior to mounting on the scale suspensions in order to provide adequate vertical clearance between the idlers and the conveyor stringers. Refer to DWG. 10ATX120. After trimming the mounting flanges off of the idler, the existing idlers are then mounted on the scale suspensions. Installation time is minimized because of the compact design.

The unit features rugged construction utilizing six (6) inch structural steel channel and three (3) inch angle for the idler support. The mounting brackets are 3/8 inch thick structural steel angle.

The Load Cells use a parallelogram construction which measures only the vertical force seen by the idlers, eliminating the problems caused by the horizontal forces against the idlers. The load cells are rated to 150% normal overload and are ultimate overload protected to 1000%.

The supplied calibration weights are sized for ease of use and allow for checking the linearity of the scale system. The calibration weights are hung on a calibration weight bracket on the retreat side of the weighbridges.

THEORY OF OPERATION

The Model MTS Scale was designed to take advantage of the parallelogram principle used in the load cells. In a parallelogram structure, only the forces applied in the vertical direction are measured since the opposite vertical member is held rigid. Any horizontal force applied exerts a moment of force, but the structure would have to deform before a vertical movement could occur due to that force.

The MTS Scale is essentially two Model MSI Single Idler belt scale suspensions and is used where certain conveyor parameters do not favor the use of the single idler scale; for example, shorter idler spacing, faster belt speeds, non-uniform material loading, or any combination thereof.

The scales are to be mounted on the conveyor frame, using the existing mounting holes left from the idlers being remounted to the scales. The weigh length is normally twice the idler spacing. This can be measured from the midpoint between the fixed approach idler and first scale idler to the midpoint between the second scale idler and fixed retreat idler. The weight of the belt, the scale idlers, and the scale steel make up the tare weight which will be zeroed out by the Compuscale II. The weight of material on the weighbridges exerts a vertical force on the load cells which convert the force to an electrical signal proportional to that weight. Since four load cells are used, the load on each cell is considered when determining the actual load.

The Milltronics MTS Scale uses active summation in the Compuscale II to add the electrical signals representing the load. This allows each load cell to independently weigh the load it sees and then have that weight added to the weight seen by the other load cells. Four load cells can be used without having to be a matched set, and in the unlikely event a cell is damaged only the defective cell has to be replaced. The use of active summation allows load cells with different zero levels to be individually calibrated for the total span.

SCALE INSTALLATION

The MTS is shipped from the factory as two single idler belt scale suspensions in foam filled boxing and banded to a wooden skid for protection during shipment. The unit should be removed from the skid and box, examined for content and inspected for physical damage.

The conveyor in which the scale is to be installed should meet the basic requirements for the installation of any scale (see the laminated card attached to each scale weighbridge for these basic requirements). The conveyor stringers should be rigid, straight, parallel to and square with the belt line in the area of the scale installation. The idlers used on the scale and at least the two idlers immediately adjacent on the approach side as well as the two idlers immediately on the retreat side must be of the same style and manufacture and be in good condition. Detailed requirements are described in the Milltronics publication PL-264-A.

After determining the best possible location in which the scale can be installed, remove the idlers and trim off the mounting flanges, as illustrated by DWG 10ATX120. Insert the MTS weighbridges in place of the removed idlers and install mounting bolts. Do not tighten any of the mounting bolts on the scale until the scale has been aligned. Mount the removed idlers with the trimmed flanges on the suspensions and use the idler clamps to secure them to the scale. Be sure to center the idlers and ensure that they are parallel and square to the suspension. Check to see that the scale is centered, square and level with the conveyor, then secure all mounting bolts.

The weigh area must be properly aligned and leveled by shimming the two approach, two retreat and two weigh idlers until they are all vertically within +/- 1/32" of each other. Be sure to check for the squareness of the idlers to the conveyor during the shimming process. Refer to DWG US250302.

Final precise idler alignment is very important if accurate results are to be achieved in any belt scale installation. mis-aligned idlers will result in varied belt tension forces being applied on each idler with various loads, causing calibration and measurement errors. Use a good quality nylon string to check for alignment as shown on DWG10A4-178. The string must be able to withstand a high degree of tension to eliminate any sag. Make the necessary adjustments required to bring the middle rolls on the idlers in line with the string while maintaining the proper alignment with the outer rolls. Be sure to check for general alignment of the idlers used in the weigh area with those of the rest of the conveyor.

