WEIGH-TRONIX

Models RD-4000 & RD-6000 Serial Remote Displays

Installation Guide

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Table of Contents

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Specifications

Dimensions:	RD-4000 Display Unit is 31 5/8" (.80 m) wide x 12" (.30 m) high x 15 9/16" (.38m) deep including mounting bracket.
Dimensions:	RD-6000 Display Unit is 45 5/8" (1.16 m) wide x 14 ½" (.37 m) high x 16 9/16" (.41m) deep including mounting bracket.
Power Supply:	Self-contained; 120VAC, 20 watts max.; 2-amp 3AG fuse. 220VAC, 20 watts max., 1-amp 3AG fuse
Data Input:	RS-232, 20 mA Current Loop, TTL
Display Numerals:	4" or 6" high electromagnetic numbers illuminated by a fluorescent tube.
Digit Options:	Up to 6 numbers and minus sign.
Weight Capacity Range:	To 999,999 lbs/kg.
Accuracy:	Equal to and determined solely by weighing system.
Operating Modes:	ON and OFF. Continuous display when ON.
Minus Sign Capability:	Yes.
Temperature:	-20°F to 130°F (-29°C to 40°C)
Humidity:	10% to 98% relative humidity, no condensation.
Dust:	Nonconductive, noncorrosive dust will not affect operation other than eventual deterioration of display readability. Metallic or chemical dust environments must be avoided.

Introduction

This publication will help in the servicing of the Remote Display. It contains system specifications, installation instructions, circuit descriptions and parts lists for our Remote Display system.

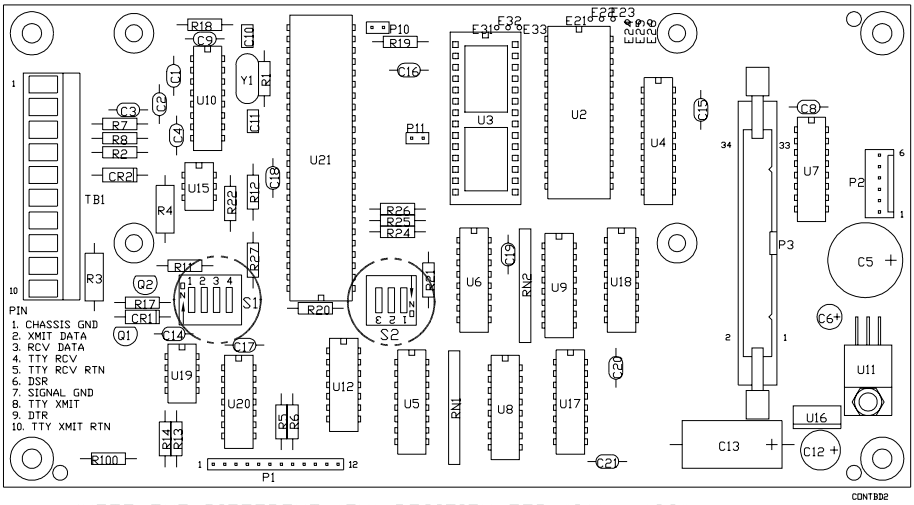
You can choose from several display modes:

- Alternate between weight value and mode (Gross, Tare, Net)
- Use a digit to indicate the unit of measure
- Combine both of the above
- Standard weight display mode accepts leading spaces
- Display a text message

There are also these advanced setup modes:

- Create a custom "no data" message
- Multi-drop capability for multiple scale systems
- Reversed or mirrored image

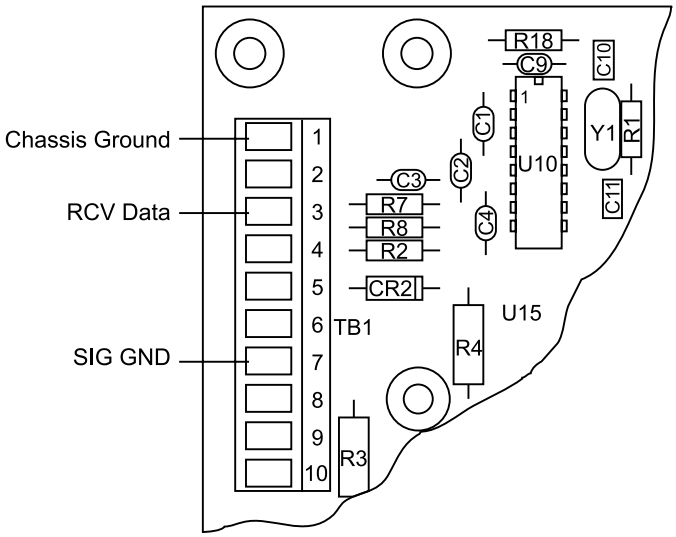
Interface to the Serial PCB



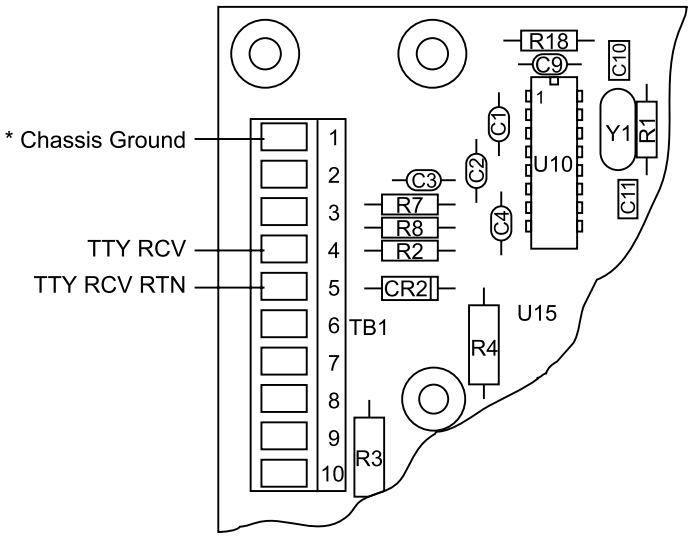
(NOTE THE DIFFERENT "ON" POSITION FOR "S1" & "S2")

