8136

Technical Manual
and
Parts Catalog

INTRODUCTION

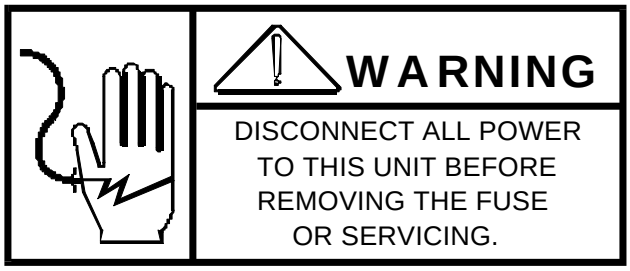
This publication is provided solely as a guide for individuals who have received METTLER TOLEDO Technical Training in servicing the METTLER TOLEDO product.

Information regarding METTLER TOLEDO Technical Training may be obtained by writing to:

METTLER TOLEDO
Training Center
P.O. Box 1705
Columbus, Ohio 43216
(614) 438-4400

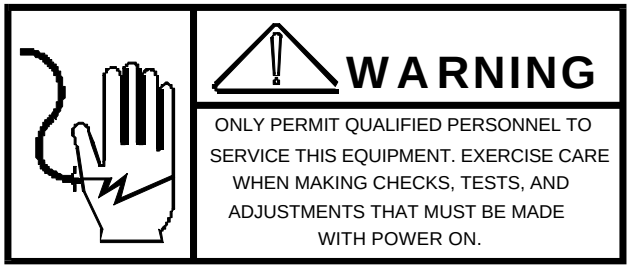
PRECAUTIONS

- **READ this manual before operating or servicing this equipment.**



- **ALWAYS REMOVE POWER and wait at least 30 seconds BEFORE connecting or disconnecting any internal harnesses. Failure to observe these precautions may result in damage to, or destruction of the equipment.**

- **ALWAYS take proper precautions when handling static sensitive devices.**



- **DO NOT connect or disconnect a load cell scale base to the equipment with power connected or damage will result.**

- **SAVE this manual for future reference.**

- **DO NOT allow untrained personnel to operate, clean, inspect, maintain, service, or tamper with this equipment.**

- **ALWAYS DISCONNECT this equipment from the power source before servicing.**

- **CALL METTLER TOLEDO for parts, information, and service.**

Contents

1. GENERAL DESCRIPTION

The Model 8136 Electronic Digital Indicator is intended for use with stain gauge load cells. The 8136 provides Gross or Net weight and Tare weight displays. The unit is available in desk and wall mount enclosures. Weight information output is transmitted to a printer or accessory device using an ASCII Code, 300 baud, 20 ma current loop with even parity.

1.1 FEATURES

- Display capacity to 50,000 LB or KG.
- Selectable capacities from 1000, 1500, 2000, 2500, 3000, 3500, 4000, or 5000 increments.
- Displays Gross, Net or Tare weight in avoirdupois or metric.
- Single or double width printing of displayed data, (under program control).
- 5 digit, LED, 0.5" high weight display, and 5 digit, LED, 0.3" high tare display.
- Available in a desk mount enclosure or in a wall mount, NEMA 4, "washdown" enclosure.
- Power input is through a separate line cord.
- Data output via separate data cable selected for the printer or accessory used.
- Automatic Zero Maintenance (within ±2% of scale capacity from zero).
- Pushbutton Zeroing (within ±2% of scale capacity from zero).
- Pushbutton Tare or Keyboard Tare.
- Under capacity blanking at approximately -.3% of scale capacity.
- Over capacity blanking at 5 increments over scale capacity.

2. SYSTEM DESCRIPTION

The instrument provides 15 volts of excitation for strain gauge load cells. The excitation is gated so that zero drift and temperature change can be compensated. The instrument conditions the microvolt signal and amplifies it to a maximum level of about 10 volts. It is then filtered and converted to a digital signal in the integrator.

The initial range is adjustable from 0 to 30 millivolts.

The span range is adjustable form 3 to 30 millivolts.

The excitation voltage is 15 volts gated.

Excitation current is provided for 4-240 ohm cells or 6-350 ohm cells.

1. **The 8136 consists of three (3) major blocks:**
   Control PCB -- Contains the scale logic, regulated strain gauge supply, program selection switches and data transmission circuitry.

2. **Display PCB -- Contains the weight, tare and legend LED's as well as the decoding circuitry for the LED's and used as an interface for the keyboard.**

3. **Keyboard -- The keyboard allows operator interface for functions such as Tare, Print, Clear, LB/KG selection, Pushbutton Zero and if ordered, Analog Verify and Test Verify.**

3. SPECIFICATIONS

3.1 ELECTRICAL AND PHYSICAL SPECIFICATIONS

1. ENVIRONMENT

The Model 8136 operates from -10 C (14 F) to +50 C (122 F) 10 to 05% relative humidity, non-condensing. Zero Temperature Coefficient is 0.15 uv/ C Maximum and the Span Temperature Coefficient is ±12 ppm/ C Maximum.

2. POWER INPUT

The Model 8136 can operate (upon selection) at 120V, 220V and 240 VAC, (+10%, -15%) 49 Hz to 61.2 Hz. Power consumption is about 25 watts.

CAUTION: All units are shipped for 120 V AC operation. Refer to Section 4 for alternate voltage operation.

3. U.L. & C.S.A. STANDARDS

Materials, components, and electrical design comply with U.L. and D.S.A. standards and requirements, including grounding of all metal parts, fusing, etc.

4. APPEARANCE AND DIMENSIONS

The color of the Model 8136 is charcoal black with a red display lens and color coded function switches. The desk mount sheet metal enclosure is 8.8 cm tall (3.47"), x 43.2 cm wide (17"), x 23.7 cm deep (9.3"), suitable for rack mounting with adaptors. The wall mount Stainless Steel NEMA 4 enclosure is 33 cm high (13"), x 45.7 cm wide (18"), x 14 cm deep 5.5"). The desk mount model 8136 weighs approximately 7 KG (15.4 LB), the wall mount unit weighs about 16 KG (35 LB). Power, load cell and output connections are made via rear mounted connectors on the 8136 desk model and via bottom mounted connectors on the wall mount.

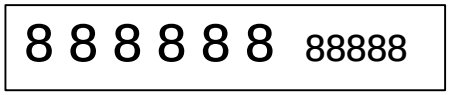
3.2 INTERNAL FUNCTIONS

The 8136 contains the necessary electronics, except the load cell (s), to calculate and display weight, as well as being capable of transmitting data at an ASCII coded 300 baud rate over a 20 ma current loop.

3.3 DISPLAY FORMAT

The weight display is a 5 digit with minus sign, 7 segment LED display. The tare display is a 5 digit , 7 segment LED display. LED's are also used as a legend indicators.

Sample display:



3.4 DATA INTERFACE

Data output is provided in bit serial form, ASCII code, 300 ma current loop, even parity, for use with a Toledo 8805 or similar printer. When the 20 ma current loop is provided by the instrument, the signal is not isolated from the ground at the scale end. The output is transmitted when the PRINT pushbutton is activated, or when a request is generated by a remote device.

3.5 RAM IDENTIFICATION

FACTORY NUMBER	MOUNTING	INDICATION	VERIFIED
8136-0001	DESK	LB or KG	NO
8136-0002		KG ONLY	YES
8136-0003		KG ONLY	NO
8136-0011	WALL	LB or KG	NO
8136-0012		KG ONLY	YES
8136-0013		KG ONLY	NO

4. INSTALLATION INSTRUCTIONS

4.1 SET-UP PROCEDURE

1. Inspect the indicator for loose or damaged parts.

2. Open the indicator and remove the top cover and continue the inspection, noting that all the interconnecting harnesses are securely fastened.

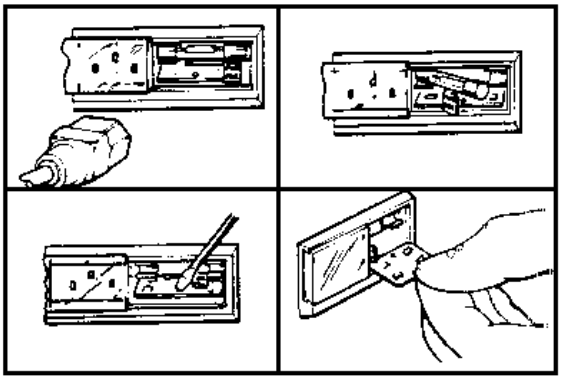
3. Check the line filter/fuse holder assembly to insure that the proper voltage and fuse size are selected for use in your area.

> **CAUTION: All U.S. units are shipped for 120 VAC operation. See below for alternate voltage operation.**

The following photos will assist you in checking or changing the voltage selection. This step MUST be performed prior to applying power to the unit.

1. This photo shows the line cord detached and the fuse cover moved to the left.

2. In this photo the fuse is removed by pulling the handle labeled "FUSE PULL"



3. With the fuse removed, use a small screwdriver or similar object and gently pry the card from the assembly. A hole in the card is provided to assist removal.

4. Once you have determined the proper voltage, return the card to the slot. The voltage desired will be on the left side of the card in a readable position. In the photo, the voltage selected is 120V. Replace the fuse with one of the correct rating. Slide fuse cover back into place.

4. Preliminary Calculations

Before any calibration is doe it should be determined if the load cell (s) are of a size that will work correctly with the instrument and platform. If it is a standard build, proceed with the installation of the scale. If it is a special build or a conversion of an existing mechanical scale, the microvolt per increment should be calculated.

4.2 HOW TO FIND MICROVOLTS PER INCREMENT

FIRST FIND:

4.2.1 Scale capacity*.

4.2.2 Increment Size*.

4.2.3 Number of load cells or total lever ratio.

4.2.4 Size of load cell(s)*.

4.2.5 Cell output rating in mV/V --millivolts per volt of excitation.

*** In LB or KG depending on how scale is to be calibrated and used.**

THEN:

4.2.6 Divide the scale capacity by the increment size to get the number of increments..

4.2.7 Multiply the cell size by the num ber of cells or the lever ratio (depending on the type of scale). This will be the overall scale capacity (disregard initial at this time).

4.2.8 Divide the overall scale capacity by the increment size. This will be the overall number of increments.

4.2.9 Multiply the cell output rating by 15 volts (15 volts is the 8136 excitation voltage). This will be the output of the cell(s) in millivolts by 1,000 to get cell output in millivolts at full load.

4.2.10 Multiply cell output in millivolts by 1,000 to get cell output in microvolts.

4.2.11 Divide cell output in microvolts by the overall number of increments to get microvolts per increment.

NOTE: * Load Cells built by Toledo are 2 mV/V. Load Cells built by BLH are usually 2 mV/V or 3 mV/V.

The chart below shows the limits in microvolts for each available number of increments.

NUMBER OF INCREMENTS PROGRAMMED	MINIMUM** uV/INCREMENT	MAXIMUM* uV/INCREMENT
5,000	2	6
4,000	2	7.5
3,500	2	8.5
3,000	2	10
2,500	2	12
2,000	2	15
1,500	2.4	20
1,000	3.5	30

NOTE: * The 8136 cannot be adjusted on builds that are greater than the voltage shown for maximum μV/Inc.
NOTE ** The instrument should never be programmed to less than 2 μV/Inc.

If these limits are exceeded, the scale will not be stable.

EXAMPLE #1

Model 2184

Scale Capacity in pounds..... 300 LB
Increment Size in pounds..... 0.1 LB
Lever Ratio..... 8.1 to 1
Size of Cell in pounds..... 100 LB
Cell Output Rating..... 2mV/V

STEP 1- 300 LB scale capacity - 0.1 LB increments 300 ÷0.1 = 3.000 increments.

