Connectivity Guide

METTLER TOLEDO®
Retail Solutions

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METTLER TOLEDO®

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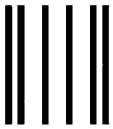

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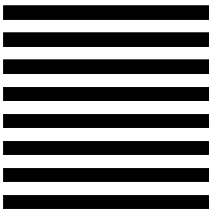

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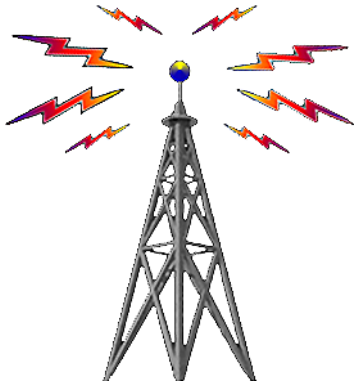
Revision History

Part Number	Date	Revisions
15575900A	**6/99**	New Manual
A15575900A	**5/00**	Revised Chapter 3. Added info on hubs, routers, firewalls. Added TNET network troubleshooting. Revised setup for STEM in Chapter 4 and clients in Chapter 5. Added DHCP information. Added Ethernet RF sections in Chapter 3, Chapter 4, Chapter 5, and added to Network Solutions sections in Chapter 6. Added new diagrams in Chapter 7 for RF configurations.
B15575900A	**11/01**	Updated Ethernet Client Chapter 4. Updated Ethernet RF Sections and Network Setup Sections in Chapter 6.. Added NextGen Information. Removed old Chapters 1, 8, 9, 3, and 10.

Trademarks

CONTENTS



For your notes

1 Scale Management Systems

Overview

Chapter 1 gives a road map overview of how the METTLER TOLEDO® Scale Management modules connect and operate with one another. In the following sections, solutions are shown using the various modules.

ScaleVision®

ScaleVision® Communications Software is a software product designed to run on MSDOS® or UNIX® based in-store processors (ISP) for scale communications. ScaleVision® software receives generic scale information (Items, Extra Text, Price changes, Nutrition Facts, etc.) from the retailer's item/price maintenance system and generates specific, executable commands to communicate with a multi-manufacturer scale system.

Generic pending files can be created using METTLER TOLEDO Intelli-Net® DX or Wintelli-Net™ DX software, or other software. The generic pending file is sent to the store's ISP (In Store Processor). ScaleVision® software, running on the in-store computer, translates the information into the specific format required by different scale types and sends it to the scale via serial or Ethernet TCP/IP. Reporting information on item totals, etc. can also be retrieved from the scales by ScaleVision®.

ScaleVision® is divided into three major functioning parts: the *Scheduler*, the *Filter*, and the *Drivers*. The Scheduler locates *Generic Pending Files*, forms an *Event* Record, and prioritizes the Event depending on when it is *due*. The Filter takes the *Event File* record and translates the generic commands into specific commands to be used by the Drivers. The Drivers then send the commands to the different scales. An example of the transition of ScaleVision® using serial scale connections is shown on the next page.

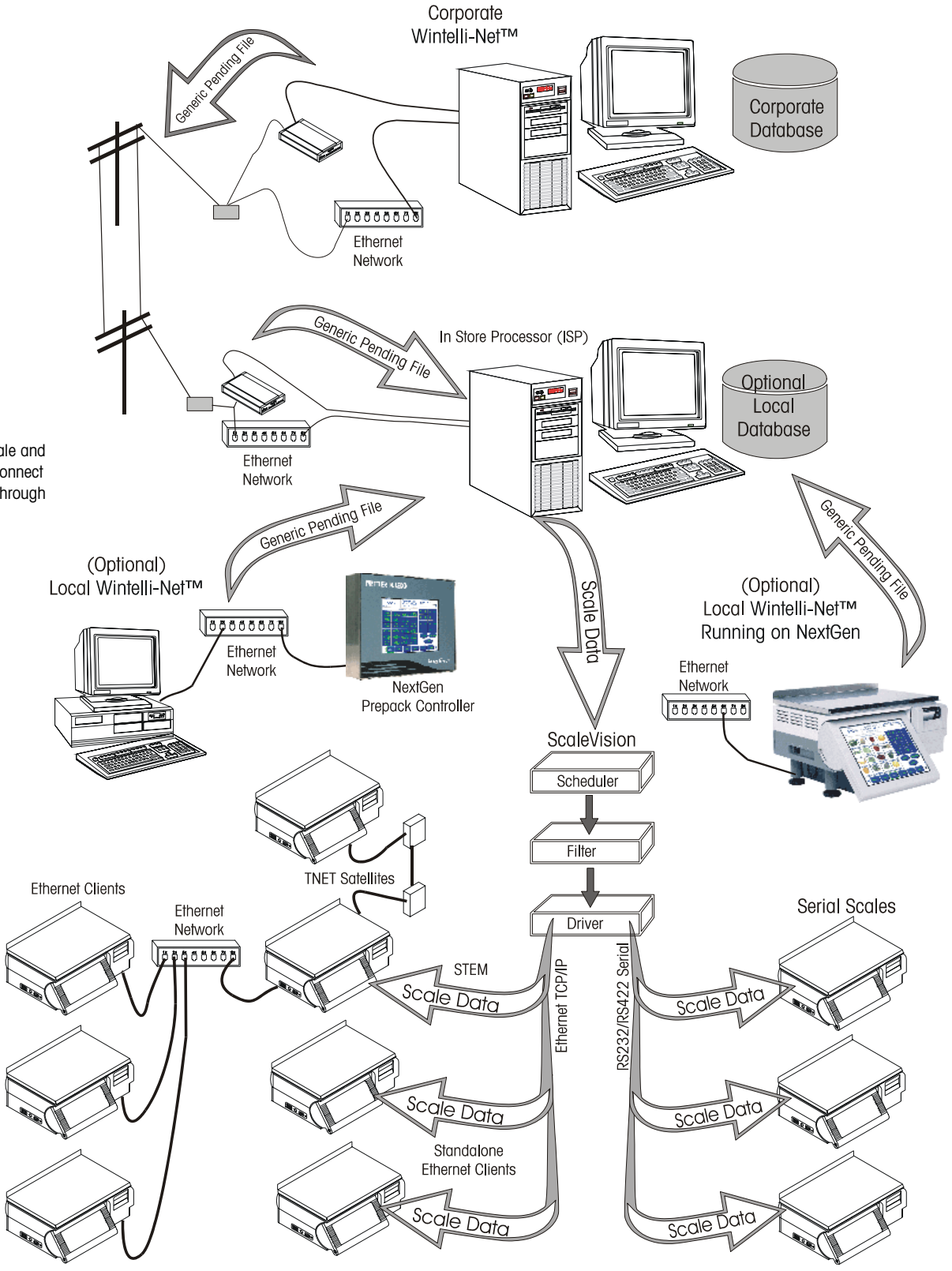
Wintelli-Net™

METTLER TOLEDO® Wintelli-Net™ is a scale management software program designed to run on Windows 95® or Windows NT®. Wintelli-Net™ provides the means to manage a scale information database, output scale data in a generic pending file format used by ScaleVision®, and to print reports. Wintelli-Net™ uses an ODBC compliant database, currently Informix®.

The next page shows a configuration using Wintelli-Net™ with serial and Ethernet scale communications with ScaleVision®.

Configuration using Wintelli-Net™ with ScaleVision® and both Ethernet and Serial scale communications.

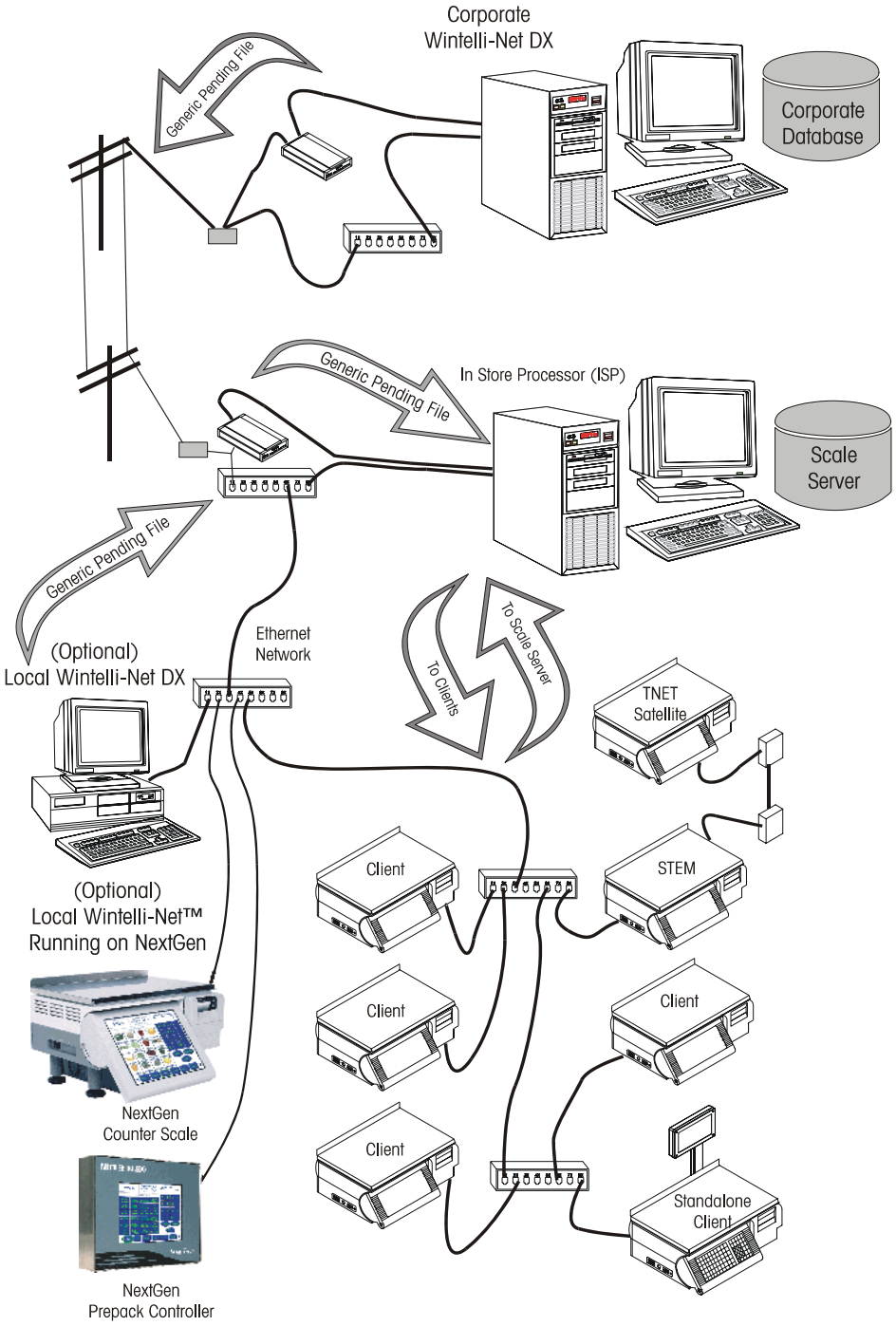
The NextGen Counter Scale and Prepack Controller can connect directly to the database through the Ethernet Network



Overview of Wintelli-Net™ using ScaleVision® with both Serial and Ethernet Scale Communication

Scale Server

In this example, the Ethernet Scales (except NextGen) are communicating directly with the in-store Scale Server. NextGen scales can connect direct to the database. The Scale Server is software running on a local in store processor (ISP). Communication to the scales uses TCP/IP through an Ethernet Network. In this configuration, Client Scales, STEM, and Standalone Clients are shown on the network. Wintelli-Net™ from either corporate or local locations can be used to maintain the database. The Scale Server and Wintelli-Net™ use an ODBC compliant database, such as Informix® or Microsoft SQL Server®. Wintelli-Net™ can run on the NextGen Counter Scale or the NextGen Prepack Controller.

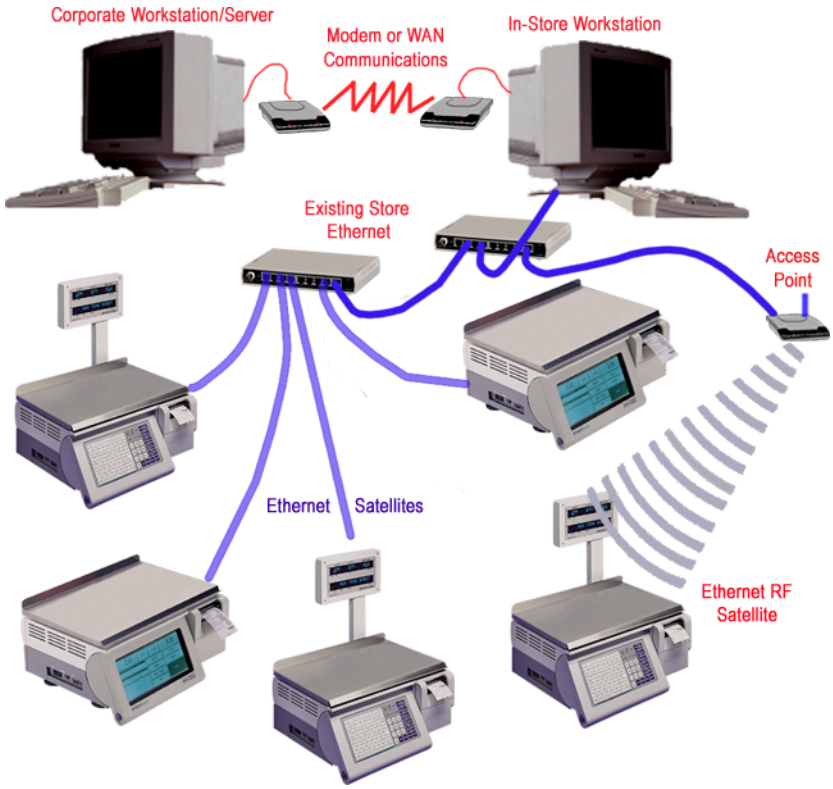


The NextGen Counter Scale and Prepack Controller can connect directly to the database through the Ethernet Network. Scale Server is not needed in this case. The Scale Server is used for proprietary scale data communications.

Ethernet RF

An Ethernet RF radio connects to the scale's Ethernet jack and converts the Ethernet signals to radio signals. The store Access Point then converts the radio signals back into standard Ethernet signals for transmission on the wired network. The Access Point may forward this information to another wireless device or it may be connected to a token ring network.

The RF scales add flexibility to add and move about scales in the store. RF is independent of the type of data being transmitted. It can be used by ScaleVision® communicating to a proprietary scale data protocol or by the NextGen scales for direct database access.



Ethernet Network with Ethernet RF Scales

The RF scales can connect as a standard wired Ethernet scale or can be used to connect multiple Ethernet scales using one wireless radio on the Symbol® 802.11 network.

In order to use the STEM installed in an Ethernet Satellite, you must use a Symbol® radio that supports bridging of multiple Ethernet devices. Refer to Chapter 2 in the configuration section for information on the Symbol® 802.11 network.

2 Ethernet Technology

Ethernet Network Cabling Systems

METTLER TOLEDO® Ethernet cabling specifications follow established industry standards. Additional information on Ethernet networks can be found on the Internet, bookstores, or at most libraries.

Ethernet networks can use UTP (Unshielded Twisted Pair), coaxial, or fiber optic cabling. Ethernet networks can also use RF (radio frequency) to connect nodes without running wiring between them. The IEEE (Institute of Electrical and Electronic Engineers) created Standard 802.3 that describes the operation of 10 Mbps networks. Different versions of Standard 802.3 exist depending on the type of cabling used. METTLER TOLEDO® Ethernet scales require a 10BASE-T connection.

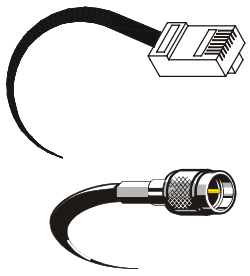
The IEEE standards for cabling are:

- Standard Thick Ethernet or 10BASE-5 (Maximum 1640 ft/500 m per segment)
- Thin Ethernet or 10BASE-2 (Maximum 607 ft/185 m per segment)
- UTP Ethernet or 10BASE-T (Maximum 328 ft/100 m per segment)
- Fiber Optics or 10BASE-FL (Maximum 3280 ft/1000 m per segment)

An easy way to tell which type of Ethernet network is being used is by checking the connector to a network card. If it has a telephone-style plug, it is 10BaseT. The cable for 10BaseT looks the same as telephone cable. If the network has a D-shaped connector with many pins in it, it is 10Base5. A 10Base2 network has a connector similar to a cable TV coaxial connector, except it locks into place. The 10Base2 connector is always circular

Devices can be purchased that can connect segments of LANs that use different cabling standards (i.e. 10BASE2 to 10BASE-T, etc.) to extend the range of the network. 10BASE-T Hubs can also be purchased with a BNC connector to connect the hubs using 10BASE2 or 10BASE5.

METTLER TOLEDO® Ethernet Client Scales and the STEM require UTP **10BASE-T** cables, **Category 5** (CAT 5) or higher, wired in a **Star topology**. Each node on the 10BASE-T network has its own cable that connects to a common hub. The cable from the node to the hub (segment) can be up to 100 meters (328 feet) in length. The hub serves as a central switching station that controls the incoming and outgoing signals. When using star topology if a station goes down it does not affect the rest of the network. Typically an RJ45 connector is connected to UTP cabling and is run straight from the hub to the device on the network.



RJ-45 Connector used on UTP 10BASE-T networks. METTLER TOLEDO® clients and the STEM use this connector.

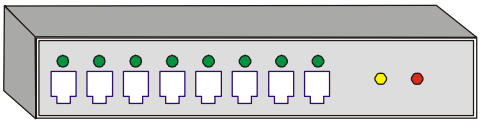
BNC Coax Connector used for 10BASE2.

Connector Types

Hubs

Ethernet is easily expandable with devices that provide multiple Ethernet ports. These devices are known as "hubs" since they provide the central portion, or hub, of a network system. Hubs can be connected to each other extending the network. Check with the Hub manufacturer or the documentation shipped with the hub to determine the maximum number of hubs that can be connected together. Depending on the manufacturer, up to four hubs can be connected. To further extend the size or distance of a network, a switch or repeater can also be purchased.

Hubs can be purchased with five, eight, and sixteen or more ports. Hubs can also be purchased that can connect a 10BASE-T network to other cable types, such as 10BASE2. A vendor, Network Administrator, or System Engineer should be consulted to determine the best configuration for your application.



Example 8-Port 10BASE-T Hub (RJ-45 Connectors)

Bridges

A bridge is used to form links between two LANs and to subdivide a single LAN to accommodate network traffic requirements. Bridges connect similar LANs to one another (such as Ethernet-Ethernet or Token Ring-Token Ring). Another use of a bridge is to transport "non-routable" protocols (such as SNA). All bridges operate in the Data Link layer of the OSI model. The primary role of a bridge is control data traffic flow. A bridge is a storage and forwarding device. The bridge reads a packet's destination address and determines whether to keep the packet or forward it. If the bridge recognizes an item, it stays. If the bridge doesn't recognize an item, it is forwarded. One negative is that a bridge does not recognize bad packets and forwards them as well as the good packet. It is because of this that routers have mostly taken the place of bridges.

Routers

Routers operate at the network layer of the OSI (operating system interface) allowing them to link different types of networks. A router does this by utilizing a common network protocol to transport data frames from source to destination devices. Routers provide traffic control when there are multiple pathways for data to follow. Routers were once commonly used to micro-segment networks for traffic control and security. This function is now being replaced by a newer technology, network switches. Most routers are capable of performing all bridge functions as well as the routing functions. Routers are storage and forwarding devices, allowing them to be used for network security. Routers can be programmed to allow or refuse packets. A router can look at the packet and determine the destination address. If it recognizes both address and data, the packet is delivered. If not, the packet is sent discarded. A primary function of a router is wide area connectivity. Using the ability to handle multiple protocols and security

features, routers can connect any number of remote sites to either a central site or each other. Routers are frequently used to connect enterprise networks to outside resources such as the Internet. While routers do have some security functions, a firewall should be installed (see Firewalls).

Frame Switches

Network switching increase bandwidth by allowing multiple "virtual" connections at the same time. There are two types of switches: "cut-through" and "store and forward". Both increase network bandwidth, but use different methods. A "cut-through" switch is the fastest type of switch that only reads the destination address of a packet and then forwards it. It does not read the rest of the packet. A "store and forward" switch performs error checking of the packet and will verify the source, destination, and integrity of the packet before forwarding the packet to the final destination. The additional checking makes this type of switch slightly slower than a cut-through.

Firewalls

Firewalls provide security for networks. In the past, routers have been used to protect the internal network from outside invasion. A router operates by allowing access to the network unless it is specifically prohibited. A firewall operates just the opposite. Unless specifically allowed, all access is prohibited. Firewalls will also allow the use of any IP addresses behind the firewall on the network.

TCP/IP

TCP/IP is used for communication on an Ethernet Network between a host and client, such as a PC or METTLER TOLEDO® Ethernet scale.

TCP/IP is software that provides a method for transferring data from one machine to another. **T**ransmission **C**ontrol **P**rotocol (the TCP part of TCP/IP) is a communications protocol that provides reliable data transfer. Data is transmitted by assembling the data into packets (smaller chunks of data). **I**nternet **P**rotocol (IP) is responsible for routing and moving the packets of data across networks. IP uses a set of unique addresses for every device on the network to determine routing and destinations. When packets are received, TCP reassembles the packets into the original data form.

BOOTP and DHCP

This section describes the Internet protocols BOOTP and DHCP.

BOOTP

BOOTP (Bootstrap Protocol) is a protocol that automatically configures a network device (receive an IP address) and lets an operating system boot without user involvement. The BOOTP server, managed by a network administrator, automatically assigns the IP address from a pool of addresses (for a certain length of time).

BOOTP was designed to allow automatic booting on a network to save the network administrators from entering parameters manually into every network node. They also wanted a system that when moved could automatically boot in the new location without intervention.

BOOTP is the basis for a more advanced network manager protocol, the Dynamic Host Configuration Protocol (DHCP). The Bootstrap Protocol (BOOTP) and the Dynamic Host Configuration Protocol (DHCP) provide a framework for passing configuration information (RFC 1541 - DHCP). Using these protocols means that a network node does not have to be configured before it can communicate using the TCP/IP protocol on a network. Some of the configuration information that is passed to client machines is:

- IP address
- IP address of the default router for that particular subnet
- Subnet mask
- IP addresses of the primary and secondary nameservers

Additional information may include:

- Time offset from GMT
- The IP address of a time server
- The IP address of a boot server
- The name of a boot file
- The IP domain name for the client

DHCP

The Dynamic Host Configuration Protocol (DHCP) is an Internet protocol for automating the configuration of computers that use TCP/IP. DHCP can be used to automatically assign IP addresses, to deliver TCP/IP stack configuration parameters such as the subnet mask and default router, and to provide other configuration information such as the addresses for printer, time and news servers.

The Dynamic Host Configuration Protocol (DHCP) provides a mechanism through which computers using TCP/IP can obtain protocol configuration parameters automatically through the network. DHCP is an open standard, developed by the Dynamic Host Configuration working group (DHC WG) of the Internet Engineering task Force (IETF). DHCP is an extension of the protocol BOOTP.

DHCP is based on a client-server system, in which the DHCP client contacts a DHCP server for configuration parameters. The DHCP server is typically centrally located and

operated by the network administrator. Because the server is run by a network administrator, DHCP clients can be configured with parameters appropriate to the current network architecture.

The most important configuration data carried by DHCP is the IP address. A computer must be initially assigned a unique IP address that is appropriate to the network to which the computer is attached (one that is not assigned to any other computer on that network). If a computer moves to a new network, it must be assigned a new IP address for that new network. DHCP can be used to manage these assignments automatically.

DHCP carries other important configuration parameters such as the subnet mask, default router and Domain Name System (DNS) server. Using DHCP, a network administrator can avoid "hands-on" configuration of individual computers through complex and confusing setup applications. Instead, those computers can obtain all required configuration parameters automatically, without manual intervention, from a centrally managed DHCP server.

