Cardinal®
DETECTO

CN20 Series
Weight Indicating
Instruments
Technical Manual

CN20 Digital Weight Indicating Instrument

Congratulations on your purchase of a series CN20 Digital Weight Indicating Instrument. This instrument, which has been designed and manufactured in the U.S.A., incorporates the latest digital technology and includes features that were unavailable only a short time ago. With reasonable care your CN20 should provide years of accurate weight measurements.

The series CN20 is housed in an injection-molded polycarbonate enclosure and may be mounted on a scale column or on a wall or desktop. The instrument is available with either a red LED display or a high-contrast LCD display. Although the basic weight indicating instrument is designed to operate from batteries, optional plug-in power supplies are available for 115 VAC or 230 VAC.

The CN20 keyboard allows the operator to lock the weight display as well as review and change operational parameters including sample rate, filtering, auto shutoff and sleep mode.

This manual is provided to serve as your guide to the installation, operation and maintenance of your new weight indicating instrument. Please take the time to read this manual before attempting to install or operate your CN20.

FCC COMPLIANCE STATEMENT
WARNING! This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instructions in this manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference.

You may find the booklet "How to Identify and Resolve Radio TV Interference Problems" prepared by the Federal Communications Commission helpful. It is available from the U.S. Government Printing Office, Washington, D.C. 20402. Stock No. 001-000-00315-4.

TABLE OF CONTENTS

PRECAUTIONS
Before using this instrument, read this manual and pay special attention to all "WARNING" symbols:
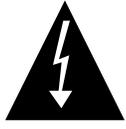
⚠ IMPORTANT   ⚡ ELECTRICAL WARNING

SERIAL NUMBER _____
DATE OF PURCHASE _____
PURCHASED FROM _____
_____
_____

RETAIN THIS INFORMATION FOR FUTURE USE

SPECIFICATIONS

Power Requirements: 12 VDC, 300ma Optional Power Supply

Operating Temperature: 14°F (-10°C) to 104°F (40°C)

Display: 4 ea. 0.7" 7-Segment High-Contrast LCD (CN20L)
or: 0.56" 7-Segment Red LED (CN20E)

Sensitivity: 1.5 uV/Graduation (0 - 3 mV/V input)

Load Cell Excitation: 5.0 VDC

Maximum Load Cell Cable Length: 30'

Capacities: 1,000 - 9,999 Displayed Graduations

Resolution: 1 part in 9,999 Displayed
1 part in 40,000 Internal

Graduation Value: 1, 2 or 5 x 1, .1, .01, .001

Sample Rate: 1 - 12 Samples Per Second Selectable

Auto Zero Range: 0.5, 1 or 3 Graduations

Manual Zero Range: 4% Capacity or Full Capacity

Weight: **(Without Batteries)**   1.3 lb (.06 kg)
           (With Batteries)   3.2 lb (1.5 kg)

Dimensions: 9 $\frac{1}{8}$" W x 5" H x 3" D

Sleep Mode: Selectable power save mode with automatic activation from 1 - 9 minutes if at zero without motion.

Options: AC Plug-in Power Modules for Operation from either 115 VAC or 230 VAC
Full Numeric Keypad (CN20LT)

Specifications subject to change without notice.

INSTALLATION

Before beginning installation of your CN20 weight indicator, make certain that the instrument has been received in good condition. Carefully remove the instrument from the shipping carton and inspect it for any evidence of damage that may have taken place during shipment. Should your CN20 come already installed on a scale, the following information describing the installation of the instrument does not apply to you.

Begin the installation by deciding where the instrument is to be mounted. The CN20 may come mounted on a column or you may choose to mount it on a desktop or wall. Refer to Figure no. 1 for illustrations of these various mounting arrangements. **Note:** If you use the mounting bracket on the scale column you may select any of these variations. Two (2) holes are located in the mounting bracket for attachment to the wall or column top. This bracket may be removed or left in place for desktop use. To remove the bracket, pry outward on the bracket at each of the pivot points while pressing the tilt buttons and pulling downward on the bracket.

INSTALLATION, Cont.

Regardless of how you mount your CN20, it should be in a safe area where it will not be in the way of normal traffic. The mounting bracket should be securely fastened to the wall or column top so that it cannot break loose from the mounting surface. After the CN20 has been mounted, it may be connected to the optional plug-in power supply or the batteries may be installed.
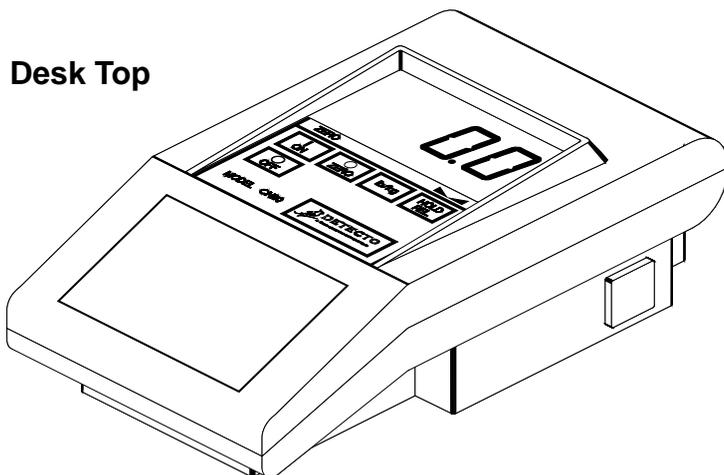
Desk Top

