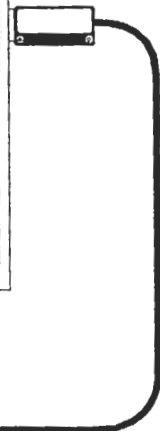
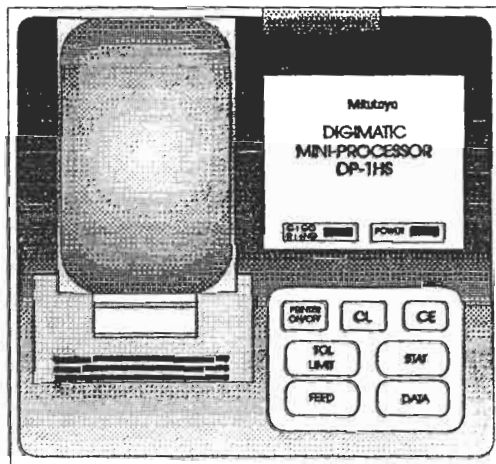
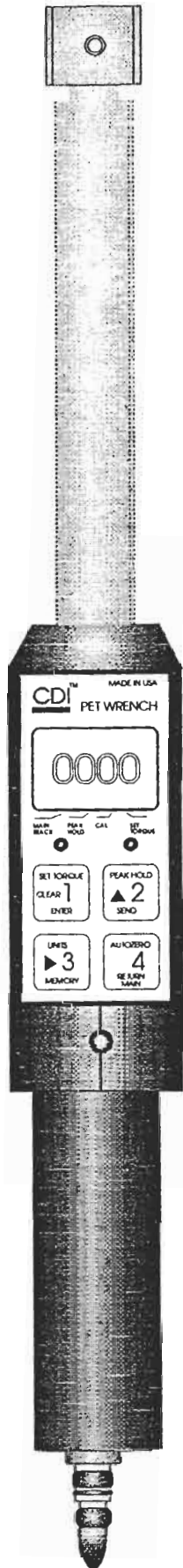


MPET WRENCH

VERSION



PET

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PET WRENCH INTRODUCTION

The M series wrench is designed to be a versatile digital torque wrench that outputs data to any Mitutoyo or Mitutoyo compatible data logger.

High and low set torque limits can be set manually. The high and low set torque values are entered, by the operator, via the four key front panel on the wrench.

Go/No Go results are displayed via green and red LED's and a buzzer. When any torque value is held on the display, the operator must decide what to do with the displayed data he/she can; (1) Clear the display, (2) send the data to memory, or (3) send the data to an external data logger. In each case, it is up to the operator to press the corresponding key to invoke the desired result.

The R series was designed to have all the functions of the M series wrench while having the ability to download torque data to printers or computers with RS232 capabilities. The transfer of data from the wrench to a datalogger or computer is as simple as pushing a button.

The C series is designed to be used for critical fasteners where high confidence and 100% traceability are required.

The C series wrench is used in conjunction with a small belt mountable computer/controller called the PET BOX.

The C series wrench can still be used without being attached to the PET BOX but with limited capabilities.

The PET BOX is used to fully program and control the C series PET wrench. It has an alphanumeric display for operator instructions and a bar code reader interface for quick data input.

With the C series PET wrench, the most complicated torquing procedure with multiple bolts and torque levels is fully automatic and 100% traceable. **It virtually eliminates operator error variables by eliminating the need for the operator to set the torque wrench or keep track of which bolt he/she is on. Even the data transfer is automatic upon reaching the required torque value.**

The C series torque wrench is truly the next generation torque wrench that may require some operation procedure modifications to fully utilize all the outstanding features. However, you will find that even without such changes the wrench will greatly enhance operations.

Which series is best for your application?

If your application is not considered highly critical, however, you need to be sure that the fastener in question is torqued accurately and you need the data to be logged--use the **M or R series** PET wrench.

If your application is considered highly critical and you need maximum certainty and 100% traceability--use the **C series** PET wrench.

M/R-SERIES OPERATION MANUAL INTRODUCTION

The CDI Programmable Electronic Torque wrench (PET) "M" or "R" Series is an accurate torque measuring device. It is designed to be used in a production or quality control environment.

The unit is extremely easy to operate. All functions can be controlled via the 4 button front panel.

The M series unit is designed to output SDP code out signals which can be accepted by a Mitutoyo data receiving device such as a data logger, data processor or multiplexer system for recording and statistically analyzing torque data. The R series unit is designed to record and store torque data, like the M series, but download this data to RS232 compatible printers or computers.

You will find that this unit is small, lightweight and very user friendly.

PRECAUTIONS

- (1) In order to obtain the best possible performance from your new torque wrench, read this operation manual thoroughly before operation.
- (2) Be careful not to over-torque the unit. This is especially important on low torque range models. Damage due to over-torquing is not covered by warranty.
- (3) Do not attempt in any way to disassemble the unit other than replacement of batteries.
- (4) The unit is water resistant, however; do not submerge in liquid.
- (5) Connect and disconnect cables only when the power is turned off.

MAINTENANCE

Calibration:

Depending on use, the torque wrench should be checked for calibration at a minimum of once per year. Many users have company procedures that require calibration checks every three months.

Cleaning:

Never clean the torque wrench with gasoline or any organic solvent. Use a damp rag with a mild detergent such as "409" OR "Simple Green".

M /R SERIES FEATURES:

- (1) Accuracy better than 1% of indicated value both directions
- (2) Programmable torque tolerance (high/low limits)
- (3) Peak Hold mode
- (4) Track mode
- (5) Red and Green Go/No Go lights
- (6) Analog auto scaling bar graph display
- (7) Easy to read digital display
- (8) Audible buzzer
- (9) Ni-Cad rechargeable batteries
- (10) Interchangeable head drives
- (11) Memory for up to 2000 torque data

AND MORE!

When used with Mitutoyo data loggers and miniprocessors:

- (12) A variety of statistical parameters (N), (M),.....
- (13) Generation of histograms
- (14) Generation of D-Chart
- (15) Various calculation functions necessary for generating an X-bar R control chart
- (16) Data output function
 - Output of measured data (via RS-232c)
 - Output of Go/No Go result (+NG, GO, -NG)
- (17) Hard-copy of all related data via internal printer

When used with Mitutoyo's interfaces or multiplexers:

- (18) Send data to host computers
- (19) Fully utilize Mitutoyo's SPC software
- (20) Hard copy of all related data via external printer

AND MUCH MORE!!