RD-4000 Eprom = 53261-0011

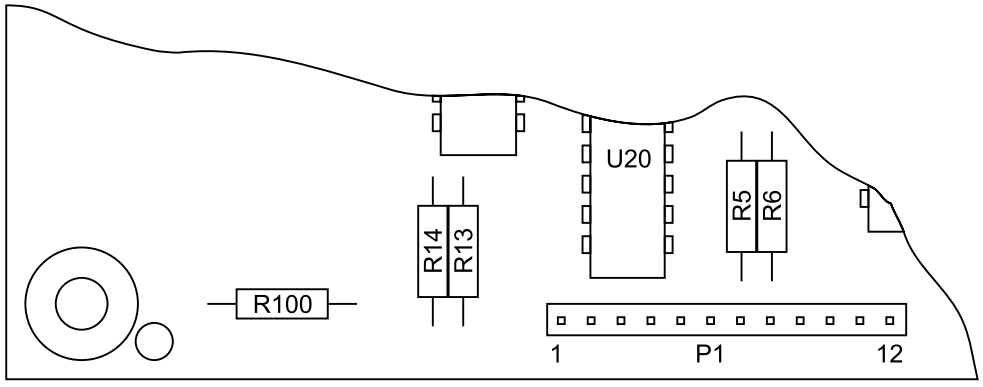
RD-6000 Eprom = 53261-0029



RS-232 Connections



Current Loop Connections



P1-1 = Receive
P1-6 = Transmit
P1-7,8,9 = +5V
P1-10 = Ground/Earth

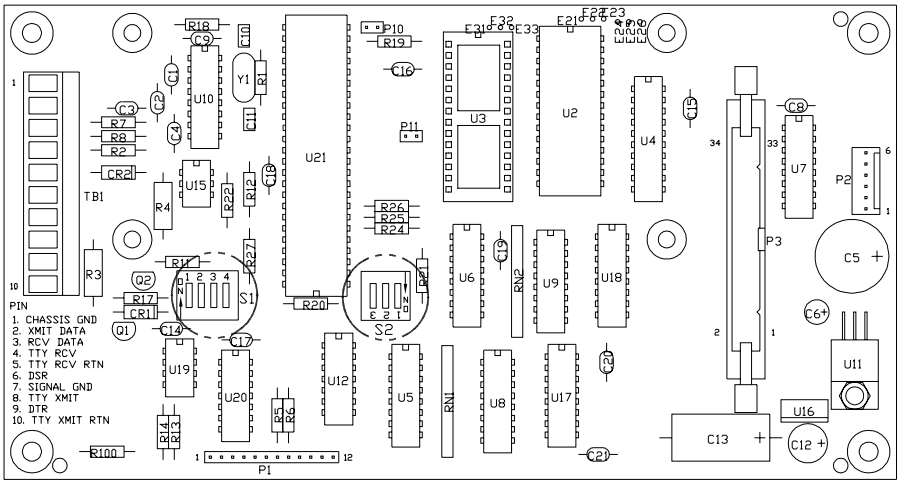
TTL Connections

RD Serial Controller Card (WT P/N 23532-0033 Rev. D)

Serial Port Configuration

The programming switches are roughly in the middle of the Rev. C (and D) circuit board. See illustration below. RS232 and current loop selection is programmed by S1 DIP switches. The communication baud rate selection is done with the S2 DIP switches.

S2-3	S2-2	S2-1	BAUD
ON	ON	ON	19200
OFF	OFF	OFF	9600 (DEFAULT)
OFF	OFF	ON	4800
OFF	ON	OFF	2400
OFF	ON	ON	1200
ON	OFF	OFF	600
ON	OFF	ON	300
ON	ON	OFF	150



(NOTE THE DIFFERENT "ON" POSITION FOR "S1" & "S2")

Normal settings for Weigh-Tronix indicators:

Current Loop
S-1
1 OFF
2 ON
3 OFF
4 ON

RS-232
S-1
1 OFF
2 OFF
3 ON
4 ON

S1	Position	Description
1	ON	Current Loop active (unit supplies power)
	OFF	Current Loop passive (units does not supply power) Note: normally off for WT indicators
2	ON	Current Loop operation
	OFF	RS-232 operation
3	ON	RS-232 operation
	OFF	Current Loop operation
4	ON	RS-232/Current Loop operation (normally on for WT indicators)
	OFF	TTL operation (normally off for Zeus radio TTL operation)

1,2,3, & 4 need to be off for the TTL input.
Use P1 for TTL input
P1-#1 to radio's transmit
P1-#6 to radio's receive
P1-#7, 8, & 9 to radio's +5v input

Valid Communication Protocol

The serial protocol transmitted must be in the following format:

<Start><weight><End>

<Start> must be any of the following characters:

G
T
N
P
g
t
n
p
STX (Start of text, ASCII 02)

<weight> is made up of numeric characters (0-9) and the minus sign.

Any other characters between <Start> and <End> are not displayed. Thus decimal points and units will not be shown. If more than 8 weight characters (0-9 and minus) are received, the message “Err” is displayed.

<End> must be any of the following characters:

CR (Carriage return, ASCII 13)
LF (Line Feed, ASCII 10)
ETX (End of text, ASCII 03)

EXAMPLE: G -123.45 lb {CR} will be displayed as “ -12345”

Start Up Sequence

When the RD4000 (or RD6000) starts up it goes through a sequence of displays that indicate configuration.

1st the display is cleared to blank and then ‘rd4ooo’ or ‘rd6ooo’ is displayed for 3 seconds.

2nd the dash number of the software is displayed for 3 seconds.

3rd the revision of the software is displayed for 3 seconds.

4th the baud setting is displayed. The baud setting will be displayed until the first valid weight is sent. The display shows ‘o’, as in ‘96oo’, instead of ‘0’ to avoid confusion with valid weights.