When a client is configured to use DHCP, on booting it broadcasts a DHCPDISCOVER request to all addresses on the network. If there's a DHCP server listening, it will respond with a DHCPOFFER. When they establish communication, the server sends the client information about how to configure network settings, like IP-address, gateway, netmask and domain name.

MAC Address

Media Access Control address is a hardware address that uniquely identifies each node of a network. Every node has a unique hardware network address, sometimes called a Data Link Control (DLC) address or Media Access Control (MAC) address.

In IEEE 802 networks, the Data Link Control (DLC) layer of the OSI Reference Model is divided into two sublayers: the Logical Link Control (LLC) layer and the Media Access Control (MAC) layer. The MAC layer interfaces directly with the network media. Consequently, each different type of network media requires a different MAC layer.

DNS

DNS (Domain Name System or Service) is an Internet service that translates domain names into IP addresses. Because domain names are alphabetic, they're easier to remember, but the Internet is really based on IP addresses. Every time you use a domain name, a DNS service must translate the name into the corresponding IP address. For example, the domain name www.mt.com might translate to 147.206.232.4. The DNS system is its own network. If one DNS server doesn't know how to translate a particular domain name, it asks another one, and so on, until the correct IP address is returned.

10BASE-T Overview

The ***10*** is for 10 Megabits per second (Mbps) operation, ***Base*** is for baseband operation, and ***T*** is for the twisted pair cable used for the network. 10BASE-T uses unshielded twisted pair (UTP) cabling. METTLER TOLEDO® recommends using **Category 5** (sometimes referred to as CAT 5) or higher wiring for the scale systems. Each node on the network has its own cable that connects to a common hub. The cable from the node (Scale, PC, or other device) to the hub can be up to 100 meters (328 feet) in length.

Basic Rules for 10BASE-T

The following basic rules apply to a 10BASE-T network.

- Maximum length per 10BASE-T segment is 100 meters or 328 feet.
- Maximum of two devices per segment; one is the station and the other is the hub.
- Maximum of four hubs can be connected without using a bridge or switch. (Consult the hub vendor for their specific specifications.)
- Star topology.
- 10Base-T Hubs can connect to fiber optic 10BASE-FL or to 10BASE-2 or 10BASe-5 coax networks that can be used to extend the distance of the network. Special hubs will be needed for this application.
- UTP (Unshielded Twisted Pair) cable. Category 5 or higher is recommended.
- UTP cabling is not recommended for areas with high electromagnetic or radio frequency interference (EMI/RFI).

Fault Isolation

Since each node on a 10 Base-T network uses a dedicated cable from the device to the hub, it is unlikely that any node can cause the entire network to fail. Most hubs have a "partitioning" function that can detect problems on any port. If any problems are found, the node is disconnected from the rest of the network, essentially isolating the problem until the node can be repaired.

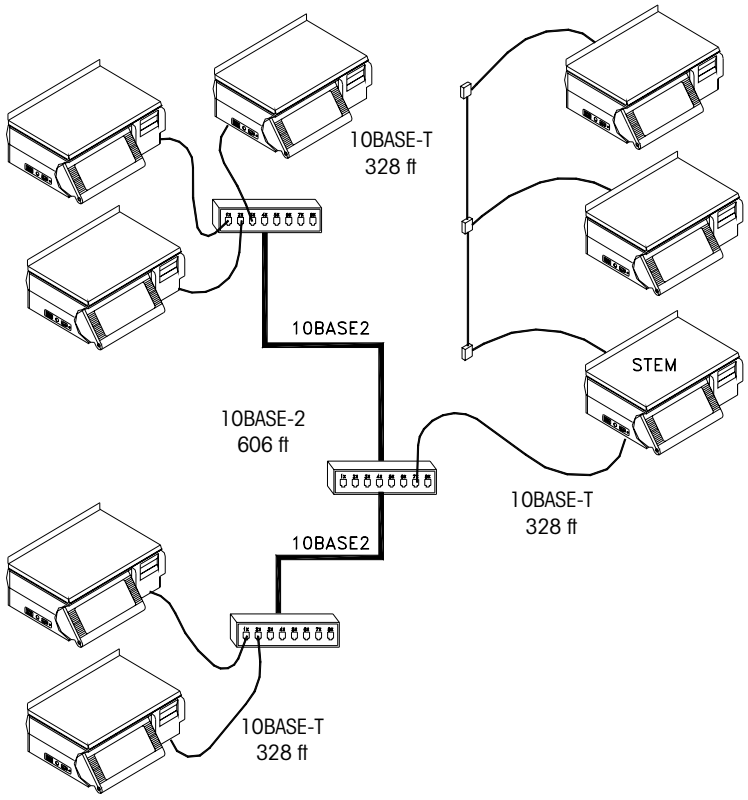
Disconnecting a node from the network will not interfere with the rest of the network. Moving or adding a device is simply a matter of unplugging or plugging it at the hub. Ports can be swapped with two devices for troubleshooting.

The partitioning function built in to the hubs and the star-wired topology makes it easy to troubleshoot a 10 BASE-T network. Nodes can be disconnected from the hub one at a time until the network recovers. Usually, the hub will give an indication by a blinking LED indicating which node is causing the problem, allowing the technician to isolate that node and repair the problem.

Cable Length

10BASE-T has a maximum cable length from a hub to a node of 328-ft (100 meters). In some installations, this can be a major problem if nodes need to be located farther away. However, by using a bridge or switch, or by using 10BASE2 or 10BASE5 to connect the hubs, in combination with 10BASE-T, most cabling problems can be resolved.

10BASE-T can also be wired in a tree topology, where a main hub connects to other hubs (see illustration below). This type of wiring scheme is also called buss or coax/fiber optic backbone cabling. You can also combine 10BASE-T with any combination of other Ethernet technologies. For example, if Thin Ethernet Coax Cable (10BASE-2) is used as a Backbone between hubs, the segment length between the hubs can be a maximum of 606-ft (185 m), as shown below. (Note: The hubs must be capable of connecting with 10BASE-2 cables.)



Example of 10BASE-T used with 10BASE2

Scale Network

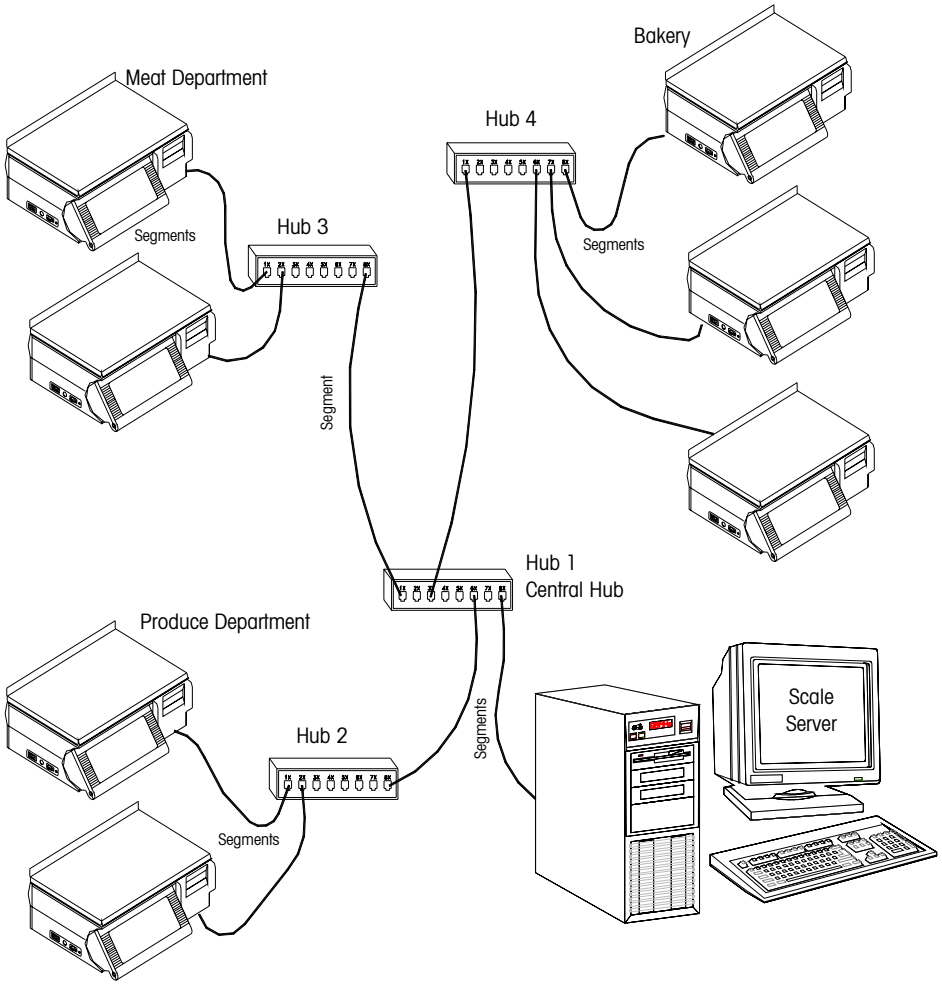
The illustration below shows an example Ethernet Network using the PC Scale Server. A Network Administrator or System Engineer should be consulted prior to purchasing any equipment. Many other configurations are possible due to the flexibility of Ethernet.

10BASE-T Segments are limited to 328 ft (100 m). Cat-5 (Category 5) Cable is recommended.

Check with the Hub manufacturer or documentation to determine how many Hubs can be connected between devices. Normally, up to 4 Hubs can be connected together. When the maximum is reached, a switch must be used to extend the network.

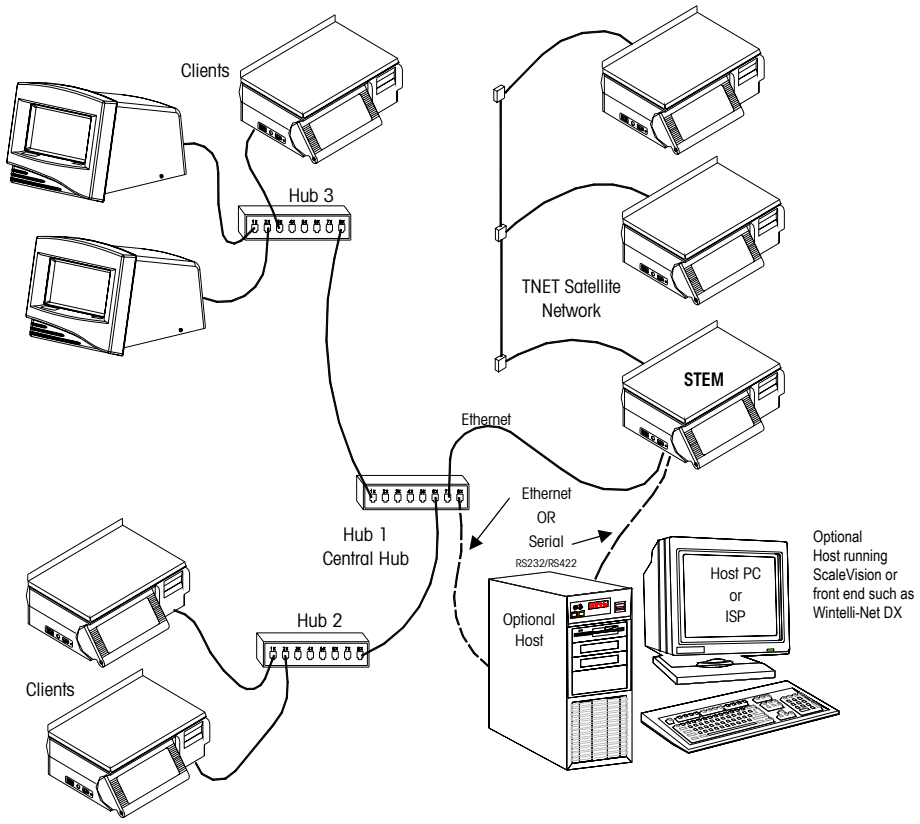
Some common hub manufacturers web pages are:

http://www.linksys.com
http://www.3com.com



Example Client/Server Scale Network

The illustration below shows an example network using the STEM (**Smart*Touch*®** Ethernet Master) as the Server. The STEM can support up to 25 Ethernet Client scales and 25 TNET Satellites simultaneously.



Example STEM Network, Ethernet and TNET

Scale Ethernet Connections

The Ethernet jacks on all METTLER TOLEDO® Ethernet Scales use standard Ethernet Wiring configurations. Standard Ethernet straight-through patch cables can be used from a hub to the Ethernet scale.

Ethernet RJ45
10 Base-T Connector
Pin 1 - TD+
Pin 2 - TD-
Pin 3 - RD+
Pin 6 - RD-

Patch Cables

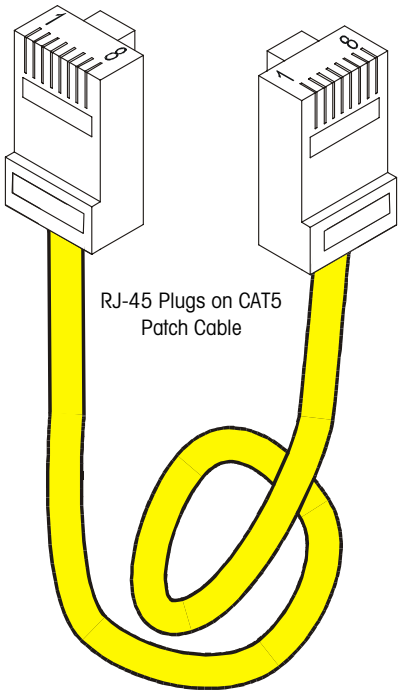
10BASE-T Straight-Through Patch Cable
Patch cables connect devices to hubs. METTLER TOLEDO® Ethernet scales require a CAT5 (Category 5) 10BASE-T UTP Straight-Through Patch Cable conforming to the EIA standard 568A or 568B. The only difference between 568A and 568B is the color code

positions (green and orange wires are swapped). It is best not to mix 568A and 568B cables in a system to avoid confusion with the color codes (however, complete cables of both types will interchange). 10BASE-T segments are limited to 328 feet (100 m). The CAT5 Straight-Through Patch Cable has four pairs of wires connecting to the same pins on both ends of an RJ-45 connector. Pairs 2 and 3 are used for the 10BASE-T signals, as shown below.

Pin connections for 568A and 568B cables.

	Plug A	Color Code 568A	Color Code 568B	Plug B
Pair 3	1 - TD+	White/Green	White/Orange	1 - TD+
Pair 3	2 - TD-	Green	Orange	2 - TD-
Pair 2	3 - RD+	White/Orange	White/Green	3 - RD+
Pair 1	4 - Not Used	Blue	Blue	4 - Not Used
Pair 1	5 - Not Used	White/Blue	White/Blue	5 - Not Used
Pair 2	6 - RD-	Orange	Green	6 - RD-
Pair 4	7 - Not Used	White/Brown	White/Brown	7 - Not Used
Pair 4	8 - Not Used	Brown	Brown	8 - Not Used

Straight Through 10BASE-T Patch Cable



10BASE-T Crossover Patch Cable for Hubs

A crossover patch cable connects the transmit pins to the receive pins. A crossover patch cable **may** be required for connecting hubs to other hubs. Refer to the documentation that is shipped with the hub for information.

1 - TD+	3 - RD+
2 - TD-	6 - RD-
3 - RD+	1 - TD+
6 - RD-	2 - TD-

Crossover 10BASE-T Patch Cable

Ethernet RF

Introduction

For more information on Symbol® RF, see www.symbol.com, or for Telxon see www.telxon.com, or for Aironet® see www.aironet.com on the world wide web.

The 802.11 Standard for wireless local area networking.

The IEEE 802.11 standard supports transmission in infrared light and two types of radio transmission within the unlicensed 2.4GHz frequency band: Frequency Hopping Spread Spectrum (FHSS) and Direct Sequence Spread Spectrum (DSSS).

The Mercury-PC supports the following technologies:

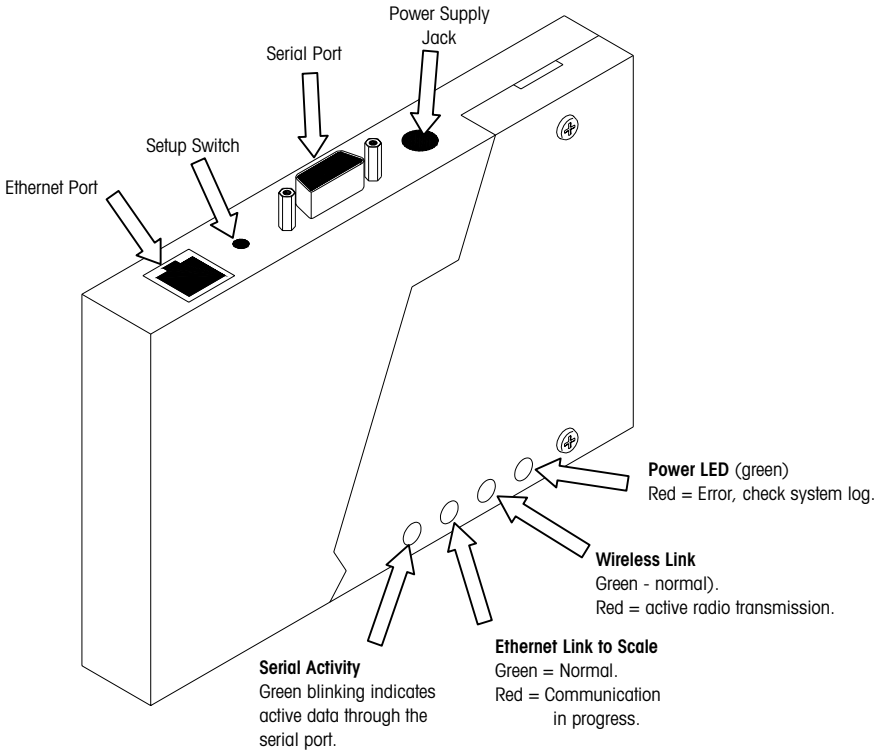
Symbol® Spectrum24 802.11 FH
Symbol® Spectrum24
Aironet™/Telxon 2.4 TMA
Aironet™/Telxon 802.11 DS

Radio Manufacturer's Notes and Recommendations

- Do not touch or move the RF antenna while the unit is transmitting or receiving.
- Keep the radio antenna away from any exposed parts of the body, especially the face or eyes, while transmitting.
- Do not operate a portable transmitter near unshielded blasting caps or in an explosive environment unless it is a type especially qualified for such use.
- Do not operate the radio or attempt to transmit data unless the antenna is connected. If the antenna is not connected, the radio may be damaged.

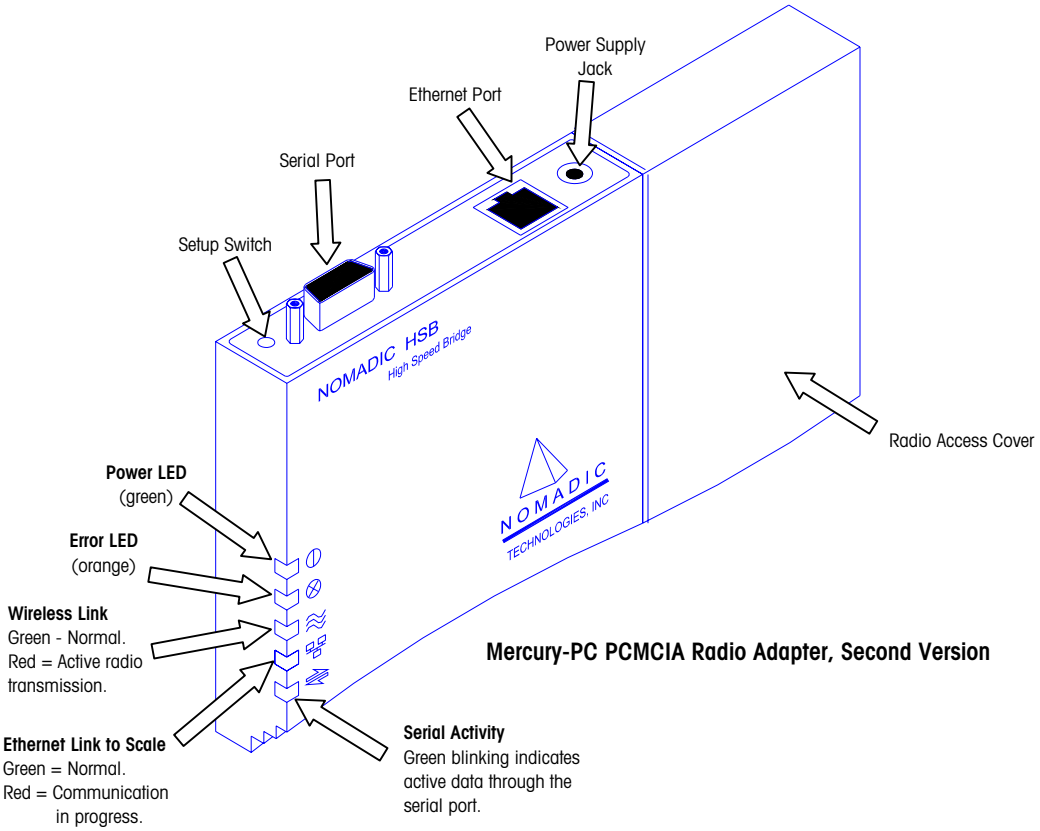
Certain **METTLER TOLEDO®** Ethernet scales (Model 8361, 8450, and 8461) are available with the Mercury-PC PCMCIA Ethernet to Wireless Adapter. The Mercury-PC will accept PCMCIA radios, such as Symbol® and Aironet™/Telxon.

The Mercury-PC supports a radio frequency receiver/transmitter that communicates through the store's Access Point via radio waves. The Mercury-PC connects to the scale's Ethernet jack and converts the Ethernet signals to radio signals. The store Access Point then converts the radio signals back into standard Ethernet signals for transmission on the wired network. The Access Point may forward this information to another wireless device or it may be connected to a token ring network.



Mercury-PC PCMCIA Radio Adapter, First Version

Only the Symbol® 802.11 radio supports bridging of multiple Ethernet devices. When the STEM is installed in an Ethernet Client, it will require multiple IP addresses which only the Symbol® supports. Refer to the configuration section for information on the Symbol® 802.11 network. If the radio will not support multiple devices, the STEM must be installed in a TNET satellite.



Mercury-PC PCMCIA Radio Adapter, Second Version

Serial Cable for Mercury-PC Module

The Mercury-PC uses a standard 9-Pin straight-through serial cable from the Mercury-PC serial port to a computer or terminal RS232 serial port. The computer or terminal transmits data on pin 3 and receives data on pin 2. The Mercury-PC receives data on pin 3 and transmits data on pin 2. The pin connections at the Mercury-PC are shown in the box to the right.

The Mercury-PC is configured to support two sets of handshake lines for flow control: RTS/CTS (Request to Send/Clear to Send), and DTR/DSR (Data Terminal Ready/Data Set Ready).

1 Configure
2 Received Data RD
3 Transmitted Data TD
4 Data Terminal Ready DTR
5 Signal Ground
6 Data Set Ready DSR
7 Request To Send RTS
8 Clear To Send CTS
9 Reset

There are two pins you should be aware of and make sure they are not connected on the Mercury-PC side. Pin 1 is the Configure pin. If you ground this pin, the Mercury-PC will enter Setup Mode in the same way as pressing the setup switch. If the pin is left grounded, the Mercury-PC will attempt to enter setup mode continuously. Therefore, **do not connect this pin**. Pin 9 is a signal. If this pin is grounded, the Mercury-PC will reset in the same way it would if power were turned off and back on. If this pin is left grounded, the Mercury will be in a constant reset state. Again, **do not connect this pin**.

