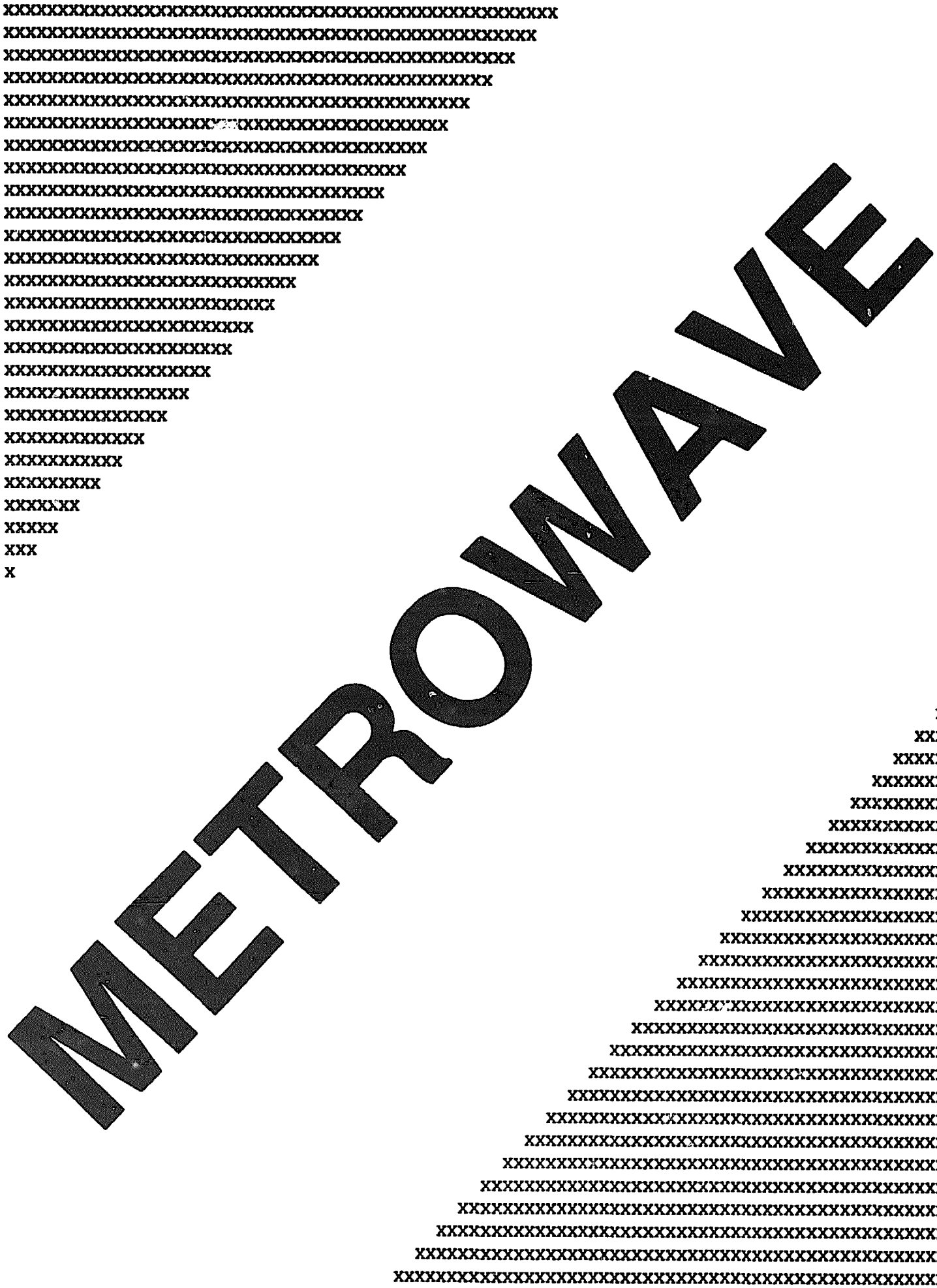
METROWAVE

METROWAVE

Technical Manual

Order Number: EK–DEMWB–TM–002

Prepared by
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Preface

ABOUT THIS MANUAL

The *METROWAVE Technical Manual* provides the field service engineer with the data required to maintain the Digital Ethernet METROWAVE Bridge (DEMWB). This document provides: a system overview; physical, electrical, and functional characteristics; operational information. Also included is a description of the necessary physical interface between the bridge unit and the associated microwave equipment. With the release of this manual, the LAN Bridge 100 is replaced by the LAN Bridge 150. This manual also identifies a new variation of Metrowave that utilizes the LAN Bridge 200 (DEBAM) rather than the LAN Bridge 150. Any reference to a LAN Bridge in this manual can be either a LAN Bridge 150 or LAN Bridge 200 unless otherwise specified.

ORGANIZATION

This manual is organized as follows:

Chapter 1	SYSTEM INTRODUCTION - Describes the DEMWB system and provides a general overview of all the units that comprise a DEMWB unit.
Chapter 2	DEMWA DESCRIPTION - Describes the physical and functional characteristics of the DEMWA.
Chapter 3	DEMWA FUNCTIONAL THEORY OF OPERATION - Discusses operation of the DEMWA unit relative to the functions it performs.
Chapter 4	DEMWA TECHNICAL DESCRIPTION - Provides physical, electrical, and timing characteristics of the DEMWA unit.
Appendix A	DEMWB CONFIGURATION GUIDELINES - Provides network configuration guidelines.
Appendix B	DEMWA SPECIFICATIONS - Provides a summary of the operational characteristics for the DEMWA.

RELATED DOCUMENTS

- *METROWAVE Installation/User's Guide*
- *LAN Bridge 150 Installation/User's Guide*
- *LAN Bridge 150 Technical Manual*
- *LAN Bridge 200 Installation/User's Guide*
- *LAN Bridge 200 Technical Manual*
- *H4005 DIGITAL™ Ethernet Transceiver Installation Card*
- *H4005 Ethernet Transceiver Technical Manual*

NOTES, CAUTIONS, AND WARNINGS

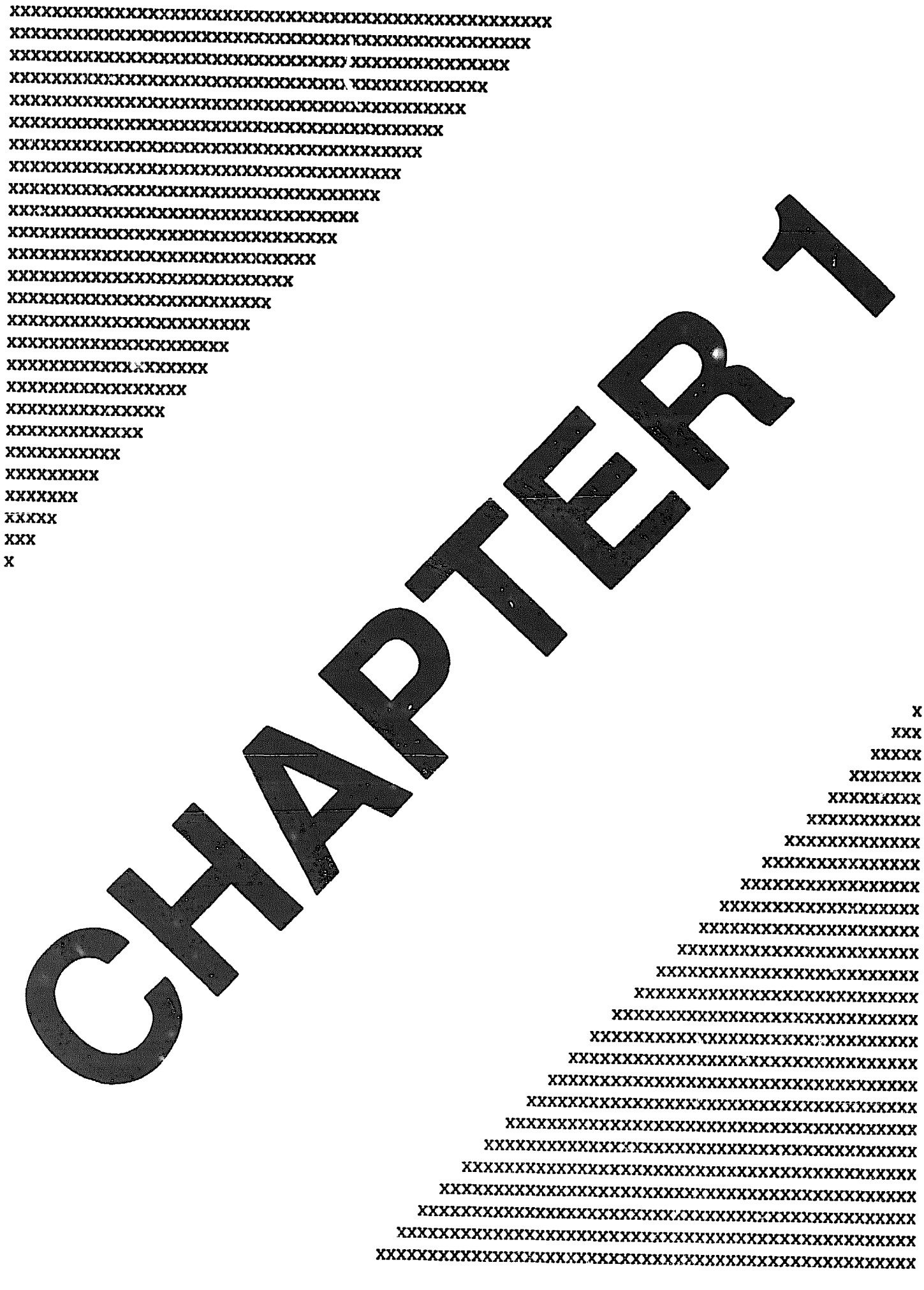
NOTE A note calls the reader's attention to any item of information that may be of special importance.