Figure No. 1

Tilt

Press here on both sides to tilt

May be rotated

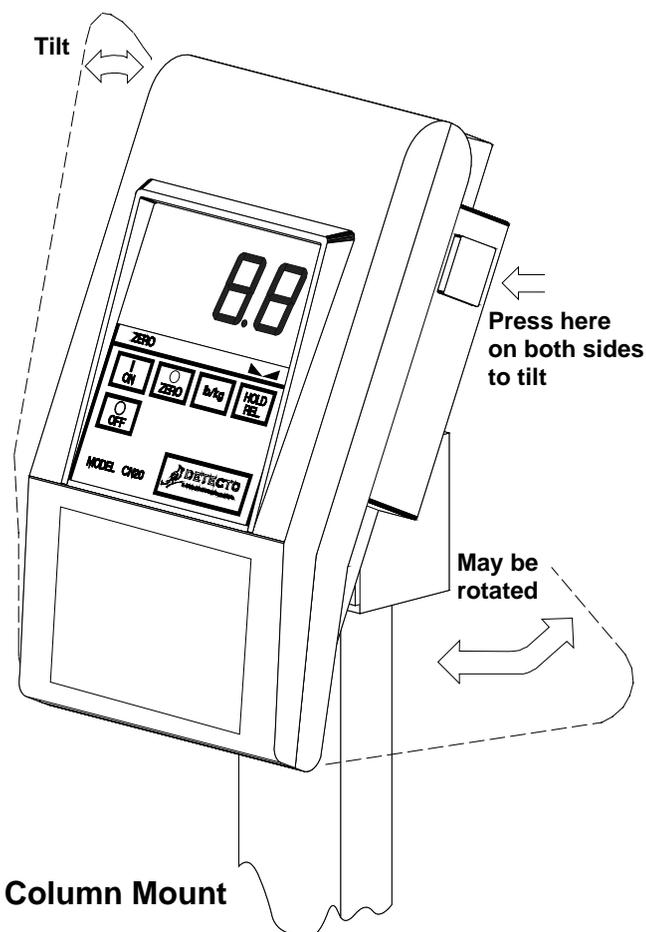**Column Mount**

OPTIONAL PLUG-IN POWER SUPPLY
If you have ordered an optional plug-in power supply to operate your CN20 from a wall outlet it may be installed at this time. Remove the power supply from the shipping carton and insert the output power cable connector into the power jack located on the underside of the CN20 enclosure. Refer to Figure no. 2 for the location of the power jack. Insert the power supply connector into the wall outlet.

Optional AC Power Supply - 115 VAC or 230 VAC Model

Power Jack

Bottom of Instrument

Figure No. 2

BATTERIES
If you did not order an optional plug-in power supply or if you did but wish to operate the CN20 from batteries, you must install batteries before operations can begin. The CN20 uses six (6) "D" size Alkaline or Ni-Cad batteries. These batteries are contained in a slide-out drawer at the back of the instrument enclosure.

To remove the battery drawer, press down on the release pad while pulling outward. Remove the battery drawer from the instrument. Install six (6) "D" size batteries in the drawer making certain that they are positioned in accordance with the battery outline located in the bottom of the drawer. **Note:** All six (6) batteries must be of the same type. They must all be Alkaline or they must all be Ni-Cad. **DO NOT** mix Alkaline and Ni-Cad batteries. Refer to Figure no. 3 for illustration of battery installation.

After placing all six (6) of the batteries in the drawer, replace the drawer in the CN20 and push it all the way forward until the retaining latch snaps into place. Failure to push the drawer in until the latch engages will keep the instrument from operating. Press the **ON** key. If the display turns on and the BAT annunciator is off, the batteries have been installed correctly. If not, remove the tray and check for one (1) or more improperly positioned batteries.
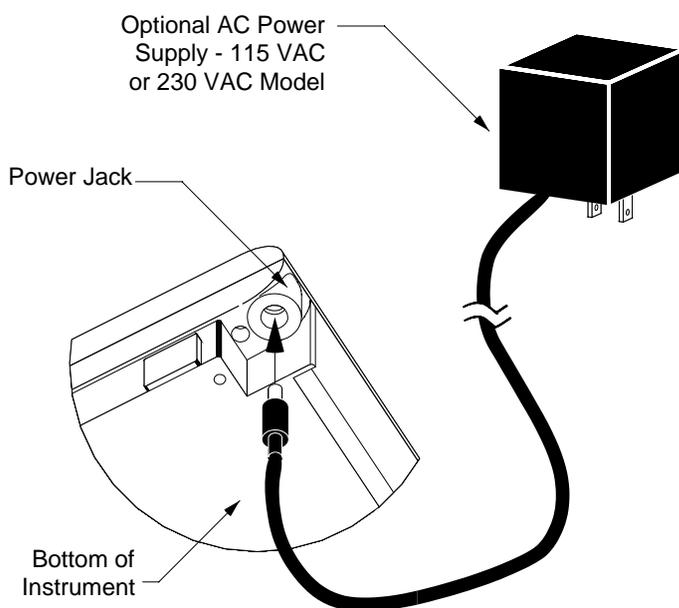
INSTALLATION, Cont.

Alkaline batteries will last several months in an instrument with a LCD display. They will last only a couple of days in an instrument with a LED display. Therefore, it is recommended that rechargeable Ni-Cad batteries be used in instruments with LED displays.

The battery charging circuitry is disabled. Should you wish to enable or disable your battery charger, please contact your scale serviceman.
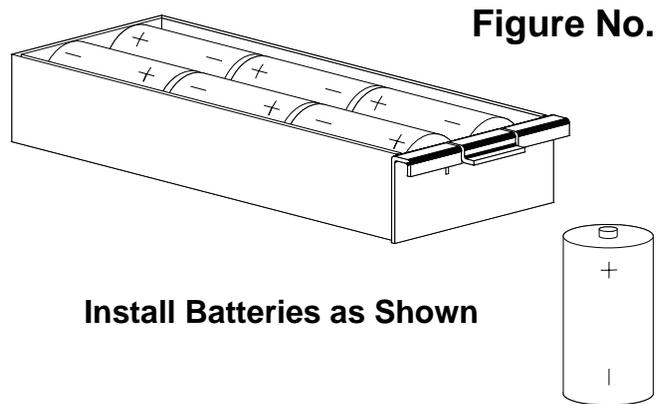
Figure No. 3

Press

Pull
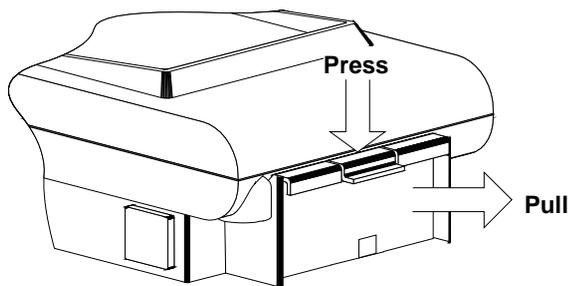
Remove Battery Drawer

Install Batteries as Shown

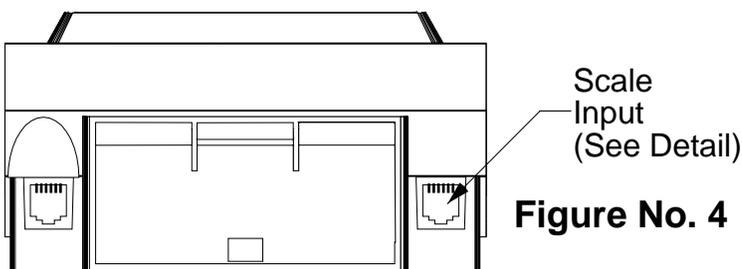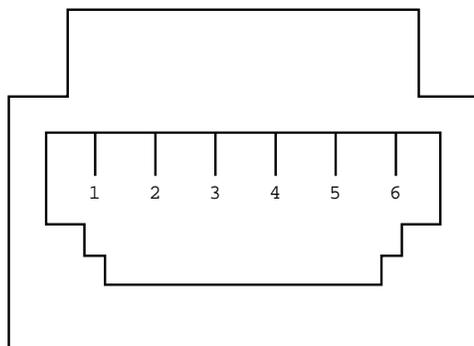## LOAD CELL CONNECTIONS