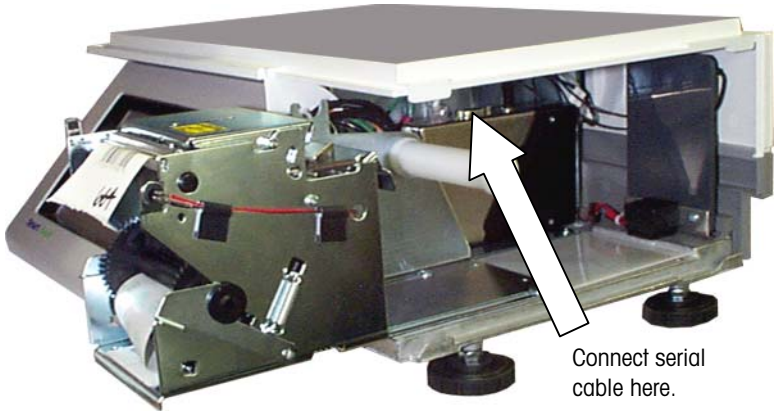
Mercury-PC Setup

When installing an RF scale, you will set up the unit's Ethernet parameters, then set up the Mercury-PC. You will need a PC and a serial cable to set up the Mercury-PC.

Serial Cable to Mercury-PC

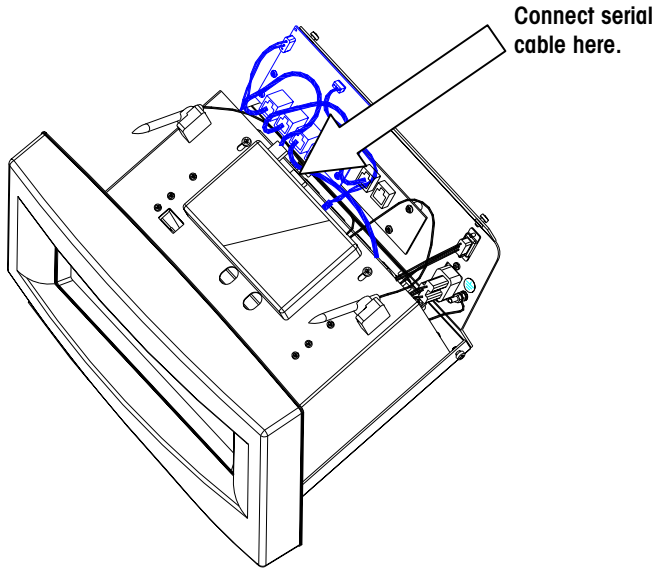
On the Model 8450 or 8461, the Mercury-PC is installed behind the printer. For access to the Mercury-PC, remove the printer door, press down on the release lever, and slide the printer forward. The Mercury-PC is mounted on the vertical frame behind the printer using a snap on bracket. Turn the power to the scale off before connecting the cable to the Mercury-PC Adapter. If a flat cable (P/N 15138600A) is not used, the module may need to be tilted outward to plug in the serial cable.

The PC RS232 to Mercury-PC cable is a DB9 M-to-F straight through cable. A flat cable, P/N 15138600A is available from **METTLER TOLEDO®** that will allow connection to the serial port without tilting the Mercury-PC adapter.



Connecting a Serial Cable to Mercury-PC Module

Remove the rear cover on the Model 8361 for access to the Mercury-PC. The Mercury-PC is mounted to the RFI cover.



Connecting a Serial Cable to Mercury-PC installed in Model 8361

Mercury-PC Setup Main Menu

Use a communications program such as Windows® HyperTerminal or ProComm® to communicate with the Mercury-PC. The communications protocol for the Mercury-PC is: 9600, N, 8, 1.

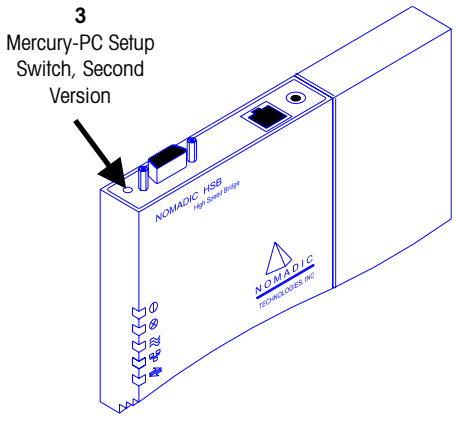
With the cable plugged in, the scale power on, and your communications software running and properly configured (9600, N, 8, 1), use a tool such as a paper clip to press the setup switch in the access hole (see below). The set up Main Menu should display. If it doesn't, press the up arrow key a few times.

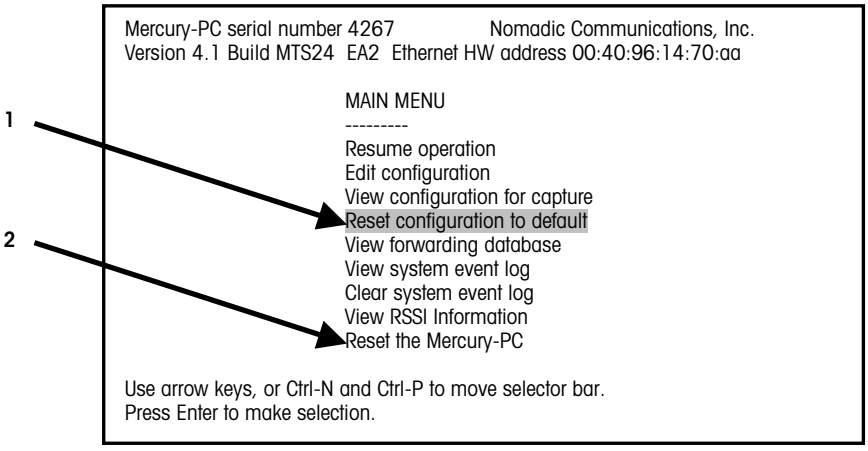
```
Mercury-PC serial number 4267              Nomadic Communications, Inc.
Version 4.1 Build MTS24  EA2  Ethernet HW address 00:40:96:14:70:aa

                          MAIN MENU
                          ---------
                          Resume operation
                          Edit configuration
                          View configuration for capture
                          Reset configuration to default
                          View forwarding database
                          View system event log
                          Clear system event log
                          View RSSI Information
                          Reset the Mercury-PC

Use arrow keys, or Ctrl-N and Ctrl-P to move selector bar.
Press Enter to make selection.
```

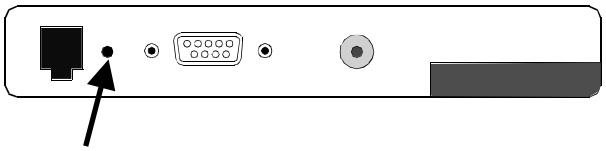
Mercury-PC Adapter Setup Screen

Initialize the Mercury-PC

For new scale setup, or anytime a radio is replaced, first select (1) "Reset configuration to default", then select (2) "Reset the Mercury-PC". This will initialize the adapter and configure it for the correct radio. Then (3) press the setup switch again to re-enter the setup menu.







Mercury-PC Configuration

Select "Edit configuration" on the Main Menu.

```
Mercury-PC serial number 4267              Nomadic Communications, Inc.
Version 4.1 Build MTS24  EA2  Ethernet HW address 00:40:96:14:70:aa

                              MAIN MENU
                              ---------
                              Resume operation
                              Edit configuration
                              View configuration for capture
                              Reset configuration to default
                              View forwarding database
                              View system event log
                              Clear system event log
                              View RSSI Information
                              Reset the Mercury-PC

Use arrow keys, or Ctrl-N and Ctrl-P to move selector bar.
Press Enter to make selection.
```

Next, select "Bridged Ethernet (lan0)".

```
Mercury-PC serial number 4267              Nomadic Communications, Inc.
Version 4.1 Build MTS24  EA2  Ethernet HW address 00:40:96:14:70:aa


                               SELECT A FILE
                               -------------
                               Return to Main Menu
                               system
                               RS-232 port (uart0)
                               Bridged Ethernet (lan0)

Use arrow keys, or Ctrl-N and Ctrl-P to move selector bar.
Press Enter to make selection.
```

This is where the various parameters specific to the radio are configured. The following screen shows the setup parameters with an Aironet™ PCMCIA radio installed.

Note for Aironet™/Telxon™ 2500 radios:

The SSID for these radios is a three-byte even hex value in the range 0x000002 to 0xFFFFFE. You cannot use three byte SSIDs and no SSIDs with the low byte equal to 0xFE (ex 0x12FE).

(Example: 254, 510, 766, 1022)

0x = Hex
FF is a byte
Even bytes end in 2, 4, 6, 8, A, C, or E

```
[hardware]
# If you are using a PC4500, the SSID may be either a string of up to
# 32 characters, or it may be a hex number. If you are using a
# PC2500, it must be an even hex number
SSID1 = 0x8
node name = Mercury-PC
# A MAC address can be specified as in the following example:
# mac address = 00a0cc2c2480
mac address = detect save
operating mode = ess

[rmp]
ethertype = 0x4e43

[ip]
ip address = 10.10.10.128
netmask = 255.255.255.0
broadcast = automatic
route = automatic
gateway = none

 File: lan0          Line #: 1
^P: up  ^N: down  ^B: back  ^F: forward  ^W: write file  ^X: exit w/out saving
```

Bridged Ethernet Setup Screen for Aironet™/Telxon

Under [hardware], the SSID1 is the wireless network system ID. This must match the System ID of the Access Point. The Service Set Identifier (SSID) controls access to a given wireless network. This value MUST match the SSID of any/all Access Points with

which you will communicate. If the value does not match, access to the system is not granted. The SSID can be up to 32 characters (case sensitive).

The "node name" is registered at the Access Point. The station name is displayed in the table of connected devices on the Access Point. It provides a logical name to determine which machines are connected without having to memorize every MAC address. The name can be up to 16 characters.

The "ip address" and "netmask" are optional and are used only for remote management of the wireless bridge through the network using a Telnet session.

Press Control-W to save and exit the screen or Control-X to exit without saving changes. The following screen shows the setup parameters with a Symbol® PCMCIA radio installed.

Note: On a Symbol® 802.11 network, a single node is supported when "dsmu = no". To support bridging of multiple Ethernet devices, change to "dsmu = yes" in the screen to the right. In the Access Point, WLAP mode must be enabled.

To use both antennas, you must add the line "diversity = yes" as shown to the right, which may increase the distance that scale can be located away from the Access Point.

```
[hardware]
network id = 101
mac address = detect save
# station or microap
radio mode = station
dsmu = no
transmit rate = 1 2
diversity = yes

[rmp]
ethertype = 0x4e43

[ip]
ip address = 10.10.10.128
netmask = 255.255.255.0
broadcast = automatic
route = automatic
gateway = none

File: lan0          Line #: 1
 ^P: up  ^N: down  ^B: back  ^F: forward  ^W: write file  ^X: exit w/out saving
```

Bridged Ethernet Setup Screen for Symbol® Radio

Ethernet RF Access Points

An Access Point is a wireless LAN transceiver that acts as a center point and bridge between wireless and wired networks.

Access Point Documentation for Telxon TMA and 4800 Access Points

Shown below is the main menu for a TMA 630 Access Point. An Aironet® Access Point configuration is very similar. To access this menu, connect a straight through serial cable to your PC and the Access Point with HyperTerminal or ProComm® communication software, (defaults are 9600,8,1,n) or Telnet session running from a computer on the network.

```
ARLAN 630 V4.2A             Main Menu        630_241e96

    Option            Value       Description

1 - Configuration   [ menu  ]   - General configuration
2 - Statistics      [ menu  ]   - Display statistics
3 - Registration    [ menu  ]   - Registration table maintenance
4 - Filter          [ menu  ]   - Control packet filtering
5 - Logs            [ menu  ]   - Alarm and log control
6 - Diagnostics     [ menu  ]   - Maintenance and testing commands
7 - Privilege       [ write ]   - Set privilege level
8 - Help                        - Introduction

Enter an option number or name
>
```

Main Menu

Filter Menu (Main Menu #4)

Under the Filter menu (Main Menu, Item 4), several things can affect Scale communications. The "Proxy_arp" function can be on or off. The Filter Menu is shown below.

```
ARLAN 630 V4.2A         Filter Menu             630_241e96

    Option        Value      Description

1 - Multicast   [ menu ]   - Multicast address filtering
2 - Node        [ menu ]   - Node address filtering
3 - Protocols   [ menu ]   - Protocol filters
4 - Proxy_arp   [  on  ]   - Activate proxy ARP function

Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

Filter Menu

One of the items that can affect the scale communications is a Multicast filter. Ensure that the Default Multicast Action is to "**forward"** Multicast packets on Filter Menu, Item #1. It is also preferable to forward multicast packets from the wireless network "**everywhere"** (see menu item #5).

```
ARLAN 630 V4.2A       Filter Multicast Menu     630_241e96

    Option            Value         Description

1 - Default      [  forward   ]   - Default multicast action
2 - Show                          - Display the multicast filters
3 - Add                           - Add a multicast address filter
4 - Remove                        - Remove a multicast address filter
5 - Radio_mcst   [ everywhere ]   - Where to forward multicasts from
radio

Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

Filter Multicast Menu

From the Filter Menu, select Item #2 to display the Filter Node Menu (shown below). Make sure that there are no IP Address filters that relate to the scales IP address or node address filters that deal with the scales MAC address which start with 00E07C. Display this information by selecting menu item #2.

```
ARLAN 630 V4.2A          Filter Node Menu      630_241e96

    Option         Value        Description

1 - Source      [ forward ]   - Source addresses
2 - Display                   - Display the node address filters
3 - Ipdisplay                 - Display the IP address filters
4 - Add                       - Add a node address filter
5 - Remove                    - Remove a node address filter

Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

Filter Node Menu

Use the menu item #2 Display function (see above menu) to make sure no IP address filters are enabled (see Filter Protocols Menu below). The IP Protocol # is 800.

```
ARLAN 630 V4.2A         Filter Protocols Menu     630_241e96

    Option     Value      Description

1 - Default   [ off ]   - Default action
2 - Unicast   [ off ]   - Filter unicast packets
3 - Display             - Display the protocol filters
4 - Add                 - Add a protocol filter
5 - Remove              - Remove a protocol filter
6 - Length    [ 22  ]   - Length of packet data to log
7 - Monitor   [ off ]   - Protocol monitoring enabled
8 - Show                - Show forwarded protocol list
9 - Clear               - Clear forwarded protocol list

Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

Filter Protocols Menu

Configuration (Main Menu #2)

From the Main Menu, select #2, Configuration (see below).

```
Configuration Menu
Option       Value      Description

1 - Radio      [ menu ]   - Radio network parameters
2 - Ethernet   [ menu ]   - Ethernet configuration
3 - Ident      [ menu ]   - Identification information
4 - Console    [ menu ]   - Console set-up
5 - Snmp       [ menu ]   - Set snmp values
6 - More       [ menu ]   - More items
7 - Dump                  - Dump configuration to console

Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

Configuration Menu

Select "**Radio**" (item #1) from the Configuration Menu (above). The Sid (item #1 below) should match the SSID1 in the Mercury module (see below). All access points working together will have the same SID. Another item to check is Root Mode (item 4 on Radio Menu). If the access point is wired to the store network, the root mode should be "**on**". If the access point is used as a repeater, root mode will be "off". A repeater will not allow scales to associate with it unless it can communicate with another access point that has root mode "on". Located under the "Extended" (item #7 below) menu on a Model 4800 Access Point, is an entry called "Allow Aironet wireless extension". This must be "**off**" if there are non-Aironet/Cisco radios running on the network.

```
RLAN 630 V4.2A         Configuration Radio Menu    630_241e96

    Option        Value      Description

1 - Sid         [  8   ]   - System identifier
2 - Bitrate     [ 2000 ]   - Data bit rate in kilobits / second
3 - Frequency   [ 2412 ]   - Center frequency in MHz
4 - Root        [  on  ]   - Enable root mode
5 - Autoscan    [  on  ]   - Enable auto scan mode
6 - Install     [ menu ]   - Installation utilities
7 - Extended    [ menu ]   - Extended parameters

Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

Configuration Radio Menu

Item #3 on the Configuration Menu is the "Ident" Menu where the Access Points IP, subnet mask, and gateway are configured.

```
ARLAN 630 V4.2A         Configuration Ident Menu     630_241e96

    Option              Value            Description

1 - Name         [  "630_241e96"   ]   - Node name
2 - Nid          [  004096241e96   ]   - Network address
3 - Inaddr       [ 146.207.104.111 ]   - Internet address
4 - Inmask       [ 255.255.255.000 ]   - Internet subnet mask
5 - Ingateway    [ 146.207.104.222 ]   - Internet default gateway
6 - Location     [       ""        ]   - SNMP system location
7 - Contact      [       ""        ]   - SNMP system contact name

Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

Configuration Ident Menu

Statistics (Main Menu #2)

Select item #2 Statistics on the Main Menu. Located under the Statistics Menu is the ARP Table (item #7 below) of the Access Point that can help in troubleshooting system problems.

```
ARLAN 630 V4.2A            Statistics Menu      630_241e96

    Option          Value     Description

1 - Throughput               - Throughput statistics
2 - Radio                    - Radio error statistics
3 - Ethernet                 - Ethernet error statistics
4 - Status                   - Display general status
5 - Watch                    - Record history of a statistic
6 - History                  - Display statistic history
7 - ARP                      - ARP table
8 - Display_time   [ 10 ]    - Time to re-display screens

Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

Statistics Menu

Diagnostics (Main Menu #6)

From the Main Menu, select #6, Diagnostics. Under the Diagnostics Menu is the "Linktest" menu (Item 3 below). Functions under this menu can show how well an access point can communicate to a client.

```
ARLAN 630 V4.2A                  Diagnostics Menu      630_241e96

    Option          Value         Description

1 - Connect                     - Start telnet session
2 - Escape      [ "^X^Y^Z" ]    - Connection escape sequence
3 - Linktest    [   menu   ]    - Run a link test
4 - Restart                     - Equivalent to power-up
5 - Shutdown                    - Prepare to power off unit
6 - Defaults                    - Return to default configuration
7 - Find                        - Flash LEDs to find unit
8 - Ping                        - Send an IP PING packet
9 - Load        [   menu   ]    - Load new version of firmware

Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

Diagnostics Menu

In the Linktest Menu (below), select "Multicast" or "Unicast" to run a 100-packet test that will report how many attempted packets the access points need to get 100 across.

```
    Option           Value      Description

1 - Multicast                 - Run a multicast test
2 - Unicast                   - Run a unicast test
3 - Remote                    - Run a remote test
4 - Destination   [ any  ]    - Target address
5 - Size          [ 512  ]    - Packet size
6 - Count         [ 100  ]    - Number of packets to send
7 - Errors                    - Radio error statistics
8 - Autotest      [ once ]    - Auto linktest mode
9 - Continuous    [  0   ]    - Repeat test once started

Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

Linktest Menu

Registration (Main Menu #3)

From the Main Menu, select #3 Registration. On the Registration Menu (see below), select "Monitor", then select "Map" to display the scales connected to each access point.

```
    ARLAN 630 V4.2A         Registration Menu         630_241e96

    Option       Value        Description

1 - Display                   - Display the table
2 - Summary                   - Display the table summary
3 - Monitor   [  menu   ]     - Monitor network registrations
4 - Autoreg   [   on    ]     - Allow automatic table additions
5 - Add                       - Control node registration
6 - Remove                    - Remove registration control
7 - Niddisp   [ numeric ]     - Node Ids display mode

Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

```
ARLAN 630 V4.2A      Registration Monitor Menu       630_241e96

    Option    Value      Description

1 - Map                - Show network map
2 - Trace    [ off ]   - Trace network registrations

Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

3 STEM/REM (SmartTouch Ethernet Master)

STEM/REM Overview

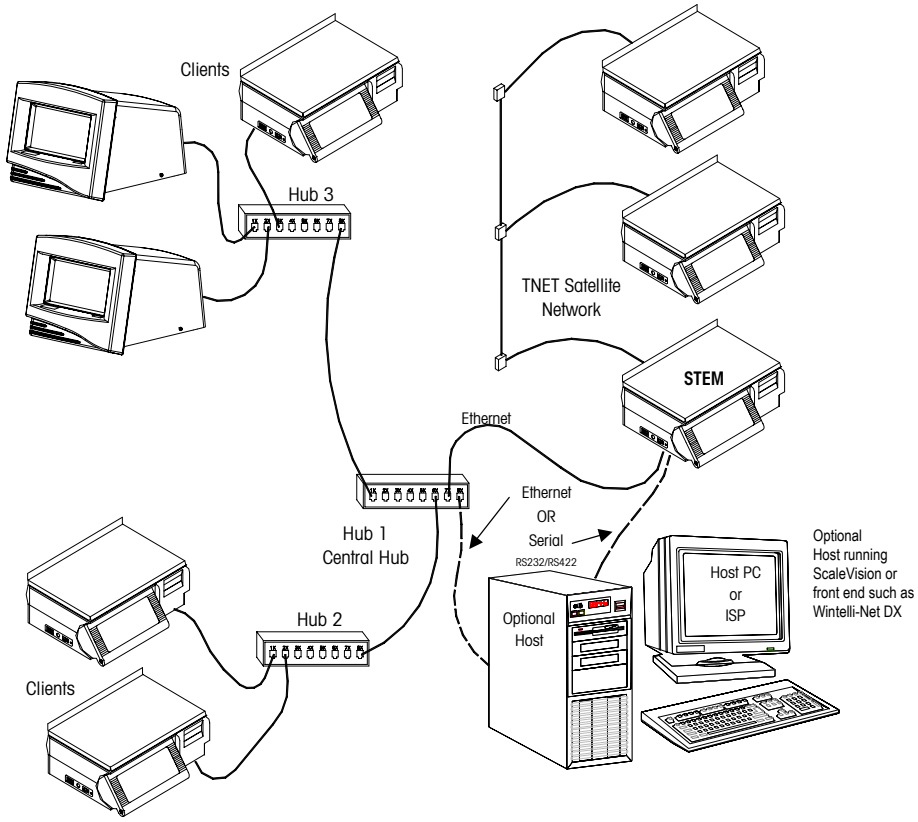
Refer to the chapter on Upgrade Kits for the Model 8360, 8361, 8460, and 8461 compatibility.

TCP/IP
(Transmission Control Protocol/Internet Protocol)

The SmartTouch Ethernet Master (STEM) is based on the **Smart*Touch*®** TNET Master. The REM is a Rack mount Ethernet Master with only the master electronics. Functionally both the TNET and STEM operate the same. The STEM adds the Ethernet interface. The STEM can be installed into the **Smart*Touch*®** Model 8360, 8361 8460, and 8461, the same as a TNET Master, or it is available in a standard rack mount configuration (REM). The STEM is able to communicate to TNET Satellites using the METTLER TOLEDO® TNET protocol, or to the Ethernet satellites using TCP/IP protocol. TCP/IP is a standard communications protocol used on Ethernet Networks and the Internet. In addition, the STEM can communicate wireless using the optional Ethernet RF radios.

The STEM contains a database of PLUs and related items that any Satellite or Client may request. An in-store-computer or any **Smart*Touch*®** Satellite or Client may be used to create or modify the PLU database. The STEM can support up to 25 Ethernet Client scales and 24 TNET Satellites simultaneously. A host PC can be used to update the database through Ethernet or RS232/RS422 ports.

The illustration below shows an example network using the STEM (**Smart*Touch*®** Ethernet Master) communicating to TNET Satellites and Ethernet Clients.