This display sequence takes about 12 seconds, but if a valid weight is received during the start up display, the start up is skipped and the RD will start displaying the weight immediately.

Once a valid weight is received, there must be another valid weight received within five (5) seconds or the display will change to center dashes (- - - - -) to show it has not received a weight. This would suggest cable break or indicator problem. The five second time may be changed by set up commands.

Display Modes

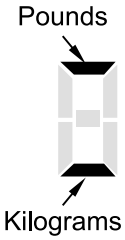
1 - Standard Weight Display (default)

This is a simple numeric display, with the number displayed right justified.

2 - Gross, Tare, Net display

This setting shows the numeric weight for approximately ten (10) seconds, then shows the mode of the sending indicator (**Gross**, **Tare**, or **Net**) for 2 to 3 seconds, then resumes weight display. The mode is detected by the starting character (G, T, N, P) with 'P' not showing any mode. If the sending indicator sends an <STX> as the start character, the display can still detect the mode if the label character is sent after the units. In this case the label character must be a capital G or N.

3 - Units Annunciation



This setting uses one display digit to show the unit of measure of the sending indicator. The units detected are only pounds or kilograms. These are detected by the 'l' or 'L' of pounds and the 'k' or 'K' of kilograms. The 'b' or 'B' of pounds and the 'g' or 'G' must be present even though they are not displayed. The top segment of the digit is used to indicate pounds and the bottom segment is used to indicate kilograms. The digit used is selectable (see *Setting the Place for Units Annunciation* at the end of this section) via serial set up. If the digit is any but the right-most, the units segments are combined with any character to be displayed. This prevents deletion of significant information. If the selected digit is the right-most, then the digit is overwritten. In this case a 'sacrificial' digit must be sent to allow full display of all information Unit annunciation will be present even during non-weight display. The place is always set as directly viewed, even if the display is set to show mirror-reversed. Units are displayed even during text message, but not during a timed out ("NO DATA") condition. Center dashes (- - - - -) is the default display for no data.

4 - Gross, Tare, Net Display and Units Annunciation

This display mode is a combination of modes 2 and 3. Conditions for both modes will be present.

5 - Leading Spaces and Non-Broadcast Devices

This will work without a start character of G,T,N, or STX. The first character must be either a <space>, ASCII 32, or a minus sign. There is no provision for mode or units display with this setting.

This mode will also transmit ?<CR><ENQ> every four seconds to ask for data from indicators that are not capable of broadcasting.

Displaying Text Messages

There are two ways to display text messages.

1. Send the string: Sxxxxxxxx{CR,LF}
2. Send the string: DIxxxxxxxx{CR,LF}

Where the x's are replaced with the desired text. All eight characters need not be sent. The RD will right justify the message. If more than eight (8) characters (x) are sent, the RD will only display the first eight after the initial 'S' or 'DI.' Only the S method will work in conjunction with addressable IDs.

A single CR or LF will work as will CR and LF together at the end of text.

The RD will show a mix of upper and lower case characters to best fit the text to the seven segment display.

The letters K, M, and W cannot be displayed.

There are substitutions for undisplayable characters that may be useful:

Transmitted Chararcter	Remote Display Response
#	- ll (in one digit)
/	- il (in one digit)
\	- li (in one digit)
%	- ^r (a small r in the top half of the digit)
&	- ^u (a small u in the top half of the digit)
‘	- ^i (a small i in the top half of the digit)
*	- ^o (a small o in the top half of the digit)
^	- ^n (a small n in the top half of the digit)
+	- ^L (a small l in the top half of the digit)
$	- = (equals, using the lower half of the digit)
X	- Three horizontal segments

EXAMPLE: S/ \cit{CR} would be displayed as: il li c i t

Advanced Setup

A terminal program can be used to additionally configure many new features. These features are controlled with the following command syntax. The RD can be set to annunciate units (pounds and kilograms), show the weight mode (gross, tare, or net), use a unique ID, you can change the "no data" time out value, and the "no data" message can be customized. Also, the RD can be made to display mirror-reversed so that the display will be correct when viewed in a rear view mirror.

The display is cleared to blank for a moment whenever a command has finished. There is a limited time to enter the next character. However, to permit hand entry of commands, this is set to 15 seconds.

If the microcontroller (U21) is changed, all custom settings will be lost and the RD must be configured as if new.

All commands start: ***!!QWKxnnn..*** *where* ***x*** *is the command and* ***nnn..*** *are any parameters needed by command* ***x****.*

Command	Parameter	Description
?	(none)	list current settings
B	**xxxxxxxx**	set time out message to 'xxxxxxxx'
C	(none)	clear to default settings
D	**n**	set time out delay to **n** seconds
I	**n**	set ID to **n**
N	(none)	display normal characters
R	(none)	display mirror-reversed characters
T	**n**	set display mode type to **n**
P	**n**	set the place for an annunciator

Display Mode

To set the type, send **!!QWKTn** where **n** is the display mode type desired.

Example: **!!QWKT4** sets the TYPE to MODE 4.

Display Current Settings (?)

By sending **!!QWK?** to the display, the RD will return a string through the serial port showing what the current setting are. The default settings are: **TYPE1,ID0,N,D5,P0**

Setting A Custom 'no data' Message (Bxxxxxxxx)

To have a custom message for 'no data' instead of "- - - - - -" send **!!QWKBxxxxxxxx,** where **x** is the desired message. This message is displayed as it is entered. There may be a slight delay if the characters are entered faster than the display itself updates. The display updates once every second. All eight characters **must** be sent, or else the display may not show the message as expected. This is done to permit spaces for custom alignment.

EXAMPLE: To have 'no data' right justified as the message send:

!!QWKB no dAtA

The mixed case of the message is intentional and will look better on the remote display than either 'no data' or 'NO DATA'.

Clear Current Settings (C)

The clear may need to be done before changing items.