CAUTION A caution contains information essential to avoiding damage to the system.

WARNING A warning contains information essential to the safety of personnel.

FCC NOTICE

The DEMWB generates, uses, and may emit radio frequency energy. The equipment has been type tested and found to comply with the limits for a Class A computing device pursuant to Subpart G of Part 15 of FCC rules, which are designed to provide reasonable protection against such radio frequency interference. Operation of this equipment in a residential area may cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.


CHAPTER 1

Chapter 1
SYSTEM INTRODUCTION

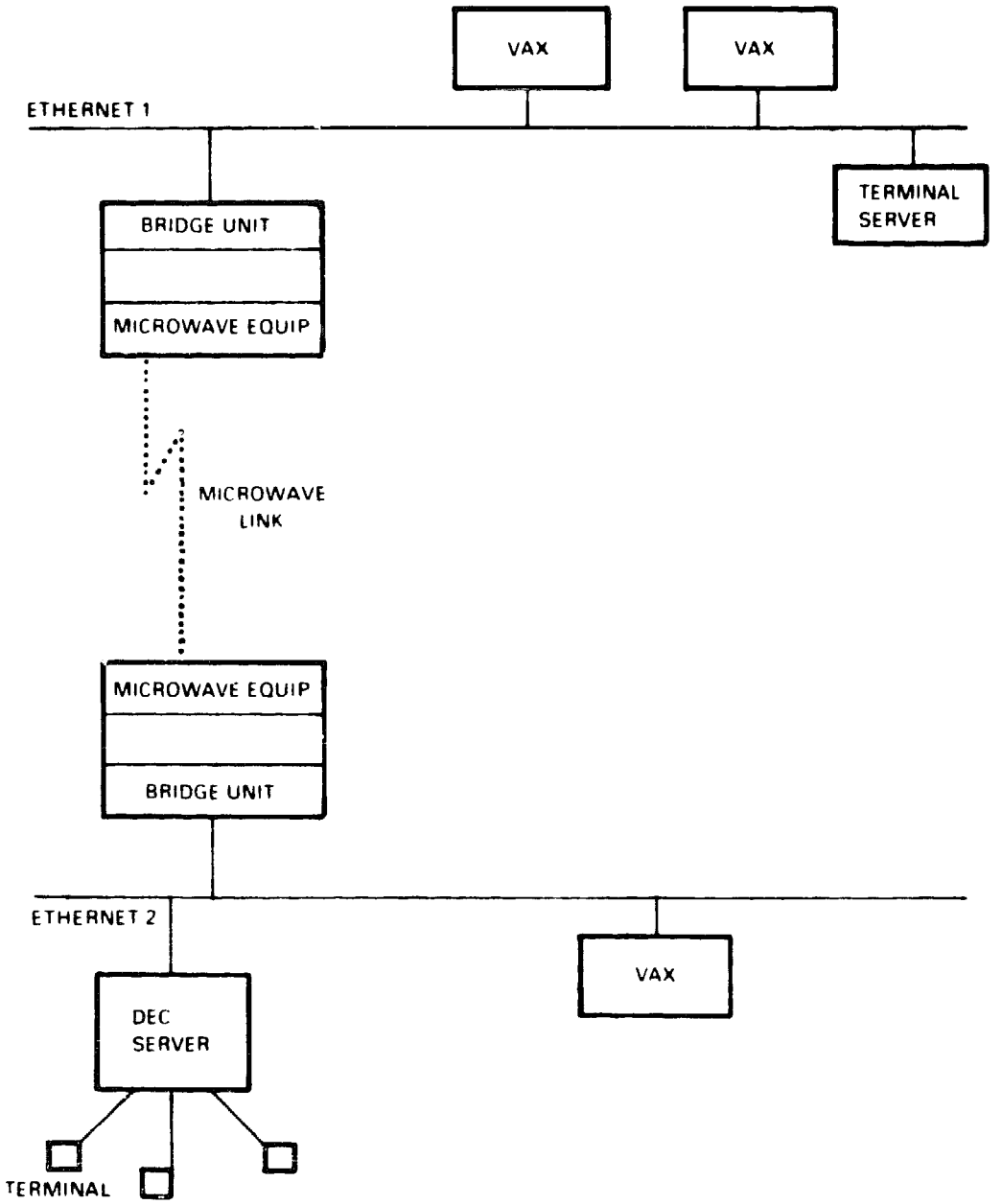
This chapter presents an overview of the METROWAVE Bridge system (DEMWB).

DEMWB provides the equipment necessary to extend the Local Area Network (LAN) up to 4.5 miles. This is done by connecting two Ethernet LAN lines together using the following components:

- Two METROWAVE Bridge units.
- Two user supplied microwave equipment units certified for use with DEMWB (for example MA23-VX or MA23-LAN).

Figure 1–1 shows a typical DEMWB extended LAN configuration.

Figure 1–1: METROWAVE Extended LAN Configuration



1.1 METROWAVE BRIDGE UNIT

This section describes the following features of the METROWAVE Bridge unit:

- Components
- Packaging Options
- Mounting Options

1.1.1 Components

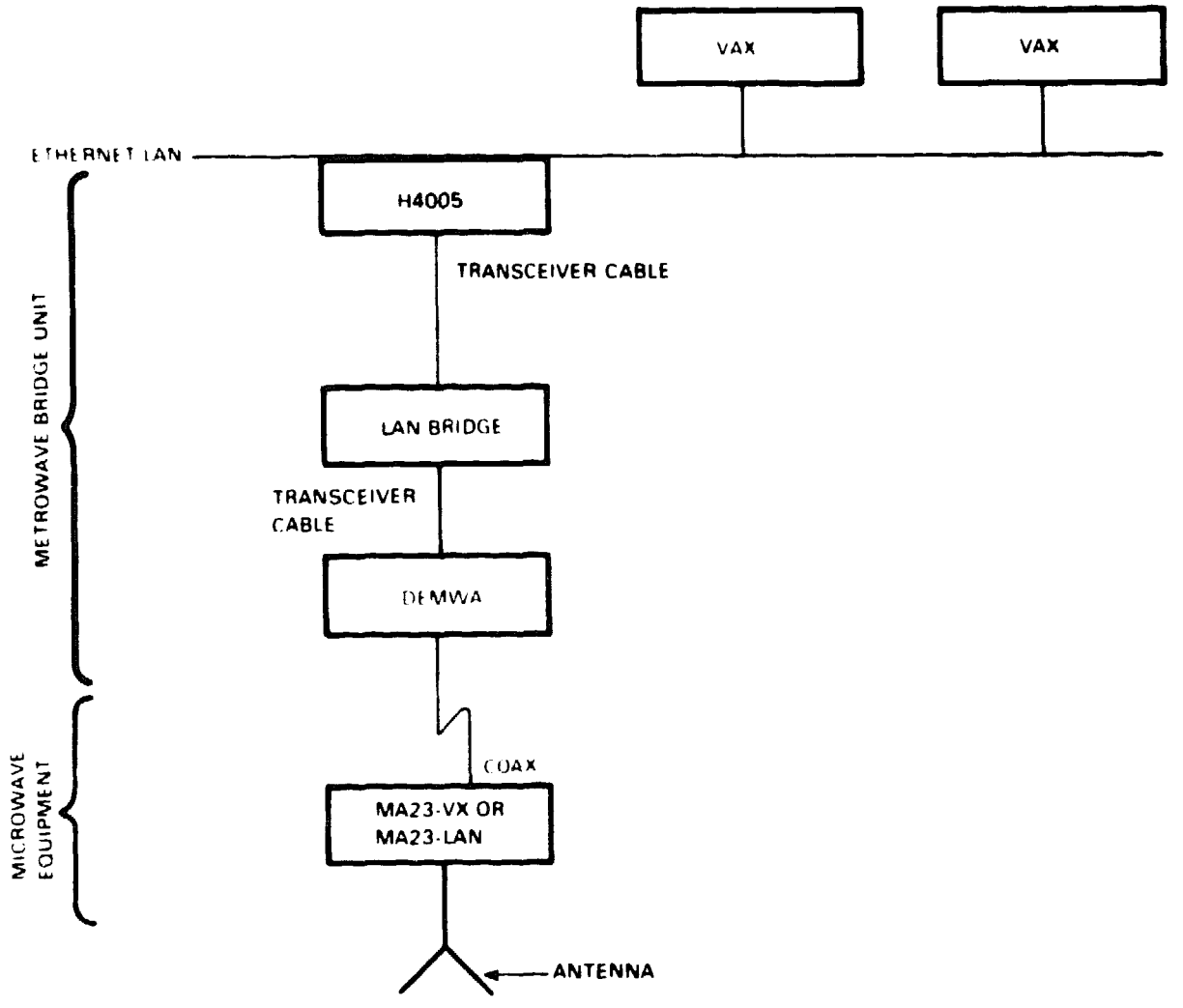
Only one of the two METROWAVE Bridge units will be described since all METROWAVE Bridge unit options are functionally the same. A METROWAVE Bridge unit consists of the following major components:

- One H4005 Transceiver
- One LAN Bridge
- One Digital Ethernet Microwave Adapter (DEMWA).

The Ethernet LAN connects to the H4005 Transceiver by means of a Ethernet baseband coaxial cable. The H4005 connects to the LAN Bridge by means of a H4005/LAN Bridge 20-meter Transceiver cable. The LAN Bridge connects to the DEMWA by means of a DEMWA/LAN Bridge two-meter cable. The DEMWA connects to the microwave transmitter/receiver by means of coaxial cable.

Figure 1–2 illustrates the components that make up a METROWAVE Bridge unit.

Figure 1–2: METROWAVE Bridge Unit



1.1.1.1 H4005 Ethernet Transceiver

The Digital H4005 provides a means of accessing the baseband Ethernet network cable.

It performs the following functions:

- **Transmit:** Responds to the signal input from the Transceiver cable and transmits the signals on the Ethernet coaxial cable.
- **Receive:** Responds to signals transmitted on the Ethernet coaxial cable and couples the received signals to the Transceiver cable.
- **Collision Detect:** Monitors the signals transmitted on the Ethernet coaxial cable, and, if a collision occurs, sends appropriate signals on the Transceiver cable.

In addition, the H4005 Ethernet Transceiver does the following:

- Maintains electrical isolation between the coaxial cable and the Transceiver cable.
- Maintains low loading/high impedance on the coaxial cable.
- Provides continuous data loopback (that is, the receiver portion of the Transceiver is always active; thus, the message being transmitted is coupled back on the Transceiver cable).
- Provides self-test of the collision detect circuitry at the end of each transmission.
- Contains protective circuitry which ensures that network integrity will be maintained in the event of a faulty Transceiver, controller, or repeater.

Additional information on the H4005 Ethernet Transceiver can be found in the *H4005 DIGITAL ™ Ethernet Transceiver Installation Card* and the *H4005 Ethernet Transceiver Technical Manual*.

1.1.1.2 LAN Bridge

The LAN Bridge eliminates many of the limitations previously presented by single LAN architectures by making it possible to expand a network beyond the normal baseband Ethernet limitation of 2800 meters. The LAN Bridge also enables a single network to exceed the maximum number of 1024 stations. The LAN Bridge provides a high-speed logical link between two LANs, thereby creating an Extended Local Area Network.

Some other features of the LAN Bridge are:

- A dynamic address-learning capability enables the LAN Bridge to acquire and maintain an accurate knowledge of the network configuration. The LAN Bridge accomplishes this by storing source addresses from received message frames.
- Once the LAN Bridge has built a database of station locations, the bridge selectively forwards only message frames based on the destination address. This minimizes network congestion by keeping local traffic local and allows literally thousands of stations to be connected to the extended network.
- The LAN Bridge functions at the Data Link layer and is upper-layer protocol-independent. Typical protocols include DECnet, Xerox Network System (XNS), Transmission Control Protocol (TCP/Internet Protocol), Local Area Transport (LAT), or any protocols based on Ethernet.

- The LAN Bridge has an automatic backup feature that is based on its ability to learn the locations of other bridges in the extended network. When bridges are configured in a loop, one of the bridges automatically enters a backup state and serves as a warm standby. This enhances network availability.
- Based on what other bridges are present in the network, the LAN Bridge automatically determines the appropriate spanning tree implementation. If there are no bridge devices using the earlier Digital spanning tree algorithm, the LAN Bridge uses the default mode of the IEEE 802.1 spanning tree implementation.
- Optional Remote Bridge Management Software (RBMS) V2.0, for remotely monitoring bridge performance, modifying parameters, initiating self tests and password protection to prevent unauthorized modification of bridge parameters. The LAN Bridge includes a software switch than can be activated through RBMS V2.0 which enables network managers to secure the bridge in IEEE 802.1 mode in mixed spanning tree environments.
- Additionally, the LAN Bridge 200 provides destination address filtering, source address filtering, protocol filtering, some on line traffic counter, higher performance and up line dump capabilities.

The LAN Bridge connects through a Transceiver cable to one of the following:

- Digital H4005 (Baseband Transceiver)
- DELN (Digital Ethernet Local Network Interconnect)
- Digital DECOM (Broadband Transceiver)
- Digital DESTA (ThinWire Transceiver)
- DEMWA (Digital Ethernet Microwave Adapter)

Additional information on the LAN Bridge can be found in *LAN Bridge 150 Technical Manual* and *METROWAVE Installation / User's Guide*.

1.1.1.3 Digital Ethernet Microwave Adapter(DEMWA)

The DEMWA (Digital Ethernet Microwave Adapter) is a hardware communications device. The DEMWA provides a communication link between a LAN Bridge and full-duplex microwave equipment, as part of the global goal of bridging two networks using the Digital Ethernet Carrier Sense Multiple Access/Collision Detection (CSMA/CD) protocol. The DEMWA implements Transceiver functions needed by the LAN Bridge for connection to a microwave link.

The DEMWA Adapter (Digital P/N 12-27983-01) is mounted on the back of the DEMWA to provide separate coaxial connections for the receive and transmit parts of the microwave transmitter/receiver.

1.1.2 Packaging Options

The METROWAVE Bridge unit is offered as either a complete package pre-installed in a cabinet, or as a complete set of components designed to be installed in a Digital Satellite Equipment Room (SER) rack (refer to Table 1–1).

Table 1–1: METROWAVE Installation Options

Order Number	Installation Version
DEMWB-AA	Consists of two METROWAVE Bridge units pre-installed in a cabinet.
DEMWB-BA	Consists of two METROWAVE Bridge units (without the H4005s and 20-meter Transceiver cables) mountable in an SER rack.
DEBWB-BB	Consists of two METROWAVE Bridge units (without the H4005s and 20-meter Transceiver cable) utilizing the LAN Bridge 200 mountable in an SER rack.
DEMWB-CA	Consists of one METROWAVE Bridge unit pre-installed in a cabinet and one METROWAVE Bridge unit mountable in an SER rack.

NOTE

The DEMWB-AA, BA, CA Versions all utilize the LAN Bridge 150. The DEMWB-BB Version utilizes the LAN Bridge 200.

1.1.3 Mounting Options

The following METROWAVE Bridge unit options are available:

- Satellite Equipment Room (SER)
- Cabinet

1.1.3.1 Satellite Equipment Room (SER)

The rack-mounted bridge unit equipment requires a 19-inch-wide rack. Twenty inches of vertical rack space is required to hold the four rack mountable components (LAN Bridge, DEMWA, and microwave controllers). The deepest components are the microwave controllers, which are 16 inches deep.

The microwave controllers mount in the front of the SER rack such that the cable plugs are in the back. The LAN Bridge and DEMWA mount in the front of the SER rack such that the cable connectors are in the front. Approximately 2 inches of clearance are required between the microwave equipment and the Digital equipment for the routing of cables.

Electrical power in the SER configuration is obtained through customer provided 120V, 60Hz outlets.

1.1.3.2 Cabinet

The cabinet mounting option provides a cabinet that is 21¼-inches wide, 31¼-inches deep, and 31½-inches high. It contains an internal 19-inch-wide rack.

In the cabinet-mounted bridge unit, the LAN Bridge and DEMWA use the 120 Vac cables provided and plug into the power controller in the bottom of the cabinet. The microwave controllers may also plug into the power controller. The cabinet power controller plugs into a customer provided 120V, 60 Hz outlet.