COMPUSCALE II

The MTS Scale is designed to be used with the Milltronics Compuscale II belt scale integrator. As described in instruction manual PL-261, the Compuscale II is a microprocessor based system with features which make the scale system easier to install, align, rerate (if desired), and operate. The operator interface is the Compuscale Access Terminal (C.A.T.) which consists of a vacuum fluorescent dot matrix display and a sealed membrane keyboard. This device, which is generally mounted on the Compuscale II enclosure door, is further described in Section 4.5.5 of instruction manual PL-261.

All programming and calibration functions are performed through the C.A.T. keyboard.

To install, set-up, and program the Compuscale II, the following must be read and understood:

1. Sections 1, 2 and 4 of Instruction Manual PL-261 for the purpose of understanding the functions and features of the Compuscale II belt scale integrator.

2. Section 3 of PL-261 for installation practices and procedures.

3. Section 5.1 of PL-261 for programming procedures.

CALIBRATION

To calibrate the Compuscale II/MTS, the following sequence must be performed:

1. Complete a Coarse Zero and Coarse Span calibration, per PL-261, Section 5.2 (Initial Calibration).

2. Complete a Fine Zero and Fine Span calibration, per PL-261, Section 6.1 and 6.2 (Routine Calibration).

SECTION 9.0

ROUTINE MAINTENANCE

As with any belt scale, the weighbridges of the scale should be kept clean. Large accumulations of material between the Idler Support Angle and the Shelf Assembly, as well as around each Load Cell, could be detrimental to accurate weighing by restricting movement of the scales. All idlers in the weigh area, those on the weighbridges, and the approach and retreat units, must be kept properly lubricated. (Do not exact undue force on scale idlers during lubrication.)

Because the Compuscale II electronics is a solid state device, no maintenance is required other than insuring that the circuit boards and display board are kept clean and dry. Once initial work is completed, ensure the enclosure door and the keypad access door are properly closed and latched.

As the speed sensor is the only rotating device, it is the unit most prone to wear. This wear is generally confined only to the sealed bearing. To promote extended service, ensure that the speed sensor is not rigidly bolted to the conveyor stringer, etc., as such restriction could cause binding in the bearings. The speed sensor should be supported by its shaft only, and the retention shaft should prevent rotation only. (See PL-219 for further details.) Periodic checks are recommended to ensure the free running of the bearing.

The bearings of the pulley where the speed sensor is mounted should also be checked to ensure free running. Also, proper maintenance of belt tension is important to ensure correct response of the pulley to belt speed.

SECTION 9.1

BALANCING OF LOAD CELLS

The Milltronics MTS Scale uses four load cells, actively summed by the Compuscale II. The testing and adjustment of the summation network is done in the factory prior to shipment of the completed system. However, if one load cell were to fail, the following sequence should be followed in order to rebalance the scale after replacing the damaged cell.

BALANCE PROCEDURES FOR COMPUSCALE II - TANDEM SCALE (MTS)

1. Preload each test weight bar with all but two test weights supplied with the scale. Locate the preload weight(s) in the middle of the bar so that one additional weight may be added to either end of the test weight bar as required in step 2. If only one or two weights are furnished with the scale then ignore this step.

2. Using a single test weight, place the weight on the test weight bar as close as possible to the side of the "A" cell (left side in direction of belt travel). Record Actual Load as indicated by the Load/Speed Display.

3. Slide the test weight to the side of the "B" cell and record the Actual Load. Adjust the Balance Potentiometer, on the Load Cell Preamp Board, for the "B" cell until the Actual Load equals the recorded value of the "A" cell.

4. Slide the test weight back to the side of the "A" cell and record the Actual Load.

5. Repeat steps 3 & 4 until the Actual Load Readings are the same when the test weight is moved across the test weight bar.

6. Place the test weight on the test weight bar of this second scale as close as possible to the side of the "C" cell (left side in direction of belt travel). Record Actual Load. Adjust the Balance Potentiometer on the Load Cell Interface Board for the "C" cell until the Actual Load equals the recorded value of the "A" cell.