When used with serial printers or computers:

- (21) Data logged in memory or transmitted to external device via RS232 interface.
- (22) Ability to work with a variety of commercially available software packages.
- (23) Instant record of applied torque while attached to a printer.
- (24) Store up to 2000 points of data in memory and download these values at any time.

M /R SERIES SET-UP

Be sure the power is off when plugging in all cables and /or the AC-adapter.

POWER SUPPLY

The power supplied to this unit is either from the built-in rechargeable Ni-Cad batteries or from the supplied AC-adapter. When the AC-adapter is used during operation, the power to the wrench will be supplied from the adapter. **The AC-adapter will automatically charge the Ni-Cad batteries while attached.** Charging time is approximately 8 hours.

Plug the AC adapter jack into the receptacle on the handle of the PET wrench.

Allow the wrench to charge for 8 hours (Full Charge).

When the batteries are fully charged, detach the AC-adapter and turn the wrench on by sliding the power switch on the side of the wrench. The wrench can easily be used continuously for a full 8 hours.

Note: A "B" will display when the batteries become low. If this occurs during use, plug in the AC-adapter to complete the job and allow the batteries to charge.

SLEEP MODE

If the PET wrench is not used for an extended period of time, it will automatically enter a "SLEEP" mode. The display will show "SLP". Simply press key # 4 on the front panel to "wake up" the wrench.

You are now ready to torque !!

M /R SERIES OPERATION

The CDI Programmable Electronic Torque wrench (PET) "M" or "R" Series is an accurate torque measuring device. It is designed to be used in a production or quality control environment.

The unit is extremely easy to operate. All functions can be controlled via the 4 button front panel.

Turn the wrench on by a slide button on the right side of the wrench. when the wrench is first turned on there will be a series of LCD display indications. These are factory programmed and will be discussed later.

When the wrench is turned on it will automatically be in the Track/Main Mode. **This is the mode that all other functions must be accessed through.**

For example: if you are operating the wrench in Peak Hold mode and you want to get into Set Torque mode, you must first get into Track/Main mode by pressing key #4 and then key #1 (Set torque mode). You can quickly determine the mode the wrench is in by observing where the icon (upside down triangle) points on the front panel.

When changing direction of torque, always apply a torque of at least as high as the set torque value and then re-zero the wrench to compensate for hysteresis. Hysteresis is a natural phenomenon that occurs in all materials.

AUTO-ZERO

To zero the wrench,(which compensates for any load on the sensor beam), press key # 4 when in Main/Track mode. The display will show "U-x" where "x" indicates the torque units that are active. A series of zeros will then be displayed. You are ready to torque.

IMPORTANT

When the PET wrench zeros, it waits for a stable reading. In this case "stable" means that the input torque is constant. If you press zero while there is a load on the wrench, and this load is constant, the wrench zero will actually be shifted by the applied load. It is very important that when the wrench is being zeroed there is absolutely no input on the drive. Therefore, when zeroing the wrench, always hold it by the handle with the drive end free and the display pointing up. Because of the high sensitivity of the wrench,you must hold it as stable as possible when zeroing.

Even the weight of a ratchet and socket will induce some load on the wrench. Therefore, it is recommended to remove all attachments fromthe drive when zeroing.

M /R SERIES TRACK MODE

In Track mode the display will "track" up and down as the applied torque is increased or decreased. In Track mode no data can be saved to memory or sent to an external device because no data is ever held on the display.

To get into Track mode from the power off condition, simply turn the wrench on. You will note that the icon now points to Track/Main.

A feature of the PET wrench is the ability of the display to show the relative position of "full scale" of the capacity of the wrench by the analog bar-graph just ascaled such that 100% (graph fully displayed) equals 100% of the maximum range of the torque wrench, a negative sign will automatically be displayed upon reverse (CCW) torque.

*****IMPORTANT*****

If there is a pre-set torque value (if you are in Set torque mode with low and high limits), the analog bar-graph will be scaled such that 100% equals the low limit.

M /R SERIES SET TORQUE MODE

Set Torque mode allows the operator to program a low and high torque point.

To get into the Set Torque mode from the Track/Main mode press

key #1 

The current low set torque limit will be displayed.

The active digit will be blinking. The active digit is the digit that can

be changed by pressing key #2 .

Press Key #2 until the desired value is reached.

To select another active digit press key #3 .

Scroll through the digits and change the value as needed to set the low set torque point.

To enter the low set torque value, press key #1 .

The current high set torque point is now displayed.

The active digit will be blinking.

Change the high set torque point the same way you changed the low set torque point.

(Do not forget to press key #1 to enter the desired high torque value into memory)

The icon should now point to "Set Torque".

Upon applying a torque, if the low set torque point is reached, a green LED will light and the buzzer will sound a continuous tone.

If the high set torque point is exceeded, a red LED will light and the display will flash while the buzzer sounds an intermittent tone while finally showing "Loos" on the display. Place wrench on the fastener and apply a "negative" torque value to remove the "Loos" from the display.

You are ready to re-torque.

To clear the display and continue in the Set Torque mode using the current high and low set torque points, press key #1 .