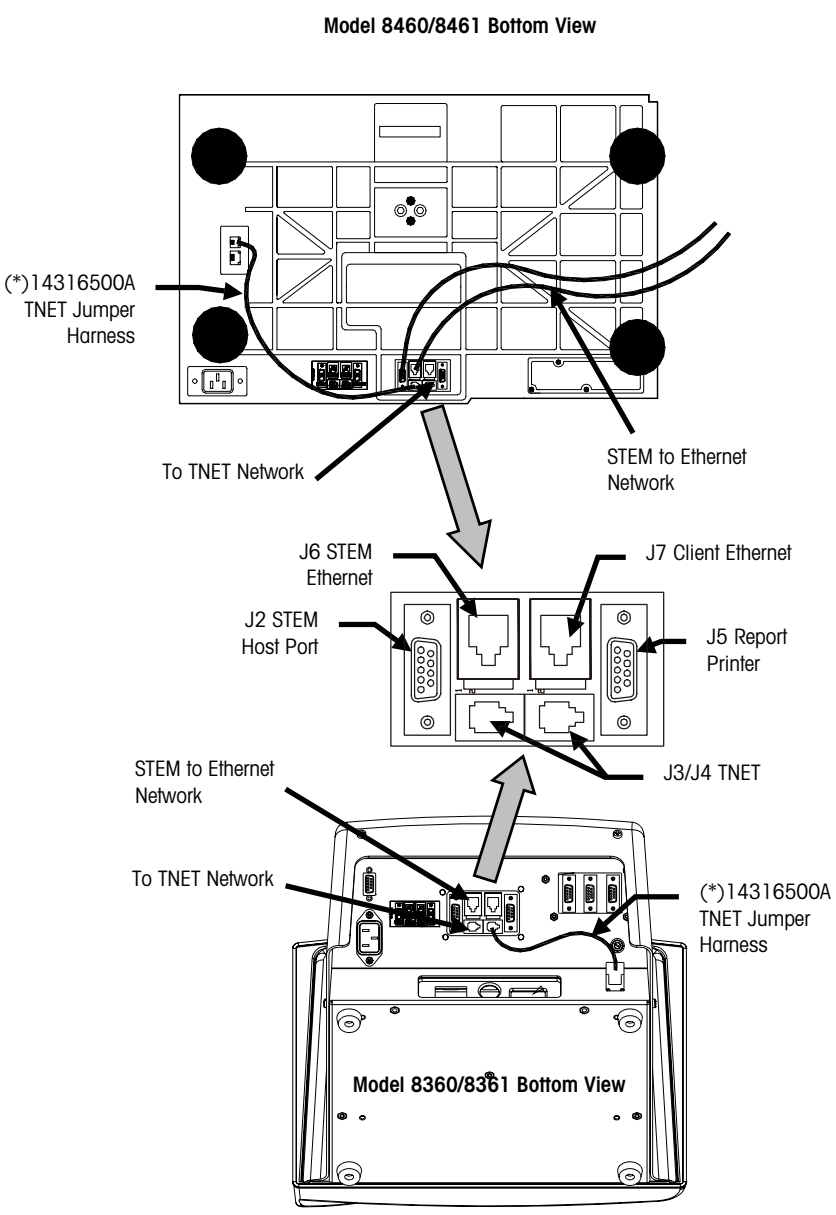
Example STEM/REM Network

STEM Connector PCB Layout

Standard Ethernet straight-through 10BASE-T patch cables are used to connect the STEM to an Ethernet hub. The Ethernet connection jack on the STEM is located on the Connector PCB, as shown in the illustration below. When connecting a STEM and Ethernet Satellite to the network, two patch cables are required. The illustration also shows the TNET, host, and report printer connectors on the Connector PCB.

Ethernet RJ45
10 BASE-T Connector

Pin 1 - TD+
Pin 2 - TD-
Pin 3 - RD+
Pin 6 - RD-



STEM Connector PCB Layout

STEM/REM IP Address

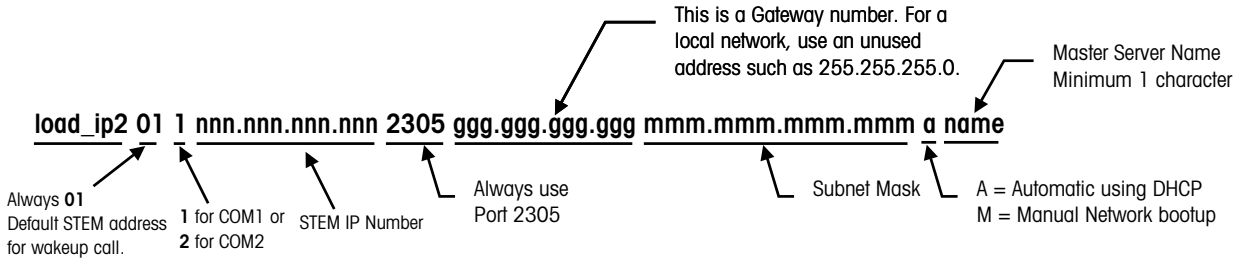
This section describes how to set the STEM/REM IP address using the PC or through the Master Editor. The network bootup can be selected to configure manually or automatically using DHCP.

LOAD_IP2.EXE

If the STEM is installed in a TNET satellite, the IP address can be set through the master editor.

After the STEM/REM is flashed with new software, the IP address and TCP port number must be set. Ethernet communications between the STEM/REM and Ethernet Satellites will not be possible until the IP address and port number are set. The IP address can be set using a TNET Satellite or with a PC program. The PC connects to the STEM RS232 Host Port and uses program called "**LOAD_IP2.EXE"** or "Databack for Windows" (see next page; available from **METTLER TOLEDO®**). Power must be cycled on the STEM/REM for the new settings to take effect. Refer to the following section "Network setup through Master Editor" for an explanation of the field terms.

To set the STEM/REM IP, first connect an RS232 Serial cable to COM1 or COM2 on the PC and to the STEM/REM Host Port. Running LOAD_IP2 with no parameters displays help. The **LOAD_IP2** command line is as follows:



The gateway number may be required to access a host PC on another network. Check with your IS department for details on a gateway and submask number.

An example command to set the STEM IP number to **207.142.140.100** would be as follows:

load_ip2 01 1 207.142.140.100 2305 255.255.255.0 255.255.255.0 m stem1

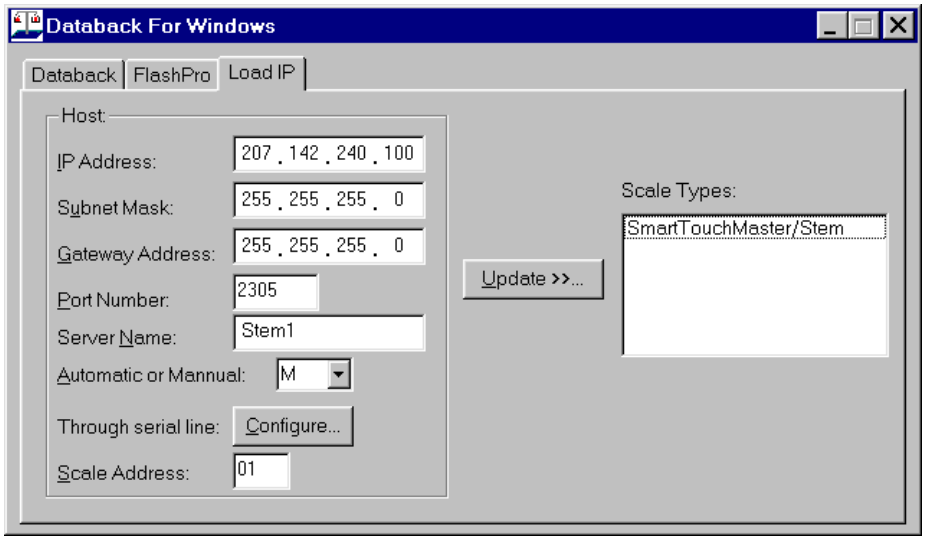
A batch file can be created to do this automatically. *Always wait at least 30 seconds after powering the STEM up before using LOAD_IP2*. When the IP number is sent successfully, the PC screen should be similar to the following example.

```
C:\STEM\>load_ip2 01 1 207.142.140.100 2305 255.255.255.0255.255.255.0
Scale address [01]; Local port [COM1]; ip address [207.142.140.100] port [2305]

      default gateway [255.255.255.0] subnet mask [255.255.255.0]
Scale returned ACK to wake-up call
Scale returned ACK to IP command.

C:\Flash\STEM\LoadIP>
```

If LOAD_IP2 reports **ACK**, the IP was set successfully. If LOAD_IP2 reports **NACK**, an error occurred. In this case power down the unit, then retry LOAD_IP2. If you get a blinking cursor after running the LOAD_IP2 command, cycle power to the scale and wait at least 30 seconds before attempting to run LOAD_IP2.

Databack for Windows

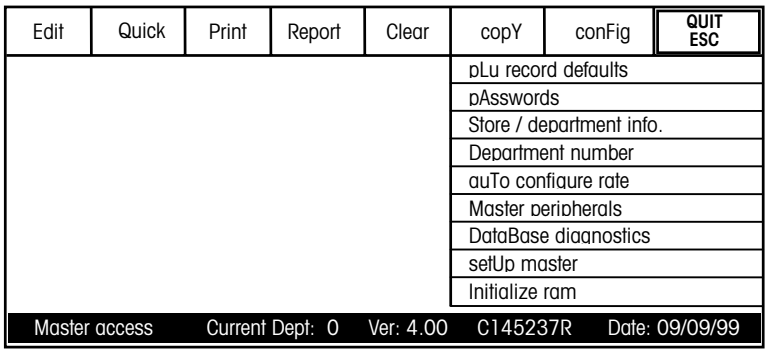
If you are using "Databack for Windows", to download the software, click the "Load IP" tab. Enter the IP Address you will be using for the STEM/REM. Enter the Subnet Mask and Gateway Address if required. Leave the Port Number as 2305. Type in a "Server Name" if required (minimum one character). Select the "Automatic or Manual" boot preference (A=Automatic, M=Manual). Click on "SmartTouchMaster/STEM" scale type, then click the "Update" button. Refer to the next section for an explanation of the field terms.



Network Setup through the Master Editor

The network configuration can be set using the Master Editor on a TNET Satellite or Ethernet Satellite. However, if the STEM is installed in an Ethernet Satellite, and the STEM software has just been flashed, you will need to use LOAD_IP2, Databack for Windows, or use a TNET Satellite to initially set the IP Address. After the STEM IP Address has been set once, it can be changed by any Ethernet Satellite through the Master Editor.

To access the Setup Menu, touch SETUP, MASTER EDITOR, enter the password or touch ENTER. The Master Editor screen will display.



STEM Master Editor

Touch CONFIG, then SETUP MASTER to display the Screen One of the Setup Menu.

Version 1 STEM

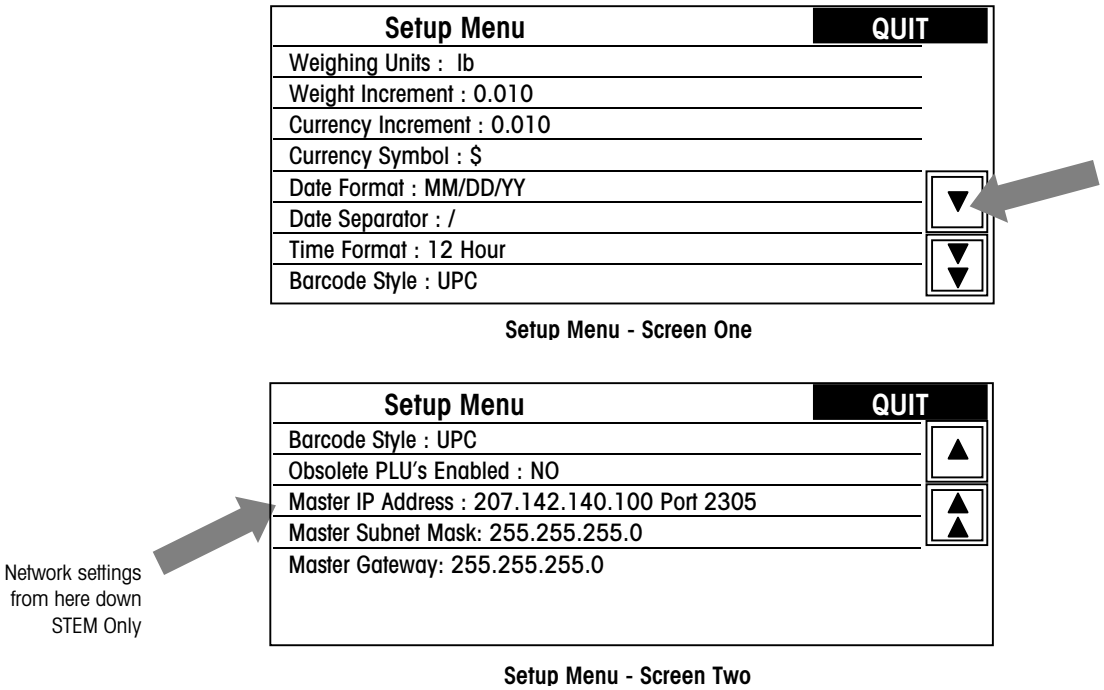


Figure 3-1: Setup Master Screens, Version 1 STEM

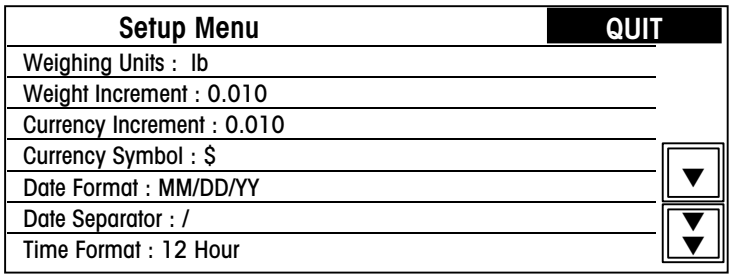
The selections on the setup screens are explained below.

Selection	Description
Weighing Units	This must match the weighing mode of the Clients and Satellites, either lb or kg.
Weight Increment	This must match the weighing mode of the Clients and Satellites. Normally 0.010 lb or 0.005 kg.
Currency Increment	The smallest division of the local currency.
Currency Symbol	When selected, the Alphanumeric keyboard will display. The symbol can be any character on the keyboard.
Date Format	Select from four different formats. MM/DD/YY, DD/MM/YY, YY/MM/DD, YY/MON/DD. Default is MM/DD/YY.
Date Separator	Select the slash "/", dash "-", or period "." for a date separator.
Time Format	Select either 12 hour or 24 hour time.
Barcode Style	Select UPC or EAN barcodes.
Obsolete PLU's Enabled	Enable or Disable obsolete PLUs. Obsolete accumulators are accumulators that are saved when weekly data for PLU's are updated.

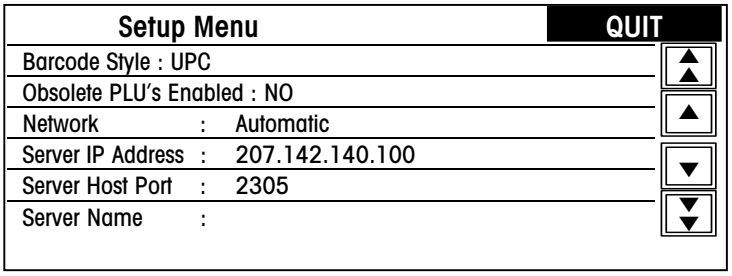
Selection	Description
Master IP Address	This is the STEM/REM IP address and port number. The IP address is entered one octet at a time. The default value for this field is 255.255.255.000. The STEM/REM TCP port number used for host communications. A 4-digit value may be entered from the numeric screen. The default value for the port is 2305 should be used in most configurations. **Local Use Networks** - If the Ethernet network is local, arbitrary numbers can be selected for the IP Address. The IP Address consists of a group of four numbers from 0 to 255, separated by periods, for example: 207.142.140.101. Do not duplicate numbers on the network. **Use on Networks Connected to the Internet** - If the network connects to the Internet, the network IP addresses must be obtained and registered with American Registry for Internet Numbers (ARIN, http://www.arin.net). When used on the Internet, the IP Address is used to specify hosts and networks. Internet Protocol (IP) numbers are part of a global, standardized scheme for identifying machines that are connected to the Internet. Consult your Network Administrator on these issues.
Subnet Mask	The Subnet Mask is used to identify the local network when accessing an IP address on the Ethernet network. The mask is entered one octet at a time. A subnet mask is used with an IP address to subdivide a network into smaller networks, allowing a greater number of nodes on a network with a single IP address. The Subnet Mask is the part of the IP address used to represent a sub-network within a logical network. By using Subnet Masks, network address space is available that would normally be unavailable. Subnet Masks also ensure broadcasts are not sent to the whole network unless intended. The default Subnet Mask, 255.255.255.0, is recommended to reduce network traffic. When Subnet Mask, 255.255.255.0 is used, the broadcast range would be the local Subnet only as follows: 255.255.255.0 Subnet Mask 207.142.140.XXX IP Address with a broadcast range of XXX. 255.255.0.0 Subnet Mask 207.142.XXX.XXX IP Address with a broadcast range of XXX.XXX Using the Subnet Mask, 255.255.255.0, improves network performance by reducing broadcast traffic.
Gateway	The router's default gateway IP address. A router is used when accessing devices outside of the local network. The IP address is entered one octet at a time. The default value for this field is 255.255.255.000.

Version 2 STEM and REM (with DHCP)

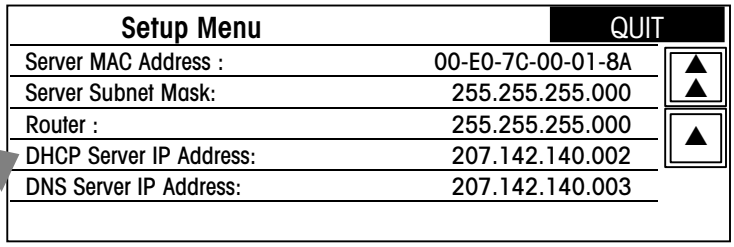
The new DHCP features will allow the client scale or scale server to obtain initial TCP/IP parameters from a DHCP or BOOTP server on the Ethernet network instead of manually setting these parameters.



Setup Menu - Screen One



Setup Menu - Screen Two



Network settings from here down display only when "Network" is set to "Automatic".

Setup Menu – Screen Three

Setup Master Screens, Version 2 STEM

The selections on the setup screens are explained below.

Selection	Description
Weighing Units	This must match the weighing mode of the Clients and Satellites, either lb or kg.
Weight Increment	This must match the weighing mode of the Clients and Satellites. Normally 0.010 lb or 0.005 kg.
Currency Increment	The smallest division of the local currency.
Currency Symbol	When selected, the Alphanumeric keyboard will display. The symbol can be any character on the keyboard.
Date Format	Select from four different formats. MM/DD/YY, DD/MM/YY, YY/MM/DD, YY/MON/DD. Default is MM/DD/YY.
Date Separator	Select the slash "/", dash "-", or period "." for a date separator.
Time Format	Select either 12 hour or 24 hour time.
Barcode Style	Select UPC or EAN barcodes.

Selection	Description
Obsolete PLU's Enabled	Enable or Disable obsolete PLUs. Obsolete accumulators are accumulators that are saved when weekly data for PLU's are updated.
Network	You must first select the network boot type, **Manual** or **Automatic**. Automatic is the default. Automatic will use DHCP to automatically obtain the network boot information from a DHCP server. The parameter details are explained below. When **Automatic** is selected, the DHCP feature will be used. The "Server IP", "Server MAC", "Subnet Mask", "Router", "DHCP Server", and "DNS Server" fields will display but can not be changed. Changes will be allowed in the "Server Host Port" and "Server Name" fields. If **Manual** is selected, then the DHCP feature is disabled and the TCP/IP parameters must be entered manually. The "Server MAC" field will display but no changes are allowed. The "DHCP Server" and "DNS Server" fields will not display and changes are not allowed to these fields. Changes will be allowed in the "Server IP", "Server Host Port", "Server Name", "Subnet Mask", and "Router" fields.
Server IP	This is the STEM's current IP address. If the "Network" is set to "Automatic", this field cannot be changed. If the "Network" is set to "Manual" then this field may be changed. The IP address is entered one octet at a time. The default value for this field is 255.255.255.000. **Local Use Networks** - If the Ethernet network is local, arbitrary numbers can be selected for the IP Address. The IP Address consists of a group of four numbers from 0 to 255, separated by periods, for example: 207.142.140.101. Do not duplicate numbers on the network. **Use on Networks Connected to the Internet** - If the network connects to the Internet, the network IP addresses must be obtained and registered with American Registry for Internet Numbers (ARIN, http://www.arin.net). When used on the Internet, the IP Address is used to specify hosts and networks. Internet Protocol (IP) numbers are part of a global, standardized scheme for identifying machines that are connected to the Internet. A Network Administrator or System Engineer should be consulted on these issues.
Server Host Port	The STEM's TCP port number used for host communications. A 4-digit value may be entered from the numeric screen. The default value for this field is 2305 and should not be changed for most configurations.
Server Name	Local domain name for the STEM. All other devices on the network will reference the STEM by using this name when the "Network" is set to "Automatic". If more than one STEM is used on a network, each STEM must have a unique name. If not, only one STEM will be functional and allow connection by clients.
Server MAC	This is the STEM's hardware Media Access Control (MAC) address. Each Ethernet device has a unique 6-byte MAC address. This field is displayed but cannot be changed.
Subnet Mask	The Subnet Mask is used to identify the local network when accessing IP address on the Ethernet network. If the "Network" is set to "Automatic" this field cannot be changed. If the "Network" is set to "Manual" this field may be changed. The mask is entered one octet at a time. The default value for this field will be 255.255.255.000. For a Subnet Mask on a local network, use an unused address such as 255.255.255.0. A subnet mask is used with an IP address to subdivide a network into smaller networks, allowing a greater number of nodes on a network with a single IP address. The Subnet Mask is the part of the IP address used to represent a subnetwork within a logical network. By using Subnet Masks, network address space is available that would normally be

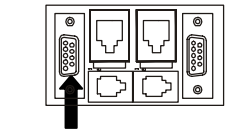
Selection	Description
	unavailable. Subnet Masks also ensure broadcasts are not sent to the whole network unless intended. The default Subnet Mask, 255.255.255.0, is recommended to reduce network traffic. When Subnet Mask, 255.255.255.0 is used, the broadcast range would be the local Subnet only as follows: 255.255.255.0 Subnet Mask 207.142.140.XXX IP Address with a broadcast range of XXX. 255.255.0.0 Subnet Mask 207.142.XXX.XXX IP Address with a broadcast range of XXX.XXX Using the Subnet Mask, 255.255.255.0, improves network performance by reducing broadcast traffic.
Router	The router's (default gateway) IP address. The router is used when accessing devices outside of the local network. If the "Network" is set to "Automatic" this field can not be changed. If the "Network" is set to "Manual" this field may be changed. The IP address is entered one octet at a time. The default value for this field will be 255.255.255.000.
DHCP Server	This is the current IP address of the local network's DHCP server. This field will only be displayed when the "Network" is set to "Automatic" and cannot be changed.
DNS Server	This is the current IP address of the local network's DNS server. This field only displays when the "Network" is set to "Automatic" and cannot be changed.

Connecting the STEM/REM to a Host PC

Two types of interfaces are available on the Host Port: RS232 and RS422. The interface is selected simply by connecting to the appropriate pins.

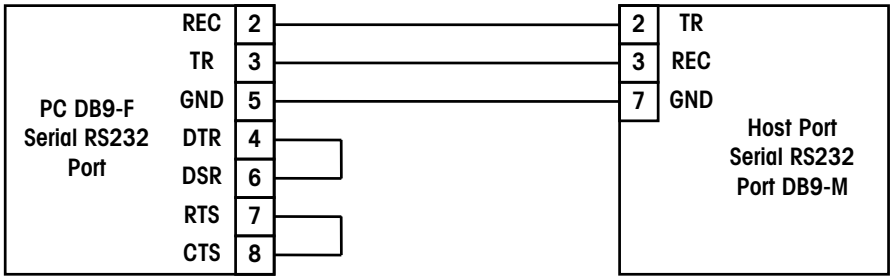
RS232 Interface

When using RS232, a single STEM can be connected to a PC RS232 serial port for distances up to 100 feet (30 meters). The following illustration shows a typical RS232 connection to a PC serial-port.

