

Telepanel

Millennium *PLUS*[™]
Price and Information System

Installation Manual

DRAFT

Safety information

- Do not power up the TX3030 before ensuring connection to ground.
- Use only manufacturer approved power supply units.
- Disconnect from power source before servicing the TX3021 or TX3030.
- Do not touch or move the TX3030 antenna connector while unit is transmitting.
- Do not open covers of the TX3030, TX3021 or ESL modules. **NO SERVICEABLE PARTS ARE INSIDE.**
- ESL modules contain lithium batteries. **DO NOT REPLACE THE BATTERIES.**

For proper disposal contact:

- **Telepanel Systems, 245 Riviera Drive, Markham ON, L3R 5J9, Canada, for North America.**

- **Telepanel Europe, 132 rue de Billancourt, 92100 Boulogne, France for Europe.**

- or the local waste management authority.

Symbols and Warnings used



Hazardous voltage present



Refer to the Installation/User Manual provided with the equipment



Class II safety rating



DC - continuous current



AC - alternative current



Ground connection

Telepanel Systems FCC Declaration of Conformity Statement

**Models: Transceiver TX3030
 Programmer TX3021
 Module ESL (5410, 5420, 9410, 9420)**

These devices comply with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) these devices may not cause harmful interference and (2) these devices must accept any interference received, including interference that may cause undesired operation.

Information to User

This equipment has been tested and found to comply with the limits for a class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct this interference at his own expense.

User Warning

Changes or modifications not expressly approved by Telepanel Systems Inc. could void the user's authority to operate the equipment.

Contents

Chapter 1 HOW TO USE THIS MANUAL	
1.1 OVERVIEW	1-1
1.2 RELATED DOCUMENTS	1-1
Chapter 2 OVERVIEW OF TELEPANEL INSTALLATION	
2.1 SYSTEM OVERVIEW	2-1
2.1.1 Network Controller	2-1
2.1.2 TX 3030 Transceiver	2-1
2.1.3 System Network	2-2
2.1.4 Display Modules	2-2
2.2 TEAM CONCEPT	2-2
2.3 PROJECT PLAN	2-3
2.4 GROUP REQUIREMENTS	2-3
2.4.1 Team (TEAM)	2-3
2.4.2 Customer (CUST)	2-4
2.4.3 Field Engineering (FE)	2-4
2.4.4 Sales Support (SS)	2-4
2.4.5 Electrical Contractor (CONT)	2-4
Chapter 3 SITE VISIT	
3.1 ESTABLISHING STORE RELATIONSHIPS	3-1
3.2 STORE INSPECTION (FE)	3-1
3.2.1 Prerequisites	3-1
3.2.2 Comparing Blueprints With Actual Store	3-1
3.2.3 Gondola Molding/Extrusion Types	3-1
3.2.4 Ceiling Type And Height	3-2
3.2.5 Freezer/Cooler Types And Locations	3-2
3.2.6 Determining Conduit Locations/Wiring Scheme Of Store	3-2
3.3 DRAW AND LABEL NETWORK PLAN (FE)	3-2
3.3.1 Determining PC And Transceiver Locations	3-2
3.3.2 Antenna Configurations For Aisles/Freezers/Coolers	3-3
3.3.3 Antenna Tuning and Certification	3-6
3.3.3.1 Tuning Specification	3-6
3.3.3.2 Signal Strength Specification	3-7
3.3.4 Recommended System Expansion Strategy	3-7
3.4 DEVELOPING A FULL STORE SPECIFICATION (FE)	3-8
3.3.1 Wiring Diagram	3-8
3.3.2 Parts List	3-8
3.5 REVIEW AND APPROVE FULL STORE SPECIFICATION (TEAM)	3-8
Chapter 4 PREINSTALLATION REQUIREMENTS	
4.1 ANTENNA NETWORK	4-1
4.1.1 Obtaining And Approving Electrical Contracting Quote (CUST)	4-1
4.1.2 Verifying Standard Store System Order (FE)	4-1
4.1.3 Ordering Additional System Components (FE)	4-1
4.1.4 Scheduling Network Installation (FE/CUST/CONT)	4-1
4.1.5 Site Preparation (FE/CUST)	4-1
4.2 MODULES AND LABELS	4-2
4.2.1 Preparation And Approval Of Module Installation Plan (SS/CUST)	4-2
4.2.2 Where Modules Should Be Installed (FE/SS/CUST)	4-2

4.2.3 Ordering/Receiving Modules (SS).....	4-2
4.2.4 Selecting Label Format (SS/CUST).....	4-3
4.2.5 Ordering Labels (CUST).....	4-3
4.2.6 Receiving Labels (CUST).....	4-4
4.2.7 Creating A Product/Location Link (SS/CUST).....	4-4
4.3 PC HARDWARE/SOFTWARE	4-5
4.3.1 Preparing PC Hardware/Software Installation Plan (FE/SS/TEAM).....	4-5
4.3.2 Ordering/Receiving Hardware/Software (SS/FE).....	4-5
4.3.3 Preparing Site For Installation (TEAM).....	4-5
4.4 STORE OPERATIONS AND PROCEDURES.....	4-6
4.4.1 Customizing Guide to Operations (SS/CUST).....	4-6
4.4.2 Suggestions For The Guide To Operations.....	4-6
4.5 PREPARE AND ORDER PROMOTIONAL MATERIAL.....	4-7
 Chapter 5 NETWORK INSTALLATION	
5.1 Installing The Antenna / Transceiver Network.....	5-1
5.2 TPN Antenna / Transceiver Database.....	5-1
5.3 Mounting the RF Serial Client and Transceiver.....	5-1
5.4 Network Test.....	5-3
5.4.1 Tuning Antennas.....	5-3
5.4.2 Measuring Signal Strength.....	5-4
5.4.3 Using Test Modules.....	5-4
5.4.4 TPN Noise Measurements.....	5-5
 Chapter 6 PC HARDWARE/SOFTWARE INSTALLATION	
6.1 INSTALLING AND TESTING PC HARDWARE (FE)	6-1
6.1.1 IBM PC AT Compatible Computer.....	6-1
6.1.2 Wireless 2.4 GHz Link.....	6-2
6.1.3 TX3021 Programmer.....	6-4
6.1.4 Bar Code Reader.....	6-4
6.1.5 Report Printer.....	6-4
6.1.6 Label Printer.....	6-4
6.2 INSTALLING, CONFIGURING, AND TESTING SOFTWARE (SS).....	6-5
6.2.1 Installing The TP Store Software (SS).....	6-5
6.2.2 Installing The POS/Host Interface (SS/CUST).....	6-5
6.3 LOADING TP DATABASE WITH HOST DATA (SS/CUST)	6-6
6.4 BACKUP DATABASE (CUST).....	6-7
 Chapter 7 SYSTEM TEST AND ACCEPTANCE	
7.1 INTRODUCTION.....	7-1
7.2 PREPARATION OF MODULES	7-1
7.3 TP TRANSMISSION DIAGNOSTICS.....	7-1
7.4 PRICE CHANGE TEST.....	7-2
7.5 HOST INTERFACE TEST	7-2
7.6 AFTER THE SYSTEM TEST.....	7-2
 Chapter 8 MODULE INSTALLATION	
8.1 INTRODUCTION.....	8-1
8.2 MODULE ASSIGNMENT AND MAINTENANCE (CUST).....	8-1
8.2.1 Guidelines For Assigning Modules	8-1
8.2.2 Guidelines For Removing Modules.....	8-1
8.2.3 Guidelines For Replacing Modules.....	8-1
8.2.4 Changing Module Information.....	8-2
8.3 TIPS.....	8-2
8.4 TROUBLESHOOTING.....	8-2

8.4.1 Wrong Prices	8-2
8.2 TESTING MODULES AFTER ASSIGNMENT	8-3
Chapter 9 IMPLEMENT TELEPANEL OPERATIONS AND PROCEDURES	
9.1 TRAIN PERSONNEL TO USE TELEPANEL	9-1
9.1.1 Sample Outline For Operator Familiarization	9-2
9.1.2 Sample Outline For Store Staff Familiarization	9-4
9.2 CONSUMER EDUCATION	9-5
Appendix A INSTALLATION PARTS LIST	
A.1 TELEPANEL PRODUCTS	A-1
A.2 OEM PRODUCTS	A-1
A.3 ANTENNA INSTALLATION MATERIALS	A-1
Appendix B CONNECTIONS	
B.1 TRANSCEIVER SERIAL CONNECTORS PINOUT	B-1
B.2 TRANSCEIVER ANTENNA CONNECTOR PINOUT	B-1
B.3 TRANSCEIVER POWER CONNECTOR PINOUT	B-1
B.4 TRANSCEIVER GROUND WIRE	B-1
B.5 PROGRAMMER SERIAL CONNECTORS	B-2
B.6 PROGRAMMER SERIAL CONNECTORS PINOUT	B-2
B.7 PROGRAMMER POWER CONNECTOR	B-2
Appendix C CHECKLISTS	
C.1 SITE INSPECTION CHECKLIST	C-1
C.2 PREINSTALLATION CHECKLIST	C-3
C.3 NETWORK INSTALLATION CHECKLIST	C-4
C.4 SYSTEM TEST CHECKLIST	C-5
Appendix D GUIDE TO OPERATIONS	
D.1 INTRODUCTION	D-1
D.2 DAILY TASKS	D-1
D.2.1 Head Office Updates	D-1
D.2.2 In-Store Updates	D-1
D.2.3 Antenna Verification	D-2
D.2.4 Transmission Reports	D-2
D.2.5 Visual Inspection	D-2
D.2.6 Label Printing	D-3
D.2.7 Backups	D-3
D.2.8 Housekeeping	D-3
D.3 WEEKLY TASKS	D-3
D.3.1 Head Office Updates	D-3
D.3.2 Specials	D-3
D.3.3 Module Data Report	D-4
D.3.4 Statistics	D-4
D.3.5 Archive Logs	D-4
D.3.6 Housekeeping	D-4
D.4 MONTHLY TASKS	D-4
D.4.1 Reports	D-4
D.4.2 Backups	D-4
D.4.3 Housekeeping	D-5
D.5 MODULE MAINTENANCE	D-5
D.5.1 Assigning Modules	D-5
D.5.2 Removing Modules	D-5
D.5.3 Replacing Modules	D-5
D.5.4 Changing Module Information	D-5

D.6 PRODUCT MAINTENANCE	D-5
D.6.1 Adding Products.....	D-5
D.6.2 Deleting Products.....	D-6
D.6.3 Changing Product Information.....	D-6

Appendix E TECHNICAL SPECIFICATION

E.1 TX3030 TRANSCEIVER.....	E-1
E.2 TX3021 PROGRAMMER.....	E-2
E.3 ESL MODULES.....	E-2

Appendix F INSTALLING AND CONFIGURING A SYMBOL SPECTRUM24™ NETWORK

F.1 Document References.....	F1
F.2 Site Setup	F1

HOW TO USE THIS MANUAL

1.1 OVERVIEW

This manual describes the installation of the Telepanel **Millennium PLUS™** Price and Information Network, from the start of the project to final acceptance by the customer.

This manual is intended primarily for use by those people directly concerned with installation process, i.e. Field Engineers and Sales Support staff.

Chapters 2 through 9 and the appendices contain the following information:

- Chapter 2 provides an overview of the Telepanel system which describes its basic function in fundamental terms. It also provides an overview of the installation process and a project methodology.
- Chapters 3 and 4 cover pre-installation issues. Chapter 3 describes how to design the network and route the antenna. Chapter 4 describes how to plan and schedule an installation.
- Chapters 5 through 7 cover the installation itself. Chapter 5 covers the network, Chapter 6 the PC hardware/software and Chapter 7 the full system test.
- Chapters 8 and 9 cover post installation issues. Chapter 8 describes module installation, and Chapter 9 describes store operations and procedures.
- Appendix A lists the parts required for an installation.
- Appendix B describes Telepanel's conventions for wiring.
- Appendix C provides checklists that can be used at various stages during an installation.
- Appendix D provides a sample "Guide To Operations".
- Appendix E contains the technical specifications for the components of the system.

1.2 RELATED DOCUMENTS

For further information on the Telepanel TP software, consult:

Telepanel User's Guide

For further information on the Telepanel TINC, TNT and TPN software, consult:

Telepanel Utilities Guide

For further information on the integration of the Telepanel system with a particular POS controller, consult:

Telepanel ICL S18 Interface Guide
ICL Inc.
Publication Number 042-023080-010

Telepanel IBM 4680 Interface Guide
ICL Inc.
Publication Number 042-020595-010

In this installation manual, these interface guides are referred to generically as the *Telepanel POS Interface Guide*.

For further information on the integration of the Telepanel system with a particular label printer, consult the *Telepanel User's Guide*.

OVERVIEW OF TELEPANEL INSTALLATION

2.1 SYSTEM OVERVIEW

The Telepanel Price and Information Network is comprised of four main elements. These are:

- **Network Controller:**
 - The store's scanning computer (RS/6000 for AIX systems, Pentium™ for DOS systems)
 - TX 3021 Programmer
 - 2.4 GHz RF Access Point
 - Bar Code Reader (optional)
 - Report Printer (optional)
 - Label Printer (optional)
- TX 3030 Transceiver Units
- System Network of Transceiver Antennas and RF Serial Clients
- Display Modules (Electronic Shelf Labels)

2.1.1 Network Controller

The Network Controller obtains price information from the scanner controller, stores that information in a database, transmits the price information to the Display Modules, initiates paper label printing, and generates status reports. The Network Controller is a computer system running the Telepanel Network Software and a Telepanel TX 3021 Programmer. An Ethernet connection is required between this computer and the RF access point. An optional report printer prints reports; and/or prints paper labels. At times, test equipment or monitoring equipment may be added to this configuration for the purpose of troubleshooting or installation.

The Programmer initializes or troubleshoots Display Modules at the Network Controller. It also allows for up to three serial devices to be connected to the Network Controller. The Programmer's antenna is internal therefore the Display Module must be placed on top of the unit to communicate with it.

2.1.2 TX 3030 Transceiver

The Transceiver acts as an RF or wireless modem, converting data from the Network Controller to radio signals which can be transmitted via the Antenna Network to the Display Modules. Similarly, the Transceiver converts radio signals received from the Display Modules through the Antenna Network to data that can be processed by the Network Controller. Price changes are communicated to the Display Modules, which then reply to the Transceiver with an acknowledgement.

The Transceiver also acts as a programmable antenna tuner, matching its output circuits to individual antennas. The Telepanel Module communicates using a single 131 kHz modulated carrier. The carrier is phase modulated for the uplink and amplitude modulated for the downlink. When communication with a particular module is initiated, the loop antenna around the aisle where the module resides is activated. A typical single transmission to a module requires approximately 65 milliseconds.