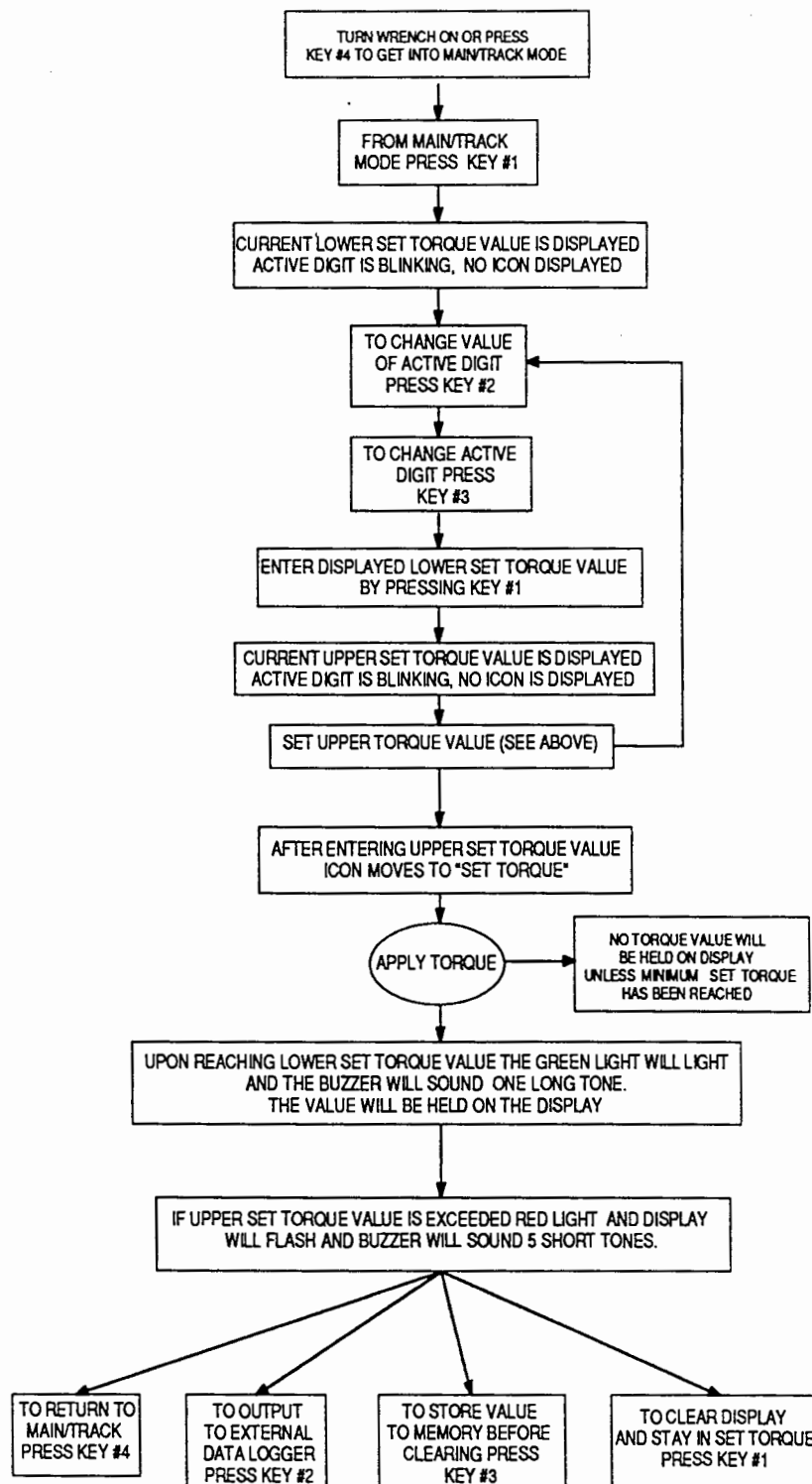
To send the displayed torque point to an external data logger, before clearing the display, press key #2 . Then press key #1 to clear the display.

OR

To send the displayed torque to memory press key #3 . Then press key #1 to clear the display.

To program a different low/high set torque point go back to Main/Track mode by pressing key #4  and repeat the above procedure.

SET TORQUE QUICK REFERENCE DIAGRAM



PEAK TORQUE MODE

Peak Torque captures the maximum applied torque.

To get into Peak Torque mode press key #2  while in Track/

Main.

The Icon will point to "Peak Hold".

After applying a torque, the maximum value will be held on the display.

To clear the display and stay in Peak Torque mode press key #1

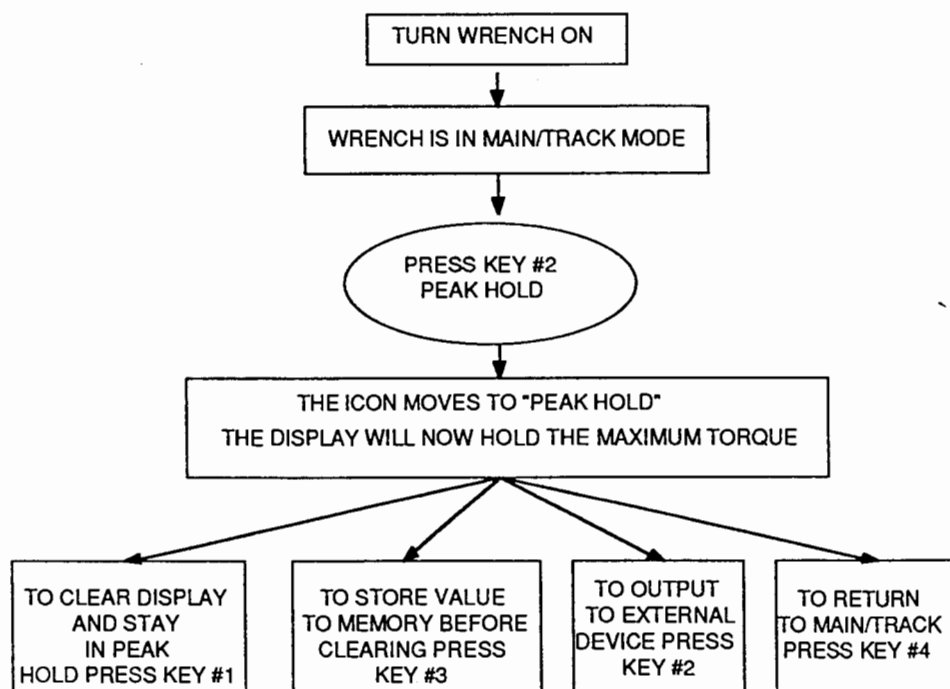


To send the displayed torque data to an external data logger, press

key #2  prior to clearing the display (by pressing key #1).

To send the displayed torque data to memory, press key # 3. Then press key # 1 to clear the display.

M /R SERIES PEAK TORQUE QUICK REFERENCE DIAGRAM



M /R SERIES MEMORY

To send displayed torque data to memory, press key #3 prior to clearing the display.

To return to Track/Main mode, press key # 4.

M /R SERIES MEMORY CLEAR

To clear the memory of all stored data in the M series PET wrench, press key # 3 and key # 4 simultaneously for two seconds. The display will clear, indicating the memory has cleared.

M /R SERIES SEND DATA

To send displayed torque data (while in Peak or Set torque mode) to an external data device, press key # 2 while the logger is attached.