STEP 2- 8.1 lever ration - 100 LB load cell
8.1 x 100 = 810 LB overall scale capacity.

STEP 3- 810 LB overall scale capacity - 0.1 LB increments
810 ÷ 0.1 = 8,100 overall number of increments.

STEP4- 2mV/V cell output rating
2mV/V x 15 = 30 millivolts cell output at full capacity.

STEP 5- 30m V x 1,000 = 30,000 microvolts at full capacity.

STEP 6- 30,000÷8,100 = 300 ÷81 = 3.7 μV per increment.

Check with chart to see if the μV/Inc. fits in the range listed for 3.000 increments. The range is 2uV//Inc. to 10vV/Inc. and 3.7 μV/Inc. is inside the range. Therefore, it will be a satisfactory build.

EXAMPLE # 2

Model 1985

Scale Capacity in pounds	**50 LB**
Increment Size in pounds	**0.01 LB**
Number of Cells	**1**
Size of Cells in pounds	**100 LB**
Cell Output Rating	**2mV/V**

STEP 1- **50 LB scale capacity - .01 LB increments 50 ÷.02 = 5000 increments.**

STEP 2- **1 load cell 0 100 LB load cell**
1 x 100 = 100 LB overall scale capacity.

STEP 3- **100 LB overall capacity - .01 LB increments**
100 ÷.01 - 10,000 overall number of increments.

STEP 4- **2mV/V cell output rating**
2mV/V x 15 = 30 millivolts cell output at full capacity.

STEP 5- **30 mV x 1,000= 30,000 microvolts at full capacity.**

STEP 6- **30,000÷ 10,000 = 3uV per increment.**

Check the chart to see if the μV/Inc. fits in the range listed for 5,000 increments. The range listed is 2 μV/Inc. to 6 μV/Inc. and 3 μV/Inc. is inside the range. Therefore, it will be a satisfactory build.

5. PROGRAMMING THE 112111 00A MAIN PCB

NOTE: See Section 4.4 for functions and locations of switches used on the discrete components PCB # 112111 00A.

1) Select proper decimal point with switches SW-1, SW 1-2, and S W1-3.

2) Select the proper number of increments to match the capacity of the platform and the load cell(s). Select with switches SW1-4, SW1-5, and SW1-6.

3) Select the proper increment size and dummy zero (if used) with switches SW1-7 and SW2-1.

4) Select the proper functions for Tare, LB/KG, and printing with switches SW2-2 through SW2-7.

5) Start with SW3-1, 2. 3. 4 OFF and SW4-1, 2, 3, 4 OFF and SW5-1, 2, 3, 4 and 5 OFF.

6. PROGRAMMING THE 114111 00A MAIN PCB.

NOTE: See Section 4 Part 5 for function and location of switches used on the LSI PCB # 114111 00A.

1. Start with SW1-1 through SW1-7 OFF and SW2-1 through SW2-7 OFF.

2. Select the proper decimal point with switches SW3-1, SW3-2, and SW3-3.

3. Select the proper number of increments to match the capacity of the platform and the load cell(s). Select with switches SW3-4, SW3-5, and SW3-6.

4. Select the proper increment size and dummy zero (if used) with switches SW3-7 and SW4-1.

5. Select the proper functions for Tare, LB/KG and printing with switches SW4-2 through SW4-7.

6. Leave SW4-8 and SW4-9 both OFF as they are not used.

4.3 PRECALIBRATION OF INSTRUMENT USING A LOAD CELL SIMULATOR

NOTE: Pre-calibration is not a required step; however, it can reduce the number of times test weights need to be applied to the scale platform.

FIRST FIND:

- **Number of cells used.**
- **Capacity of one cell*.**
- **Total level ration (if required).**
- **Millivolt output of the cell(s).**

*** In LB or KG depending on how the scale is to be calibrated and used.**

THEN:

1. **Multiply the cell capacity by the number of cells used. Multiply this number by the lever ratio, if required, to find the Total Cell Capacity.**
2. **Divide the Total Cell Capacity by the correct division number to find LB or KG per step on the simulator. Refer to the following chart for this number.**

MILLIVOLTS/VOLT CELL OUTPUT	DIVISION NUMBER
1	5
1.8	9
2	10
3	15

3. **At this time, connect the simulator to the instrument.**
4. **Connect to the power line.**
5. **In the simula tor switch to the zero position and set the instrument to zero using the initial switches and potentiometer.**
6. **Calibrate the instrument. Use the maximum number of steps on the simulator without exceeding the instrument's capacity.**
7. **Record the indication at all steps on the simulator along with the simulator's serial number. Insert this record into the instrument housing for future troubleshooting assistance.**
8. **Remove power, disconnect the simulator from the instrument and connect the load cell(s). Reconnect to power. At this time the display will indicate the initial weight. Reset to zero using the initial switches and potentiometer. Make final calibration test with test weights.**

4.4 CALIBRATING THE 8136

1. When the discrete Main PCB (# 112111 00A) is installed use the following procedure.

a) Connect the load cell(s) to load cell connector. See Section 6, part 5 for typical hook-up.
b) Connect to the power line.
c) Adjust the initial pot to the full counter clockwise position; Span pot t o the full clock wise position. Set to zero with SW5-1, 2, 3, 4. Starting with SW5-1, try turning the switches ON, one at a time - leave ON only the switches that do not take the indication under zero. Finish with the initial pot R- 57. (There will be very little interaction between initial an span.)

> **NOTE: SW5-1 will be the largest step and will be used only on scales with very high initial.**

d) With the 8136 indicating "ZERO", put test weights on the scale (about 10% of capacity). The indication should be greater than the test weight. Turn SW3-1 ON, if the indication is then too low, turn it OFF. IF it is still to high, leave it ON an go to SW3-2 through SW3-4 and SW4-1 through SW4-4 leaving only those switches ON that do not take the indication below the test weight. Finish calibration with span pot R-63. Check zero, then set span with appropriate test weights.

e) When the LSI Main PCB (# 114111 00A) is installed use the following procedure.

1. Connect the load cell (s) to load cell conn ector. See Section 6, part 5 for typical hook-up.

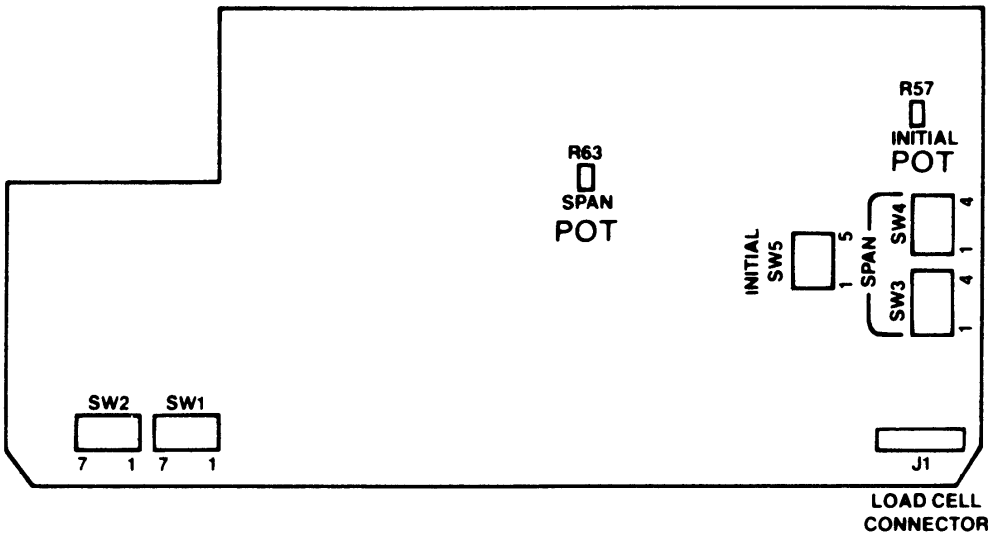
2. Connect to the power line.

3. Adjust the initial pot. R-13 and span pot. R-14 fully clockwise. Set the indication to zero by turning ON switches SW2-4, SW2-5, SW2-1, SW2-2 and SW2-3 (in that order) leaving ON only the switches that do not take the display below zero. Finish with the fine adjust pot. R-13.

> **NOTE: SW-4 will be the largest step and will be used only on scales with very high initial.**

4. With the 8136 indicating "ZERO", put test weights on the scale (about 10% of capacity). The indication should be greater than the test weight. Turn SW1-1 ON, if the indication is then too low, turn it OFF. If it is still too high leave it ON and go to SW1-2 through SW1-7 and then SW2-7 leaving only those switches ON that do not take the indication below the test weight. Stop with the indication at or above test weight. Finish calibration with span pot R-14. Check zero, then set span with appropriate test weights.

4.5 SWITCH SUMMARY (Main PCB No. 112111 00A)



PCB No. 112111 00A

PCB NO. 112111 00A

SW1-1 DECIMAL POINT AND EXPAND X 10
SW1-2 DECIMAL POINT AND EXPAND X 10
SW1-3 DECIMAL POINT AND EXPAND X 10

AVOIR X1-X2-X5 METRIC X1-X2	METRIC X5	SW1-1	SW1-2	SW1-3
XXXXX	XXXX.X	OFF	OFF	OFF
XXXX.X	XXX.XX	OFF	OFF	ON
XXX.XX	XX.XXX	OFF	ON	OFF
XX.XXX	X.XXXX	OFF	ON	ON
X.XXXX	NOT USED	ON	OFF	OFF
	EXPAND X 10	ON	ON	ON

NOTE: Use only the above switch settings.

SW1-4 NUMBER OF INCREMENTS
SW1-5 NUMBER OF INCREMENTS
SW1-6 NUMBER OF INCREMENTS

	INCREMENTS		
NUMBER OF INCREMENTS	SW1-4	SW1-5	SW1-6
1000	OFF	OFF	OFF
1500	OFF	OFF	ON
2000	OFF	ON	OFF
2500	OFF	ON	ON
3000	ON	OFF	OFF
3500	ON	OFF	ON
4000	ON	ON	OFF
5000	ON	ON	ON

SW1-7 INCREMENT SIZE
SW2-1 INCREMENT SIZE

AVOIR	METRIC	SW1-7	SW2-1
1	0.5	OFF	OFF
2	1	OFF	ON
5	2	ON	OFF
10	5	ON	ON

SW2-2 TARE INTERLOCK

ON = Tare may be entered by pressing the Tare button only when the scale is in the Gross weight mode, the gross weight is positive, and there is no motion. The zero pushbutton is not operative after a tare has been taken. Tare must be cleared by the use of the C pushbutton before a new tare can be entered.

OFF = Tare can be entered anytime the gross or net weight is positive and there is no motion.

SW2-3 DISPLAY VERIFY INHIBIT

ON = Failure of any segment will not cause any error display or stop the use of the rest of the display.

NOTE: Must be ON for non-verified units.

OFF = If one or more segments in the weight display should fail, the weight display will signal an error by turning on the lower most segment of all weight numbers and the display will not indicate any weight numbers (Automatic display verify). (RAMS 2 or 12 only)

SW2-4 KEYBOARD DISABLE

ON = The numbered part of the keyboard cannot be used for tare.

OFF = All of the keyboard is usable (except when specific are switched off.)

SW2-5 POWER UP METRIC

ON = The instrument will be in the metric (KG) mode when power is applied and cannot be changed to LB by pressing the LB/KG pushbutton. With this switch ON, a checksum digit is automatically transmitted to the printer or other devices.

