Digi-Star★

TCX-1000 SERIES GENERAL OPERATION & INSTALLATION MANUAL

READ THIS FIRST

TYREL PRODUCT NOTICE – GROUNDING   6/2/96

Proper grounding is critical to ensure correct operation of your new TCX-1300 Scale Indicator.

After mounting the indicator, ***directly connect the power cable of the indicator to the vehicle battery or regulated power supply.***

The stand of the TCX-1300 should be connected to the vehicle frame using a lugged 16AWG or heavier stranded wire. This lug can be connected to one of the bolts, which secures the indicator stand to the truck if the installation allows. Alternatively this lug can be connected to one of the two #6 screws at the bottom of the stand back-plate on the backside.

NOTE: In many newer vehicles the body and cab are isolated from the frame, making these unsuitable for ground connections. The chassis ground from the indicator must be connected to the frame of the vehicle to ensure proper grounding.

When using a junction box, the negative load cell excitation must not be connected to ground In the TCX-1300 negative excitation is not the same as frame ground… so if negative excitation shorts to frame ground, it will cause a short and the TCX-1300 will be damaged. Likely it will have a failure to show a weight. The Negative Excitation Wire is connected to position 4 of the TCX-1300's Load-Cell Connector. Be sure the negative excitation lead and ground are separate.

NOTE: In the TCX-1300 the negative excitation is carried on the black wire. Digi-Star J-box cables (and possibly other brands) have the black wire connected to the shield wire. With this type of J-box cable, the installer must make sure that the

shield wire is electrically isolated from the junction box. To isolate the shield wire form the J-box, cut it, or apply electrical tape.

If the scale head is serviced in the field, please verify that all ground connections are secured. Even verify connection of ground wires inside the TCX-1300.

Whenever Welding, Jump starting, charging or any kind of electrical work on the truck, tractor or mixer,
<u>Disconnect the power and load cell connections to the TCX-1300</u>. Major internal damage can be caused by not disconnecting.

NOTE: For specific operator instructions refer to the firmware guide.

I. OPERATOR INSTRUCTIONS

For specific operator instructions refer to the firmware guide included with this manual, or refer to the "ON CD Manual."

A. POWER ON SEQUENCE

When the "ON" button is pressed, the indicator will power up into either the warm up cycle or go to gross cycle depending upon how the indicator is configured. These two cycles refer to "warm-up" or "GotoGr" in the configuration menu. These options are set up by the installer to comply with your local weights and measures regulations. In most applications, the indicator will be configured on the GotoGr mode. This will allow simple power on and go operation. During either power on mode, the indicator will enter the segment test.

SYSTEM WARM UP
During a warm up cycle, the upper weight display will show all eight's and the annunciators will flash on and then off, with appropriate LED's displaying the current configuration of the indicator (Gross or Net, Lbs. Or Kg's etc). If the warm up cycle lasts for more than 30 minutes call your scale service dealer. Upon completion of the warm up cycle the unit will enter the segment test. The warm up cycle is designed to allow the circuits to stabilize at a working temperature. The warm up option in not necessary for normal indicator operation.

SEGMENTS TEST
During the segments test, the weight display will show all eight's and all eight annunciators will be on. If no interaction is taken with the indicator, the gross mode will be displayed.

> **NOTE**: If system warm up is disabled (i.e. go to gross gotogr enabled) the unit will enter the segment test at power on bypassing warm up cycle.

B. PRESSING THE ESC KEY DURING SEGMENTS TEST

By pressing esc during segments test the user will have options to change time/date, load/delivery, tolerance, print settings, remote settings and others. For more detail refer to the "TCX-1300 ON+ESC Flow chart, included with this manual, or specific sections within this manual.

C. ID/RECALL

Pressing the ID/RECALL button will usually access the Mem Card functions of the TCX 1300, some versions of Firmware do not operate this way, refer to your Firmware guide for more information. The Mem Card functions allow you to pass information to the Mem Card "Log in" and place completed feeding records into the Mem Card "LogoUt".

D. SETPT/ALARM

Various versions of firmware offer options to modify Setpoint parameters, call Digi-Star's service department at (920) 563-9700 for assistance.

E. ZERO KEY

Press the Zero key to zero an empty scale. The ZERO key will only zero the gross weight. Pressing the ZERO key while displaying NET weight will have no affect on the net or gross weights

NOTE: The Zero key can be used to zero a scale for a weight such as a container or pallet that should not be included with the item to be weighed, same applies for auto tare.
NOTE: The Zero key only works when the indicator is in the gross weigh mode and the gross weight is within the zeroing range of 2% or 100% as selected by the installer, and when there is not an overload, underload, or scale in motion condition.

F. GROSS/NET KEY

Press the Gross net key during segments test to immediately enter Gross weighing mode. During normal weighing operations pressing the net/gross key will switch between the gross and net weight.

G. AUTO TARE KEY

Press the Auto Tare key to tare the scales net weight to zero. Press the Auto Tare key to tare scales net weight to zero. If the auto tare key is pressed while the 1300 is in the gross weight mode then the indicator will be placed in the net weight mode.

NOTE: The Auto Tare key will not operate with an overload, underload, scale in motion condition, or if the weight is negative.

H. UNITS KEY

Press the Units key to switch between the LB and KG weigh units. The units button will only function if the configuration step "2 Unit" has been enabled. See Operational Flowchart for more information.

I. PRINT KEY

Press the Print key to print a weigh ticket. In either the gross or net modes a weigh ticket can be printed as formatted using the "Printr" configuration. (See Firmware guide)

NOTE: The time and date will be printed if enabled.
Printing is inhibited if the gross weight is negative or if o-LoAd, U-Load, no tiC, or
no BAL is being displayed in the upper display. Often an o-Load or U-Load condition can be solved by Zeroing and/or auto taring the indicator. If the indicator is too sensitive to motion, the motion detection stability window can be altered.
The message "no-tic" refers to no ticket present in the printer. Check the printer for problems as well, as the cabling to the indicator. If it should be required to disable the indicators ability to detect a ticket in the printer, this can be done with the buSy configuration step in the printer subsection.

J. SETPT/ALARM KEY

The set-point setup mode can only be entered from the weigh mode for which the set point is configured.

Press the set-point key to display the set-point weight settings.

NOTE: Set-Points may only be setup in the primary (LB or kg) units, but are functional in both the primary and alternate units.

If the value needs to be changed then set the new value per the following:
> Press the NO/CLEAR key to clear the value to zero.
> Press the YES/ENTER key to save the new value

NOTE: The set point responds to the absolute value of the weight reading (minus signs are disregarded). Thus, a negative weight condition may be used to activate the set point for weigh out applications.

K. ANNUNCIATORS

Eight enunciators are located to the left and right of the upper display.

ID# This annunciation is on in the id# entry/recall sequence.

MOTION when on motion is present on the scale.

LB and KG Either the LB or the kg annunciator will be on whenever the indicator is in the one of the weigh modes.

TARE WEIGHT On in the manual tare entry mode.

GROSS WEIGHT When on the indicator is in the gross weigh mode

NET WEIGHT When on the indictor is in the net weight mode

SET PT On in the setpoint entry mode.

CENTER OF ZERO A letter "c" displayed in the top half of the most significant digit. When on, the gross weight is within ¼ of a graduation of true zero.

L. ERROR MESSAGES

o-LoAd Whenever the weight on the scale exceeds 102.5% of the scale capacity the error message o-LoAd will be displayed.

U-LoAd The scale may need servicing. Disconnect Load-Cell cable and press the word ZERO, then reattach cable.

No bAL The printing was inhibited by scale motion. This message may be displayed during the calibration procedure or during the printing process. Look at the raw counts and see if

they are varying by more than +/- 20 counts. If they are make sure the truck is not running for calibration. Check the filter settings and make adjustments if necessary.