Scale
Input
(See Detail)

Figure No. 4

The load cell connection to the CN20 is made via a 6-PIN modular type connector located on the rear panel of the enclosure. Refer to Figure no. 4 for the location of this connector. Your scale should be equipped with a cable terminated in a modular type connector. This connector should be inserted into the mating connector on the rear of the CN20 until it locks into place.

If you are connecting the CN20 to a scale without a modular connector, it will be necessary to modify the scale cable by installing a 6-conductor modular connector. Refer to the detail figure and table below for identification of the wires from this connector.

Load Cell Connector Wiring

PIN #	SIGNAL	WIRE COLOR
1	N.C.	*BLUE**
2	N.C.	*YELLOW**
3	+EXC	GREEN
4	+SIG	RED
5	-EXC	BLACK
6	-SIG	WHITE

N.C. = no connection
*Blue and Yellow wire not used

SETUP AND CALIBRATION

⚠ If you received your CN20 already installed on a scale, calibration is not required. Your scale was calibrated at the factory.

Before beginning the setup and calibration of your CN20, first make certain that it has been installed in accordance with the instructions given in this manual. Remove the two (2) front screws from the bottom of the enclosure and loosen the rear two (2). Make certain the CN20 has been turned off then lift upward on the rear of the top enclosure to expose the calibration switch. Refer to Figure no. 5 for the identification and location of this switch.

Press the calibration switch and hold it while pressing the **ON** key on the instrument's keyboard. Release the calibration switch. If the display shows ınɛ the CN20 is ready for setup and calibration. If, however, the display is blank the following should be checked:

1. If using the optional AC plug-in power supply, verify that the mating connector is fully seated in the power jack on the bottom of the instrument housing and that the power supply is plugged into a working outlet.

SETUP AND CALIBRATION, Cont.

Figure No. 5

Printed Circuit Board

Calibration Switch

Push and hold during power up

Loosen

Remove
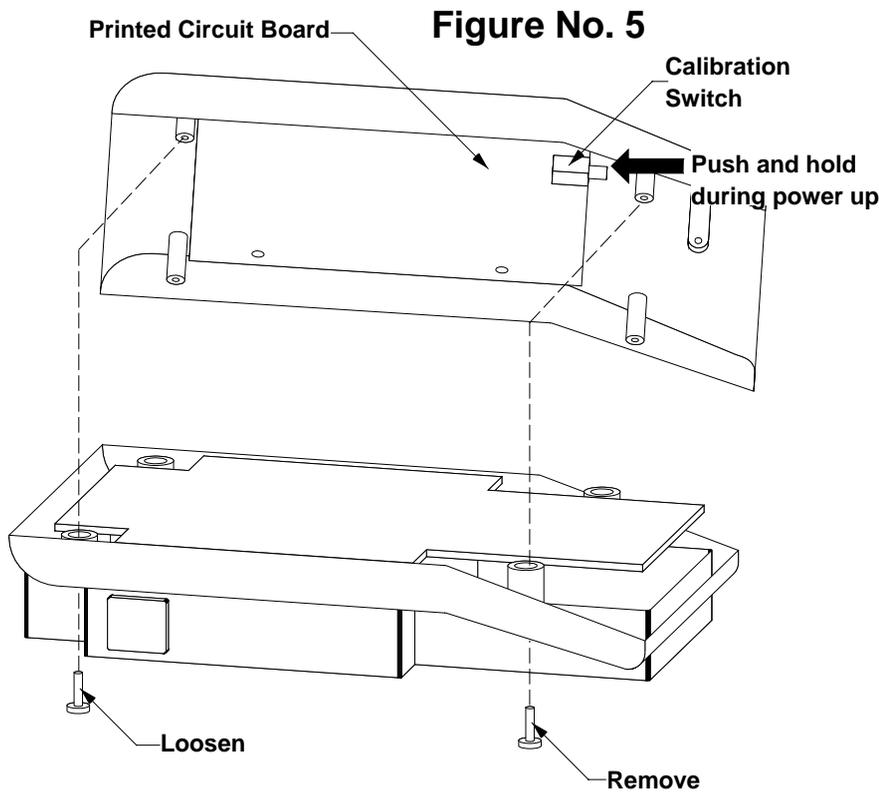
2.   If operating from batteries, verify that the batteries are new or if Ni-Cad, that they are fully charged and that they have been correctly installed in the battery drawer. Make certain that the battery drawer is fully inserted and that the drawer catch is engaged.

3.   Make certain that the calibration switch is fully depressed when the **ON** key is pressed. Press the **OFF** key and repeat the procedure.

After the ı n t ꞊ display prompt is shown in the CN20 display window, setup and calibration may continue.

During the setup and calibration process it will be necessary to enter operational parameters via the CN20's keyboard. Pressing the **HOLD/REL** key will cause the data entered or displayed to be retained and the CN20 will advance to the next prompt. The cursor location is identified by the blinking character and can be advanced to the left to the next position by pressing the **lb/kg** key. Pressing the **ZERO** key will change the blinking character to the next value.

NOTE: IF YOUR INDICATOR IS EQUIPPED WITH A NUMERIC KEYPAD below the upper keypad, the function of the **HOLD/REL** key during setup and calibration is replaced by the **ENTER** key. The functions of **lb/kg** and **ZERO** keys during setup and calibration are replaced by the numeric keys. If a YES or NO response is required, pressing the **1** key will display YES, the **0** key will display NO.

SCALE INTERVAL
With the display showing ı n t ꞊ press the **HOLD/REL** key, then the **ZERO** key until the proper scale interval (1, 2 or 5) is displayed, then press the **HOLD/REL** key to store the displayed value and proceed to the next prompt.

