

INSTALLATION PLANNING GUIDE

---

# MDTS Point of Sale System



**SYSTEM TEN** COMPUTER BY **SINGER**

---

**SINGER**  
BUSINESS MACHINES

---

# INSTALLATION PLANNING GUIDE

## MDTS Point of Sale System



Publication No. 40-077-1  
January 1972

**SINGER**  
**BUSINESS MACHINES**

2350 WASHINGTON AVE.  
SAN LEANDRO CALIF 94577

## LIST OF EFFECTIVE PAGES

---

Page	Effective Date
i thru vi	1/72
1-1 thru 1-2	1/72
2-1 thru 2-2	1/72
3-1 thru 3-5	1/72
4-1 thru 4-3	1/72
5-1 thru 5-2	1/72
6-1 thru 6-2	1/72
7-1	1/72
8-1	1/72

# CONTENTS

---

	<u>Page</u>
1 INTRODUCTION . . . . .	1-1
Related Documents . . . . .	1-1
Singer Responsibilities . . . . .	1-1
Customer Responsibilities . . . . .	1-2
2 SYSTEM COMPONENTS AND CONFIGURATION . . . . .	2-1
3 COMPONENT LOCATION AND INSTALLATION . . . . .	3-1
Model 900 Data Terminal . . . . .	3-1
Model 800 ISF Module . . . . .	3-2
Data Modem . . . . .	3-5
4 POWER LINE REQUIREMENTS AND INSTALLATION . . . . .	4-1
Electrical Requirements (Model 900 MDTS Data Terminal) . . . . .	4-1
Electrical Requirements (Model 800 ISF Module) . . . . .	4-2
Electrical Requirements (Model 202E9 Modem) . . . . .	4-2
Grounding . . . . .	4-2
Power Line Run . . . . .	4-3
5 COMMUNICATIONS (DATA) LINE REQUIREMENTS AND INSTALLATION . . . . .	5-1
Junction Box Wiring . . . . .	5-2
System Map . . . . .	5-2
6 WIRING TESTING . . . . .	6-1
7 MAINTENANCE AREA . . . . .	7-1
8 INSTALLATION SCHEDULE . . . . .	8-1

	<u>Page</u>
<b>ILLUSTRATIONS</b>	
Figure 2-1. Typical ISF Master/Slave Configuration (Schematic) . . . . .	2-2
Figure 3-1. Power and Data Line Hole Dimensions for a Typical Data Terminal Counter Installation . . . . .	3-2
Figure 3-2. Typical Multiple ISF Wall Installation (Six Units Shown) . . . . .	3-3
Figure 3-3. ISF Mounting Bracket . . . . .	3-4
Figure 4-1. Typical Power Pole Installation . . . . .	4-3
 <b>TABLES</b>	
Table 5-1. Communication Line Wire Sizes . . . . .	5-1

# 1 INTRODUCTION

---

This installation planning guide for the MDTS\* point of sale system will assist the customer in preparing for the installation of the components of the MDTS system – the Model 900 Data Terminals and the Model 800 Individual Store and Forward (ISF) Modules – which are installed throughout the customer's retail store and which do not require a special controlled environment in which to operate. The MDTS computer system, as well as other communications components located near the computer, require different installation planning to take into consideration the special air conditioning, electrical, and structural requirements unique to the computer system, and therefore are detailed in separate documents.

Careful advance planning will allow the power lines and data communication lines to be installed and routed with little or no interruption of daily routine.

## RELATED DOCUMENTS

For computer system installation planning, the the Installation Guide for the System Ten\* computer, Publication Number 40-031R, or the installation planning guide for the computer system being used.

Other related documents include the Model 900 MDTS Data Terminal Reference Manual, Publication Number 40-202; and the Model 800 Individual Store and Forward Module Machine Reference Manual, Publication Number 40-118.

## SINGER RESPONSIBILITIES

The Systems Engineer and the Customer Service Representative are available to assist the customer in planning equipment and wiring installation and in providing any specialized assistance needed.

Singer will provide the ISF-to-ISF and ISF-to-data modem cables and connectors, a standard length data signal cable between the data terminal and the ISF, and the standard 8-foot power cords supplied with each data terminal and ISF.

The Customer Service Representative will unpack, install, and test all system components. After the system is operating according to established specifications, it will be turned over to the customer by the account salesman.