1.2 MICROWAVE EQUIPMENT

User supplied microwave equipment such as the MA23-VX or MA23-LAN Transmitter/Receiver, must be certified for use with the DEMWB. This section provides information as follows:

- Microwave Transmitter/Receiver Description
- Microwave Transmitter/Receiver Equipment Characteristics

1.2.1 MA23-VX and MA23-LAN Transmitter/Receiver

The Digital METROWAVE Bridge unit does not include the microwave equipment. Microwave equipment must be acquired separately. METROWAVE is qualified to work with the MA23-VX and MA23-LAN Systems from M/A-COM MAC.

The MA23-VX and MA23-LAN Systems are low-cost, solid-state, FM microwave radio systems that provide reliable short-range communications links in the 21.2 to 23.6 GHz frequency band. The microwave radios are FCC accepted for operation throughout the Common Carrier (Part 21, 24 channels) and Private Operational Fixed (Part 94, 24 channels) bands.

The compact, light-weight, microwave systems are engineered to provide reliable performance and simplicity of operation. Transmitter and Receiver subsystems are comprised of weather-resistent RF units equipped with Category A high gain antennas (one-foot, two-foot, or four-foot diameter) designed for outdoor use, and indoor Baseband Processing/Interface Units containing power supply and baseband circuits. Coaxial cables are used to connect the indoor and outdoor units. RF/Antenna Units easily mount on poles using self-contained pipe clamps. RF Units can either be pole mounted or integral with the antenna.

For additional information on the MA23-VX or MA23-LAN Transmitter/Receiver, see the *MA23-VX or MA23-LAN Transmitter/Receiver Operator's Manual* provided by M/A-COM MAC.

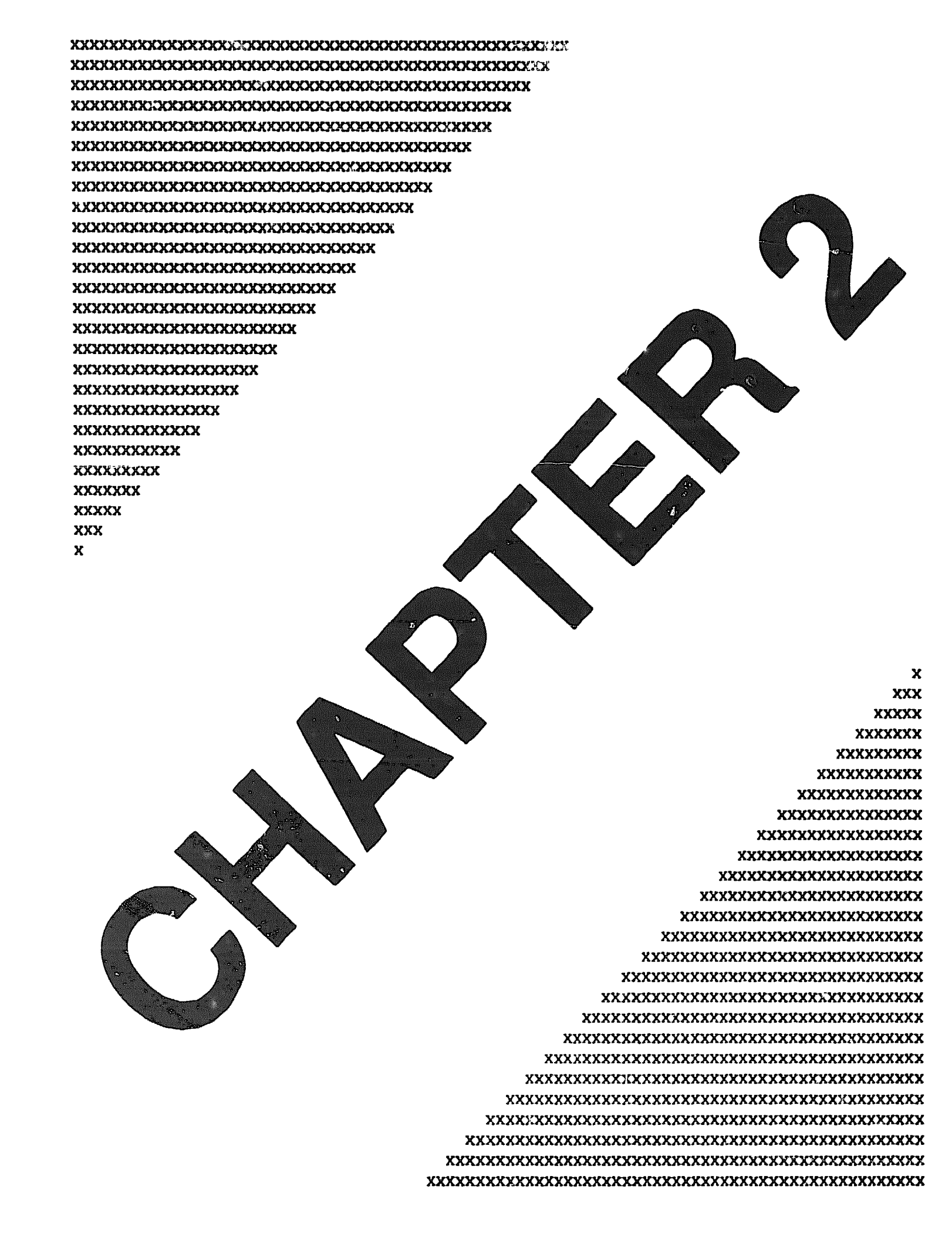
1.2.2 Microwave Transmitter/Receiver Equipment Characteristics

The microwave equipment used with the METROWAVE Bridge is supplied by the microwave vendor. The microwave equipment should be configured such that two end stations are used to implement a microwave link which is ideally transparent to the METROWAVE. For the purposes of this technical manual, the cabling is part of the microwave equipment.

As a minimum, the microwave link should meet the following specifications.

Table 1–2: Microwave Link Characteristics

Parameter	Minimum	Typical	Maximum
Baseband Bandwidth	17 MHz	18 MHz	19 MHz
Signal-to-Noise Ratio (10 kHz - 20 MHz)	63 dB	67 dB	-
Input Impedence	74.1 Ω	78 Ω	81.9 Ω
Ouput Impedence	74.1 Ω	78 Ω	81.9 Ω
Peak-to Peak Input Voltage Level	700 mV	1000 mV	1400 mV
Peak-to-Peak Output Voltage Level	700 mV	1000 mV	1400 mV
Jitter	-	-	±7 ns
Bit Error Rate	-	-	10^{-8}
Round Trip Propagation Delay	-	-	46.4 μs


CHAPTER 2

Chapter 2
DEMWA DESCRIPTION

This chapter provides a general description of the DEMWA including:

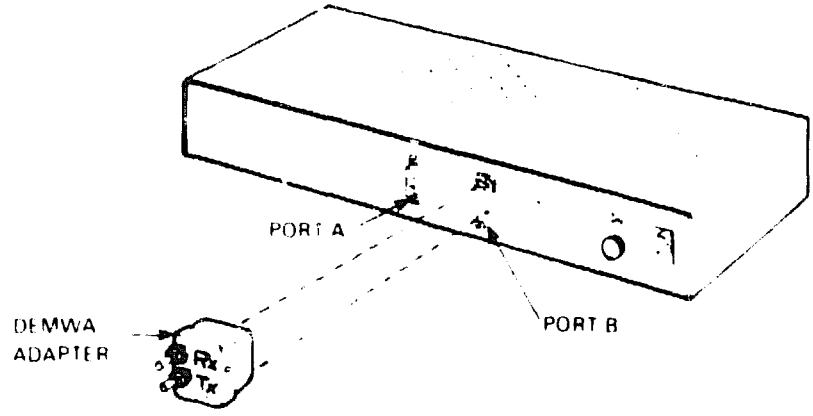
- Physical Description
- Functional Description
- Interface Description
- Configuration
- Mounting Options

2.1 DEMWA PHYSICAL DESCRIPTION

This section describes the following physical characteristics of the DEMWA (Figure 2–1):

- Dimensions and Weight
- Controls and Indicators
- Connectors
- DEMWA Adapter
- Fuses

Figure 2–1: Digital Ethernet Microwave Adapter



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2.1.1 Dimensions and Weight

The dimensions and weight of the DEMWA unit (both with and without the plastic housing) are shown in Table 2–1.