No tiC The ticket was not printed. The ticket may not have properly placed in the printer. The CTS line was not at the proper state to print a ticket, see section 3 for more information. Make sure the buSy= configuration step is not set to buSy=1 in the printer configuration section.

OFLO The indicator internally has gone into over range. Press the Zero button in the gross mode and the Autotare button in the Net mode. This may correct the problem, the scale may have lost the zero point. The scale may need servicing.

UFLo The indicator internally has gone into under range. Press the Zero button in the gross mode and the Autotare button in the Net mode. This may correct the problem, the scale may have lost the Zero point. The scale may need servicing.

NoCArd There is no MemCard in the socket or the cable to the MemCard socket is damaged or missing. Check to see that the card is inserted correctly and nothing is blocking the pins at the bottom of the socket. Try the MemCard in the controller or another indicator. Try the MemCard socket in a different indicator. If problems persist call your local scale dealer.

LobAtt The indicator has an internal battery voltage detector. If the voltage to the indicator is less than approximately 10.8 volts, this message will be displayed. The message will flash on the display for a period of time determined by the configuration step Lbt=***. After the time period defined by this step, the indicator will shut off. This auto-shutoff feature can be software disabled by Lbt=no

no A-d Calibration was not completed due to A/D errors. Check the internal counts.

-- SPAn Calibration was not completed due to a zero or negative span. Test weight may not be on scale.

LoSPAn Calibration was not completed due to insufficient number of internal counts per graduation.

Hi CAP Calibration was not completed due to lack of over-capacity span. The TCX 1300 must be able to display 104% of the capacity.

II. TIME & DATE

A. *ENTER TIME, DATE SETTING MODE*

The setup can be accessed at power on, by pressing the ECS key once during the segment test, "t-DAtE" will be displayed. Press the ON/POWER key from any mode to display segment test.

Press the ENTER key to display the first Time/Date setup step, or press ESC to cycle through the user menus. Pressing ESC will take the user to each of the configuration heading. Pressing Enter at any of the headings or subheading will cause a value to be recorded and the new submenu item to be displayed. If Enter is pressed at the bottom of a sub-category, the next main category will be displayed.

B. *USING THE KEYPAD TO SET THE TIME AND DATE*

To change the values of time and date:

Use: "0"-"9" to enter numeric values for steps displaying a blinking digit.

NO/CLEAR to clear the last digit to 0.

↑ to select the next option from a list of options, if a list of options applies. Otherwise use the numeric keypad.

↓   to select the previous option forms a list of options, if a list of options applies. Otherwise use the numeric keypad

ESC to abort entry of the prese   nt step and restart the menu.

NOTE: Press the ENTER key to save the new value. A new entry will be stored only by pressing ENTER, even though there are other ways to exit a step.

C. *SETTING TIME & DATE*

Press the POWER / ON button
While the indicator is in all 8's press the ESC button. The upper display will now show t-dAtE
Press the YES/ENTER button once and the lower display will show the current time in military 24hr format. The time displayed may look something like this:

                         ti 15:21

This would correspond to 3:21 p.m.   ti:hh:mm   hh= Hours   mm= Minutes

Key in the new time, in 24hr format, using the keypad on the front panel of the indicator. Once you press the first digit of the time you are to enter, the time will become 00:00 with the rightmost digit replaced by the number just entered.
Key in the rest of the digits and after all the digits have been entered, press the YES/ENTER button. Be shure not to press YES/ENTER between the digits. After the YES/ENTER button has been pressed, the date will be displayed in the format:

                         03:14:01

Which corresponds to March 14, 2001 and the rightmost digit will be blinking.

Date Setting mm: dd: yy mm=month dd=day yy=year

Key in the new date using the keypad on the indicator pressing YES/ENTER once all the digits have been entered. To erase an incorrect digit, pressing the NO/CLEAR button and that digit will disappear.

Press the ENTER key to save the current date and time

D. RUN/HALT INTERNAL CLOCK

To access the run/halt feature in the internal clock, press the ON button and while the indicator is on the segments test press the ESC button twice.
The display will show "td-Con". Press the ENTER key to display the current time date control step or press ESC to cycle through the user menus.
Use the arrow keys to change the display from run to halt and back. The two setting for the run/halt setting are:

Clock Run/Halt   td run= Clock is running
                          tdHALt= Clock Halted

Note: Selecting tdHALt will power off the TCX 1300. This step allows the user to stop the TCX 1300's Time / Date Clock to save battery life. This step should be used only if the TCX 1300 is to be stored for a long period of time. This option is rarely if ever used in the field.

III.SERIAL CONFIGURATION

A. SERIAL OUTPUT

The serial port output provides information displayed in the upper display of the TCX 1300. As input, any of the keys can be pressed from the front panel can be transmitted to the indicator through the serial port from a computer. Additionally, remote displays such as the RDD-200 can transmit the print command to the TCX 1300 for the remote printing.
The serial port setup can be accessed at the power on, by pressing the ESC key three times during the Segment Test. The ESC key is also used to toggle through cub-sections of the setup. The ENTER key is used to access steps within a sub-section.

B. USING THE KEYPAD TO ACCESS SERIAL FUNCTIONS

If the value needs to be changed then SET the NEW value per the following:
Use: "0"-"9" to enter numeric values for steps displaying a blinking digit.

NO/CLEAR to clear the last digit to 0.

↑ to select the next option from a list of options.

↓ to select the previous option from a list of options.

ESC to abort entry of the present step and restart the menu.

NOTE: Press the ENTER key to save the new value. A new entry will be stored only by pressing ENTER, even though there are other ways to exit a step.

C. SERIAL OUTPUT CONFIGURATION

At SEriAL Press the ENTER key for the next step

Refer to the following table to setup communications

Serial Communication Setup Table

CONTROL	PROGRAM VALUE	AUTO CONFIG 1&2	VALUE 3
SERIAL	Sio on = Serial output enable	Sio off	Sio on
	Sio off = Serial output disable		
SERIAL	Sio dE = Serial output on demand.	Si dE	Sio Co
	"T" command must be transmitted to the indicator		
	through serial port to cause indicator to transmit display		
	information out through serial port.		
	Sio Co = Continuous serial output, the serial output is		
	interruped momentarily during a print cycle.		
SERIAL	bd0600 = 600 Baud	bd1200	bd1200
	bd1200 = 1200 Baud		
	bd4800 = 4800 Baud		
	bd9600 = 9600 Baud		
SERIAL	CHAr8n = 8 Data bits no parity	CHAr8n	CHAr8n
	CHAr7n = 7 Data bits no parity		
	CHAr7E = 7 Data bits even parity		
	CHAr7o = 7 Data bits odd parity		
	CHAr7I = 7 Data bits ignore parity		

Other options may exist in Serial configuration menu depending upon firmware version. Check specific firmware application note for more details.

D. SERIAL COMMUNICATIONS MODES

The serial output will mirror the upper display according to the data format described below.

When "Sio on" and "Sio dE" are selected the indicator will transmit data only when it receives a "T" control code, as described below.

