8186

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:

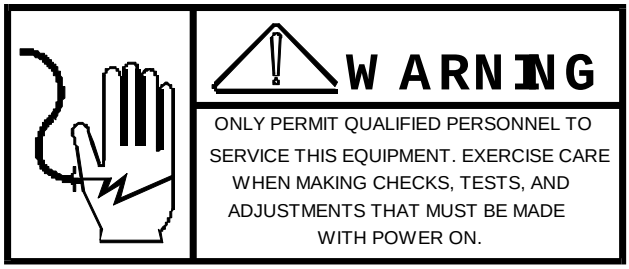
METTLER TOLEDO
Training Center
P.O. Box 1705
Columbus, Ohio 43216
(614) 438-4400

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.

1. GENERAL DESCRIPTION

The Model 8186 is a heavy duty industrial parts counting scale. The 8186 will accept one additional scale base, which may be used along with the scale contained in the console. The 8186 will accept one additional scale base, which may be used along with the scale contained in the console.. Any one or both, of the bases used may be used for a specific counting operation.

The 8186 is calibrated and programmed via the keyboard.

1.1 STATEMENT OF PERFORMANCE

The performance of any count-by-weighing scale is dependent on uniformity of weight per piece, number of pieces in the sample, individual piece weight and the percent of rated load placed on the scale. In application, count accuracy is also dependent upon the ability of the operator to read and record the count information accurately.

The Model 8186 Digital Parts Counting Scale significantly reduces count errors induced count errors induced by the operator. In most applications, it provides better practical accuracy than either hand counting or using mechanical techniques. Assuming proper scale selection, count accuracy of ± one part is attainable in many specific cases. However, the most significant variable is uniform weight of the parts to be counted. This variable is not controllable by the scale system.

1.2 ACCURACY CONSIDERATIONS

Counting accuracy is determined primarily by these factors:

1. Digital resolution of the Sample Weight.
2. Digital resolution of the Gross Weight.
3. Piece to piece weight variation.

Item 1 is the most frequent cause of parts counting inaccuracy because of users desire to count and handle the minimum number of sample pieces. For example, with a sample weight of 0.2% of full scale, sample weight resolution is ± 1 part in 400, so counting error is ± 0.25% at best. Use of the 0.5% or 1% minimum sample weights will significantly improve counting accuracy.

Item 2, resolution of the gross weight is normally not a problem unless the gross scale is used below 2% of scale capacity. At 2%, weight resolution is 1 part in 4000.

Item 3 is not under control of the Parts counter, but is a factor which merits serious attention by the user. The overall count accuracy can be no better than the piece to piece variation, and may be much lower if the sample is not representative of the average piece weight.

1.3 FEATURES

- Alphanumeric display and micro-motion keyboard for ease of operation.

- Ability to repeat Tare and/or Average Piece Weights from one transaction to the next.

- Self-contained unit can accommodate one remote understructure.

- Keyboard configuration and calibration.

- Internal resolution of 1 part in 200,000 of scale capacity.

- Variety of settings for sufficient sample.

- Pushbutton zeroing (within ± 2% of scale capacity).

- Optional 20mA current loop/RS232C output for printer or computer.

- Selectable Automatic countup, countdown, single scale full container counting.

Keyboard selection of LB or KG.

Automatic Zero Maintenance for each scale.

Excitation current is provided for 4-350 ohm load cells for each A/D PCB.

Sample Enhance.

Interface with HI resolution 8188 smart sample.

1.4 SYSTEM DESCRIPTION

The 8186 provides 15 volts of excitation for strain gauge load cell (s). Zero drift and temperature change are compensated for by gating this voltage. The microvolt signal from the load cell is then conditioned, amplified and converted to a digital signal and displayed.

The initial range is adjustable from 0 to 30mV.

The span range is adjustable from 3 to 30mV.

Excitation current is proved for 4-350 ohm load cells for each A/D PCB.

The Model 8186 consists of eight major blocks. The Model 8182/8185 consists of eight (8) major blocks:

1.4.1 POWER SUPPLY
Provides various DC voltages to the other PCB'S.

1.4.2 MOTHER PCB
This PCB distributes the power to the CPU and Analog PCB's, as well as providing
intercommunication lines between the Logic CPU PCB and Analog PCB* Display PCB and
Serial Interface PCB*.

* Optional

1.4.3 CPU PCB

Provides control over operating functions and serial I/O ports assigned to the following tasks.

1) Keyboard Display I/O
2) Printer I/O

3) External Device I/O
4) Scale Control Logic
5) Automatic Zero Maintenance

Automatic Zero Maintenance (AZM) is provided for each scale, and is limited to 4% of scale capacity. Weight variations which occur at the rate of 0.2 increments per second or slower will be compensated.

6) Motion Detector

Each scale includes a motion detector, which inhibits scale zeroing or data output to a printer when the weight is changing. ''No Motion'' is defined as 3 successive weight readings within 0.5 display increments.

1.4.4 DISPLAY PCB

The Display PCB provides 16 characters of a alphanumeric data, for weight, operator prompting and set-up. The Display PCB to CPU PCB interface consists of a transmit, receive and four control lines of EIA level.

1.4.5 KEYBOARD

The keyboard has 20 keys containing numeric characters, and control keys. The keyboard allows operator input for control and data entry.

1.4.6 KEYBOARD ANNUNCIATOR

Provides an audible tone to the scale operator to indicate that a pushbutton has been depressed.

1.4.7 ANALOG TO DIGITAL PCB

The A/D PCB contains the load cell excitation and analog to digital conversion circuitry.

1.4.8 LOAD CELL/ WEIGH MODULE

A moment insensitive load cell is supplied with the 8186. The load cell supplies an output signal to the A/D PCB in proportion to the applied load.

In addition, one external scale may be connected with the addition of optional A/D PCB and load cell harness.

1.5 SPECIFICATIONS

1.5.1 ELECTRICAL & PHYSICAL SPECIFICATIONS

WARNING: For continued protection against shock hazard, connect to properly grounded outlet only. Do not remove the ground prong.

1). Environment

The Model 8186 is operable from 14ºF (-10ºC) to 104ºF(+40ºC), at 10 to 95% relative humidity, non-condensing.

Zero temperature coefficient is 0.3 microvolts/ºC maximum. (electronics only)

Span temperature coefficient is ± 12 PPM/ºC maximum. (electronics only)

2.) Power Requirement

The 8186 is operable upon selection, at 120V, 220V, and 240 VAC, (+10%, -15%), 50Hz to 60Hz. Power consumption is less than 75 watts.

CAUTION: All units shipped for 120V AC operation. Refer to Section 2 for alternate voltage operation.

3.) U.L. & C.S.A. Standards

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

4.) RFI

The Model 8186 is not intended for use in areas where a high concentration of Radio Frequency Interface is expected.

5). Appearance and Dimensions

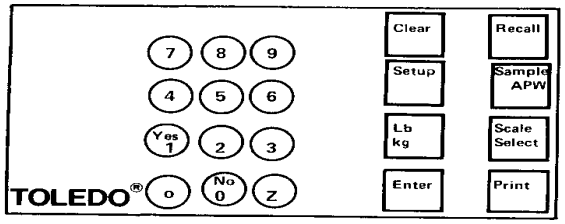
8186 - The Model 8186 is fog white with a flat black base assembly. The unit is 17.8 cm (7.0 in.) tall, X 42.4 cm (16.7 in.) wide, X 47 cm 18.5 in.) deep. The 8186 weighs approximately 20.4 kg (45 lbs).

6). Platter Dimensions -

5 and 10 lb capacities 8'' ( ) x 8'' ( ) Black Plastic. 25, 50 and 100 lb capacities 12'' x 16-1/2" Stainless Steel.

1.5.2 EXTERNAL FUNCTIONS

The 8186 keyboard controls all weighing and printing functions. The keyboard contains 20 keys providing the following functions.



Digits: 0-9

Control Functions: Clear , Recall, Setup Sample, / APW, LB/KG, Scale Select, Enter. Print, Decimal point, Zero.

In addition to the main keys, the ''1'' a and ''0'' are also defined as ''Yes'' and ''No'' keys, to assist in scale programming.

For detailed information on these keys, refer to Section 3, Operating instructions.

1.5.3 DISPLAY FORMAT

The display consists of a 16 character, 5 x 7 dot matrix, alphanumeric display, vacuum fluorescent, with 0.44'' high characters. The display operates in a ''prompting'' mode, where the operator action required is shown on the display. The left-most two digits of the display are used to continuously designate the number of the gross and sample scales. This is especially important in a two scale system.

CONFIGURATION GUIDE

Factory Number	Avoirdupois Indication	Platform Size	Load Cell Capacity
8186-0001`	5 lb x .001 lb	8'' x 8''	4.5 kg
8186-0002	10 lb x .002 lb	8'' x 8''	9.0 kg
8186-0003	25 lb x 0.005 lb	12'' x 16-1/2"	15 kg
8186-0004	50 lb x 0.01 lb	12'' x 16'' -1/2"	30 kg
8186-0005	100 lb x 0.02 lb	12'' x 16 - 1/2"	60 kg

2. INSTALLATION INSTRUCTIONS

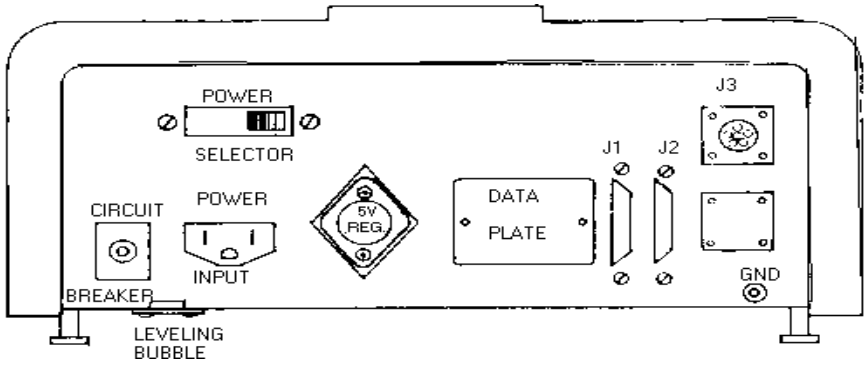
2.1 PRELIMINARY SET-UP

2.1.1 Inspect the outside of the scale for any loose or damaged parts.

2.1.2 Check all internal wiring harnesses form proper connections and that they are securely fastened.

2.1.3 Check the voltage input selection switch to insure that the proper voltage is selected for use in each installation.

CAUTION: All units are shipped for 120 VAC operation. See below for alternate voltage operation.



If the voltage selection switch requires changing, simply loosen the two retaining bracket until the selection switch is in the correct position for the voltage required and tighten the retaining bracket screws. See the figure above for clarification.

2.1.4 Preliminary Calculations

Before connecting the 8186 to an understructure, 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. However, if it is a special build or if it is a conversion of an existing mechanical scale, the microvolt per increment should be calculated. Calculate the microvolts per increment, then check with the chart to make sure the proposed load cell (s) are the correct size.

1). To find the microvolt per increment build, you must first find:

a). Scale capacity
b). Increment size*
c). Number of load cells or total lever ratio
d). Size of load cell (s)*
e). 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.

2). Find the total load cell output in millivolts by multiplying the cell output rating* by the 8186 excitation voltage, 15 volts.

*NOTE: Toledo load cells are 2mV/V. Other types may be 1mV/V, 1.75 m V/V or 3mV/V.

3). Use the formula shown to calculate the microvolt per increment ratio.

$$\frac{\text{Increment Size x total Load Cell Output (mV) x 1000}}{\text{Load Cell Capacity x Number of Cells (or Lever Ratio)}}$$

4). Divide scale capacity by increment size to determine number of increments to be programmed.

5). The Microvolt Chart shows the limits in microvolts for each increment selection.

MICROVOLT CHART

NUMBER OF INCREMENTS	MINIMUM ** uV/INC	MAXIMUM* uV/INC
1000	3	35
1500	2	23.3
2000	1.5	17.5
3000	1.0	11.7
4000	.75	8.8
5000	.6	7
6000	.5	5.8
8000	.37	4.4
10000	.3	3.5
12000	.3	2.9
14000	.3	2.5
15000	.3	2.3
16000	.3	2.2
18000	.3	1.9
20000	.3	1.75

NOTE: *The 8186 may not calibrate to builds that are greater than the voltage shown for maximum uV/Increment.

NOTE: ** The instrument should never be programmed to less than. 3uV/Increment for multiple cell scales (4 or more) and no less than 1.0 uV/Increment for single cell scales. If this limit is exceeded, the scale may not be stable.

2.2 OPERATION PROGRAMMING

This section of the technical manual deals with the programming of all the operating modes and features as well as the self-calibrating procedure. By using the following steps as a guide you will find it a very simple task to program and calibrate this unit. Described under each sample display you will find all of the possible answers that the unit will accept, along with what effect his answer will have on the unit's operation.

2.2.1 NOTES OF INTEREST

When going through the operation programming you will see that by answering the question the unit will automatically proceed to the next question in the sequence. If an incorrect answer is entered and the unit is at
the next question, simply press the PRINT button to return to the previous question. You can now enter the correct answer.