Table 2–1: DEMWA Dimensions and Weight

	With Plastic Housing	Without Plastic Housing
Width	19.25 in. (48.9 cm)	17.50 in. (44.5 cm)
Depth	7.75 in. (19.7 cm)	7.00 in. (17.8 cm)
Height	3.50 in. (8.9 cm)	2.50 in. (6.4 cm)
Weight	10.5 lb (4.8 kg)	10 lb (4.6 kg)

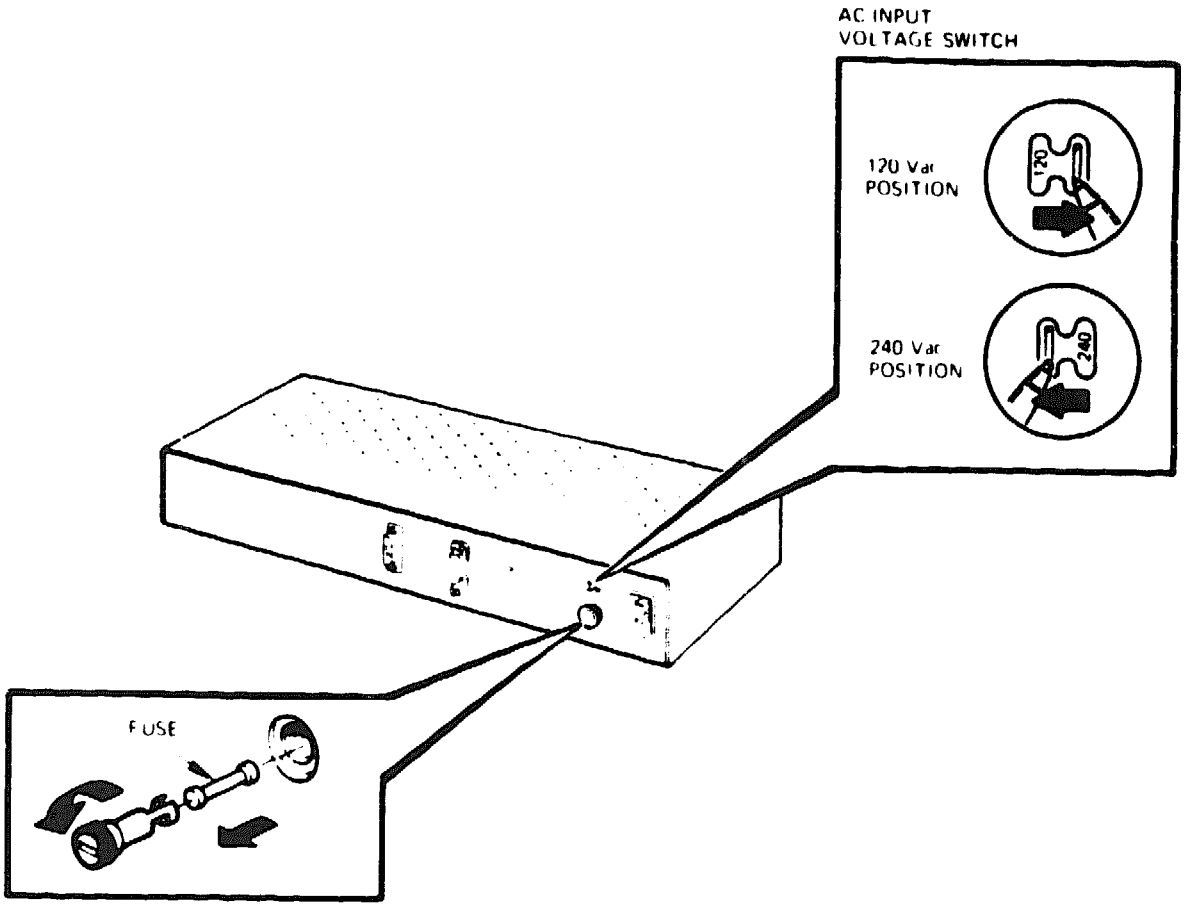
2.1.2 Controls and Indicators

Table 2–2 describes each of the controls, and indicators, and specifies its function. The location of the controls and indicators of the DEMWA unit are shown in Figure 2–2.

Table 2–2: Controls and Indicators

Control/Indicator (Type)	Function
(Green LED)	Power Supply Indicator: Lights to indicate operational status of the +5 Vdc power supply within the DEMWA unit.
120/240 (Two-position slide switch)	Ac Input Voltage Switch
120	Makes DEMWA unit compatible with 90-128 Vac, 60 Hz input power source.
240	Makes DEMWA unit compatible with 180-256 Vac, 50 Hz input power source.

Figure 2–2: DEMWA Control Locations



2.1.3 Connectors

Table 2–3 describes each of the connectors, and specifies its function. The connectors of the DEMWA unit are shown in Figure 2–2.

Table 2–3: Connectors

Connector Type	Function
15 pin	Port A Connector: Links the DEMWA to the LAN Bridge.
15 pin	Port B Connector: Links the DEMWA to the microwave equipment.

2.1.4 DEMWA Adapter

The DEMWA Adapter uses two bulkhead 75 ohm BNC coaxial cable connectors to interface to the microwave equipment. The transmit connector, labeled TX, interfaces to the Baseband Out cable from the microwave equipment and the receive connector, labeled RX, interfaces with the Baseband In cable from the microwave equipment.

Coaxial cables between the microwave equipment and the DEMWA Adapter are provided by the supplier of the microwave equipment. These cables should be made from RG-59/U, 75 ohm coaxial cable. Cable lengths should not exceed 2 meters. At the DEMWA, the coaxial cable should be terminated with 75 ohm BNC connectors. At the microwave equipment end, these cable must be terminated with connectors compatible with the microwave equipment.

The DEMWA adapter uses a bulkhead male 15-pin D subminiature male connector with locking posts. For normal METROWAVE operation, this connector is always plugged into Port B of the DEMWA.

2.1.5 Fuses

The DEMWA unit is fused as follows:

- DEMWA-AA - 3AG, 0.5 A, Slo-Blo.

The locations of the fuse is shown in Figure 2–2.

The following spare fuses and fuse holders may be ordered separately:

- 5/20 mm, T, 0.5 A fuse (Digital P/N 12-19283-19)
- 5 mm fuse carrier (Digital P/N 12-21126-04)
- 3AG, 0.5 A, Slo-Blo fuse (Digital P/N 90-07209-00)
- 1/4-inch fuse carrier (Digital P/N 12-21126-03)

2.2 DEMWA FUNCTIONAL DESCRIPTION

The DEMWA (Digital Ethernet Microwave Adapter) is a hardware communications device. The DEMWA provides a communication link between a LAN Bridge and full-duplex microwave equipment, as part of the global goal of bridging two networks using the Digital Ethernet Carrier Sense Multiple Access/Collision Detection (CSMA/CD) protocol. The DEMWA implements Transceiver functions needed by the LAN Bridge for connection to a microwave link. This section describes the following:

- Signal Flow
- Collision Handling
- Signal Level Conversion

2.2.1 Signal Flow

Port A of the DEMWA connects to a LAN Bridge. Through this port, the DEMWA provides Transceiver functions that the LAN Bridge requires to operate properly. These functions are Data Transmit and Receive, Collision Detect, Collision Presence Test, and Collision Presence Signaling.

Port B of the DEMWA connects to the DEMWA Adapter and ultimately to the microwave equipment. The functions provided by this port are Data Transmit and Receive, Collision Detect, and Collision Presence Signaling.

The Transmit function of Ports A and B provides the data path between the Port A Transmit pair input and the Port B Transmit pair output. It is through this path that data from the LAN Bridge is transmitted across the microwave link to a remote LAN.

The Receive function of Ports A and B provides the data path between the Port B Receive pair input and the Port A Receive pair output. This path distributes the data received from the microwave equipment through the DEMWA to the LAN Bridge.

2.2.2 Collision Handling

The DEMWA performs the following Collision Handling functions:

- Collision Presence Test
- Collision Detection
- Collision Presence Signaling

The Collision Presence Test function implements a self-test to indicate to the LAN Bridge the operational status of the Collision Presence circuitry in the DEMWA. The Collision Presence Test signal, or heartbeat, is asserted on the Port A Collision Presence pair after each transmission to the LAN Bridge.

The Collision Detection function detects a collision when both the Port A Transmit and Port B Receive pairs of the DEMWA unit are asserted simultaneously.

When a collision is detected, the Collision Presence signaling function causes a 10 MHz signal to be asserted on the Collision Presence pair of Port A for the duration of the transmit. This is the collision detect signal. Also, data is disabled on the Receive pair of Port A during a

collision. In addition, a 5 MHz signal is also asserted on the Transmit pair of Port B, for the duration of the receive. This is called a Jam signal.

2.2.3 Signal Level Conversion

Another function of the DEMWA is signal level conversion. The DEMWA converts signals between the full-duplex microwave link and the Transceiver connection at the LAN Bridge.