OFF = LB or KG can be selected alternately by pressing the LB/KG pushbutton. AV will not be operative with the switch OFF, NO checksum digit is transmitted.

> **NOTE: Set SW2-5 to the desired position before powering up the unit.**

SW2-6 PRINT FORMAT
SW2-7 PRINT FORMAT

FUNCTION	SW2-6	SW2-7
A. TARE 1 LINE PRINTING	OFF	OFF
B. TARE MULTIPLE LINE PRINTING	ON	OFF
C. PRINT DISPLAYED INFORMATION IN "SINGLE" WIDTH	OFF	ON
D. PRINT DISPLAYED INFORMATION IN "DOUBLE" WIDTH	ON	ON

SW2-6 AND SW2-7

A. With SW2-6 OFF and SW2-7 OFF, the printer will print Gross, Tare, Net on one line. (Or Gross only, if tare is not entered.)

B. With SW2-6 ON, and SW2-7 OFF, the printer will print Gross, Tare, Net on multiple lines. (Or Gross only, on one line, if tare is not entered.) Not on Victor Printers.

C. With SW2-6 OFF, and SW2-7 ON, the printer prints the displayed weight information, Net or Gross in standard width.

D. With SW2-6 ON, and SW2-7 ON, the printer prints the displayed weight information Net or Gross in double width.

> **NOTE: Not all printers will print all options due to printer design limitations and storage capacity.**

SW3, SW4 - SPAN

SW3-1 **LARGEST STEP**
SW3-2
SW3-3
SW3-4
SW4-1
SW4-2
SW4-3
SW4-4 **SMALLEST STEP**

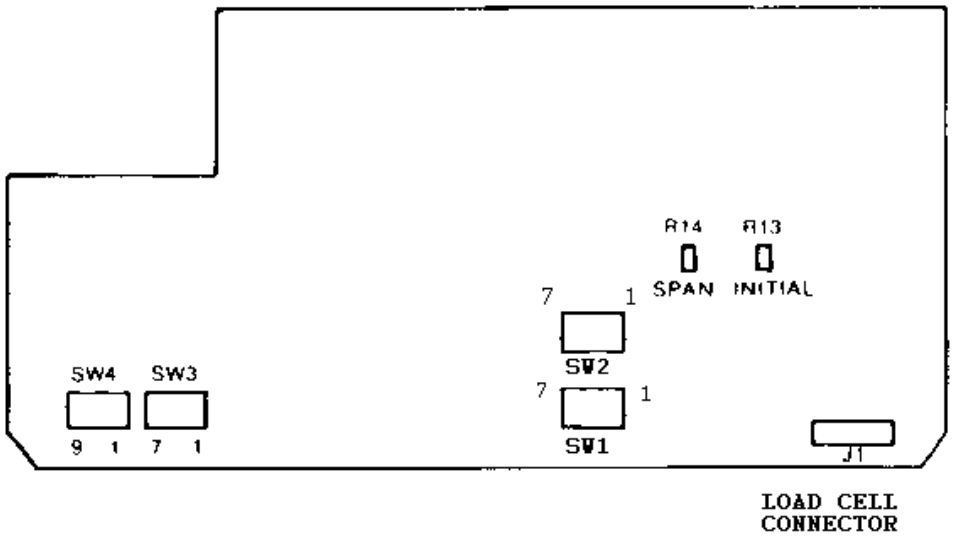
Turning ON any of the SW3 and SW4 Span switches will decrease the weight indication. SW3-1 has the greatest effect. SW3-3 has 1/2 the effect of SW3-1. SW3-3 has 1/2 the effect of SW3-2 and so on through SW4-4.

SW5 INITIAL

SW5-1 **LARGEST STEP**
SW5-2
SW5-3
SW5-4
SW5-5
SMALLEST STEP

Turning On any of SW5 initial switches will increase the initial compensation. SW5-1 has the largest effect. SW5-3 has 1/2 the effect of SW5-2 and so on down to SW5-5.

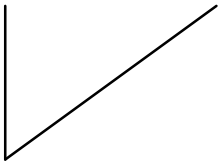
4.6 SWITCH SUMMARY (Main PCB No. 114111 00A)



PCB NO. 114111 00A

SW1 AND SW2-7 - SPAN

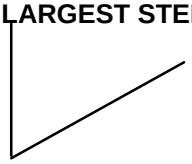
SW1-1	**LARGEST STEP**
SW1-2	
SW1-3	
SW1-4	
SW1-5	
SW1-6	
SW1-7	
SW2-7	**SMALLEST STEP**



Turning ON any of SW2 Span switches will decrease the weight indication. SW1-1 has the largest effect. SW1-2 has 1/2 the effect of SW1-1. SW1-3 has 1/3 the effect of SW1-2 and so on through SW2-7.

SW2 - INITIAL

SW2-4	**LARGEST STEP**
SW2-5	
SW2-1	
SW2-2	
SW2-3	
	SMALLEST STEP



Turning ON any of the initial switches will increase the initial compensation. SW2-4 has the greatest effect. SW 2-5 has 1/2 the effect of SW2-4. SW2-6 has 1/2 the effect of SW2-5 and so on down through SW2-3.

SW2-6 NOT USED - SHOULD BE OFF

SW3-1 DECIMAL POINT AND EXPAND X 10
SW3-2 DECIMAL POINT AND EXPAND X 10
SW3-3 DECIMAL POINT AND EXPAND X 10

AVOIR X1-X2-X5 METRIC X1-X2	METRIC X5	SW3-1	SW3-2	SW3-3
XXXXX	XXXX.X	OFF	OFF	OFF
XXXX.X	XXX.XX	OFF	OFF	ON
XXX.XX	XX.XXX	OFF	ON	OFF
XX.XXX	X.XXXX	OFF	ON	ON
X.XXXX	NOT USED	ON	OFF	OFF
	EXPAND X 10	ON	ON	ON

NOTE: Use only the above switch settings.

SW3-4 NUMBER OF INCREMENTS
SW3-5 NUMBER OF INCREMENTS
SW3-6 NUMBER OF INCREMENTS

	INCREMENTS		
NUMBER OF INCREMENTS	SW3-4	SW3-5	SW3-6
1000	OFF	OFF	OFF
1500	OFF	OFF	ON
2000	OFF	ON	OFF
2500	OFF	ON	ON
3000	ON	OFF	OFF
3500	ON	OFF	ON
4000	ON	ON	OFF
5000	ON	ON	ON

SW3-7 INCREMENT SIZE
SW4-1 INCREMENT SIZE

AVOIR	METRIC	SW1-7	SW2-1
1	0.5	OFF	OFF
2	1	OFF	ON
5	2	ON	OFF
10	5	ON	ON

SW4-2 TARE INTERLOCK

ON = Tare may be entered by pressing the Tare button only when the scale is in the Gross weight mode, the gross weight is positive, a and there is no motion. The zero pushbutton is not operative after a tare has been taken. Tare must be cleared by the use of the C pushbutton before a new tare can be entered.

OFF = Tare can be entered anytime the gross or net weight is positive and there is no motion.

SW4-3 DISPLAY VERIFY INHIBIT

ON = Failure of any segment will not cause any error display or stop the use of the rest of the display.

NOTE: Must be ON for non-verified units.

OFF = If one or more segments in the weight display should fail, the weight display will signal an error by turning on the lower most segment of all weight numbers and the display will not indicate any weight numbers (Automatic display verify). (RAMS 2 or 12 only)

SW4-4 KEYBOARD DISABLE

ON = The numbered part of the keyboard cannot be used for tare.

OFF = All of the keyboard is usable (except when specific are switched off.)

SW4-5 POWER UP METRIC

ON = The instrument will be in the metric (KG) mode when power is applied and cannot be changed to LB by pressing the LB/KG pushbutton. With this switch ON, a checksum digit is automatically transmitted to the printer or other devices.

OFF = LB or KG can be selected alternately by pressing the LB/KG pushbutton. AV will not be operative with the switch OFF, NO checksum digit is transmitted.

NOTE: Set SW4-5 to the desired position before powering up the unit.

SW4-6 PRINT FORMAT
SW4-7 PRINT FORMAT

FUNCTION	SW2-6	SW2-7
A. TARE 1 LINE PRINTING	OFF	OFF
B. TARE MULTIPLE LINE PRINTING	ON	OFF
C. PRINT DISPLAYED INFORMATION IN "SINGLE" WIDTH	OFF	ON
D. PRINT DISPLAYED INFORMATION IN "DOUBLE" WIDTH	ON	ON

SW4-6 AND SW4-7

A. With SW2-6 OFF and SW2-7 OFF, the printer will print Gross, Tare, Net on one line. (Or Gross only, if tare is not entered.)

B. With SW2-6 ON, and SW2-7 OFF, the printer will print Gross, Tare, Net on multiple lines. (Or Gross only, on one line, if tare is not entered.) Not on Victor Printers.

C. With SW2-6 OFF, and SW2-7 ON, the printer prints the displayed weight information, Net or Gross in standard width.

D. With SW2-6 ON, and SW2-7 ON, the printer prints the displayed weight information Net or Gross in double width.

NOTE: Not all printers will print all options due to printer design limitations and storage capacity.

SW4-8 NOT USED SHOULD BE OFF

SW4-9 NOT USED SHOULD BE OFF

5. OPERATING INSTRUCTIONS

KEYBOARD

Pushbuttons are as follows:

Button Marking	Function
Zero	Rezero the scale
TR	Enter Tare
C	Clear Tare
*LB/KG	Select LB or KG, alternate action
*AV	Analog Verify
*TV	Test Verify
Print	Print
0-9	Numeric Tare Entry
(Blank)	(Not Used)

*** The instrument will be equipped with either a LB/KG pushbutton or an Av pushbutton and a TV pushbutton. Or with all of the three pushbuttons blank, depending on the factory number ordered.**

FRONT PANEL CONTROLS

DISPLAY:
Weight display is 5 digits 0.5 inches high with lighted decimal point. Tare display is 5 digits 0.3 inches high with lighted decimal point. Over capacity is indicated by blanking of the display at 5 increments over scale capacity. Under capacity is shown by display blanking, except for a minus sing to the far left. This occurs at approximately -3% of selected capacity.

LEGENDS:
The back lighted legends are LB, KG, Zero and Net. Motion is indicated by the blanking of the KG or LB legend.

LB:
The LB display is illuminated when motion has ceased and the LB mode has been selected.

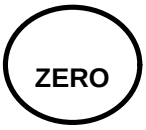
KG:
The KG display is illuminated when motion has ceased and the KG mode has been selected.

ZERO:
The Zero will be illuminated when the instrument zero is within ±0.25 increment of the center of zero increment.

NET:
The Net display, when illuminated, indicates tare has been entered.

INSTRUMENT ZEROING

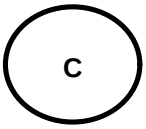
AUTOMATIC ZERO MAINTENANCE: The scale is equipped with automatic zero maintenance (AZM). The range of zero maintenance is limited to ±2% of scale capacity. Weight variations which occur at a rate of 0.2 increments per second or slower will be compensated.



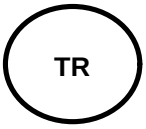
Pushbutton Zero: This keyboard pushbutton provides re-zeroing of the scale over a range of ±2% of scale capacity. the ZERO pushbutton must be held depressed while there is "no motion", with the scale in the Gross weighing mode, to be effective. Pushbutton zero operates by determining the difference between the actual weight and zero, and adding or subtracting this value to the actual weight to provide a corrected weight display.

CLEAR

Pressing the CLEAR pushbutton will clear the tare.