DECIMAL POINT LOCATION
With the display showing d P ꞊ press the **HOLD/REL** key then the **ZERO** key until the number of digits to the right of the decimal point is displayed, then press the **HOLD/REL** key to store this setting and proceed to the next step. Numbers zero (0) through three (3) are available and correspond to the following decimal point locations:

	0 = XXXX	2 = XX.XX
1 = XXX.X	3 = X.XXX	

SCALE CAPACITY
With the display showing C A P ꞊ press the **HOLD/REL** key, then use the **ZERO** key to enter the proper digit at the blinking location, then press the **lb/kg** key to step to the left and the next digit location. Repeat the process until all four (4) digits of the scale's capacity have been entered. Should you make a mistake and press the **lb/kg** key with an incorrect digit entered, it will be necessary to repeatedly press the **lb/kg** key until the blinking character returns to the proper location, then use the **ZERO** key to enter the correct digit. After all four (4) digits have been correctly entered, press the **HOLD/REL** key to store the capacity and advance to the next step.

WEIGHING UNITS
With the display showing U n t ꞊ press the **HOLD/REL** key to show current setting, then press **ZERO** to select 1 through 6. Press the **HOLD/REL** key to save setting.

1=Pounds Only	3=Pounds/Kilograms	5=Ounces Only
2=Kilograms Only	4=Kilograms/Pounds	6=Grams Only

SETUP AND CALIBRATION, Cont.

LOAD CALIBRATION WEIGHT

The display will now indicate $Lod =$ which is a prompt for the entry of the calibration weight value and placement of this amount of test weights on the scale platform. If the scale has been previously calibrated and you do not wish to change the calibration setting, simply press the **HOLD/REL** key twice without taking any other action and the internal calibration factor will be retained. If, however, the scale needs to be calibrated, press the **HOLD/REL** key once and proceed in the following manner:

1. Place the desired amount of calibrated test weights on the scale platform. It is recommended that a minimum of 50% of the scale's capacity be used but 70% to 100% is preferred.
2. Determine the exact amount of test weights to be placed on the scale platform and enter this value into the CN20 by using the **ZERO** and **lb/kg** keys in the same manner used to enter the scale's capacity. Verify that the numbers entered are the same as the total weight of test weights, and the least significant digit agrees with the scale interval.
3. Press the **HOLD/REL** key.

After a moment the display will indicate the message $UnLd$ which is a request that the calibrated test weights be removed from the scale platform. Remove all of the weights then press the **HOLD/REL** key. The calculated calibration factor is now stored in the CN20's nonvolatile memory.

ZERO TRACKING RANGE

The CN20 display will now indicate $trA =$. Press the **HOLD/REL** key to show the value assigned to the Automatic Zero Tracking range. This is the value in scale divisions that will be automatically zeroed off. That is, if the scale divisions are 0.5 and the zero tracking is set to 3, the CN20 will automatically zero weights of 1.5. Values of zero (0) through nine (9) divisions and 0.5 division are available for the zero tracking range. Use the **ZERO** key to step through these available values. Once the proper value is shown, press the **HOLD/REL** key to store the value.

FOUR PERCENT ZERO TRACKING RANGE

The display will next indicate $trL =$ which is the prompt requesting whether a 4% limit be placed on the Automatic Zero Tracking feature. This 4% limit is a requirement by Canadian Weights and Measures but, at the time this was printed, is not a U.S. requirement. Press the **HOLD/REL** key, then use the **ZERO** key to enter either YES, (use the 4% limit) or NO, (do not use the 4% limit) and press the **HOLD/REL** key.

POWER UP ZERO

With the display showing $PU0 =$ press the **HOLD/REL** key to show current setting, then press **ZERO** to select YES (enable) or NO (disable). Press **HOLD/REL** key to save setting.

DIGITAL FILTER LEVEL SELECTION

The display will now show $FLt =$ which is the prompt for the selection of the digital filtering level. Four (4) levels of filtering (0, 1, 2 and 3) are available with zero (0) having minimum filtering and two (2) the greatest. Three (3) is used for custom filtering when zero (0), one (1) or two (2) are inadequate. Press the **HOLD/REL** key, then use the **ZERO** key to select the desired level of filtering then press the **HOLD/REL** key to save the setting. If you select level three (3) for custom filtering, the CN20 will respond with $F =$ which is the filter weight setting. Use the **ZERO** and **lb/kg** keys to select from 1 to 16 filter weight levels then press **HOLD/REL** to save the setting. The CN20 will respond with $br =$ which is the break point setting. Using the **ZERO** key select from 1 to 64 divisions as the break point value then press the **HOLD/REL** key to save the setting. Your CN20 should arrive from the factory with the proper filter setting already entered. Please check with your scale service technician should you wish to change the programmed filter weight and break point.

MOTION (UNSTABLE) RANGE

The display will next indicate $Un5 =$ which is the prompt for the motion (unstable) range. Changes in weight exceeding the selected number of divisions will cause the stable indicator to turn off. Values from zero (0) to nine (9) divisions may be selected after pressing the **HOLD/REL** key by pressing the **ZERO** key. Once the correct value is shown press the **HOLD/REL** key to save the setting.

SAMPLE RATE

The display will now indicate $5r =$ which is the prompt for entry of the sample rate. The sample rate may be set from a minimum of one (1) sample per second to a maximum of twelve (12) samples per second in one (1) sample per second intervals. After pressing the **HOLD/REL** key use the **ZERO** and

SETUP AND CALIBRATION, Cont.

SAMPLE RATE, Cont.
lb/kg keys until the desired sample rate is displayed then press the **HOLD/REL** key to save the setting. **Note:** Like the filtering level, the sample rate may be changed later without having to enter the calibration mode.

AUTOMATIC SHUTOFF
The display will now indicate $A5H$ which is the prompt for the selection of the Automatic Shutoff feature. This feature will automatically turn the CN20 off after a predetermined period of inactivity. To turn the instrument back on you must press the **ON** key. This feature helps prolong battery life by turning the CN20 off when it is not in use. After pressing the **HOLD/REL** key, use the **ZERO** key to select the desired number of minutes (1 through 9) of inactivity before turning the CN20 off. Entry of the number zero (0) disables the Automatic Shutoff feature. Press the **HOLD/REL** key to save the setting. **Note:** This setting may be revised without having to enter the calibration mode.

SLEEP MODE
The display will now indicate $5LP$ which is the prompt for selection of the Sleep feature which can also be used to conserve battery power when the indicator remains unused for a selected period of time. If this feature is enabled, the load cell excitation will be reduced and the display will be reduced to one scrolling segment after remaining at zero for the selected time from 1-9 minutes. Unlike the Automatic Shutoff feature which only requires that there be no motion on the indicator to activate, the Sleep feature requires that the indicator remain at zero (0) to activate. To enable the Sleep feature after pressing the **HOLD/REL** key, use the **ZERO** key to display a number of 1 to 9 which corresponds to number of minutes of inactivity while at zero (0) before the indicator will automatically enter the Sleep mode. Press **HOLD/REL** to store the setting. Entry of zero (0) turns this feature off.