When the SETUP key is pressed, the following sequence of displays will occur.

1). RS232 SCALE? _N

Push:

YES - If the 8186 will be connected to the RS-232 scale, the 8188.

NO - If the 8186 will not be connected to the RS-232 scale.

ENTER - If the answer on the display is the correct one required.

CLEAR- Causes the unit to default to the last question in the sequence, refer to step 66.

NOTE: If Yes is entered for this question, the computer interface portion of the 8186's programming will be automatically set-up. if an 8188 scale is not connected, there will be a flashing error display of ''NO DATA RECVD''. This error display will also occur if the 8188 is not formatted properly. See Section 4. 3 for initial setup for 8188.

SCALE SELECTION

2). GROSS SCALE_ _1

Push:

1 - If the gross scale is to assigned the number one as its address.

2 - If the gross scale is to assigned the number two as its address.

ENTER - If the answer on the display is the correct one required.

CLEAR - Causes the unit to default to the last question In the sequence, refer to step 66.

3). SMPL SCALE _ _1

(Sample Scale)

Push:

1 - If the sample scale is to be assigned the number one as its address.

2 - If the sample scale is to be assigned the number two as its address.

ENTER - If the answer on the display is the correct one required.

CLEAR - Causes the unit to default to the last question in the sequence, refer
step 66.

COUNTING FEATURES

4). INCLUDE SMPL_Y

(This question is only displayed in a two scale system)

Push:

YES - If the sample pieces are to be included in the total piece count.

NO - If the sample pieces are not to be included in the total piece count.

ENTER - If the answer on the display is the correct one required.

CLEAR - Causes the unit to default to the last question in the sequence, refer to step 66.

NOTE: This selection is only used with a two scale system. A one scale system will always include the sample pieces in the total piece count.

5). NORMAL SMPL_ _Y

(Normal Sample)

Push:

YES - If the normal sample mode is to be used.

NO - If the normal sample mode is not to be used.

ENTER - If the answer on the display is the correct one required.

CLEAR - Cause the unit to default to the last question in the sequence, refer to step 66.

NOTE; If YES is entered the unit will automatically skip the next two questions and go to Step 8.

6). SMPL ENHANCE _N

(Sample Enhance)

Push:

YES - If the sample enhance mode is to be used.

NO - If the sample enhance mode is not to be used.

ENTER - If the answer on the display is the correct one required.

CLEAR - Causes the unit to default to the last question in the sequence, refer to step 66.

NOTE: If YES is entered the unit will automatically skip the next question and go to Step 8.

7). SMRT SMPL_ _ _ _ _N

(Smart Sample)

Push:

YES - If the smart sample mode is to be used.

NO - If the smart sample mode is not to be used.

ENTER - If the answer on the display is the correct one required.

CLEAR - Causes the unit to default to the last question in the sequence, refer to step 66.

NOTE: If NO is entered the unit will automatically return to Step 5, as no sample mode has been selected.

REPEAT FEATURES

8). REPEAT TARE_ _N

Push:

YES - If the same tare weight is to be repeated from one count sequence to the next.

NO - If the tare weights are not the same for each count sequence.

ENTER - If the answer on the display is the correct one required.

CLEAR - Causes the unit to default to the last question in the sequence, refer to step 66.

9). REPEAT APW _ _ _N

Push:

YES - If the same average piece weight is to be repeated form one count sequence to the next.

NO - If the average piece weight is not the same for each count sequence.

ENTER - If the answer on the display is the correct one required.

CLEAR - Causes the unit to default to the last question in the sequence, refer to step 66.

10). CONFIGURE ?

At this time the unit is asking if you want to access the configure portion of the set-up routine. This portion is used to initialize or change any of the scales operating parameters.

1. Operation with switch 1-2 ON (SW1-2 is on the CPU PCB)

Push:

YES - The unit will proceed to step 11.

NO - The unit will default to the last question in the sequence, refer to step 66.

ENTER - The unit will default to the last question in the sequence, refer to step 66.

CLEAR - The unit will default to the last question in the sequence, refer to step 66.

2. Operation with switch 1-2 OFF (SW1-2 is on CPC PCB)

Push:

YES - The display will ask for the password to be entered. If the correct password is entered the unit will enter the configure routine and allow changes to be made.

If the incorrect password is entered the unit will default to step 66, and not allow configuration changes to be made.

PASSWORD

11). CHANGE PASSWD ?

(Change Password)

Push:

YES - If the password is to be entered or changed.

NO - If the password is not to be entered or changed, the unit will automatically proceed to step 13.

ENTER - The unit will automatically proceed to step 13.

12). PASSWORD ? _ _ _

At this time a one, two, or three digit password may be entered in the units memory. If a one or two digit number is entered it must be followed by the enter button, if a three digit number is entered the unit will automatically got the next question.

13). APW PC/LB _ _ _ _N

(Average Piece Weight in Pieces per Pound)

Push:

YES - If the average piece weight is to be entered in pieces per pound.

NO - If the average piece weight is to be entered as a decimal value.

ENTER - If the answer on the display is the correct one required.

CLEAR - Causes the unit to default to the last question in the sequence, refer to step 66.

14). MIN SMPL 0

(Minimum Sample)

At this time the unit is asking what percent of the sample scales capacity must be reached before a count sequence may be completed.

The available percentages are 0.0%, 0.1%, 0.2%, and 0.5% of sample scale capacity. When entering this percentage simply push the corresponding one digit number on the numeric keyboard no decimal point is required.

Push:

0 - This is one hundredth percent minimum sample.

1 - This is one tenth percent minimum sample.

2 - This is two tenths percent minimum sample.

5 - This is one half percent minimum sample.

ENTER - If the answer on the display is the correct one required.

CLEAR - Causes the unit to default to the last question in the sequence, refer to step 66.

CALIBRATION

15). CALIB IN LB? Y

(Calibrate in Pounds)

Push:

YES - If the scale or scales are to be calibrated using avoirdupois (LB) test weights.

NO - If the scale or scales are to be calibrated using metric (kg) test weights.

ENTER - If the answer on the display is the correct one required.

CLEAR - Causes the unit to default to the last question in the sequence, refer to step 66.

16). POWER UP LB? _Y

Push:

YES - If the scale or scales are to power up in the LB weighing mode.

NO - If the scale or scales are to power up in the kg weighing mode.

ENTER - If the answer on the display is the correct one required.

CLEAR - Causes the unit to default to the last question in the sequence, refer to step 66.

CALIBRATE SCALE 1

17). CONFIG SC1 ?

(Configure Scale 1)

Push:

YES - The unit goes automatically to the next step and begins the self- calibration procedure for scale 1.

NO - The unit defaults to the first question after the self-calibration procedure (Step 28).

ENTER - The unit defaults to the first question after the self-calibration procedures (step 28).

NOTE: Once the ‘‘configure scale’’ mode has been entered, calibration must be completed before exiting the procedure.

Error Displays

1. A/D #1 MISSING

This error code means that the A/D PCB for scale number 1 is missing, improperly wired, or defective.

18). SC1 CA 100.00

(Scale Capacity)

At this time the unit is asking for the capacity of scale 1. If the capacity displayed is the correct one simply push the ENTER button. If the capacity displayed is NOT the correct one, push the CLEAR button. The display will now read SC1 CA _ _ _ _ _ _. Simply enter in the correct capacity and push the ENTER button.

NOTE: The 8186 should never be programmed for a larger capacity than the scale understructure will allow. Each understructure has a list of standard configurations which should be use to determine how the 8186 is to be programmed.

The 8186 will not calibrate on all possible builds as there a limited number of actual increments which are available. The actual increments are found by dividing the scale capacity by the increment size.

$$\frac{\text{SCALE CAPACITY}}{\text{INCREMENT SIZE}} = \text{ACTUAL INCREMENTS}$$

The following list shows the number of Actual Increments that the 8186 may be configured for.

TOTAL INCREMENTS AVAILABLE

1,000	10,000
1,500	12,000
2,000	14,000
3,000	15,000
4,000	16,000
5,000	18,000
6,000	20,000
8,000	

The 8186 will not calibrate if the Actual Increments are not in the above list.

19). SC1 INC 000.01

(Scale 1 Increment Size)

At this time the unit is asking for the increment size for scale 1. If the increment displayed is the correct one simply push the ENTER button.

If the increment size displayed is not the correct one, push the CLEAR button. The display will now read SC1 INC _ _ _ _ _. Simply enter the correct increment size and push the ENTER button.

NOTE: The 8186 should never be programmed for a smaller increment size than the scale understructure will allow. Each understructure has a list of standard configurations which should be used to determine how the 8186 is to be programmed. The increment size must be a multiple of 1,2, or 5.

20). EMPTY SCA > ENT

(Empty Scale)

At this time remove all material form the scale platform, any weight left on the platform at this time will be initialized in the self-calibration procedure and must be left on the scale platform at all times. After the scale platform is empty push the ENTER button.

21). WAITING 15 SEC

This 15 second waiting period is required to allow the platform to settle to a no-motion condition and for the unit to perform the necessary calculations.

Error Displays

1. IN - MOTION

If a motion condition is present after the first ten seconds the display will change to read IN-MOTION until the motion has stopped. Five seconds after this motion stops, the calculations will be complete and the unit will proceed to the next step.

2. ERROR - RETURN

This error display means that an error has occurred in the self-calibration procedure. Push the ENTER button and the display will return to step 18. The self-calibration procedure will have to be repeated at this time.

22). ADD WGT > ENT

(Add Test Weights)

At this time place test weights, equal to 10% or more* of the scales capacity, onto the platform and push the ENTER button.

* The minimum amount of test weights required is 10% of the scales capacity. However, it is preferable to use test weights equal to 50% or more of the scales capacity
to insure a more accurate calibration.

23). TST WT = ? _ _ _ _

(Test Weights =)

With this question on the display simply enter the amount of test weights that you have placed on the platform.

NOTE: The value entered must be a integer number; that is, it must be a whole number with no decimal points.

EXAMPLE:

Capacity = 100 pounds
Increment Size = .01
Test Weights Added = 50 Pounds

ENTER = 50 : DON NOT ENTER 50.00

Error Display

1). NO FRCT WT > ENT

This error display meats that the number that was entered as the test weight value was not an integer number. Pressing the ENTER button at this time will return the display to TST WT = ?. In put in the correct number and push the ENTER button.

2). NEED MORE WGT

This error display means that you have not met the minimum requirement of test weights. Pressing the ENTER button at this time will return the display to ADD WT > ENT. Add the necessary test weights to reach the minimum.

3). CAPACITY LOW > NET

This error display means that you have programmed an invalid build. Press the ENTER button and reconfigure this scale.

24). WAITING 15 SEC

This 15 second waiting period is required to allow the platform to settle to a no-motion condition and for the unit to perform the necessary calculations.

Error Displays

1). IN-MOTION

If a motion condition is present after the first ten seconds the display will change to read IN-MOTION until the motion has stopped. Five seconds after this motion stops, the calculations will be complete and the unit will proceed to the next step.

2). ERROR-RETURN

This error display means than an error has occurred in the self-calibration procedure. Push the ENTER button and the display will return to step 18. The self-calibration procedure will have to be repeated at this time.

25). EMPTY SCA > ENT

(Empty Scale)

At this time remove the test weights from the platform. After all the test weights have been removed, push the ENTER button.

26). WAITING 15 SEC

This 15 second waiting period is required to allow the platform to settle to a no-motion condition and for the unit to perform the necessary calculations.

Error Displays

1). IN-MOTION

If a motion condition is present after the first ten seconds the display will change to read IN-MOTION until the motion has stopped. Five seconds after this motion stops, the calculations will be complete and the unit will proceed to the next step.

2). ERROR-RETURN

This error display means that an error has occurred in the self-calibration procedure. Push the ENTER button and the display will return to step 18. The self-calibration procedure will have to be repeated at this time.

27). CALIB DONE

(Calibration Done)

This message will appear on the display for approximately one second. This message simply means that the self-calibration procedure is now complete.

28). AZM SCL1 _ _ _ _ _ Y

(Automatic Zero Maintenance for Scale 1)

Push:

YES - If the automatic Zero Maintenance is to operate. The AZM will keep the unit on zero in spite of small changes in weight (0.2 increments per second).

NO - If the Automatic Zero Maintenance is to be disabled.

ENTER - If the answer on the display is the correct one needed.

CLEAR - Causes the unit to default to the last question in the sequence, refer to step 66.

CALIBRATE SCALE 2

29). CONFIG SC2 ?

(Configure Scale 2)

Push:

YES - The unit goes automatically to the next step and begins the self- calibration procedure for scale 2.

NO - The unit defaults to the first question after the self-calibration procedure (step 40). If no second scale is present the unit will default to step 41.

ENTER - The unit defaults to the first question after the self - calibration procedure (step 40). If no second scale is present the unit will default to step 41.

Error Display

1). A/D #2 MISSING

This error code means that the A/D PCB for scale number 2 is missing, improperly wired, or defective.

30. SC2 CA 100.00

(Scale 2 Capacity)

At this time the unit is asking for the capacity of scale 2. If the capacity displayed is the correct one simply push the ENTER button.