By sending **!!QWKC** to the display, the RD will reset to the default settings: **TYPE1,ID0,N,D5,P0**. This will also change any custom time out message back to center dashes "- - - - - -".

Setting the Delay for "NO DATA" Message(D)

To set the delay send **!!QWKDx** where **x** is the number of seconds (1-9) to elapse before displaying a 'no dAtA' or "- - - - - -" message.

ID Operation (I)

When an RD is set to use an ID, any weight sent *without* an ID will be displayed. Any weight sent with an ID of 0 will be displayed, no matter what the ID setting of the RD is.

A weight sent with a nonzero ID will only be displayed by an RD with a matching ID (or by any remote display with an ID of 0).

The ID 0 is special in two ways.

1. A weight with an ID of 0 is a “broadcast” weight that all RDs will display.
2. An RD with an ID of 0 will be “promiscuous” and display weights with any ID.

To set the ID of a display send:

!!QWKIn where **n** is the desired ID integer.

EXAMPLE: !!QWKI2 sets the ID to 2.

To send an ID addressed weight, the weight string must be preceded with **!x** or **!Ax** where **x** is the ID integer.
EXAMPLE:
!A5<space>**G**<space><space>**4500**<space>**lb**<space><CR><LF> will show 4500 only on the RD with an ID of 5 (or of 0).
EXAMPLE:
!5<space>**G**<space><space>**4500**<space>**lb**<space><CR><LF>will show 4500 only on the RD with an ID of 5 (or of 0).

NOTE: Text messages may be sent to single displays only by !#Smessage or !A#message but *not* by !#DImessage or !A#DImessage.

Mirror Reversing and Normal (N,R)

To set the RD to display mirror reversed, send **!!QWKR**

To set the RD to display normally, send **!!QWKN**

Setting the Place for Units Annunciation (P)

The places are 0-7, with 0 at the far left and 7 at the far right. The far right is ALWAYS 7. A six digit display would have places 2-7.

To set the place, send **!!QWKPn** where **n** is the desired place.

EXAMPLE: To set the place to 1 (left most digit on a 7 digit display) send **!!QWKP1**

For places 0-6, the top or bottom segments are combined with any character in that position, so as not to overwrite any negative sign. For a place 7, however, the digit is overwritten. This means that unit annunciation may be on the far right, but an extra (sacrificial) digit would need to be sent after the real weight. Alternately, the weight could be multiplied by ten and sent knowing the last digit would be overwritten.

Unit annunciation will be present even during non-weight display. The place is always set as directly viewed even if the display is set to show mirror-reversed.