E. SERIAL DATA FORMAT

All characters are in ASCII

The output Data Format is:
CR / D6 / D5 / D4 / D3 / D2 / D2 / D1 / D0 / STATUS / DISPLAY-MODE / LF

CR = ASCII Carriage Return ODH
D6 = The most significant weight digit or 2DH if minus weight
D5-D0 = Weight digits plus a decimal point 2EH
STATUS = Description below:
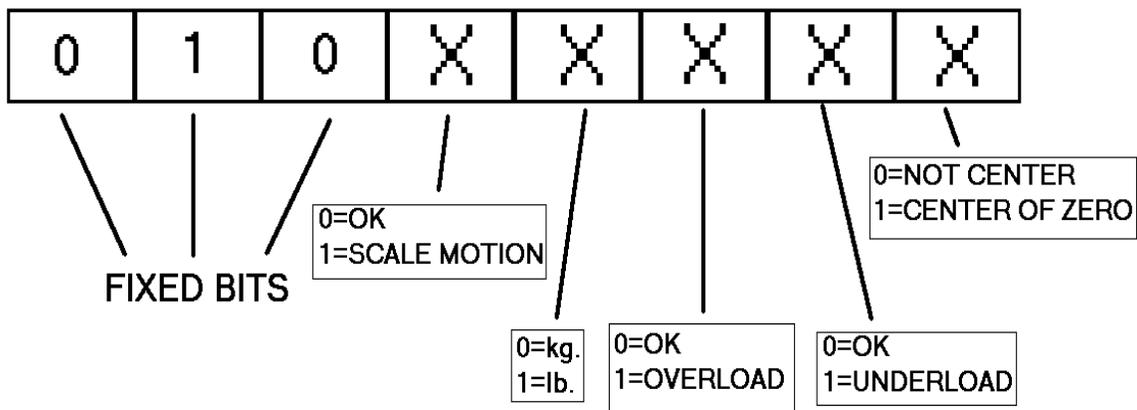
DISPLAY MODE = The display mode byte indicates the mode of the indicator. See the following table:

ASCII CHARACTER	DESCRIPTION
0	SEGMENTS
1	TIME / DATE
2	OUTPUT
3	PRINTER FORMAT
4	GROSS
5	NET
6	INTERNAL COUNTS
7	CONFIGURATION
8	CAPACITY
9	CAL 0
:	CAL POINT
;	TARE
<	WARM-UP IN PROGRESS
=	ILLEGAL

>	SET POINT MODE
?	ILLEGAL

LF = ASCII Line Feed 0AH

F. CONTROL CODES FOR COMPUTER CONTROL

If a cable is connected to the serial port and the codes listed below are sent to the indicator, the indictor will perform the listed tasks. This can be quite useful, if programming of the indicator is to be done from a computer. All information that can be entered in from the front panel can be done through the serial port. This includes ration and feeding information. The only operation that cannot be done through the serial port is the pressing of calibration switch (SW1). This is an NTEP requirement. However, if a single raw count reading is needed while in any mode, the "T" DATA REQUEST command can be issued to get the current raw count value. This command may be issued continuously to access sequential rawcount clues. If data is to be entered for batching or feeding information (i.e. information on the 2x40 display) the same entry format for letters is required as with front panel entry. This means that to enter the letter "Q", for example, the number 7 should be sent through the serial port followed by the down arrow twice. The information that is displayed on the upper display will be sent back through the serial port. There is no means of transmitting any of the information on the 2x40 display back through the serial port to the host computer.

MESSAGE	FUNCTION
Z (5AH)	ZERO
A (41H)	AUTO TARE
M (4DH)	GROSS / NET
P (50H)	PRINTS
U (55H)	UNITS
C (43H)	CLEAR
0-9 (30H-39H)	0-9
+ (2BH)	ACCUMULATOR
S (53H)	SET POINT
T (54H)	DATA REQUEST
^R (12H)	RESETS INDICATOR
R (52H)	ID RECALL
ESC (1BH)	ESCAPE
CR (0DH)	ENTER
< (3EH)	↑
> (3CH)	↓

NOTE: Check with dealer for correct firmware version to utilize "+" Accumulator control code.

G. SHIELD TERMINATION OF CABLES

All cables entering the TCX 1300 indicator enclosure should be shielded cable and have its shield terminated in the following fashion:

A. Strip the cable jacket (outer insulation) back so that a 1-inch length of the shield wire is exposed.
B. Crimp and solder the appropriate pin gender to the shield lead. Insert the pin into an available amp connector plughole.
C. Crimp and solder the mating pin to a 12" long, 24 gauge insulated wire insert the pin into the matching AMP connector receptacle position. Termination may be shield wire at the nearest mounting stud / screw inside the enclosure. Termination may be made either by wrapping the wire around the stud or by installing a lug on the wire.

H. *SERIAL INTERFACE CONNECTIONS*

Serial interface connections for serial communication are made to terminal block J1 located on the indicator circuit board to the lower left of the circuit board. The female 8 pin weather tight AMP receptacle's pinout is described in the chart below.

BI-DIRECTIONAL SERIAL RS232C OUTPUT

6 PIN MALE ON-BOARD MOLEX RECEPTACLE "J"	8 PIN FEMALE INDICATOR CASE AMP RECEPTICLE	SIGNAL	SIGNAL TYPE	DEFINITION	DIRECTION
3	2	RxD SERIAL	RS-232c	RECEIVE DATA	IN
4	3	TxD SERIAL	RS-232c	TRANSMIT DATA	OUT
1	5	ON-MOMENTARILY GROUNDTO TURN INDICATOR ON			
5	6	REMOTE DISPLAY POWER CONTROL LINE			
2	7	COMMON GROUND			
6	8	+12 VDC BATTERY			

I. COMMUNICATIONS CABLE INSTALLATION INSTRUCTIONS

Disconnect the MAIN DC POWER line from the indicator.
Use a shielded cable and terminate the shield.

Insides of scale head
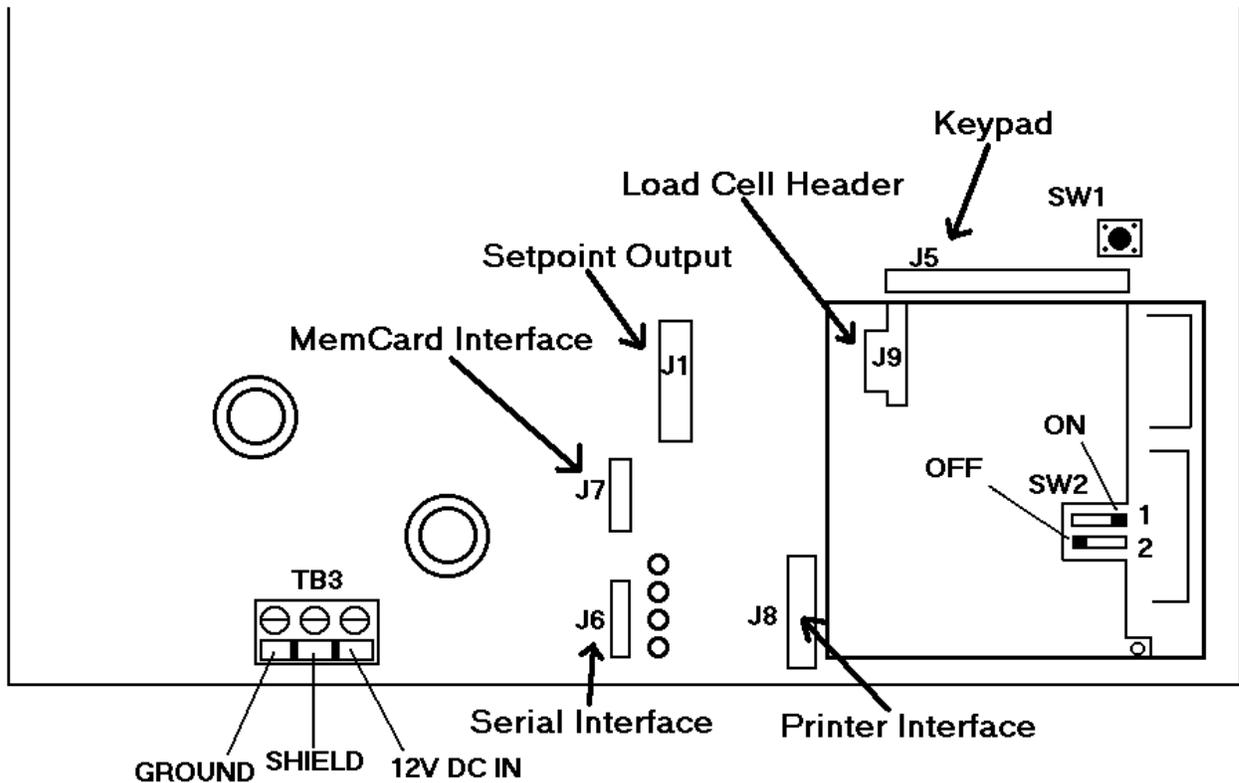
IV. PRINTER INSTALLATION

A. *PRINTER OUTPUT*

The setup can be accessed at power on, by pressing the ESC during the segment test. The ESC key is also used to toggle through subsections of the setup. The ENTER key is used to access steps within a sub-section.