DUMP MEMORY TO DATA LOGGER

To send all stored torque data to the data logger, printer, etc., press key # 1 and # 3 simultaneously for approximately one second. Please note: the torque values will still remain in the memory of the wrench until they are permanently removed. (See "memory clear" above)

IMPORTANT

WHEN SENDING DATA OR DUMPING MEMORY TO AN EXTERNAL DEVICE, THE WRENCH MUST BE IN MAIN/TRACK MODE.

IMPORTANT

IF THERE IS AN AUDIBLE "BEEP" SOUND AND RED LIGHT, THIS INDICATES DATA IS NOT BEING TRANSMITTED AND/OR THE EXTERNAL DEVICE IS NOT PROPERLY CONNECTED.

M/R SERIES UNITS

The PET wrench displays the current torque units by using a "unit code". The unit code is labeled on the back handle of the wrench. When the wrench is first turned on, the display flashes a U-....(number). This number reflects the current torque units presently active when using the wrench. See chart below.

To display the unit code (1 through 7), press key #3  for 1-2 seconds.

To change the unit code, press key # 1.

Continue pressing key # 1 to scroll through all seven basic torque units (all units and their respective codes are listed on the back of the wrench).

When the desired unit code is displayed, press key #4  to enter it to memory and return to Track/Main mode.

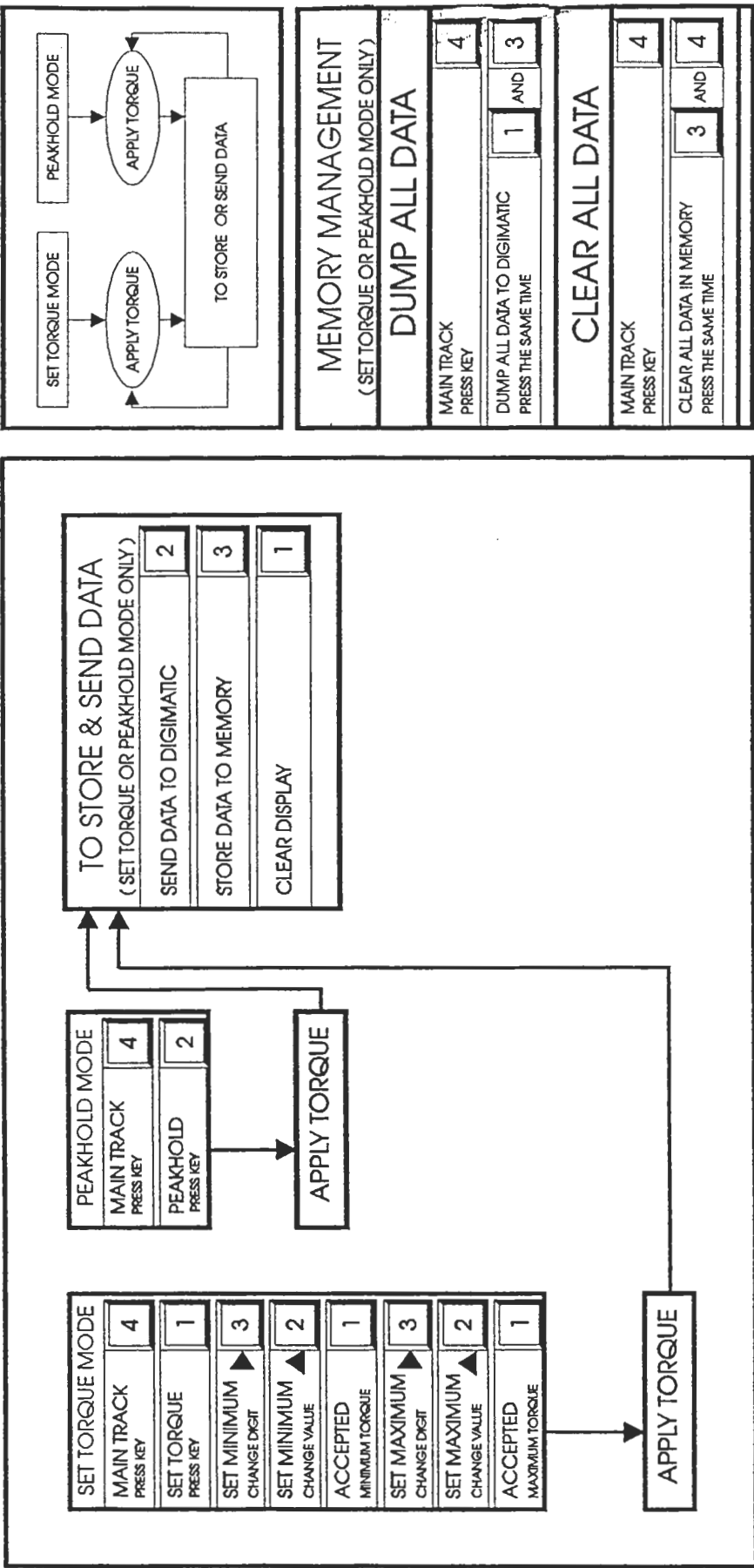
IMPORTANT

Please note that the 50 in.lb. wrench cannot be set in Mkg units. Also, the 200 ft. lb. wrench cannot be set in in. oz. units. If the operator tries to set either of the wrenches in the torque units listed, the display will read "EEEE" indicating an error.