7. Return the test weight to the "A" cell position and record the Actual Load.

8. Repeat steps 6 & 7 until the Actual Load readings are the same when the test weight is in either location.

9. Place the test weight on the test weight bar of the second scale as close as possible to the side of the "D" cell. Record the Actual Load. Adjust the Balance Potentiometer on the Load Cell Interface Board for the "D" cell until the Actual Load equals the recorded value of the "C" cell.

10. Slide the test weight to the "C" cell position and record the Actual Load.

BALANCE PROCEDURES FOR COMPUSCALE II - TANDEM SCALE (MTS)

11. Repeat steps 9 & 10 until the Actual Load is the same with the test weight in either location.

12. Move the test weight to each of the four cell locations, verifying the Actual Load readings are equal in each location. Minor adjustment to Individual Balance Potentiometers may be required at this time to achieve equal balance throughout the four-cell system.

13. Remove the test weight. Follow initial calibration procedures as outlined in PL-261, Section 5.2.

SECTION 9.2

RECOMMENDED SPARE PARTS

A. Milltronics MTS Scale

Load Cells	50 lb.	100 lb.	250 lb.
	400 lb.	500 lb.	1000 lb.

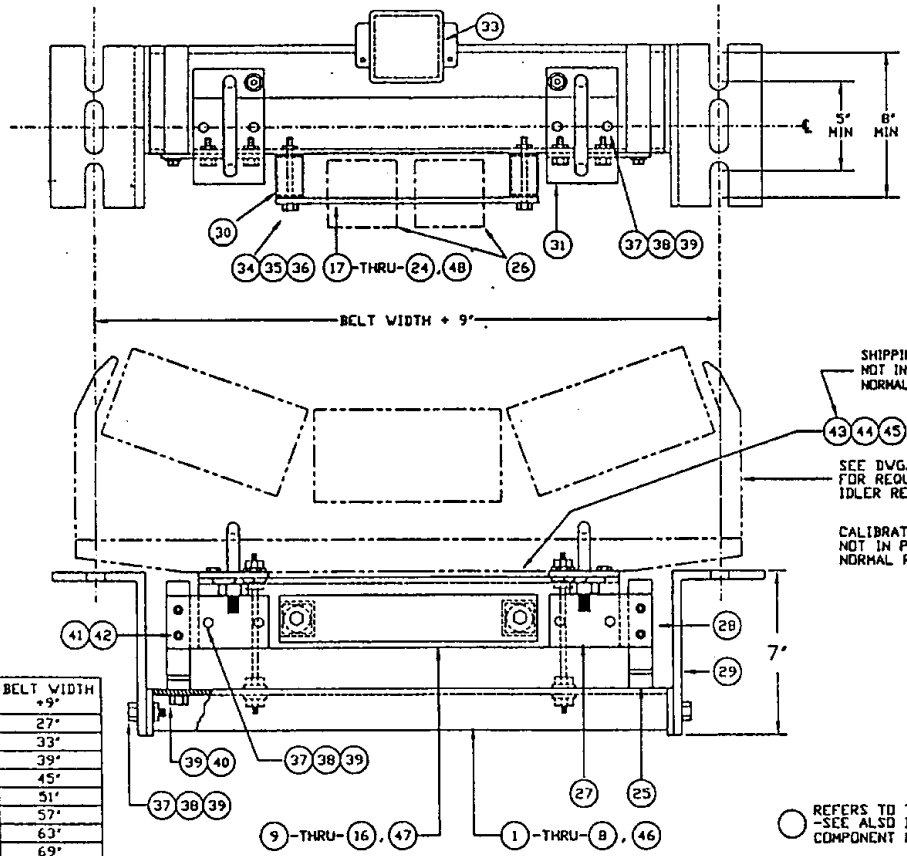
B. Milltronics Compuscale II

Refer to Section 8 of Compuscale II Manual PL-261.

C. Milltronics MD-1 Speed Sensor

Refer to MD-1 Manual PL-219.