B. *ENTERING VALUES*

If the value needs to be changed then set the new value per the following:

Use: "0" – "9" to enter numeric values for steps displaying a blinking digit.
Press CLEAR to clear the last blinking digit to 0.

↑ to select the next option from a list of options.

↓ to select the previous option from a list of options

ESC to abort entry of the present step and restart the menu.

NOTE: Press the ENTER key to save the new value. A new entry will be stored only by pressing ENTER, even though there are other ways to exit a setup.

C. *PRINTER OUTPUT CONFIGURATION*

With the display showing "Printr" press the ENTER key to display the first printer output setup step, or press ESC to cycle through the user menus.

STEP	PROGRAM VALUE	AUTO CONFIG 1&2	AUTO CONFIG 3
Ptr on	Printer Output Enabled	Ptr on	Ptr on
PtroFF	Printer Output Disabled		
tCP-10	Tyrel TCP-10 Printer	Stndrd	TCP-10

tCP-40	Tyrel TCP-4000 Printer		
SP2000	Fargo SP-2000 Printer		
idS152	IDS Model 152 Printer		
tCP-rP	TCP-10 in Reverse Mode		
Stndrd	Standard Printer Codes		
bUSy	=1	bUSy=0	bUSy=0
bUSy	=0		
bd0600	600 Baud	bd1200	bd1200
bd1200	1200 Baud		
bd4800	4800 Baud		
bd9600	9600 Baud		
CHAr8n	8 Data Bits No Parity	CHAr8n	CHAr8n
CHArn	7 Data Bits No Parity		
CHAr7e	7 Data Bits Even Parity		
CHAr7i	Data Bits Ignore Parity		
toL=__	toL=__		
Ogd=__	Ogd=__		
	Aptr=n		
	Aptr=y		
	bEEP=n		
	bEEP=y		

NOTE: To test the functionality of the print button or a remote with remote print feature set the busy=1. Press the print button or trigger the remote display remote button. If the indicator has received the print command the message "No Tic" will be displayed on the upper display. This indicates that a request for printing was received by the indicator. If this procedure works for the remote display it infers problems in the field. Set the option back after the testing is done.

D. TICKET FORMAT

The ticket printing capability of the TCX 1300 is highly formatable. The user can choose where the various labels should appear on the ticket by choosing the line and the column where text is to appear.

STEP	FUNCTION	PROGRAM VALUE	AUTO CONFIG 1 & 2	AUTO CONFIG 3
grLn	Gross Print Line	00 = NO PRINT	1	1
		01 – 79 = LINE #		
grCo	Gross Print Column	01 – 23 = COLUMN #	1	1
ntLn	Net Print Line	00 = NO PRINT	3	1
		01 – 79 = LINE #		

ntCo	Net Print Column	01 – 23 = COLUMN #	1	1
tALn	Tare Print Line	00 = NO PRINT	2	0
		01 – 79 = LINE #		
tACo	Tare Print Column	01 – 23 = COLUMN #	1	0
tiLn	Time Print Line	00 = NO PRINT	4	1
		01 – 79 = LINE #		
tiCo	Time Print Column	01 – 33 = COLUMN #	10	27
dALn	Date Print Line	00 = NO PRINT	4	1
		01 – 79 = LINE #		
dACo	Date Print Column	01 – 30 = COLUMN #	10	27
idLn	Id Number Print Line	00 = NO ID Number Print	5	1
		01 – 99 = ID Number Line		
idCo	Id Number Print Column	00 = No ID Number Print	1	1
		01 – 99 = ID Number Column		
CnLn	Consecutive Number Print Line	00 = No CS Number Print	0	0
		01 – 99 = CS Number Line		
CnCo	Consecutive Number Print Column	00 = No CS Number Print	0	0
		01 – 99 = CS Number Line		
FdLn	Feeding Number Print Line	00 = No Fd Number Print	0	2
		01 – 99 = Fd Number Line		
FdCo	Feeding Number Print Line	00 = No Fd Number Print	0	1
		01 – 99 = Fd Number Line		
PnLn	Pen Number Print Line	00 = No Pn Number Print	0	3
		01 – 99 = Pn Number Line		
PnCo	Pen Number Print Column	00 = No Pn Number Print	0	1
		01 – 99 = Pn Number Line		
rtLn	Ration Number Print Number	00 = No rt Number Print	0	3
		01 – 99 = rt Number Line		
rtCo	Ration Number Print Line	= No rt Number Print	0	16
		01 – 99 = rt Number Line		
CALn	Call Weight Print Line	00 = No CA Weight Print	0	4
		01 – 99 = CA Weight Line		
CACo	Call Weight Print Line	00 = No CA Weight Print	0	1
		01 – 99 = CA Weight Line		
drLn	Delivered Weight Print Line	= No dr Weight Print	0	4
		01 – 99 = dr Weight Line		

drCo	Delivered Weight Print Line	= No dr Weight Print 01 – 99 = dr Weight Line	0	18
gp	Gross Mode Printout	gtn = Weights Printed Form Gross g = Gross Print	gtn	g
gtn	Weight Digit Print Character Size	ds = Double Size Print ns = Normal Size Print	ds	Ds
t	TIME FORMAT Some Software Versions Require 24 Hour Formats Due to Data Recording Compatibility Date Format	12Hr= 12 HOUR AM / PM 24Hr= 24 HOUR	12AP	12AP
USdAtE **ECdAtE**		= MM-DD-YY = DD-MM-YY	USdAtE	UsdAtE
LEgndS **NoLgdS**	Weight Legends	= PRINTED = SUPPRESSED	LEgendS	LegndS
PrUnit	Print Units	= PRINT UNIT	PrUnit	noUnit
tAPr	AUTOTARE ON PRINT If the user requires that the indicator autotare on print, this option should remain enabled	tAPr=n NO AUTOTARE tAPr=y AUTOTARE ON PRINT ON PRINT	tAPr=n	tARp=y
CSn	Consecutive Number Clear	CSn=on INCREMENTS CS NUMBER ON PRINT CSnClr RESET CS NUMBER	CSn=on	CSn=on

E. PRINTER DATA OUTPUT FORMAT

The printer communication channel consists of an RS-232 data output and a device busy input. The printer output is only active when the printer output has been enabled.

All characters are in ASCII.
The Data formats are:
 Time   Date   Gross   Net   Tare
HH:MM MNM-DD-YY WWWWWWWWuu GR WWWWWWWWuu NT WWWWWWWWuu TA
Note: uu = LB or kg, units currently displayed
       W = Weight Digit, minus sign, decimal point, or blank space

## F. PRINTER INTERFACE CONNECTIONS

For printer communication are made to the 4 pin male AMP receptacle as shown in the diagram below. Refer to the following diagram and table.