M/R SERIES UNITS CODE

U-1 = IN.LBS.
U-2 = FT.LB.
U-3 = IN.OZ
U-4 = NM
U-5 = CmKg
U-6 = d NM
U-7 = MKg

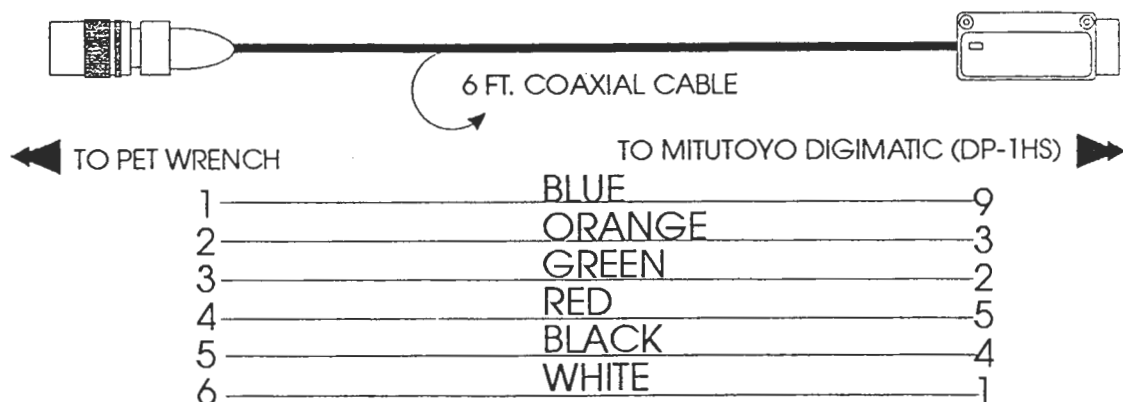
QUICK START



CDI PART No: P113-5

PET WRENCH CABLE

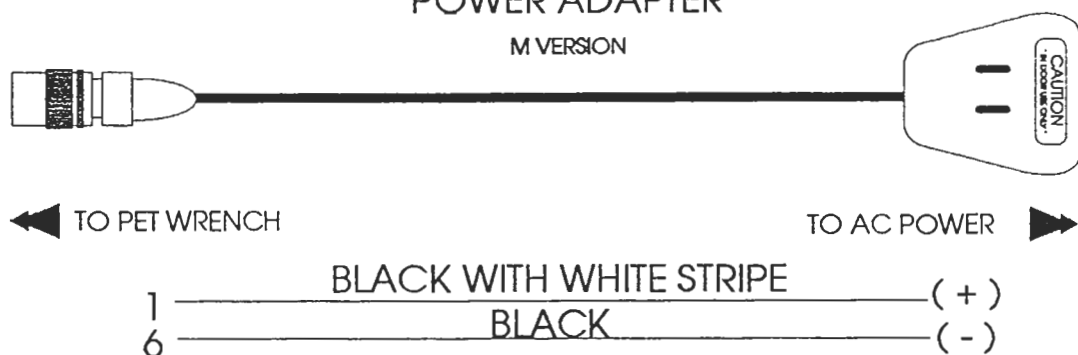
M VERSION



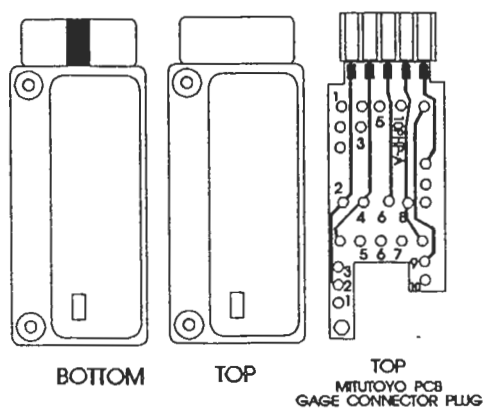
CDI PART No: P113-20

POWER ADAPTER

M VERSION



10 PIN GAGE CONNECTOR PLUG FOR MITUTOYO DIGIMATIC (DP-1HS)



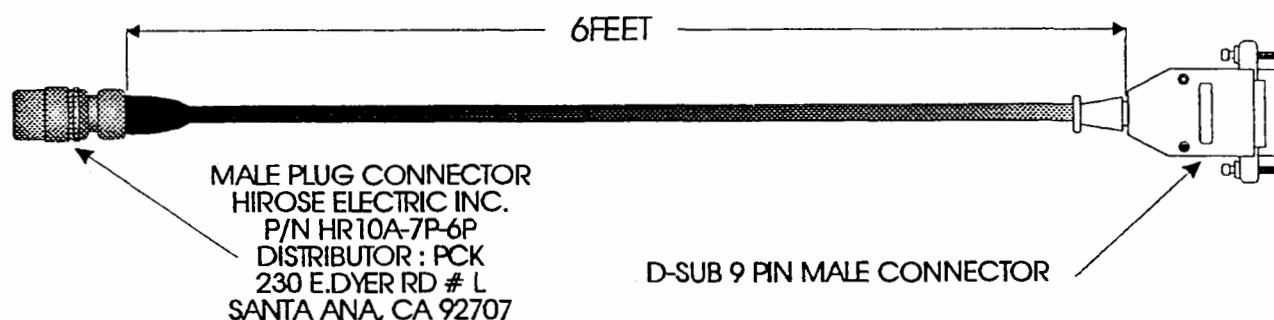
PET WRENCH (Ver. R) & PC & SERIAL PRINTER (RS-232)

CONNECTOR AND PIN ASSIGNMENT

PET WRENCH & PC

PET WRENCH		6 FEET COAXIAL CABLE	PC	
SIGNAL	RECEPTACLE		D-SUB FEMALE 9 PIN CONNECTOR	SIGNAL
RxD	3	GREEN	2	RxD
GND	6	WHITE	5	GND
			4 + 6 (JUMPER)	

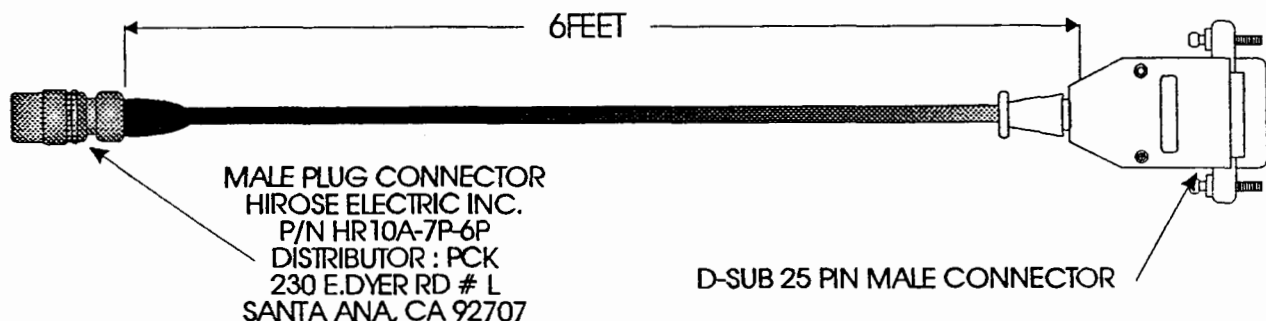
PROTOCOL : 1200 , 8 DATA BITS , 1 STOP , NO PARITY