2.1.3 System Network

The Telepanel software controls each Electronic Shelf Label (ESL) through a series of two-way communication links. The Store Processor is connected via an Ethernet cable to an Access Point. The Access Point communicates with the each RF Serial Client via an *open standard* 2.4 GHz, spread-spectrum wireless link. The RF Serial Client relays messages to the Transceiver through a serial (RS-232) cable. The Transceiver communicates to ESLs using a patented low-frequency wireless protocol. The Antenna Network consists of a series of loops of stranded, single conductor copper wire located around each aisle gondola, cooler and freezer. The antenna loop is electromagnetically coupled over several feet to an antenna inside the ESL. Data and acknowledgements from the ESL follow a reverse path back to the store processor.

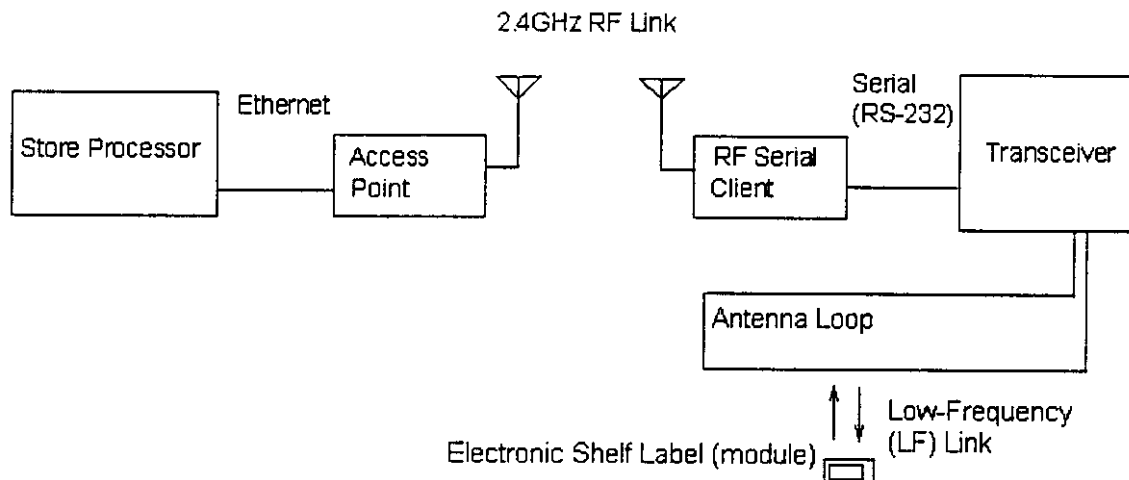


Figure 2.1

2.1.4 Display Modules (Electronic Shelf Labels)

The Display Modules form the consumer interface to the system. Each module contains a liquid crystal display capable of displaying a wide variety of product information. Two or three buttons are provided to allow the customer to query the module and are fully programmable. For example, pressing the middle button may cause the module to display the unit price. Generally the label prompts the consumer to press a particular button for the related information.

The LCD display is controlled by a four-bit microprocessor and communicates with the Transceiver through a custom communications chip. Each module contains a coil tuned for 131 kHz. The coil facilitates communications through the antenna closest to the module. In the event of a power failure involving the Network Controller or the Transceiver, the modules will continue to display product information, since they are equipped with replaceable batteries.

If requested, a module will transmit stored data back to the Transceiver for transmission verification. Each module is programmed with a unique ID code.

In a typical store, the Network Controller communicates to the Display Modules once or twice a day. The rest of the time, the Transceiver is idle. Display Modules use more power to communicate than to simply display information. Therefore, to conserve battery life, each module periodically listens for the 131 kHz carrier and returns to a low power condition if the carrier is not detected.

2.2 TEAM CONCEPT

It is recommended that a project team be formed to install a Telepanel system. The success of an installation depends upon each team member completing his/her assigned tasks on schedule.

2.3 PROJECT PLAN

Every Telepanel installation follows roughly the same working plan (see Figure 2-2). As soon as the installation is confirmed, project team members should meet to establish communications and review their respective tasks.

The project can be divided into two distinct stages. In the first stage, there are several concurrent activities:

- Network design, installation, and test (Chapters 3 and 5)
- Module and label procurement (Section 4.2)
- Software specification / development
- Store start-up planning (Sections 4.4 and 4.5)

These activities culminate in system integration, in which the separate elements are combined into a working system. The system is ready for normal operations, but no modules have been installed. If necessary, the installation can be held dormant at this point.

The second stage of installation is the store start-up. This begins with the training of store personnel in system operation of the system and culminates in full module installation.

2.4 GROUP REQUIREMENTS

2.4.1 Team (TEAM)

The project team consists of the customer's representatives assisted by a Project Manager, and Customer Support.

2.4.2 Customer (CUST)

The customer's project team should consist of representatives from data processing, store operations, facility engineering, merchandising, and store systems. This group will deal with the following major tasks:

- Review and Approve a Full Store Specification (Section 3.4)
- Obtain and Approve Electrical Contracting Quote (Section 4.1.1)
- Prepare Site (Section 4.1.5)
- Prepare and Approve Module Installation Plan (Section 4.2.1)
- Order Labels (Section 4.2.5)
- Customize Guide to Operations (Section 4.4)
- Prepare the initial TP import file
- Install Modules (Chapter 7)

- Implement Telepanel Operations and Procedures (Chapter 8)
- Educate Consumers (Section 8.1)

2.4.3 Customer Support (CS)

Customer support is responsible for the communications network. The CS deals with the following tasks:

- Inspect Store (Section 3.2)
- Develop a Full Store Specification (Section 3.3)
- Verify Standard Store System Order (Section 4.1.2)
- Determine Additional System Components Required (Section 4.1.3)
- Install Network (Chapter 5)
- Install and Test PC Hardware (Section 6.1)

2.4.4 Project Manager (PM)

The project manager assists the customer in implementing the Telepanel system. The PM is involved in the following tasks:

- Prepare Modules and Labels (Section 4.2)
- Order / Receive Modules (Section 4.2.3)
- Install, Configure, and Test Software (Section 6.2)
- Load TP Database with Host Data (Section 6.3)
- Train Store Personnel (Chapter 8)

2.4.5 Electrical Contractor (CONT)

The electrical contractor performs the antenna wiring and antenna switch installation (Chapter 5). The customer is responsible for retaining the services of an electrical contractor. The contractor can be either an independent firm or part of an in house facility management department.

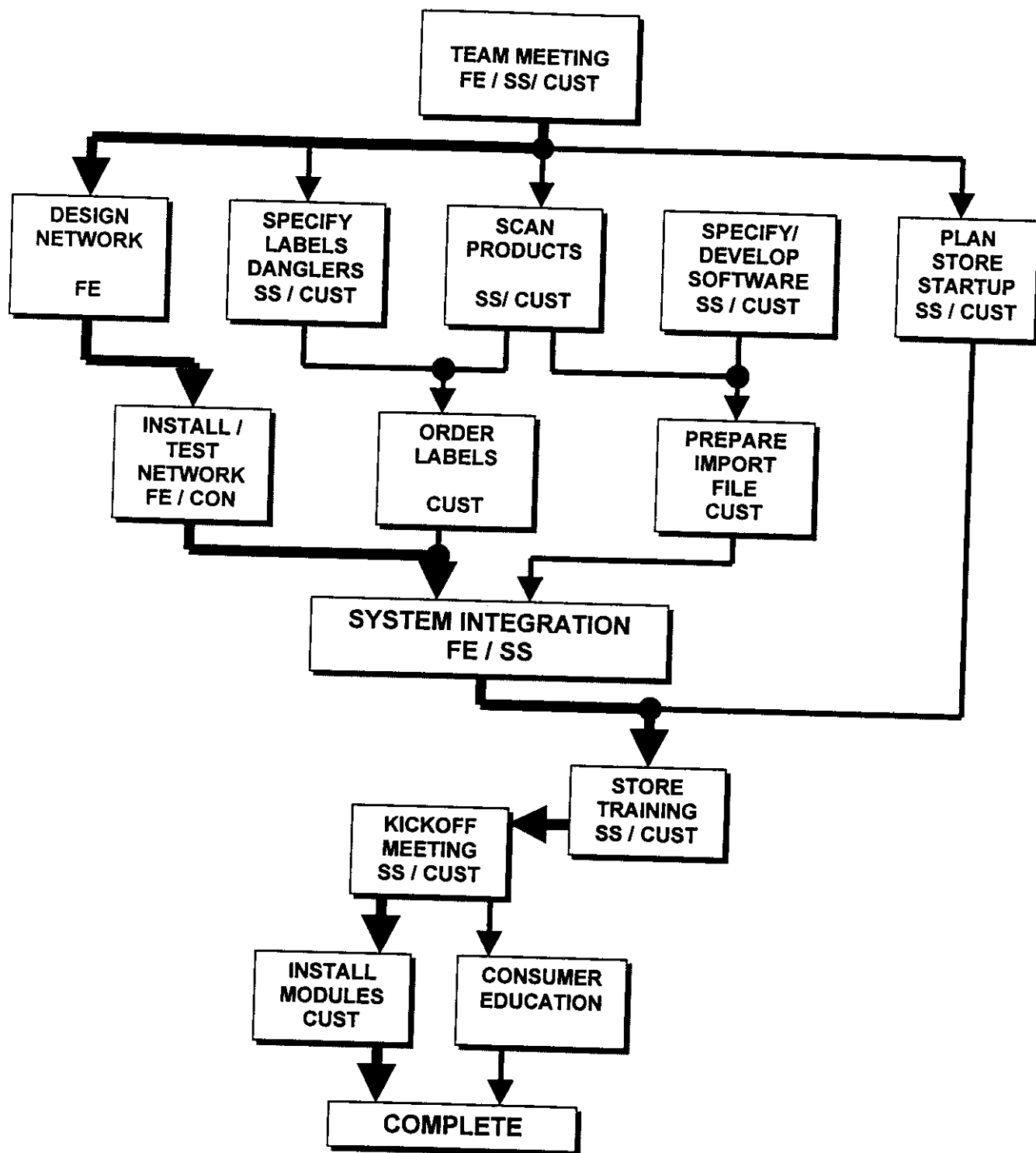


Figure 2-2 Project Plan

3.1 ESTABLISHING STORE RELATIONSHIPS (PM)

Prior to the site visit, the PM should:

- Introduce the store manager and key store personnel to the Telepanel system and the installation process. The store inspection and ensuing network installation may have an impact upon normal store operations. Therefore, the cooperation of the store manager and key store personnel is essential. Assure the store manager that the project team will minimize disruptions to daily routine and solicit his/her support and advice in arranging any activity that may impact store operations.
- Introduce the members of the project team and explain the role that each plays in the installation.

3.2 STORE INSPECTION (CS)

The objective of the store inspection is to generate a full store specification for the Telepanel system.

3.2.1 Prerequisites

The following prerequisites must be arranged prior to the store inspection:

Store Blueprints	Available from the store's facility engineering department. Several working copies should be made.
Sample Modules	A set of working sample modules equipped with all the available shelf clip types.
Standard CS Toolkit	

3.2.2 Comparing Blueprints with Actual Store

Compare store blueprints to the actual store layout. While many of the construction details are not likely to have changed, the placement of fixtures within the store may have. In particular, verify the placement of gondolas, freezers and coolers.

3.2.3 Gondola Molding / Extrusion Types (PM)

Determine the type of tag-rail extrusion on each gondola, freezer, and cooler. If the mounting clip with or without an angle bracket does not fit on a given extrusion, then a sample of that extrusion must be obtained and sent to Telepanel.

3.2.4 Ceiling Type and Height

Note the type of ceiling on the blueprint. Determine the height of the ceiling and the height of the gondolas. In some cases, this is included in the store blueprints. In many cases, it must be estimated as closely as possible during the site inspection. This information will help determine where to mount the RF Access Point.

3.2.5 Freezer / Cooler Types And Locations

The freezer and cooler units in a store can be classified into the following categories:

- Closed door upright freezers
- Open upright freezers
- Open upright coolers
- Coffin freezers

Note their type, length, and location.

3.2.6 Determining Conduit Locations / Store Wiring Scheme

If wiring is to use the under-floor refrigeration conduits, note their locations.

3.3 DRAW AND LABEL NETWORK PLAN

The network plan, showing the location of the PC, transceivers and antennas, will be used by the electrical contractors when wiring the store and by customer service when troubleshooting the installation.

Generate the network plan using one of the blueprints obtained prior to the site visit. Do not work with the original prints, use one of the working copies.

Represent each RF Serial Client and Transceiver by a small 1/4" square. Mark a "T" inside the Transceiver boxes and the network address near the RF Serial Client boxes. Assigning a network address for the Serial Client is discussed in Appendix "E".

3.3.1 Determining PC and Transceiver Locations

Locate the Telepanel PC, if it is a separate unit, nearby the store's POS scanner controller. Location may be dictated by the Telepanel interface required. A table of 6 feet in length and 2.5 feet in width should be provided. The Telepanel system needs at least four power outlets. The Telepanel system is typically connected to the isolated power outlets supplying other store PC's.

One way to power the Transceiver and RF Serial Client is by using the local AC line. Gondolas and freezer cases may already have nearby AC power receptacles. Telepanel recommends using a 12 VDC, 3A switching power supply specified for the local AC line and plug type. When ordering the RF Serial Client, make sure the adapter included meets local power requirements.

Each Transceiver draws 0.3 Amps at 12 Volts DC during idle mode and 1.2 Amps during communications. Only one Transceiver communicates at any given time. The RF Serial Client uses a different voltage and current rating as specified by the manufacturer. These low-voltage power plugs may be similar, so they should be

labeled at the connector. This information must be taken into consideration if wiring a low-voltage power network to the gondola.

A grounding wire must be connected between the Transceiver chassis and earth ground. This wire is usually connected with a screw to a nearby duplex receptacle. The location of the grounding point (and available power) will have an impact on where to install the Transceiver along the gondola. This location should be clearly marked on the Network Plan.

3.3.2 Antenna Configurations For Aisles / Freezers / Coolers

A Telepanel antenna is essentially a large loop of wire rectangular in shape, which is mounted on or in the vicinity of the tag-rails serviced by the system. This loop can be situated in a vertical or a horizontal plane, depending upon the type of application. The antenna wire shall not be installed within one inch of where a Single-Frequency module may be secured. This specification ensures that excessive signal does not overload the module.

Aisle Antennas

An aisle antenna is wired with a *Gondola Wrap*. This is a rectangular shaped antenna shown in Figure 3.1. It starts at the top front corner, runs along the top of the gondola to the opposite (back) end. From this location, the wire drops down to one inch above the bottom shelf. The antenna wire is then routed horizontally towards the front of the gondola, as shown by note 'A'. The wire completes its loop by being routed from the bottom-front corner to the top-front corner. The wire is secured with screw mounted cable ties every four feet along this path. The start/finish location of the antenna loop may vary, depending on the location of the Transceiver, as specified in the network plan (Section 3.3.1).