PUSH BUTTON TARE
With the display showing Pbt press the **HOLD/REL** key to show current setting, then press **ZERO** to select YES (enable) or NO (disable). Must be NO if equipped with standard (Figure no. 7) keypad. Press the **HOLD/REL** key to save setting.

AUTOMATIC HOLD MODE
The display will next indicate HLd which is the prompt for the selection of the Automatic Hold mode. This mode of operation is used to lock the CN20 display and is used only in noncommercial applications. After pressing the **HOLD/REL** key, enter a YES to enable or a NO to disable by pressing the **ZERO** key, then press the **HOLD/REL** key. This feature must be set to NO for "Legal for Trade" applications.

NON-ROLL-UP MODE
The CN20 display will now indicate nrU which is the prompt for selection of the Non-Roll-Up mode of operation. The Non-Roll-Up mode blanks the display and delays the weight display update until the weight has stabilized or a three-second time delay has elapsed. A single moving segment is displayed during this time delay. After pressing the **HOLD/REL** key, press the **ZERO** key to set the value to YES or NO, then the **HOLD/REL** key to save the setting.

INHIBIT SERIAL DATA
The display will now indicate $i5nd$. After pressing the **HOLD/REL** key, press the **ZERO** key to set the value to NO. Press the **HOLD/REL** key to save the setting.

The display will display the software revision number then the gross weight. The setup and calibration process has been completed and the indicator is ready to weigh. Place the test weight back on the scale to verify calibration.

Make certain that all four (4) screws in the bottom of the CN20 enclosure have been tightened.

A summary of the setup and calibration steps is shown in Figure no. 6 to serve as a quick reference.

SETUP AND CALIBRATION, Cont.

1. Press OFF key.
2. Press and hold calibration switch.
3. Press ON key.

int =   Interval
1, 2 or 5

dP =   Decimal Point Location
0, 1, 2 or 3

0=XXXX   2=XX.XX
1=XXX.X   3=X.XXX

CAP =   Scale Capacity up to 9,999

Unt =   Weighing Units

1=lb only   4=kg/lb
2=kg only   5=oz only
3=lb/kg   6=g only

Lod =   Calibration Weight

Press HOLD/REL twice to bypass or once and enter test weight value and load scale. Press HOLD/REL again

UnLd   Remove Test Weights

trA =   Zero Tracking Range .5,1,2,3,4,5, 6,7,8 or 9

trL =   4% Zero Tracking Limit Yes/No

PUO =   Power Up Zero

FLt =   Filtering? 0, 1, 2 or 3

0=No Filtering   2=Moderate Filtering
1=Minimal Filtering   3=Custom Filtering

If 0, 1 or 2 then
If 3 then

F =   Filter Level 1 to 16

br =   Break Range 1 to 64

UnS =   Motion Range 1 through 9

Sr =   Sample Rate 1 to 12   (skipped if FLt= 1 or 2)

ASH =   Auto Shutoff 0=Disable or 1 to 9 minutes

SLP =   Sleep Mode 0=Disable 1 to 9 minutes

Pbt =   Push Button Tare? Yes/No

HLd =   Enable Hold Feature Yes/No

nrU =   Enable Non-Roll-Up Mode Yes/No

iSnd =   Inhibit Serial Data No
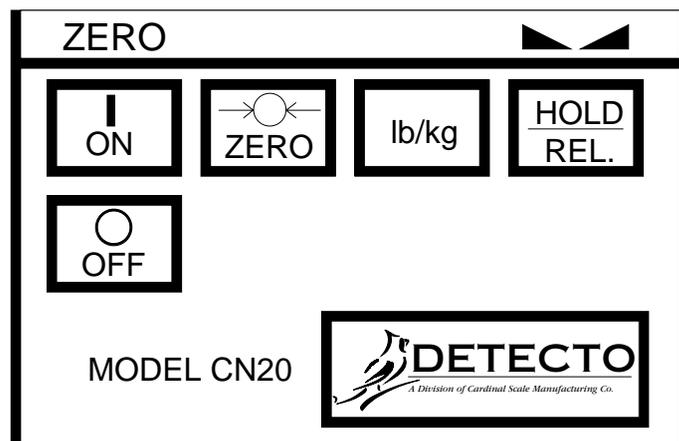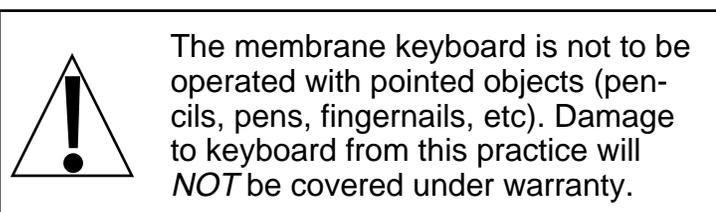
CALIBRATION COMPLETE

FINE SPAN

The span can be fine-adjusted, if required, after calibration. Remove the two front screws from the bottom of the enclosure and loosen the rear two screws. With the indicator on, press and hold the calibration switch and press the **ZERO** or **HOLD/REL** key (Calibration Switch + **ZERO** = Increase Calibration Switch + **HOLD/REL** = Decrease). Turn the indicator off by pressing the **OFF** key. Tighten the four cover screws. The indicator is ready for use.

KEYPAD FUNCTIONS

Figure No. 7

The CN20L weight indicator comes standard with a membrane keypad containing five (5) keys. The keypad is shown in detail in Figure no. 7. The following describes the use of each of these keys:

| ZERO | ▶◀ ◢ |

| **ON** | **ZERO** | lb/kg | **HOLD REL.** |

OFF

MODEL CN20   DETECTO
A Division of Cardinal Scale Manufacturing Co.

⚠ The membrane keyboard is not to be operated with pointed objects (pencils, pens, fingernails, etc). Damage to keyboard from this practice will *NOT* be covered under warranty.

ON KEY
Pressing this key when the CN20 is off will apply power to the instrument.

ZERO KEY
Pressing this key will cause an immediate zeroing of the display up to the selected limit of either 4% or 100% of the scale capacity. This selection is made during setup and calibration of the CN20. It is also used to step from one value to the next during setup of the CN20.
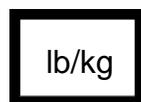
lb/kg KEY
Pressing this key will change the weighing units to the alternate units of measurement if selected during setup of the instrument. With pounds displayed, pressing this key will change the weighing units to kilograms. Note that this feature must be enabled during setup and calibration for this key to be operational.