---

\*A trademark of The Singer Company.

## CUSTOMER RESPONSIBILITIES

The customer is responsible for selecting suitable locations for the data terminal and ISF, and for providing suitable counters, shelves, or wall space to accommodate these units and the data modems. In addition, the customer is responsible for providing and installing all power lines, data lines longer than those provided by Singer, and associated conduit. All customer installed equipment and lines must conform to Singer specifications.

CAUTION

The customer must neither uncrate nor unpack the equipment; such action voids the factory warranty.

## 2 SYSTEM COMPONENTS AND CONFIGURATION

---

Exclusive of the computer system and any communications equipment installed in the computer room, a Modular Data Transaction System consists of three basic components; however, in a particular installation, one or more of these components may not be used, depending on how the MDTS network is configured. The three basic components are:

- Model 900 MDTS Data Terminal.
- Model 800 Individual Store and Forward (ISF) Module.
- Western Electric 202E9 modem (or equivalent modem with RS-232-B interface).

These components can be combined in one of the following ways:

- Data Terminal-to-computer.
- Data Terminal-to-ISF-to-202E9 modem-to-computer.

Several ISF units can be connected together in series into one modem link. In this case, the ISF connected directly to the modem is called the master and the other ISFs are called slaves. A schematic representation of a typical master/slave configuration is shown in Figure 2-1.