Installing the bottom run of antenna involves a method known as *tunneling*. Every four feet, product is removed from the bottom shelf, so that the wire can be fished through (tunneled). The wire is secured to the back wall, one inch above the bottom shelf. The product is re-shelved during installation to avoid interrupting store operations.

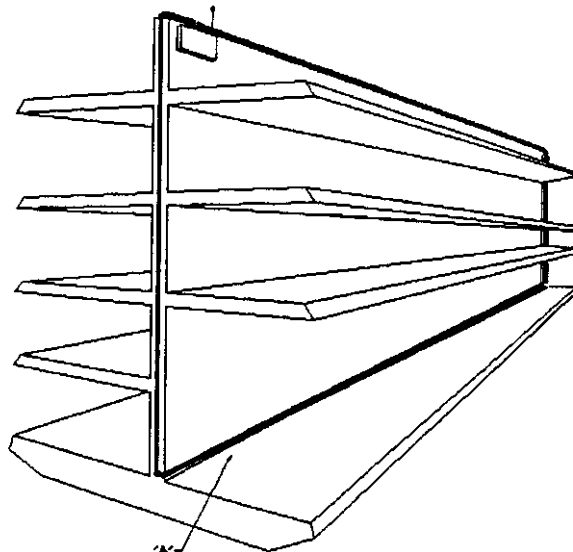


Figure 3.1

Endcap Antennas

If the *Gondola Wrap* does not provide enough signal strength at the endcap, a separate *Endcap Antenna* is recommended. The *Endcap Antenna* provides good coverage to the endcap ESLs because its antenna orientation is parallel with the ESLs. Figure 3.2 shows an *Endcap Antenna* installation. The bottom-horizontal run of wire is secured one inch above the bottom shelf. The vertical runs are secured one inch away from the end of the endcap wall to help hide the wire. The wire is secured with screw mounted cable ties every four feet along this path. Endcap Antennas may need extra inductors installed in series in order to tune. Two *Endcap Antennas* may be connected in series if the Tuning and Signal Strength Specifications are met. (See sections 3.3.3.1, 3.3.3.2)

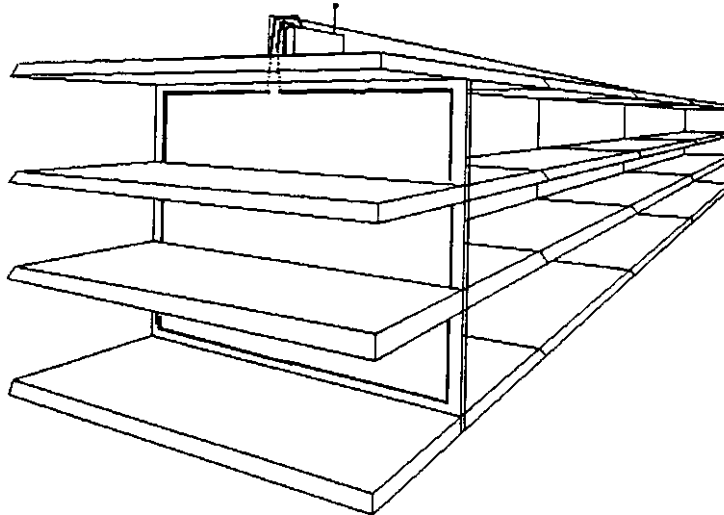


Figure 3.2

Coffin Antenna

Dairy and frozen coffins have a horizontal loop of wire installed around the inside circumference of the case. Figure 3.3 shows a *Coffin Antenna*. The wire is installed at least one inch from any tag-rail, and secured with cable-ties every two feet. The wire must not be attached to any shelves or removable gratings, as this would complicate periodic refrigeration maintenance.

The ends of the antenna wire are hidden and fished under the coffin. The coffin case may need holes drilled or be temporarily opened to do this. The antenna ends are connected with crimp connectors to a trunk cable. This trunk cable is fished through the refrigeration conduit to a nearby Transceiver, usually installed on top of a freezer.

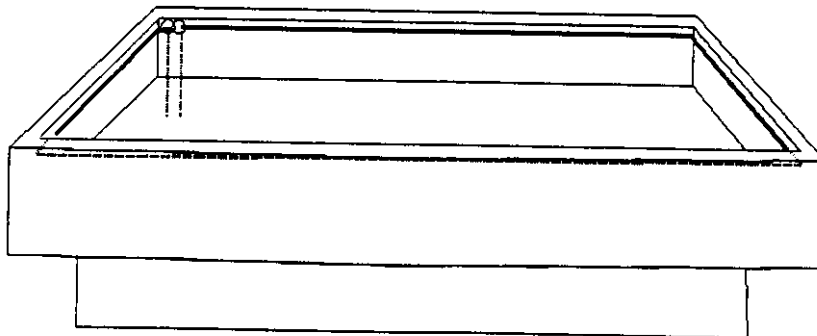


Figure 3.3

Freezer Antenna

A *Freezer Antenna* consists of one rectangular antenna loop installed inside the freezer, close to the freezer door. Figure 3.4 shows a *Freezer Antenna* with a Transceiver installed on top. The doors have been removed from the drawing to show the antenna wires.

Access to the interior of the case may be obtained by drilling a hole through the top of the unit, passing any necessary wiring through and plugging the hole with insulation upon completion of the work. Care must be taken to avoid drilling through any existing piping or electrical wires.

The freezer wire may be installed behind fluorescent bulbs in order to place the wire away from the door. Avoid attaching the wire to removable gratings, as this would complicate refrigeration maintenance.

The vertical runs of wire may be covered with nylon-molded channels to hide and protect the wires. These channels are adhered to the side walls along the vertical runs. For the horizontal runs, screw-mounted cable-ties are used every two feet to secure the wire.

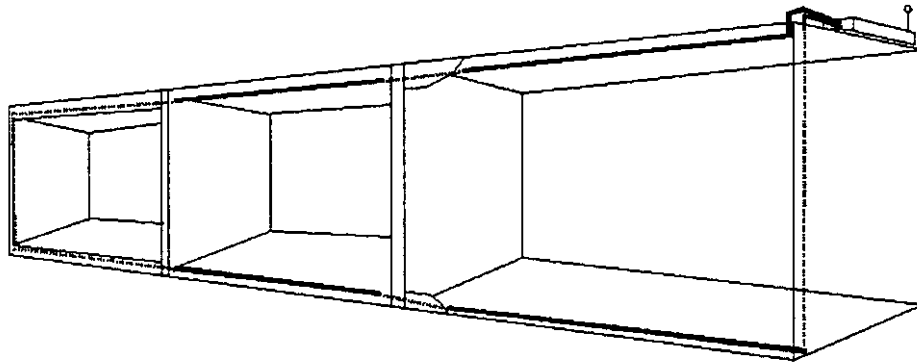


Figure 3.4

Reach-In Freezers and Coolers

Reach-in freezers and coolers are serviced by an antenna loop, as shown in Figure 3.5. The top front fascia has been removed from the drawing to illustrate the path of the antenna wire. A Transceiver is shown on top of the case.

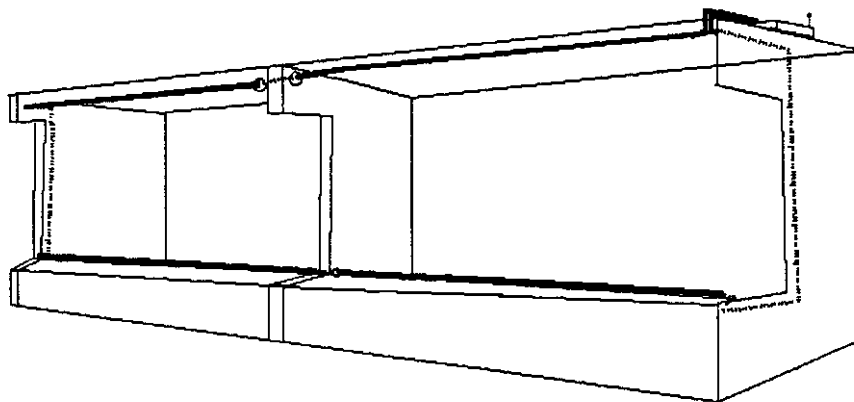


Figure 3.5

Access to the interior of the case may be obtained by drilling a hole through the top of the unit, passing any necessary wiring through and plugging the hole with insulation upon completion of the work. Care must be taken to avoid drilling through any existing piping or electrical wires.

To hide the vertical runs of wire, nylon-molded channels are used, as described for *Freezer Antennas*. The antenna wire should be installed inside the case, within three inches of the inner front wall. The top portion may be hidden behind fluorescent light bulbs, if present. The bottom portion may be secured along the inside wall, close to the cold air vents. Avoid attaching the wire to removable gratings, as this would complicate refrigeration maintenance.

Freezer and Cooler Sections

Freezer and cooler cases are often divided into sections separated by metal walls. Each of these sections would require a separate antenna loop. One Transceiver may service up to four antenna loops. Figure 3.6 illustrates two examples of where to place the Transceiver on top of the case. A twisted pair of antenna wire is used between the Transceiver and the start of the antenna loop.

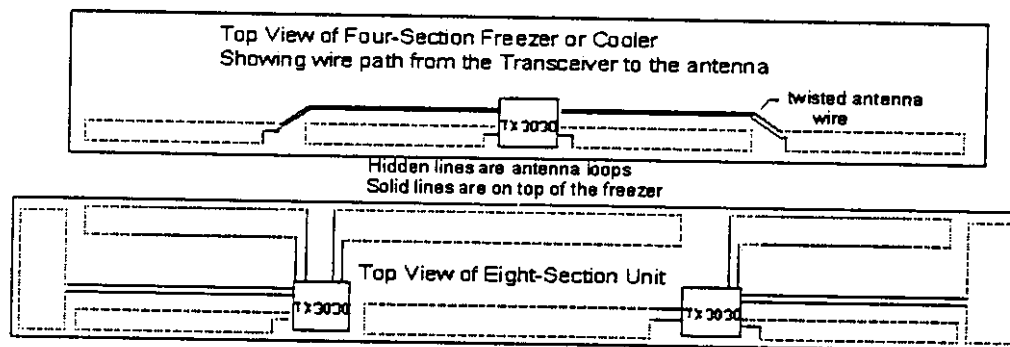


Figure 3.6

3.3.3 Antenna Tuning and Certification

Each of the antenna loops listed above must be tuned and tested to meet performance criteria. The antenna loop must be tuned so it can deliver and receive maximum signal from an ESL. The antenna signal strength must be tested to ensure adequate signal strength at all specified tag-rail locations. A detailed tuning procedure is shown in section 5.4.

3.3.3.1 Tuning Specification

The Transceiver has a built-in antenna tuner, which matches individual antennas to a tuned circuit in the Transceiver. During tuning, five capacitors in this circuit are cycled on and off and a current pulse is measured for each setting. The capacitor setting that provides the peak current flow is recorded.

The Telepanel TINC computer program is used to tune antennas. The 132kHz tune values are used to determine proper antenna tuning. An antenna wire shall be tuned such that a capacitor setting between 4 and 28 is observed and the TINC flow number is greater than 400.

If there is a capacitor setting higher than 28, then an inductor is added in series with that antenna loop to bring the tuning range into specification. This inductor is connected to the antenna wire with a crimp connector. The inductor, connection wire and crimp connector are to be extra insulated with heat-shrink tubing and neatly bundled with cable-ties. The approved inductor is shown on the parts list in Appendix A.

A capacitor setting of less than 4 indicates that the antenna loop length is too long. Telepanel recommends re-wiring this long loop as two smaller loops. These smaller antenna loops should overlap each other's area by approximately four feet. This will improve signal strength for the tag rail locations in between the two antennas.

3.3.3.2 Signal Strength Specification

At the shelf edge, the module requires a certain amount of signal from the antenna to communicate properly. It is very important to test the signal strength at module tag-rail locations. The peg-hooks, corners and ends of shelves may receive the least amount of signal. Metal cans are known to shield the antenna signal, so these locations should be examined closely.

A "*Telepanel Standard Receiver Module*" is a measurement tool used by installers and field personnel. A Fluke 123 scope-meter or similar device is connected to this *Receiver Module* with a 50 ohm BNC cable. The *Receiver Module* is secured to the tag-rail. Signal that is sent by the Transceiver may be measured at a tag-rail location. The *Receiver Module* must be placed at the same angle as mounted display modules to obtain an accurate reading. This measurement value, measured in millivolts, is called the "signal strength" for the location.

Telepanel specifies that for any tag-rail location, the *Receiver Module* should measure between 50 and 5000 mV, peak to peak at 131 kHz. If this specification cannot be met, then adjustments to the antenna wire should be made. To increase signal strength, the antenna loop can be split into two separate loops. To decrease the signal strength, the antenna wire can be installed further from the ESL.

3.3.4 Recommended System Expansion Strategy

Some stores may insist on a phased installation. The full store specification is generated, however, parts of it may be deferred to a later date. In this case it is necessary to specify how the store may be divided into workable sections and how these sections fit in to one unified plan. Installing sections of a store while other sections are in full operation may restrict the testing process to off-peak hours.

The cost of installing the network in this manner will exceed the cost of performing the entire installation at once. The recommended expansion strategy should include enough information to allow the different phases to be priced separately, as well as together.

3.4 DEVELOPING A FULL STORE SPECIFICATION (CS)

A full store specification consists of a complete wiring diagram and a detailed bill of materials including estimates of the amount of wire necessary. The full store specification should include all the information necessary for an electrical contractor to provide a detailed quote on the work to be done.

3.4.1 Wiring Diagram

The wiring diagram is generated from the network plan. If the network plan is already properly drafted on a copy of the store fixture plan, then generating the wiring diagram is simply a matter of annotating the network plan to provide wiring details for the electrical contractor. Otherwise it will be necessary to redraw the network plan.

Each run of wire on the network plan must be labeled with a number, which the electricians will use to mark the actual wire routing. Should it become necessary to troubleshoot the system, these markings will prove essential. In addition, these numbers can be used to specify the exact type of wire used in each run. A table indicating the wire number and the exact wire type should be included on the wiring diagram or in an addendum.

3.4.2 Parts List

Base the parts list on the wiring diagram. In order to facilitate an informed discussion of any system expansion strategy, the parts list should be divided into the sections proposed by that strategy.

For each section of the store, the following factors need to be determined:

- Total length of antenna wire required
- Total number of Transceivers required
- Total number of (2.4 GHz) serial client bridges required
- Type and quantity of mounting hardware required

These lengths can be measured on the wiring diagram. An allowance should be made for vertical runs of wire since the wiring diagram is two-dimensional. Once the measurements are made, add approximately ten percent to the figures to arrive at a final estimate. Recommended wire types can be found in Appendix A.