HOLD/REL KEY
This key is used to either lock or unlock the display. If the hold feature was enabled during the setup and calibration procedure, the weight display will lock after placing a load on the scale platform and obtaining a stable value. The HOLD annunciator will be turned on to show that the display is locked. The display will become active again and the HOLD annunciator will turn off when the **HOLD/REL** key is pressed. When active, the weight display may be locked manually by pressing the **HOLD/REL** key.

OFF KEY
This key is used to remove power from the CN20, turning it off.

The CN20 series indicators can be equipped with a membrane keypad containing twenty (20) keys with full numeric keypad. This keypad is shown in detail in Figure No. 8. The following describes the use of the keys not available on the standard keypad:

GROSS KEY
This key is used to return the weight display to the Gross Weight mode. In this mode, the total of all weight placed on the scale since the display was zeroed is displayed. The GROSS annunciator is turned on to signal the display of gross weight.

TARE KEY
This key is used to enter a tare weight of up to three (3) digits and can operate in one of two modes depending on the setup of the CN20. If the push button tare feature was selected during the setup of the instrument, pressing this key will cause the CN20 to enter the current gross weight as the new tare weight value and automatically enter the Net Weight mode. The NET annunciator will be turned on to indicate that the CN20 is now displaying a net weight. If the push button tare feature was not selected, pressing the **TARE** key will cause the currently stored tare weight to be displayed and the TARE

TARE KEY, Cont.
annunciator will blink. The numeric keys may be used to enter a new tare value and the **ENTER** key pressed to store the new value. Once the new tare value is entered, the CN20 will automatically enter the Net Weight mode indicated by turning on the NET annunciator.

Figure No. 8

NET KEY
Pressing this key will cause the CN20 to enter the Net Weight mode where the weight displayed is the gross weight less the stored tare weight. The NET annunciator is turned on to show that the displayed weight is the net weight. Note that the CN20 will only enter the Net Weight mode if a valid tare weight is currently stored.

TEST KEY
This key is used to conduct a test of all display and memory elements. The test consists of four (4) cycles each lasting two (2) seconds:
  1. All vertical display segments on (no annunciators)
  2. All horizontal display segments on (no annunciators)
  3. All annunciators and decimal points on
  4. All display elements off

ENTER KEY
This key serves two purposes. First, when reviewing setup parameters, pressing the **ENTER** key will cause the current setting of the parameter to be displayed. Second, the **ENTER** key is used to signal the completion of the entry of data and causes the CN20 to process the data entered.
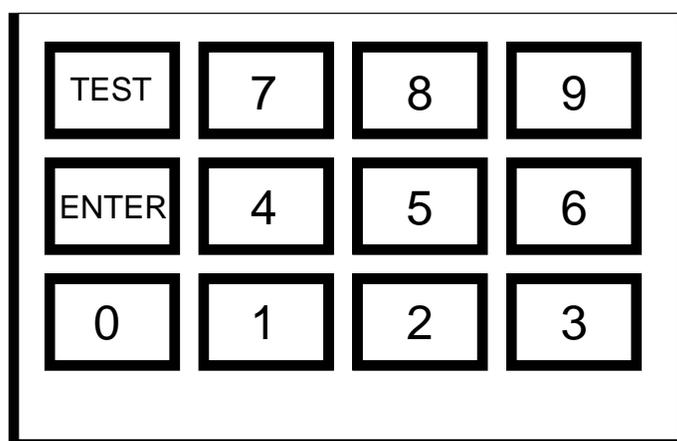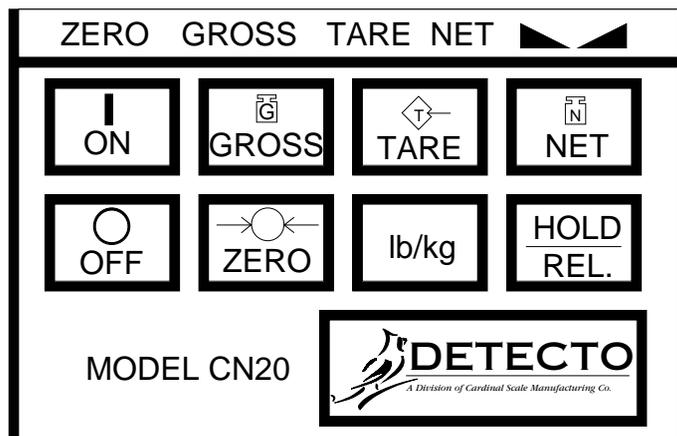
0 THROUGH 9 KEYS
These keys are used to enter numeric data during the setup and calibration as well as during normal operation of the instrument.

ANNUNCIATORS

Note that annunciators are turned on to indicate that the display is in the mode corresponding to the annunciator label or that the status indicated by the label is active. Some annunciators are flashed on and off to signal that the CN20 is waiting for an input from the keypad for use by the feature indicated by the annunciator.

ZERO
The ZERO annunciator is turned on to indicate that the weight is within +/- 1/4 division of the center of zero.

GROSS (optional keypad only)
The GROSS annunciator is turned on to indicate that the displayed weight is the gross weight which is the total of all weight placed on the scale platform since the display was last reset to zero.

TARE (optional keypad only)
The TARE annunciator is flashed on and off to show that the CN20 is in the tare weight input mode and that the new tare weight value should be entered on the numeric keys.

NET (optional keypad only)
The NET annunciator is turned on to show that the displayed weight is the net weight which is the gross weight less the tare weight.

ANNUNCIATORS, Cont.

STABLE
The STABLE annunciator is identified with two small triangular shapes and is turned on when the weight display is stable. This means that the change in successive weight samples is less than the motion limits selected during setup and calibration of the CN20.

BAT
The BAT annunciator is located to the right of the display and indicates that the battery voltage is low and the batteries will soon need to be recharged or replaced.

CHG (LED displays only)
The CHG annunciator is located to the right of the display and indicates that the batteries are being charged.

lb
The lb annunciator is located to the right of the weight display and is turned on to show that the displayed weight units of measure is pounds.

kg
The kg annunciator is located to the right of the weight display and is used to signal that the units of measurements for the displayed weight is kilograms.

HOLD
The HOLD annunciator is located to the right of the display and indicates that the weight display is locked with the last stable weight reading.