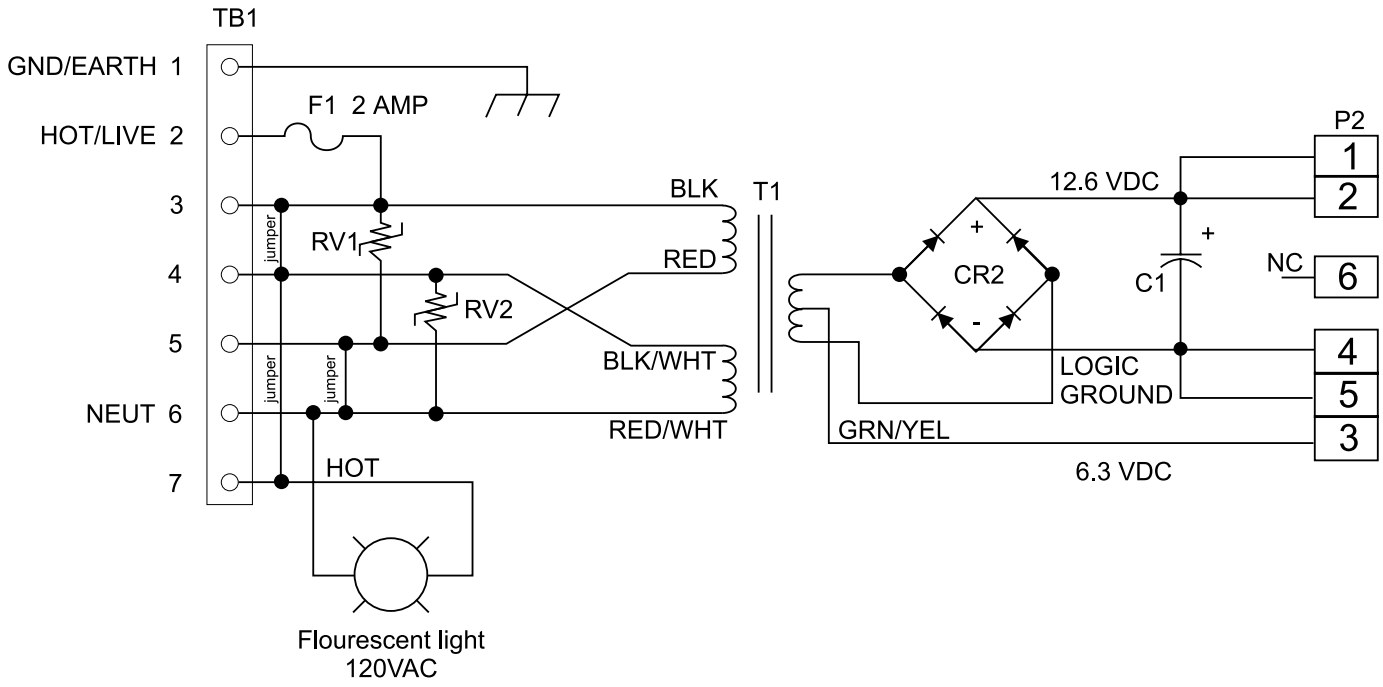
Power Supply Assembly WT P/N 22558-0026

Circuit Description

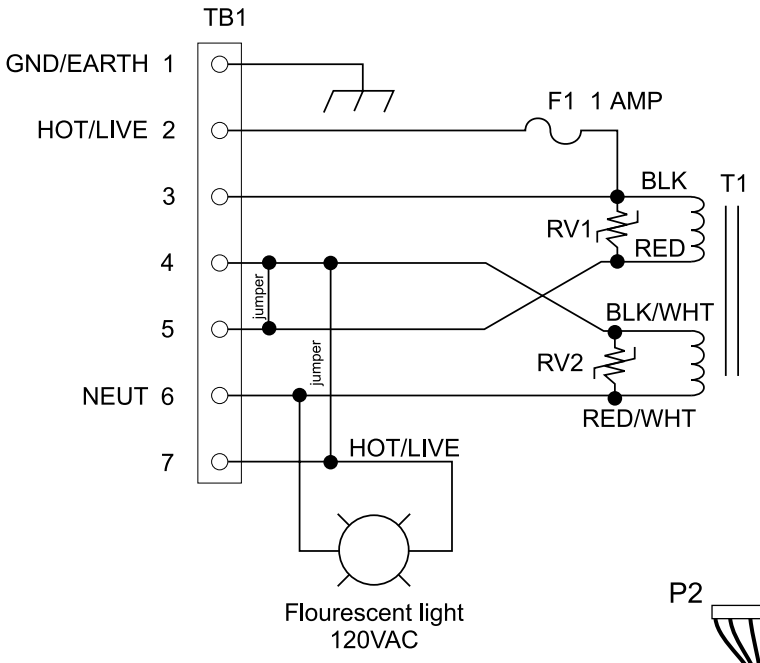
The AC voltage will be applied at TB1 and will be passed through a fuse to a transformer (T1). The AC voltage will then be rectified into two DC voltages (15 and 12.6) by CR2 and C1. These dc voltages will then be used by the other circuits within the remote display.

Jumpers are installed from TB1-3 to TB1-4 and TB1-5 to TB1-6 when powered by a 110VAC source. When energized by 220VAC there is only one jumper, TB1-4 to TB1-5.

120 VAC Operation

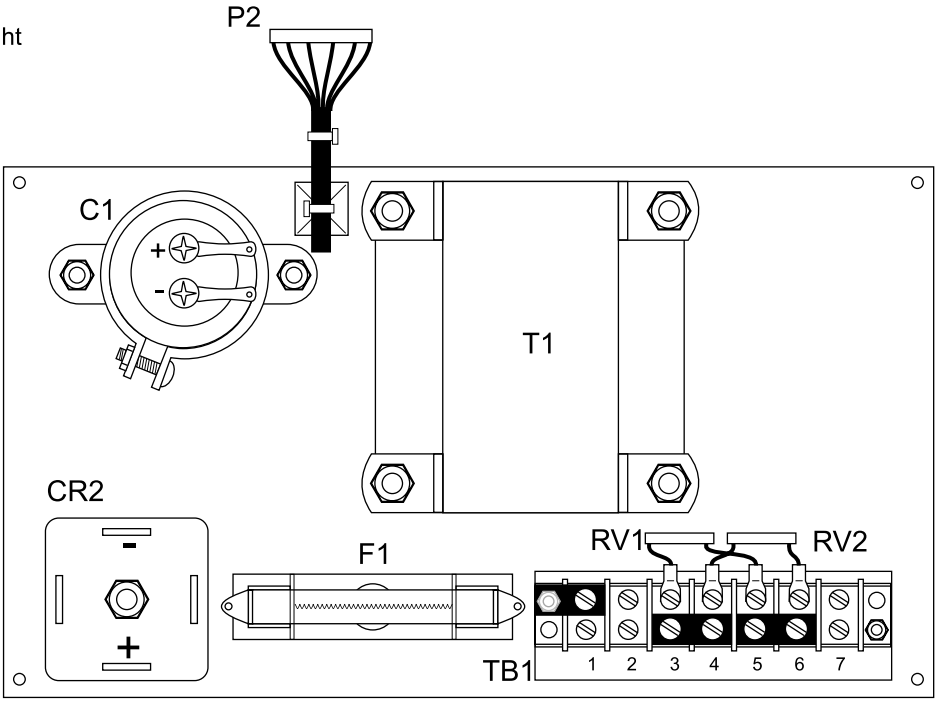


220 VAC Operation



Power Wiring Power Supply Terminal Block		
Color	**Function**	**Terminal**
Green	Ground	TB1-1
Black	Hot	TB1-2
White	Neutral	TB1-6

EU Wiring Power Supply Terminal Block		
Color	**Function**	**Terminal**
Grn/Yel	Earth	TB1-1
Blue	Neutral	TB1-6
Brown	Live	TB1-2



(120VAC Version Shown)

SYMBOL	W-T PART NUMBER	DESCRIPTION
C1	15649-0039	13000 uF, 25V
CR2	16051-0046	Diode Bridge Circuit
F1	15453-0026	Fuse (2 AMP, 120VAC)
F1	15453-0018	Fuse (1 AMP, 220VAC)
J1,2	15887-0014	Jumper
P2	17732-0058	Connector
	17732-5016	Pins (6 required)
RV1,2	16046-0010	Varistor
T1	44607-0018	Transformer 12.6 V CT @ 6.3A
TB1	15427-0060	Connector
XF1	18039-0015	Fuse Holder