3.5 REVIEW AND APPROVE FULL STORE SPECIFICATION (TEAM)

The CS and PM must present the full store specification to the customer and electrical contractor at a meeting convened for that purpose. The customer's project leader, facility manager, and store manager should attend. The objective of the meeting is to arrive at a final store specification that the contractor will quote on. Discuss the specific calculations used for arriving at the bill of materials. Often the contractor will add 10-15% because he does not know that you already have. He may recommend changes that add or decrease costs.

In presenting the specification, the reasoning for the design decisions should be explained. The system expansion strategy should be explained along with the advantages and disadvantages of each alternative. The customer should decide the extent of the work and the timetable.

Both the customer and the contractor should be invited to comment upon the specification. Particular attention should be paid to aesthetics and contractor experience with respect to routing. This is the time to make any last minute changes.

PREINSTALLATION REQUIREMENTS

4.1 STORE SYSTEM (PM)

The standard store system must be ordered by the PM at the outset of the project. A standard store system consists of Transceivers, a Programmer, a Bar Code scanner, an RS232 / wireless network, modules and a software package. The computer must have a FAST disk, i.e. a disk with an access of no more than 40ms. An 85ms disk is unacceptable. If the printer accepts only 8 1/2" wide paper then it must be capable of accepting either the Epson or LaserJet command sets, so that Telepanel system reports, which are 132 columns wide, may be printed. To ensure smooth operation, impact printers should be equipped with a tractor feed mechanism and an output storage bin, since many reports will be printed when the system is unattended.

Note: Shipping arrangements should be made in consultation with the customer. Space limitations may dictate an alternate destination.

Once the Full Store Specification has been produced, further steps are required prior to installation.

4.1.1 Obtaining and Approving Electrical Contracting Quote (CUST)

Following the store specification review meeting (section 3.4) the contractor will provide a quote for the customer. The contractor should secure permits for regulatory requirements.

4.1.2 Verifying Standard Store System Order (CS)

The CS should verify that a standard store system was ordered at the outset of the project and obtain a projected delivery date.

4.1.3 Ordering Additional System Components (PM)

The components that are required over and above the standard store system must be ordered by the PM. This may include additional Transceivers or serial client bridges.

4.1.4 Scheduling Network Installation (CS/CUST/CONT)

CS must schedule the network installation based upon his/her availability and the availability of the electrical contractor. The customer should be consulted regarding scheduling around peak store activity periods.

4.1.5 Site Preparation (CS/CUST)

Just prior to network installation, the store should be inspected for any changes that may have taken place since the design was completed. Temporary signs or displays that will impede the installation should be removed. If the installation will take place during normal store hours, signs should be posted indicating that there is work in progress.

4.2 MODULES AND LABELS

The full store specification and recommended expansion strategy specify which gondolas, freezers and coolers will be covered by the antenna network. Modules can only be installed in areas covered by antennas.

Module and label specifications must be concurrent with network design to allow for lead times on delivery.

4.2.1 Preparation and Approval of Module Installation Plan (PM/CUST)

A plan describing the details of installing modules should be prepared by the PM and the customer. The items covered by the plan should be:

- Location of modules
- Personnel assignments for module installation
- Task assignments for all personnel
- Store operations during module installation

This plan should be reviewed and approved by everyone responsible for the installation of modules.

4.2.2 Where Modules Should Be Installed (CS/PM/CUST)

The number and location of modules must be specified. Consideration should be given to the number of price changes a section gets, how often the product set changes, and the facing width when choosing areas that will receive modules. The modules should be ordered at the same time as the basic store system. Module installation may be carried out in several stages if desired. The pace of module installation is subject to the limitations of the system and personnel availability.

4.2.3 Ordering / Receiving Modules (PM)

The modules should be ordered at the same time as the basic store system. The modules must be ordered with the correct type (or types) of clips as determined at the store inspection. Indication as to the breakdown of modules required for dry grocery, HABA, dairy and freezers must be included with the module order.

Modules can be pre-assigned by Telepanel if desired. Telepanel will put the labels on the modules and assign the modules to the database provided by the chain. Pre-assigning modules results in a faster and more efficient module installation. Contact Telepanel for current pricing and lead times involved in this service. Telepanel must receive the labels, the database and a location link file to perform pre-initialization.

4.2.4 Selecting Label Format (PM/CUST)

The PM should assist the customer to determine the best format for the Telepanel labels. Labels for Telepanel are cut to fit over the module leaving a window for the LCD display.

The labels should provide whatever information the customer finds valuable. Either the item code or the UPC number should be printed on the label to aid in the re-ordering process. The labels usually

show the item description, item code, bar coded item code, size, case pack, unit price common factor, and unit price button location. **A matte finish on the label is recommended to reduce glare.**

Labels may be produced by the Telepanel laser label printing capability or by the customer's existing supplier. Either way, label production should be automated so that all new items and changes of label information get printed in the Telepanel format. A new label should arrive in the store shortly after the new product information does. If an outside label supplier is being used, a store level procedure for ordering replacement labels must be developed.

Telepanel can provide a dangler that is custom designed to fit the display module. It consists of a plastic collar that fits over the rim of the module with a flat plastic space for a label. If required, labels for use on the Telepanel generic shelf talkers should be designed and ordered.

4.2.5 Creating Label Database and Product/Location Link (PM/CUST)

A label database must be created from which the customer will order labels. The Telepanel system requires a file linking each product to an antenna. The contents of these two files are dependent on the products that will receive Telepanel modules. They are best created concurrently. Data may be obtained by specific commodity or UPC codes, category group, or planogram.

UPC/Item Codes

Preparing a file of the specific UPC's or item codes that require labels is the most accurate method of obtaining label data. Using a portable scanner to expand the file allows the location data to be entered right at the shelf.

Typically, the item code is the easiest to scan. UPC can be used if the item code is not available or unique. The Antenna number is first specified by typing ten "9's" and then a three-digit antenna number into the scanner. Then the products to be included under the antenna are scanned.

After the data is collected, transfer it to the PC. Further information is provided in scanner documentation.

The data must then be processed into product/location link files and optionally a list for label ordering. A utility is available from Telepanel that can aid in this process.

Planogram

Ordering labels by planogram may not be possible. Different software packages may represent the store in different ways. One package represents the store as one long shelf. To use this system you must provide the beginning and ending products of the relevant aisles.

The planogram method may produce a set of labels, which includes some discontinued products, and excludes some existing products due to the lag in maintaining the planogram system. It may be possible to obtain a file of all the item codes in a section, but this file may need considerable manipulation before being used for location data.

Category Group

Ordering labels by category group requires specification of all categories that are present in the sections where modules will be installed.

In practice, there will always be missing labels using this method. Typically more labels will be produced than the store carries product for. This means either manually sorting the labels before use or assigning modules to all the labels and removing the extra modules later. Ordering by category does not yield useful location data.

Note: Telepanel requires the product/location link files for the pre-initialization process.

4.2.6 Ordering and Receiving Labels (CUST)

The installation of modules should occur as soon as possible after the labels are ordered to ensure up-to-date information. Therefore, labels should be ordered immediately following creation of the label database.

When ordering the labels, specify sort order to the supplier. The labels should be produced in aisle groups for ease of installation. If it is impossible to have labels sorted by aisle then the next best method is by category group. Sort order should also be considered if producing labels using the Telepanel laser label printing package.

When the labels are received, determine that the bar code scans properly, that they fit the module, and that the product description and code number matches what is in the Telepanel system. If the modules are being pre-initialized, send them to Telepanel, taking into account lead and delivery times.

4.3 COMPUTER HARDWARE/SOFTWARE

The computer hardware and the Telepanel system software are required for system integration.

4.3.1 Preparing for Computer Software Installation (CS/PM/TEAM)

The initial database import file must be prepared. Refer to the *Telepanel User's Guide* for further information. Appendix C specifies the database format and Appendix D specifies the import file format. When the initial database import file is ready, the Telepanel database should be loaded. Products are constantly being added and deleted from the store's item file. After the initial database load it is important to keep the Telepanel database current by setting up TP to periodically invoke its Head Office Product Updates function. Consult Chapter 7 of the *Telepanel User's Guide* for details.

4.3.2 Receiving Hardware/Software (CS/CUST)

When the equipment is received, it should be examined by the customer and the CS to make sure it meets the requirements. Any deficiencies in the shipment should be carefully noted and dealt with immediately.

4.4 STORE OPERATIONS AND PROCEDURES

4.4.1 Customizing Guide to Operations (SS/CUST)

A *Telepanel Guide to Operations* manual should be written that takes into account exactly how the chain operates. The manual should be geared for store staff that has been trained to use the Telepanel system and need a quick refresher.

A step by step procedure should be included in this manual for all tasks. This will also enable someone to use the manual to run the system even if they do not normally do so.

Appendix D contains an outline for the Guide to Operations. The tasks are arranged according to the frequency with which they are performed. The manual should be used in conjunction with the *Telepanel User's Guide*.

4.5 PREPARE AND ORDER PROMOTIONAL MATERIAL

The PM should provide sample promotional material to the customer that can be adapted to the store being installed. The chain's advertising department normally reviews this material to determine its suitability and customize it to their requirements.

Materials that have proven effective in the past include signs, bag stuffers, questionnaires and buttons. It is usually desirable to start the promotion of the installation shortly before module installation. Generating a positive consumer response early in the installation process will facilitate the introduction of the system.

NETWORK INSTALLATION

5.1 INSTALLING THE ANTENNA / TRANSCEIVER NETWORK

The antenna / Transceiver network is installed by the electrical contractor with some direction from the CS. Installation of the antenna loops was discussed in Chapter 3.

The installation should be scheduled such that one antenna of each type (i.e. gondola, cooler, freezer) be completed first to allow CS to perform testing while the other loops are being wired.

5.2 TPN ANTENNA / TRANSCEIVER DATABASE

Using the antenna network drawing, the Telepanel antenna database can be built. Once done, only major modifications to the network will require database changes. When testing with a laptop computer at the Transceiver location, antenna switch settings 01, 02, 03, 04 are all that is required.

In order to proceed with testing it is necessary to manipulate the TPN antenna database. TINC provides the means to do this using the *ants* command. Issuing the *ants* command at the ENTER prompt in TINC will result in the contents of the antenna database being displayed on the screen. To change one of the entries, use the cursor controls to move the highlighted field to the entry being changed and press return. This will cause an edit window to appear displaying the contents of the selected antenna entry. If no antennas are defined, press the [F3] ADD key and add a new antenna definition. The fields in the edit window can be changed as necessary. The result will be an entry for each physical antenna loop. For further information consult Part 2 section 3.6 of the *Telepanel Utilities Guide, Defining Antennas with TINC*.

Alternatively, the antenna maintenance function of TNT may be used to define the antenna database. For further information consult Part 1 section 2.2 of the *Telepanel Utilities Guide, Antenna Maintenance with TNT*.

5.3 Mounting the RF Serial Client and Transceiver

An RF Serial Client is a device that provides a wireless link between the Transceiver and an Access Point. The RF Serial Client has an antenna, which must be oriented vertically and positioned above the gondola or freezer case.

Mounting on a Gondola

For a gondola, the Transceiver and RF Serial Client are mounted on the back wall of the top shelf, as specified on the installation drawing. The DC power cables for the Transceiver and the RF Serial Client are routed to this location. The gondola antenna loops terminate at this location.

Figure 5.1 shows the recommended mounting method. Appendix A lists recommended mounting hardware.

Two 6-32 screws are temporarily removed from the Transceiver cover. These screws are the 2nd ones from the top, on each side (see the mounting bracket in Figure 5.1). The screws are replaced, but with angle brackets and lock washers inserted in between the screw and the cover. The angle brackets now provide mounting holes for the Transceiver. The Transceiver is screwed into the back wall using two 6-32 self-drilling metal or wood screws, depending on the wall material.

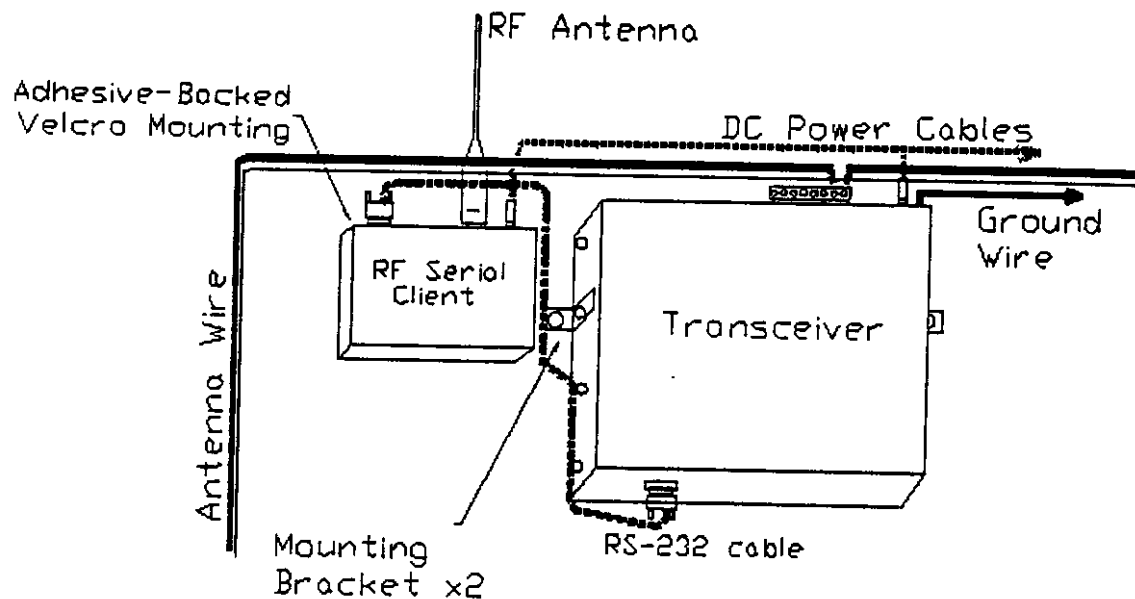


Figure 5.1

The RF Serial Client does not have any mounting holes. Two pieces of "hook-and-loop" (Velcro™) tape are used to secure it to the wall. Two pieces of "hook" tape are attached to the back of the RF Serial Client. The "loop" tape is attached to a clean, smooth surface on the wall so that it mates with the RF Serial Client's tape. Firmly press the RF Serial Client against the wall to mate the Velcro strips. Gently pull it to test for a strong hold. The RS-232 cable is screwed in the Transceiver Port 2 and the RF Serial Client DB9 connector. The cable is secured tightly to the wall with loop cable-ties, with any extra wire folded and tied neatly together. The grounding wire from the Transceiver should be routed and connected to a nearby safety ground (e.g. a duplex receptacle). The DC power cables for both devices should be connected and fastened with cable-ties close to their connectors. The DC power cables are neatly routed and secured with cable-ties to their AC power source.