LIST OF ILLUSTRATIONS



UP NO. LTX190	BELT WIDTH	BELT WIDTH +9"
1	18"	27"
2	24"	33"
3	30"	39"
4	36"	45"
5	42"	51"
6	48"	57"
7	54"	63"
8	60"	69"
9	20"	29"

○ REFERS TO THE PART NO. ON MATERIAL LIST NO. 10LTX190 -SEE ALSO DWG. US250306 (ML#10LTX191) FOR ELECTRICAL COMPONENT MOUNTING AND WIRING.

SUPERCEDES 10CTX169

SCALE	3"=1'0"	DATE
DRAWN	R.MOORE	3/15/87
CHECKED	K.JK	3/17/87
APPROVED	K.JK	3/17/87

MILLTRONICS
ARLINGTON, TEXAS PETERBOROUGH, ONTARIO

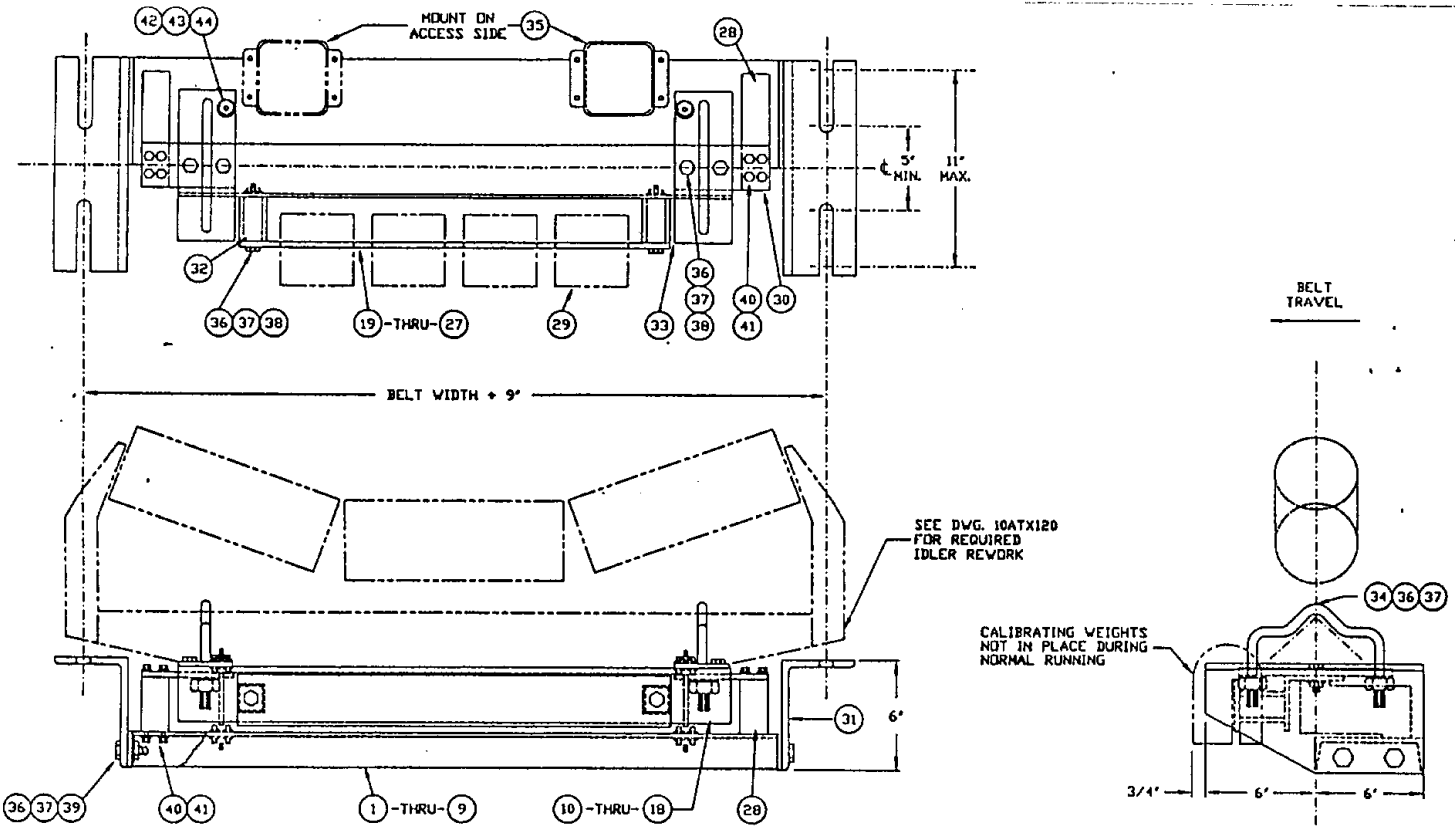
TITLE: MSI BELT SCALE (50#-250# CELL CAPACITY) SHOP ASSEMBLY DRAWING

JOB/CONTRACT NO.