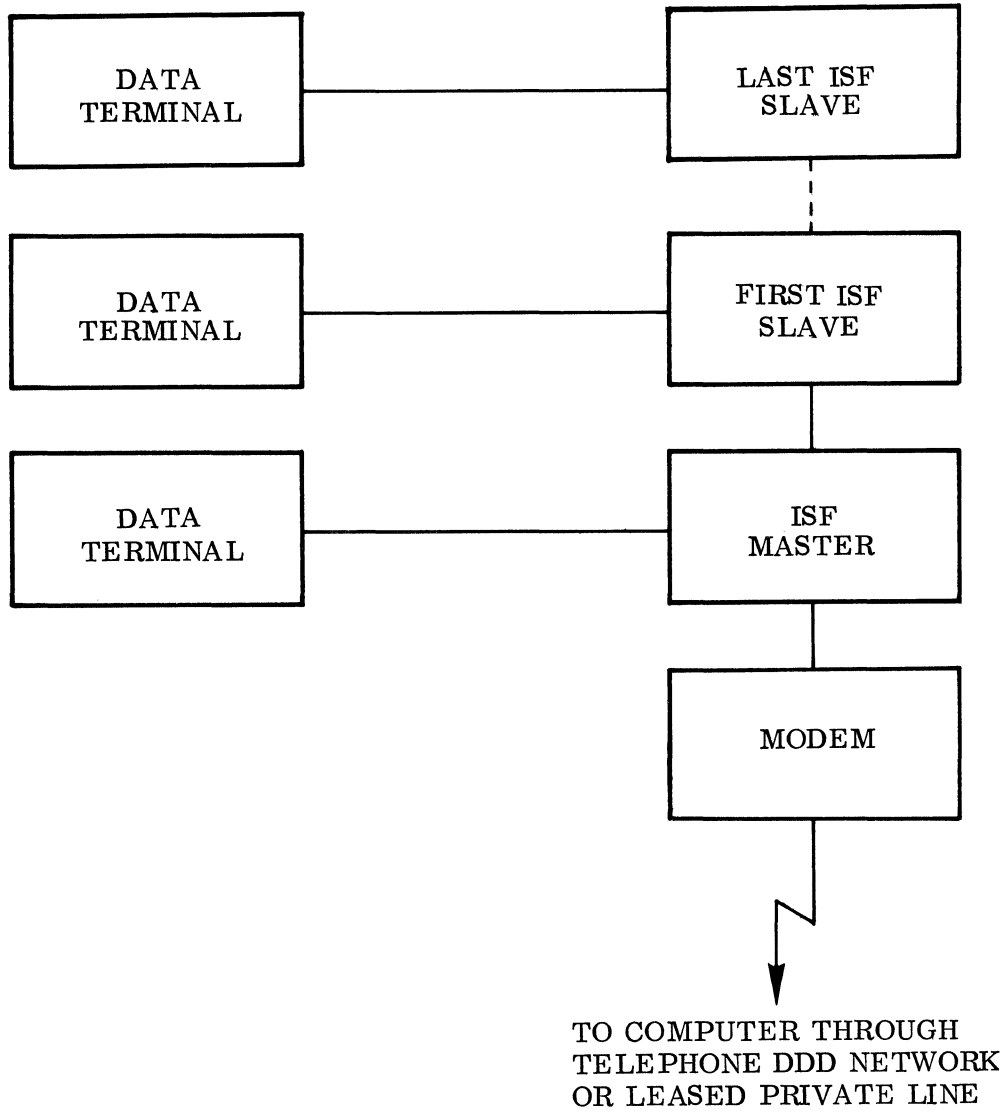


Figure 2-1. Typical ISF Master/Slave Configuration (Schematic)

## 3 COMPONENT LOCATION AND INSTALLATION

---

### MODEL 900 DATA TERMINAL

The data terminal is installed at any location a cash register is usually installed. Data terminals can also be installed in the audit department, credit department, and training classrooms in addition to the usual selling floor locations.

The data terminal is not bolted to the table or counter; however, it may be necessary or desirable to drill holes in the counter to accommodate the power cord and data line. Figure 3-1 shows a typical counter installation and the dimensions for the power line and data line holes.

Observe the following specifications:

#### Dimensions

Width - 19-1/2 inches (49.5 cm).

Depth - 20 inches (51 cm).

Height - 19-1/2 inches (49.5 cm).

Weight - 95 pounds (43 kg).

#### Clearances

The cash drawer extends 14 inches when fully open.

The optional media drawer extends 14 inches when fully open.

Allow 4 inches of clear space at the rear of the terminal for air circulation.

The suggested height of the table or counter surface from the floor is 30 to 32 inches (without optional media drawer); 26 to 28 inches (with optional media drawer).

Power Cord - Approximately 8 feet long.

#### Operating Environment

+32° through +115°F (0° through +46°C) at a relative humidity (wet bulb, noncondensing) of 20% to 80%.

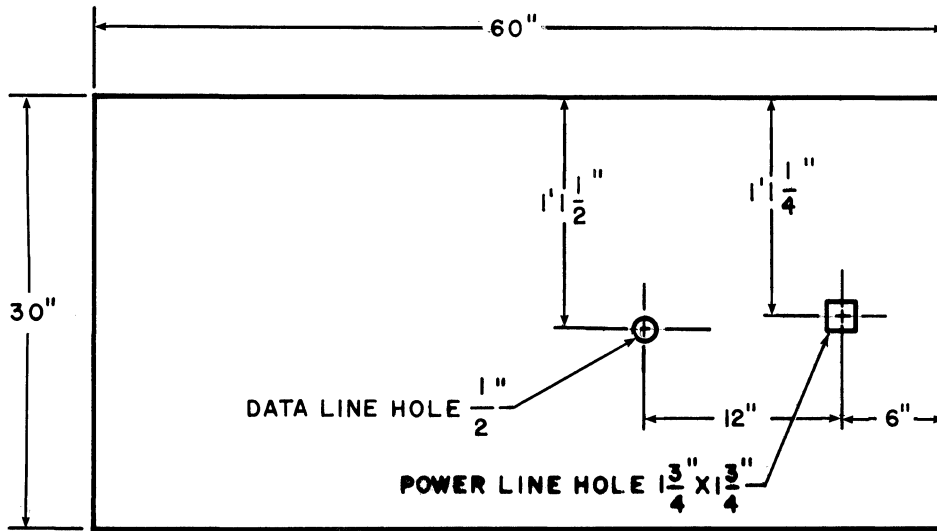


Figure 3-1. Power and Data Line Hole Dimensions for a Typical Data Terminal Counter Installation