Mounting on Top of a Freezer Case

The Transceiver can be rested on top of a freezer or cooler. Allow six inches of clearance between this device and any sources of heat, air vents, or electronic ballasts. The antenna wires and DC power cables should be neatly fastened to the top of the freezer case with loop cable-ties. The RF Serial Client should be secured with Velcro™ to the top of the case, or against a wall as shown in Figure 5.1. The RF antenna should be above any metal obstructions and pointed up to ensure clear transmission.

5.4 NETWORK TEST

System testing requires the use of the TPN, TINC, TNT and TP programs. The procedure in verifying the proper operation of an antenna network involves four distinct steps. First, the physical antenna data must be entered into TPN's antenna database (section 5.2). Second, the antenna must be tuned. Third, the signal strength must be measured and fourth, test modules must be installed and TP's diagnostics run.

5.4.1 Tuning Antennas

Once the antenna has been entered into the antenna map, TINC can be used to tune the antenna. To simplify testing with a laptop computer, four antennas (Ant1, Ant2, Ant3, and Ant4) may be set up with switch settings 01, 02, 03, and 04 respectively. The Transceiver contains a circuit to measure the current into an antenna. The reading obtained is not an absolute value, but is nevertheless useful in tuning the antenna. The tuning procedure is basically a trial and error process that uses the TINC program as well as store software under certain circumstances.

Set up the laptop computer near the Transceiver to tune the antennas for the first time. Problems such as misconnected wires or power faults can be solved quickly at this location. Connect the null-modem cable to Port 2 on the Transceiver.

TINC's *anti(n)* command sends the address information required to activate the selected antenna. It then sends a series of commands to the antenna tuning circuits in the Transceiver which select each one of the tuned circuits in turn, measuring the relative current returning through that tuned circuit. Since the antenna system is an electromagnetically coupled circuit, the setting that returns the highest relative current value is the optimum tuned setting. Once all of the possible tuned settings have been attempted, the program will select the optimum setting and change the antenna map accordingly.

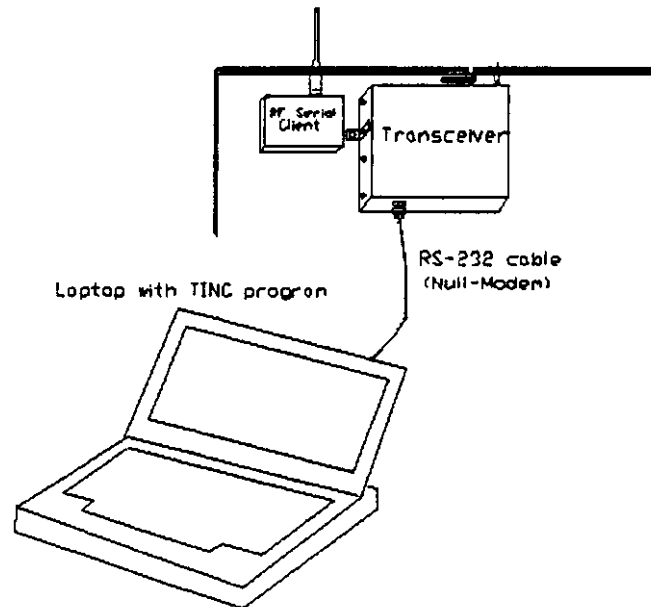


Figure 5.2

Alternatively, the TNT Quick Network Test command may be used to initialize groups of antennas. This report has one line for each antenna in the test, which shows the result of the antenna initialization ("anti"). For further information on TNT, consult Part 1 of the *Telepanel Utilities Guide*, TNT.

The flow values selected by the *anti* command must be above 400. Otherwise, the following may have occurred:

1. Open antenna loop.

Symptom: one or more negative readings, or all positive readings of 50 or less. This can be verified by a continuity check of the antenna loop with an ohmmeter.

2. Short antenna loop.

Symptom: current values are low (<400) and/or capacitor settings are high (>28). Insert a 50uH high current inductor in series with the antenna wire to bring capacitor settings to less than 28. The inductor should be crimped in series with the antenna wire and insulated carefully with shrink tubing. Use cable-ties to secure the inductor to the gondola or wire bundle.

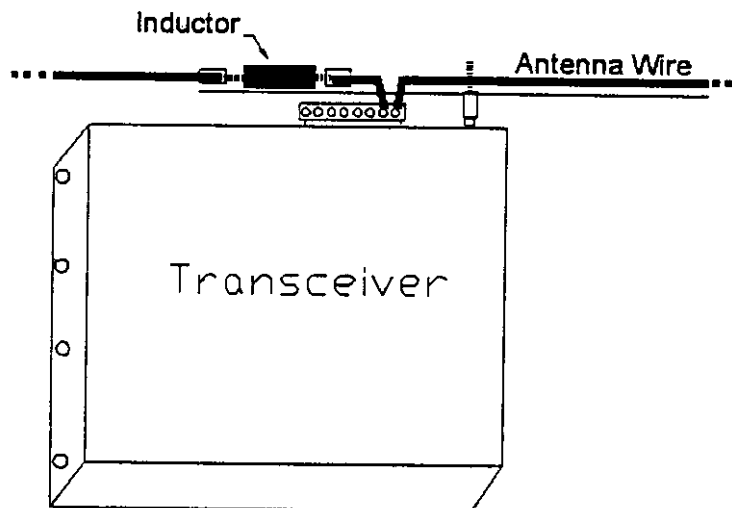


Figure 5.3

3. Long antenna loop.

Symptom: current values are low (<400) and capacitor settings are also low (<4). The length of the loop should be reduced or the loop should be split into two separate antennas.

5.4.2 Measuring Signal Strength

Measuring the signal strength of an antenna requires that the antenna be turned on for a period of time. This is done using the TINC program.

To turn on the carrier, select the antenna using the appropriate *anti* command and then type *car(300,132)*. This sends the carrier for 300 seconds. Three hundred is the maximum values in seconds that TINC will permit. Values less than 300 may be used.

Measuring the signal strength requires a Telepanel Standard Receiver Module and a portable oscilloscope. This device is a modified test module. It is equipped with shelf clips and a BNC output to connect to the oscilloscope. Once the carrier has been turned on, mount the module on the shelf, move it along the shelf and note the readings on the oscilloscope display.

Care should be taken to hold the standard module firmly against the shelf, to ensure it is at the same angle as a display module. Holding the module in one hand and the oscilloscope in the other, walk along the shelf, taking readings on all shelves every section or two. Record the readings on a communications map. Pay particular attention to the lower shelves and the ends of aisles. Freezers and coolers should be carefully checked on all shelves.

A good antenna has signal strength readings between 50 mVpp and 10 Vpp in all areas. An aisle antenna typically has signal strengths two to four times the minimum necessary for communications with modules. A marginal antenna has readings at, or slightly below these values. Such areas may be found at the extreme ends of an aisle antenna. The bottom shelves and some regions of a closed door freezer exhibit high values and in some cases, when the antenna wire is too close to the modules, the maximum value of 10 Vpp is exceeded. All efforts should be made to bring the signal strength in the (50 mVpp-10 Vpp) range. Proper antenna installation is essential to meet this requirement.

Mark any locations reading below 50 mVpp. Similarly, mark any locations reading above 10 Vpp. Antenna wire positions may need to be adjusted to either increase or decrease the signal strength, in order to meet the 50 mVpp-10 Vpp specification.

A written record should be kept of any readings found below the minimums for quality control purposes.

5.4.3 Using Test Modules

A set of test modules is preprogrammed and marked with consecutive manufacturers ID numbers starting at 1. Telepanel will include this in a field installation kit.

To test an antenna, install the test modules on the shelves in a widely spaced pattern. Ensure that modules are placed in areas of low signal strength. Place modules in each of the corners and on the center shelf.

Initialize the antenna by issuing the *anti(n)* command from TINC. The actual test procedure with TINC is described in the *Telepanel Utilities Guide*. Send a "chirp" command to each module. Compare the returned data with a valid acknowledgement, "F9A42BB0". Mark the location of the modules on the communications map. Circle the number of each successful module and place an X next to each unsuccessful one. A good antenna should have successful communication at all tag-rail locations.

5.4.4 TPN Noise Measurements

If the field strength meets the 50-5000 mVpp requirements, the antennas tune, but modules do not communicate reliably, there may be a noise problem. Whenever the Telepanel software performs an *anti* command, whether in TINC or TP, a noise measurement is made. In TINC it is reported at the bottom of the antenna window. In TP it is stored in the system log file along with the other antenna initialization information.

This measurement is significantly different from that obtained using an oscilloscope. Where an oscilloscope gives a qualitative noise measurement, the *anti* command returns a quantitative measurement of how the noise affects the system.

When an *anti* command is issued, the following sequence of events occurs:

1. All antenna switch relays are turned off
2. The switches for the selected antenna are is turned on
3. The tuning capacitor is set
4. The current flow is measured
5. Noise measurements are made using module commands.
6. The antenna capacitor setting, flow and noise figure is displayed.

These noise measurements are averaged and the result returned as the reported noise. The returned value will be a digital representation of the noise present on the antenna. The returned signal is compared with a known response and a numerical noise figure is returned. The higher the noise figure, the more closely the returned signal matches the known response. In a very quiet antenna, the returned value would be zero, meaning the noise measurement is quite low.

This type of noise measurement is useful for keeping historical records of the noise patterns in a store or for remote troubleshooting. If noise problems are intermittent then these noise measurements can be used to provide a correlation between time-of-day and noise.