Inside of connector

Black = Ground

Red = Tx to Printer
Yellow = Busy Signal to 1300 From Printer

MOLEX CONNECTOR
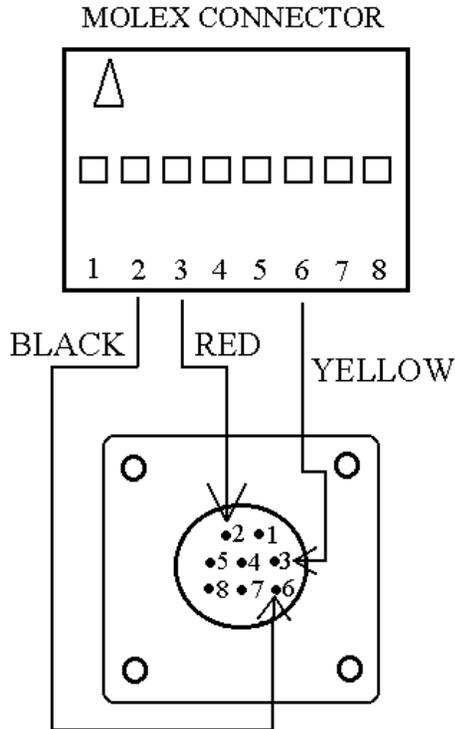
V. INSTALLATION INSTRUCTIONS

A. SHEILD TERMINATION OF CABLE

Entering the TCX 1300 indicator enclosure should be a shielded cable and have its shield terminated in the following fashion:

Strip the cable jacket (outer insulation) back so that a 1 inch length of the shield wire is exposed. Preserve approximately 1 inch of the shielding foil, if possible.
Crimp and solder the appropriate pin gender to the shield lead. Insert the pin into an available amp connector plug hole.
Crimp and solder the mating pin to a 12" long, 22 gauge insulated wire and inset the pin into the matching stud/screw inside the enclosure. Termination may be made either by wrapping the wire around the stud or by installing a lug on the wire

B. CONNECTING D.C. POWER

TB3
1   GROUND (Direct to Battery)
2   + 12 Volt D.C. Power input (Direct to Battery)

Note: If D.C. power drops below 8.7 volts, the indicator will flash LobAtt. If the input voltage drops below 5.5 volts, the indicator will reset itself.

C. *LOAD CELL CABLE INSTALLION INSTRUCTIONS*

Disconnect the main D.C. power line from the indicator.
The lad cell cable should be a shielded cable. Terminate the shield
Strip the insulation off each conductor wire of the cable back 3/8" from wire end.
 Crimp and solder the supplied male AMP pin to the appropriate conductor wire.
Insert the pin into the appropriate AMP connector plug hole, according to the load cell connections chart in this section.

D. *SET POINT CONNECTION*

SETPOINT WIRING CHART FOR TERMINAL BLOCK TB1

TB1 POSITION NUMBER	DEFINITION
1	SETPOINT #8
2	+5 VOLTS
3	GROUND

TB1 BEEPER

+5V

GROUND

Keypad

Load Cell Header

SW1

Setpoint Output

J5

MemCard Interface

J1

J9

J7

ON

OFF SW2

1

2

TB3

J6

J8

Serial Interface

Printer Interface

GROUND SHIELD 12V DC IN
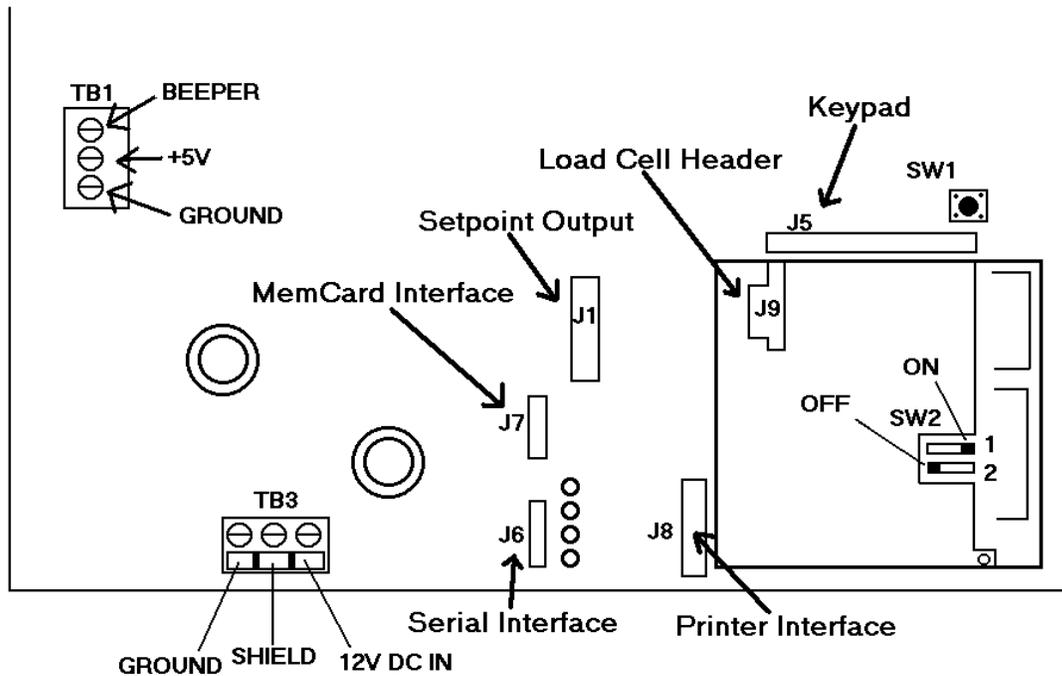
VI.   TCX 1300 CONFIGURATION AND CALIBRATION

A. CONFIGURATION / CALIBRATION MENU

After pressing the internal calibration switch "SW1" on the circuit board directly above the keyboard pigtail slot, the internal counts will be displayed. If the unit has not been calibrated before or the e-prom has been replaced, the raw counts may appear to jump from one value to another thousands of counts away. An auto-configuration may help solve this problem.
Once the raw counts are showing press the enter key once to display ConFig. Pressing ESC after this will display the menu headings listed below.

199999 = Internal counts 000000 to 400000 under normal conditions, approximately 199999 with no load cell connected. If there should ever be an error message displayed, pull the load cell connector off and correct the problem.

ConFig = Configuration Setup
SetPtS = Setpoint Setup
ACLtrS = Accumulation Entry
**CAPCty** = Capacity Entry
CAL 0 = Zero Calibration
CALPt1 = Span #1 Calibration, to
CALPt8 = Span #8 Calibration

B. CONFIGURATION INSTRUCTIONS

Press the program key "SW1" from any mode to display internal counts. This key is located on the opposite side of the TCX 1300.
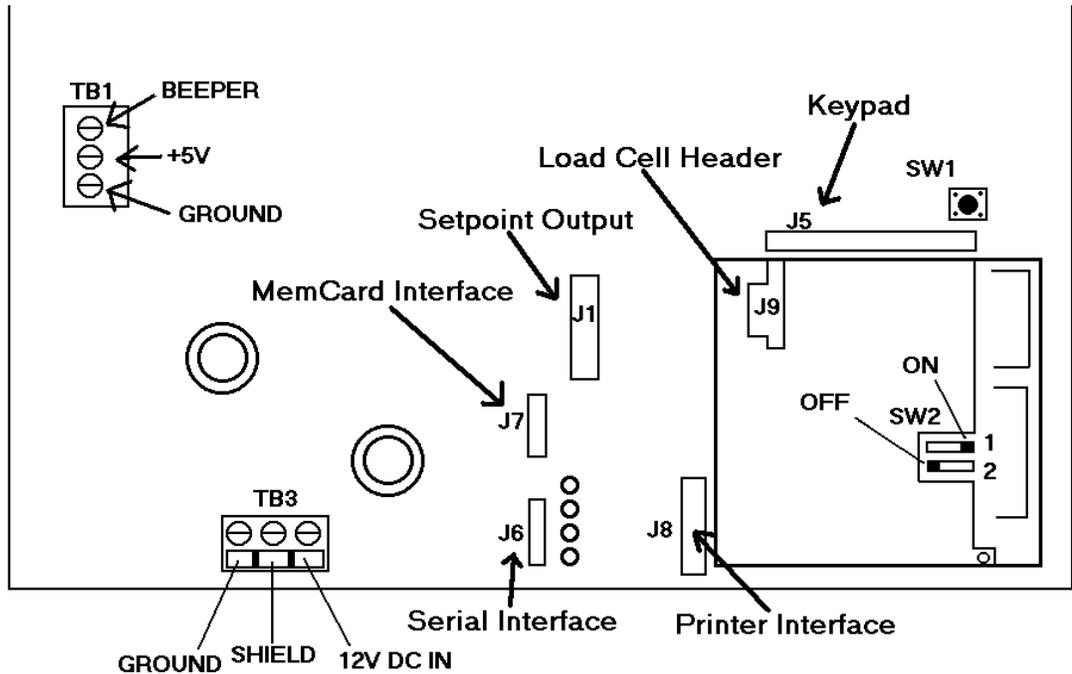
Press the enter key to display the first configuration menu setup, or press ESC to cycle through the calibration menus.