**MODEL 800 ISF MODULE**

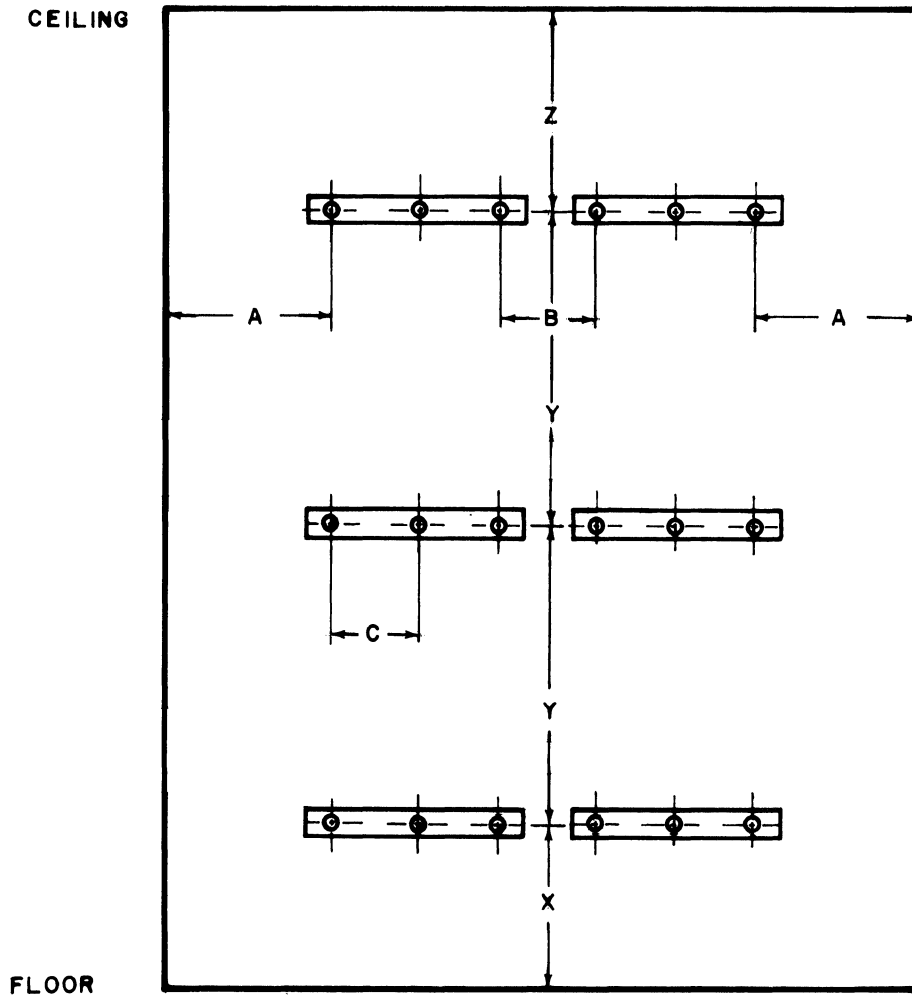
The ISF can be located under or beside the counter on which the data terminal is located, however, the most common practice is to install the ISF in a back room off the selling floor or in a manager's office. The ISF has integral feet so that the unit can be set on the floor or on a shelf. However, it may be more convenient and result in better use of space to hang the ISF on a wall using the bracket supplied by Singer. A wall installation is particularly convenient when several ISF units are used in a master/slave configuration.

See Figure 2-1 for a schematic representation of a typical ISF master/slave configuration.

See Figure 3-2 for a typical wall installation for six ISF units. Figure 3-3 shows the mounting bracket dimensions.

**CAUTION**

When hung on a wall, the ISF must be level and in the same relative position as when sitting on the floor or shelf.



- A - Distance of bracket hole from wall: 8 inches or more.
- B - Distance between adjacent bracket holes: 12 inches or more.
- C - Distance between bracket holes: 7 inches.
- X - Distance of bracket hole from floor: 18 inches or more.
- Y - Distance between brackets (above and below): 25 inches or more.
- Z - Distance of bracket hole from ceiling: 18 inches or more.

**CAUTION**

When hung on a wall, the ISF must be level and in the same relative position as when sitting on the floor or shelf.

Figure 3-2. Typical Multiple ISF Wall Installation (Six Units Shown)