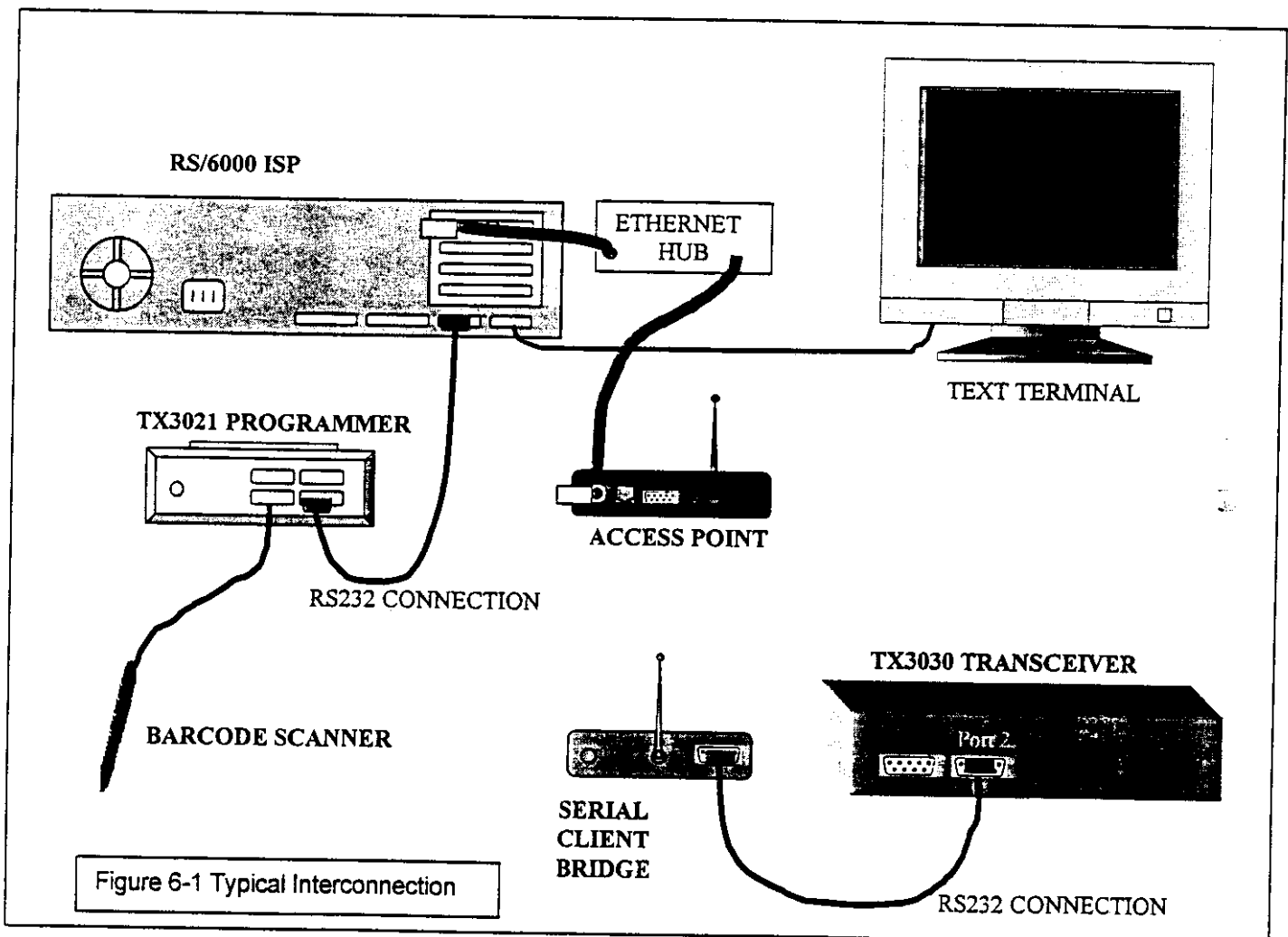
PC HARDWARE/SOFTWARE INSTALLATION

6.1 INSTALLING AND TESTING PC HARDWARE (CS)

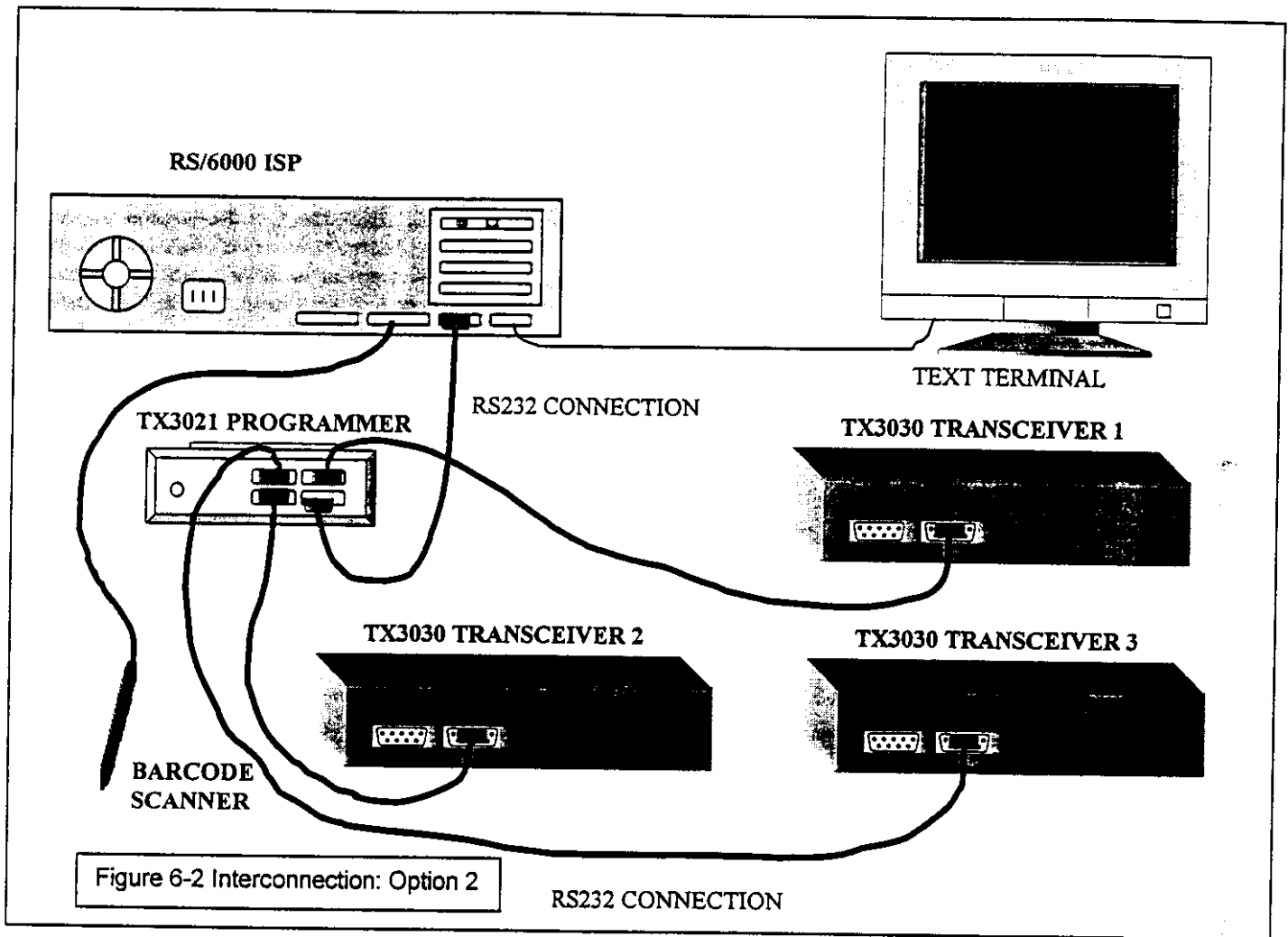
6.1.1 Store ISP Computer

The Store ISP computer is the heart of the system and runs the Telepanel software. The computer should have access to the Telepanel Price and Information Network. The Telepanel software is capable of scheduling certain time dependent operations such as price updates. Some software applications make use of the computer's resources, such as memory or interrupts, in a way that may interfere with the Telepanel software. A list of installed applications on the machine should be provided to Telepanel before installing Telepanel's software.

The computer can communicate with the rest of the network controller elements in two ways:



Option One is a communications network based on a 2.4 GHz RF link. This consists of an Access Point with an Ethernet connection to the Hub, and Serial Client Bridges directly connected to the TX3030 Transceivers (Figure 6-1).



In cases where a small number of Transceivers is required (up to three) and store conditions permit, a wired network (Option Two) can be created using the serial port multiplexing capabilities of the TX3021 Programmer (Figure 6-2).

6.1.2. Wireless 2.4GHz Link

The configuration of the RF Serial Infrastructure is detailed in Appendix F.

6.1.3 TX3021 Programmer

The Programmer requires no special setup in order to connect it to the system. Use a 9-pin F/F null-modem cable as specified in Appendix B to connect the unit's *Main Port* to the computer.

The TX3021 is provided with the capability of re-routing communications through the secondary serial ports (*Sub-Port 1, 2 and 3*) to the computer via *Main Port*. This allows for up to three devices to be connected to the system. See Appendix B for configuration of the secondary ports.

The Programmer should be located such that it is convenient to use. However, **it must be placed at least 15 inches away from any video display units.**

6.1.4 Bar Code Reader

A bar code scanner (Welch-Allyn HBD Micro 2 Plus with a DB-9 connector) is supplied with the system. While this device will not normally be required for system testing, it should be installed at the same time as the rest of the Network Controller elements.

The bar code readers are programmed through the use of bar code charts that are supplied with the unit. The unit should be programmed for 9600 baud, no parity, 8 bits, 1 stop bit and no handshaking.

6.1.5 Report Printer

Refer to the documentation supplied with the printer for installation instructions.

6.1.6 Label Printer

A label printer may be supplied with the system. Refer to the documentation supplied with the printer for installation instructions, and the *Telepanel User's Guide* for information about how to integrate the Telepanel software with a label printer.

6.3 LOADING TP DATABASE WITH HOST DATA (PM/CUST)

The host data file should be prepared in Telepanel comma separated variable import format, which is described in Appendix C and D of the *Telepanel User's Guide*. The host data file should be placed in the \TP\IMPORTS directory.

Normally an empty Telepanel database is created by the INSTALL program.

Procedure

1. Choose IMPORT from TP's *Management Menu*.
2. Select the "No Shelf Display Update" option.
3. Enter the filename of the host data file.
4. Press [ENTER].

When the import is finished the system log should be inspected for any errors. The error that is most commonly seen is duplicate UPCs. In the Telepanel system UPCs must be unique. The first occurrence of a

UPC is loaded into the database and any subsequent occurrences are rejected. If the first occurrence of the UPC was not the one that should have been loaded then manually delete it and add the correct one.

Load a small portion of the host data first. This allows the verification of the file format before the whole file is loaded. If the file format is incorrect, delete the file "**tp.db**". Create a new, empty database by starting TP with the "**-c**" option. Complete details about creating a new database can be found in the *Telepanel User's Guide*. Once a new database is created the host data can be corrected and the procedure retried.

6.4 BACKUP DATABASE (CUST)

Once the database is loaded, back it up. This may save large amounts of time during the test of the host and POS interfaces.

SYSTEM TEST AND ACCEPTANCE

7.1 INTRODUCTION

The antenna network must be completely tested before the system test and acceptance procedure is attempted. The store software, correct Telepanel POS interface, and the database must be loaded. The purpose of system test and acceptance is to verify the functionality of the completed system and to provide the customer with the means to accept the installed system.

The system test checklist found in Appendix C is a complete list of all of the TP system functions. Reference should be made to the *Telepanel User's Guide* regarding the operation of these functions. The testing should be performed in the presence of a representative of the customer who should initial the checklist on behalf of the customer.

These functions involve the interface between the Telepanel system and the POS scanner controller. When a price change is initiated, either locally or remotely, the Telepanel system must detect the change and respond.

Testing these functions requires the cooperation of store personnel in initiating a simulated price update. The least disruptive update would simply change the prices to their current price. This may not be possible with all types of POS systems. Consult the appropriate *Telepanel POS Interface Guide* for details about the particular interface being used. It may be necessary to change the prices in the TP database prior to starting these tests in order to force the system to perform a transmission.

7.2 PREPARATION OF MODULES

Before the test begins some modules should be assigned to actual products for use during the test. The modules will be removed from the products after the test, so don't put labels on them.

A sample of ten modules should be sufficient for the test. For a comprehensive test, products should be selected from a number of different antennas spread throughout the store. One module should be placed in the service area of each type of antenna. For details on assigning modules see the *Telepanel User's Guide*.

7.3 TP TRANSMISSION DIAGNOSTICS

Chapter 8 of the *Telepanel User's Guide* describes the transmission diagnostic facilities available in TP. These facilities should be used to test, verify, and demonstrate the integrity of the network.

Procedure

1. Invoke "Bed Check" on all antennas at least twice.
2. Invoke "Verify Module Contents" on all antennas at least twice.
3. Invoke "Price Change Diagnostics" on all antennas at least twice.

The transmission report produced by each of these transmissions should be examined very carefully for communications errors.

7.4 PRICE CHANGE TEST

The price change test should test all types of In-Store and Head Office price changes. This test will be slightly different depending on the type of POS system in use. It may be more convenient to test Head Office price changes in conjunction with the Host Interface test.

Change two or three products' prices in the POS controller. Invoke TP's In-Store Product Updates function. The price changes will be detected by TP and automatically transmitted to the modules.

Change the prices back to their original values. Invoke TP's In-Store Product Updates function. The prices will be automatically transmitted to the modules.

After this test, examine the system logs for errors. An error free test indicates that the POS interface successfully communicates with the POS controller.

7.5 HOST INTERFACE TEST

The host interface test demonstrates that product additions, deletes, and updates made from the head office work correctly. Depending on the POS controller this may include a test of price updates made from head office.

Create a sample host file containing all potential types of transactions and place it in the appropriate area in the POS controller. Invoke TP's Head Office Product Updates function. Details on this function can be found in the *Telepanel User's Guide*.

An error free test indicates that the system can accept file maintenance from the host system.

7.6 AFTER THE SYSTEM TEST

Remove the modules used in the test from the products they were assigned to. The system is now ready for full-scale module installation.

MODULE INSTALLATION

8.1 INTRODUCTION

Before module installation can begin the complete System Test and Acceptance procedure must be performed. The module labels must have been received and inspected, and the Telepanel database must be loaded with the correct information.

8.2 MODULE ASSIGNMENT AND MAINTENANCE (PM, CUST)

To install modules, TP's *Module Maintenance* ASSIGN function is used. In some cases modules that have been assigned cannot be put on the shelf because they refer to deleted products, products with very small facings, or product information has changed. These modules must be removed from the database so they will not appear as CM2's on the transmission reports.

If pre-initialization is used, refer to the instructions that come with the data disk to load the database and activate the modules.

During the installation process, replace modules that prove defective. If incorrect antennas are found, edit the module information.

8.2.1 Guidelines for Assigning Modules

When assigning modules, check the information in the assign window against the label. If the label and product information does not match, and the label is correct, the product information must be edited to match the label. If an incorrect label is found, discard it and order a correct label. If these steps are not followed, the unit price will not be correct.

When placing the module on the shelf ensure that the item code on the label matches the shelf tag that is being replaced. Compare the price and investigate any discrepancies. The module must not be put up until any differences are resolved.

8.2.2 Guidelines for Removing Modules

When modules are "removed" they should be set to display "OFF". This will ensure that the module cannot be accidentally placed on the shelf with a wrong price.

If a module is "removed" because it is missing and then subsequently is found, it must be reassigned to its product. Because of this, if anyone in the store finds a module in the backroom, under a shelf, etc. they should bring it to the person who looks after the Telepanel system rather than put it back on the shelf.

8.2.3 Guidelines for Replacing Modules

When modules are replaced due to damage, the damaged module should be clearly marked with the reason for replacement, the date, the store, and any other useful information.

If a module is replaced for any other reason than "Damaged" the module should be set to display "OFF" during the replacement procedure.

8.2.4 Changing Module Information

A module's antenna assignment is specific to each module and may be changed if necessary; i.e. if you change a module's antenna you will not affect any other modules assigned to the same product.

8.3 TIPS

Usually store labor is used for most of the installation. The store personnel will need to be trained in the system and in proper installation techniques.

When assigning modules, it is possible that the module could be loaded with a price yet not be assigned in the database. This occurs if the price instruction is sent and received by the module but the receive acknowledge is not heard by the PC. If this happens, the software displays an error window with the message **"Can't assign this module, unable to connect"**. Don't ignore this message! Retry the assign using the CONTINUE key. If this happens repeatedly with one module then the module is probably defective.

Incorrect module-antenna numbers will occur during almost every installation. The "hunt" option of the Bed Check diagnostic may be used to automatically adjust them (See *Telepanel User's Guide*, Chapter 8). Incorrect antenna values must be adjusted in the Telepanel database as soon as possible after they are discovered.

8.4 TESTING MODULES AFTER ASSIGNMENT

At a convenient time, usually at night after a group of modules is assigned, the *Verify Module Contents* diagnostic should be run on all antennas with new modules. This will ensure the price and product information is correct and the appropriate communications phase is set for each module.

The transmission report produced by this activity should be studied for modules with incorrect antenna number values. These can be easily corrected through TP's *Module Maintenance* facilities.

Other modules may not be found on the shelf due to various reasons. These modules should be either placed on the shelf or removed from the database. Any communications warnings that are still unexplained need to be carefully examined.

First locate the module on the shelf and visually inspect it for damage. Take note of its location, and then remove the module from the shelf and use TP's *Module Maintenance* TEST function to test the module on the Programmer. If the module tests OK, then it can be placed back on the shelf, otherwise, it should be replaced.

If a module shows up repeatedly as a communications error it should be replaced, even though it may pass the TEST function. If the replacement module fails, then the CS should check the signal strength in that area.

8.5 TROUBLESHOOTING

By following the troubleshooting procedures below, most module problems can be solved quickly.

Break down the problem into its hardware, software, module, and interface components. Determine which of these do not seem to be working correctly. Compare your observations with the documentation.

If a solution to the problem does not come to mind, call Product Support. Before calling have all the information before you and be ready to clearly explain the situation.

8.5.1 Wrong Prices

What is the correct price? Is it the ad price, the price book price, the shelf price, the POS controller's price, etc? In the Telepanel system, the *ONLY* price is the price recorded in the POS controller. TP uses the UPCs stored in its database to perform price look-ups on the POS system. If a UPC is not correct then an unexpected price will result. When a "wrong" price is reported, gather the following information:

- The product's UPC.
- The product's Item code.
- The product's current POS controller price.
- The product's current Telepanel database price.
- The date of the last price change.
- The result of the price change transmission to the module.
- The serial number of the module in the database.
- The serial number printed on the module.

Ensure the product information on the paper label matches the Telepanel module. If so, scan the product to establish the price at the check out. If the module is displaying the POS price, leave it at the shelf. If necessary, the price can be changed by updating the POS. The Telepanel "In-Store" update will then load the correct price into the module.

If the module price differs from the POS, remove the module from the shelf. Verify that it is assigned to the correct product. Correct any assignment problems and return the module to the shelf.

If the module is assigned to the correct product, verify that the UPC codes are consistent. If not, remove the module from the old UPC and assign to the new one.

If standard operating procedures are not followed, TP may not have detected a change in the POS controller's Item File. Check the system log to ensure TP has polled the POS controller.

Whenever TP is not 100% sure that a module has received the correct price, it reports the module as a potential error. These errors must be checked on the shelf. An ignored or missed report may be the source of the problem.

IMPLEMENTING TELEPANEL OPERATIONS AND PROCEDURES

9.1 TRAIN PERSONNEL TO USE TELEPANEL

There are three groups of people that should be trained on the Telepanel system. They are:

- Systems Support
- Store Operating Staff
 - Personnel who will operate the Telepanel System
 - Managerial and Supervisory Personnel
 - Backups for operating personnel
- Regular Store Staff

One or more persons in the customer systems support group must be given an in-depth understanding of the system and how to troubleshoot problems.