If the capacity displayed is NOT the correct one, push the CLEAR button. the display will now read SC2 CA _ _ _ _ _ _. Simply enter in the correct capacity and push the ENTER button.

NOTE: The 8186 should never be programmed for a larger capacity than the scale understructure will allow. Each understructure has a list of standard configurations which should be used to determine how the 8186 is to be programmed.

The 8186 will not calibrate on all possible builds as there are a limited number of actual increments are found by dividing the scale capacity by the increment size.

$$\frac{\text{SCALE CAPACITY}}{\text{INCREMENT SIZE}} = \text{ACTUAL INCREMENTS}$$

The following list shows the number of Actual Increments that the 8186 may be configured for.

TOTAL INCREMENTS AVAILABLE	
1,000	10,000
1,500	12,000
2,000	14,000
3,000	15,000
4,000	16,000
5,000	18,000
6,000	20,000
8,000	

The 8186 will not calibrate if the Actual Increments are not in the above list.

31). SC2 INC 000.01

(Scale 2 Increment Size)

At this time the unit is asking for the increment size for scale 2. If the increments size displayed is the correct one simply push the ENTER button.

If the increment size displayed is NOT the correct one, push the CLEAR button. The display will now read SC2 INC _ _ _ _ _ . Simply enter in the correct increment size and push the ENTER button.

NOTE: The 8186 should never be programmed for a smaller increment size than the scale understructure will allow. Each understructure has a list of standard configurations which should be used to determine how the 8186 is to be programmed. The increments size must be a multiple of 1,2, or 5.

32). EMPTY SCA > ENT

(Empty Scale)

At this time remove all material from the scale platform, any weight left on the platform at this time will be initialized in the self-calibration procedure and must be left on the scale platform at all times. After the scale platform is empty push the ENTER button.

33). WAITING 15 SEC

This 15 second waiting period is required to allow the platform to settle to a no-motion condition and for the unit to perform the necessary calculations.

Error Displays

1). IN-MOTION

If a motion condition is present after the first ten seconds the display will change to read IN-MOTION until the motion has stopped. Five seconds after this motion stops, the calculations will be complete and the unit will proceed to the next step.

2). ERROR-RETURN

This error display means that an error has occurred in the self-calibration procedure will have to be repeated at this time.

34). ADD WGT > ENT

(Add Test Weights)

At this time place test weights, equal to 10% or more* of the scales capacity, onto the platform and push the ENTER button.

* The minimum amount of test weights required is 10% of the scales capacity. However, it is preferable to use test weights equal to 50% or more of the scales capacity to insure a more accurate calibration.

35). TST WT = ? _ _ _ _ _

(Test Weights =)

With this question on the display simply enter the amount of test weight that you have placed on the platform.

NOTE: The value entered must be a integer number; that is, it must be a whole number with no decimal points.

EXAMPLE:
Capacity = 100 pounds
Increment Size = .01
Test Weights Added = 50 Pounds

ENTER = 50 : DO NOT ENTER 50.00

Error Displays

1). NO FRCT WT > ENT

This error display means that the number that was entered as the test weight value was not an integer number. Pressing the ENTER button at this time will return the display to STS WT = ?. Enter in the correct number and push the ENTER button.

2). NEED MORE WGT

This error display means that you have not met the minimum requirement of test weights. Pressing the ENTER button at this time will return the display to ADD WT > ENT. Add the necessary test weights to reach the minimum.

3). CAPCTY LOW > ENT

This error display means that you have programmed an invalid build. Press the ENTER button and reconfigure this scale.

36). WAITING 15 SEC

This 15 second period is required to allow the platform to settle to a no-motion condition and for the unit to perform the necessary calculations.

Error Displays

1). IN-MOTION

If a motion condition is present after the first ten seconds the display will change to read IN-MOTION until the motion has stopped. Five seconds after this motion stops, the calculations will be complete and the unit will proceed to the next step.

2). ERROR-RETURN

This error display means that an error has occurred in the self-calibration procedure. Push the ENTER button and the display will return to step 30. The self-calibration procedure will have to be repeated at this time.

37). EMPTY SCA > ENT

(Empty Scale)

At this time remove the test weights from the platform. After all the test weights have been removed, push the ENTER button.

38). WAITING 15 SEC

This 15 second waiting period is required to allow the platform to settle to a no-motion condition and for the unit to perform the necessary calculations.

Error Displays

1). IN-MOTION

If a motion condition is represent after the first ten seconds the display will change to read IN-MOTION until the motion has stopped. Five seconds after this motion stops, the calculations will be complete an the unit will proceed to the next step.

2). ERROR-RETURN

This error display means that an error has occurred in the self-calibration procedure. Push the ENTER button and the display will return to step 30. The self-calibration procedure will have to be repeated at this time.

39). CALIB DONE

(Calibrate Done)

This message will appear on the display for approximately one second. This message simply means that the self-calibration procedure is now complete.

40). AZM SCL2 _ _ _ _Y

(Automatic Zero Maintenance for Scale 2)

Push:

YES - If a tare weight has to be entered before a count sequence may be completed.

NO - If the Automatic Zero Maintenance is to be disabled.

ENTER - If the answer on the display is the correct one needed.

CLEAR - Causes the unit to default to the last question in the sequence, refer to step 66.

TARE FUNCTIONS

41). TARE ACTIIVE_ _Y

Push:

YES - If a tare weight has to be entered before a count sequence may be completed.

NO - If a tare weight is not required to complete a count sequence.

ENTER - If the answer on the display is the correct one required.

CLEAR - Causes the unit to default to the last question in the sequence, refer to step 66.

42). KEYBRD TARE_ _Y

(Keyboard Tare)

Push:

YES - To allow both a hand entered tare weight, via the keyboard, and the auto tare function to operate.

NO - This will allow only the auto tare function to operate.

ENTER - If the answer on the display is the correct one required.

CLEAR - Causes the unit to default to the last question in the sequence, refer to step 66.

43). LB/KG SW ACT ? Y

(LB,KG Switch Active)

Push:

YES - If the front panel LB/KG button is to be activated. This will allow switching from LB to KG and back again using the front panel key.

NO - If the front panel LB/KG button is to be inactive.

ENTER - If the answer on the display is the correct one required.

CLEAR - Causes the unit to default to the last question in the sequence, refer to step 66.

PRINTER OPTIONS

44). PRNTR ACTIVE _ _ _ _Y

(Printer Active)

Push:

YES - If the printer interface is to be active. This will allow access to all off the programmable features available in the printer interface.

NO - If the printer interface is to be inactive. This will cause the unit to skip all of the printer interface questions, and go to step 57.

ENTER - If the answer on the display is the correct one required.

CLEAR - Causes the unit to default to the last question in the sequence, refer to step 66.

NOTE: If no Serial I/O PCB is installed in the unit the display will be NO PRINTER PCB. Simply press the ENTER button to continue. If a Serial I/O PCB is installed and the display reads NO PRINTER PCB, check the setting of switch 1-1 thru 1-4 on the Serial I/O PCB. If the switches are correct, replace the Serial I/O PCB.

45). PRINTER 0000

At this time enter the model number of the Toledo Scale printer which will be used with this installation. The available model numbers are: 307, 8805, 8806* and 8855.

* The model number ‘‘8800’’ should be entered if the printer is either a model 8810, 8820, or 8830. The model 8804 should be entered as 8806.

NOTE: If other than a Toledo Scale printer is used, it is recommended that the 8186 be programmed for the model 8855 printer.

46). CHKSM ACTIVE_N

(Checksum Active)

The unit is asking if you want a checksum character transmitted along with the outputed data.

Push:

YES - If a checksum character is to be transmitted.

NO - If a checksum character is not to be transmitted.

ENTER - If the answer on the display is the correct one required.

CLEAR - Causes the unit to default to the last question in the sequence, refer to step 66.

NOTE: If a checksum character is transmitted the printer must be programmed to receive this character (see appropriate printer technical manual). The checksum character is defined as the value in (Hex) required to negate the sum of all preceeding characters including STX and CR.

47). BAUD RATE 0000

This is the speed at which the selected information is to be transmitted to the printer. The 8186 printer output is programmable for either 300, 1200, 2400, or 4800 baud.

At this time enter the correct baud rate required for the printer that is to be used.

NOTE: The 300 baud rate is the most commonly used speed for Toledo Scale printers. Refer to the appropriate technical manual for any other possible baud rate combinations.

48). PRNT SNG LN_ _N

(Print Single Line)

Push:

YES: - If the data output is to be in a single line format (see note).

NO - If the data output is to be in a multiple line format.

ENTER - If the answer on the display is the correct one required.

CLEAR - Causes the unit to default to the last question in the sequence, refer to step 66.

NOTE: If you answered YES to the above question, the ‘‘PRINT GROSS’’ (step 49), ‘‘PRINT TARE’’ (step 50) and ‘‘PIRINT NET’’ (step 51) questions will not be asked but a ‘‘PRINT WEIGHT’’ question is asked in their place. The weight printed will be net only or gross if no tare has been taken. This is done because in single line format only three fields may be transmitted. (Also refer to the note under step 54).

49). PRINT GROSS _ _ _N

Print Gross)

Push:

YES - If the gross weight is to be transmitted to the printer.

NO - If the gross weight is not to be transmitted.

ENTER - If the answer on the display is the correct one required.

CLEAR - Causes the unit to default to the last question in the sequence, refer to step 66.

50). PRNT TARE _ _ _ _N

(Print Tare)

Push:

YES - If the tare weight is to be transmitted to the printer.

NO - If the tare weight is not to be transmitted.

ENTER - If the answer on the display is the correct one required.

CLEAR - Causes the unit to default to the last question in the sequence, refer to step 66.

51). PRNT NET _ _ _ _N

(Print Net)

Push:

YES - If the net weight is to be transmitted to the printer.

NO - If the net weight is not to be transmitted.

ENTER - If the answer on the display is the correct one required.

CLEAR - Causes the unit to default to the last question in the sequence, refer to step 66.

52). PRNT APW _ _ _ _N

Push:

YES - If the APW value is to be transmitted to the printer.

NO - If the APW value is not to be transmitted.

ENTER - If the answer on the display is the correct one required.

CLEAR - Causes the unit to default to the last question in the sequence, refer to 66.

53). PRNT COUNTS _ _N

(Print Counts)

Push:

YES - If the piece count is to be transmitted to the printer.

NO - If the piece count is not to be transmitted.

ENTER - If the answer on the display is the correct one required.

CLEAR - Causes the unit to default to the last question in the sequence, refer to step 66.

54). PRT CNT DBW_N

(Print Count Double Width)

Push:

YES - If the piece count is to be transmitted as double width.

NO - If the piece count is to be transmitted as single width.

ENTER - If the answer on the display is the correct one required.

CLEAR - Causes the unit to default to the last question in the sequence, refer to step 66.

NOTE: If the unit is programmed to print single line, only one other field may be programmed to transmit if the piece count is to be double width.

55). AUTOPRINT _ _ _ _N

Push:

YES - If the auto print function is to be active.

NO - If the auto print function is to be inactive.

ENTER - If the answer on the display is the correct one required.

CLEAR - Causes the unit to default to the last question in the sequence, refer to step 66.

The Auto Print function is used in both the printer and the computer interface. It is not possible to have the computer interface programmed for Auto Print without the printer interface being the same way.

56). REPEAT PRINT_Y

Push:

YES - If the repeat print function is to be acitve.

NO - If the repeat print function is to be inactive.

ENTER - If the answer on the display is the correct one required.

CLEAR - Causes the unit to default to the last question in the sequence, refer to step 66.

NOTE: If the Repeat Print function is programmed active, no fields may be changed after a piece count is reached.

COMPUTER OPTIONS

57). COM ACTIVE _ _ _ _N

(Computer Active)

Push:

YES - If the computer interface is to be active. This will allow access to all of the programmable features available in the computer interface.

NO - If the computer interface is to be inactive. This will cause the unit to
skip all of the computer interface questions and go to step 66.

ENTER - If the answer on the display is the correct one required.

CLEAR - Causes the unit to default to the last question in the sequence, refer to step 66.

58). BAUD RATE 0000

This is the speed at which the selected information is to be transmitted to the computer. The 8186 computer output is programmable for either 110, 300, 600, 1200, 2400, 4800, or 9600 baud.

At this time enter the baud rate required for your interface.

59). TRAN GROSS _ _ N

(Transmit Gross)

Push:

YES - If the gross weight is to be transmitted to the computer.

NO - If the gross weight is not to be transmitted.

ENTER - If the answer on the display is the correct one required.

CLEAR - Causes the unit to default to the last question in the sequence, refer to step 66.

60). TRAN TARE _ _ _ _ _N

(Transmit Tare)

Push:

YES - If the tare weight is to be transmitted to the computer.

NO - If the tare weight is not to be transmitted.

ENTER - If the answer on the display is the correct one required.

CLEAR - Causes the unit to default to the last question in the sequence, refer to step 66.

61). TRAN NET _ _ _ _ _ N

(Transmit Net)

Push:

YES - If the net weight is to be transmitted to the computer.

NO - If the net weight is not to be transmitted.