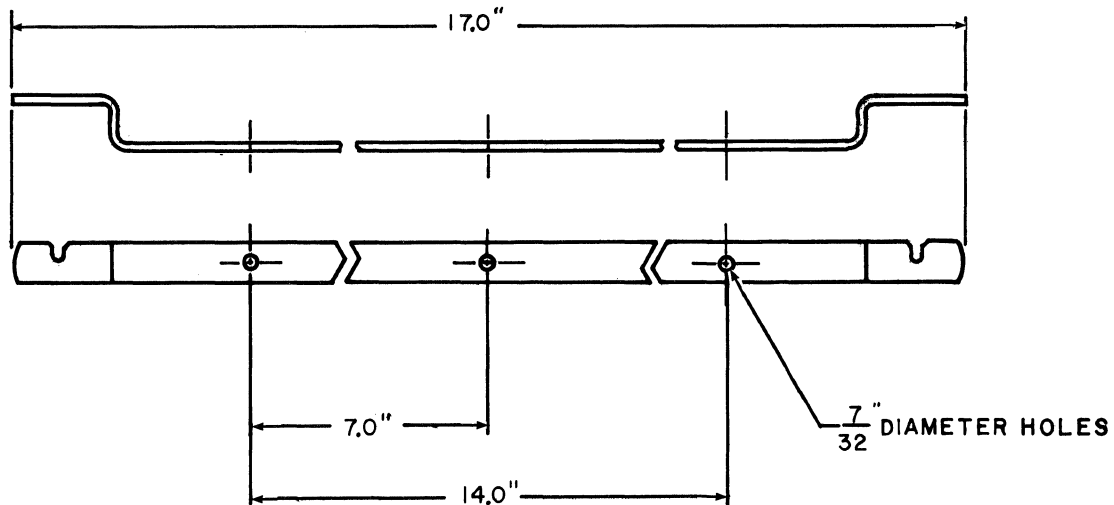


Figure 3-3. ISF Mounting Bracket

Observe the following ISF specifications:

Dimensions

Length - 19-7/8 inches (50.48 cm).

Width - 7-1/2 inches (19.05 cm).

Height - 18-1/4 inches (46.36 cm).

Weight - 45 pounds (20.39 kg).

Power Cord - Approximately 8 feet long.

Distance from ISF to Data Modem

Cable supplied by Singer is approximately 8 feet long.

Distance Between ISF Units

Two cables, one approximately 8 feet long, the other approximately 30 inches long, are supplied by Singer. Either cable can be used, or both may be used together.

Distance Between ISF and Model 900 Data Terminal

Standard cable supplied by Singer is approximately 10 feet long. For distances greater than 10 feet, the cable is to be supplied by the customer. See COMMUNICATIONS (DATA) LINE REQUIREMENTS AND INSTALLATION.

Operating Environment

+36° through +105°F (+2° through +42°C) at a maximum relative humidity of 90%. (NOTE: The atmosphere must be noncondensing.)

DATA MODEM

The modem required for an MDTS system installation is a Western Electric 202E9 or equivalent modem with RS-232-B interface. The modem must be able to transmit asynchronous data in a switched line (DDD or private leased line) operation at a speed of 1200 BPS. The modem must have reverse channel signal and automatic answering capability. C2 conditioning is recommended for the switched line facilities.

The modem must be located on a shelf or desk near the master ISF. The distance between the modem and the ISF is approximately 8 feet (length of cable supplied by Singer).

202E9 Modem Specifications

Dimensions

Width - 9 inches.

Depth - 11-3/4 inches.

Height - 4 inches.

Voltage - 110 V AC

Current - .045A

Operating Temperature - +40° to +120°F.

Humidity - 20% to 95%.

Weight - Approximately 7-3/4 pounds.

202E9 Modem Power Requirements

An external power transformer is used to supply a.c. power to the modem at a voltage which is stepped down from the power line voltage. The transformer is equipped with a cord terminated by a two-prong plug which fits a standard 110 volt grounded receptacle. The transformer is supplied and installed by the telephone company.

## 4 POWER LINE REQUIREMENTS AND INSTALLATION

---

All MDTS system equipment operates on single-phase power and may be connected to any three-wire grounded outlet that supplies the required current. Although a dedicated power line is not required for the equipment, care must be taken to ensure that no equipment with electric motors such as adding machines, fans, or electric typewriters be plugged into the same power line. If this requirement cannot be met, a separate, dedicated power line must be provided for the units of the MDTS point of sale system.

### ISF AND MODEM CAUTION

Since the remote computer can poll the ISF at any time, the power to the ISF and the modem must be turned on at all times. Hence, a separate, dedicated circuit may be required for the ISF.

Locate each piece of equipment near a separate two-plug or four-plug power outlet rated at 20 amperes. This is sufficient power for any operating and servicing requirement, and the extra convenience outlets enable the Customer Service Representative to plug in test equipment when checking the units in place.

If the building is equipped with three-phase power, instruct the electrician to alternate phases among the various power outlets to be used so that all units are not on the same phase.