TARE



Pushbutton Tare - Normal Mode:
Tare may be entered by pressing the TARE button whenever the gross or net weight is positive and there is no motion. Tare is limited to a maximum value equal to scale capacity.

Pushbutton Tare - Interlock Mode:
When the internal tare interlock switch is ON, tare may be entered by pressing the TARE button only when the scale is in gross weight mode, the gross weight is positive, and there is no motion. The ZERO pushbutton is not operative after a tare has been taken. Tare must be cleared by use of the C pushbutton before a new tare may be entered.

Keyboard Tare:
Provision is included for entry of Tare via digit keys 0 through 9 which are mounted on the keyboard. With Tare Interlock switch (SW2-2) ON, the least significant digit (LSD) of tare entry must correspond to the increment size or tare will not be accepted. With Tare Interlock switch (SW2--2) OFF, the tare entry is rounded to the nearest increment size.

LSD OF TARE ENTERED	WITH SW2-2 O N				SW2-2 OFF			
	X1	X2	X5	X10	X1	X2	X3	X4
0	0	0	0	0	0	0	0	0
1	1	-	-	-	1	1	0	0
2	2	2	-	-	2	2	0	0
3	3	-	-	-	3	3	5	0
4	4	4	-	-	4	4	5	0
5	5	-	5	-	5	5	5	10
6	6	6	-	-	6	6	5	10
7	7	-	-	-	7	7	5	10
8	8	8	-	-	8	8	10	10
9	9	-	-	-	9	9	10	10
10	10	10	10	10	10	10	10	10
(-) Means tare not accepted								

LB/KG SELECTION

For avoirdupois models, a keyboard LB/KG pushbutton is provided. When power is first applied to the unit, the LB mode is selected and the LB indicator is turned ON. Pressing the LB/KG button selects the KG mode and turns on the KG indicator. Pressing the button again restores the LB mode.

The increment in the KG mode is related to the LB mode increment as follows:

LB	KG
10	5
5	2
1	0.5
0.5	0.2
0.2	0.1
etc.	etc.

Note that the correct decimal point and increments are automatically selected when switching modes. Note that the total number of increments is always the same for both LB an KG modes, as selected by the capacity switch.

DISPLAY VERIFICATION - VISUAL

ZERO

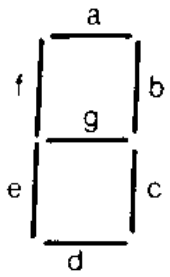
For this operation, the 8136 should be in the Gross mode and display all zeros. Pressing the ZERO pushbutton will then cause the center segment of each of the 5 weight display LED's an all legends to turn non. When the button is released and the scale is empty, all zeros will be displayed. A combination of these two displays demonstrates that all segments and drive circuits are functional in both ON and OFF conditions

DISPLAY VERIFICATION - AUTOMATIC EUROPEAN REQUIREMENTS ONLY

TV

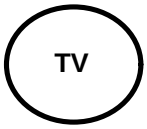
Circuitry within the instrument continuously samples the voltage drops across the Display LED segments to ascertain whether the LED is on or off. This information is reconstructed within the microprocessor to generate data which is compared to the data used to control the digital display. If the data is the same, the daily is correct. If the data differs, an error message is generated.

AN ERROR MESSAGE FOR DISPLAY VERIFICATION IS SEGMENT "d" ON, SEE REFERENCE BELOW:



To confirm that this checking system is functional, the Test Verify pushbutton, if equipped, causes a short in once of the LED segments which results in false data, and a display verify failure indication.

ANALOG VERIFICATION
EUROPEAN REQUIREMENTS ONLY



When the AV key is pressed, a precision resistor shunts the load cell to establish a predetermined weight display reading of about 95% of full scale. This reading must be visually checked by the operator to be certain that if falls within allowable tolerances of the predetermined reading.

OVERCAPACITY

Gross weights which exceed the selected capacity of the scale by more than 5 increments will cause blanking of the Weight display.

WEIGHT IN MOTION

The system includes "weight in motion": detection in order to inhibit the ZERO, TARE, OR PRINT functions while the weight display is changing. Not motion is defined as 3 successive weight readings with ±0.5 increments.

6. PREVENTIVE MAINTENANCE

The Model 8136 Digital Indicator is designed to require a minimum of maintenance and service. This section provides instructions and procedures for maintenance of the indicator, as well as a troubleshooting guide to aid problem analysis.

It is suggested that assistance from METTLER TOLEDO service personnel be requested in the event a problem should arise that is beyond the scope of this technical manual.

6.1. REQUIRED TOOLS AND SUPPLIES

The following items are recommended for 8136 maintenance and repairs. Common hand tools are also required:

- **Volt - Ohm Meter**
- **Load Cell simulator (P/N 100865 00A)**
- **Cleaning Cloth**
- **"Velostat" Static Bags**

6.2 MAINTENANCE SCHEDULE

The frequency at which normal maintenance (cleaning and inspection) should be performed, when installed in a clean office environment, should be twice a year. However, if the unit is subjected to a dusty or a dirty environment the frequency should be increased as required.

6.3 CLEANING

Clean the keyboard and cover with a soft, clean cloth that has been dampened with a mild window type cleaner. DO NOT USE ANY TYPE OF INDUSTRIAL SOLVENT. DO NOT SPRAY CLEANER DIRECTLY ONTO THE UNIT.

6.4 TROUBLESHOOTING

1 **If operational difficulties are encountered, obtain as much information as possible regarding the particular problem as this may eliminate a lengthy, detailed checkout procedure.**

2 **Check fuses, primary power lines, external circuit elements and related wiring for possible defects. Failures and malfunctions often may be traced to simple causes such as loose or improper circuits, power supply connections or fuse failure.**

3 **Use the electrical interconnecting diagram as an aid in locating trouble causes. The diagram contains various voltage measurements that are average for normal operation. Use instrument probes carefully to avoid causing short circuits and damaging circuit components.**

4 **A printed circuit board believed to be defective may be checked by replacing it with a known good PCB and observing whether the problem is corrected. WHEN HANDLING A PCB, USE A "VELOSTAT" STATIC BAG FOR BOTH THE NEW AND DEFECTIVE PCB.**

5 **To verify the problem, as being in the removed PCB, reinstall the defective PCB and retest. This simple test will eliminate the possibility of having replaced a good PCB because of a loose or poor connection.**

Exchange PCB's or sub-assemblies are available from your authorized Toledo Scale representative. These assemblies are repaired and tested at various Toledo Scale factories.

TESTING THE POWER SUPPLY VOLTAGES

The 5 volt supply can be measured at the pin 2 of PJ-5. The load cell excitation voltage is gated off and on and therefore, cannot be measured accurately with a digital or analog voltmeter because they generally measure average volts. However, some digital meters will not indicate equally in the negative direction, so for this reason, switch the test leads when checking the negative voltage against the positive.

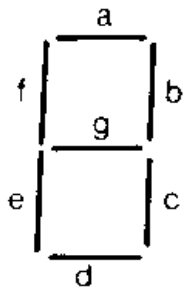
The voltages when measured with a voltmeter will be:

PINS AT J18	EXCITATION VOLTAGE
C to G	+3.75 VDC
D to G	-3.75 VDC
C to D	+7.5 VDC

The raw supply voltages can be measured at the filter capacitors. The voltage present will usually indicate the condition of the filter capacitor if the line voltage is correct for the transformer tap in use. The correct voltages are shown on the power supply diagram at C44 and C45.

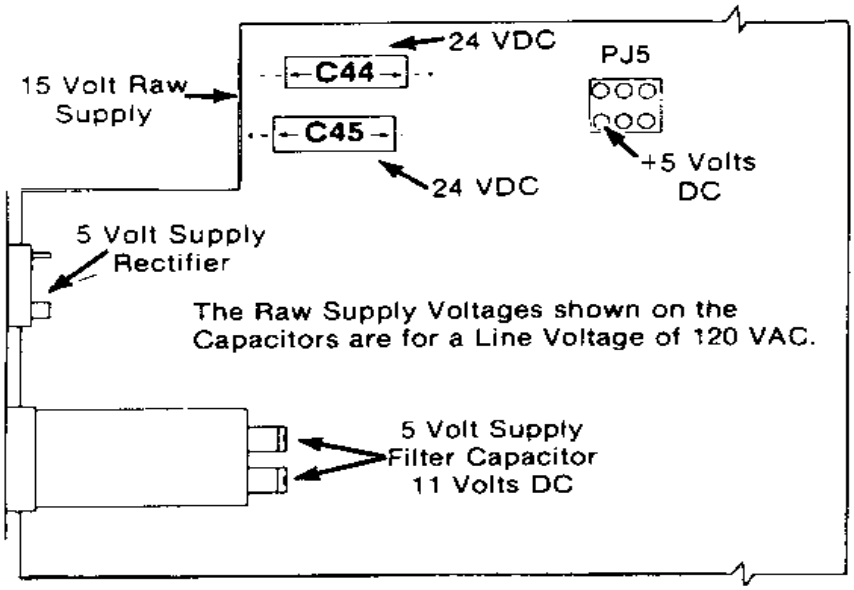
ERROR CODES

Failure of the microprocessor to read or write data to RAM, (Random Access Memory), will result in a segment "a" error message. Failure of the microprocessor ROM, (Read Only Memory), program memory to yield correct checksum, will result in a segment 'g" error message. If such a failure occurs replace the Main PCB.



TYPICAL 7 SEGMENT DIGIT.

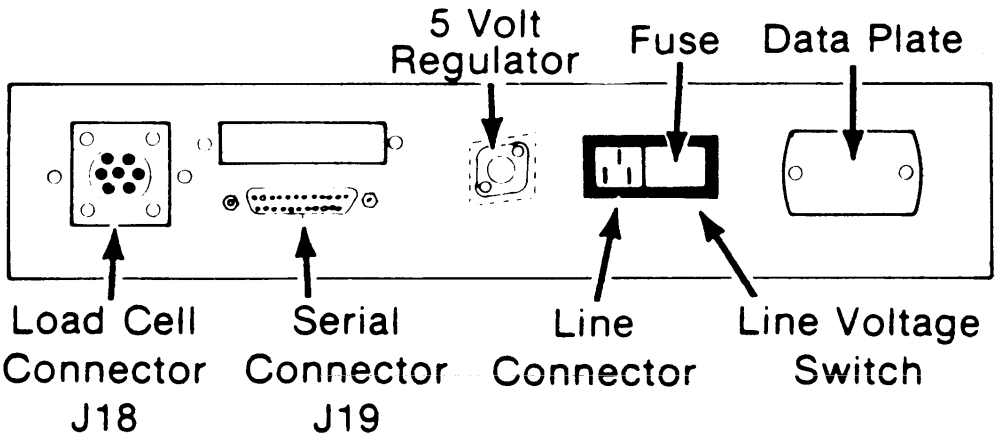
POWER SUPPLY (11211100A PCB)



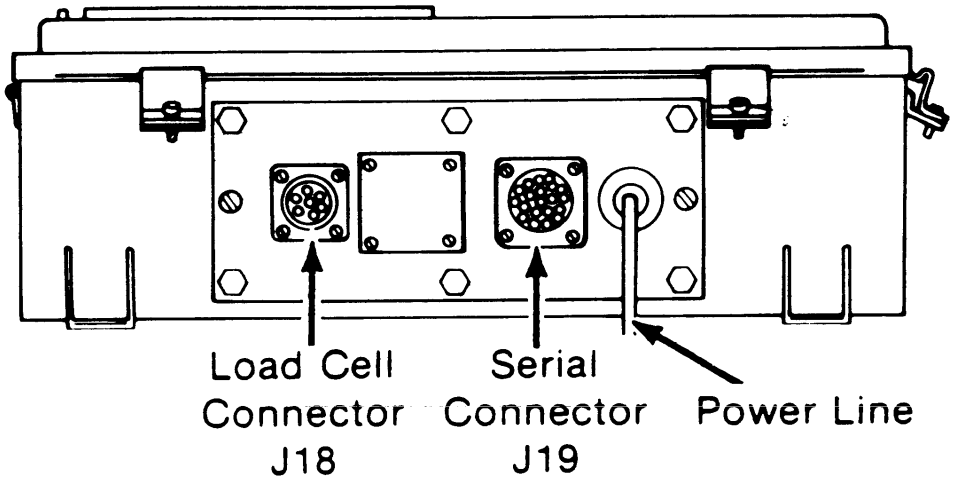
NOTE: On the 11411100A PCB, C44 and C45 will be labeled C52 and C51 respectively.