ENTER - If the answer on the display is the correct one required.

CLEAR - Causes the unit to default to the last question in the sequence, refer to step 66.

62). TRAN APW_N

(Transmit Average Piece Weight)

Push:

YES - If the APW value is to be transmitted to the computer.

NO - If the APW value is not to be transmitted.

ENTER - If the answer on the display is the correct one required.

CLEAR - Causes the unit to default to the last question in the sequence, refer to step 66.

63). TRAN COUNT _ _ _ _Y

(Transmit Count)

Push:

YES - If the piece count is to be transmitted to the computer.

NO - If the piece count is not to be transmitted.

ENTER - If the answer on the display is the correct one required.

CLEAR - Causes the unit to default to the last question in the sequence, refer to step 66.

64). APW COM INP_ _Y

(Average Piece Weight Computer Input)

Push:

YES - If the APW value is to be sent from the computer.

NO - If the APW is not to be sent from the computer. This answer will also cause the unit to go to step 66, as tare may not be the only field sent from the computer.

ENTER - If the answer on the display is the correct one required.

CLEAR - Causes the unit to default to the last question in the sequence, refer to step 66.

65). TARE COM INP _ _N

(Tare Computer Input)

Push:

YES - If the tare weight is to be sent from the computer.

NO - If the tare weight is not to be sent from the computer.

ENTER - If the answer on the display is the correct one required.

CLEAR - Causes the unit to default to the last question in the sequence, refer to 66.

66). CHANGES PERM?

(Changes Permanent)

Push:

YES - If the changes that were made during this programming sequence are to be made permanent. These changes are then stored in memory and will remain there during a power failure. The unit then return to its home position.

NO - If the changes that were made during this programming sequence are are temporary changes. these changes are

not stored in memory and will not be maintained during a power failure. The unit then returns to its home position.

CLEAR - This button returns the unit to its home position and resets all changes that were just made back to their original state.

2.3 PROGRAMMING (Use with 8188)

Certain programming selections in the 8188 and 8186 must be chosen or the two units will not communicate properly. The following sections describe the functions that must be selected and the cable used to interconnect the two units.

REQUIRED

1. Serial Interface PCB
   A119497 00A

2. Interconnecting Cable
   123657 00A

*NOTE: There must be a ''U'' revision or newer CPU PCB in the 8186. The part number of this PCB is U119502 00A.

2.3.1 Programming the 8186

Upon entry into the setup mode, the first question asked is ''RS232 SCALE?*. If the 8188 scale is to be connected, answer this first question with a YES. All formatting for connection to the 8188 scale will be done automatically. The 8188 will be designated as Scale 2 and cannot be changed.

Complete the programming for the 8186 then exit the setup routine. The 8186 will flash the display ''NO DATA RECVD'' if the communication fails.

2.3.2 Programming the 8188

The codes listed below are the codes recommended for standard applications. The codes followed by an ''*'' indicate that function may require a different selection depending upon the application and environment. See TM008188 I01 for a complete description of these codes.

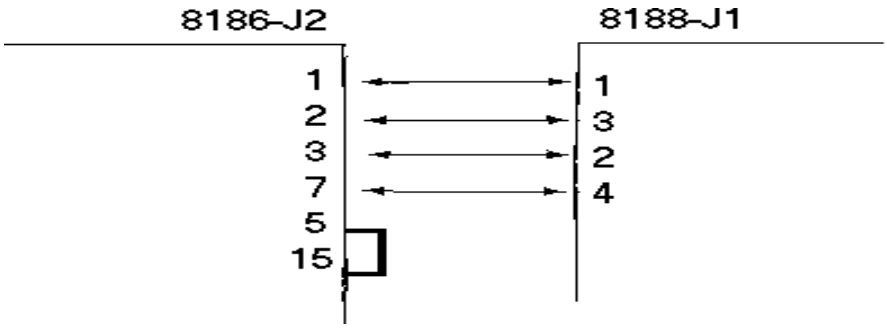
	FUNCTION	CODE
1.	Display Filtering	C111*
2.	Motion Range Selection	C123*
3.	Display Format	C131
4.	Tare Input	C142
5.	Auto Zero Maint.	C151
6.	Auto Ranging	C162
7.	Print Command	C213
8.	Baud Rate	C226
9.	Parity Selection	C233
10.	Weighing Program	C412
12.	Auto Zero Range	C421

After selecting these codes, the programming in the Model 8188 will be complete.

2.3.3 Interconnecting Cable

The part number of this cable is 123657 00A.

The pin configuration is as follows:



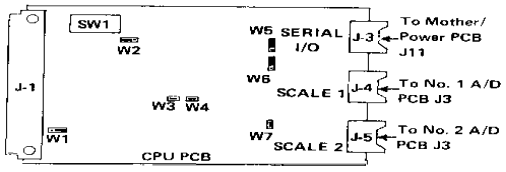
2.4 PCB JUMPER AND PROGRAM SWITCH SUMMARY

This section deals with the jumpers and program switches located on the printed circuit boards (PCB's).

It is important that you check the Technical Manual of the printer (if a printer is to be used) for any program switch settings that may affect the operation or printed format, prior to connecting the model 8186 to the printer.

NOTE: All PCB's are inserted upside down from the position shown in the following diagrams.

2.4.1 CPU PCB



Jacks are keyed at the following positions;

J2 at PIN 4 (Not used)
J3 at PIN 8
J4 at PiN 6
J5 at PIN 6

1). Jumper Settings

W1 - Timing Clock
The jumper must be on pins 2 and 3.

W2 - Rom Select
the jumper must on pins 1 and 2.

W3 - Chip Enable
The jumper must be in place, shorting the two pins.

W4 - Test
The jumper must be in place, shorting the two pins.

W5 - Voltage Select
The jumper must be on pins 1 and 2.

W6 - Ram Select
the jumper must be on pins 1 and 2.

W7 - Store Enable
The jumper must be in place shorting the two pins.

2). Program Switch Settings

SW1-1 - NOT USED-MUST BE OFF

SW1-2 - PASSWORD ENTRY

ON - With this switch in the ON position a password may be initially entered or changed. If no password is required this switch may be left in the ON position.

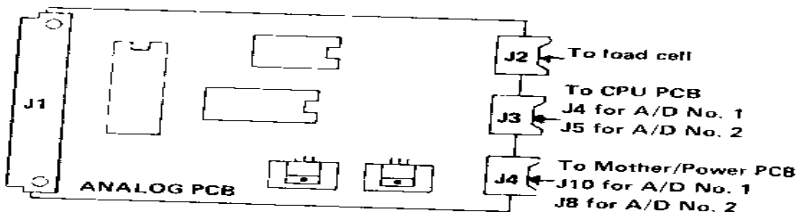
OFF - With this switch in the OFF position, a password MUST be entered before you can gain access to the configure mode via the keyboard.

SW1-3
SW1-4 NOT USED, MUST BE OFF
SW1-5
SW1-6

SW1-7 INTERRUPT SET - THESE
SW1-8 SWITCHES MUST BE ON

SW1-9 NOT USED, MUST BE OFF.

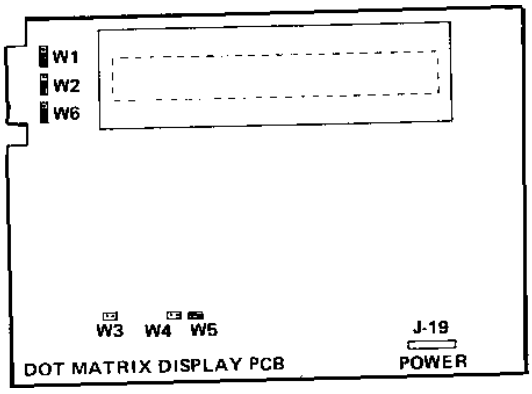
2.4.2 ANALOG PCB



The Analog PCB contains no jumpers or program switches. Jacks are keyed at the following positions;

J2 at PIN 5
J3 at PIN 6
J4 at PIN 9

2.4.3 DOT MATRIX DISPLAY PCB



1). Jumper Settings

W1 - T x D
The jumper must be on pins 2 and 3 (EIA).

W2 - CTS
The jumper must be on pins 2 and 3 (EIA).

W3 - TEST
Used to start the self test feature when the diagnostic harness is installed. Jumper should be out for normal operation.

W4 - EA
This jumper must be out.
Not shorting the pins.

W5 - CS
This jumper must be in place, shorting the two pins.

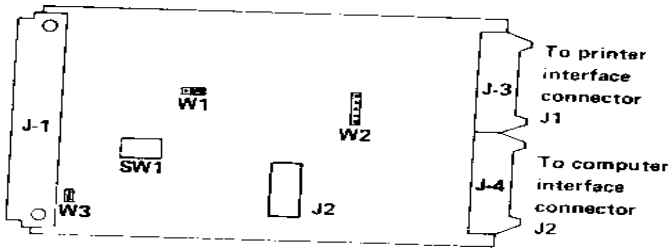
W6 - DSR
The jumper must be on pins 2 and 3 (EIA).

2). Program Switch Settings

The Display PCB contains no program switches.

2.4.4 SERIAL I/O PCB

1). Early Version



Jacks are keyed at the following positions;

J2 at PIN 4
J3 at PIN 1
J4 at PIN 15

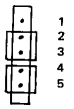
2). Jumper Settings

W1 - Timing Clock
The jumpers must be on pins 2 and 3.

W2 - External Device Interfacing (CTS and DSR)
The jumpers on this plug may be positioned to allow either RS-232-C or 20mA interfacing on the CTS line. The DSR line is not monitored by the 8186 however, a jumper must be installed in one of the two positions. Position the jumpers on W2 as shown for RS-232-C control of CTS via Pin 5 of the J1 output connector. (This configuration is used with all Toledo Scale printers.)

20mA DSR RS-232-C CTS	2-3 4-5

To enable 20mA current loop control of the CTS line via Pins 8 and 10 at the J1 output connector, position the jumpers as shown:



RS-232-C DSR 20mA CTS	1-2 3-4

W3 - RST

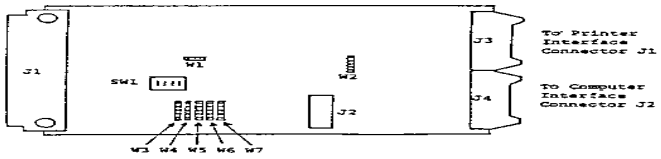
This jumper must be in place, shorting the two pins.

a). Program Switch Settings

This program switch bank is used to set the PCB address number.. These switches must be set as follows.

SW1-1 MUST BE ON SW1-2 MUST BE OFF SW1-3 MUST BE OFF SW1-4 MUST BE OFF

2). Newer Version



Jacks are keyed at the following positions;

J2 at PIN 4
J3 at PIN 1
J4 at PIN 15

a). Jumper Settings

W1 - Timing Clock
The jumpers must be on pins 2 and 3.

W2 - External Device Interfacing (CTS and DSR)

The jumpers on this plug may be positioned to allow either RS-232-C or 20mA interfacing on the CTS line. The DSR line is not monitored by the 8186 however, a jumper must be installed in one of the two positions. Position the jumpers on W2 as shown for RS-232-C control of CTS via Pin 5 of the J1 output connector. (This configuration is used with all Toledo Scale printers.)

20mA DSR RS-232-CTS	2-3 4-5

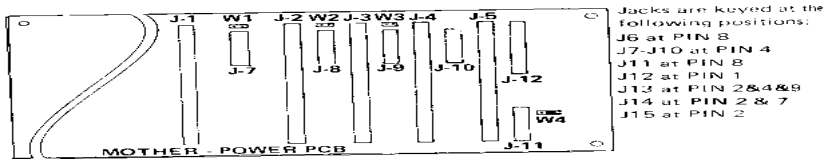
To enable 20mA current loop control of the CTS line via Pins 8 and 10 at the J1 output connector, position the jumpers as shown:

RS-232-C DSR 20mA CTS	1-2 3-4

b). Program Switch Settings

This program switch bank is used to set the PCB address number. These switches must be set as follows:

SW1-1 MUST BE ON SW1-2 MUST BE OFF SW1-3 MUST BE OFF SW1-4 MUST BE OFF



2.4.5 Mother - Power PCB

1). Jumper Settings

These jumpers are not headed at this time and should be OUT.

W4 - R x D
The jumper must be on pins 2 and 3.

2). Program Switch Settings

The Mother - Power PCB contains no program switches.

3. OPERATING INSTRUCTIONS

3.1 OPERATORS PANEL DESCRIPTION

CLEAR - used to clear any inaccurate or erroneous keyboard entry. Two successive depressions will return the display to the ‘‘home position.’’ The scale is now ready for the next counting sequence.

SETUP - used to access the setup routine where the operator can select the gross and sample scales, include sample and program the unit to repeat tare and average piece weight.

LB/KG - used to select pound or kilogram weighing units.

ENTER - used to enter all inputs and for pushbutton tare.

RECALL - used to recall all weight information (APW, Net, Tare and Gross) once a count is attained.

SAMPLE/APW - used to select the mode of piece weight entry.

SCALE SELECT- used to display the weight on either scale platform in a single or dual platform system.