DRAWING NO. US25030

REV.

REVISIONS



GROUP NO. ML#10LTX___	BELT WIDTH	BELT WIDTH +9"
9	72"	81"
8	60"	69"
7	54"	63"
6	48"	57"
5	42"	51"
4	36"	45"
3	30"	39"
2	24"	33"
1	18"	27"

(##) REFERS TO THE PART NO. ON MATERIAL LIST NO. 10LTX___ -SEE ALSO DWG. US250306 (ML#10LTX191) FOR ELECTRICAL COMPONENT MOUNTING AND WIRING.

SUPERCEDES 10CTX258

SCALE	3"=1'0"	DATE
DRAWN	R.MOORE	5/27/87
CHECKED	K.JK	5/28/87
APPROVED	K.JK	28/87

MILLTRONICS
ARLINGTON, TEXAS PETERBOROUGH, ONTARIO

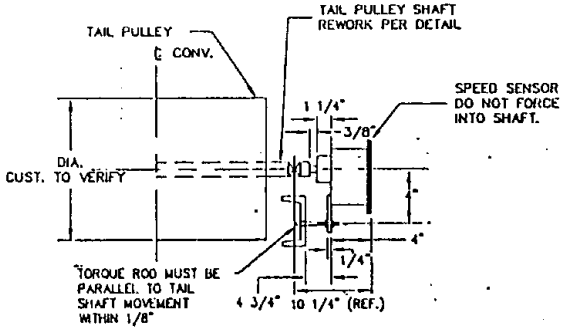
TITLE: MSI BELT SCALE
LOW PROFILE UNIT (400-1000#)
SHOP ASSEMBLY DIAGRAM

JOB/CONTRACT NO.

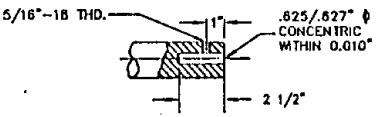
DRAWING NO. US250[illegible]

REV.