Display Module Assembly

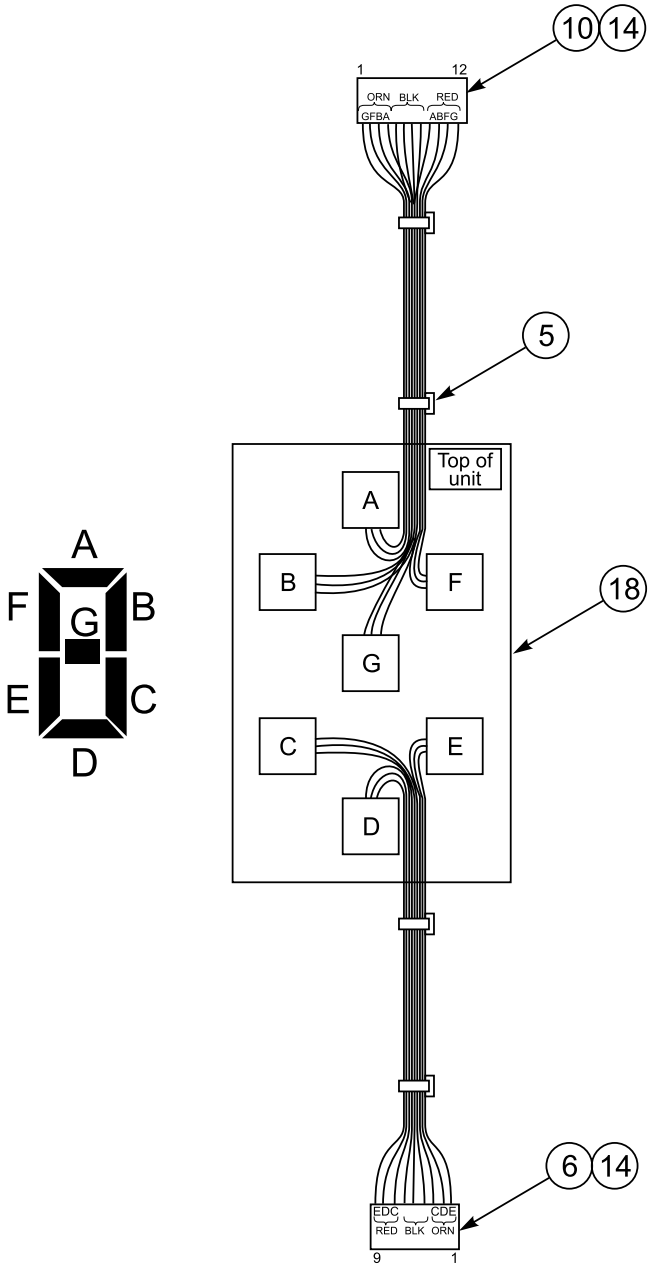
Circuit Description

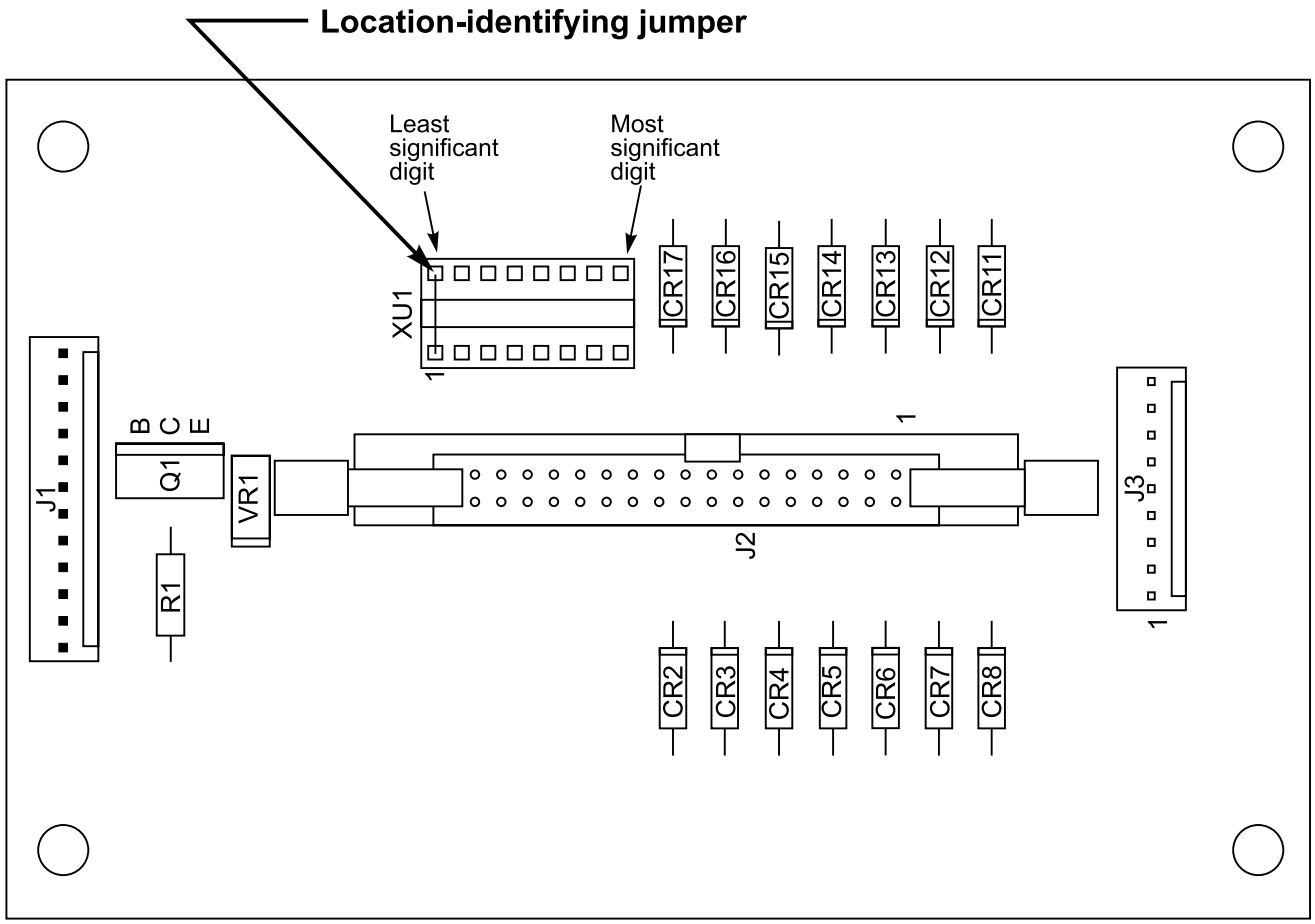
(4": WT P/N 22728-0013)
(6": WT P/N 22728-0021)

These display modules are comprised of seven individual reflective yellow segments. Each segment is controlled by a signal from its' digit decoder pc card. The signal will enable a dual solenoid which will activate or deactivate a particular segment.