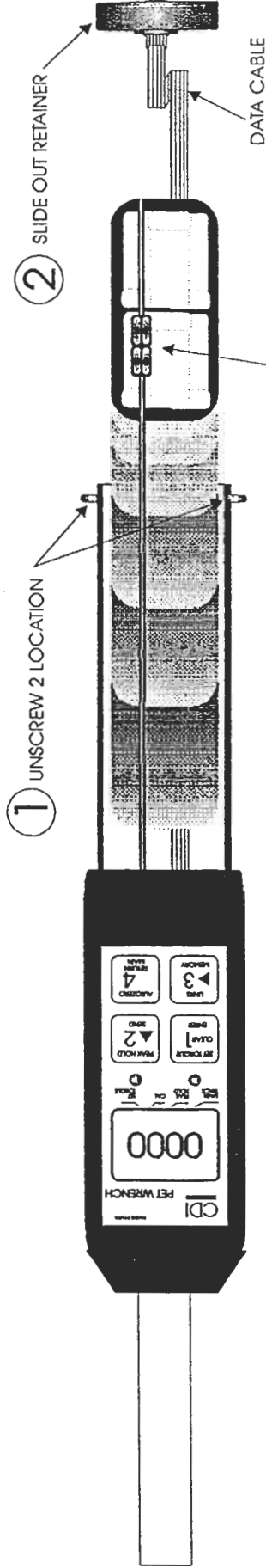


PET WRENCH & SERIAL PRINTER (RS-232)

PET WRENCH		6 FEET COAXIAL CABLE	PC	
SIGNAL	RECEPTACLE		D-SUB FEMALE 25 PIN CONNECTOR	SIGNAL
RxD	3	GREEN	3	RxD
GND	6	WHITE	7	GND

PROTOCOL : 1200 , 8 DATA BITS , 1 STOP , NO PARITY

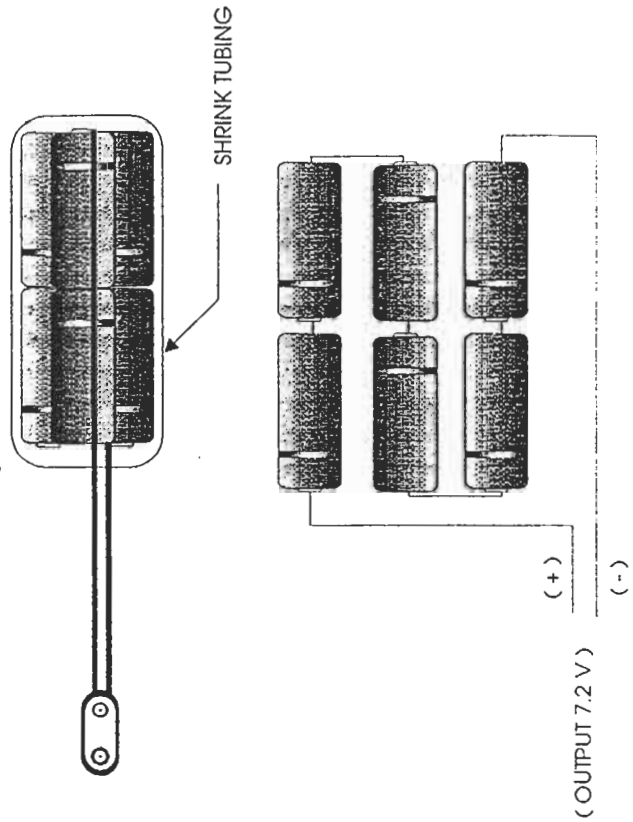




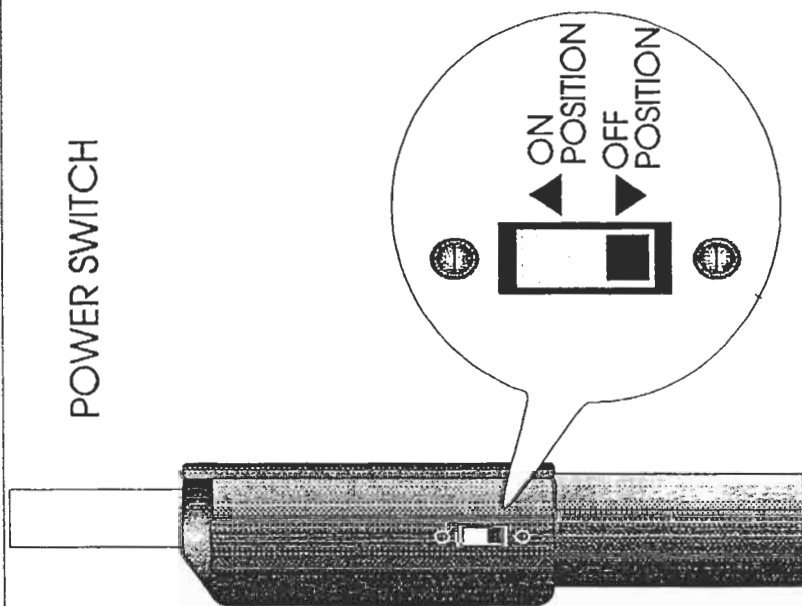
3 PULL OUT THE BATTERY PACK
UNPLUG THE OLD BATTERY PACK
REPLACE WITH NEW ONE (PART No : 1100-5)
REASSEMBLE RETAINER AND 2 SCREW