Any store staff who will operate the system, and store management must be given an in-depth understanding of the system. This includes a clear picture of what will be done each day. Emphasis should be placed on the procedures associated with price changes.

Other store staff should be given an overview of the system and its associated benefits. System operations, as it affects them, should be discussed. For example, solutions for what to do if they find a module on the floor, or if a customer says the price is wrong, should be made clear.

A draft copy of the store operations manual should be given to the systems operators before training starts. Training should start after the system has been tested and before modules are installed. The operations manual should be modified to account for any changes suggested during the training.

9.1.1 Sample Outline for Operator Familiarization

Introduction

- The Telepanel Price and Information Network
- System overview
 - Components
 - Data Requirements
 - What the System does
- Course Outline
 - Hardware
 - Software
 - Operations
 - Trouble Shooting

Hardware

- Computer
- Programmer
- Transceiver
- Peripherals
 - Bar-code Scanner
 - Wireless RF Serial Client
 - Interface to POS
 - Interface to Host
 - Report printer
 - Label printer
- Antennas
 - Layout
 - Numbering Scheme
- Other Accessories
 - Removal Tools
 - Module Clips
 - Cleaning Modules

Software

- Database structure
 - Identifying the Product
 - Identifying the Price
 - Identifying the Module
- System functions
 - Installing
 - Updating
 - Querying
 - Adding
 - Deleting
 - Replacing
- System Reports
 - Product Updates
 - Transmission
 - Module Data
- POS interface
- Host Interface

Operations

Daily tasks

- POS Maintenance
- Host Maintenance
- Visual Inspection
- Adds and Deletes
- Specials
 - Marking
 - Deleting
 - Changing Regular Price
- Transaction Log Backup
- Database Backup
- Printing Labels

Weekly tasks

- Label Reordering (if not printing labels with TP)
- Backups
- Facing Information (optional)
- Problem Solving
- Complete System Backup

Logging Results

- Daily Journal
- Keeping Reports
- Daily Checklist
- Distributing the Results

Initial Installation

Data Requirements

- POS
- Host

Labels

- Design
- Initial Set
- Maintenance
- Problems

Operations

- What is needed

Module Installation

- Installation Options
 - Pre - Initialized
 - Initialized at store
- Labour requirements
- Who should be involved

Problems

Trouble Shooting

- What system problems can occur
- What Module problems can occur

9.1.2 Sample Outline for Store Staff Familiarization

Introduction

The Telepanel Price And Information Network

What the System does

Picks up POS price and automatically puts it on shelf edge

Can display management information

Displays sale information

What the system is

Radio controlled price display

Antenna

Other Components

Benefits

Chain

Price management

Marketing information

Shelf management

Store

Shelf management

Price management

Consumer

Greater accuracy

Easy to read

Day to Day Operations

What Happens

Price Changes

Discontinued Products

New Products

Modules

What functions

Facings

Specials

Unit Price

How to attach

What to do if module is...

On the floor

Dirty

Broken

Antennae

Where they are

What not to do

Questions

INSTALLATION PARTS LIST

A.1 TELEPANEL PRODUCTS

Model No.	Part	Typical Quantity
TX 3030	Transceiver	20+
TX 3021	Programmer	1
Varies	Display Modules	5000 – 20,000
TBD	Telepanel System Disk	1
TBD	Telepanel Utilities Disk	1
TBD	Telepanel Controller Interface Disk *	1
TBD	Telepanel User's Guide	1
TBD	Telepanel Utilities Guide	1
TBD	Telepanel Installation Manual	1
TBD	Telepanel POS Interface Guide **	1

Notes

- * There is a different interface disk for every POS controller.
 ** There is a different interface guide for every POS controller.

A.2 OEM PRODUCTS

Model No.	Part	Typical Quantity
TR9CE3000LCP-A	Giobtek 12V, 3A Power Supply	One per Transceiver
AA-091ABN or STA-4110	OEM 9V ~, 1A, AC Adaptor (Europe) STANCOR 10VAC, 0.7A, AC Adaptor (North America)	One per Programmer One per Programmer
SB-2401-5AZL-01(USA/Can)*	Symbol Spectrum24™ Serial Client Bridge	One per Transceiver
AP-2411-5AZL-01(USA/Can)*	Symbol Spectrum24™ Access Point	One per store
ML-2499-HPA1-00*	Symbol Spectrum24™ High- Performance Antenna	One per store

* The exact part number may depend upon the country of installation and ongoing product revisions. Consult Telepanel before ordering.

A.3 ANTENNA INSTALLATION MATERIALS

	Typical Quantity
Antenna Wire	2000 - 5000 ft.
12 AWG single conductor stranded wire	
PVC insulation with nylon jacket, white	
e.g. Type THHN, TFFN, TEW	

Antenna Trunk Cable	100-300 ft.
12 AWG 2 conductor PVC insulated, protected by interlocking galvanized steel or aluminum armor e.g. BX122	

Typical Quantity

Antenna Inductor	As required
50uH, high current choke, wrapped in a protective vinyl shrink sleeve, UL 94V-0 flammability rating, 1 Amp minimum e.g. Hammond, 1537J	

Wire Routing Devices and Tools	As Required
--------------------------------	-------------

For Example:

- Panduit PLT 2S CABLE TIE 48mm x 4.8mm 50 lbs.
- Panduit PLT 1M CABLE TIE 99mm x 2.3mm 18 lbs.
- Panduit SSC 2S CLAMP TIE 188mm x 4.6mm 50 lbs.
- Panduit ABMM-A ADHESIVE MOUNT 20mm x 20mm
- Panduit ABM 2S-A ADHESIVE MOUNT 25mm x 25mm
- Panduit PM2H25 PUSH IN MOUNT 6.4mm
- Panduit D-250A NON INSULATED DISCONNECT ADAPTER
- Panduit BSN14 INSULATED BUTT SPLICES
- Panduit BSN10 INSULATED BUTT SPLICES
- Panduit JN418-212 NYLON INSULATED WIRE JOINT 12-18 AWG
- Panduit JN218-216 NYLON INSULATED WIRE JOINT 16-22 AWG
- Panduit T25R SPIRAL WRAPPING, FLAME RETARDANT
- Panduit CT-160 PLIER TYPE CRIMPING TOOL
- Panduit CT-550 CONTROLLED CYCLE CRIMPING TOOL

Mounting Hardware

Right-Angle-Brackets, SPAE-NAUR 073-010T, ½" x 9/16", hole for 6-32 screw	2 per Transceiver
Metal Self-Drilling Screws, #6, 1", Philips pan head, carbon steel	2 per Transceiver
External Tooth Lock washer, for #6 screw, SPAE NAUR 43-SN.	2 per Transceiver
Hook and Loop (Velcro) fasteners, 3M Scotchmate brand, P/N SJ352658-0-ND (hook), SJ352758-0-ND (loop), 45m roll, adhesive backed	As required
Hooked tape is fastened to the RF Serial Client. Looped tape affixed to the wall.	

Field Test Kit / CS Toolkit

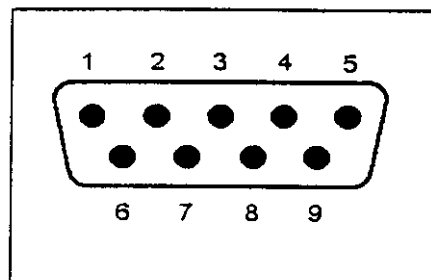
Telepanel Standard Receiver Module	1
Telepanel test modules (ID#'s 1,2,3... 10)	10
BNC cable, M-M, 50-ohm impedance, RG58/U coax, 4 ft.	1
Fluke 123 Scopemeter (or equivalent)	1
Laptop PC with TINC installed and one free serial port	1
Slot-head screwdriver with a 2.5mm x 0.5mm head	1
Philips #2 screwdriver	1
Null-Modem Serial Cable, DB9F/F, shielded, 6ft or longer	1

CONNECTIONS

B.1 TRANSCEIVER SERIAL CONNECTOR (PORT 2)

The connector is a 9 pin male, RS232 DB9M connector.

1	Not connected
2	Receive data
3	Transmitted data
4	Not connected
5	Signal ground
6	Not connected
7	(RTS) Not used
8	(CTS) Not used
9	Not connected

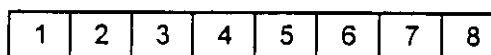


Note: Typical serial connection with a PC requires a 9 pin, female-female, null modem cable, shielded type.

B.2 TRANSCEIVER ANTENNA CONNECTOR



1,2	Antenna 01
3,4	Antenna 02
5,6	Antenna 03
7,8	Antenna 04



Warning: Risk of electric hazard when the unit is operating in transmit mode. Refer to the safety information page at the beginning of this manual.

B.3 TRANSCEIVER POWER CONNECTOR



Center Pin: +12 V  (DC), 3A Max
Outer Pin: Return

Warning: Use only Telepanel approved external power supply units: 12 V  (DC), 3A min

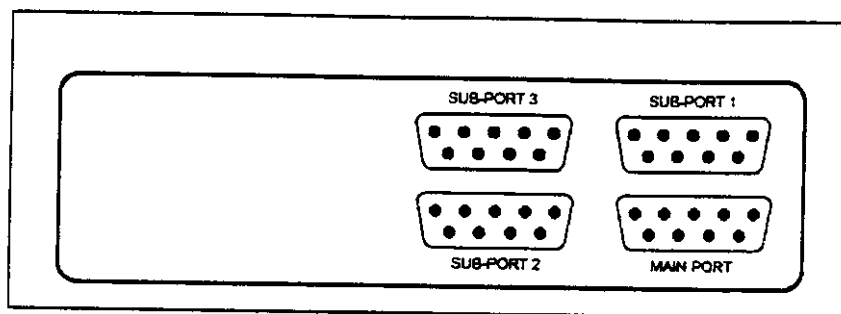
B.4 TRANSCEIVER GROUND WIRE



Connected between chassis screw and safety ground from an AC receptacle.

Warning: The connection to ground must be made before the power is applied to the transceiver. Refer to the safety information page at the beginning of this manual.

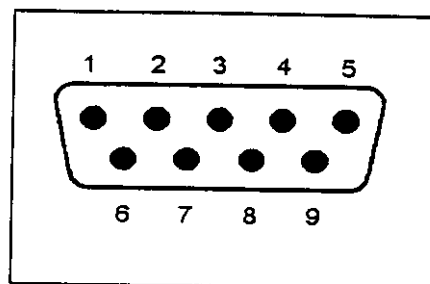
B.5 PROGRAMMER SERIAL CONNECTORS



B.6 PROGRAMMER CONNECTORS PINOUT

All four serial connectors are 9 pin male, RS232 standard.

- 1 Not connected
- 2 Receive data
- 3 Transmitted data
- 4 Not connected
- 5 Signal ground
- 6 Not connected
- 7 (RTS) Not used
- 8 (CTS) Not used
- 9 Not connected



Note: Typical serial connection with a PC requires a 9 pin, female-female, null modem cable.

B.7 PROGRAMMER POWER CONNECTOR



Center Pin, Outer Pin: 9-10 V $\sim$ (AC), 0.5 A Max, no polarity

Warning: Use only Telepanel approved external power supply units: 9-10 V $\sim$ (AC), 0.5A min

Appendix C

CHECKLISTS

C.1 SITE INSPECTION CHECKLIST

Initials	Task	Completed
___	1. Obtain copies of the store blueprints.	___
___	2. Make working copies of the store blueprints	___
___	3. Obtain sample modules with all available mounts.	___
___	4. Compare blueprints with store layout and revise them.	___
___	5. Determine which module mounting is required in each section of the store.	___
___	6. Obtain extrusion samples where no existing mounting fits.	___
___	7. Measure the ceiling and gondola heights and mark on the blueprint	___
___	8. Determine the ceiling type and mark on the blueprints.	___
___	9. Identify the freezer and cooler types on the blueprints.	___
___	10. Identify wiring and refrigeration conduit locations on the blueprints.	___
___	11. Identify dry good aisle groupings that can be serviced by a single Transceiver.	___
___	12. Determine the location of the Telepanel computer and mark on the blueprint.	___
___	13. Determine the Transceiver locations and mark on the blueprint.	___
___	14. Determine the antenna configurations for the aisles and mark each aisle on the blueprint.	___
___	15. Determine the antenna configuration for the freezers and coolers. Mark each one on the blueprint.	___
___	16. Determine the location of the power lines and mark on the blueprint.	___
___	17. Complete the network plan on the blueprint.	___
___	18. Determine a system expansion strategy.	___
___	19. Generate a complete wiring diagram from the network plan.	___

- _____ 20. Generate a parts list from the wiring diagram.
- _____ 21. Review and approve the full store specification.

C.2 PREINSTALLATION CHECKLIST

Initials	Task	Completed
_____	1. Obtain and approve electrical contracting quote.	_____
_____	2. Order system components (standard & additional).	_____
_____	3. Order modules.	_____
_____	4. Select label format.	_____
_____	5. Schedule network installation.	_____
_____	6. Prepare site for network installation.	_____
_____	7. Prepare and approve module installation plan.	_____
_____	8. Create a product / location import file. If pre-initializing modules send file to Telepanel.	_____
_____	9. If pre-initializing modules, send Product and Antenna database to Telepanel.	_____
_____	10. Order and receive labels. If modules are to be pre - initialized, send labels to Telepanel.	_____
_____	11. Prepare and approve a hardware/software installation plan.	_____
_____	12. Order and receive hardware.	_____
_____	13. Order and receive software.	_____
_____	14. Customize Guide to Operations.	_____
_____	15. Prepare consumer introduction to the system.	_____
_____	16. Order promotional materials.	_____
_____	17. Receive hardware/software/ modules from Telepanel. Pre-initialized modules will be supplied labeled, and with a data disk.	_____

C.3 NETWORK INSTALLATION CHECKLIST

Initials	Task	Completed
_____	1. Install antenna network wiring.	_____
_____	2. Install the computer hardware.	_____
_____	3. Install the TP software.	_____
_____	4. Build the TPN antenna database.	_____
_____	5. Check the ground connections for the Transceivers.	_____
_____	6. Install the Transceivers.	_____
_____	7. Install and test the wireless network.	_____
_____	8. Tune antennas.	_____
_____	9. Measure and map the signal strength on the antennas.	_____
_____	10. Test the antennas with display modules.	_____

C.4 SYSTEM TEST CHECKLIST

Initials	Function	Completed
	1. System Maintenance	
_____	1.1 Module Maintenance	_____
_____	1.2 Product Maintenance	_____
_____	1.3 Custom Reports	_____
_____	1.4 Label Batches	_____
_____	1.5 Database Stats	_____
_____	1.6 Backup	_____
_____	1.7 Archive Logs	_____
	2. Reports	
_____	2.1 Logs	_____
_____	2.2 Product Updates	_____
_____	2.3 Diagnostics	_____
_____	2.4 Module Data	_____
_____	2.5 Custom	_____
_____	2.6 All	_____
	3. Management	
_____	3.1 Schedule	_____
_____	3.2 Import Data	_____
_____	3.3 Export Data	_____
_____	3.4 Collect Module Data	_____
_____	3.5 Transmit Batches	_____
_____	3.6 Userids	_____

4. Product Updates

_____ 4.1 Head Office Updates

_____ 4.2 In-Store Updates

_____ 4.3 Sync Scanner Prices

5. Diagnostics

_____ 5.1 Bed Check

_____ 5.2 Verify Module contents

_____ 5.3 Price Change Diagnostics

GUIDE TO OPERATIONS

D.1 INTRODUCTION

This appendix describes the tasks that are done by the operator of a Telepanel system, organised by frequency. It may be used as an outline for the *Guide to Operations*.