6.5 INPUT/OUTPUT CONNECTIONS

8136 DESK TOP REAR PANEL



8136 WALL MOUNT BOTTOM PANEL



LOAD CELL CONNECTOR TABLE
7 PIN CONNECTOR

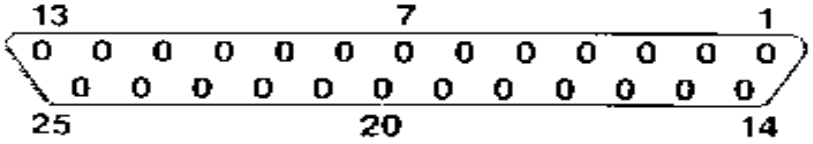
PIN		
A	+	SIGNAL
B	-	SIGNAL
C	+	EXCITATION
D	-	EXCITATION
E	+	SENSE
F	-	SENSE
G		SHIELD

SERIAL OUTPUT CONNECTIONS J-19 DESK AND WALL MOUNT						
SIGNAL NAME	**8136 J-19**	**301 & 307 J-9**	**8805 J-1**	**8806 J-7**	**8810-20-30 J-25**	**8855 J-1**
Chassis Ground	1					
Not Used	2					
Not Used	3				2	
Supply Ground	7				7	
20mA Transmit+	10	7	28			22
20 mA Transmit-	11			16	18	
Supply Ground	12			18		
Supply Ground	15		25			
20mA Receive-	16		19	13	14	
	20					
20 mA Receive +	23		24	23	15	
	24		6			
20 mA Supply	25	6	26		16	3
Jumper is in 8136 end of cable					9 ┐ 19 ┘	
Jumper is in 8136 end of cable	11 ┐ 12 ┘	11 ┐ 12 ┘	25 ┐ 10 ┘	11 ┐ 12 ┘	11 ┐ 12 ┘	

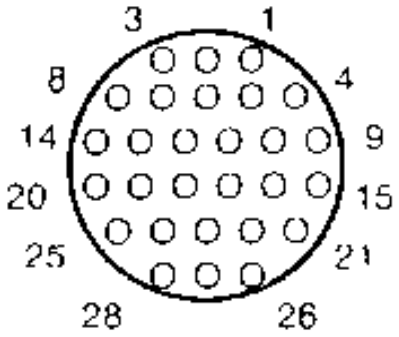
NOTE: There is no parallel output available.

25 PIN CONNECTOR VIEWED FROM REAR OF INSTRUMENT (DESK TOP ONLY)

CONNECTOR IS SHOWN TO AID IN PIN NUMBER IDENTIFICATION



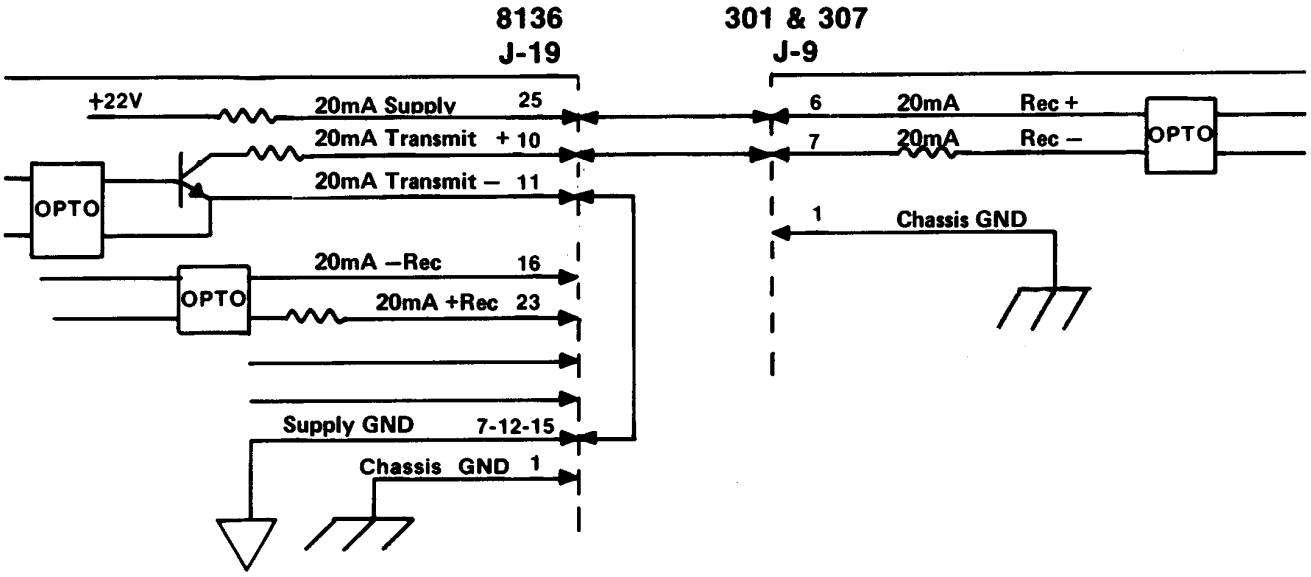
THE WALL MOUNT CONNECTOR IS ROUND WITH 28 PINS, (PINS 26, 27-28 ARE NOT CONNECTED). THE PIN NUMBERS ARE MARKED ON THE CONNECTOR.

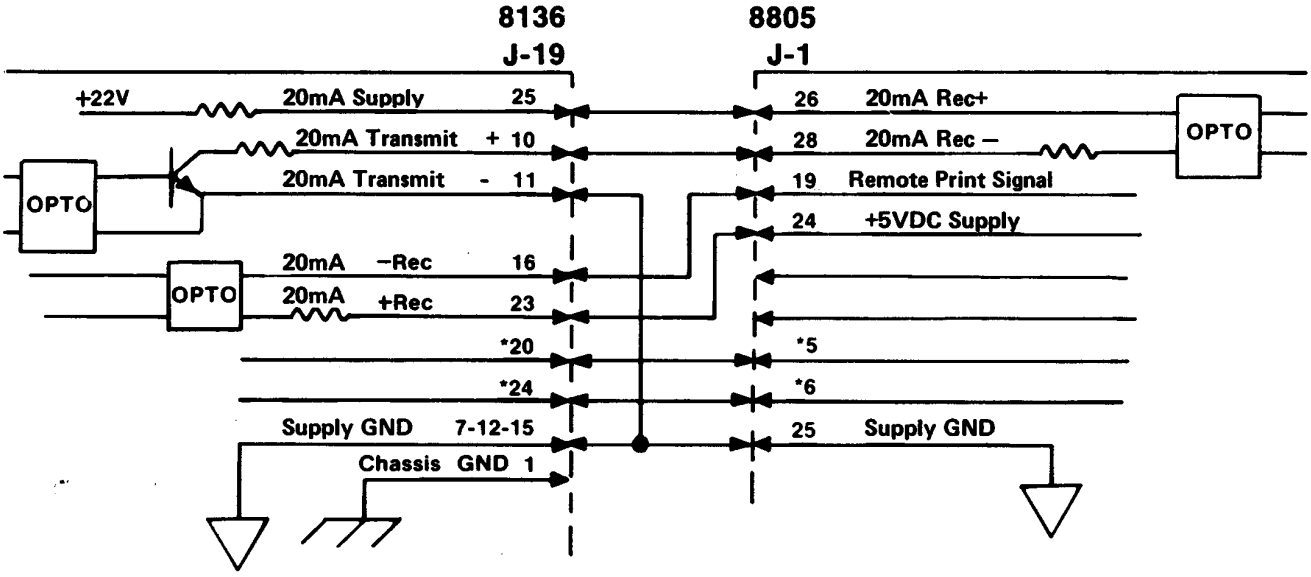


SERIAL OUTPUT INTERCONNECTING CABLES			
PRINTER	**8136**	**LENGTH**	**PART NUMBER**
301/307	**Desk** **Wall**	**20'** **20'**	**112156 00A** **112157 00A**
8805	**Desk** **Wall**	**6'** **20** **6'** **20'**	**110837 00A** **110838 00A** **110849 00A** **110850 00A**
8806	**Desk** **Wall**	**6'** **20'** **6'** **20'**	**115494 00A** **115495 00A** **115496 00A** **115497 00A**
8810 **8820** **8830**	**Desk** **Wall**	**6'** **20'** **6'** **20'**	**114033 00A** **114034 00A** **114035 00A** **114036 00A**
8855	**Desk** **Wall**	**6'** **20'**	**114285 00A** **114408 00A** **114104 00A** **114105 00A**