2.3 DEMWA COMMUNICATION INTERFACES

The DEMWA unit provides two communication interfaces. These are:

- Port A - the link between the DEMWA and the LAN Bridge
- Port B - the link between the DEMWA and the DEMWA Adapter

Port A has the following paired signal line interfaces:

- Transmit
- Receive
- Collision Presence

Port B has the following paired signal line interfaces:

- Transmit
- Receive
- Collision Presence*

2.4 DEMWA CONFIGURATION

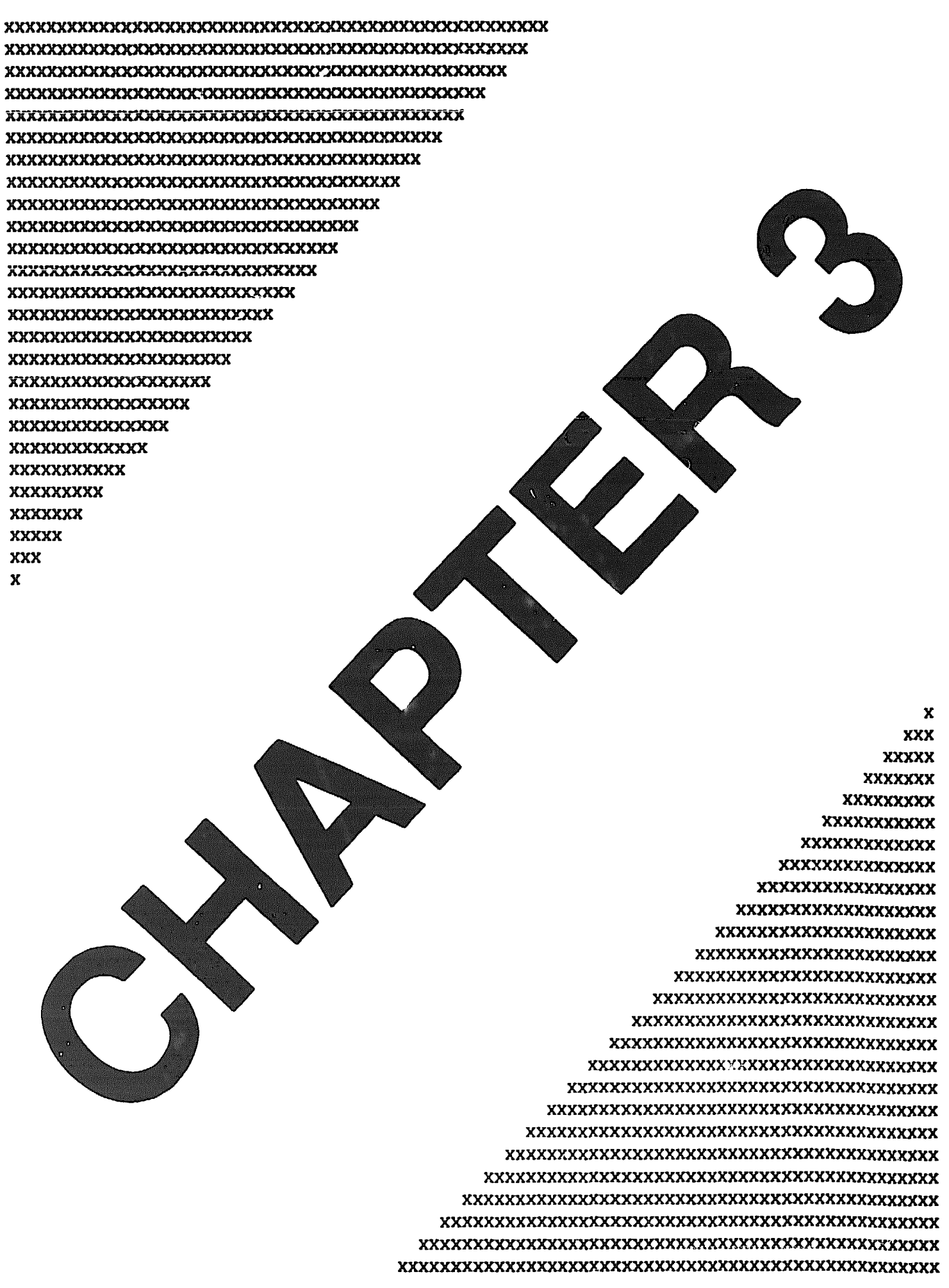
There is only one configuration for the DEMWA. The DEMWA-AA is designed to be configured as part of the METROWAVE Bridge System (DEMWB). The configuration for US applications is detailed below:

- 3AG, 0.5 A, Slo-Blo fuse and 1/4-in. fuse carrier installed
- The 120/240 V switch is preset to the 120 V position.
- Ac power cord

2.5 DEMWA MOUNTING OPTIONS

The DEMWA unit may be mounted in a standard cabinet with a 19-inch (48.26-cm) wide rack, or in a Digital Satellite Equipment Room (SER) rack.

*internal connection only


CHAPTER 3

Chapter 3
DEMWA FUNCTIONAL THEORY OF OPERATION

This chapter describes the theory of operation of the following DEMWA functions:

- Power Supply Function
- Transmit Function
- Receive Function
- Collision Function
- Collision Presence Test Function

3.1 POWER SUPPLY FUNCTION

The power supply uses a switching regulator to convert the 120/240 Vac input power to a regulated +4.9 Vdc output. The +4.9 Vdc output is used to power the DEMWA unit.

The two-position slide switch on the front panel makes the DEMWA power supply compatible with either 120 Vac input or 240 Vac input. The +4.9 Vdc output of the power supply drives the power indicator light (green LED) on the front panel of the DEMWA unit.

3.2 TRANSMIT FUNCTION

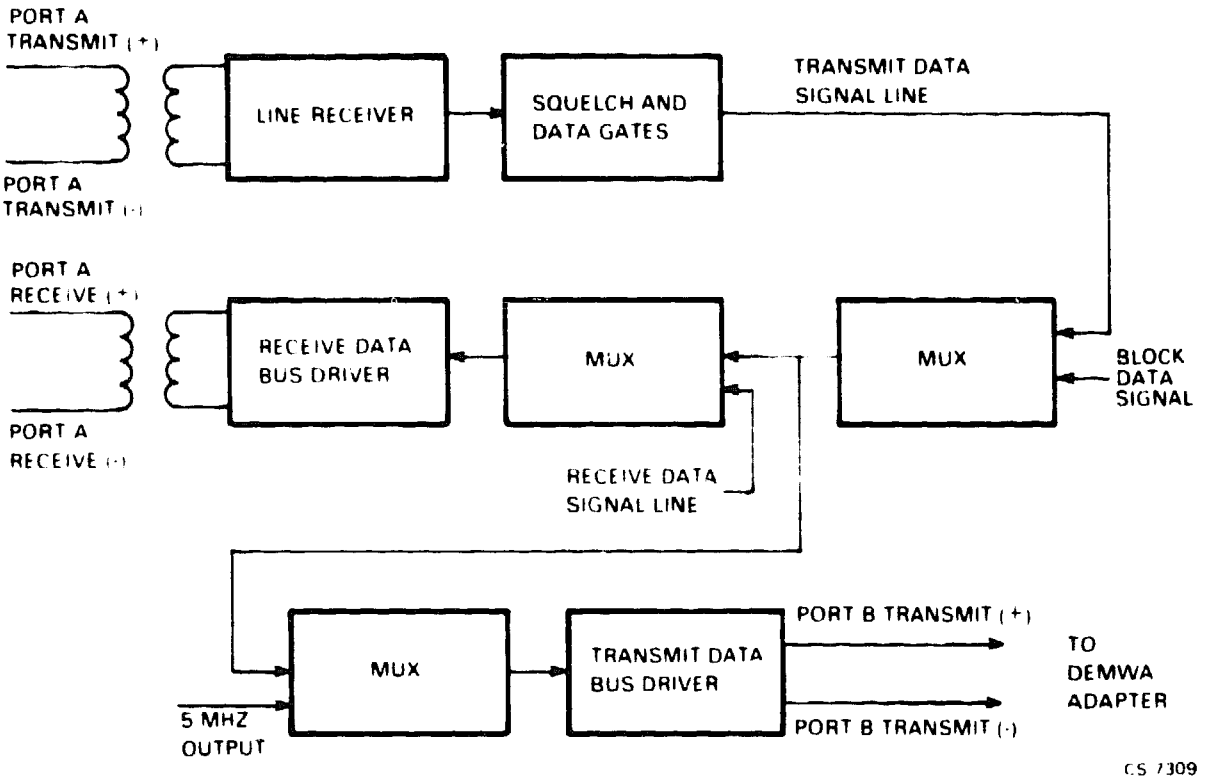
The DEMWA provides the data path between the Port A Transmit pair and Port B Transmit pair (refer to Figure 3–1).

The signal asserted to the Port A Transmit pair is coupled through an isolation transformer and asserted to the Transmit pair squelch and line receiver. The line receiver amplifies the signals and asserts them to the data gate.

The transmitter squelch turns off only after the differential signal input has met the specific threshold and timing requirements outlined in Section 4.2.1.2.

When the transmitter squelch turns off, it enables the data gate to pass the output of the line receiver to the transmit data signal line.

Figure 3–1: DEMWA Transmit Signal Flow Diagram



The transmit data signal line is wire ORed with the block data signal from the data enable\collision control to produce the data output to the Port A Receive pair and the Port B Transmit pair. The block data signal is asserted during collision conditions to block signals from being asserted on the Port A Receive pair.