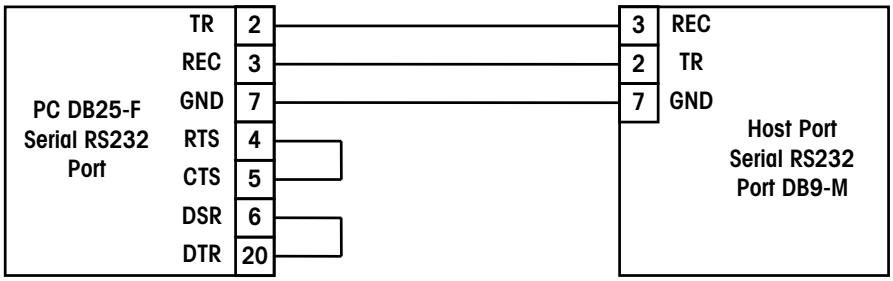


STEM Host Port J3

0900-0285 (*13816200A) Cable, PC DB9 to Scale 10 ft/3 m
0900-0297 (*14102600A) Cable, PC DB9 to Scale 25 ft/7.62 m



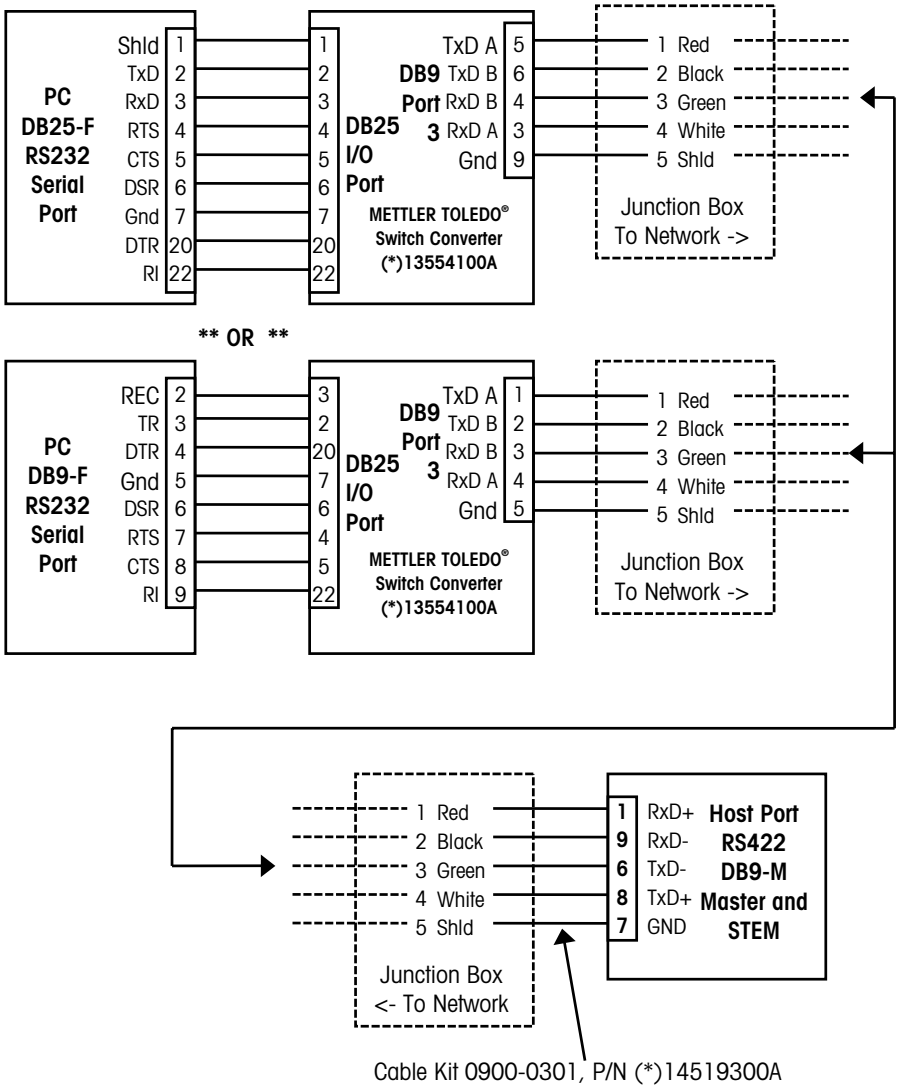
0900-0286 (*13816300A) Cable, PC DB25 to Scale 10 ft/3 m
0900-0298 (*14102800A) Cable, PC DB25 to Scale 25 ft/7.62 m



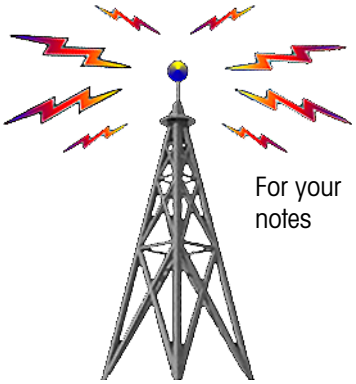
Smart*Touch*® Master or STEM to PC RS232 Serial Port Wiring

RS422 Interface

When the cable length will exceed 100 feet, or if multi-drop capability is needed (for connecting more than one unit to the Host network), RS422 must be used. ***The maximum cable length for RS422 is 1200 feet (366 meters).*** A wiring diagram is shown below using the METTLER TOLEDO® RS232 to RS422 Converter.



Smart*Touch*® Master or STEM RS422 to METTLER TOLEDO® Converter Wiring



For your notes

4 Ethernet Clients

Ethernet Client Overview

METTLER TOLEDO® Ethernet Clients can be connected to a standard Ethernet network. The Ethernet Clients are designed to communicate to a PC network using the Scale Server Software running on a Microsoft NT® PC, or to the METTLER TOLEDO® STEM (SmartTouch Ethernet Master) or the REM (Rack mount Ethernet Master).

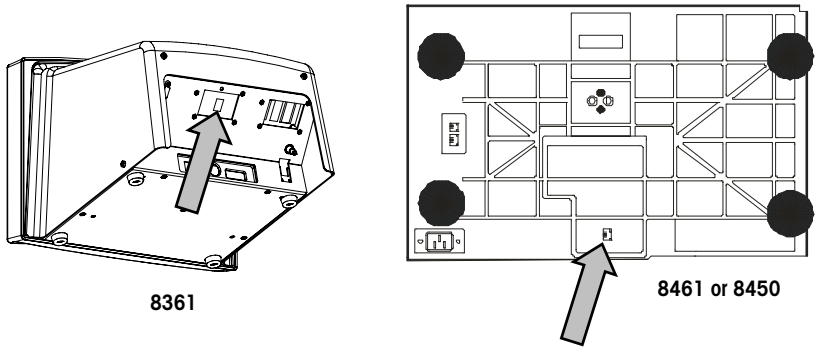
The STEM/REM can support up to 25 Ethernet scales and 25 TNET Satellites simultaneously. Ethernet Clients are only limited by the IP addresses. For example: 142.207.140.100 through 142.207.140.255 will allow 155 Ethernet Clients using this address scheme.

Ethernet Client Wiring

The Ethernet jacks on all METTLER TOLEDO® Ethernet scales use industry standard Ethernet Wiring configurations allowing the use of 10BASE-T straight-through patch cables from a hub to the Ethernet Client (node). The Ethernet connection jacks on the Model 8450 or 8461 are located on the bottom of the unit, as shown below.

Ethernet RJ45
10 Base-T Connector

Pin 1 - TD+
Pin 2 - TD-
Pin 3 - RD+
Pin 6 - RD-



Ethernet Client 10BASE-T RJ-45 Ethernet Connector

Network Configuration

Note: **Do not duplicate any ID/IP numbers on the network**. If the STEM will be supporting both TNET Satellites and Ethernet Clients, the following guidelines should be followed.

TNET Unit ID - 1 to 30

Ethernet Clients - xxx.xxx.xxx.031 to xxx.xxx.xxx.254

8361 Clients using Cutting Test - If cutting test is used, the Ethernet IP Address must be below xxx.xxx.xxx.100.

The Client's Unit ID and server IP are used to identify each of the devices on the network. The numbers must be unique on the network (no duplicates). If connected to the METTLER TOLEDO® STEM with TNET Satellites, no Client Unit ID's and TNET Satellite ID's can be duplicated. If the network is separate from any other networks, the IP address can be any address other than 0.0.0.0 and 255. 255. 255. 255. If the unit is installed on an existing network, the network manager should supply the IP address.

Local Networks

When connecting clients to a local Ethernet network (not on the Internet, etc.) using a Scale Server PC or STEM/REM, arbitrary numbers can be selected for the IP Addresses. The IP Address consists of a group of four numbers from 0 to 255, separated by periods, for example: 207.142.140.101. Do not duplicate any numbers on the network. The Server IP is the IP Number assigned to the STEM or Scale Server PC.

Use on Networks Connected to the Internet

If the network connects to the Internet, network IP addresses must be obtained and registered with American Registry for Internet Numbers (ARIN) (http://www.arin.net). The IP Address is used to specify hosts and networks. IP (Internet Protocol) addresses are part of a global, standardized scheme to identify devices connecting to the Internet. A Network Administrator or System Engineer should be consulted on these issues.

A gateway and submask number can also be used if the units are on different networks, but connected to a WAN or to the Internet.

Subnet Mask

A subnet mask is used with an IP address to subdivide a network into smaller networks, allowing a greater number of nodes on a network with a single IP address. The Subnet Mask is the part of the IP address used to represent a subnetwork within a logical network. By using Subnet Masks, network address space is available that would normally be unavailable. Subnet Masks also ensure broadcasts are not sent to the whole network unless intended.

The default Subnet Mask, 255.255.255.0, is recommended to reduce network traffic. When Subnet Mask, 255.255.255.0 is used, the broadcast range would be the local subnet only as follows:

255.255.255.0 Subnet Mask
207.142.140.XXX IP Address with a broadcast range of XXX.

255.255.0.0 Subnet Mask
207.142.XXX.XXX IP Address with a broadcast range of XXX.XXX

Using the Subnet Mask, 255.255.255.0, improves network performance by reducing broadcast traffic.

Default Gateway (or Default Router)

If the server (Scale Server or STEM/REM) is on a different network (see Subnet Mask), the client will access the server by routing the request to default router address. The Gateway Router will route the request to other devices on the network to deliver the request to the server. The requested data from the server will then be routed back through the Gateway Router to the requesting client. The Gateway Router must be on the same local network as the client.

Network Setup

Model 8361/8461 Unit ID-Ethernet Client, (First Version)

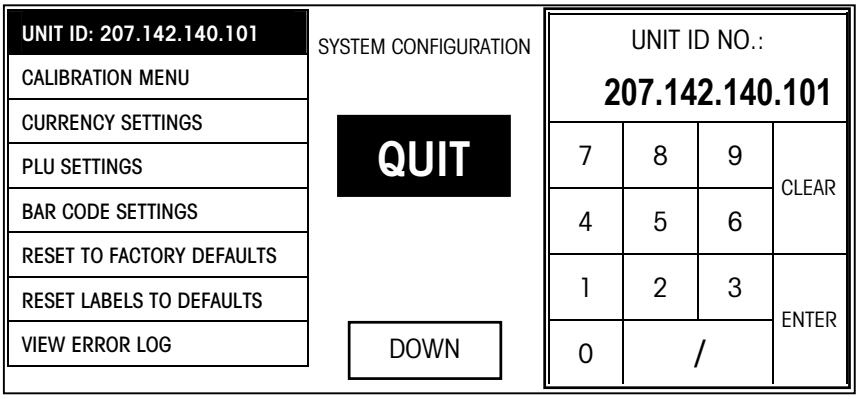
The Unit ID Number is a unique IP number (Internet Protocol) that identifies the satellite on the Ethernet network. After entering the Unit ID number, you must enter the Server IP number, Router (Gateway), and Subnet Mask (below).

If the network is local, arbitrary numbers can be selected for the IP Address. An IP Address consists of a group of four numbers from 0 to 255, separated by periods, for example: 207.142.140.101. Do not duplicate numbers on the network. To enter the numbers, key in the numbers starting at the MSD (left Most Significant Digit) number. The periods are not entered in this procedure. Enter numbers lower than 100 with preceding zeros (Example: 10 is entered as 010). To exit without saving, touch CLEAR.

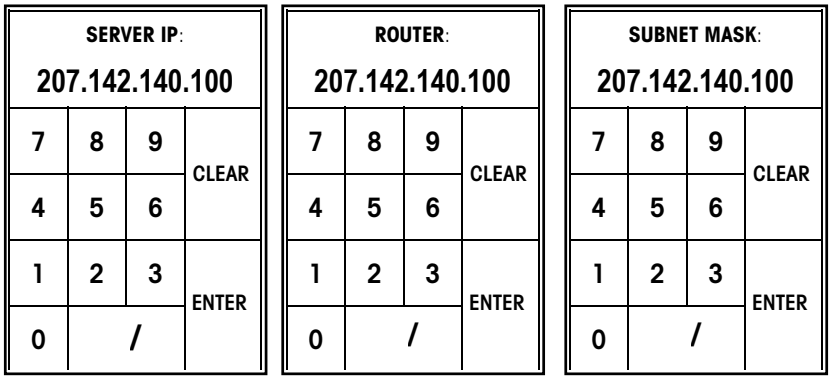
Power the unit down after changing the IP address for the new changes to take effect.

To find the Windows NT Server IP address, refer to Chapter 4.

Refer to Chapter 4 for additional information on IP address numbers and Ethernet or the **METTLER TOLEDO®** Connectivity Guide.



System Configuration Menu, Ethernet Client Unit ID Number



Server IP, Router (Gateway), and Subnet Mask Numbers, Ethernet Client

UNIT ID	This is the scale IP address. The IP address is entered one octet at a time. The default value for this field is 255.255.255.000.
SERVER IP	This is the STEM or PC Scale Server current IP address. The default value is 255.255.255.000.
ROUTER	The router's (default gateway) IP address. The router is used when accessing devices outside of the local network. The IP address is entered one octet at a time. The default value is 255.255.255.000.
SUBNET MASK	The mask that is used to identify the local network when accessing IP address on the Ethernet network. The mask is entered one octet at a time. The default value is 255.255.255.000.

Network Setup-Ethernet Client and Standalone Client

The network configuration is set up for the Client (Software Revision 5.5 or later) on the Unit Setup Screen. On Software revisions prior to 5.5, the network setup is accessed under the "Calibrate/Install Unit" button. To enter setup mode, touch SETUP, UNIT, NETWORK SETUP. Software revision 5.0 added DHCP. Software revision 5.5 added Backup Server.

If the network is local, arbitrary numbers can be selected for the IP Address. An IP Address consists of a group of four numbers from 0 to 255, separated by periods, for example: 207.142.140.101. Do not duplicate numbers on the network. To enter the numbers, key in the numbers starting at the MSD (left Most Significant Digit) number. The periods are not entered in this procedure. Enter numbers lower than 100 with preceding zeros (Example: 10 is entered as 010). To exit without saving, touch CLEAR.

Power the unit down after changing the IP address for the new changes to take effect.

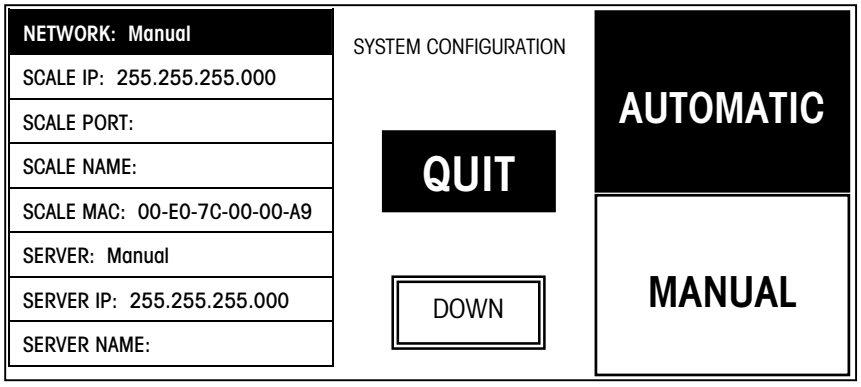


Figure 3-1: Network Setup Menu Screen One

On Client Software Revision 5.5, the client will ping the network for the Scale IP that it is configured for. If a duplicate IP is found on the network, the message "DUPLICATE IP ADDR" will display. You must then change the IP address to a unique address on the network before the client can access the master database.

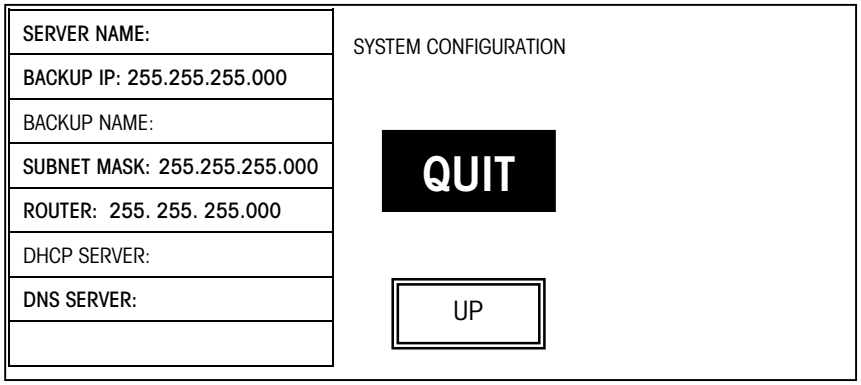


Figure 3-2: Network Setup Menu Screen Two

The network configuration parameters are described in the following section.

You must first select the network boot type, **Manual** or **Automatic**. Automatic is the default. Automatic will use DHCP to automatically obtain the network boot information from a DHCP server. The parameter details are explained below.

NETWORK	When **Automatic** is selected, the DHCP feature will be used. The "SERVER IP", "SERVER MAC", "SUBNET MASK", "ROUTER", "DHCP SERVER", and "DNS SERVER" fields will display but cannot be changed. If **Manual** is selected, then the DHCP feature is disabled and the TCP/IP parameters must be entered manually. The "Server MAC" field will display but no changes are allowed. The "DHCP Server" and "DNS Server" fields will display but changes are not allowed to these fields.
SCALE IP	This is the standalone IP address. If the "Network" is set to "Automatic" this field cannot be changed. If the "Network" is set to "Manual" then this field may be changed. The IP address is entered as four sets of numbers called octets consisting of three digits. The address is entered one octet at a time. A decimal point will appear after every three numbers are entered. When there are only 1 or 2 digits in an octet, fill in with zeros. For example, 1 is entered as 001. The default value for this field is 255.255.255.000.
SCALE PORT	Used in the standalone mode. This is the TCP/IP Host Port number used to communicate with the Standalone scale.
SCALE NAME	This is the local domain name to given to the standalone scale. Devices on the network can reference the scale by using this name.
SCALE MAC	Hardware Media Access Control (MAC) address. Each Ethernet device has a unique 6-byte MAC address. This field is displayed but cannot be changed.
SERVER	Select Automatic or Manual. If you wish to set the Subnet Mask and Router fields, set this function to Manual.
SERVER IP	This may be displayed, but is not used in the standalone mode.
SERVER NAME	This may be displayed, but is not used in the standalone mode.
BACKUP IP	If the database located at SERVER IP is un-available, the client will attempt to locate the record at the Backup IP location. The IP address is entered one octet at a time.
BACKUP NAME	This is the name of the location entered as the Backup IP.
SUBNET MASK	The mask that is used to identify the local network when accessing an IP address on the Ethernet network. If the "Network" is set to "Automatic" this field cannot be changed. If the "Network" is set to "Manual" thee field may be changed. The mask is entered one octet at a time. The default value is 255.255.255.000.
ROUTER	The router's (default gateway) IP address. The router is used when accessing devices outside of the local network. If the "Network" is set to "Automatic" this field cannot be changed. If the "Network" is set to "Manual" this field may be changed. The IP address is entered one octet at a time. The default value is 255.255.255.000.
DHCP Server	Display only. This is the current IP address of the local network's DHCP server. This field only displays when the "Network" is set to "Automatic" and cannot be changed.
DNS Server	Display only. This is the current IP address of the local network's DNS server. This field only displays when the "Network" is set to "Automatic" and cannot be changed.

On Client Software Revision 5.5, the client will ping the network for the Scale IP that it is configured for. If a duplicate IP is found on the network, the message "DUPLICATE IP ADDR" will display. You must then change the IP address to a unique address on the network before the client can access the master database.

In Client Software Revision 5.5 or later, the main screen will indicate whether the primary database or backup database is online by displaying **OnLine1** or **OnLine2** respectively. If both are off line, **Off Line** will be displayed.

Model 8450/2450/355, Version 1 Ethernet

SCL? - The IP Address identifies the client on the network. The IP Address is a unique number consisting of four parts separated by periods. (Ex: 146.207.40.1)

RTR? – Gateway Router IP address is used if the server is on a different network.

Use the following key sequence to set the client IP address and Gateway address. The example shows setting the IP address to 146.208.104.015.

Press:	SETUP	
Press:	ENTER	
Press:	NETWORK	
Display:	**SCL 255.255.255.255**	
Press:	ENTER	
Display:	**SCL? 255.255.255.255**	(SCL is this scale's IP.)
Key In:	**146 208 104 015**	(Example IP address, no spaces or .'s needed)
Press:	ENTER	
Display:	**SCL NAME**	
Press	ENTER	(ENTER to modify scale name)
Display:	**SCL MAC xxxxxxxxxxx**	(displays Ethernet chip address)
Press	ENTER	
Display:	**Port 0**	
Press	ENTER	
Display:	**Port ? 0**	
Key In:	**2305**	(always set to this number)
Press:	ENTER	
Display:	**MSK 255.255.2555.255**	
Press	ENTER	(ENTER to modify Mask)
Display	**MSK? 255.255.255.255**	
Key In:	255.255.255.0	(Enter new mask
Press	ENTER	
Display:	**RTR 255.255.255.255**	(RTR is the Gateway Router IP.)
Press:	ENTER	
Display:	**RTR? 255.255.255.255**	
Key In:	146 208 104 100	(Example IP address, no spaces or .'s needed)
Press:	ENTER	
Display:	**SCL 146.208.104.015**	(where xxx shows the new number entered)
Press:	CLEAR to exit setup mode.	

Turn power off and back on to reset the scale with the new data.

Model 8450/2450/355, Version 2 Ethernet

The new DHCP features in the Version 2 software allow the Ethernet scale to obtain initial TCP/IP parameters from a DHCP or BOOTP server on the Ethernet network instead of manually setting these parameters.

The client automatically checks and displays an error if it finds a duplicate of its IP on the network. The client will send a ping to the network and report if it receives a reply.

To enter into the setup menus, press the following keys:

[SETUP MODE]
[ENTER]
[UNIT ID]

The following setup menu will then display, one line at a time.

NETWORK: AUTOMATIC
SCL:207.142.140.102
SCL NAME:
SCL MAC:
SERVER: AUTOMATIC
SVR:207.142.140.100
SVR NAME:
BKP: 255.255.255.000
BKP NAME:
MSK:255.255.255.000
RTR:207.142.140.001
DCP:207.142.140.002
DNS:207.142.140.003

Press the "UP" and "DOWN" buttons to advance to the next setup menu item. Press the "ENTER" button to select or change.

You must first select the network boot type, **Manual** or **Automatic**. Automatic is the default. Automatic will use DHCP to automatically obtain the network boot information from a DHCP server. The parameter details are explained below.

Network	When **Automatic** is selected, the DHCP feature will be used. The "SERVER IP", "SERVER MAC", "SUBNET MASK", "ROUTER", "DHCP SERVER", and "DNS SERVER" fields will display but cannot be changed. Changes are allowed in the "Scale Name" and "Server Name" fields. If **Manual** is selected, then the DHCP feature is disabled and the TCP/IP parameters must be entered manually. The "Server MAC" field will display but no changes are allowed. The "DHCP Server" and "DNS Server" fields will not display and changes are not allowed to these fields. Changes are allowed in the "SCALE IP", "SCALE NAME", "SERVER IP", "SERVER NAME", "SUBNET MASK", and "ROUTER" fields.
SCL (SCALE IP)	This is the current scale IP address. If the "Network" is set to "Automatic" this field cannot be changed. If the "Network" is set to "Manual" then this field may be changed. The IP address is entered one octet at a time. The default value for this field is 255.255.255.000.
SCL Name	This is the local domain name to given to the Client scale. All other devices on the network will reference the scale by using this name when the "NETWORK" is set to "AUTOMATIC".