PRINT - used to initiate data output of all programmed weight/count information.

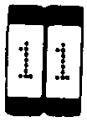
3.2 OPERATING SEQUENCES

3.2.1 Sampling Methods- Three sampling methods can be selected during setup. All three of these methods can be used for counting up, counting down and single scale full counting. The container first two digits of the display are used to designate the number of the gross and sample scale currently being used for the counting sequence. They are labeled ‘‘Gross Scale’’ and ‘‘Sample Scale’’ on the lens.

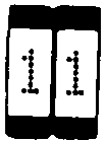
1). Normal Sample

In this mode, sample pieces are counted by hand and added to the platter. The quantity of pieces placed on the scale is input via the keyboard and the enter key pressed.

a). TR? 0.0000 LB
Press the ‘‘ZERO’ key; zero weight is displayed. The triangular annunciators below the number of the gross and sample scale will be illuminated when the scale(s) are on zero.



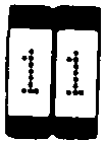
b). SMPL 0.0000 LB
Place empty container on the gross scale; then press ‘‘ENTER’’. If counting down, place full container on gross scale; then press ‘‘ENTER’’.



c). SMPL 0.0136 LB
Depending on the counting mode, add or remove sufficient sample
pieces. Enter the sample quantity via the numeric keyboard,
then press ‘‘ENTER’’.

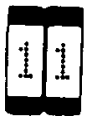
(OR)

d). APW 0.0012 LB



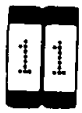
If the average piece weight is known, it is not necessary to use a
sample. Access the APW mode by pressing the ‘‘SAMPLE’’/APW’’ key.
Enter the known value via the numeric keyboard; then press ‘‘ENTER’’.

e). PCS = 0000042



The scale is now ready to count. Count up or count down until the
desired quantity has been reached.

f). PCS 0000000

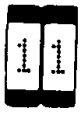


The count can be reset to zero, by prssing the ''ENTER'' key.

2). Smart Sample

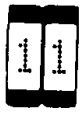
In this sample mode, the operator is prompted to place five pieces on the sample platform. The enter key is then pressed, and the scale will advise the operator how many additional sample pieces are required to reach the pre-selected minimum sample weight. Simply add these pieces to the platform and press enter. (If more or less than five pieces are added to the platform, input the number via the keyboard and press enter). The scale will now display the count.

a). TR? 0.0000 LB



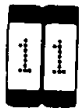
Press the ''Zero'' key; weight displayed. The triangular annunciators below the number of the gross and sample scale will be illuminated when the scale(s) are on zero.

b). SMP5 0.0000 LB



Place empty container on the gross scale; then press ''ENTER''. If counting down, place full container on the scale; then press ''ENTER''.

c). SMP5 0.0026 LB

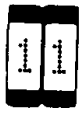


Depending on the counting mode, add or remove five sample pieces.

d). SMPL 000011 PCS

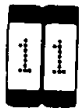
Press the ''ENTER'' key. The display will indicate the number of additional pieces required to reach the preset minimum sample weight.

e). PCS = 0000016



Depending on the counting mode, add or remove the displayed sample quantity; then press ''ENTER''.

f). PCS =0000000



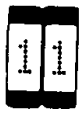
The count can be reset to zero by pressing the ''ENTER'' key.

3). Sample Enhancement

In this sample mode, it is possible for the operator to continually update the average piece weight based on larger and larger samples. A minimum average piece weight of ten internal counts is required in order to utilize this sampling method. If the APW is below ten counts the message ''CANT ENHANCE'' will appear and the system will default to the smart sample method.

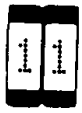
Pressing the enter key at any time during the sequence will cause the APW to be updated based on the current number of pieces on the scale.

a). TR? 0.0000 LB



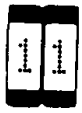
Press the ''Zero'' key; zero weight displayed. The triangular annunciators below the number of the gross and sample scale will be illuminated when the scale(s) are on zero.

b). SMP5 0.0000 LB



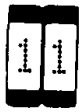
Place empty container on gross scale; then press ''ENTER''. If counting down, place full container on gross scale; then press ''ENTER''.

c). SMP5 0.0037 LB



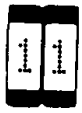
Depending on the counting mode, add or remove sample pieces.

d). SMPL 0000010



Enter the sample quantity via the numeric keyboard; then press ''ENTER'' (if 5 sample pieces are used, simply press ''ENTER'').

e). SMPL 0000017



The displayed numeric value indicates the current count. Continue to add/remove sample pieces to obtain a sufficient sample, and press ''ENTER''. When a sufficient sample is reached the SMPL indication will change to PCS.

f). PCS = 0000025

A sample weight equal to the previously programmed percentage of sample scale capacity has been reached. The scale is now in the counting mode.

g). ENHCD 0000034

The scale is now in the counting mode. (Single Scale System only.) As additional pieces are added/ removed, the average piece wieght can be recalculated (enhanced) by pressing the ''ENTER'' key. The ''ENHCD'' message will flash briefly and then the count display will return. NOTE: When operating in this mode, excessively large/ small weight changes inhibit the enhancement feature. When this occurs, the operator will be prompted via displayed message to decrease (DECR) or increase (INCR) the piece quantity to an accepted level.

INCR 0000035

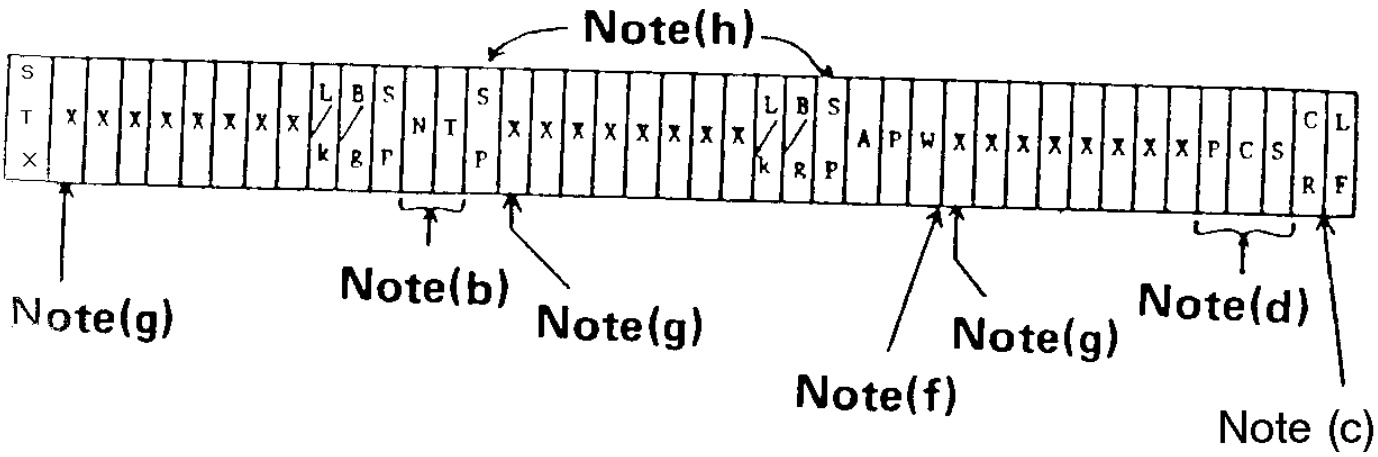
4. INTERFACE SPECIFICATIONS

4.1 PRINTER OUTPUT FORMATS

4.1.1 Single Line Print

Any three of the possible 5 fields of information may be selected to print in a single line format.

Format Example:



NOTES:

a). Leading zeros for all selected fields are not transmitted, however a space is sent in its place.

b). If programmed active, the checksum character is transmitted after the CR and before the LF characters.

c). All field lengths are shown including a decimal point.

d). If Pieces are printed double width a shift out character (HEX OE) is added.

e). The first character in all fields is used for the minus sign. If the field is a positive value a space is sent not a plus sign.

f). If the unit is programmed for power up kg, these spaces will not be transmitted.

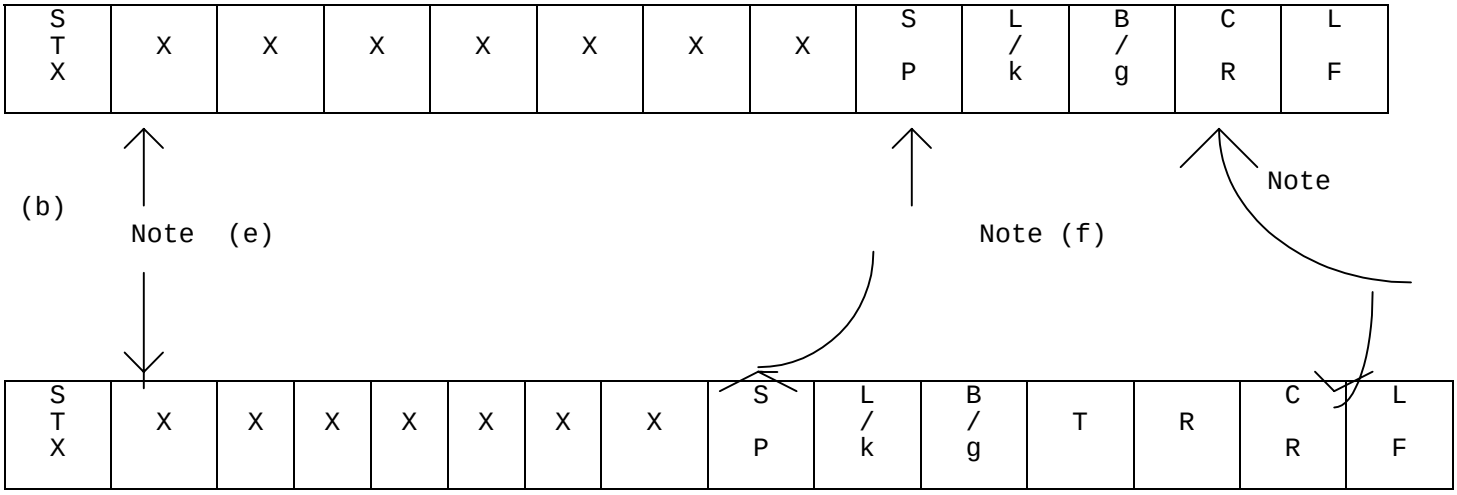
g). The first character in all fields is used for the minus sign. If the field Is a positive value a space is sent not a plus sign.

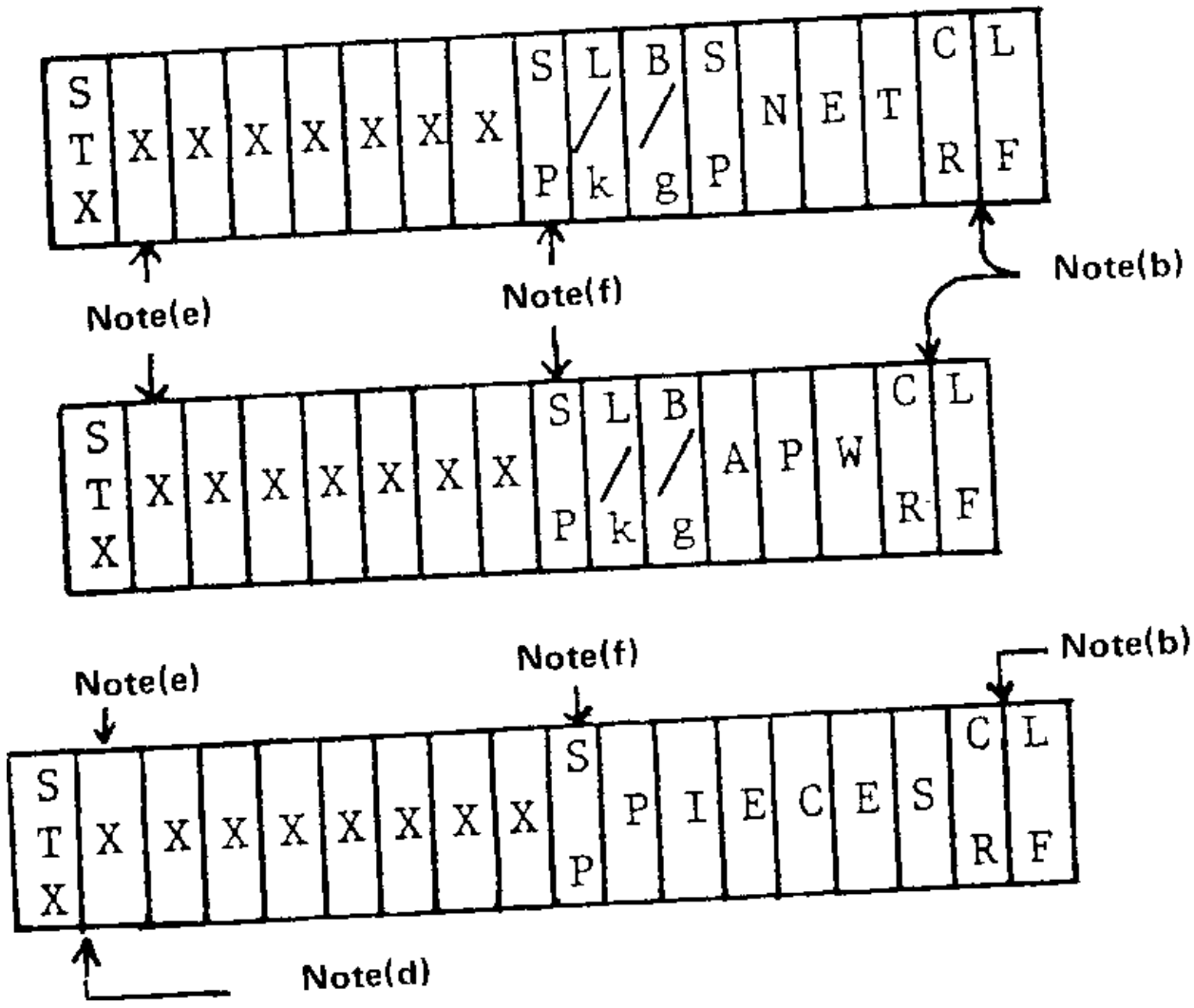
h). SP is the abbreviation for a space.