The data output is wire ORed with the Port B 5 MHz output line at the Port B interface to produce the transmit data output signal. The Port B 5 MHz signal is asserted during collision conditions.

The transmit data output signal goes to the Transmit pair line driver, which sends the data on the Port B Transmit pair.

The DEMWA adapter attaches to Port B of the DEMWA unit. It converts the physical interface of the DEMWA into that required by the microwave equipment. This consists of converting the balanced differential driver and receive interfaces of the DEMWA into a single-ended interface for the microwave equipment. The DEMWA Adapter uses two transformers to interface the connector ports correctly. It meets the required signal interface specifications given in Table 1–2. Additionally it adapts the D subminiature connector at Port B of the DEMWA to two BNC connectors for coaxial cable connection to the microwave equipment.

Table 3–1 contains a summary of the operation of the DEMWA transmit function.

Table 3–1: DEMWA Transmit Function

Item	Function
Port A Connector Pins 3 and 10	Transfer transmit interface signals to DEMWB.
Isolation Transformer	Provides electrical isolation between the DEMWA unit and the LAN Bridge connected to the Port A connector.
Port A Transmit Pair Line Receiver	Amplifies the signals received from the secondary of the isolation transformer.
Port A Transmit Pair Data Gate	Allows data from the line receiver to be passed only after the Transmit pair squelch parameters have been met.
Port A Transmit Pair Squelch Circuit	Provides noise immunity by ensuring that only valid Ethernet signals asserted on the Port A Transmit pair are passed through the data gate.
Port A Transmit Pair Collision Blocking Gate	Block signals from being asserted during collision conditions.
Port B Transmit Pair Line Driver	Amplifies the transmit data signal input and drives the Port B Transmit pair.
Port B Connector Pins 3 and 10	Transfer transmit interface signals to microwave equipment transmit controller.

3.3 RECEIVE FUNCTION

The DEMWA provides the data path between the Port B Receive pair and Port A receive pair (refer to Figure 3–2).

The signals asserted on the Port B Receive pair are asserted to the Receive pair squelch and line receiver. The line receiver amplifies the signals and asserts them to the data gate.

The receiver squelch turns off only after the differential signal input has met the specific threshold and timing requirements outlined in Chapter 4, Section 4.2.2.4.

When the receiver squelch turns off, it enables the data gate to pass the output of the line receiver to the receive data signal line.

The receive data output signal goes to the Receive pair line driver, which sends the data on the Port A Receive pair.

Figure 3–2: DEMWA Receive Signal Flow Diagram

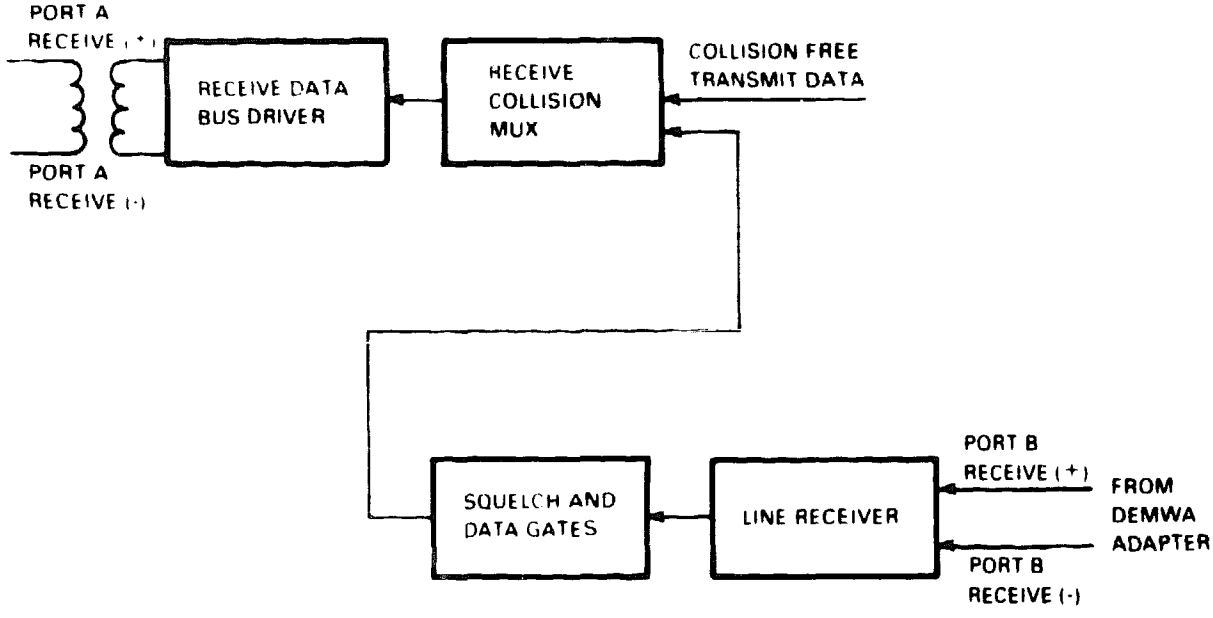


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Table 3–2 contains a summary of the operation of the DEMWA receive function.

Table 3–2: DEMWA Receive Function

Item	Function
Port B Connector Pins 3 and 10	Transfer receive interface signals to DEMWB.
Port B Receive Pair Line Receiver	Amplifies the signals received from the Port B Receive pair.
Port B Receive Pair Data Gate	Allows data from the line receiver to be passed only after the Receive pair squelch parameters have been met.
Port B Receive Pair Squelch Circuit	Provides noise immunity by ensuring that only valid signals on the Port B Receive pair are passed through the data gate.
Port A Receive Pair Line Driver	Amplifies the receive signal input and drives the Port A Receive pair of the DEMWA unit.
Port A Connector Pins 3 and 10	Transfer receive interface signals to the LAN Bridge.

3.4 COLLISION DETECTION FUNCTION

Collision detection is performed by the data presence and collision detector (refer to Figure 3–3). Collision Signaling is initiated by the data enable/collision control and generated by the 10 Hz Oscillator.

When valid signals are asserted on the Port A Transmit pair or the Port B Receive pair, the associated connector interface squelch circuit turns off. While the associated squelch circuit is off, it asserts the received signal to the data presence and collision detector.

The data presence and collision detector asserts a collision signal to the data enable/collision control if both the Port A Transmit pair and the Port B Receive pair are asserted simultaneously.