SCL MAC	This is the hardware MAC (Media Access Control) address. The MAC address will be displayed but cannot be changed. The 8450 will now display the Ethernet board MAC address at powerup after it displays memory usage. It will display 6 sets of 2 numbers that start with 00:E0:7C:xx:xx:xx. The last 6 digits will vary with each scale. If no Ethernet hardware is installed it will display "NO NETWORK BOARD".
Server	This is the client scale's server configuration setting. The server (STEM or PC scale sever) IP address may be configured to be "AUTOMATIC" or "MANUAL". If the "SERVER" is set to "AUTOMATIC", the scale server IP address will be obtained automatically using the "SRR NAME" through the DNS server and/or with a SARP on the local network. If the "SERVER" is set to "MANUAL", the scale server IP address used will be the one set in the "SVR". The "SVR NAME" will not be used.
SVR	This is the STEM or PC Scale Server current IP address. If the "NETWORK" is set to "AUTOMATIC" then this field cannot be changed. If the "NETWORK" is set to "MANUAL" then this field may be changed. The IP address will be entered as currently done, which is four octets, each separated by a decimal. The default value is 255.255.255.000.
SVR NAME	This is the local domain name of the scale server, which may be a STEM or PC. The scale will use this name when the "NETWORK" is set to "AUTOMATIC". The default value is "MTMaster01".
BKP	If the database located at SVR is un-available, the client will attempt to locate the record at the Backup Server IP location. The IP address is entered one octet at a time. This can be used to point the client to a secondary STEM (or PC running Scale Server) by entering the STEM or PC's IP (if manual) or Name (if automatic). At power up, the client will attempt to connect to the Primary STEM and if not available, it will then look for the secondary STEM/SERVER. This can take several minutes. If the client has been connected to the primary and then lose the connection, (e.g. someone turns the STEM off, etc.), it can take up to 30 seconds for the client to locate and call the PLU from the secondary.
BKP NAME	This is the name of the location entered as the Backup Server IP.
MSK	The Subnet Mask is used to identify the local network when accessing IP address on the Ethernet network. If the "Network" is set to "Automatic" this field cannot be changed. If the "Network" is set to "Manual" this field may be changed. The mask is entered one octet at a time. The default value is 255.255.255.000.
RTR	The router's (default gateway) IP address. The router is used when accessing devices outside of the local network. If the "Network" is set to "Automatic" this field cannot be changed. If the "Network" is set to "Manual" this field may be changed. The IP address is entered one octet at a time. The default value is 255.255.255.000.
DCP	Current IP address of the local network's DHCP server. This field only displays when the "Network" is set to "Automatic" and cannot be changed.
DNS	Current IP address of the local network's DNS server. This field only displays when the "Network" is set to "Automatic" and cannot be changed.

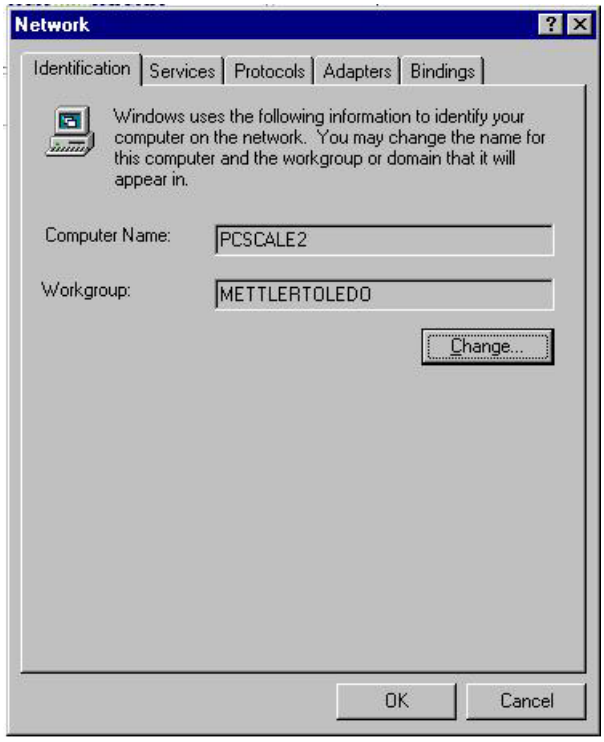
5 NextGen Scales

Network Settings

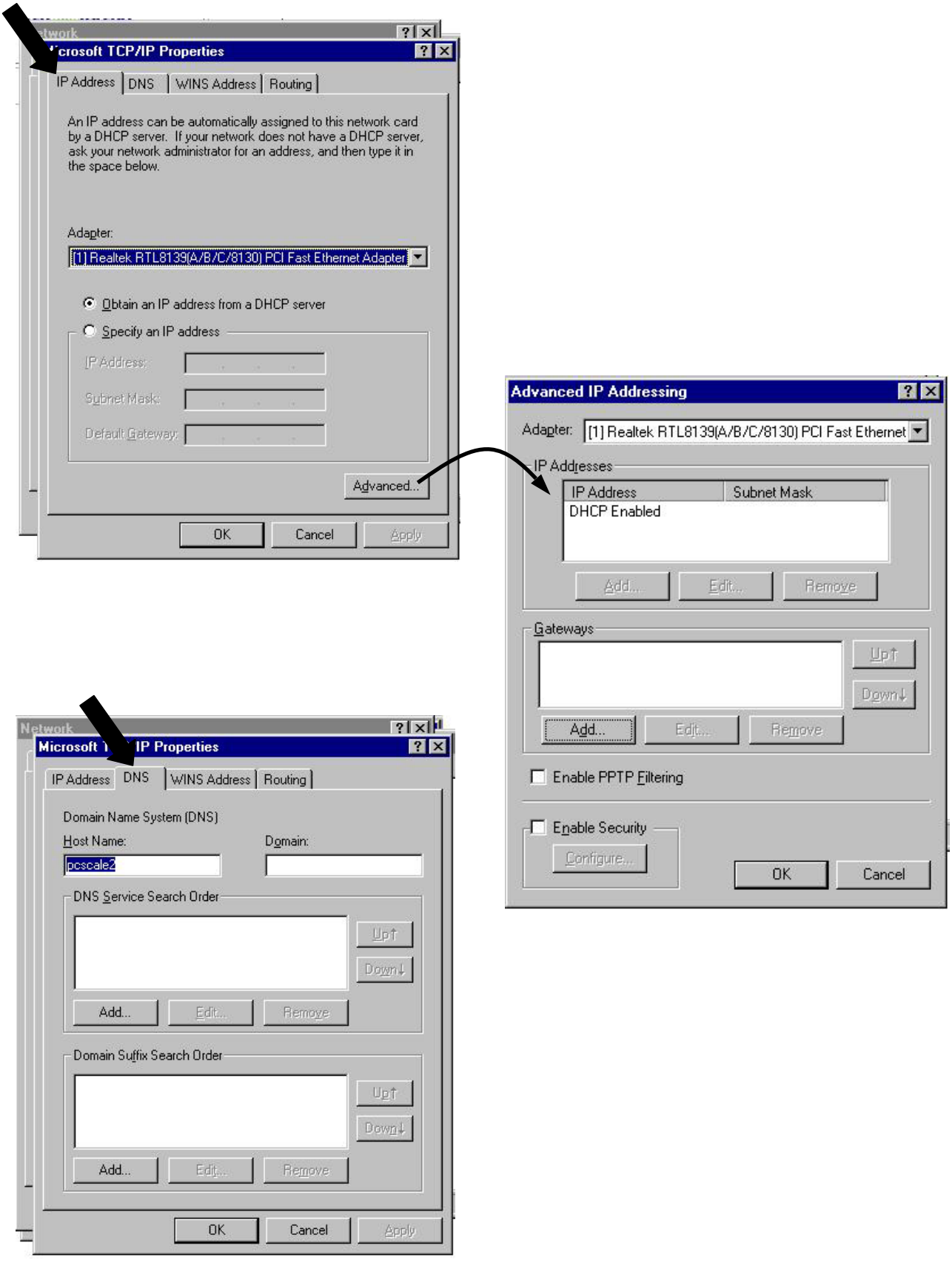
NextGen Scales, including the Model 8462 and Model 8366 include a built-in Ethernet Interface with the TCP/IP drivers installed.

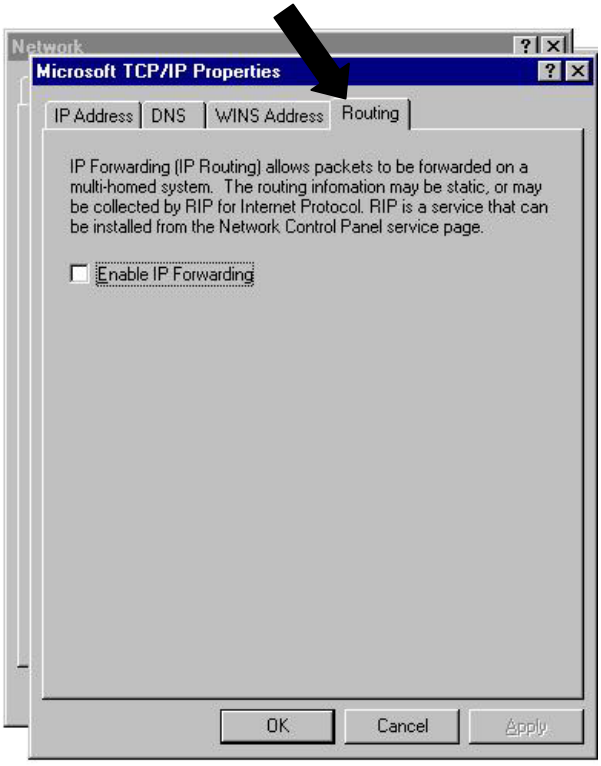
The factory default workgroup name is "METTLERTOLEDO". The computer name will vary by the unit. An example is shown in the figure below. Both names can be changed as needed. The computer name must be unique on the network. Keep in mind the ramifications on the setup data regarding the computer name that are discussed in the database section.

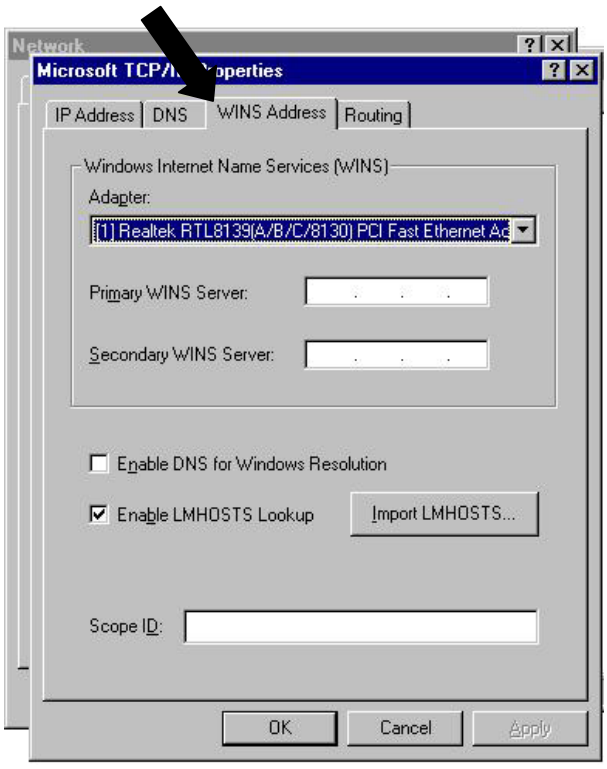
The following example screens show recommended and default Windows® network settings.



TCP/IP is the default protocol and it is configured to use DHCP to obtain an IP address. The following screens define the default network configurations for the scale unit.



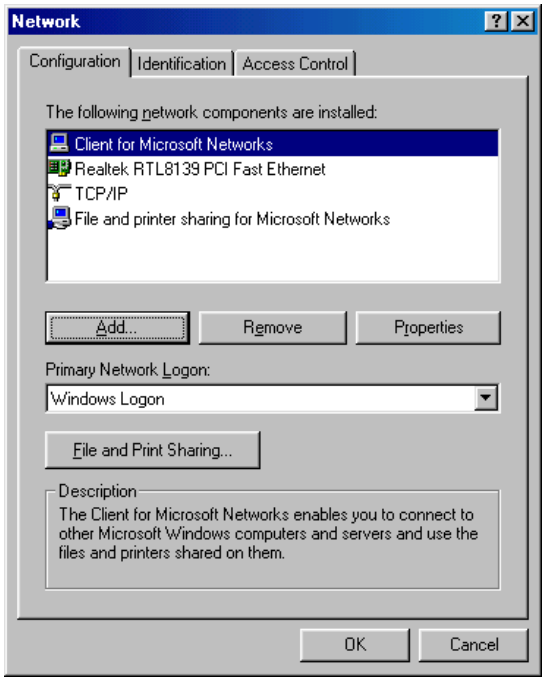




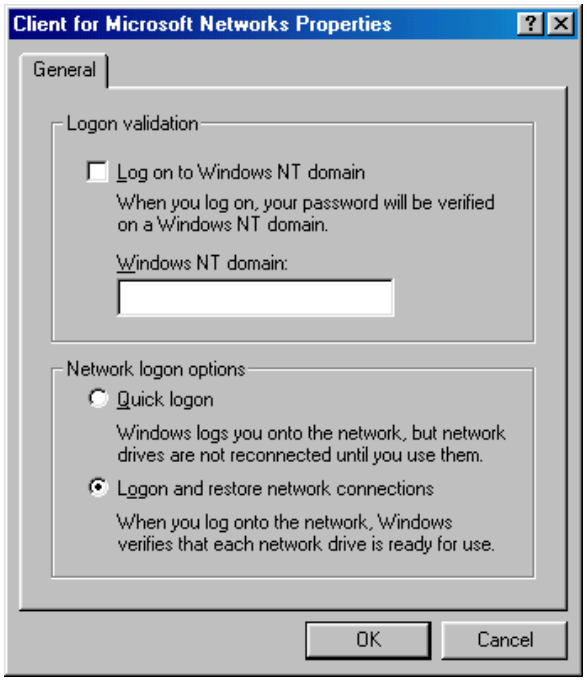
Transferring Files and Drive Sharing

The easiest way to transfer files to the Next Generation Scale's hard drive is by using drive sharing. This can be done across any network including a network of just the scale and a laptop using a crossover patch cable.

To setup a disk drive for file sharing (e.g. to install an application or upload a file), you will need the four network components shown in the Network window below on the network drive. There may be other network components installed, but these are the minimum you should have when the configuration is completed.

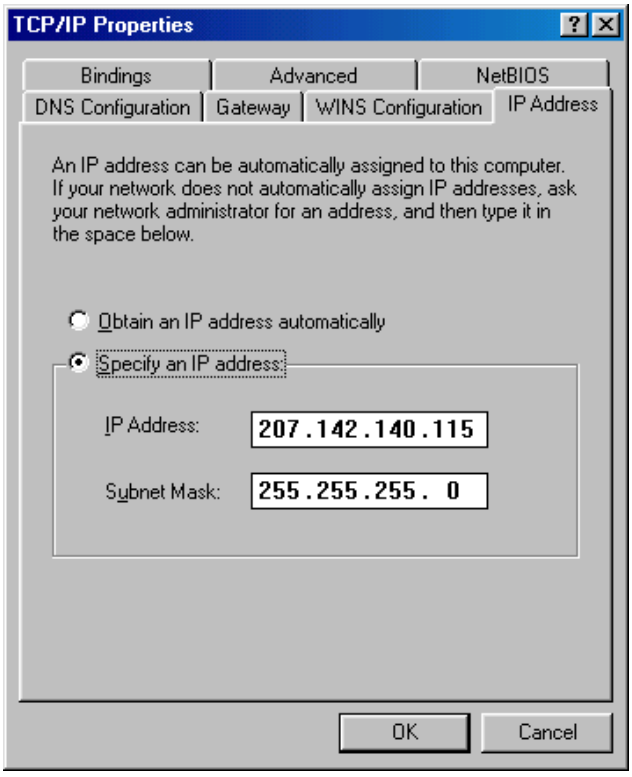


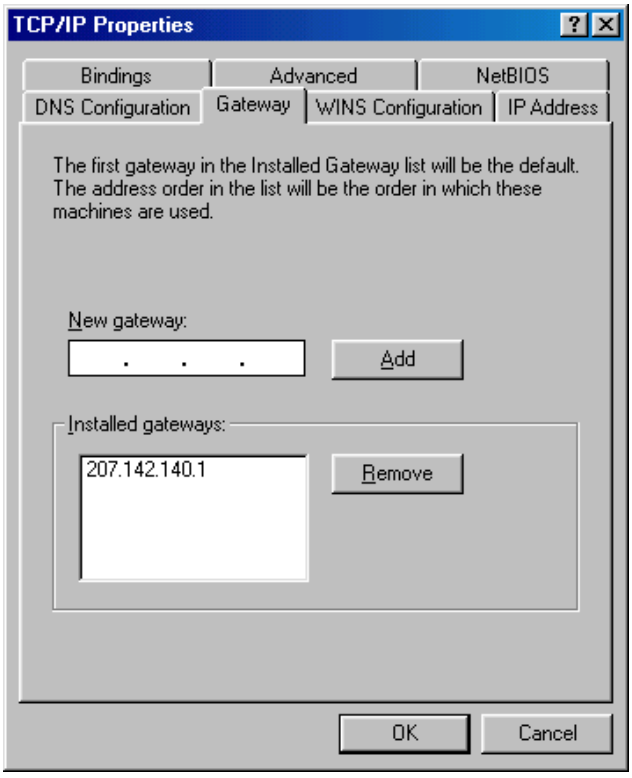
Properties for Client for MS networks should be set as follows:



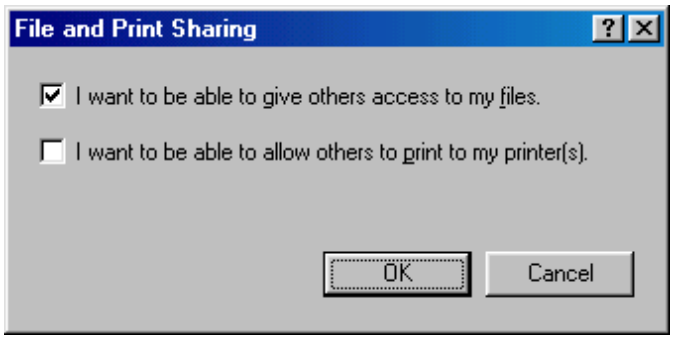
The network card should be setup at the factory. TCP/IP should be checked in Bindings.

TCP/IP properties should be set per the directions of the customer's IS department. Here is a sample of the setup for a manual IP with a Gateway (router). If you are using your laptop as the network drive, be sure that its IP is on the same subnet as the Next Gen scale.

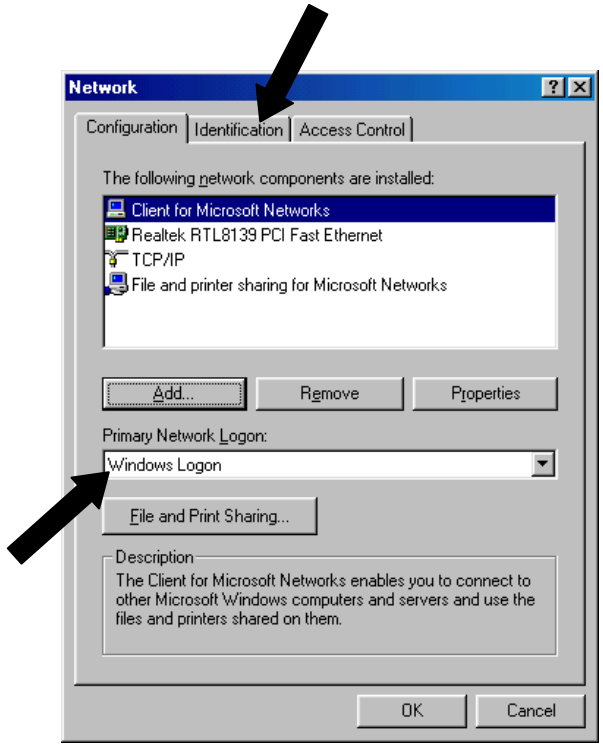




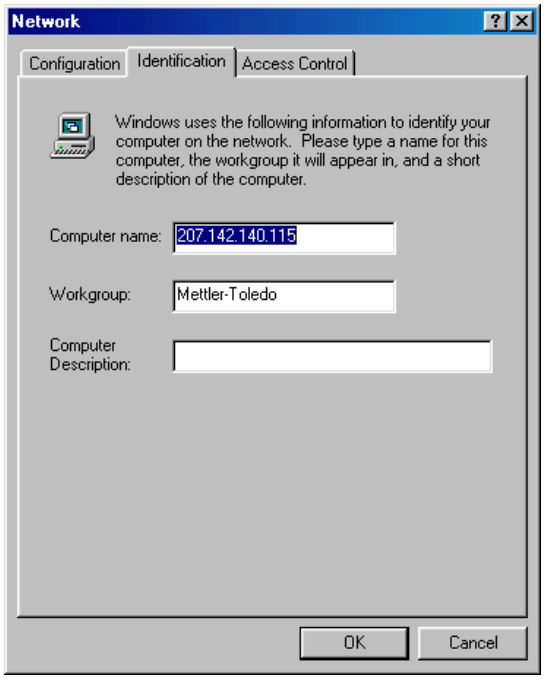
Click on File and Print Sharing Button and enable File sharing and click OK. Windows® will install it in the configuration. There are no changes to the default properties.



Select Windows logon for the "Primary Network Logon".

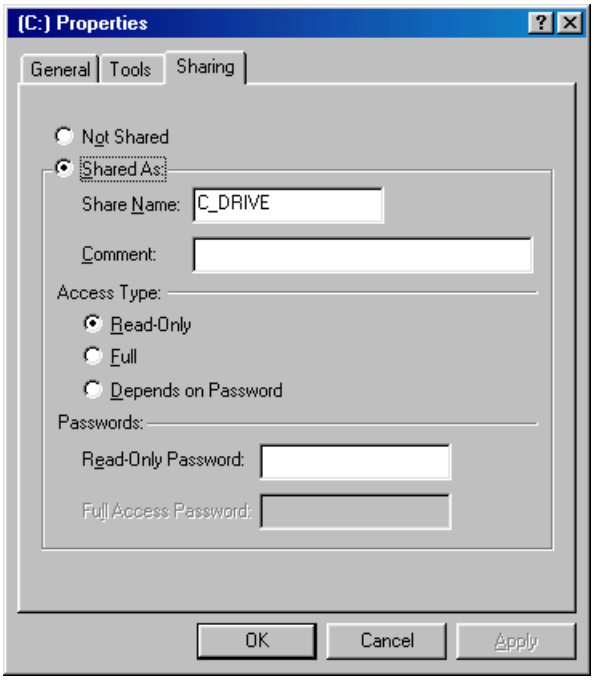


Click on the Identification tab. Type in the computer name and the workgroup name (both are 15 characters max).



Click the "Access Control" tab, then click on "Share-level access control".

Click OK after when done. You will be prompted to re-start your computer so the settings will take effect. Restart the computer. After the scale boots up, open "My Computer", right click on the "**C**:" drive and select a share name for the C: drive. You need to select **Read-Only** access for one-way file transfer (i.e. your laptop to the scale). If you are going to transfer a file from the scale to your laptop then select **Full** access.



At the scale you only need to be sure you have logged on to Windows. If you are not sure in anyone is logged on then shutdown, close all programs and log on as a user (any user). Click on network neighborhood or Explorer, Find, Computer to locate the shared hard drive.

Connecting to Other Ethernet Scales

The NextGen Scale Family supports connectivity to **METTLER TOLEDO®** Ethernet Clients (8461, 8361, 8450). Using the Scale Server Application, installed on a Next Generation Scale, Ethernet Clients can use a Next Generation Scale as a 'master' for the item data.

Next Generation Scales will not be able to act as clients off of a STEM or TNET Master.

6 TNET Satellites

TNET Satellite Network

TNET (Toledo NETwork) is a proprietary system that uses RS485 Synchronous Data Link Communication (SDLC) at 345k baud. A four-conductor modular connector telephone cable is used to connect each scale to the network. The maximum recommended data cable length is 1500 feet (457 meters), including the 25-ft scale drops.