4.1.2 Multiple Line Print

Any or all of the possible 5 fields of information may be selected to print in a multiple line format. Pieces may be programmed as double width.

Format Example:


STX
X
X
X
X
X
X
X
SP
L/k
B/g
CR
LF
(b)
Note (e)
Note (f)
Note
STX
X
X
X
X
X
X
X
SP
L/k
B/g
T
R
CR
LF


STX
X
X
X
X
X
X
X
SP
L/k
B/g
SP
NET
CR
LF
Note(e)
Note(f)
Note(b)
STX
X
X
X
X
X
X
X
SP
L/k
B/g
APW
CR
LF
Note(e)
Note(f)
Note(b)
STX
X
X
X
X
X
X
X
X
SP
PIECES
CR
LF
Note(d)

NOTES:

a). Leading zeros for all selected fields are not transmitted, however a space is sent in its place.

b). If programmed active, the checksum character is transmitted after the CR and before the LF characters.

c). All field lengths are shown including a decimal point.

d). If Pieces are printed double width a shift out character (HEX OE) is added.

e). The first character in all fields is used for the minus sign. If the field is a positive value a space is sent not a plus sign.

f). If unit is programmed for power up kg, these spaces will not be transmitted.

4.2 COMPUTER INTERFACE

This section deals only with the computer interface portion of the 8186 and is intended to be used as a guide for the system programmer.

4.2.1 Data Format

The 8186 data format is as follows:

- The transmit rate is selectable, in the Set-up mode, for either 110, 300, 600, 1200, 2400, 4800, or 9600 baud rate.

- All data is transmitted as bit serial, ASCII coded, via a 20 milliamp current loop or RS232C.

- All data fields are a fixed length of 9 characters and are separated with a field separator character (Hex 1C). Each field includes a sign*, 6 digits, a decimal point and a one digit field indentified**. APW does not include a sign but the weight field is increased to 7 digits. Count weight field does not include a decimal point but is increased to 7 digits.

  **The field identifiers are as follows:

  G=Gross
  T=Tare
  N=Net
  A=Average Piece Weight or P = Piece Per Pound
  C=Count

- All transmissions sent from and received by the 8186 must have a Block Check Character (BCC) as the last character in the data string. The BCC is defined as the exclusive or (XOR) sum of all characters preceding the BCC character excluding the initial STX character.

4.2.2 Communication Modes

There are two types of modes available with the 8186. The first type being the data Output Mode. This is used only when the transaction results are to be transmitted to the computer for processing. The second type is the interactive Mode. This is used when the computer is to transmit tare and APW or APW only to the 8186 for a particular transaction. The following is a more detailed description of these two modes.

4.2.3 Data Output Mode

Gross weight, tare weight, net weight, average piece weight and count can all be selected to output via the keyboard. A 2 digit status word is sent at the beginning of each message that designates a) the number of times the message has been sent (note: this is normally an ‘‘l’’ and, b) the unit of measurement - L for pounds, K for kg. Weight units are constant throughout a single transaction. When all data fields are sent, the message format is as follows:

STX/1L/b123.456G*bb23,456T*b100.00N*0.002468A*bbb40519C*ETX/BCC

STX = start of text character
1L = status word (first transmission, pounds)
b = space
* = field separator (ASCII 1C) designates a field separator
/ = used for clarity, but is not in the message
EXT = end of text character
BCC = block check character
RS232C handshakes are utilized. The hardware line ‘‘RTS’’ (Requested to send) is made true by the 8186 when a non zero count, with no motion, is displayed and the print button is pressed or, if autoprint is selected. The computer makes the CTS (clear to send) line true and the data is transmitted by the 8186 to the computer. The computer responds ‘‘ACK’’ (acknowledge) if a successful transmission has been completed, and the 8186 data register is then cleared. If the computer responds ‘‘NAK’’ (negative acknowledgment) or no response is received within 2 seconds, the message was not received . The 8186 will then retransmit a second message. If a ‘‘NAK’’ or no response is received in several seconds the 8186 will briefly display an error message ‘‘COM IF ERROR’’ for 2 seconds. The 8186 display will then return to count and the data should be recorded manually.

The system is functional in 20mA current loop by installing a jumper between the ‘‘RTS’’ and ‘‘CTS’’ lines at the rear connector J2. See Computer I/O Serial Connector Chart for correct pin numbers.

4.2.4 Interactive Mode

In this mode it is assumed that the 8186 is located near a computer terminal, and that several fields of identification data (i.e. part number, location code, operator code, customer number, etc.) are entered on the terminal’s keyboard. The terminal will loop up tare and APW, or just APW for that particular transaction and send the information to the 8186. The scale will then display the count and transmit the count and weight to the computer in the same format as described in the data output mode when the print key is pressed or, if autoprint is selected, as soon as a stable count is displayed.

The computer must transfer the tare and APW in the following format:

STX/1L/0023.456T*0.002368AETX/BCC

STX = start of text character
1L = status word (first transmission, pounds)
b = space
* = field separator (ASCII 1C) designates a field separator
/ = used for clarity, but is not in the message
EXT = end of text character
BCC = block check character

NOTE: If pieces per pound is selected, the computer must send seven digit field plus a decimal point followed by the identifier ‘‘A’’. The software handshakes used in this mode are as follows:

''ENQ'' = Enquire (ASCII HEX 05)
''X ON'' = Transmit On (ASCII HEX 11)
''X OFF'' = Transmit Off (ASCII HEX 13)

The computer must set the CTS true, and then send ''ENQ'' to the 8186.
When the 8186 receives ''ENQ'', it sends ''X ON''. The computer then sends the data in the defined format. After the data is successfully received sends ''NAK''. If good data is not received in approximately two seconds, the 8186 displays ''NO DATA RECVD'' for two seconds then returns to the manual mode.

The 8186 will only react to ''ENQ'' when it is in the correct mode, and if it receives an ''STX'' within 2 seconds after it sends ''X ON.'' The 8186 must be programmed to receive tare/ APW from the computer and be in the home position (TR?).

5. PREVENTIVE MAINTENANCE

The Model 8186 is designed to require a minimum of maintenance and service. This section provides instructions and procedures for the maintenance of this unit, as well as a troubleshooting guide to aid in problem analysis.

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

5.1 REQUIRED TOOLS AND SUPPLIES

The following items are recommended for maintenance and repairs of the unit. Common hand tools are also required.

Volt - Ohm Meter
Load Cell Simulator (Pin 100865 00A)
Cleaning Cloth
Static Bags
Static Wrist Strap

5.2 MAINTENANCE SCHEDULE

The frequency at which normal maintenance (cleaning and inspection) should be performed, is twice a year.

5.3 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.

5.4 TROUBLESHOOTING

5.4.1 Procedure

1). If operational difficulties are encountered, obtain as much information as possible regarding the particular trouble, 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 connections, power supply connections or fuse failure.

3) Use the electrical interconnecting diagram as an aid to locating trouble causes. This 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 then observing whether the problem is corrected . WHEN HANDLING A PCB, USE A STATIC BAG FOR BOTH THE NEW AND DEFECTIVE PCB. When replacing a suspected faulty PCB, do not program the replacement PCB from the original one as the malfunction may be caused by a programming error. Use the proper technical manual to determine in what position the switches and/or jumpers should be.

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 subassemblies are available from your authorized Toledo Scale representative.

5.4.2 Error Codes

Various errors can be displayed by the 8186 if a failure is detected. The following descriptions will help identify the error and possible solutions.

NOTE: Before replacing any PCB's verify that all voltages are correct and that all harnesses are seated properly.

1). NOV ROM ERROR
This indicates a non-volatile rom error on the CPU PCB. Power the unit down then back on and try to recalibrate the scale (s). If the error occurs again, replace the CPU PCB.

2). EE ROM ERROR
This is a hard error and the CPU PCB should be replaced.

3). TRANSMISSION ERROR

This indicates a communication error between the Display and CPU PCB's . Power down and then retry the sequence of operation. If the error recurs, the problem will be in either the Display, CPU or Mother PCB.

NOTE: Running the display diagnostic routine should determine whether or not the problem is caused by the Display PCB.

4). PROCESSOR ERROR

This indicates an error in the Display PCB operation. Power down and then retry the sequence of operation. If the error recurs, the problem should be either the Display PCB or CPU PCB.

NOTE: Running the display diagnostic routine should determine whether or not the problem is caused by the Display PCB.

5). NO DATA RECVD

This shows that the computer interface port J2 did not receive any data within its time limit or that the data was not formatted correctly.

6). COM IF ERROR

This computer interface error shows that the device connected to the computer port J2 did not respond properly after data transmission from the 8186.

7). SC1- - - ---LB

When six minus signs are displayed on the 8186, it indicates that the scale is under zero.

8). SC1++++++LB

When six plus signs are shown on the display, it indicates that the scale is over capacity.

9). @@@@@@@@@@@@@@@@

This indicates no communication between the Display and CPU PCB's. Power down and then retry operation. If the error recurs, the problem will be in either the Display PCB, CPU PCB or Mother PCB.

NOTE: Running the display diagnostic routine should determine whether or not the problem is caused by the Display PCB.

10). PCS = ++++++

Indicates the 8186 has either gone over capacity in the piece count mode or has exceeded seven digits of piece count.

11). A/D #1 MISSING

This means the A/D PCB for scale number 1 is missing, defective or improperly wired.

12). NO PRINTER PCB

This indicates that the Serial I/O PCB is missing, defective or improperly wired. Verify switch settings of SW1 on the Serial I/O PCB.

13). NO FRCT > ENT

This error display means that the number that was entered as the test weight value was not an integer number. Pressing the ENTER button at this time will return the display to TST WT = ?. Input in the correct number and push the ENTER button.

14). NEED MORE WGT

This error display means that you have not met the minimum requirement of test weight for calibration. Pressing the ENTER button at this time will return the display to ADD WT>ENT. Add the necessary test weights to reach the minimum.

15). CAPCTY LOW > ENT

This error display means that you have programmed an invalid build. Press the ENTER button and reconfigure the scale.

16). ERROR-RETURN

This error display means that an error has occurred in the self-calibration procedure. Push the ENTER button and the display will return to the self-calibration procedure to be repeated.

17). IN MOTION

If a motion condition is present after the first ten seconds of calibration the display will change to read IN-MOTION

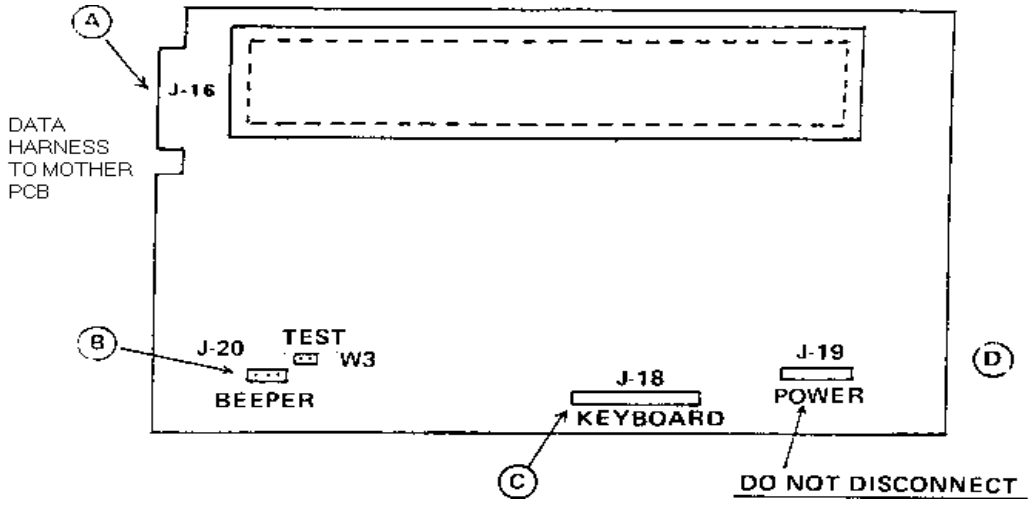
until the motion has stopped. Five seconds after this motion stops, the calculations will be complete and the unit will proceed tot the next step.