SETUP REVIEW

The CN20 allows several operational parameters to be reviewed and changed as necessary without having to enter the setup and calibration mode.

To enter the setup review mode, simply turn the CN20 off, then press and hold the **HOLD/REL** key, then press the **ON** key. The display will then prompt for entry of the power up zero feature (*PU0=*). Refer to the instructions listed in the Setup and Calibration section of this manual for information on how to change these parameters. The parameters in the setup review will be processed in the following sequence:

> POWER UP ZERO
> AUTOMATIC SHUTOFF TIME
> SLEEP MODE TIME
> PUSH BUTTON TARE
> NON-ROLL-UP MODE

BATTERY CHARGING

Battery operation is a standard feature of the CN20 weight indicating instrument. Although the CN20 will operate from either Alkaline or Ni-Cad batteries, only the Ni-Cad batteries may be recharged.

⚠ **Attempts to recharge Alkaline batteries may result in rupture of the Alkaline cells which could result in damage to the CN20 and could even cause chemical burns to personnel.**

It is for this reason that if Ni-Cad cells will be used, the battery recharger must be enabled by moving jumper (J1) on the printed circuit board to the on position. Refer to Figure no. 9 for additional information on this modification.

To recharge Ni-Cad batteries, the optional plug-in AC power supply must be connected to a power outlet. Approximately 15 hours are required to fully recharge the Ni-Cad batteries in the CN20. **Note:** The CN20 is shipped with the battery charging circuitry disabled.
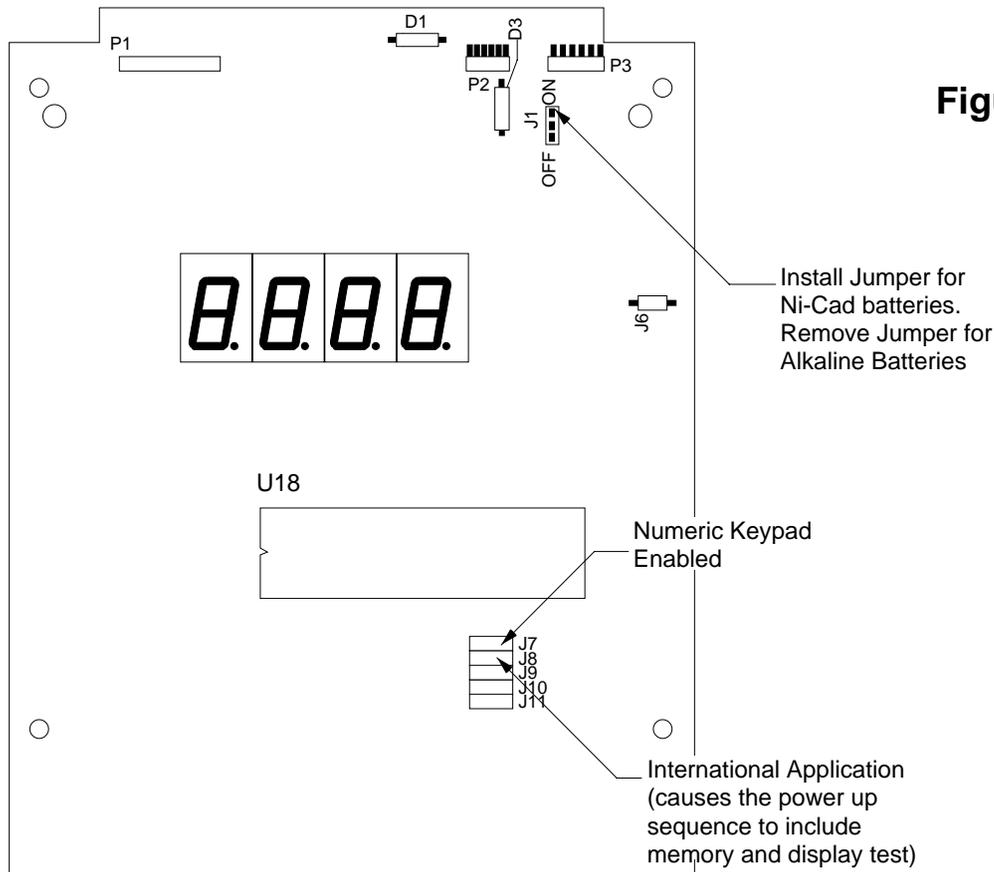
BATTERY CHARGING, Cont.

Figure No. 9

Install Jumper for Ni-Cad batteries. Remove Jumper for Alkaline Batteries

Numeric Keypad Enabled

International Application (causes the power up sequence to include memory and display test)

PRINTED CIRCUIT BOARD JUMPER TABLE

FACTORY SETUP

	CN20E LED	CN20L LCD	PCB Side Location	Shorted Function Function
J1	Open	Open	Component	(Battery Charger Enable)
J6	Open	Open	Component	(Auto-on)
J7	*Open	*Open	Component	(Numeric Keypad Enable)
J8	Open	Open	Component	(International Application)
J10	Shorted	Open	Component	(LED Select)
J11	Open	Open	Component	(Test Mode Select)

Refer to Figure No. 9

*Shorted if equipped with numeric keypad.

ERROR AND STATUS DISPLAYS

The CN20 is equipped with a diagnostic software program that tests various portions of the instrument's circuitry and verifies proper operation. Should a problem be detected, an error or status message will be displayed alerting the operator to that condition. The following lists these errors and status displays and their meaning:

Display	Meaning
UnSt	Motion is present when the CN20 is attempting to perform one of the following operations: Power Up Zero Weight Display
UnLd	The weight on the scale platform exceeds the zero range on Power On.
LoAd	The scale deadload is less than the zero range on Power On.

ERROR AND STATUS DISPLAYS, Cont.

Display	Meaning
- o F -	Attempting to display a negative number greater than -999 or a positive number greater than 9,999.
- o L -	Scale weight exceeds scale capacity.
C A L b	Indicates improperly stored calibration data; calibration is necessary.
E r r	Indicates a disallowed keyboard entry: Attempt to zero when the weight is outside the scale zero range.
E r r 1	Program checksum mismatch.
E r r 2	EEPROM write illegal.
E r r 3	RAM test failure.
E r r 4	EEPROM read failure.
E r r A	No load cell signal or load cell polarity reversed.

CARE AND CLEANING

Your CN20 is constructed of high impact resistant polycarbonate and requires no maintenance other than an occasional cleaning with a soft damp cloth. Never use an abrasive cleaner on the instrument nor use a pointed object like a pencil point or letter opener to press the keys.