Note: **Do not duplicate any ID/IP numbers on the network**. If the STEM will be supporting both TNET Satellites and Ethernet Clients, the following guidelines should be followed.

TNET Unit ID - 1 to 30

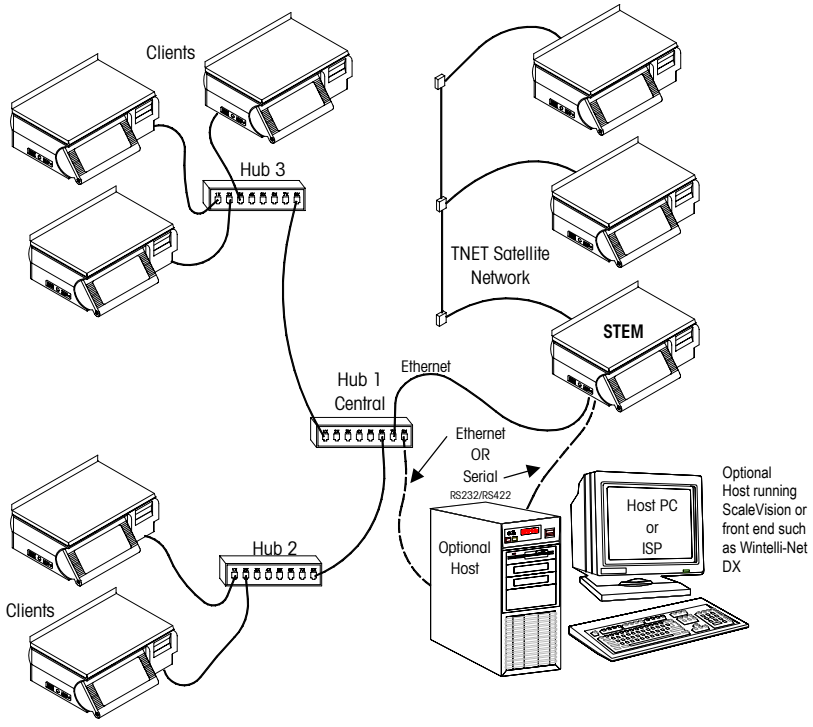
Ethernet Clients - xxx.xxx.xxx.031 to xxx.xxx.xxx.254

8361 Clients using Cutting Test - If cutting test is used, the Ethernet IP Address must be below xxx.xxx.xxx.100.

TNET Satellites can connect to a TNET **Smart*Touch*®** Master, STEM (SmartTouch Ethernet Master), or REM (Rack mount Ethernet Master). TNET Satellites can coexist with Ethernet Satellites providing no Unit ID numbers are duplicated on any of the satellites (TNET or Ethernet). The TNET Master can support up to 24 satellites. The STEM/REM can support up to 25 TNET Satellites (on the TNET port) and 25 Clients (on the Ethernet Port).

When a PLU number is called, it is retrieved from the master and added to a local backup PLU table. On power-up, the backup table, action code table, grade table, and department configuration is updated. If the master is off-line, satellites can operate with backup information until the master goes back on-line.

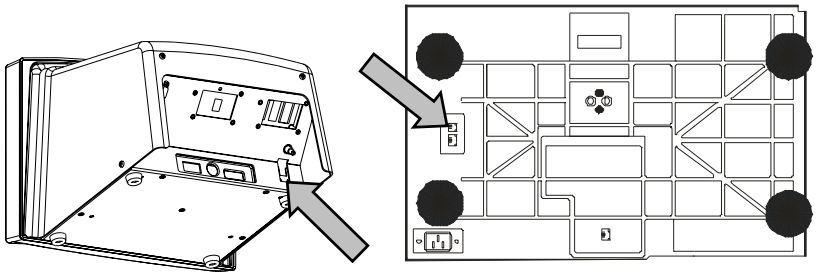
The illustration below shows an example network with the STEM connected to TNET and Ethernet satellites.



STEM Network Example

TNET Satellite Connections

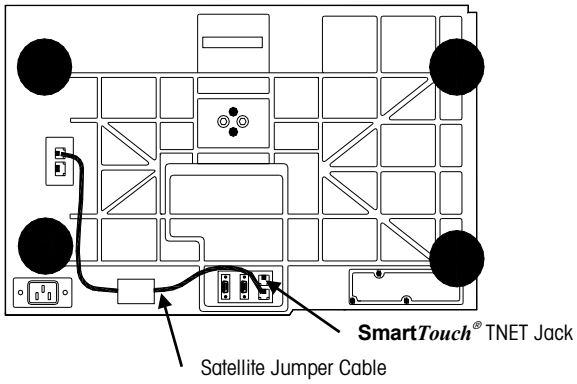
Each TNET satellite is shipped with a modular phone jack box and a 25 ft (7.62 m) communication cable that connects the box to the TNET connector on the bottom of the scale, as shown below. The 25-ft (7.62 m) communication cable has a 4-position modular phone plug on one end, and a 6-position modular plug on the other. Connect the 4-position end to the Satellite in the TNET jack, and the 6-position end to the supplied phone jack. The total data-cable length of the network, including the main data cable and 25 ft (7.62 m) scale drop cables is limited to 1500 feet (457 meters).



Model 8460/8461 and 8360/8361 Satellite TNET Connectors

Smart*Touch*® Master TNET Connections

The **Smart*Touch*®** Master connects to the network the same as a satellite, using the 25-ft/7.62 m communication cable and phone jack (shipped with each master). A short cable runs from the satellite TNET jack to a connector board from the master. The network cable then connects to the spare jack, as shown below.



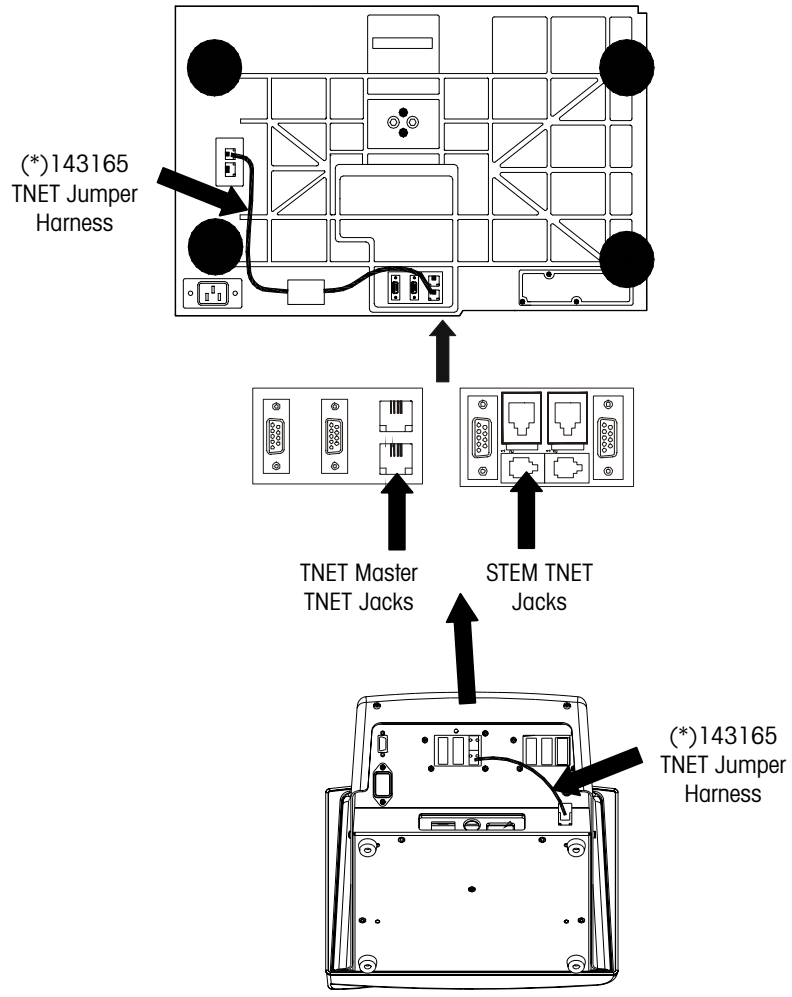
Model 8460/8461 Smart*Touch*® Master TNET Connector

The master can be located at any point on the network. However, when nearing the maximum cable length of 1500 feet, the master should reside near the middle.

STEM TNET Connections

If the STEM master is installed in a TNET Satellite, a jumper cable connects the satellite TNET jack to a TNET jack on the connector board from the STEM. The network cable then connects to the spare jack, as shown below.

The STEM (**Smart*Touch*®** Ethernet Master) can support up to 25 TNET Satellites in addition to 25 Ethernet Clients. The TNET jacks on the STEM Connector PCB are shown below. Connection can be made on either jack.



STEM Connector PCB Layout

TNET Hardware

The maximum cable length of the TNET network, which includes the main data cable and all 25 ft (7.62 m) scale drop cables, is limited to 1500 feet (457 meters). Use only approved or equivalent UTP (unshielded twisted pair) cable. The use of unapproved cable may result in data communications errors.

If the cable will be routed through a plenum area or in ceilings, check the local electrical/fire codes. Special UTP non-flammable/non-smoking plenum-cable may be required.

Table 7-1 lists the METTLER TOLEDO® wiring specifications.

Two-Pair UTP (Unshielded Twisted Pair) Category 2 (or higher), 22-24 Gauge, Solid Core Cable is required for the master/satellite network.

Material	Approved Vendors	Specifications
Phone jack	• METTLER TOLEDO P/N (*)12716300A • Allen Tel. Prod. #AT468-4 (or equivalent)	Wall mount telephone jack with screw terminals and one RJ-45 modular jack.
Terminating Resistor	METTLER TOLEDO P/N (*)12839300A. or equivalent	1/4 Watt, Metal Film, Tolerance ±1%.
UTP Data Cable	Belden 1227A AT&T 1005 002A W1000	Solid-Core (22-24 gauge), Two-Pair UTP (Unshielded Twisted Pair) EIA Category 2 or higher or UTP Telephone Cable. • Category 2 or higher • Maximum 1500 feet (457 m) cable length (including drops) • 22-24 AWG Solid Core • 2-Pair UTP (Unshielded Twisted Pair) • N.E.C. type CM • Nominal Capacitance **16-18** pf/ft **max**.

Table 7-1: TNET Hardware

TNET Network Wiring

The maximum cable length, including the main data cable and 25 ft (7.62 m) scale drop cables is limited to 1500 feet (457 meters).

Only one twisted pair will be used. The other pair is not connected and can be used as a spare.

The main data cable must be run so it is located within 25 ft (7.62 m) of each scale on the network. Once the cable is routed, a modular phone jack (P\N 12716300A) must be attached to the main data cable at each scale location. The phone jack must be located within 25 ft (7.62 m) of the scale to allow connecting the 25 ft (7.62 m) communication cable between the phone jack and the scale. Each scale is shipped with a 25-ft (7.62 m) communication cable (P/N 12716500A) which connects the scale communication port to the phone jack. Refer to the illustration below that shows an example of the scale network wiring in detail. ***The main data line must be terminated at the ends by connecting the supplied 113 ohm resister (P/N 12839300A) between the Green and Red terminals in the phone jacks. The terminating resistors are supplied with each master scale. Use only one twisted pair to connect to the Green and Red terminals in the phone jack. Do not use a wire from each pair.***

NOTE 1: The 25-ft (7.62 m) Communication Cable, P/N 12716500A, and the Phone Jack, P/N 12716300A, are supplied with each scale. The four-position modular phone connector plugs in the scale TNET connector, and the six-position modular phone connector plugs into the phone jack.

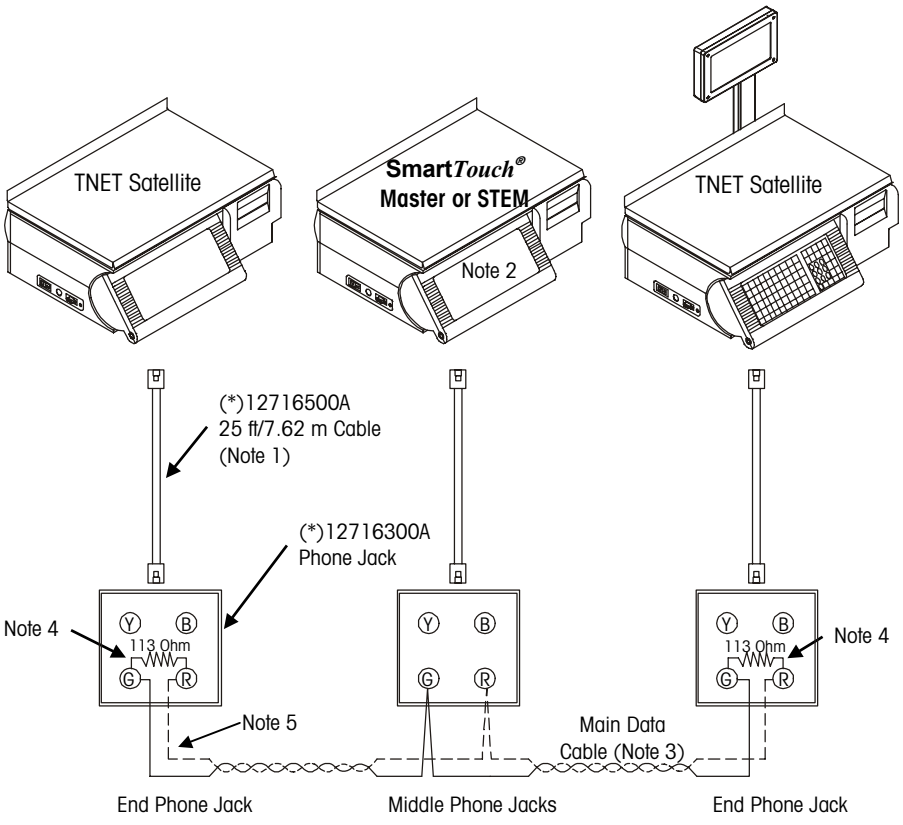
NOTE 2: The STEM Master can be installed at any location on the TNET network. In this example, the Master is installed near the middle of the main cable. When the cable length approaches near maximum, it is recommended the master be located near the middle of the network. Up to 25 satellites are supported.

NOTE 3: All phone jacks must be installed on the main data line which runs to each location. This main data line must not branch off into multiple sub-networks from one phone jack. The total cable length, including the 25 ft (7.62 m) scale communication cables must not exceed 1500 feet (457 meters). The cable must meet the local building code requirements and meet NFPA requirements.

NOTE 4: The 12839300A 113 ohm Terminating Resistor MUST BE INSTALLED BETWEEN THE GREEN AND RED TERMINALS OF THE PHONE JACK AT BOTH ENDS OF THE MAIN DATA CABLE. Trim any excess cable beyond the last connection.

NOTE 5: Use only one twisted pair to make the connections. Leave the other twisted pair for a spare. Do not use one wire from each twisted pair.

(*) = May have letter prefix.



TNET Network Wiring

7 Glossary

Standard Glossary

This glossary includes standard terms and some of the specialized terminology and concepts that are used in the weighing industry.

Accumulator—A database that holds a value such as total dollars, total weight, etc.

802.11 - The IEEE standard that specifies a carrier sense media access control and physical layer specifications for 1 and 2 megabit per second wireless LANs.

802.11b - The IEEE standard that specifies a carrier sense media access control and physical layer specifications for 5.5 and 11 megabit per second wireless LANs.

802.3 - The IEEE standard that specifies carrier sense media access control and physical layer specifications for Ethernet LANs.

Access Point - A wireless LAN transceiver that acts as a center point and bridges between wireless and wired networks.

Accuracy—Capability of a measuring device to provide measured values without systematic measurement deviations. The ratio of the error to the full-scale output.

Ambient Conditions—The conditions (humidity, pressure, temperature, etc.) of the medium surrounding a device.

Ambient Temperature—The temperature of the medium surrounding a device.

Analog-Digital Converter—An electronic device designed to convert analog signals (voltages) into digital signals. This type of circuit is used in scales and digital voltmeters.

Analog—In communications, transmission employing variable and continuous wave forms to represent information values, where interpretation by the receiver is an approximation of the encoded value; compare with **Digital**.

ANSI (American National Standards Institute)—The principal standards development body supported by over 1000 trade organizations, professional societies and companies. USA's member body to ISO (International Standards Organization).

ASCII (American Standard Code for Information Interchange)—A system used to represent alphanumeric data; a 7-bit-plus-parity character set established by ANSI and used for data communications and data processing; ASCII allows compatibility among data services; one of two such codes (see EBCDIC) used in data interchange, ASCII is normally used for asynchronous transmission.

Asynchronous—Data transmission that is not related to the timing, or a specific frequency, of a transmission facility; transmission characterized by individual characters, or bytes, encapsulated with start and stop bits, from which a receiver derives the necessary timing for sampling bits; also, start/stop transmission.

Attenuation—The deterioration of signal strength, measured in decibels; opposite of gain.

Auto Zero Maintenance (AZM)—AZM is a way for the scale to gradually re-zero itself to compensate for small changes in zero. Class III, legal-for-trade scales typically use an AZM range of ±0.5 display increments. AZM is active any time the weight on the scale is stable and is within the AZM range near gross zero.

Autotare—An autotare is taken by pressing the TARE key with the empty container on the scale. The scale then displays a zero weight with the net cursor illuminated.

Bandwidth - Specifies the amount of the frequency spectrum that is usable for data transfer. It identifies the maximum data rate that a signal can attain on the medium without encountering significant loss of power.

Bandwidth—The range of frequencies available for signaling; the difference expressed in Hertz between the highest and lowest frequencies of a band.

Baud/baud Rate—Unit of the transmission rate in serial data transmission expressed in bits per second.

Beamwidth - The angle of signal coverage provided by a radio. Beamwidth may by decreased by a directional antenna to increase gain.

Bit (Binary Digit)—The smallest unit of information in a binary system; a 1 or 0 condition.

Bit Parallel, Character Serial—This is a combination of parallel and serial transmission methods where characters are transmitted one at a time using nine wires.

Bit Serial, 20 mA or RS232—A transmission method where each character is transmitted sequentially.

Boot Protocol (BOOTP) - The protocol used for the static assignment of IP addresses to devices on the network.

BPS (Bits Per Second)—The basic unit of measure for serial data-transmission capacity; Kbps for kilo (thousands of) bits per second; Mbps for mega (millions of) bits per second; Gbps for giga (billions of) bits per second; Tbps for tera (trillions of) bits per second.

Bridge - A device used to connect LANs by forwarding packets across connections at the Media Access Control (MAC) layer.

Byte—Data word of length 8 bits, allows the encoding of 256 different characters. All common microprocessors possess a byte structure or a multiple of it in their data words.

Calibration—The comparison and adjustment of load cell outputs against standard test loads. A certified test weight is used in calibration as a known value that is compared with the displayed weight. The scale then adjusts the displayed weight accordingly.

Capacity—The maximum load that can be weighed on a particular scale.

Certificate of Conformance (COC)—A certificate and number issued by NIST under the National Type Evaluation Program that states a submitted device complies with applicable technical requirements of Handbook 44, "Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices".

Certification Seal—A stamp or seal applied by the weights and measures department to the tested weighing device to attest that certification has been carried out.

Certification—Official testing and sealing of an instrument (balances, weights) according to the certification requirements. The seal (Certification Seal) attests that the instrument has satisfied the certification requirements with respect to its design and metrological characteristics and, in particular, that it conforms with the Calibration Tolerance Limits.

Chain Tare— If a tare is entered using the numeric keypad with the scale in the net weight mode, then the tare value entered is added to the current tare weight value.

Character—Letter, number, punctuation, or any other symbol contained in a message.

Checksum—The total of a group of data items or a segment of data that is used for error-checking purposes. Both numeric and alphabetic fields can be used in calculating a checksum, since the binary content of the data can be added. Just as a check digit tests the accuracy of a single number, a checksum serves to test an entire set of data that has been transmitted or stored. Checksum can detect single-bit errors and some multiple-bit errors.

Class, Scale—An NIST classification system that separates scale types into groups.

Class	**Application or Scale Type** (Reference: 1999 Handbook 44)
I	Precision laboratory weighing.
II	Laboratory weighing, precious metals and gem weighing, grain test scales.
III	All commercial weighing not otherwise specified, grain test scales, retail precious metals and semi-precious gem weighing, animal scales, postal scales, scales used to determine laundry charges, and vehicle on-board weighing systems.
III L	Vehicle, axle load, livestock, railway track scales, crane, hopper (other than grain hopper) scales, and vehicle on-board weighing systems.
IIII	Wheel-load weighers and portable axle-load weighers used for highway weight enforcement.

Clock—An oscillator-generated signal that provides a timing reference for a transmission link; used to control the timing of functions such as sampling interval, signaling rate, and duration of signal elements; an "enclosed" digital network typically has only one master clock.

Communication Protocol—The rules governing the exchange of information between devices on a data link.

Computing Scale—A scale that indicates the money values of amount of commodity weighed at predetermined unit prices.

Conversion Formulas—Useful conversion formulas are as follows:

lb = kg x 2.205
kg = lb x 0.4536
mm = in. x 25.4
in. = mm x 0.03937
ºC = (ºF - 32) / 1.8
ºF = (ºC x 1.8) + 32

Counting Scale—A scale used to count a number of pieces all having the same weight. Electronic counting scales determine the mean individual weight and the weight of all counted parts, and supply the piece number by arithmetic division.

Counts—The total number of display increments available on a particular scale, which is determined by simply dividing the scale capacity by its readability. A scale with a capacity of 10 lb and a resolution of .001 lb would have 10,000 counts.

Creep Error—The change in load cell output occurring with time while under load and with all environmental conditions and other variables remaining the same.—Drift.

Current Loop Interface (20 mA)—Digital peripheral interface for serial data transmission in which the logic states 0 and 1 are represented by the currents 0 mA and 20 mA, e.g. TTY interface in teletype.

Data Bus (serial)—A data bus represents the electrical connection between several components. Bus multipoint connections have a long main cable to which the participants are attached via short spur lines. In contrast to star or ring structures, the bus structure represents a multipoint connection. It can be used for the connection of computers, peripherals and measuring instruments.

Data Link—Any serial data-communications transmission path, generally between two adjacent nodes or devices and without intermediate switching nodes.

Data—Information represented in digital form, including voice, text, facsimile, and video.

Data-Transfer Rate—The average number of bits, characters, or blocks per unit of time transferred from a data source to a data sink.

dBi - A ratio of decibels to an isotropic antenna that is commonly used to measure antenna gain. The greater the dBi value, the higher the gain and, as such, the more acute the angle of coverage.

Declaration of Conformity—Statement by a supplier, claiming under his sole responsibility that a product, process or service is in conformity with a specific standard or other normative document.

Density—The density ("p") of a substance is the quotient of its mass ("m") and volume ("V"); p = m/V.

Department—A grouping of data files that contains similar items, such as produce, meat, seafood, etc.

Differential Quadrature Phase Shift Keying (DQPSK) - Modulation technique used by IEEE 802.11-compliant wireless LANs for transmission at 2Mbps.

Digital Filter—Software-based filtering of very low frequency to negate the effects of vibrations, drafts, etc. for the purpose of achieving more stable indications.

Digital—Referring to communications procedures, techniques, and equipment by which information is encoded as either a binary one (1) or zero (0); the representation of information in digits.

Dip Switches—Switches that are usually in banks of two or more and normally mounted directly to a circuit board that are used to enable or disable certain options or functions.

Dipole - A type of low gain (2.2 dBi) antenna consisting of two (often internal) elements.

Direct Sequence Spread Spectrum (DSSS) - A type of spread spectrum radio transmission that spreads its signal continuously over a wide frequency band.

Directional Antenna - An antenna that concentrates transmission power into a direction thereby increasing coverage distance at the expense of coverage angle. Directional antenna types include yagi, patch and parabolic dish.

Discrimination—Ability of an instrument to react to small variations of load. The discrimination threshold, for a given load, is the value of the smallest additional load that, when gently deposited on or removed from the load receptor, causes a perceptible change in the indication.