### ELECTRICAL REQUIREMENTS (MODEL 900 MDTS DATA TERMINAL)

<u>Voltage Range</u>	115V AC $\pm$ 11.5V	220V AC $\pm$ 20V
<u>Frequency</u>	60 $\pm$ 1Hz	50 $\pm$ 1Hz
<u>Current</u>	2.7 amperes	1.35 amperes
<u>Maximum Current</u>	15 amperes	8 amperes
<u>Phase</u>	Single	Single
<u>kVA</u>	0.3	0.3

### ELECTRICAL REQUIREMENTS (MODEL 800 ISF MODULE)

<u>Voltage Range</u>	115V AC $\pm$ 11.5V	220V AC $\pm$ 20V
<u>Frequency</u>	60 $\pm$ 1Hz	50 $\pm$ 1Hz
<u>Current</u>	1.4 amperes	0.7 amperes
<u>Phase</u>	Single	Single
<u>kVA</u>	0.16	0.16

### ELECTRICAL REQUIREMENTS (202E9 MODEM)

Voltage Range - 110V AC

### GROUNDING

The power cord supplied with each unit of the MDTS network has a green (or green with yellow trace) insulated equipment ground. Each customer installed power circuit must have an insulated wire conductor equal to or larger than the size of the current carrying conductors to ground the equipment; however, the ground wire size should conform to local or National Fire Protection electrical codes. All such ground wires can be connected to a main ground wire (not a system neutral). This wire must be carried directly back to the service ground to a suitable building ground.

Each component of the system uses a three-pin branch circuit receptacle. To determine if the ground connection of the receptacle is adequate for use with the equipment, make the following test:

With a volt-ohmmeter measure the resistance from AC common to ground. If the resistance is less than 2.4 ohms, the ground is acceptable. (CONDUIT GROUND NOTE: If a conduit ground is used, this measurement should be made every six months.)

TEST PROCEDURE NOTE: To avoid any damage to the volt-ohmmeter when making the above test, set the voltmeter for its highest voltage and check for any voltage in the circuit before measuring the resistance.

If the equipment ground is not acceptable as determined above, run a separate ground wire directly from the main power panel, service ground, or suitable building ground to the receptacle ground pin.



## POWER LINE RUN

When the installation of the data terminal and ISF requires a new, additional, or separate power line, the following suggestions will be helpful.

In stores with basements and wood floors the power line can be run in the basement to the components and up through the floor to the receptacles.

In stores with existing conduit the power line can be run in the conduit if it is large enough to accommodate the extra line.

In stores having drop ceilings or where the lines cannot be run along the floor, the line can be run above the ceiling and then down to the components using a special power pole such as those manufactured by the Wiremold Co. or the Microflector Co. See Figure 4-1.

In stores with plaster ceilings the line can be run up walls and across the ceiling (with or without conduit) and then down to the components using a special power pole such as those manufactured by the Wiremold Co. or the Microflector Co. See Figure 4-1.

UL approved wiring is recommended.