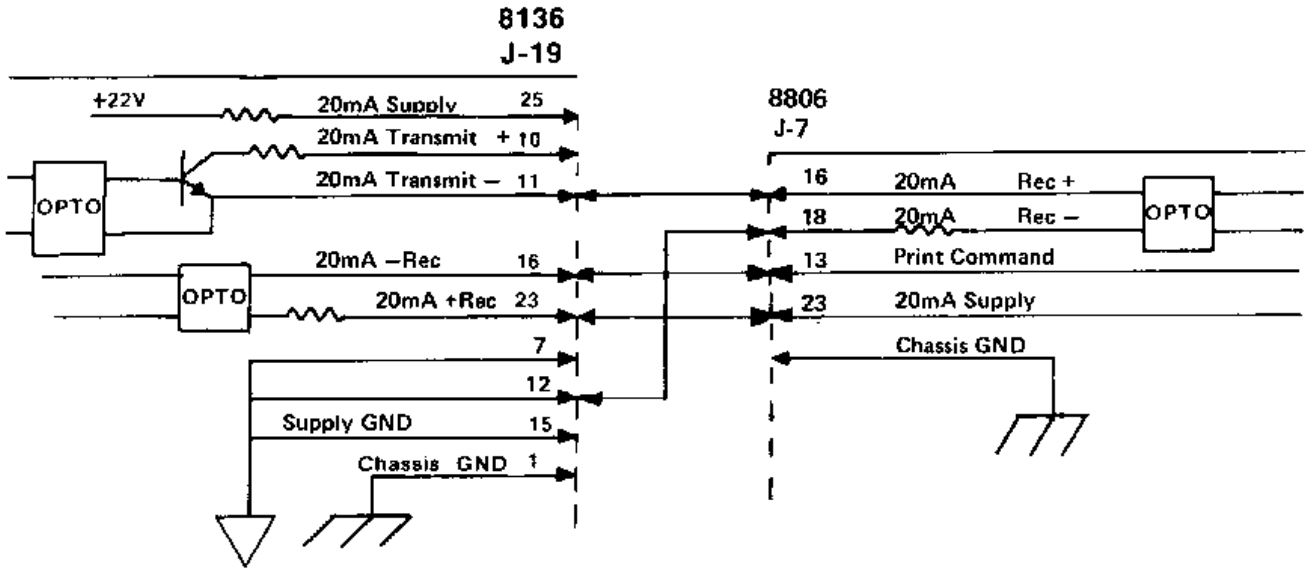
CONNECTIONS FOR ATTACHMENTS

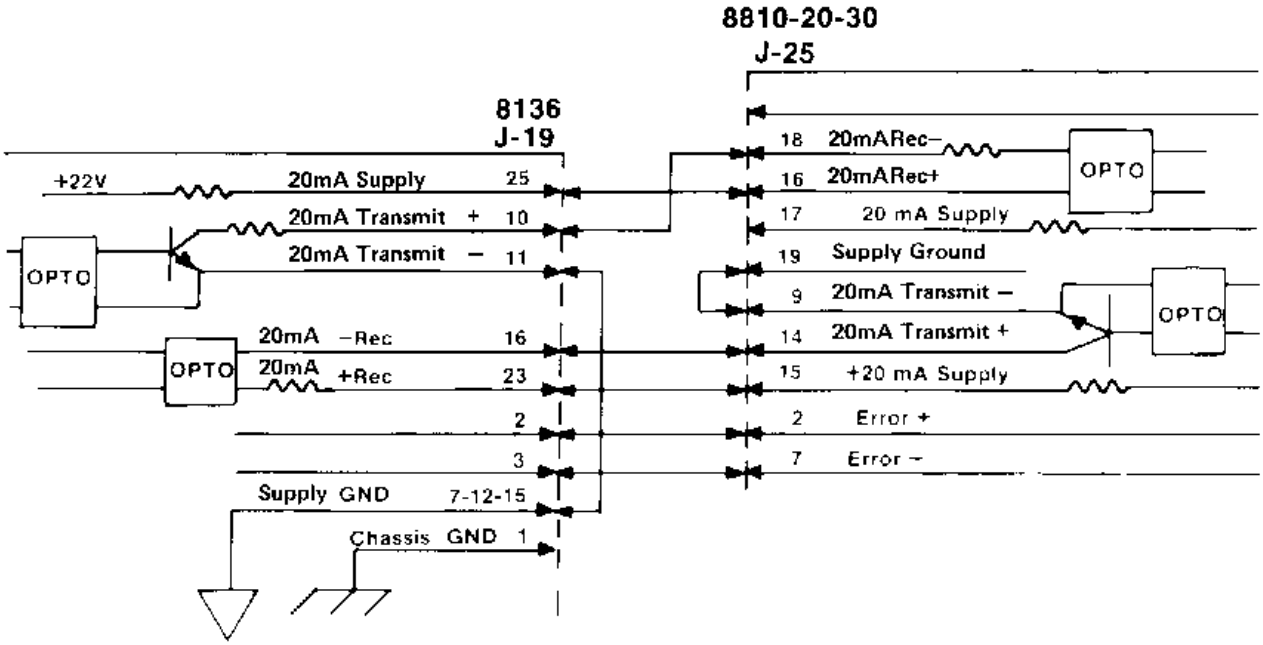
The 8136 uses a 20 milliamp current loop output (ASCII) for printers and other devices. The output is designed so that it can be used with various types of interconnections to other devices. It can be used with an internal power source depending on what terminals are connected on the

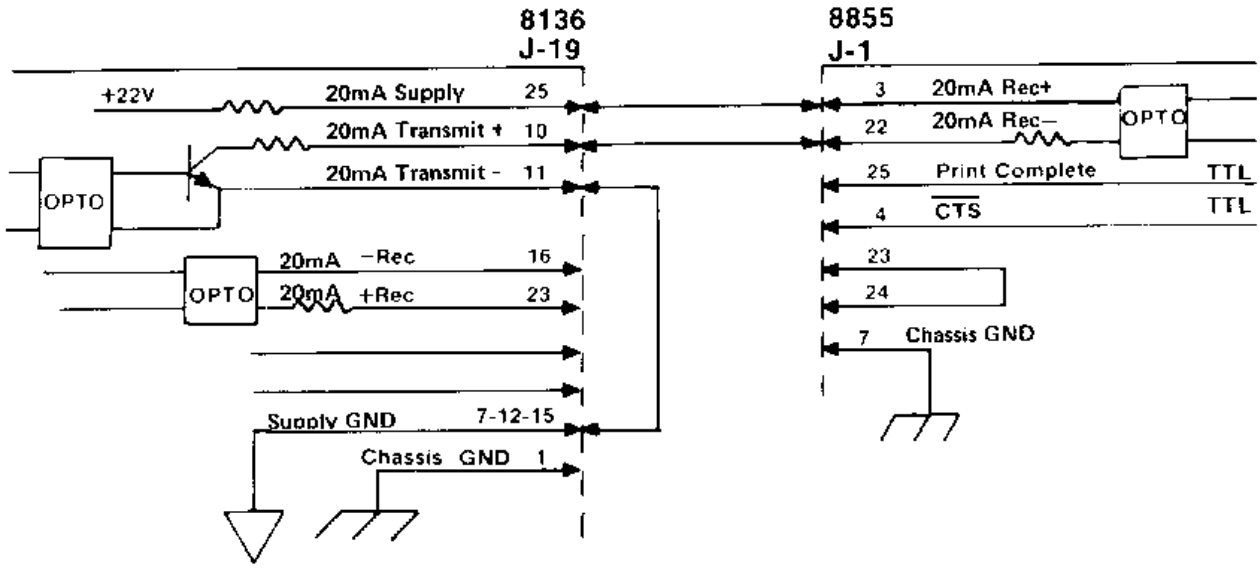




*** Wire is connected in cable but used for 8132 only.**

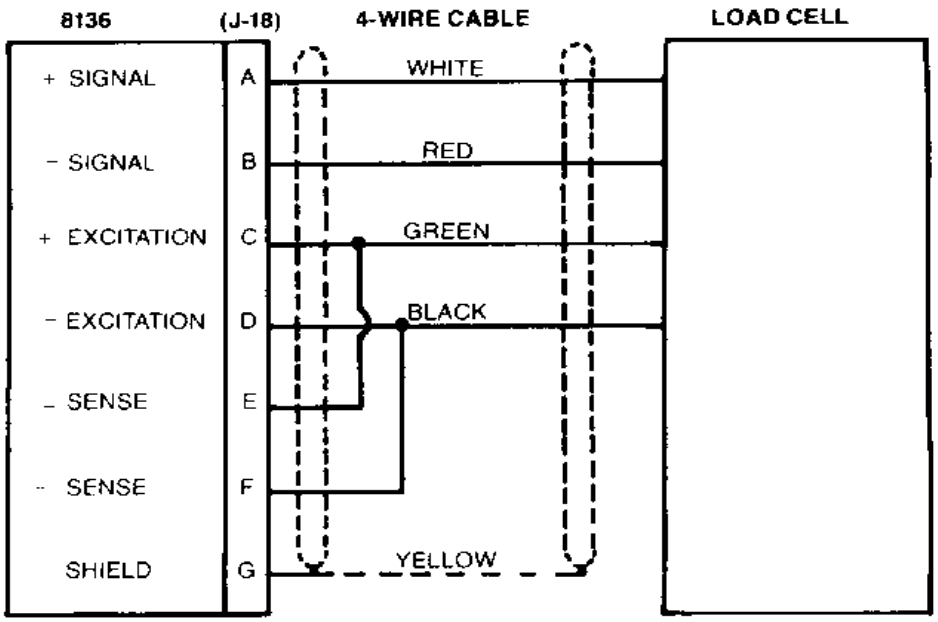

8136
J-19
+22V
20mA Supply 25
20mA Transmit + 10
20mA Transmit – 11
OPTO
20mA –Rec 16
OPTO
20mA +Rec 23
7
12
Supply GND 15
Chassis GND 1
8806
J-7
16 20mA Rec +
18 20mA Rec –
OPTO
13 Print Command
23 20mA Supply
Chassis GND


8810-20-30
J-25
8136
J-19
+22V
20mA Supply 25
20mA Transmit + 10
20mA Transmit – 11
OPTO
20mA –Rec 16
OPTO
20mA +Rec 23
2
3
Supply GND 7-12-15
Chassis GND 1
18 20mARec–
16 20mARec+
OPTO
17 20 mA Supply
19 Supply Ground
9 20mA Transmit –
14 20mA Transmit +
OPTO
15 +20 mA Supply
2 Error +
7 Error –

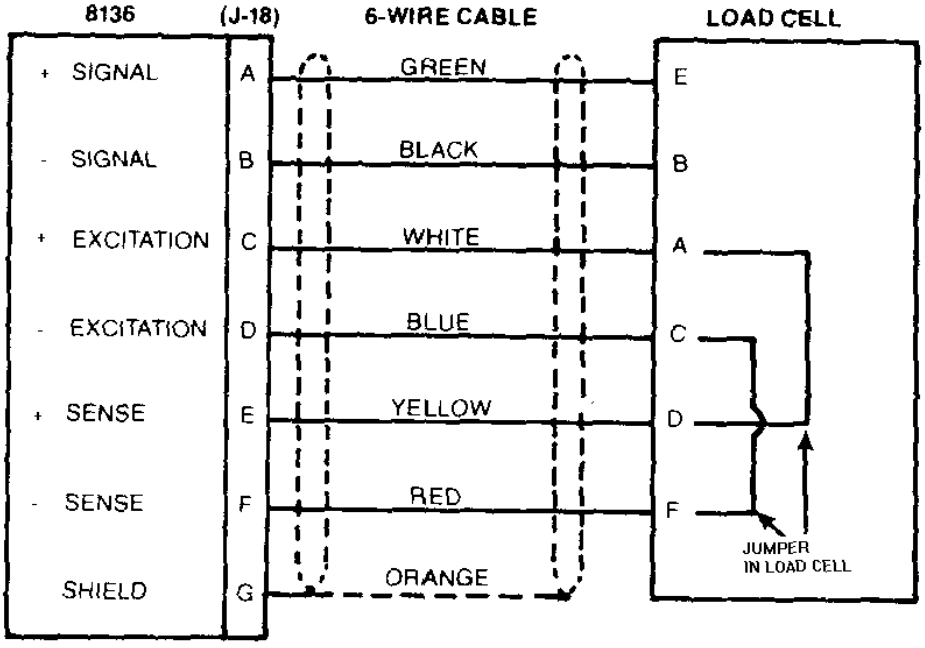

8136
J-19
8855
J-1
+22V
20mA Supply
25
20mA Transmit +
10
20mA Transmit -
11
OPTO
20mA -Rec
16
OPTO
20mA +Rec
23
Supply GND
7-12-15
Chassis GND
1
3
20mA Rec+
22
20mA Rec-
OPTO
25
Print Complete
TTL
4
CTS
TTL
23
24
7
Chassis GND

TYPICAL LOAD CELL WIRING CONNECTIONS

This arrangement is Typical For a Single Load Cell System Connected Directly To The Model 8136 (No junction box)