We suggest that regular checks of the calibration be made to insure that a high degree of weighing accuracy is maintained. Contact your scale service technician for additional information regarding this service.

> ⚠ The membrane keyboard is not to be operated with pointed objects (pencils, pens, fingernails, etc). Damage to keyboard resulting from this practice will *NOT* be covered under warranty.

BEFORE YOU CALL FOR SERVICE

The CN20 has been designed to provide you with years of trouble-free operation. In spite of this, troubles sometimes happen. Before calling for service assistance you should make some initial checks to verify that a problem does exist. The following describes several types of symptoms along with suggested remedies.

Problem	Possible Solutions
Display does not turn on	Batteries discharged - replace.
	Batteries not installed or not installed correctly.
	AC power supply not plugged in.
Incorrect weight displayed	Instrument not calibrated.
	Scale platform touching adjacent object.
Indicator will not display weight	Refer to Error Display section and make certain that the *Un Ld* or *Lod :* messages are not on. If so, and scale is not loaded, perform the calibration sequence.

APPENDIX A

REPLACEMENT PART IDENTIFICATION

Figure no. 10 illustrates the various parts and assemblies that are available as replacement parts for the CN20. The chart following this figure lists part numbers and description of each item shown. When ordering a new printed circuit board assembly, make certain that you include the exact model number of your CN20 to ensure that you will receive the correct version of printed circuit board. Replacement parts may be ordered from your scale dealer.
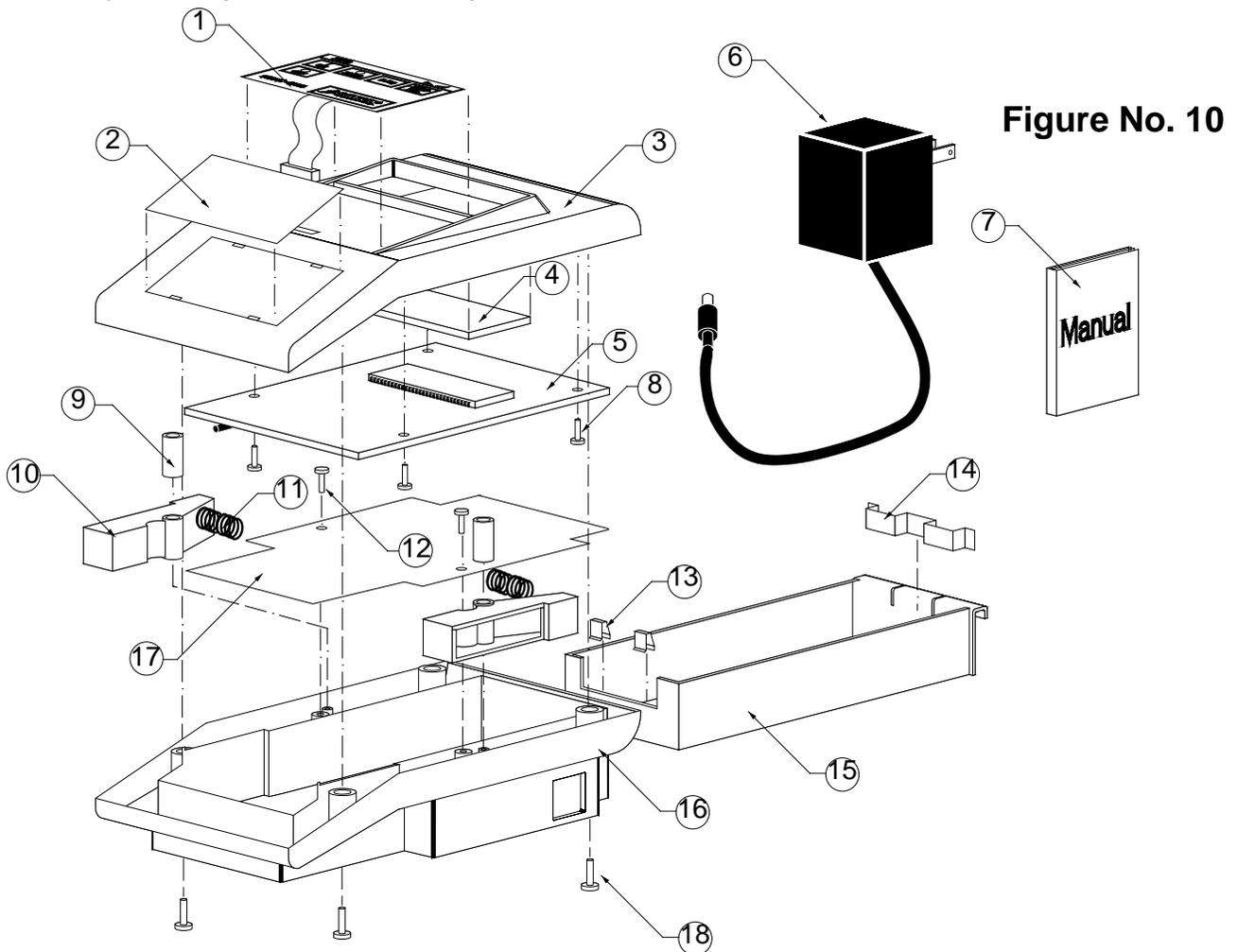

Figure No. 10

Item	Part Number	Description
1	8534-C501-08	CN20 Keyboard (Standard)
	8534-C502-08	CN20 Keyboard (Optional)
2	8534-C513-08	Instruction Card
	8534-C503-08	Numeric Keypad (Optional)
3	*	Top Enclosure Half
4	8534-B379-08	Display Lens (LCD)
	8534-B379-18	Display Lens, Red (LED)
5	8534-D500-XA	Circuit Board Assy
	Include Exact Model Number When Ordering	
6	AC115	Power Supply, 115 VAC 60 Hz
	AC230	Power Supply, 230 VAC 50 Hz
7	8534-M514-O1	Technical Manual
8	6021-1186	PC Board Mounting Screw
9	*	Tilt Lever Spacer
10	*	Tilt Lever
11	6022-0021	Tilt Lever Spring
12	6021-1186	Separator Plate Screw
13	6610-1128	Battery Spring Terminal
14	8534-B333-08	Battery Shorting Bar
15	*	Battery Drawer
16	*	Lower Housing Half
17	8534-C387-08	Separator Plate
18	6021-1185	Housing Retaining Screw

* Items 3, 9, 10, 15 and 16 are not sold separately, but are available in the following kit:

Part Number	Description
8534-D4114-OA	CN20 Plastic Parts Kit (white)

NOTES

DESIGNED & MANUFACTURED IN U.S.A.