5.4.3 Display Diagnostic KOP

There is a diagnostic kit to test the Display PCB in the 8186. The Toledo part number is 08122 020. To use the self test kit, use the following steps.

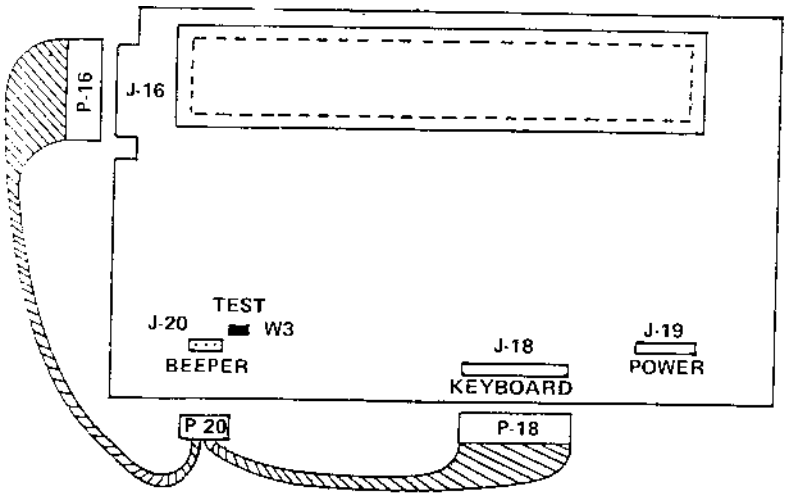
1). Remove power from the scale. Remove Display PCB from cover.

2). Disconnect the harness to the Mother PCB A, the harness to the beeper



B and the keyboard harness C. Leave the power harness D connected.

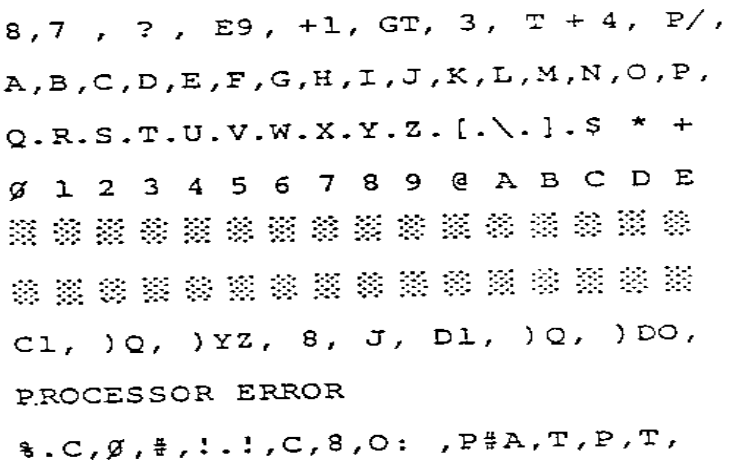
3). Connect the self test harness and install the jumper supplied on the two pins labeled " TEST" (W3) as shown.



NOTE: Make certain the Display PCB will not short to any conductive materials before applying power.

4). Apply power to the scale. The display PCB will now step through a self test routine.

The normal display sequence will be as follows:



If there are any other displays during the sequence that flash on and off, they indicate an error and the Display PCB should be replaced.

5.5 RECOMMENDED SPARE PARTS

5.5.1 A recommended list of spare parts consists of the following items.

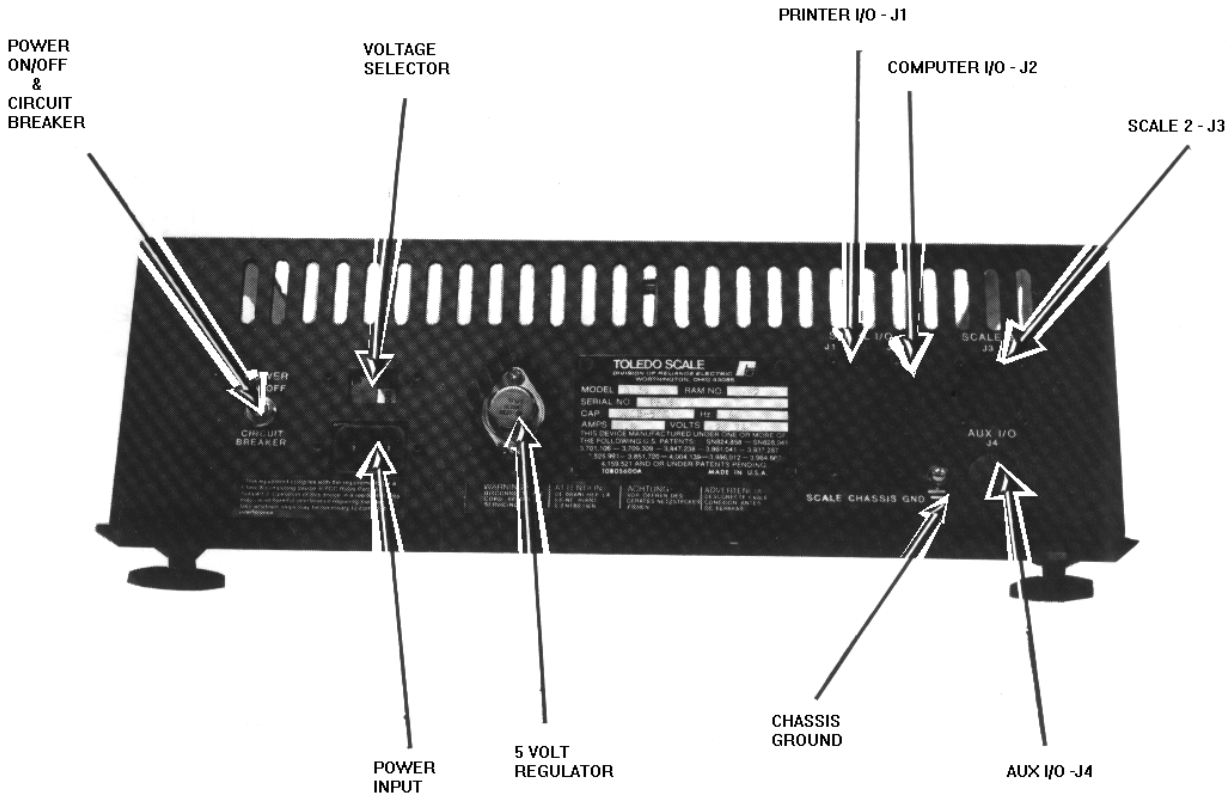
Qty.	Part Number	Description
1	V118502 00A	CPU PCB
1	118504 00A	Analog PCB
1	A118509 00A	Mother-Power PCB
1	C118511 00A	Serial I/O PCB
1	H114150 00A	Dot Matrix Display PCB

5.5.2 Optional Kit of Parts

External Scale KOP 110496 00A
Data I/O KOP 119497 00A

In addition to these items, it is also recommended that a parts catalog also be ordered so that items not listed may be properly identified. The part number for the parts catalog is PC 008186 I01.

6. INPUT/OUTPUT CONNECTIONS

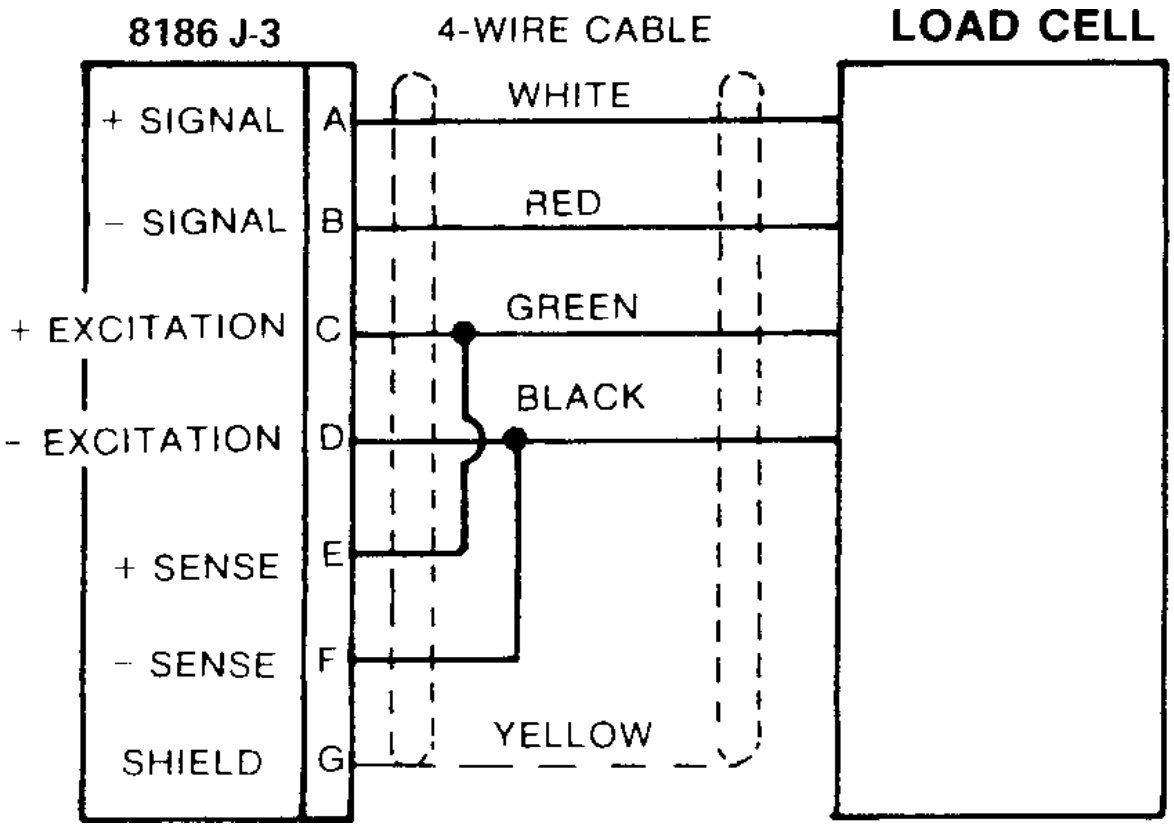


6.1 LOAD CELL CONNECTIONS

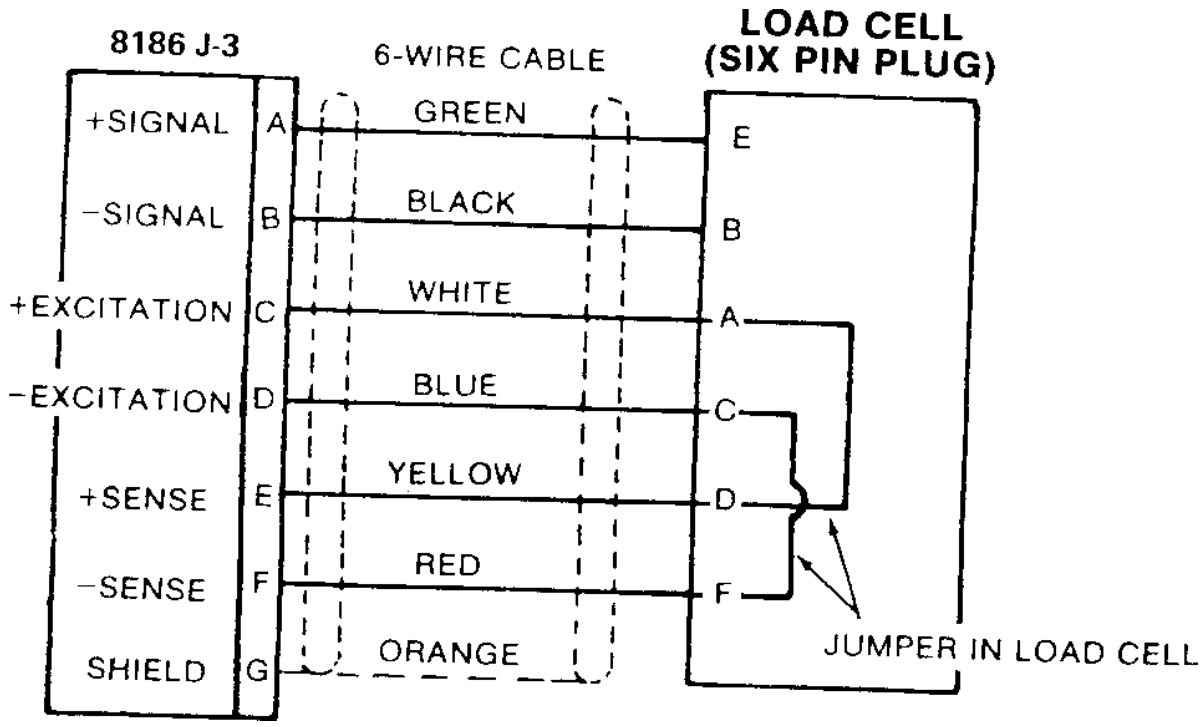
LOAD CELL CONNECTOR TABLE 7 PIN CONNECTOR - J3	
PIN	
A	+ SIGNAL
B	- SIGNAL
C	+ EXCITATION
D	- EXCITATION
E	+ SENSE
F	- SENSE
G	SHIELD

TYPICAL LOAD CELL WIRING CONNECTIONS

This arrangement is typical for a single load cell system connected directly tot the Model 8186 (no junction box).