C. TO ENTER VALUES IN THE CALIBRATIONS MENUS

Use 0 – 9 to enter numeric values for steps displaying a blinking digit.
"Clear" to clear the last digit to 0
↑ to select the next option from a list of options

↓ to select the previous option from a list of options
ESC to abort entry of the present step and restart the menu
ENTER to save the value and go to the next step

AUTO=n	NO AUTO CONFIG
AUTO=1	TRUCK SCALE
AUTO=2	FLOOR SCALE
AUTO=3	ON-BOARD WEIGHING

Note: Auto=1 and Auto=2 are preset configurations and printer formats for use with truck platform and/or floor scales. The values thus selected are shown in the far right columns of this table. By far the option used most for on-board weighing is that of the Auto=3. The indicators come from the factory with an Auto=3 setting. If an individual option is to be changed, graduation size for example, do not set the indicator to Auto=3 unless all other setting are desired to be changed back to factory defaults. Use the Auto=n setting and once the chosen option has been modified, press the Yes/Enter button until the Pdn=no option is displayed. This insures that the changes have been recorded into memory.

CONTROL	DISPLAYED	PROGRAM VALUE	AUTO= 1	AUTO= 2	AUTO= 3
	Fon=Hi	High Vibration			
	Fon=on	Filter Locked On			
GRADUATION SIZE	gd0.001	.001	20	1	10
	gd0.002	.002			
	gd0.005	.005			
	gd0.01	.01			
	gd0.02	.02			
	gd0.05	.05			
	gd0.1	.1			
	gd0.2	.2			
	gd0.5	.5			
	gd1	1			
	gd2	2			
	gd5	5			
	gd10	10			
	gd20	20			
	gd50	50			
	gd100	100			
	gd200	200			
	gd500	500			
PRIMARY UNITS	CAL	in kg	LB	LB	LB
	CAL	in lb			
MULTI-POINT CALIBRATION ENABLE	CALb=1	SINGLE POINT CALIBRATION	8	8	1
	CALb=8	MULTI-POINT <=8 Calibration This option either two points the calibration curve, beginning and end, zero and maximum load, or fits a curve along the load line with 8 points. The latter option would ensure a more accurate weighment but the former option is used most often.			
FILTER READINGS	Ftr=no	DISABLED	32	32	32
	Ftr=02	2 Readings			
	Ftr=04	4 Readings			
	Ftr=08	8 Readings			
	Ftr=16	16 Readings			
	Ftr=32	32 Readings			
FILTER TYPE	Fon=Lo	Low Vibration	ST	ST	ST
	Fon=St	Standard Filter			
FILTER OFF READINGS	FoFF=1	1 Reading	2	2	8
	FoFF=2	2 Readings			
	FoFF=4	4 Readings			
	FoFF=8	8 Readings			

Note: The preceding steps have been provided to adjust the indicator for the best response time and the best vibration tolerance. The Filter Readings sets the maximum number of internal readings that may be averaged together to smooth out vibration and other scale fluctuations. The TCX 1300 takes a reading 16 times per second, thus the filter time is adjustable from .125 seconds to 2 seconds. The Filter Off Readings sets the number of consecutive readings that differ more than this amount that will be ignored; the next such reading will end filtering. The majority of applications where the scale never settles, such as a cattle scale, the High Vibration filter will need to be selected. In cases where very small changes in weight must be displayed quickly, the filter readings may be adjusted downward. In case where "spike" readings are common, the filter off readings may be adjusted upwards.

CONTROL	DISPLAYED	PROGRAM VALUE	AUTO = 1	AUTO = 2	AUTO = 3
Display Rate	dSp=16	16 updates per sec	16	16	4
	dSp=8	8 updates per sec			
	dSp=4	4 updates per sec			
	dSp=2	2 updates per sec			
	dSp=1	1 update per sec			
Auto Zero Tracking Readings	A0rd00	AZT Disabled	40	40	40
	A0rdxx	xx = 01 to 99 : Number of readings within AZT window to actuvate zero			
Auto Zero Tracking Window	A0gd.5	0.5 Graduations	3	1	.5
	A0gd01	1 Graduations			
	A0gd02	2 Graduations			
	A0gd03	3 Graduations			
Stability Detection Readings	Sbrd00	Motion Disabled	10	10	10
	Sbrdxx	xx = 01 to 99 : Number of readings in stability window to deactivate motion			
Stability Detection Window	Sbgd0.5	.5 Graduations	3	1	3
	Sbgd01	1 Graduations			
	Sbgd02	2 Graduations			
	Sbgd03	3 Graduations			
Keyed Zero Band	0b=1.00	100% of capacity	0.02	0.02	1.0
	0b=0.02	2% Of Capacity this option is set to .02 it the scale is involved in NTEP weighing. This is used to discourage illegal use of the scale system			
Units Conversion	1 Unit	Calibration Unit Only	1	1	1
	2 Unit	Conversion Enabled. This option will allow a conversion from one set to the other I the 2 unit setting			
Net Mode Select	nEtoFF	Net Mode Disables	on	on	On
	nEt on	Net Mode Enabled			
Auto Log	AtE=on	Automatically logging loading or unloading weights, once reaching or exceeding tolerance setting	Off	Off	Off

	AtE=OFF				
Net Sign Select	nt=Sgn	Net Wt is signed	Sgn	Sgn	Sgn
	nt=Abs	Net is Absolute value			
Display on Motion	Sb Dsp	Display in Motion	dsp	dsp	Dsp
	Sb Clr	Clear if in motion the upper display will clear if the indicator detcts motion on the platform.			
System Start Up	gotogr	Allows access to gross weight on power-up	gotogr	gotogr	gotogr
	HEAtUP	Warm up load cells and analog section on power-up			
Tare Mode Select	tA=gtn	Single tare mode	gtn	gtn	Gtn
	tA=Sto	Stored tare table			
	tA=inb	Inbound Wt table			
ID Number Select	id=oFF	No ID Entry	oFF	oFF	On
	id= on	ID enabled			
Memory Card Log	LogoFF	No Logging	oFF	oFF	On
	Log on	Logging Enabled			
Memory Card Size	Log 64	Card size 64k	64	64	64
	Log 128	Card size 128k			
	Log 256	Card size 256			
	Log 512	Card size 512k			
Alphanumeric Display	LCd no	No alphanumeric LCD	no	no	LCd2:40
	LCd2:40	2x40 Character LCD This option is never used other than in the LCd2:40 mode			
Beeper Alarm Enabled in Delivery Mode	bEEP=n	Alarm Disabled	n	n	Y
	bEEP=y	Alarm Enabled			
Power Supply Section	12dC	12 Volts DC Power			
	110AC	110 Volts AC Power DO NOT USE THIS OPTION			
Auto Power-Down Timer	Pdn=no	No Auto Power-Down	no	no	No
	Pdn=02	Power-Down 2 mins			
	Pdn=05	Power-Down 5 mins			
	Pdn=15	Power-Down 15 mins			
	Pdn=30	Power-Down 30 mins			
	Pdn=60	Power-Down 60 mins			
Low Battery Power-Down Timer	Lbt=no	No Low Battery Power-Down	30	30	30
	Lbt=02	Power-Down After 2 mins of low battery			
	Lbt=05	Low Battery 5 mins			
	Lbt=15	Low Battery 15 mins			
	Lbt=30	Low Battery 30 mins			
	Lbt=60	Low Battery 60 mins			
LCD Backlight Off Timer	Lit=on	Backlight on	2.0	2.0	2.0
	Lit=0.1	Backlight off 6 seconds after motion or key press			
	Lit=0.5	Backlight 30 seconds			

	Lit=1.0	Backlight 1 minute			
	Lit=2.0	Backlight 2 minutes			
	Lit=5.0	Backlight 5 minutes			
1st Security Code	SC1=00	Code Disabled	00	00	00
	SC1=xx	xx = 01 to 99 : Set security Code #1			
2nd Security Code	SC2=00	Code Disabled	00	00	00
	SC2=xx	xx = 01 to 99 : Set Security Code #2			

Note: Be sure to record both Security Codes somewhere for safekeeping. If they are lost the indicator will have to be returned to the factory to have the codes reset to 00. After pressing the enter key to enter the last configuration menu step, the display will show SEtPntS.