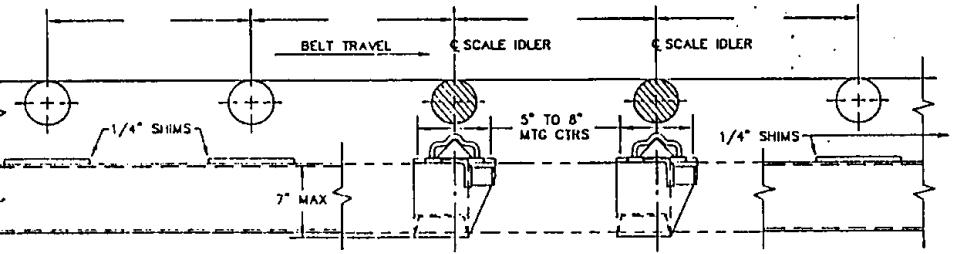
REVISIONS



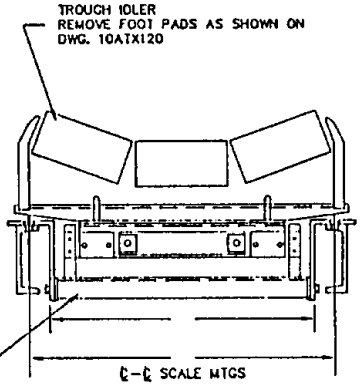
VIEW AT TAIL PULLEY



TAIL PULLEY SHAFT DETAIL



MATERIAL	–
DENSITY	–
CAPACITY	–
SPEED	–
BELT LOAD	–
BELT WIDTH	–
P.O. NO.	–



SCALE	NONE	DATE	
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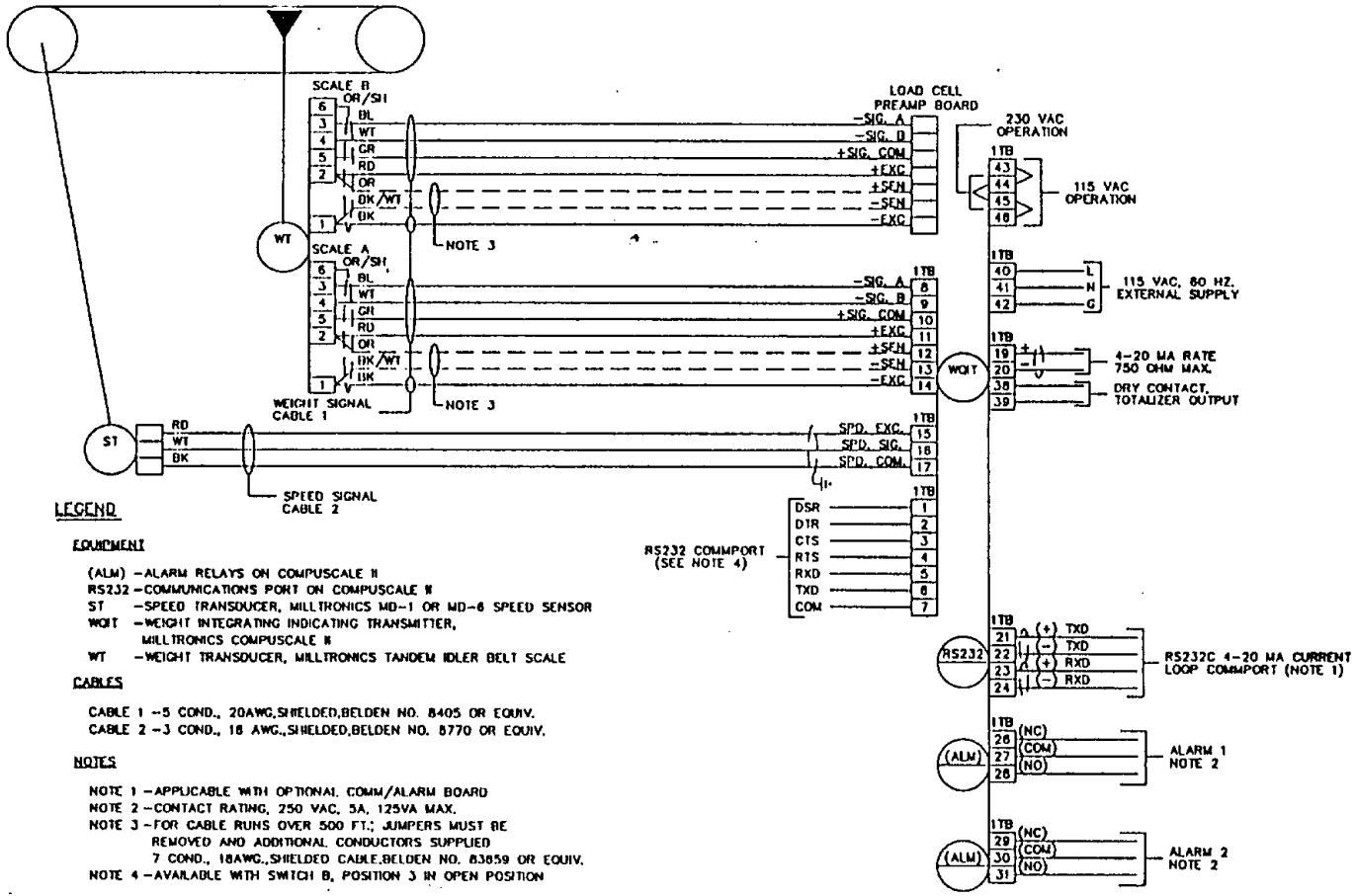
CHECKED	K.JK	5/14/87	TITLE "MTS" BELT SCALE CUSTOMER'S CONVEYOR GENERAL ARRANGEMENT
APPROVED	K.JK	5/15/87	