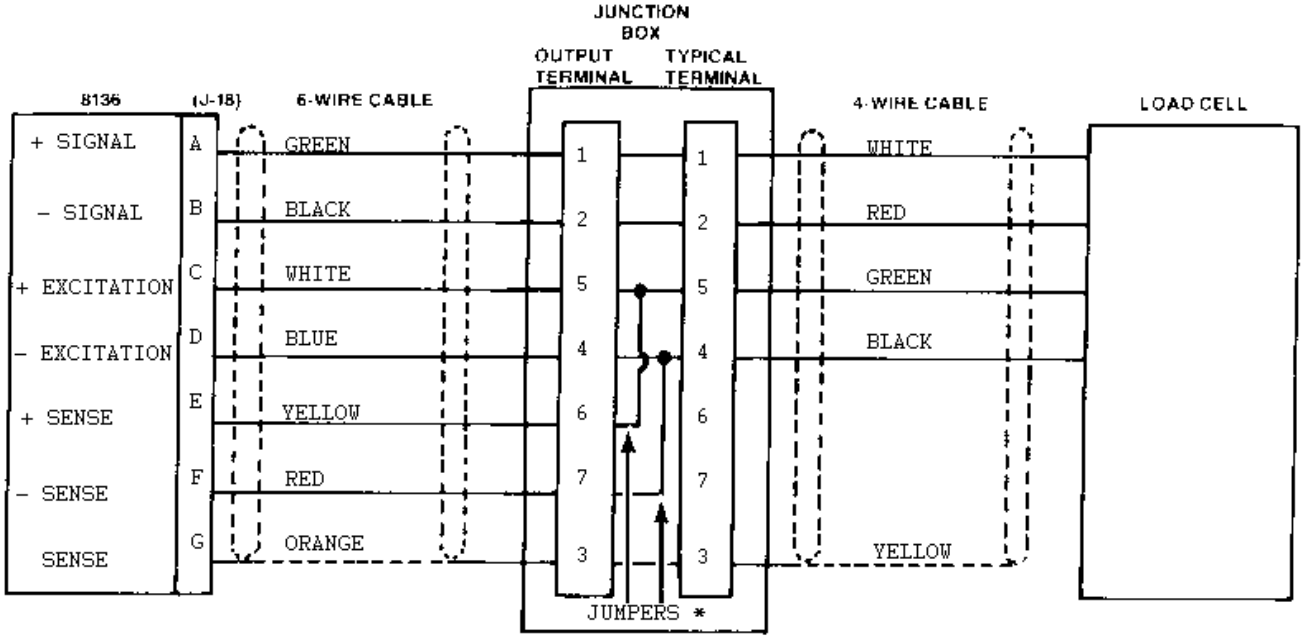


SINGLE 4 WIRE CELL CONNECTED DIRECTLY TO INSTRUMENT.

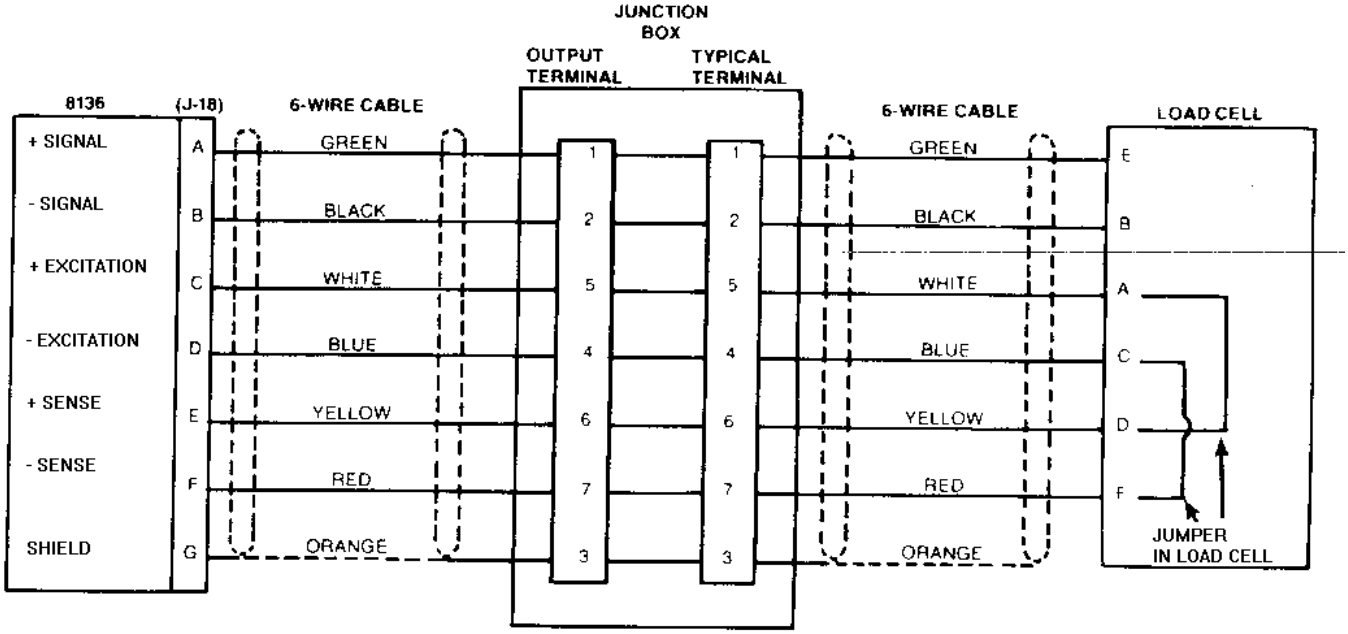


SINGLE 6 WIRE CELL CONNECTED DIRECTLY TO INSTRUMENT.

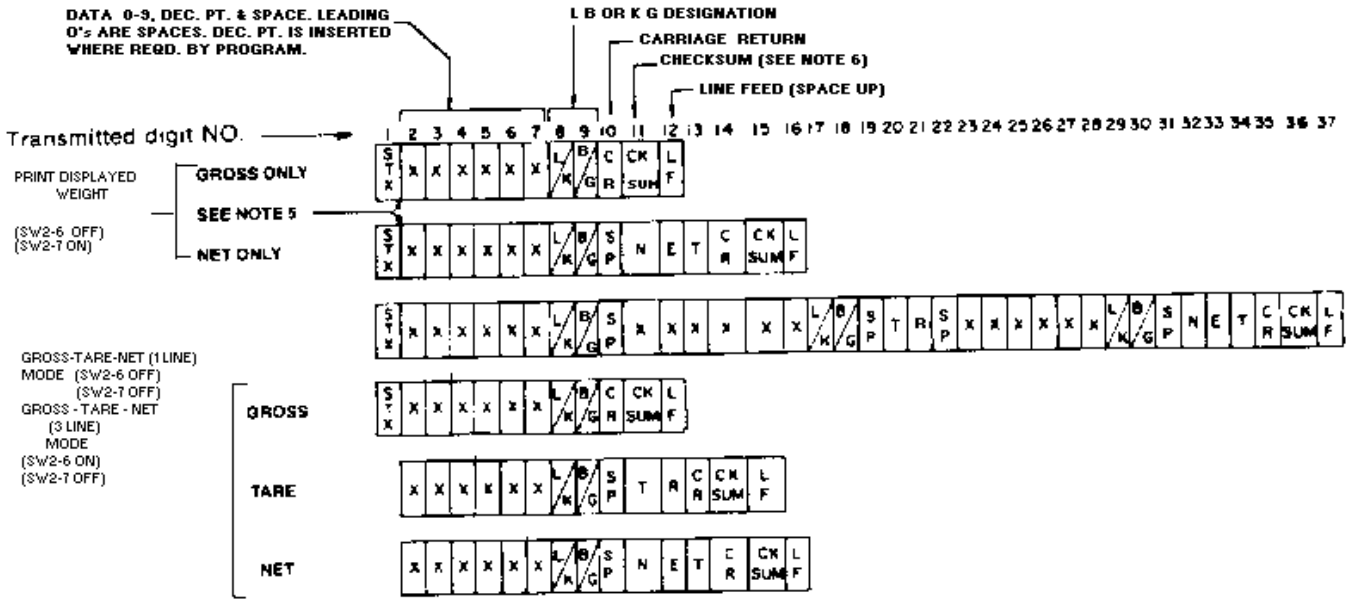
These are typical load cell hookups for single and multiple cell installations.



*** When using 4 wire cells, there will be jumpers between terminals 4 and 7 and between terminals 5 and 6 on TB101. On the 6 wire cells the jumpers are built into the load cell and they are between pins A and D and between pins C and F. Use terminal strip TB101 if only one load cell is used.**



6.6 OUTPUT DATA FORMAT



NOTES:

1. **ALL NON SIGNIFICANT LEADING ZERO'S WILL BE SENT AS SPACES.**

2. **ALL DATA IS 11 BIT ASCII (1 START BIT, 7 DATA BITS, 1 EVEN PARITY BIT, 2 STOP BITS) @300 BAUD.**

3. **DATA IS SENT ONCE EACH TIME PRINT BUTTON ON FRONT OF MODULE IS PRESSED OR RECEIVE SIGNAL IS "ON".**

4. **IF 8136 IS USED IN METRIC (KG) MODE ONLY (SW2-5 ON) & KEYBOARD TARE IS USED, THE DATA FORMAT IS MODIFIED TO ADD "H" AFTER "TR" AND "C" AFTER "NET". ALL FOLLOWING CHARACTERS ARE SHIFTED RIGHT ACCORDINGLY.**

5. **IF DOUBLE WIDTH PRINTING IS SELECTED (SW2-6 ON, SW2-7 ON) AN "SO" CHARACTER (HEX 3) IS INSERTED AT THIS POINT.**

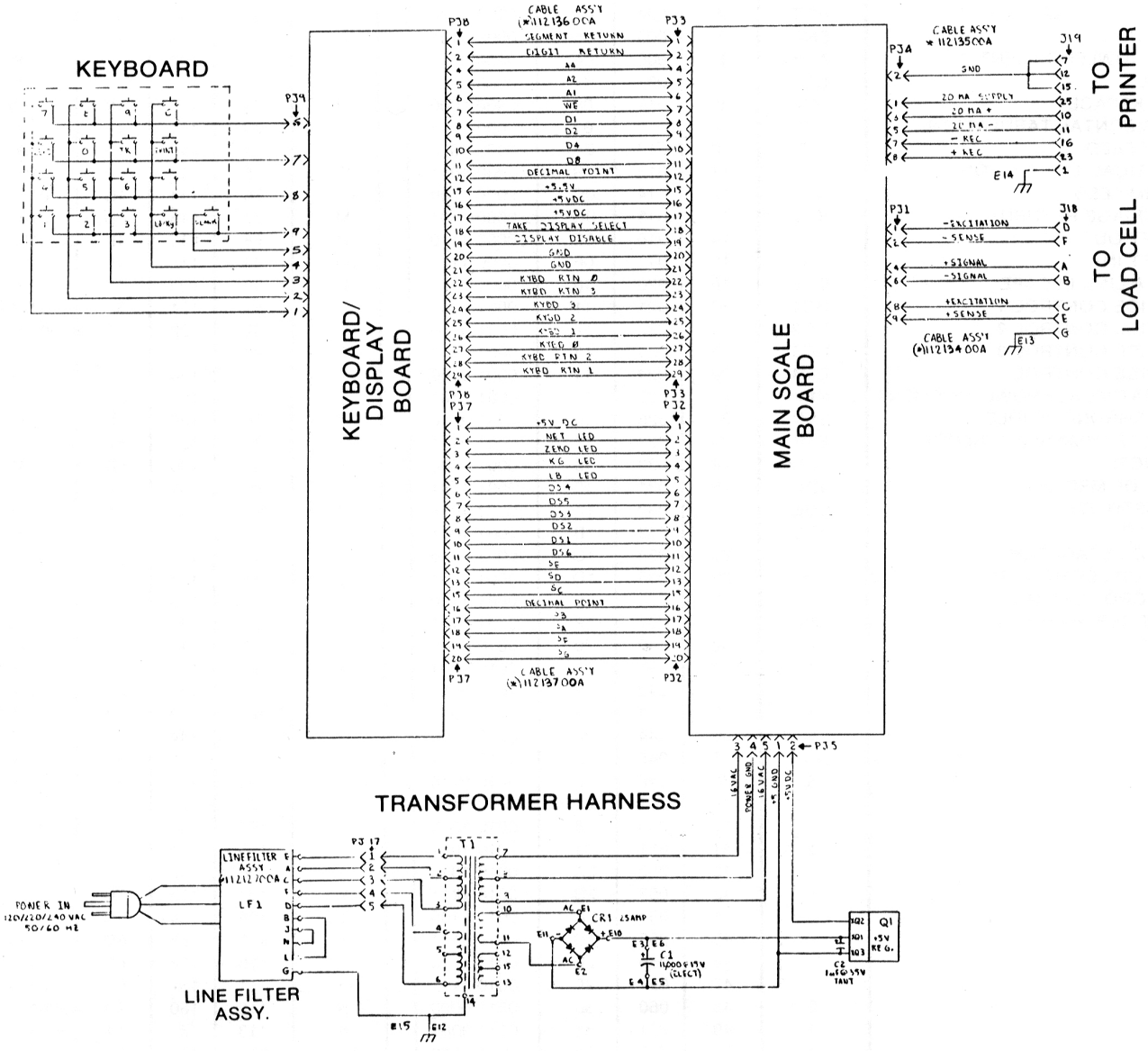
6. **CHECKSUM IS THE 2'S COMPLEMENT OF THE SUM OF THE BITS 0-6 OF ALL CHARACTERS PRECEDING THE CHECKSUM. BIT NO. 7 OF CHECKSUM IS EVEN PARITY OF THE 7 LOWER ORDER BITS OF CHECKSUM. CHECKSUM IS EVEN PARITY OF THE 7 LOWER ORDER BITS OF CHECKSUM.**