D. SETPOINT SETUP

With the display showing SetPntS, press the Enter key to display the current setpoint #1 Mode, or repeat ESC to cycle through the calibration menus.

Display	Step
S1:__	SETPOINT #1 MODE
S2:__	SETPOINT #2 MODE
S3:__	SETPOINT #3 MODE
S4:__	SETPOINT #4 MODE
S5:__	SETPOINT #5 MODE
S6:__	SETPOINT #6 MODE
S7:__	SETPOINT #7 MODE
S8:__	SETPOINT #8 MODE

Codes for setpoint Values

Display	Legal Values
oFF	Setpoint Disabled
grHi	Setpoint Gross Weight High
ntHi	Setpoint Net Weight High
grLo	Setpoint Gross Weight Low
ntLo	Setpoint Net Weight Low
drib	Setpoint acts as dribble

VII. CALIBRATION

A. Calibration using a Load-Cell Simulator.

REQUIRED TOOLS / ITEMS:
-Screwdriver: Medium, flat blade. (To Open/Close the TCX indicator.)
-A load-cell simulator which can achieve 0mV/V and .4mV/V settings.

1.) Turn on the indicator
2.) Open the indicator and press the tiny black push-button "SW1" one time.
     (Refer to page 25)
3.) Press [YES/ENTER] one time, the indicator will display "ConFig"
4.) Press [ESC] three times, the indicator will display "CAPCty"
5.) Press [YES/ENTER] one time, then use the [NO/CLEAR] key and the
     NUMBERS on the keypad to enter a desired Capacity.

     (The TCX-1300 User Defined Capacity "CAPCty" can be set to equal the
     maximum amount of weight which may be loaded onto the scale system, plus
     the amount of weight already on the load-cells.)

     For commercial applications the "CAPCty" is limited to 10,000 graduations.
     To calculate the capacity (in this case,) multilply 10,000 times your
     graduation size. Example: 10,000 * 5 = 50,000

     Once the desired Capacity is visible on the indicator, press the [YES/ENTER]
     keypad. The indicator will display "CAL 0"

6.) (Make sure a load-cell simulator is connected to the indicator and set to 0.0
     mV/V,) With "CAL 0" still being displayed, make sure the motion LED is not
     lit, and press the [ZERO] keypad for approximately one second. The
     indicator should display "CALPnt" at this time.

7.) Switch the load-cell simulator to .4 mV/V.

8.) With "CALPnt" still being displayed on the indicator, press [YES/ENTER].

Using the indicators numeric keypad, input the calibration number*. The calibration number depends on the type of load-cells in the scale system. (Call Digi-Star at 920-563-9700 to get the calibration number for your system.)

* The calibration number must be rounded to the nearest graduation. (Example: If your indicator is set to display in 5-pound graduations round your calibration number to the nearest 5.)

With the TCX Calibration Number "CALPnt" visible on the indicator, press the [YES/ENTER] key.

The indicator will display "BUSy" for up to three minutes, then it will go into segment test (flash *888888* with all Red LED's on.) After Segment Test the indicator should settle into Gross Weighing Mode (The Gross LED should be on.) The amount of weight being displayed should be equal to the "CALpnt" or "Calibration Number" which was just entered.

Calibration is complete!

Switch the simulator to 0.0 mV/V, the indicator should go to 0, Press the word "ZERO" if the indicator isn't displaying 0.

When reconnecting the load-cell cable – the weight of the "box" will appear on the indicator. The weight of the box can be "zeroed out" by pressing the ZERO key. (When the Box is "zeroed off" it will use a portion of the Indicators User Defined Capacity.)

B. *Calibration using weight.*

REQUIRED TOOLS / ITEMS:
-Screwdriver: Medium, flat blade. (To Open/Close the TCX indicator.)
-Calibration weight, (or a way to figure out how much weight will be loaded into the truck/wagon.)

1.) Turn on the "TCX-1000 Series" scale indicator.

2.) Make sure the "load-cell cable" is connected to the indicator.

3.) Open the TCX scale indicator and press internal push-button (SW1) one time. (A large positive number –higher than 200,000 will be displayed.)

(Refer to page 25)

4.) Press [YES / ENTER], the indicator will display "COnfig" in the upper display.

5.) Press [ESC] 3 times to "CAPCty"

6.) Press [YES / ENTER]--- make sure that the Capacity Number is correct, (change the Capacity Number if necessary.)

(The indicator's Capacity Number can be set to the weight of the "box" plus the maximum weight that could be put into the "box".)

(The capacity is user selectable, for more information on this please contact Digi-Star.)

7.) With the Capacity Number showing on the upper display, Press [YES / ENTER] the indicator will display "CAL 0".

8.) With the Wagon or Truck cleaned out, on a level surface, (preferably with no wind present,) press the [ZERO] button. Now the indicator is displaying "CALPt1"

At this point some amount of weight must be put into the feed truck/wagon. It is important that this amount of weight be known or can be figured out (perhaps by using a truck platform scale.)

-If using a platform scale to figure the amount of weight to be loaded into the feed truck/wagon, then the feed truck/wagon should be weighed at this time, (this is the "empty weight") record this number.

9.) The indicator is still displaying "CALPt1" at this time…

-If a truck scale is being used: Load some amount of weight onto the feed-truck/wagon, subtract the "empty weight" from the "loaded weight". (At this point the amount of weight inside the feed truck/wagon has been figured.)

-If not using a truck scale: Put a known amount of weight into the truck/wagon.

10.) Press [YES / ENTER], and using the numeric key-pad enter the amount of weight

that is inside the truck/wagon. This number should be visible in the upper display.

Press [YES / ENTER], the indicator should display "BuSy" followed by "*888888*" then go into Gross Weighing mode.

The Gross Weight on the display should be equal to the calibration weight which was just put into the truck/wagon. When calibration weight is unloaded --- the indicator will display a number very close or equal to "0".

Calibration is complete!

(Call Digi-Star's service department at (920) 563-9700 for further assistance.)

VIII. SECURITY CODE ENTRY

The SECUrE display indicates that a password must be entered into the indicator to allow the configuration and calibration menus to be accessed. In order to proceed, you must press the Enter key to display SEC=00. Use the "?" and "?" keys to enter the first security code, then press the Enter key. The display will again show SEC=00. Now enter the second security code. After the second security code has been entered, if it matches the user defined security code, the configuration step will be displayed. Otherwise the TCX 1300 will return to a menu that is not Security protected. There is a provision to have a user definable security code in addition to the factory default. This allows the scale installer to set a code that will allow a user to access the configuration and calibration should it become necessary. This user definable access code can be changed as often as necessary with the factory default value always constant.

SPECIFICATIONS
 The TCX 1300 Digital weight indicator is a microprocessor based general purpose instrument.