JOB/CONTRACT NO.	DRAWING NO.	REV.
	US250302	

REVISIONS



LEGEND

EQUIPMENT

(ALM) –ALARM RELAYS ON COMPUSCALE II
RS232 –COMMUNICATIONS PORT ON COMPUSCALE II
ST –SPEED TRANSDUCER, MILLTRONICS MD-1 OR MD-6 SPEED SENSOR
WQIT –WEIGHT INTEGRATING INDICATING TRANSMITTER, MILLTRONICS COMPUSCALE II
WT –WEIGHT TRANSDUCER, MILLTRONICS TANDEM IDLER BELT SCALE

CABLES

CABLE 1 –5 COND., 20AWG, SHIELDED, BELDEN NO. 8405 OR EQUIV.
CABLE 2 –3 COND., 18 AWG., SHIELDED, BELDEN NO. 8770 OR EQUIV.

NOTES

NOTE 1 –APPLICABLE WITH OPTIONAL COMM/ALARM BOARD
NOTE 2 –CONTACT RATING, 250 VAC, 5A, 125VA MAX.
NOTE 3 –FOR CABLE RUNS OVER 500 FT.; JUMPERS MUST BE REMOVED AND ADDITIONAL CONDUCTORS SUPPLIED 7 COND., 18AWG., SHIELDED CABLE, BELDEN NO. 83659 OR EQUIV.
NOTE 4 –AVAILABLE WITH SWITCH B, POSITION 3 IN OPEN POSITION

SCALE	NTS	
DRAWN	R.MOORE	5/14/87
CHECKED	K.JK	5/15/87
APPROVED	K.JK	[illegible]

DATE

MILLTRONICS
ARLINGTON, TEXAS PETERBOROUGH, ONTARIO

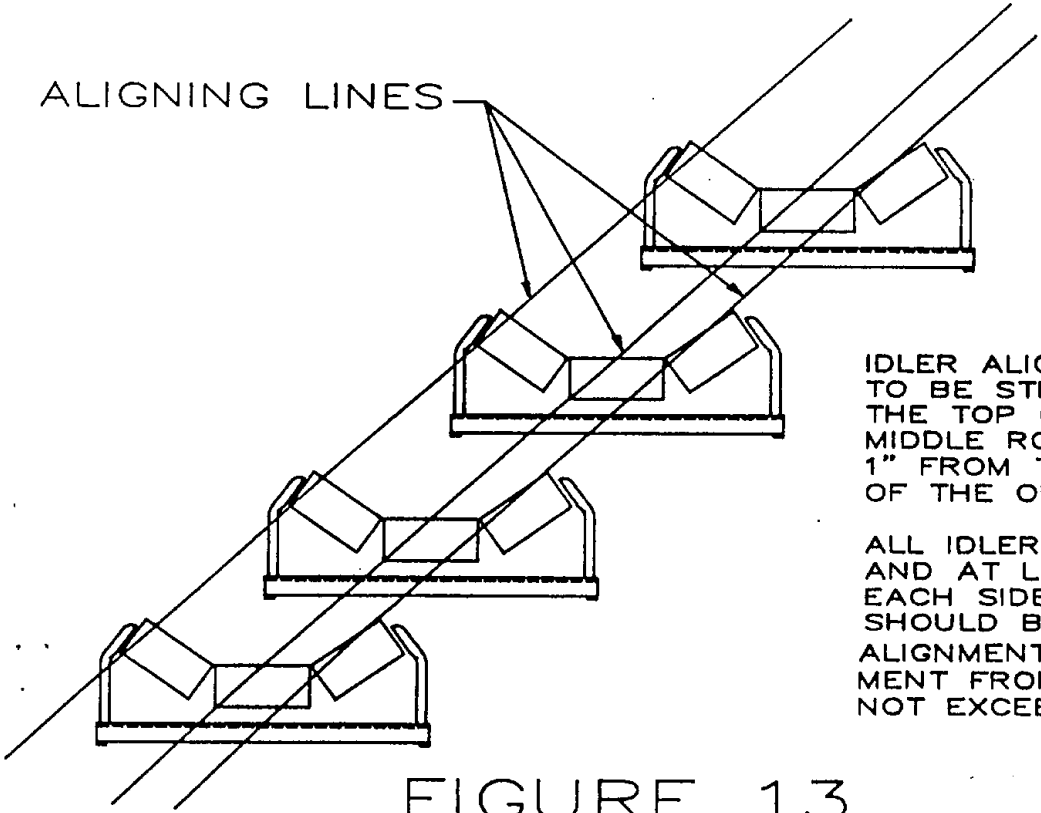
TITLE: COMPUSCALE II/MTS BELT SCALE PROCESS CONTROL LOOP INTERCONNECTION WIRING DIAGRAM

JOB/CONTRACT NO.