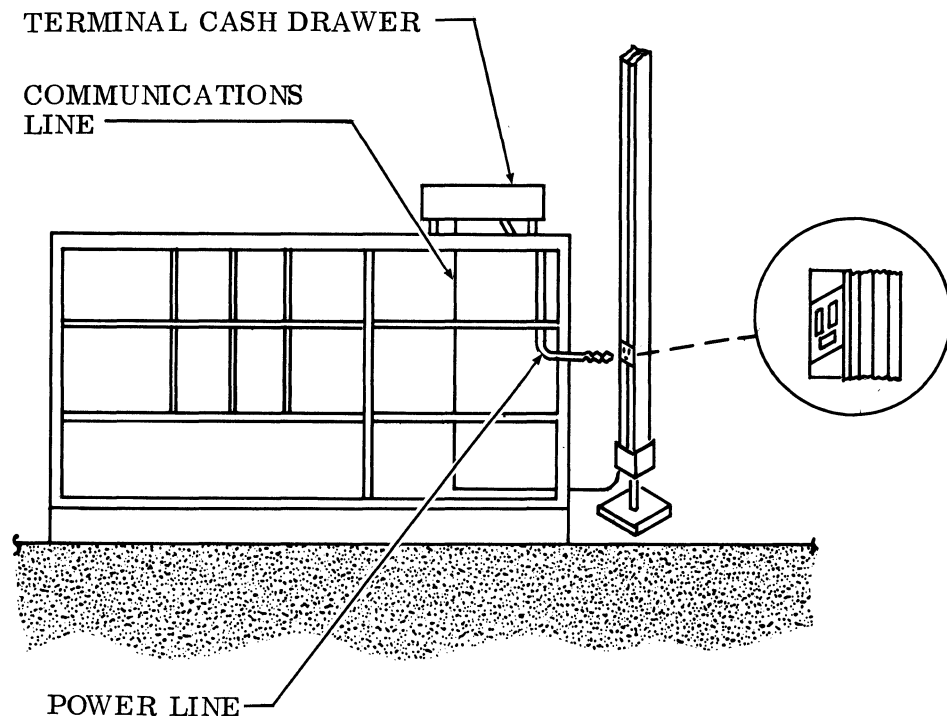


Figure 4-1. Typical Power Pole Installation

## 5 COMMUNICATIONS (DATA) LINE REQUIREMENTS AND INSTALLATION

---

Twisted pair wiring is used to connect the data terminal to the computer or ISF, and can be up to eight wire miles long. A cable containing the required number of twisted pair lines can be used to run multiple pairs into a single area to reduce the number of visual wires and to lower the cost of wire installation. Wire type and size are listed in Table 5-1. (NOTE: UL approved stranded type wire is recommended.)

Table 5-1. Communication Line Wire Sizes

Terminal-to-ISF Distance	Wire Size
Up to 1 wire mile	20 AWG PVC twisted pair (single unit installation) 26 AWG PVC twisted pair (multiple unit installation)
Up to 2 wire miles	20 AWG PVC twisted pair (single unit installation) 22 AWG PVC twisted pair (multiple unit installation when run in a cable)
Up to 3 wire miles	20 AWG PVC twisted pair
Up to 4 wire miles	19 AWG PVC twisted pair
Up to 8 wire miles	16 AWG PVC twisted pair

WIRE MILE NOTE: The distance in wire miles is the total one way length of wire required to connect the terminal to the ISF unit.

WIRE SIZE NOTE: The wire sizes specified above are minimum wire sizes, and a larger size may be used where convenient or desirable. In many installations the wire sizes listed for up to 2 miles may prove to be the most practical and economical.

Installation of the data lines is similar to the installation of the power lines. Observe the following considerations.

- When running the data line parallel to the power line, the data line must be a minimum of one foot away from the power line to avoid interference. However, some power poles have separate channels for the two lines and provide adequate protection to the data line.

- Data lines should not be run in elevator shafts because of the danger of interference from high amperage circuits.
- If it is necessary to run the data lines in conduit containing telephone lines, shielded cable should be used to avoid possible interference from telephone signals. The shield should be grounded at both ends. The conduit should also be grounded. Although it is necessary to use shielded cable only for the part of the run in the conduit, it is advisable to use shielded cable for the entire run to eliminate splicing shielded and unshielded cable.
- In some cases common carrier wire facilities may be used for the data lines. In this case, the leased common carrier facilities should be installed in the same way as customer installed data lines.

### JUNCTION BOX WIRING

In the computer room, the junction box in which the data lines terminate should be an appropriate commercially available type with a sufficient number of terminals to isolate each terminating wire. It is good practice to color code or affix a permanent identification tag to the wires from each terminal, both at the terminal and at the junction box, and to prepare a chart showing the terminal-to-color code (or identification tag) correspondence. This identification tag must identify completely the terminal (or ISF), the line, the cable, the intermediate junction block(s), and any other information needed to trace the circuits.

### SYSTEM MAP

A valuable aid for equipment installation, circuit tracing, trouble shooting, and testing is a system map showing the exact location of each terminal, ISF, modem, intermediate junction block, and all lines and cables. The map should show all terminal connector numbers, all line and cable numbers, and all junction block numbers. The map should be as detailed as necessary so that any electrician or technician can identify and locate any component of the system easily and quickly.

## 6 WIRING TESTING

---

All power and data lines must be tested after installation to ensure that there are no faults, high resistance connections, or circuit imbalances. These tests must be completed before the Customer Service Representative will connect the cables to the units. The duration of the tests must be sufficient to ensure experience with all line operating conditions that would be encountered in the future. Usually, at least one full day is required. The tests should include both customer-owned and common carrier-owned facilities.