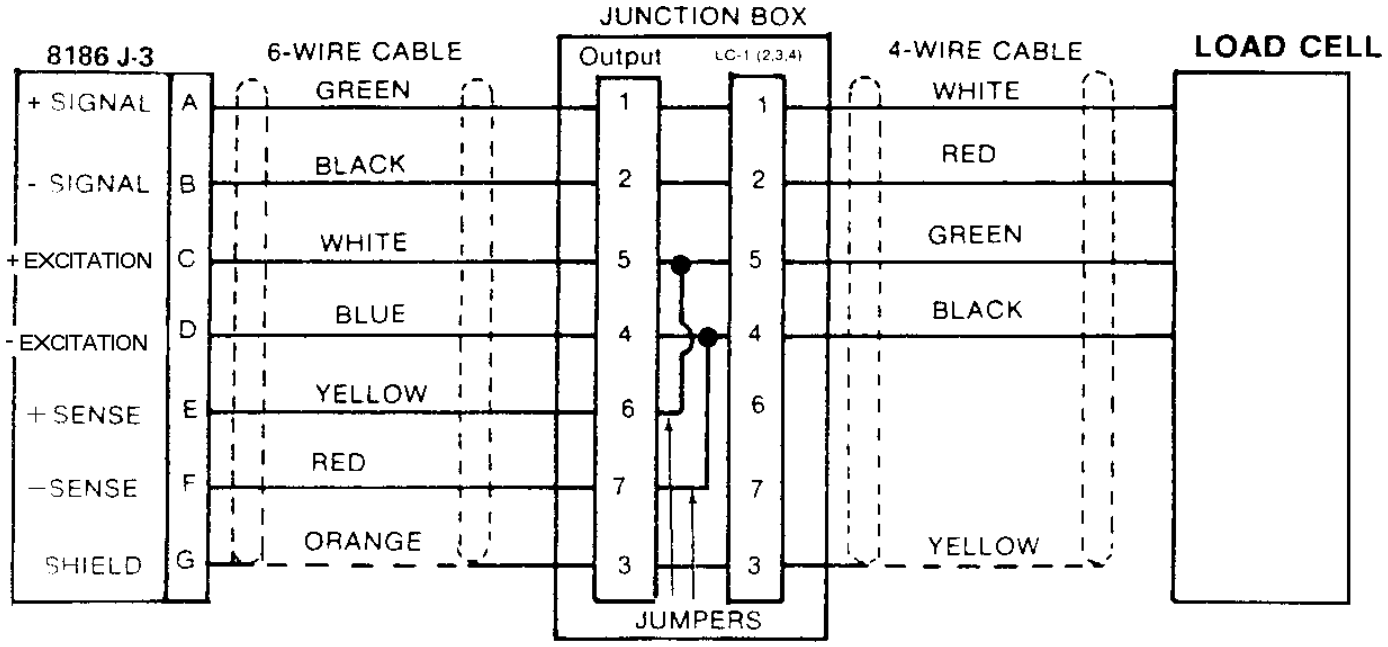


SINGLE 4 WIRE CELL CONNECTED DIRECTLY TO INSTRUMENT



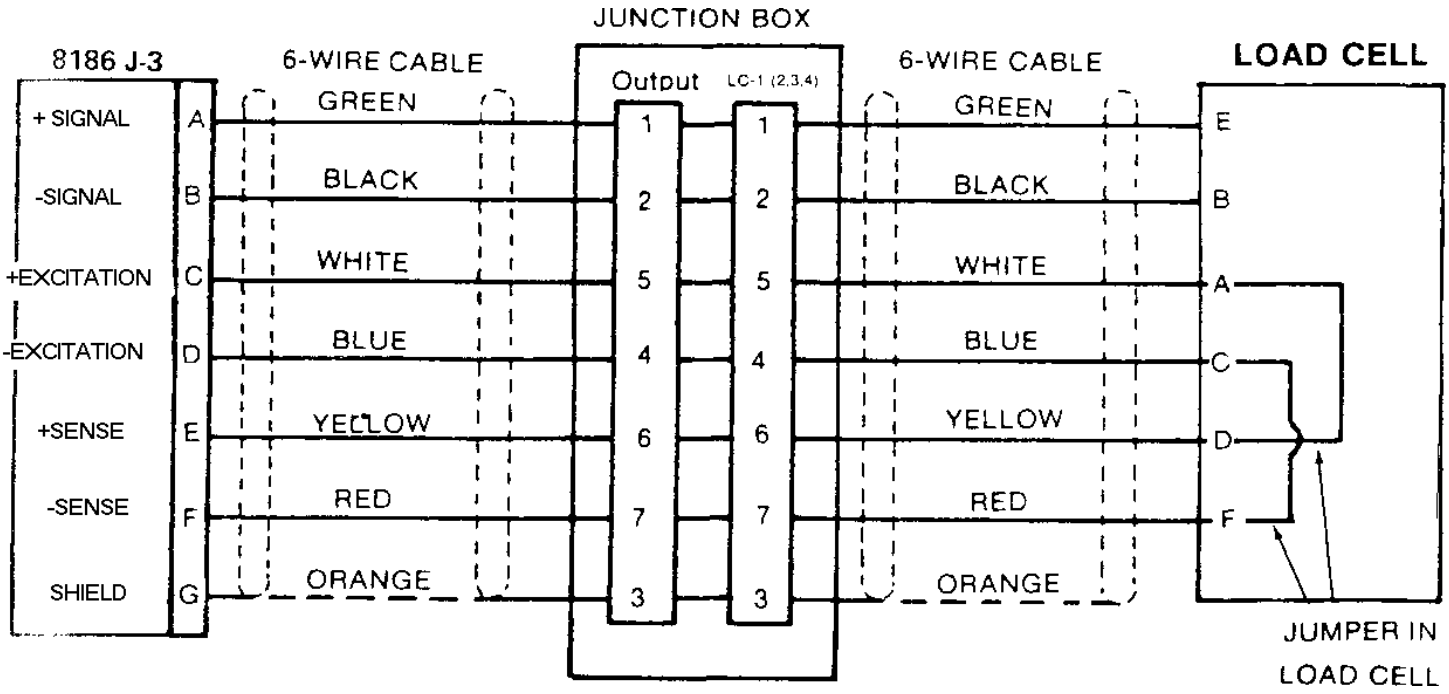
SINGLE 6 WIRE CELL CONNECTED DIRECTLY TO INSTRUMENT

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



4 WIRE LOAD CELL(S) WITH JUNCTION BOX

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.



6 WIRE LOAD CELL (S) WITH JUNCTION BOX

TYPICAL 20 MILLIAMP LOOP CONNECTIONS WHEN USED WITH TOLEDO SCALE PRINTERS

6.2 PRINTER I/O SERIAL CONNECTIONS - J1

Signal Name	301 307 J9	8805 J1	8804■ 8806 J7	8820 8830 J25	8855 J1

Chassis Ground	*	*	*	*	*
TxD (RS-232-C)					
RxD (RS-232-C)					
RTS (RS-232-C)					
CTS (RS-232-C)					
DSR (RS-232-C)					
Logic Ground					
20mA Receive + (Aux.)		24	11	15	
20mA transmit -	6	26	16	16	3
20mA Receive - (Aux.)		19	22	14	
Not Used					
Not Used					
Not Used					
20mA Transmit +					
20mA Supply (+12 VDC)					
20mA Receive +					
20mA Supply (--12 VDC)					
20mA Receive --					
Logic Ground					
DTR (RS-232-C)					
20mA Supply (-12 VDC)					
Logic Ground	7	28	18	18	22
Logic Ground					
Not Used					
Not Used					
Jumper shown is in printer end of interconnecting cable.			12 23	9 19	

△ Jumper is in 8186 end of interconnecting cable
* Denotes shield connection.
■ Must use 127358 00A Adaptor Plug included with 8804.

NOTE: Data transmitted from the printer port is 11 bit ASCII coded -- one start bit, seven data bits, one even parity bit and two stop bits.

8186 INTERCONNECTING CABLES

PRINTER	LENGTH	PART NO.
301/307	6′ 20	1119714 00A A119716 00A
8805	6′ 20	A119716 00A A110717 00A
8804* 8806	6′ 20′	A115544 00A A115545 00A
8820/8830	6′ 20′	A110720 00A A110721 00A

8855	6′ 20	AA110722 00A A110723 00A

* Using Adapter #127358 00A included with 8804.

6.3 COMPUTER I/O SERIAL CONNECTIONS-J2

SIGNAL NAME	8186-J2
*	1
Transmit Data (RS232C)	2
Receive Data (RS232C)	3
RTS (RS232C) (Output)	4]**
CTS (RS232C) (Input)	5]
DSR (RS232C) (Input)	6
Signal Ground	7
*	8
20mA Transmit--	9
*	10
*	11
*	12
*	13
20mA Transmit+	14
20mA Transmit Supply (!12VDC)	15
20mA Receive)	16
20mA Receive Supply (-12VDC)	17
20mA Receive-	18
Signal Ground	19
DTR (RS232C) (Output)	20
*	21
Signal Ground	22
*	23
*	24
*	25

* - Pin number not used at this time.
** - This jumper should be installed if computer output is to be 20mA current loop only.

The following table should be used as a distance reference, when connecting an 8186 to a printer or computer. All distances are expressed in feet.

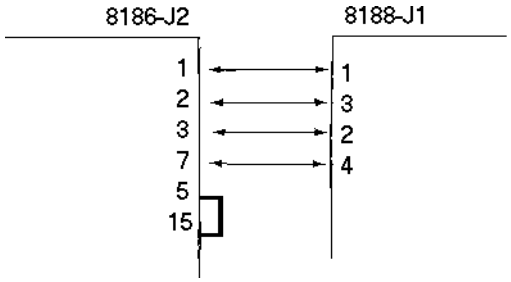
BAUD RATE	RS 232C	20mA
*110 300 *600 1200 2400 4800 *9600	50′	1000′

* Computer interface only, not available in the printer interface.

Interconnecting Cable For 8188

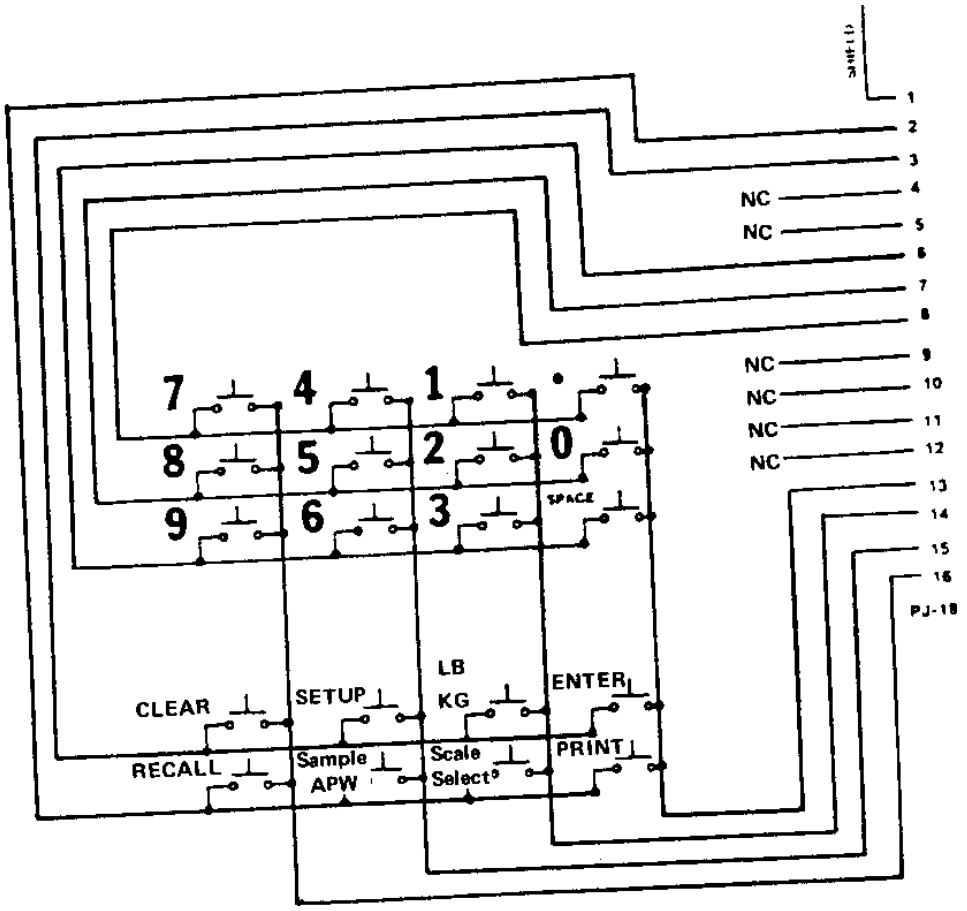
The part number of this cable is 123657 00A

The pin configuration is as follows:



7. DRAWINGS

7.1 KEYBOARD DETAIL



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