DRAWING NO. US250313

REV.

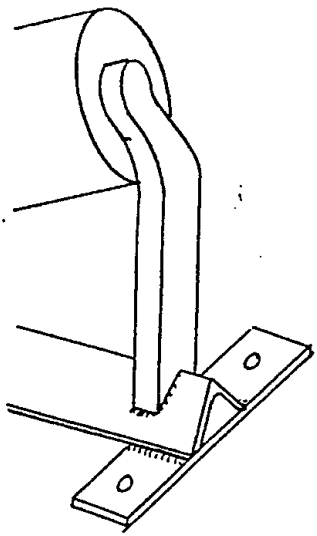
REVISIONS



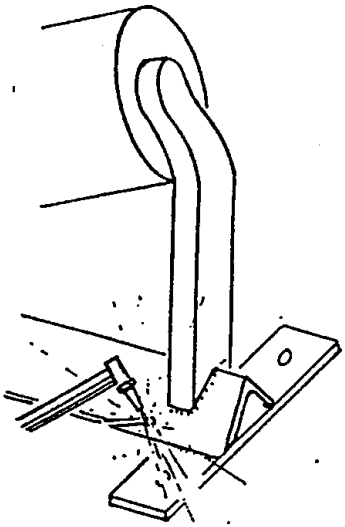
IDLER ALIGNMENT LINES ARE TO BE STRUNG ALONG THE TOP CENTER OF THE MIDDLE ROLL AND ABOUT 1" FROM THE OUTER EDGE OF THE OUTER ROLLS

ALL IDLERS ON THE SCALE AND AT LEAST TWO ON EACH SIDE OF THE SCALE SHOULD BE INCLUDED IN THE ALIGNMENT. VERTICAL DISPLACEMENT FROM THE LINE SHOULD NOT EXCEED 1/64"

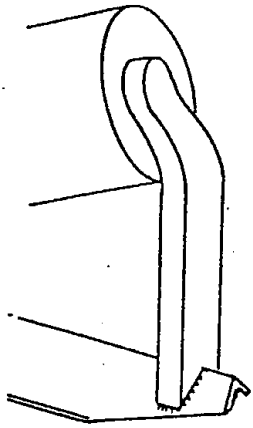
FIGURE 13



BEFORE REWORK

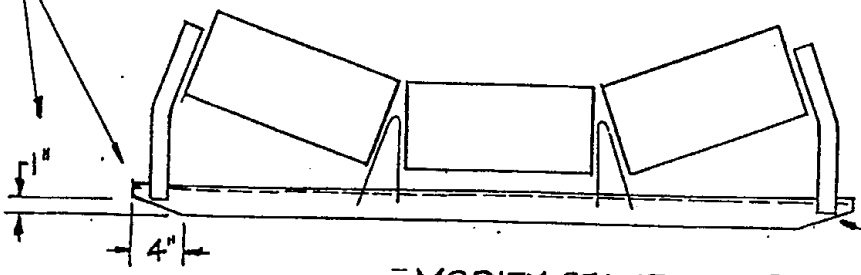


REWORK



AFTER REWORK

APPLICABLE TO MOST IDLER MFGR'S



- MODIFY STANDARD CEMA IDLERS
- BY REMOVING FOOT PLATES AS
- SHOWN ABOVE

REVISION

MILLTRONICS
PETERBOROUGH, ONTARIO ARLINGTON, TEXAS

TITLE "CEMA" IDLER MODIFICATION FOR MODEL 'MSI SCALE

SCALE	JOB/CONTRACT NO.	
DRAWN KKNAPP		
CHECKED SRJ 11-20-84	DRAWING NO. 10ATX120	REV.
APPROVED		