A successful wiring test will indicate future satisfactory operation only if the conditions prevailing at the time of the test are maintained. If equipment is added or if the wiring is changed later, a previous test can no longer be considered valid.

An unsuccessful test will indicate the need to reduce noise level by using shielded cable or other techniques. The customer should request a log of the test results from the company performing the tests.

Test for the following types of faults:

- Crossed wires in a pair.
- Open circuits in individual conductors or shields.
- Short circuits between conductors of the same pair.
- Grounds on individual conductors, either between a conductor and a shield or between a conductor and some grounded object.
- Crosses or short circuits between a conductor of one pair and one or more conductors of another pair.
- Unterminated stubs.
- Determine the voltage fluctuations at the power service entrance(s) over a period of time. A strip recorder is excellent for this purpose. If the voltage fluctuations are greater than 10% of the nominal voltage, a voltage regulator is required.
- The resistance of individual pairs should not exceed the maximum values specified for the various sizes of recommended wire and cable. The d.c. resistance should be no greater than 500 ohms.

COMMON CARRIER SWITCHING EQUIPMENT NOTE: Panel or step-by-step (SXS) switching equipment should not be used by the telephone company in an MDTs network because of excessive high levels of impulse noise. If there is doubt about the existence of such equipment, insist that the telephone company perform the following impulse noise pretest.

Impulse Noise Pretest. The number of impulse noise counts in a fifteen-minute period should be measured at a threshold of 60 dB<sub>rnc</sub> (1 dB below the average received data signal level for a long distance call). This measurement should be performed on several test lines from the local switching office throughout the business day. If more than 50% of the tests exhibit more than 15 noise counts due to telephone office equipment, a bypass route should be requested.

## 7 MAINTENANCE AREA

---

In stores with several data terminals and ISF units it is recommended that a small shop area be prepared to service the equipment.

The shop area should contain a sturdy table whose surface is 30 inches from the floor, a suitable stool or chair for the service technician, and at least one grounded, four-plug receptacle to plug in the system component and test equipment. The room should be well lighted and be air conditioned if necessary.

## 8 INSTALLATION SCHEDULE

---

Since installation scheduling will vary according to the size of the store, the number of terminals and ISF units to be installed, and other factors, Singer makes no attempt to determine the scheduling for the customer. However, we strongly recommend that the installation of the required wiring begin no later than thirty days before the arrival and installation of the equipment.

# MDTS POINT OF SALE SYSTEM INSTALLATION PLANNING GUIDE

Publication No. 40-077-1

We produce manuals for you, and we want you to find them useful and informative. That's our job.

So we're asking you to help us furnish you with the best possible publications. Please take a few minutes to answer the following questions. Add any comments you wish. If you desire a reply to any question, be sure to include your name and address.

Thank you.

DETACH HERE

- Does this manual meet your needs? Yes  No   
If not, what additional information would be of help to you?

---

---

---

- Can you find what you're looking for quickly and easily? Yes  No   
How can the organization be improved?

---

- Is the material easy to read and to understand? Yes  No   
Are there enough illustrations to support the text? Yes  No   
Comments \_\_\_\_\_

---

---

---

- Did you find any errors or ambiguities in the manual? Yes  No   
If yes, please cite page, line, and/or figure number with your comments.

---

---

---

- Other comments.

---

---

---

---

- What is your relationship to the product described?

- Operator.
- Programmer.
- Other (please specify)



FOLD BACK

**BUSINESS REPLY MAIL**  
No postage stamp necessary if mailed in the United States

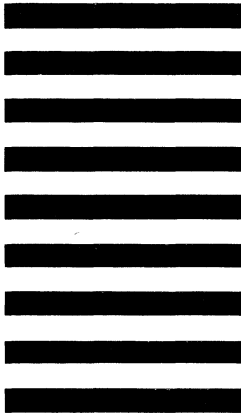
POSTAGE WILL BE PAID BY

FRIDEN DIVISION  
THE SINGER COMPANY  
2350 Washington Ave.  
San Leandro, California 94577

Attn: Customer Technical Publications,  
Department 753

FOLD BACK

**FIRST CLASS**  
PERMIT No. 320  
San Leandro, Calif.



**SINGER**  
BUSINESS MACHINES

Publication No. 40-077-1