7. **NOT ALL PRINTERS WILL PRINT ALL OPTIONS DUE TO PRINTER DESIGN LIMITATIONS AND STORAGE CAPACITY.**

*** TRH SIGNIFIES (H) FOR HAND ENTERED TARE (KEYBOARD).**
NETC SIGNIFIES (C) FOR CALCULATED NET.

ASCII CHAR.	DECIMAL	HEX	76543210	ASCII CHAR.	DECIMAL	HEX	76543210
NULL	0	00	00000000	@	64	40	01000000
SOH	1	01	00000001	A	65	41	01000001
STX	2	02	00000010	B	66	42	01000010
ETX	3	03	00000011	C	67	43	01000011
EOT	4	04	00000100	D	68	44	01000100
ENQ	5	05	00000101	E	69	45	01000101
ACK	6	06	00000110	F	70	46	01000110
BELL	7	07	00000111	G	71	47	01000111
BACKSPACE	8	08	00001000	H	72	48	01001000
TAB	9	09	00001001	I	73	49	01001001
LineFeed	10	0A	00001010	J	74	4A	01001010
Vert. Tab	11	0B	00001011	K	75	4B	01001011
Form Feed	12	0C	00001100	L	76	4C	01001100
Carr.Return	13	0D	00001101	M	77	4D	01001101
Shift Out	14	0E	00001110	N	78	4E	01001110
Shift In	15	0F	00001111	O	79	4F	01001111
Data Link Esc	16	10	00010000	P	80	50	01010000
DC1	17	11	000010001	Q	81	51	01010001
DC2	18	12	00010010	R	82	52	01010010
DC3	19	13	00010011	S	83	53	01010011
DC4	20	14	00010100	T	84	54	01010100
NAK	21	15	00010101	U	85	55	01010101
SYNCH IDLE	22	16	00010110	V	86	56	01010110
End Trans. Block	23	17	00010111	W	87	57	01010111
CANCEL	24	18	00011000	X	88	58	01011000
End Of Medium	25	19	00011001	Y	89	59	01011001
SUBSTITUTE	26	1A	00011010	Z	90	5A	01011010
ESCAPE	27	1B	00011011	[	91	5B	01011011
FS (Cursor Right)	28	1C	00011100	\	92	5C	01011100
GS (Cursor Left)	29	1D	00011101	]	93	5D	01011101
RS (Cursor Up)	30	1E	00011110	^	94	5E	01011110
US (Cursor Down)	31	1F	00011111	_	95	5F	01011111
SPACE	32	20	00100000	`	96	60	01100000
!	33	21	00100001	a	97	61	01100001
"	34	22	00100010	b	98	62	01100010
#	35	23	00100011	c	99	63	01100011
$	36	24	00100100	d	100	64	01100100
%	37	25	00100101	e	101	65	01100101
&	38	26	00100110	f	102	66	01100110
'	39	27	00100111	g	103	67	01100111
(	40	28	00101000	h	104	68	01101000
)	41	29	00101001	i	105	69	01101001
*	42	2A	00101010	j	106	6A	01101010
+	43	2B	00101011	k	107	6B	01101011
,	44	2C	00101100	l	108	6C	01101100
-	45	2D	00101101	m	109	6D	01101101
.	46	2E	00101110	n	110	6E	01101110
/	47	2F	00101111	o	111	6F	01101111
0	48	30	00110000	p	112	70	01110000
1	49	31	00110001	q	113	71	01110001
2	50	32	00110010	r	114	72	01110010
3	51	33	00110011	s	115	73	01110011
4	52	34	00110100	t	116	74	01110100
5	53	35	00110101	u	117	75	01110101
6	54	36	00110110	v	118	76	01110110
7	55	37	00110111	w	119	77	01110111
8	56	38	00111000	x	120	78	01111000
9	57	39	00111001	y	121	79	01111001
:	58	3A	00111010	z	122	7A	01111010
;	59	3B	00111011	{	123	7B	01111011
<	60	3C	00111100	|	124	7C	01111100
=	61	3D	00111101	}	125	7D	01111101
>	62	3E	00111110	~	126	7E	01111110
?	63	3F	00111111		127	7F	01111111

6.7 INTERCONNECTION DIAGRAM



6.8 RECOMMENDED SPARE PARTS

PART NUMBER	DESCRIPTION
114111 00A or 1121525 00A	PCB, Main (Non-Verified) PCB, Display (Non Verified)
B113755 00A 112145 00A 104935 00A	Keyboard Fuse Voltage Regulator
100865 00A 510616 370	Simulator, Load Cell - Tool 6 Conductor Load Cell Cable (Specify Length)

In addition to these items, it is also recommended that a parts catalog also be ordered so that items not listed above may be properly identified for correct and prompt delivery. The Parts Catalog number is PC 008136 I01.

EXTERNAL MATING CONNECTORS

QTY.	PART NUMBER	DESCRIPTION
1 1	117661 00A 117662 00A	Load Cell Connector Load Cell Connector Clamp
1 1	107187 00A 107188 00A	Serial I/O Mating Connector (Desk) Serial I/O Mating Connector Clamp (Desk)
A.R. 1	107189 00A 112139 00A	Serial I/O Connector Contact Pins (Desk and Wall) Serial I/O Mating Connector (Wall)
1	110803 00A	Serial I/O Mating Connector Clamp (Wall)

A.R. - As Required - Packaged (10) to the set.

7. Replacement Parts

Part Number	Description
	FRONT PANEL AND COVER ASSEMBLIES (DESK)
A097478 00A	Outer Cover
112112 00A	Display Lens (Ram 1)
112116 00A	Display Lens (Ram 2)
112150 00A	Display Lens (Ram 3)
D108546 00A	Front Panel
	POWER SUPPLY COMPONENTS, PCB'S (DESK)
C108652 00A	Chassis Assembly
112107 00A	Transformer Assembly
1412135 00A	Serial I/O Harness Assembly
112111 00A	Main PCB (Rams 1 & 3)
112110 00A	Main PCB (Ram 2)
112125 00A	Display PCB (Rams 1 & 3)
112114 00A	Display PCB (Ram 2)
112144 00A	Bracket
107763 00A	11000 uf Cap. 15V
093943 00A	Bridge Rectifier
	MISCELLANEOUS HARDWARE (DESK)
108578 00A	Cover
112145 00A	.5A Slo Blo Fuse (Rams 1 & 3)
095920 00A	.25A Slo Blo Fuse (Ram 2)
111189 00A	Line Filter Spacer
112127 00A	Line Filter Assembly
900549 020	Aluminum Insulator
104935 00A	Voltage Regulator
105403 00A	Heat Sink
112134 00A	Serial I/O Harness Assembly *
105403 00a	Cover
112134 00a	Load Cell Harness**
115833 00A	Load Cell Harness, RFI Filtered**
	DISPLAY PCB AND HARNESSES
112144 00A	Display PCB Bracket (Rams 1,2,3)
A108593 00A	Display PCB Bracket (Rams 11,12,13)
112125 00A	Display PCB (Rams 1,2,11,13)
112114 00A	Display PCB (Rams 2,12)
112136 00A	12" Harness (Key at 14) Desk (Rams 11,12,13)
112118 00A	Tare LED
A102312 00A	Display LED
105026 00A	LED
097446 00A	9" Harness (Key at 25) Desk (Rams 1,2,3)
112137 00A	9" Harness (Key at 25) Desk (Rams 1,2,3)
112119 00A	21" Harness (Key at 25) Wall (Rams 11,12,13)

FRONT PANEL AND KEYBOARD (DESK & WALL)

A108595 00A	Keyboard Retainer Bracket
114275 00A	Back Board
B113755 00A	Keypad Assembly*
A112126 00A	Keyboard Mask (Rams 2 & 12)
112151 00A	Keyboard Mask (Rams 3& 13)
A113486 00A	Plastic Window
112112 00A	Display Lens (Rams 1 & 11)
112116 00A	Display Lens (Rams 2 & 12)
112150 00A	Display Lens (Rams 3 & 13)

When ordering a keypad for Rams 2 & 3 you must order a keyboard mask also.

FRONT PANEL AND ENCLOSURE ASSEMBLY (WALL)

C108580 00A	Enclosure (S.S.)
A112128 00A	Decorative Bezel
D108546 00A	Front Panel
112122 00A	Display Lens (Ram 11)
112116 00A	Display Lens (Ram 12)
112150 00A	Display Lens (Ram 13)

POWER SUPPLY, PCB'S AND MISC. HARDWARE

A108596 00A	Main Panel
112111 00A	Main PCB (Rams 11 & 13)
112110 00A	Main PCB (Ram 12)
108648 00A	Insulator (Fishpaper)
107763 00A	1100 uf Cap. 15V
108585 00A	Mounting Bracket
093943 00A	Rectifier
112107 00A	Transformer Assembly
111161 00A	Terminal Cover
097821 00A	Terminal Block
112145 00A	.5A Slo Blo Fuse (Rams 11 & 13)
095920 00A	.25A Slo Blo Fuse (Ram 12)
111188 00A	Power Cord (Right Angel)
112127 00A	Line Filter Assembly
104935 00A	Voltage Regulator
R00549 020	Aluminum Insulator
097522 00A	Heatsink
B108583 00A	Terminal Strip Bracket
111179 00A	Display PCB Support

CONNECTOR COMPONENTS

D108587 00A	Plate, Bottom
A111160 00A	Cover Plate
112108 00A	Serial I/O Harness*
112143 00A	Serial output Cap.
109859 00A	Line Cord
P00477 020	CGB Connector
112117 00A	Load Cell Harness **
115834 00A	Load Cell Harness, RFI Filtered

*Mating Connector consists of:

112139 00A	Connector (25 Pin)
110803 00A	Cable Clamp
107189 00A	Contact Pin (Pkg. Of 10)

** Mating Connector consists of:

094048 00A	Connector (7Pin)
094049 00A	Clamp