Parts List

Item Number	Description	WT P/N
5	Cable tie	13762-0019
6	Connector	17732-0082
10	Connector	17732-0116
14	Contact pins	17732-5016
18	6" module	17990-0089
18	4" module	17990-0055

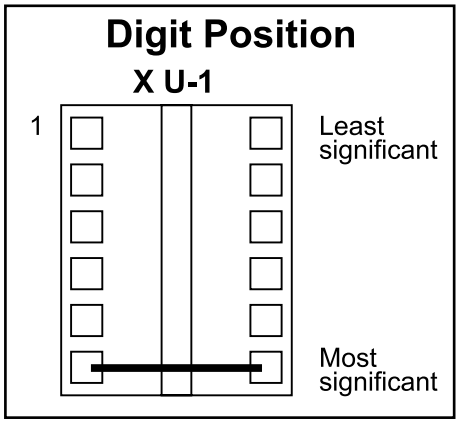




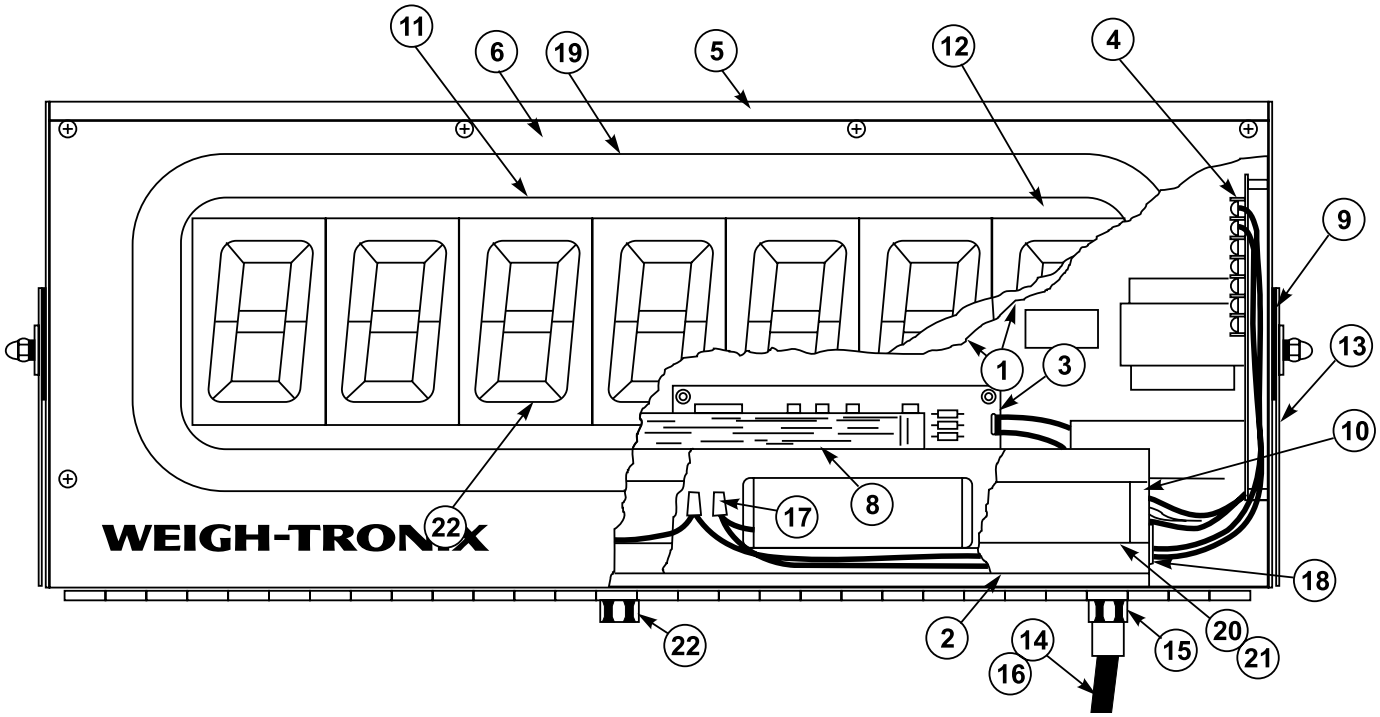
Parts List

WT P/N 21642-0026

Symbol	Description	WT Part Number
CR2-8,11-17	1N4004	15668-0043
J1	12 Pin Connector	17794-0111
J2	34 Pin Connector	17818-0352
J3	9 Pin Connector	17794-0087
Q1	TIP127	16271-0081
R1	1K ohm 5% 1/4W	14477-0732
VR1	1N5353B	15669-0158
XU1	16 Pin Socket	14361-0038



RD4000 & 6000 Parts List



RD-6000

ITEM NO.	DESCRIPTION	W-T P/N	ITEM NO.	DESCRIPTION	W-T P/N
1	Digit Decoder Pc Bd	21642-0026	12	Display Mtg Bracket	22739-0010
2	Nut Plate	22753-0011	13	Mounting Bracket	22766-0016
3	Remote Display Pc Bd	23532-0033	14	Power Cable	15318-0013
4	Power Supply Unit	22558-0026	15	Water Tight Conn	22380-0046
5	Enclosure	22756-0018	16	Lug Terminal	15434-0038
6	Front Panel	22747-0010	17	Twist-On Connector	17909-0014
7	Display Mod Assy (6")	22728-0021	18	Conduit Nipple	17918-0013
8	Ribbon Cable Assy	22732-0025	19	Window Weatherstrip	22345-0016
9	Neoprene Pad	19563-0017	20	Lamp Fixture (36")	22347-0022
10	Light Mtg Bracket	22738-0011	21	Fluorescent Black Light	22348-0021
11	Window	22710-0021	22	Conduit Hub	15408-0014