Also included are some guidelines for the different software functions. These could be made standard operating procedures when performing these tasks, depending on the individual case.

D.2 DAILY TASKS

D.2.1 Head Office Updates

Typically Head Office Updates are activated in the POS controller on a regular schedule. In this case, the changes should be processed in the Telepanel system automatically at a set time each day.

Database maintenance for the Telepanel system occurs during Head Office Updates. Any additions, changes, deletes, or special maintenance sent by the customer's head office computer is picked up directly from the POS controller without any manual intervention.

Head Office Updates are invoked from TP's *Product Updates Menu*. The execution time varies depending on the controller interface and the size of the host maintenance file. If a change affects module information it will be automatically transmitted to the module and a transmission report will be produced.

After any product update, the Product Update Synopsis Report must be checked for any warnings or errors. The most common warning is UPCs not found in the Telepanel database.

Another possible warning that may appear indicates that a product delete failed because a module was assigned to the product. Normally a discontinued product's module(s) will have been removed before the product record, but occasionally this may not happen. In this case the module should be removed from the product and the product manually deleted. If this is not done the product record will stay in the database forever. This also could indicate that the UPC has changed. In this case the module should be removed from the old UPC and assigned to the new UPC.

D.2.2 In-Store Updates

Since In-Store price changes can occur at any time in most stores, the In-Store Product Update function should be scheduled to run periodically through the day. The actual time interval chosen can be adjusted to whatever works best. The time interval represents how much time the chain can live with an incorrect price on the shelf. A good general guideline would be to run an update automatically every hour, during operating hours.

After the update is finished, the system log must be checked for any warnings or errors. If a change affected module information, it would be automatically transmitted to the module and a transmission report would be produced.

D.2.3 Antenna Verification

Antenna verification includes Verify Module Contents and Bed Check. These procedures check communications with all modules under the specified antennas. Module contents verification also checks the contents of the module against the database. Bed check is much quicker than Verify Module Contents and normally should be used.

Antenna verification is useful in testing communications with modules under one antenna and in identifying missing modules. The whole store should be bed checked each week with a small portion scheduled to run each night.

Each morning, any problems listed on the transmission reports must be checked. If a module is missing and cannot be found in the store, a new label should be ordered and the module removed from the product in the database.

If a module is on the shelf and it has been a CM2 4/5 times, (seen as "CM2(4)" on transmission reports) it should be removed from the shelf to have a communications check using the TEST function in module maintenance. If the module passes, it should be placed back on the shelf, otherwise a new module should be used. If the product shows up as an error again this shelf should be reported to your CS as a potential poor communications area.

D.2.4 Transmission Reports

Transmission reports are produced whenever a module communicates with the Transceiver. These reports show the results of the communications. The condition codes beside the product name are found in Table D-1.

Table D-1
Transmission Condition Codes Meanings and Required Action

<u>Code</u>	<u>Meaning - Action Required</u>
OK	Transmission Received - None
CM2	Possible Transmission Failure - Check module; replace if contents of module are not correct
IVC	Module contents was found to be incorrect - check module; replace if contents of module is not correct
NOP	Communications aborted - Finish transmission using Transmit batch maintenance

D.2.5 Visual Inspection

A daily inspection of the modules is suggested. When inspecting look for the following: damaged labels, dusty modules, loose modules, modules with a faded or blank display, or modules with incorrect displays. An inspection will also highlight modules that can be removed (i.e. product has been both discontinued and has sold out).

D.2.6 Label Printing

If TP's label printing facility is being used, then product labels should be printed as required.

D.2.7 Backups

Each day a backup of the database and system logs should be made. This includes everything in the \TP\DB directory. Backing up the system is very important. If there is a problem, using the backup could be the only way to restore operations.

There should be 7 backup sets of disks at the store (assuming the store is open 7 days a week). These backup sets can be reused at the end of the week.

D.2.8 Housekeeping

A daily log should be kept on system performance. This would include: how many price changes were made, results of these price changes, Antenna verification reports results, adds and deletes for Telepanel, visual inspection results, etc.

This daily log can be used to track system performance over time. The performance data is helpful in benefit analysis. The daily log should have checkpoints where the person running the system can initial. This helps ensure all required tasks have been accomplished.

D.3 WEEKLY TASKS

D.3.1 Head Office Updates

In some cases Head Office Updates only need to be invoked when adds/deletes or special functions are activated. In this situation, price changes of all types are done with the In-Store Updates.

D.3.2 Specials

Some stores use modules to display certain additional information for sale items. This may include savings, old price, percentage off, date the sale ends, etc. The information for these functions will come through the Head Office Update in most cases, although there is also a facility for manually modifying and maintaining specials information.

If the information for specials must be manually maintained, the area that requires the closest scrutiny is the regular price. This will default to the highest price the Telepanel system has ever seen for the product. In cases where there has been a regular price decline and then the item is put on sale, the regular price stored in the Telepanel system must be adjusted.

When an item goes on or off sale, a transmission report is produced. This report must be handled the same way a price change transmission report would be. In addition, a special dangler (shelf talker) may be placed over the modules that are going on special and removed from the modules going off special.

D.3.3 Module Data Report

Every week on the same day the button pushes may be read for all the modules. The report produced can be linked to product velocity to do statistical analysis. This information can be extremely useful for merchandising research. It is important to read this data at the same time every week. When the data is read it is automatically cleared from the module.

D.3.4 Statistics

The statistics that have been gathered during the week should be compiled into a report. This report would include all price changes made during the week and the results of the changes. This report should be given to the chain's system co-ordinator at the end of each week. A list of the modules that were replaced should be compiled and the modules set aside for return. A list of the Bed Check reports by antenna should be kept and sent to CS if any abnormalities are noted.

D.3.5 Archive Logs

Each week a copy of the transaction logs should be made. This includes the files \TP\REPORTS\LG*. If there is a problem, the transaction logs are used to restore normal operations. Backups of the system log should be kept for six months so there is a record of what was done to the system.

D.3.6 Housekeeping

Periodically the modules should be cleaned as required. The labels should be inspected for damage and replacement labels ordered. TP automatically deletes old reports, import files, logs, etc.

D.4 MONTHLY TASKS

D.4.1 Reports

Each month a system status report should be compiled. This report should summarise system activity and problems. The results from bed checking the store should be summarised and analysed. Any defective modules should be reported by type and number with the details attached and shipped to Telepanel.

D.4.2 Backups

Each month a backup should be made of the complete system. This includes everything under the \TP directory except the *import*, *tq*, and *reports* sub-directories. If there are additional files needed for the system to function, they should also be backed up.

D.4.3 Housekeeping

If more modules or dangles are required they should be ordered.

D.5 MODULE MAINTENANCE

D.5.1 Assigning Modules

When assigning modules it is important to compare the information in the assign window against the label. If the label is different, the product information must be edited to match the label. If this is not done the unit price will not be correct.

When placing the module on the shelf, it is crucial that the item code on the module label must match the shelf tag that is being replaced. The price must also be compared and any discrepancies investigated. The module should not be put on the shelf until any differences are resolved.

D.5.2 Removing Modules

When modules are removed they should be set to display "OFF". This will ensure that the module cannot be accidentally placed on the shelf with a wrong price.

If a module is removed from the database because it is missing and subsequently found, it must be reassigned to its product before reaching the shelf. Because of this, if anyone finds a module they should bring it to the person who looks after the Telepanel system rather than putting it back on the shelf.

D.5.3 Replacing Modules

When modules are replaced due to damage, the damaged module should be clearly marked with the reason for replacement, the date, the store, and any other useful information.

If the module is replaced for any other reason the "old" module should be set to display "OFF" before the new one is used.

D.5.4 Changing Module Information

A module's antenna number may be changed. The antenna number is module specific; if you change one module's antenna you will not affect any other modules even if they are assigned to the same product. If only one module is assigned to a product then changing the module antenna will also change the default product antenna.

D.6 PRODUCT MAINTENANCE

D.6.1 Adding Products

Adding products is generally accomplished through a host interface. There may be rare cases in which it would be desirable to manually add a product.

Manually adding a product has a relatively high possibility of introducing errors into the database. Care must be taken to ensure that all information is correctly typed in. This is especially so for UPC and item codes as they cannot be changed manually once they are entered.

If at a later time a manually added product is also added through the host support, then the host support information would be rejected because the product is already in the Telepanel database.

D.6.2 Deleting Products

Deletion of products should be done through host support. Unless host support is not implemented, there is no advantage to manually deleting products.

D.6.3 Changing Product Information

Product information changes are handled by host support, but from time to time it may be expedient to change some information manually.

The most common types of changes are size changes. The host changes may not appear at the store at the same time labels do. This could cause problems with unit price. The database should always match the label that is on the module.

The default antenna can be changed in the product maintenance system. It differs from the antenna number found in the module record in the database. This number is the antenna that a new module will be assigned to if there is no manual override. This number is displayed under antenna in all browsers.

Other information changes are also possible such as the category code, manufacturer, description, etc. Changing UPC and item code is not possible. To "change" these fields: a new product record should be created with the new information, any modules should then be removed from the old product and assigned to the new product, finally the old product should be deleted from the database.

TECHNICAL SPECIFICATION

E.1 TX3030 TRANSCEIVER

Enclosure	- 3 piece aluminum enclosure (10"x 9.6"x 2") - Total Weight: 1.1Kg
Power Supply	- Stand alone (desktop) max. size 6.5" x 3" x 2". - Max. Weight: 0.5 Kg
Transmitter	- 131.072 KHz 100% amplitude modulated - encoding: Manchester, 1024 Baud - 4.5W output power into test load (80uH + 0.94Ω) - output tuning range: 50 to 200 uH - 5 stage relay switched capacitor tuner
Receiver	- phase shift discriminator at 131.072 KHz center frequency
A/D converter	- dual VCO @ 350KHz nominal - Mux. for antenna current, reference measurement - Mux. for gain selection
Processor system	- Motorola MC68LC302PU20B CPU @ 16.777216 MHz - 128K x 16 static RAM - 128K x 16 Flash ROM
Input Power	+ 12VDC, 3A maximum
Internal Power	Switching type supply (200KHz) 12VDC 0.6A input, +5V 1A, -5V 100mA output
RS232 serial	PORT1, PORT2 – 9-pin 'D' male (AMP 747250-3)
Power input	2.5mm jack center positive
Antenna	8-pin Phoenix COMBICON P/N GMSTBA 2.5/8G-7.68
Indicators	Green LED: power on, processor running when flashing Yellow LED: communications active when flashing
External Power Supply: 100/240VAC 50-60Hz input, 12VDC 3A output (P/N 699-0003A01)	
Environmental	The unit is intended for indoor use only, in a fixed (secured) position. Operating temperature 0C - 40C Storage temperature -20C - 70C Operating Humidity 15% to 85% RH Storage Humidity 5% to 90% RH

Antenna

The antenna is a custom made single turn loop wound around the gondolas in the store or inside the freezer case. The metallic structure of the gondolas, as well as the building walls, are intrinsic part of the antenna. The variations in electrical parameters from one location to another are compensated by the tuning capabilities of the TX3030 output stage.

Typical dimensions 1.5 m height, 5 to 15 m long
Inductance range 50 to 200 μ H

E.2 TX3021 PROGRAMMER

Power supply: external, 9 V a.c, 500 mA transformer (OEM)
Destination: programming of the initial information in the ESL modules
Communication: inductive coupling (near field)
Antenna: built-in multi-loop, untuned
Output power 0.01 mW
Carrier frequency: 131.072 kHz
Modulation: AM, 100 %
RF Data Rate: 1024 Baud
Data Encoding: Manchester type (0=xx, 1=xy with $xx(xy)=1/1024=0.976\text{ms}$)
Serial comm.: RS232, 9600 baud, no parity, 8 data bits, 1 stop bit
Serial ports: 4 (1 master, 3 slaves), 9 pin 'D' male
Microcontroller: Motorola MC68HC705C8A
Crystal resonators: 4.0 MHz and 4.194304 MHz
Light indicators: LED type: 'Power' / 'RS232 Tx' / 'RS232 Rx'
Dimensions: approx. 135 x 135 x 55 mm / 5.3 x 5.3 x 2.1 inches
Enclosure: plastic box (Hammond 1598BGY enclosure)
Environmental: the device is intended for indoor use, temperature 0 to 40° C

E.3 ESL MODULES

Power supply: 3 V, Lithium battery (standard, 2430)
Destination: display of price information in supermarket stores
Antenna: built-in multi-loop, tuned
Output power 25 mW
Carrier frequency: 131.072 kHz
Transmit modulation: PM
RF data rate: 1024 Baud
Data encoding: Manchester type (0=xx, 1=xy with $xx(xy)=1/1024=0.976\text{ms}$)
Microcontroller: 4 bit custom ASIC
Crystal resonator: 32.767 kHz
Display: LCD type
Power consumption: 5 μ A in standby mode
 30 μ A in receive mode
 8 mA in transmit mode
Form factors 5410, 5420 small, single / double display, North America
 9410, 9420 large, single / double display, North America
 5620, 9620 small / large double display, Europe
Dimensions: approx. 80 x 40 x 25 mm / 3.2 x 1.6 x 1 inches for 9xxx
 approx. 60 x 40 x 25 mm / 2.3 x 1.6 x 1 inches for 5xxx
 (including mounting clip)
Enclosure: plastic
Environmental: indoor use, temperature -30° to 40° C

INSTALLING AND CONFIGURING A SYMBOL SPECTRUM 24™ NETWORK

F.1 DOCUMENT REFERENCES

Symbol Document Filename	Title
1205701	Access Point User Guide
2018203	Access Point Addendum
70-203	Serial Client Bridge User Guide
fmc.pdf	Serial Client Bridge FMC Addendum
2013052	High-Performance Antenna Spec

F.2 SITE SETUP

This procedure is currently under review.