FEATURES
- The following features are standard on all models:
- Selectable digital averaging
- Auto zero tracking, selectable from .5 to 3 graduations
- Push button zero, selectable from 2% to 100% of capacity
- Function keys: zero, print, units, net/gross, esc, no/clear, yes/enter, auto tare, set point, ID#/recall, acc Pt/alarm.
- Units Conversion, selectable pounds or kilograms
- 2 Serial Outputs:
    one duplex ASCII RS-232C outputs,
    one simplex ASCII RS-232C outputs

- Programmable ticket printing format and control codes
- Time & Date software clock for printing
- Wall mount NEMA 4X washdown enclosure
- Displays:
  Six-digit weight window,
  1" high, back-lit seven-segment LCD 80 character
   (40 character x 2 line alphanumeric back-lit LCD
- Eight enunciators LED's
- Calibration: Digital configuration and calibration 8 point linearity correction

PHYSICAL SPECIFICATIONS
Size: 9.6" W x7.5" H x 4.9: d
Weight: 6 Lbs.
Power: +9 to +13 VDC, 0.4 Amps @ 12 VDC
Operating Temperature: -10 Degrees C to 40 Degrees C
Excitation: -5→+5 VDC at 200 ma, sufficient for six 350 ohm load cell or twelve 700 ohm load cells
Resolution: 10,000 displayed graduations (commercial)
            100,000 displayed grads (non-commercial)
            250,000 internal counts
Sensitivity: From .3μV to 30μV per Graduation

SERVICE INFORMATION

Service Instructions
To return this product for service, complete Digi-Star's service fact sheet on the last page of this manual.
The return authorization number may be obtained by calling customer service at Digi-Star.
Pack the product securely (preferably in the original carton or double packed)
Enclose the service fact sheet. Shipping prepaid UPS

Digi-Star Service Procedure
Service Fact Sheet

The following information is required to timely and efficiently service this equipment:

**Company
Name**:_____

**Company
Address**:_____

**City,
State**:_____

**Zip
Code**:_____

**Product Model
Number**:_____

**Product Serial
Number**:_____

**Return Authorization
Number**:_____

**Description of
Malfunction**:_____

_____

Company's representative to contact for further information:

Name:_____ **Phone:**_____-_____-_____

**Digi-Star, LLC
790 West Rockwell Ave.
Fort Atkinson, WI 53538**

IX. CERTIFICATE OF CONFORMANCE FOR WEIGHING AND MEASURING DEVICES

National Conference on Weights and Measures
15245 Shady Grove Road, Suite 130 • Rockville, MD 20850
Certificate Number: 01-060
Page 1 of 2

National Type Evaluation Program
Certificate of Conformance
for Weighing and Measuring Devices

This device was evaluated under the National Type Evaluation Program (NTEP) and was found to comply with the applicable technical requirements of Handbook 44, "Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices." Evaluation results and device characteristics necessary for inspection and use in commerce are on the following pages.

Effective Date: August 31, 2001
Ronald D. Murdock Louis E. Straub
Chairman, NCWM, Inc. Chairman, National Type Evaluation Program Committee
Issue date: August 31, 2001

Note: The National Conference on Weights and Measures does not "approve", "recommend", or "endorse" any proprietary product or material, either as a single item or as a class or group. Results shall not be used in advertising or sales promotion to indicate explicit or implicit endorsement of the product or material by the NCWM.

Submitted by:
Digi-Star LLC
790 W. Rockwell Ave.
Fort Atkinson, WI 53538
Tel: (920) 563-1400
Fax: (920) 563-9721
Contact: Bruce L. Johnston

For:
Indicating Element
Digital Electronic
Models: TC-10 and TCX-1000*
$_{nmaX}$: 10,000
Accuracy Class: III/IIIL

Standard Features and Options
Gross/tare/net display modes **Options:**
Liquid crystal display (LCD): Model TCX-1000 Keyboard tare
Light emitting diode (LED) display: Model TC-10 Multiple tare memories
Semi-automatic zero and tare with motion detection Printing of time, date, I.D. number
Automatic zero setting mechanism Weigh-in/Weigh-out capability
lb/kg conversion (Other available units: g = grams, RS-232 Computer Interface
oz = ounces, lb = pounds, kg = kilograms,
LT = long tons, ton = short tons)
*Letters and combinations of letters used as a suffix on both models to define options:
A Advanced Keyboard and Set-Point Display
D Desk Top
W Washdown Wall Mount
S Simplified Keyboard without numeric keypad (When used as the first suffix)

S Stainless Steel (When used as the second suffix)
B Panel Mount
-B 12 VDC Battery Option (The 12 VDC power supply version has an option to set the Auto-Powerdown timer, Low-Battery Powerdown timer and LCD Backlight off timer.)
-L Liquid Crystal Display
Temperature Range: -10 °C to 40 °C (14°F to 104 °F)
Certificate Number: 01-060

Digi-Star LLC
Digital Electronic Element
Models: TC-10 and TCX-1000
Application: General purpose indicating elements.

Identification: The identification badge is located on the top of the indicator. It is a self-destructible adhesive badge.

Sealing: All models require a wire security seal. The TC-10 D desk mounted version is sealed using a wire seal through the heads of two screws located on the back of the case. The TC-10 W wall mounted version is sealed using a wire security seal through two holes in the cover and housing. The TC-10 B panel mounted version is sealed using a wire security seal through two sealing screws on the left side of the indicator case. The TC-10 WS stainless steel wall mounted version is sealed using a wire security seal through a sealing screw and a hole in a tab located on the lower left side of the indicator. The TC-10 S and all of the TCX-1000 models are sealed by using a wire security seal through the four corner screws of the cover and holes in the cover.

Test Conditions: This certificate supersedes Certificate of Conformance number 89-086A4 and is issued to indicate the transfer of ownership from Tyrel Corp. to Digi-Star LLC. The NTEP Certificate of Conformance 89-086A4, though inactive, remains in effect to cover those devices previously sold and installed under the original name. Previous test information and documentation provided by the company was reviewed. The test conditions for the original type evaluations are listed below for reference.

Certificate of Conformance No. 89-086A4: This Certificate supersedes Certificate of Conformance No. 89-086A3 and is issued to include the Model TCX-1000 and include the 12 VDC battery option. The Model TCX-1000-B was tested at –10 °C to verify operation of the LCD display at low temperatures. Additionally, low battery tests were conducted using a variable DC voltage power supply.

Certificate of Conformance No. 89-086A3: This Certificate supersedes Certificate of Conformance No. 89-086A2 and is issued to remove the B option for use of a 12 VDC power input instead of 117 VAC power. No testing was done with this power source and the B option was included in error. Test conditions for Certificate of Conformance No. 89-086A2 have been revised to remove the reference to the B option.

Certificate of Conformance No. 89-086A2: This Certificate supersedes Certificate of Conformance No. 89-086A1 and is issued to include the -L suffix. The addition of the suffix has no metrological effect on the device, and no formal testing was required.

Certificate of Conformance No. 89-086A1: This Certificate supersedes Certificate of Conformance 89-086 and was issued to add optional Model TC-10A. Model TC-10A is the same as Model TC-10 except that it has extra keys on the front panel to prevent operator errors and a two digit display to show the cut-off set point. Two internal changes were made to automatically set the dead load and gain switch during calibration.

Certificate of Conformance No. 89-086: The emphasis of the evaluation was on the device design, operation, and compliance with influence factor requirements. The indicator was interfaced with an

approved weighing element for purposes of the evaluation. The indicator was tested over a temperature range of -10 to 40 °C (14 to 104 °F). Additionally, tests were conducted using power supplies of 100 to 130 VAC.
The results of the referenced evaluations indicate these devices comply with applicable requirements of NIST Handbook 44.

Type Evaluation Criteria Used: NIST Handbook 44, 1994 Edition
Tested By: Bill Fishman (NY), Ed Szesnat (NY), B. Badenhop (OH) (89-086)
Reviewed By: S. Patoray (NCWM)