RD-4000

ITEM NO.	DESCRIPTION	W-T P/N	ITEM NO.	DESCRIPTION	W-T P/N
1	Digit Decoder Pc Bd	21642-0026	12	Display Mtg Bracket	22717-0016
2	Nut Plate	22218-0010	13	Mounting Bracket	22729-0012
3	Remote Display Pc Bd	23532-0033	14	Power Cable	15318-0013
4	Power Supply Unit	22558-0026	15	Water Tight Conn	22380-0046
5	Enclosure	22679-0012	16	Lug Terminal	15434-0038
6	Front Panel	22707-0018	17	Twist-On Connector	17909-0014
7	Display Mod Assy (4")	22728-0013	18	Conduit Nipple	17918-0013
8	Ribbon Cable Assy	22732-0017	19	Window Weatherstrip	22345-0016
9	Neoprene Pad	19563-0017	20	Lamp Fixture (24")	22347-0014
10	Light Mtg Bracket	22768-0013	21	Fluorescent Black Light	22348-0013
11	Window	22710-0013	22	Conduit Hub	15408-0014

Appendix 1: Indicator Standard Outputs

Serial Communication-Standard Output from Indicators

For WI-110s/120s

Information is sent to the RD-4000/6000 in two formats depending on the indicator series used. For WI-110/120 indicators set to displayed weight only the format is as follows:

sp G+00000 sp lb CR LF

For WI-125s, 152s, 150s

The format sent by WI-125s set to displayed weight only is as follows:

G sp + 00000 sp lb CR LF

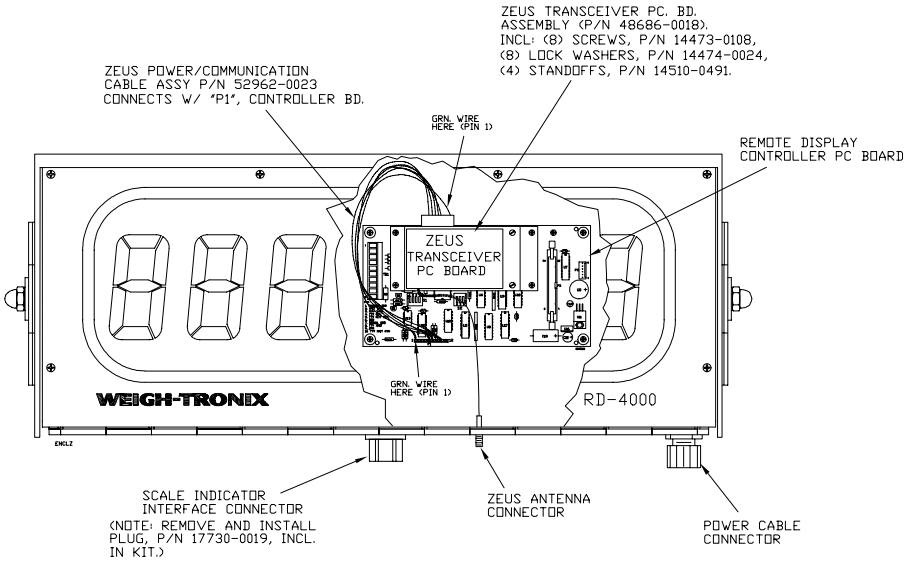
For WI-130s and 127s

These indicators can be programmed to output in either format listed above.

Appendix 2: Zeus Transceiver Kit Installation (PN 53581-0012)

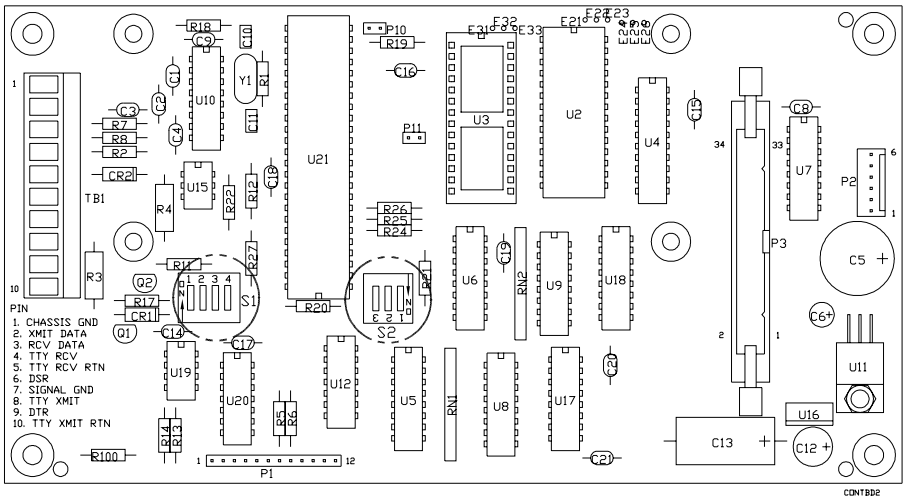
Installation

There is a Zeus transceiver field kit (PN 53581-0012) availabe to allow wireless communication between your indicator and the remote display. Below are the instructions and illustrations for installing the kit.



1. Install the Zeus transceiver PC board to the controller PC board using the supplied screws, washers and standoffs. See illustration above.
2. Connect the power/communication cable to the Zeus transceiver board and controller board. Note that the green wire goes to Pin 1.

3. Turn off all switches on S-1 located on the controller PC board. See illustration below.



(NOTE THE DIFFERENT "ON" POSITION FOR "S1" & "S2")

4. Install the Zeus antenna connector through a .25" hole in the RD lower enclosure using the supplied connector and locknut. Note that this is a lefthanded thread.
5. Attach the antenna to the connector.

Below are photos of the Zeus transceiver and antennae which connect to your indicator.

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Pointe Claire, QC H9R 4R7 Canada
Telephone: 514-695-0380
Facsimile: 514-695-6820

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