REPLACE BATTERY PACK

BATTERY PACK PART No : 1100-5

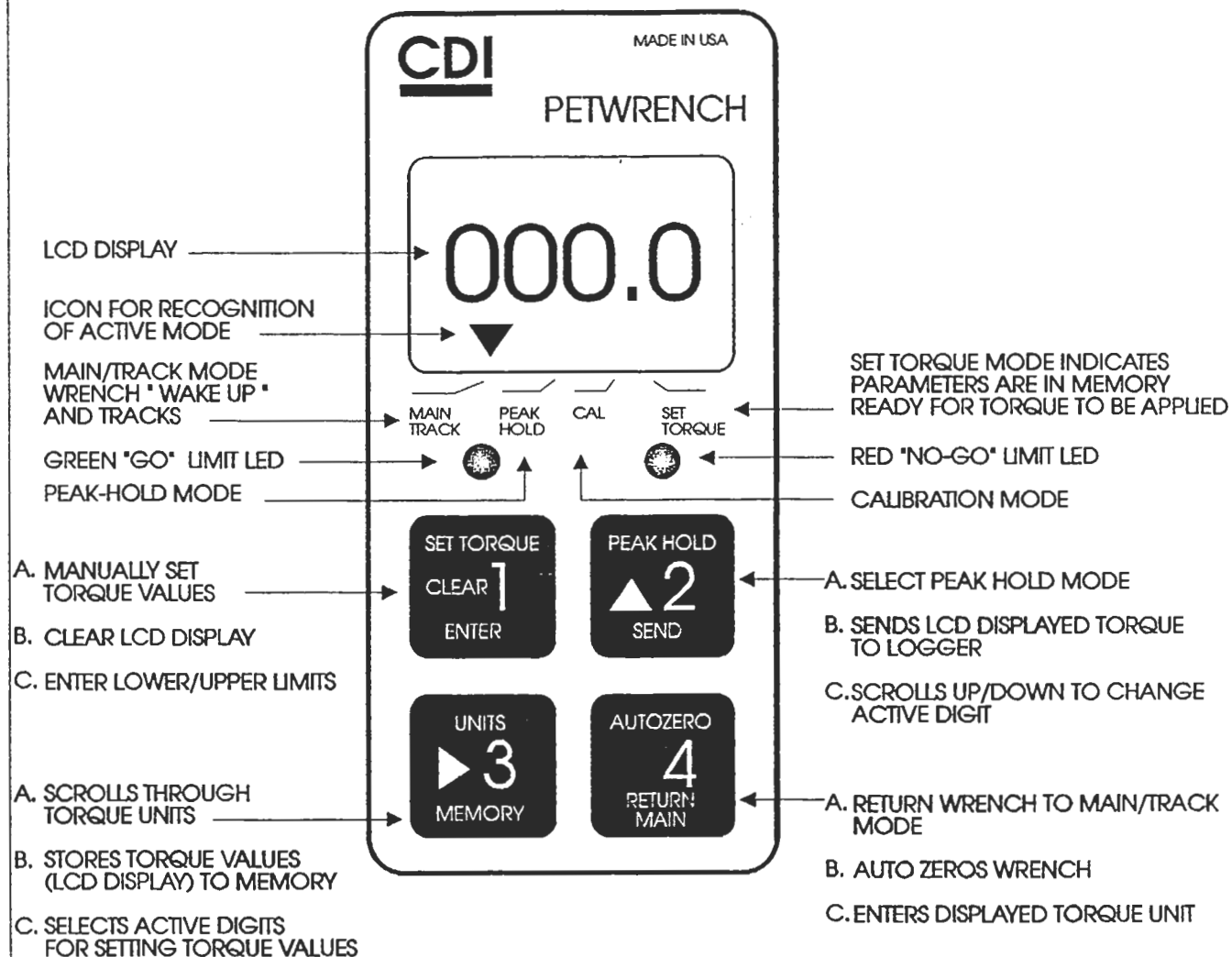


POWER SWITCH



PET-M/R SERIES

KEYPAD FUNCTIONS:



code 314

CALIBRATION PROCEDURES FOR THE PET TORQUE WRENCH

Due to the accuracy and the sensitivity of the PET Wrench, a mechanical loader with a torque display (preferably electronic) must be used to input torque. This loader is necessary because the human hand simply cannot "push" or "pull" on the wrench with enough stability for the torque input to be an accurate value.

The calibration procedure requires a pass-code (refer to the pass-code card provided with the torque wrench) for security.

The calibration procedure must always be done in both directions; first in the counter-clockwise (CCW) direction and then in the clockwise direction (CW).

There are three calibration points in each direction. They are usually, but not limited to, 10, 50 and 100% of full scale. During calibration, the wrench will automatically display a factory preset calibration point; however, this can be changed as needed.

Some important pre-calibration considerations:

- Make sure the PET wrench is level (horizontal) while in the loader. If not, side-loads will affect the true readings.
- Make sure the reaction point is in the center of the grip of the PET wrench.
- Make sure the least amount of sockets and adapters are used when mating to the torque transducer.
- Check all sockets and adapters for wear or "excessive play". This could result in false-loads being applied and shown on the display.
- When using CDI transducers, it is extremely important to orient the transducer in the mechanical loader properly. Please contact the factory if there are questions regarding this procedure.

IMPORTANT

Make sure the wrench is in the proper "units" code before calibration begins; i.e., a 300 in. lb. wrench that is to be calibrated in inch pounds must be in the unit code "U-1" (inch pound) prior to calibrating. The units code is clearly marked on the back of each PET wrench for your reference. Instructions for changing "torque units" are described in the operation manual supplied with each PET wrench.

Calibration Steps:

1. Turn the wrench "on" - the display should show four "0"'s.
2. Place the wrench on the mechanical loader and exercise it to the left (counter-clockwise) three consecutive times the maximum torque range of the wrench, i.e., 300 in. lbs.
3. Wait approximately 30 seconds after the last exercise above (after the 0000's reappear). Take the wrench off of the loader and hold, or point, the wrench vertically (without any load on the wrench), press the Auto Zero button (Key #4) on the wrench. Place the wrench back on the loader.
4. Press the Zero Tare button on the monitor/calibrator being used.
5. Press keys 1 and 2 simultaneously on the PET wrench being calibrated. The display should show the letters "CAL".
6. Press the first number of your pass code (Key #3). The display should show "CA".
7. Press the second number of your pass code (Key #1). The display should show "C".
8. Press the third number of your pass code (Key #4). The displayed "C" disappears and is replaced by "-0".

IMPORTANT The negative sign (-) in front of the "0" signifies that calibration in the left hand direction is ready to begin. The zero-signifies "zero" input.

IMPORTANT Make sure the wrench has no torque applied to the drive before going to the next step (otherwise the wrench will have a false zero point).

9. Press Key #1 to display the first left-hand zero calibration point. The display shows "----" for a few seconds, then will show the first expected calibration point; i.e., "050.0". The display will be blinking, signifying that you may change the value using the Keys #2 and #3 labeled with arrows on the wrench's faceplate.