Diversity Antennas - An intelligent system of two antennas that continually senses incoming radio signals and automatically selects the antenna best positioned to receive it.

Dot Matrix—(e.g. 5x7 dots) Type of alphanumeric character indication—Display. Also used describe a printer—dot matrix printer.

Downloading—The process of sending data, operating software or other data from a host to another device.

Drift—Slow change with time in the value of a metrological characteristic (e.g. in the display) of a measuring device at constant loading.

Dynamic Host Configuration Protocol (DHCP) - A protocol available with many operating systems that automatically issues IP addresses within a specified range to devices on a network. The device retains the assigned address for a specific administrator-defined period.

Dynamic Weighing— When there is relative motion between the weighing object and the scale during the weighing process. The mass (weight) is recorded while the object is in motion.

EBCDIC (Extended Binary Coded Decimal Interchange Code)—An eight-bit code used primarily in IBM® equipment. The code has 256 characters in the set.

Edit—The process of adding, modifying, or deleting data in a file.

EEPROM (Electrically Erasable Programmable Read Only Memory)— Ready-only, non-volatile, semi-conductor memory that is erasable via a signal input to a certain pin and re-programmable.—See ROM.

EMI (Electromagnetic Interference)—A device's radiation leakage that couples onto a transmission medium, resulting (mainly) from the use of high-frequency-wave energy and signal modulation; reduced by shielding; minimum acceptable levels are detailed by the FCC, based on type of device and operating frequency.

Emulation—The imitation of all or part of one device, terminal, or computer by another, so that the imitating device accepts the same data, performs the same functions, and appears to other network devices as if it were the imitated device.

EPROM (Erasable Programmable Read-Only Memory)—Ready-only, non-volatile, semi-conductor memory that is erasable via ultra violet light and re-programmable.—See ROM.

Erasable Storage—A storage device whose contents can be modified (e.g., Random Access Memory, or RAM) as contrasted with read-only storage (e.g., Read-Only Memory, or ROM).

Ethernet—A popular local area network design (originally designed by Xerox® Corp.) characterized by 10-Mbps baseband transmission over a shielded coaxial cable and employing CSMA/CD as the access control mechanism; standardized by the IEEE as specification IEEE 802.3; referring to the Ethernet design or as compatible with Ethernet.

Even Parity—Data verification method in which each character must have an even number of "on" bits.

Excitation Voltage—The electrical voltage applied to a transducer or load cell for proper operation.

File—A collection of data stored in memory or other storage device such as a floppy or hard disk.

Filter—An electrical circuit designed to pass through certain frequencies and reject others.

Floppy Disk—A removable storage device used on a PC. The most common in use now is the 1.44-megabyte floppy disk.

Flow Control—The procedure or technique used to regulate the flow of data between devices; prevents the loss of data once a device's buffer has reached its capacity.

Frequency Hopping Spread Spectrum (FHSS) - A type of spread spectrum radio transmission in which the transmitter and receiver hop in synchronization from one frequency to another according to a prearranged pattern.

Fresnel Effect - A phenomenon related to line of sight whereby an object that does not obstruct the visual line of sight obstructs the line of transmission for radio frequencies.

Full Duplex (FDX)—Transmission in either direction, at the same time.

Gain - A method of increasing the transmission distance of a radio by the concentration its signal in a single direction, typically through the use of a directional antenna. Gain does not increase a radio's signal strength, but simply redirects it. Therefore, as gain increases, the decrease in angle of coverage is inversely proportional.

Gain—Increased signal power, usually the result of amplification; see Attenuation.

Gateway—A conceptual or logical network station that serves to interconnect two otherwise incompatible networks, network nodes, sub-networks, or devices; performs a protocol-conversion operation across numerous communications layers.

Gigabyte—A term used to express the storage capacity of disk drives, RAM memory, etc. One Gigabyte is equivalent to one billion bytes of data. Commonly referred to as a "Gig"; one Gig, two Gigs, etc.

Gigahertz (GHz) - One billion cycles per second. A unit of measure for frequency.

Gram —The gram (unit symbol g) is the one thousandth part of a kilogram.

Gross Value (G or B)—Indication of the weight of a load on an instrument, with no tare or preset tare device in operation.

Gross Weight—Mass of the weighing sample (net weight) including its container or packaging (tare weight).

Ground—An electrical connection or common conductor that, at some point, connects to the earth. The reference point of an electrical system.

Half Duplex (HDX)—Transmission in either direction, but not at the same time.

Handbook 44—A series of regulations adopted by NIST (National Institute of Standards & Technology) to control the consistency of weighing and measuring devices.

Handshake—One or more special control lines for the timed coordination of the data flow in parallel and serial interfaces by acknowledgments between sender and transmitter. Example: The data receiver reports readiness to receive, the data transmitter then reports that the data are ready for transmission.

Hanging Scale—A scale designed to be hung from an overhead support where the load is suspended below the scale.

Hard Disk—Usually a permanent non-removable storage device used on PC's, usually with a great amount of storage capacity.

Hertz (Hz) - Cycles per second. A unit of measure for frequency.

Hertz (Hz)—A measure of frequency or bandwidth. The same as cycles per second.

Hidden Node - A station on a wireless LAN that attempts to transmit data to another station but, due to its location relative to the others, cannot sense that there is a third station simultaneously communicating with the intended recipient. Lost message and multiple retries is the result.

Humidity, Relative—The moisture content of air relative to the maximum that the air can contain at the same pressure and temperature.

Hysteresis—The maximum difference between load cell output readings for the same applied load. One reading is obtained by increasing the load from zero, and the other by decreasing the load from rated capacity. Usually measured at half rated capacity and expressed in percent of rated capacity.

I/O—Input/Output.

Increasing Load Test—The performance of a scale as increments of test load are successively added to the scale.

Increment—The value of the smallest value that can be reported by the scale (displayed or printed).

Institute of Electrical and Electronic Engineers (IEEE) - A professional society serving electrical engineers through its publications, conferences, and standards development activities. The body responsible for the Ethernet 802.3 and wireless LAN 802.11 specifications.

Interface—A shared boundary; a physical point of demarcation between two devices, where the electrical signals, connectors, timing, and handshaking are defined; the procedures, codes, and protocols that enable two entities to interact for a meaningful exchange of information.

International Organization for Legal Metrology (OIML)—Abbreviation for Organization Internationale de Metrologie Legale. The main task of the OIML involves unification of the administrative and technical regulations for measurement methods and measuring instruments for the field of legal metrology at an international level.

International Standard—An ISO standards document that has been approved in final balloting.

Intrinsically Safe—An instrument that will not produce any spark or thermal effects under normal or abnormal conditions that will ignite a specified gas mixture.

IPX (Internet Packet Exchange)—A product of Novell, Inc. that represents a network protocol for delivery of data packets from one network node to one or more other nodes. It does not provide guarantee of delivery (see SPX).

IR—Abbreviation for InfraRed. Light lying at the extreme range of red and outside of the visible range. The type of light emitted by an LED (Light Emitting Diode).

ISO (International Standards Organization)—This organization handles the international standardization of terms, measurement methods, tolerances and the like in the industrial field.

Isotropic - An antenna (or a theoretic construct of an antenna) that radiates its signal 360 degrees both vertically and horizontally-- a perfect sphere.

Item Number—The number programmed in a PLU file that is used to encode into a printed bar code symbol. The item number is then used by a bar code scanner to identify the commodity (item).

Jitter—The slight movement of a transmission signal in time or phase that can introduce errors and loss of synchronization in high-speed synchronous communications.

Jumper—(1) A wire which connects a number of pins on one end of a cable only, such a looping back Request to Send from Clear to Send. (2) Connector on a printed circuit board of an electronic circuit used to set or initiate certain functions. A jumper is either ON/SHORTED or OFF/OPEN.

Keyboard (keypad)—A device consisting of an array of keys used to initiate functions and/or enter alphanumeric data and special characters.

Keyboard Tare—Keyboard entered tare is used when the empty weight of a container is a known value. The known tare weight is entered using the numeric keys, and the TARE key is pressed.

Kilogram—the kilogram (unit symbol kg) is the base unit of mass in the metric system.

LAN—Local Area Network. Data link between individual computers at different locations, e.g. in an office or throughout the grounds of a factory, typically up to 1 km. The data transmission rate lies between 100 KB/s and 20 MB/s. Local networks are multipoint connections. They operate with serial data transmission and are independent of the post office lines.

LCD—Abbreviation for Liquid Crystal Display; a type of display used many types of devices, including scales, calculators, notebook PC's, etc.

LED (Light Emitting Diode)—Also called light diode or luminescence diode. Available colors: red, green, yellow, and orange. An LED is a semiconductor diode that emits light when a current of about 10 mA flows through it. Its illuminating power is high, but its current consumption is also relatively high. Can be read without external light.—Readout.

Line of Sight - An unobstructed straight line between two transmitting devices. Line of sight is typically required for long-range directional radio transmission. Due to the curvature of the earth, the line of sight for devices not mounted on towers is limited to 16 miles (26km).

Linearity—Linearity is a measure of how well the scale is capable of following the linear relationship between the loaded weight and the display value. The characteristic curve of a balance is envisaged as a straight line between zero and maximum load. The non-linearity defines the width of the band within which a plus or minus deviation of the measured value from the ideal characteristic line can occur.

Linearization—The non-linearity of the characteristic curve of a weighing cell leads to measurement errors and various measures are thus employed in an attempt to keep the linearity error small. Modern linearizations are, e.g. correction of the characteristic curve by corrections stored in the microprocessor or built-in calibration weights that are weighed singly and together in the calibration process. The microprocessor determines the actual linearity deviation and then corrects it.

Load Cell—A device that produces an electrical output signal proportional to the applied weight or force.

Load—The weight or force applied to the load cell.

Loopback—Type of diagnostic test in which the transmitted signal is returned to the sending device after passing through all, or a portion of, a data communications link or network.

Loss—Reduction in signal strength, expressed in decibels; also, Attenuation; opposite of gain.

Manual Tare (Keyboard Tare)—The operator enters a tare value manually and presses the TARE key.

Mark—Presence of signal. In telegraph communication, a mark represents the closed condition or current flowing. A mark impulse is equivalent to a binary 1.

Mass—The physical quantity mass (m) is the property of matter of a body expressed in terms of both its inertial effects with respect to a change in its state of motion and the attraction it exerts on other bodies. The mass of an object is independent of its location. If is determined by comparison with bodies of known mass, for example by weighing. The embodiment of a unit of mass and its fractions or multiples is called weights or weight pieces. The base unit of mass is the kilogram or kg.

Master—In a scale network, the master acts like a PC File Server. The master contains all of the data records. A satellite on the network can retrieve the record and use it locally for a transaction. The master on the network keeps track on each transaction and adds it into an accumulator database. The METTLER TOLEDO master/satellite network is commonly called a TNET (Toledo Network). The TNET can support up to 24 satellites.

Maximum Capacity (Max)—Maximum weighing capacity, not taking into account the additive tare capacity.

Maximum Load Capacity—The maximum load a balance or scale can accommodate without damage. It is always greater or equal to the maximum load plus the maximum tare load. Abbreviation: Lim.

Maximum Load—Upper limit of the weighing range without consideration of the additional maximum tare.

Maximum Safe Load (Lim)—Maximum static load that can be carried by the instrument without permanently altering its metrological qualities.

Megabyte—A term used to express the storage capacity of disk drives, RAM memory, etc. One Megabyte is equivalent to one million bytes of data. Commonly referred to as a "Meg"; one Meg, two Megs, etc.

Megahertz (MHz) - One million cycles per second. A unit of measure for frequency.

MELSI—Mettler Large Scale Integration. A proprietary circuit that performs analog-to-digital weight conversion.

Memory—A type of storage used in PC's and scales, generally referred to as RAM (Random Access Memory). The RAM in a PC will only store data as long as the power is on. The RAM used for data storage in scales is usually battery backed in case of a power loss.

Menu—A group of selections or options on a screen.

Metric Weight—A unit of weight based on the kilogram (1,000 grams).

Metrology—The science of measurement, measurement systems, and units.

Minimum Capacity (Min)—Value of the load below, which the weighing results, may be subject to an excessive relative error.

M—Mega; designation for one million (e.g., Mbps or megabyte).

m—Milli; designation for one thousandth.

Modem (Modulator-Demodulator)—A device used to convert serial digital data from a transmitting terminal to a signal for transmission over a telephone channel, or to reconvert the transmitted signal to serial digital data for acceptance by a receiving terminal.

Modulation - Any of several techniques for combining user information with a transmitter's carrier signal.

Monitor—A display screen used on PC's and other devices.

Motion Detection—The process of sensing a rate of change of applied load to determine when a given weighing system has reached a state of equilibrium.

Multipath - The echoes created as a radio signal bounces off of physical objects.

MultiRange—A scale whose weighing range is divided into partial weighing ranges with different scale division values. Switching of the division values occurs automatically with increasing and decreasing load at the same display values. **n = (max.)/d**

Net Weight—The weight of a weighing sample after deduction of the weight of its packaging or of the transport device (tare weight) with which it had previously been weighed.

Network—An interconnected group of Nodes; a series of points, nodes, or stations connected by communications channels; the assembly of equipment through which connections are made between data stations.

NIST—Abbreviation for the National Institute of Standards & Technology.

Noise—An unwanted signal that can contribute to errors in measurement.

Notch Filter—A tunable filter used to filter out one specific frequency below the lowpass filter frequency.

NTEP—Abbreviation for the National Type Evaluation Program. An NIST procedure where devices submitted to NTEP are evaluated using Handbook 44 as a reference. See Certificate of Conformance (COC).

Number of Scale Divisions—Quotient calculated from maximum load (max.) and scale division

Odd Parity— A data verification method in which each character must have and odd number of "on" bits.

Omni-Directional Antenna- An antenna that provides a 360 degree transmission pattern. These types of antennas are used when coverage in all directions is required.

Optical Isolation—Two networks or devices that are connected only through and LED transmitter and photoelectric receiver and with no electrical continuity between the two devices.

Over/Under Indication—A scale that is capable of indicating weights greater or lesser than a predetermined weight.

Overload Rating, Safe—Maximum load in percent of rated capacity which can be safely applied without damaging or producing a permanent shift in performance characteristics beyond those specified.

Parabolic - A concave or dish-shaped object. Often refers to dish antennas. Peer-to-Peer Network: A network design in which each computer shares and uses devices on an equal basis.

Parallel Transmission—Transmission mode that sends a number of bits simultaneous over separate lines.

Parity Bit—A bit that is set at "0" or "1" in a character to ensure that the total number of "on" bits in the data field is even or odd. (See Even/Odd Parity)

Parity Check—The addition of non-information bits that make up a transmission block to ensure that the total number of 1s is always either even or odd.

Password—A set of characters or numbers that must be typed in to gain access to certain functions on a scale or computer.

PC—A common term referring to a Personal Computer.

Pending File—A temporary file that will be used to update a regular file.

Pin Assignment—In electronic instruments, this term refers to the assignment of the individual connector contacts to certain signals. Some types of commonly used connectors used on PC's and peripherals are internationally standardized.

Platter—The platform of a scale on which the load is placed.

PLU—Abbreviation for Price Look Up. The PLU number is a data record's index number used to store it in a data file, and by an operator to retrieve the record.

Poise—A moveable weight mounted upon or suspended from a weighbeam bar and used in combination with graduations on the bar to indicate weight values.

Polarity—Any condition in which there are two opposing voltage levels or changes, such as positive and negative.

Port—A point of access into a computer, a network, or other electronic device; the physical or electrical interface through which one gains access; the interface between a process and a communications or transmission facility.

Precision—The degree to which a scale conforms to a predetermined specification as well as its ability to successfully repeat actions within closely specified limits.

Prepackaging Scale, Prepack—A scale or weighing mode designed for weighing random weight prepackaged items.

PROM (Programmable Read Only Memory)—Nonvolatile memory device which retains its contents when the power supply is switched off. They can be only read (i.e. not written to) by the processor and contain programs and important device parameters. They are installed as integrated components.

Proportional Tare—Proportional Tare (SmartTouch Master must be Version 3.0 or later) is stored in the Tare2 field. By-Weight tares are stored in the Tare1 field. The Net Weight will be the gross weight minus the By-Weight Tare, minus the proportional tare, times the Gross Weight, minus By-Weight Tare value. The mathematical representation is as follows: Net Weight = (Gross Wgt - Tare1) - (Tare2 x (Gross Wgt - Tare1))

Protocol—Formal set of rules governing the format, timing, sequencing, and error control of exchanged messages on a data network; may be oriented toward data transfer over an interface, between two logical units directly connected, or on an end-to-end basis between two users over a large and complex network.

Pushbutton Zero—Pushbutton zero is a way for the operator to capture a new gross zero reference point. The weight on the scale must be stable and within the pushbutton zero capture range of the original zero recorded during calibration.

Radio Frequency (RF) - A generic term for radio-based technology.

RAM (Random Access Memory)—Storage device into which data can be entered (written) and read; compare with ROM.

Range - A linear measure of the distance that a transmitter can send a signal.

Readability—The smallest possible weight change detectable on the scale readout and a function of the external resolution.

Receiver Sensitivity - A measurement of the weakest signal a receiver can receive and still correctly translate it into data.

Repeatability, Reproducibility—The ability of a scale to duplicate the same value when identical samples are loaded and reloaded in succession. Simply put, it's getting the same value repeatedly.

Resolution—The smallest possible weight change detectable on the scale readout. A function of the external resolution.

Reverse Polarity TNC (RP-TNC) - A connector type unique to Aironet radios and antennas. Part 15.203 of the FCC rules covering spread-spectrum devices limits the types of antennas that may be used with transmission equipment. In compliance with this rule, Aironet, like all other wireless LAN providers, equips its radios and antennas with a unique connector to prevent attachment of non-approved antennas to radios.

RFI—Radio Frequency Interference

Roaming - A feature of some access points that allow users to move through a facility while maintaining unbroken connection to the LAN.

ROM (Read-Only-Memory)—A data storage device, the contents of which cannot normally be altered; storage in which writing-over is prevented; also, permanent storage; compare with RAM.

RS-232 Interface—A digital serial synchronous interface complies with the EIA RS-232 standard for modem connections for data transmission over the telephone lines. The standard is suitable for the description of computer interfaces as, e.g. connector design, pin assignment and signals are described. The use of modem control lines is not defined for the connection of computers and often leads to difficulties in data transmission.

RS-422—Electrical characteristics of balanced-voltage digital interface circuits.

RS-423—Electrical characteristics of unbalanced-voltage digital interface circuits.

RS-485—An interface similar to RS422 that has improved drive capabilities and can be used for multiple device networking.

Sample Rate—The number of samples per unit of time that a circuit or device measures the input signal.

Scale divisions, Number of (n)—The quotient of the capacity divided by the value of the scale division (e). **n = Capacity / e**

Scale Divisions, Value of (d)—The value of the scale division, expressed in units of mass, is the smallest subdivision of the scale.

Scale division—Smallest weighing increment of a scale.

Sealing, Security Seal—1. Eliminating access to certain components by attaching objects (seals) that are usually metallic. A safety seal is stamped on these objects by means of pliers (lead-sealing pliers). 2.The official process of attaching a seal to a measuring instrument, e.g. the main seal or the EC certification seal after an instrument has been certified, or any required safety seal. A locking seal is understood to refer to the kind of seal that simultaneously secures the housing of a balance to prevent it being opened.

Sensitivity—The smallest possible weight change detectable on the scale readout. A function of the external resolution.

Serial Data Transfer—The consecutive transmission of data over one or several lines.—Data Transmission.

Serial Transmission—The most common transmission mode in which information bits are sent sequentially on a single data channel.

Shielding—Protective enclosure or surrounding for and electrical circuit or transmission medium, such as coaxial cable, designed to minimize electromagnetic and radio frequency leakage and interference.

Shift Test—A test intended to disclose the weighing performance of a scale under off-center loading.

SI Units—Units of the International System of Units (SI = Systeme International d'Unites). The system consists of seven base units (meter, kilogram, second, ampere, Kelvin, mol, candela), a number of derived units (created by combining several base units e.g. Newton $N=m \cdot kg \cdot s^{-2}$), and certain supplementary units (e.g. radian rad for a plane angle).

Span Stability—The capability of an instrument to maintain the difference between the indication of weight at maximum capacity and the indication at zero over a period of use within specified limits.

Span—The full scale capacity less the zero or minimum value.

Specific Gravity—The ratio or mass of any material to the mass of the same volume of pure water at 4ºC.

Spread Spectrum - A radio transmission technology that "spreads" the user information over a much wider bandwidth than otherwise required in order to gain benefits such as improved interference tolerance and unlicensed operation.

Stability—The measure of a scale's ability to give the same weight or count reading at different points in time. Phenomena affecting stability include creep, vibration, temperature, and humidity.

Start Bit—In asynchronous transmission, the first bit or element in each character, normally a space, which prepares the receiving, equipment for the reception of a character.

Static Weighing— When an object is placed on the scale either manually or automatically for a sufficient time to record the mass (weight). After the weight is recorded, it is removed from the scale.

Stop Bit—In asynchronous transmission, the last bit, used to indicate the end of a character.

Strain Gage—A measuring element for converting force, pressure, tension, etc. into an electrical signal, usually by a change in resistance of the device.

String—Any combination of alphanumeric characters (letters, numbers and special characters.)

Tare—Tare is the empty weight of a container or vehicle. Tare is normally used to determine the net weight of the contents of the container. Tare is used in several different ways.

Temperature Range, Compensated—The range of temperature over which the load cell is compensated to maintain the rated output and zero balance within specified limits.

Test Weight—A calibrated weight used to calibrate scales.

Timeout—Expiration of predefined time period, at which point some specified action occurs. In communications, timeouts are employed to avoid unnecessary delays and improve traffic flow. They are used, for example, to specify maximum response times to polling and addressing before a procedure is automatically reinitiated.

TNET—Toledo Network. An RS485 communications network used in the Retail Master/Satellite network where a single master supports up to 24 satellites. The satellites retrieve PLU data from the master through the high-speed network as needed. The standard TNET runs at 345k baud.

Tolerance—A value fixing the limit of allowable error or departure from true performance or value, as established by authority of usage.

Tonne—A special name for the megagram (unit symbol t) which is equivalent to one thousand kilograms: $1\ t = 10^3\ kg$.

Troy Weight—A series of units of weight based on a twelve ounce pound using ounces of 20 pennyweight or 480 grams.

TTL—Transistor-to-Transistor logic. A type of solid state logic that uses only transistors to form the logic gates.

Vacuum Florescent Display—A type of display that illuminates like a light bulb. VFD displays are used when visibility is required in both brightly lit and dimly lit areas.

Weighing Range—The range, within which, a balance may be used for weighing. The limits of a weighing range are called minimum load (lower limit) and maximum load (upper limit).

Weighing—Determining the mass (weight) of an object. Weight force as the product of the mass of a body and the local acceleration due to Gravity. Weight or weight piece as the embodiment of a mass unit. In commerce and industry, the result of a weighing can continue to be referred to as weight (DIN 1305).

Weighment—A single complete weighing operation.

Weight Tolerance—A term which describes the difference between the admissible plus or minus deviations and a specified weight value.

Weight Value—(lb or kg, etc.)

Wired Equivalent Privacy (WEP) - Optional security mechanism defined within the 802.11 standard designed to make the link integrity of the wireless medium equal to that of a cable.

X-ON/X-OFF (Transmitter On/Transmitter Off)—Control Characters in a serial communication data stream used for flow control, instructing a terminal to start transmission (X-ON) and end transmission (X-OFF).

Yagi - A type of often cylindrical directional antennas.

Zero Capture at Power-up—The scale attempts to capture a new center of zero when power is applied. Weight on the scale must be stable and within the zero capture range at power-up. The zero capture range is symmetrical around the original zero recorded during calibration.

Zero—Zero is the empty weight of the scale platform. The gross zero reference is recorded during the calibration procedure. The zero reference recorded during calibration can be modified to compensate for changes that are due to material buildup on the scale or temperature change.

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