10. Press Key #1 if the blinking value is acceptable as your first calibration point. If not----press Keys #2 and/or #3 to change the calibration point to the desired number. When the displayed torque value is acceptable, press Key #1 to accept this value. The display will stop blinking.

PROGRAMMABLE ELECTRONIC TORQUE WRENCH

11. Apply the proper torque value to the drive using the mechanical loader. When you have input the proper torque (when the calibrator reads the same as the PET wrench), press Key #3. This will calibrate the PET wrench at the desired point. The wrench will now display the second calibration point, i.e., "100.0".

12. Press Key #1 if the blinking value is acceptable as your second calibration point. If not---press Keys #2 and/or #3 to change the calibration point to the desired number. Then press Key #1 to accept this value. The display will stop blinking.

13. Apply the proper torque value to the drive using the mechanical loader. When you have input the proper torque (when the calibrator reads the same as the PET wrench), press Key #3. This will calibrate the PET wrench at the desired point. The wrench will display the third calibration point; i.e., "250.0".

14. Press Key #1 if the blinking value is acceptable as your third calibration point. If not---press Keys #2 and/or #3 to change the calibration point to the desired number. Then press Key #1 to accept this value. The display will stop blinking.

15. Apply the proper torque value to the drive using the mechanical loader. When you have input the proper torque (when the calibrator reads the same as the PET wrench), press Key #3. This will calibrate the wrench at the last (-) desired point. The display then should read "+0". This signifies that the calibration data has been entered for the counter-clockwise direction (CCW).

IMPORTANT

15. Prior to calibrating in the clockwise direction (CW), exercise the PET wrench (clockwise) three consecutive times to the maximum torque range of the wrench, i.e., 300 in. lbs. When the last exercise is completed, wait 30 seconds (this is after the "+0" appears on the display). It is important to press the Zero/Tare button on the monitor/calibrator again at this time. Place the wrench back onto the loader.

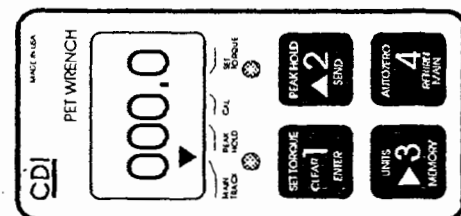
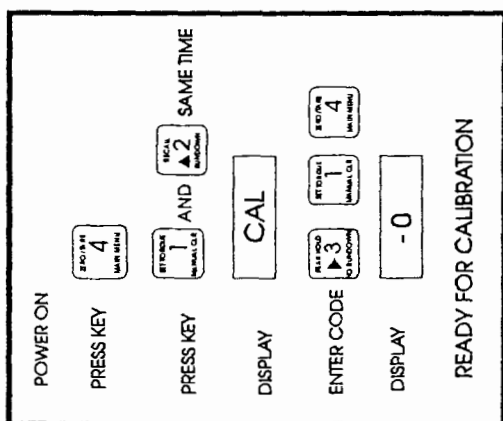
16. Press Key #1 and the first calibration point expected in the clockwise direction--(CW) will be blinking.

IMPORTANT

Follow steps #9-14 above to complete calibrating in this direction. The wrench display will show the "reading" of the last calibration point in the clockwise (CW) direction when the calibration procedure has been completed.

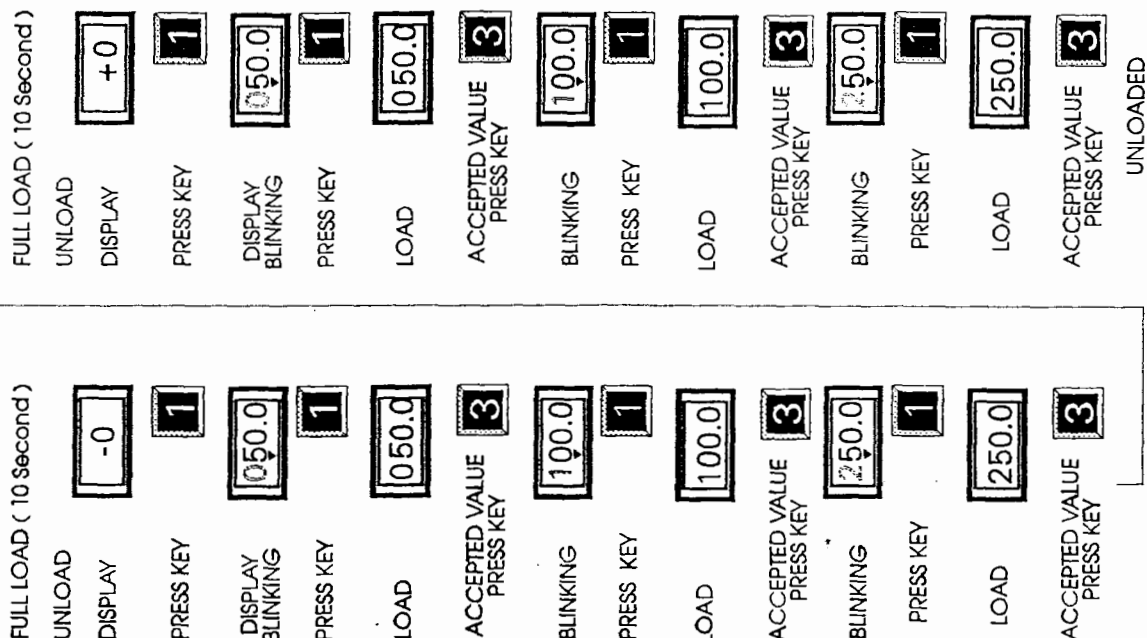
YOU ARE DONE!!!

QUESTIONS ? Consolidated Devices, Inc.
19220 San Jose Ave
City of Industry, Calif. 91748
(800) 525-6319



EXAMPLE : CALIBRATION 300 IN-LB

(TURN COUNTER CLOCKWISE)



YOU ARE DONE!!!

CDI

19220 SAN JOSE AVE
CITY OF INDUSTRY CA 91748
PH. 1-800-525-6319
FAX 818-810-2759

Manufacturer of quality:
Micrometer torque wrenches
Dial torque wrenches
Electronic torque wrenches
Electronic torque testers
Electronic force testers

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in the compilation of this manual- CDI
assumes no responsibility for errors or
omissions. Additionally, no liability is
assumed for any damage that may result
from the use of the information contained in
this manual.