Figure 3–3: DEMWA Collision Detection Signal Flow Diagram

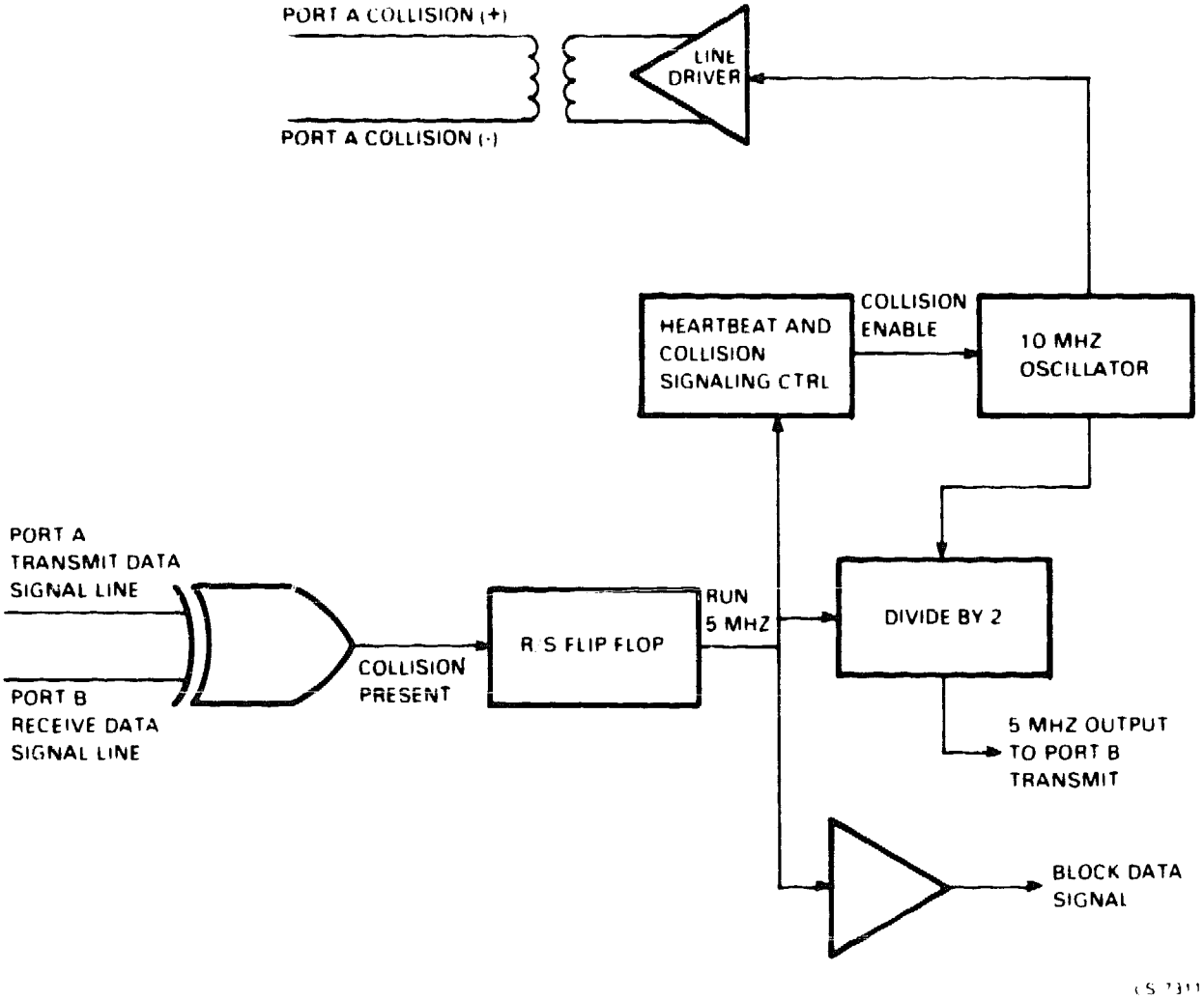


Table 3–3 contains a summary of the operation of the DEMWA collision detection function.

Table 3–3: DEMWA Collision Detection Function

Item	Function
Port A Transmit Pair Squelch Circuit	Asserts a transmit signal to the data presence and collision detector when the Port A Transmit pair squelch circuit turns off.
Port B Receive Pair Squelch Circuit	Asserts a receive signal to the data presence and collision detector when the Port B Receive pair squelch circuit turns off.
Data Presence and Collision Detector	Detects the condition in which the Port A Transmit pair and the Port B Receive pair are active simultaneously.
Data Enable/Collision Control	Blocks data signal to inhibit the normal transmit data path. Initiates Port B (5 MHz) and Port A (10 MHz) collision signaling.
10 MHz Oscillator	Generates and asserts a 10 Mhz signal on the Port A Collision Presence pair and to the transmit data substitute in response to collision signaling.
Transmit Data Substitute	Maintains an average 50/50 duty cycle on the Port B connector interface transmit data signal to generate 5 MHz signal used by Port B to signal a collision condition.
Port A Collision Presence Pair Line Driver	Amplifies the 10 MHz collision signal input and drives the Port A Collision Presence pair of the DEMWA unit.
Port B Transmit Pair Line Driver	Amplifies the 5 MHz collision signal input and drives the Port B Transmit pair.
Port A Collision Presence Pins 2 and 9	Transfer the 10 MHz collision signal to the LAN Bridge.
Port B Transmit Pins 3 and 10	Transfer the 5 MHz collision signal to the microwave equipment.

3.5 COLLISION PRESENCE TEST FUNCTION

DEMWA provides heartbeat signaling to the LAN Bridge for the collision detect circuitry self-test at the end of each transmission (refer to Table 3-4 and Figure 3–4).

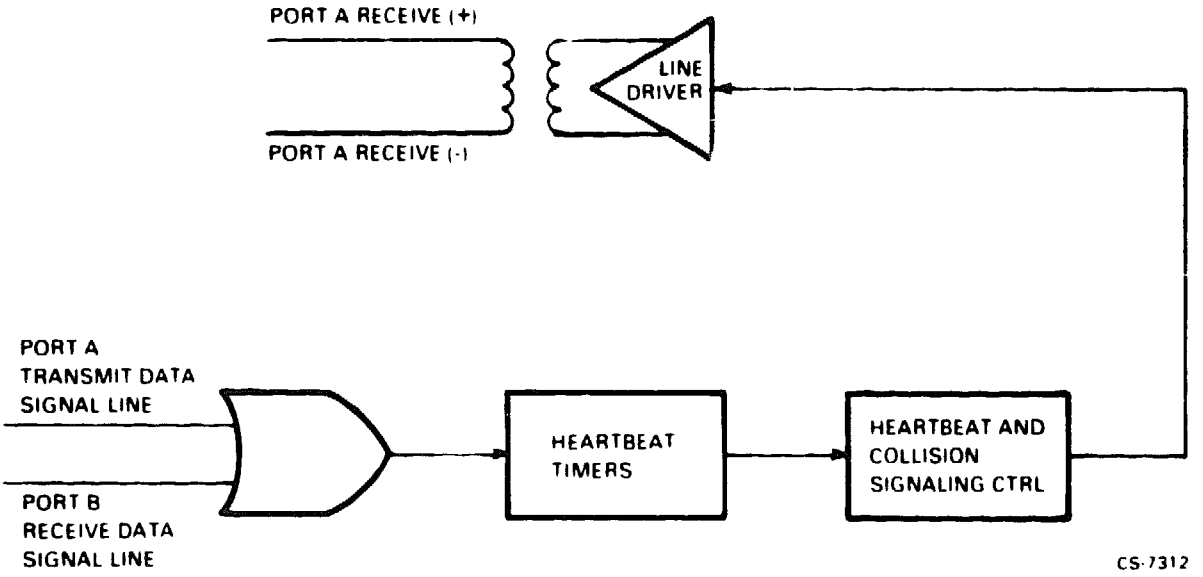
During each transmission interval, a transmit signal is asserted to the data presence and collision detector by the Port A connector interface squelch circuit. While the transmit signal is asserted, the data presence and collision detector asserts a data presence signal to the heartbeat timers. At the end of the transmission interval, the squelch circuit deasserts the transmit signal.

The heartbeat timers use the data presence signal to generate the heartbeat signal. The heartbeat timers contain two RC networks. While data is present, the RC networks are conditioned. When the data is no longer present, the RC networks, which are coupled to differential amplifiers, control assertion of the heartbeat signal.

Table 3–4: DEMWA Collision Presence Test Function

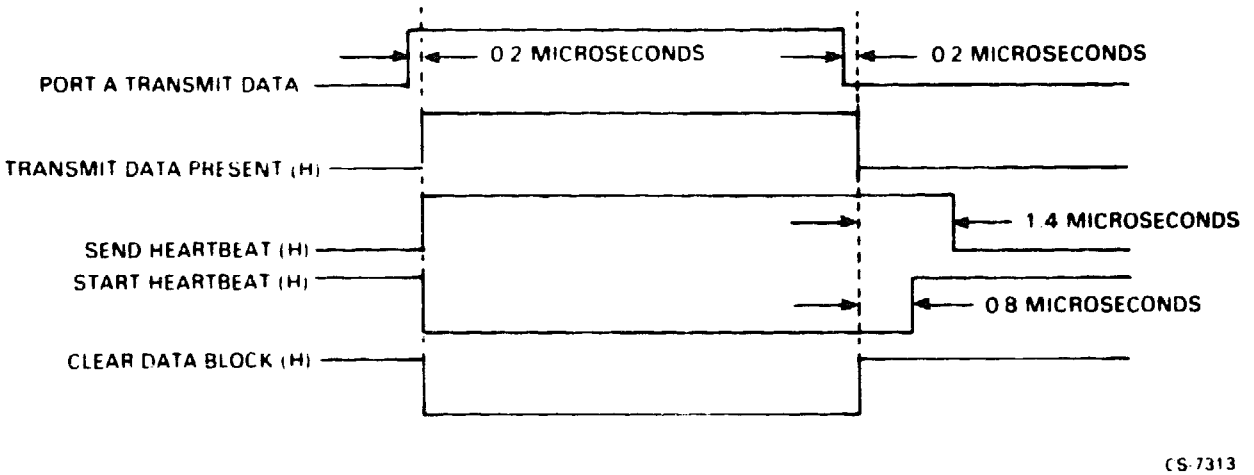
Item	Function
Port A Transmit Pair Squelch Circuit	Asserts a transmit signal to the data presence and collision detector when the Port A Transmit pair squelch circuit turns off.
Data Presence and Collision Detector	Monitors the operation of the Port A connector interface transmitter squelch circuits to ensure that valid Ethernet signals are being asserted on the Port A Transmit pair.
Heartbeat Timers	Control the interval and duration of the heart beat signal on the Port A Collision Presence pair.
Heartbeat and Collision Signaling Control	Responds to the heartbeat timers by applying the heartbeat signal, or Collision Presence Test, to the Port A Collision Presence pair after each transmission from the LAN Bridge.
Port A Collision Presence Pair Line Driver	Amplifies the heartbeat signal input and drives the Port A Collision Presence pair of the DEMWA unit.
Port A Collision Presence Pins 2 and 9	Transfer the heartbeat signal to the LAN Bridge.

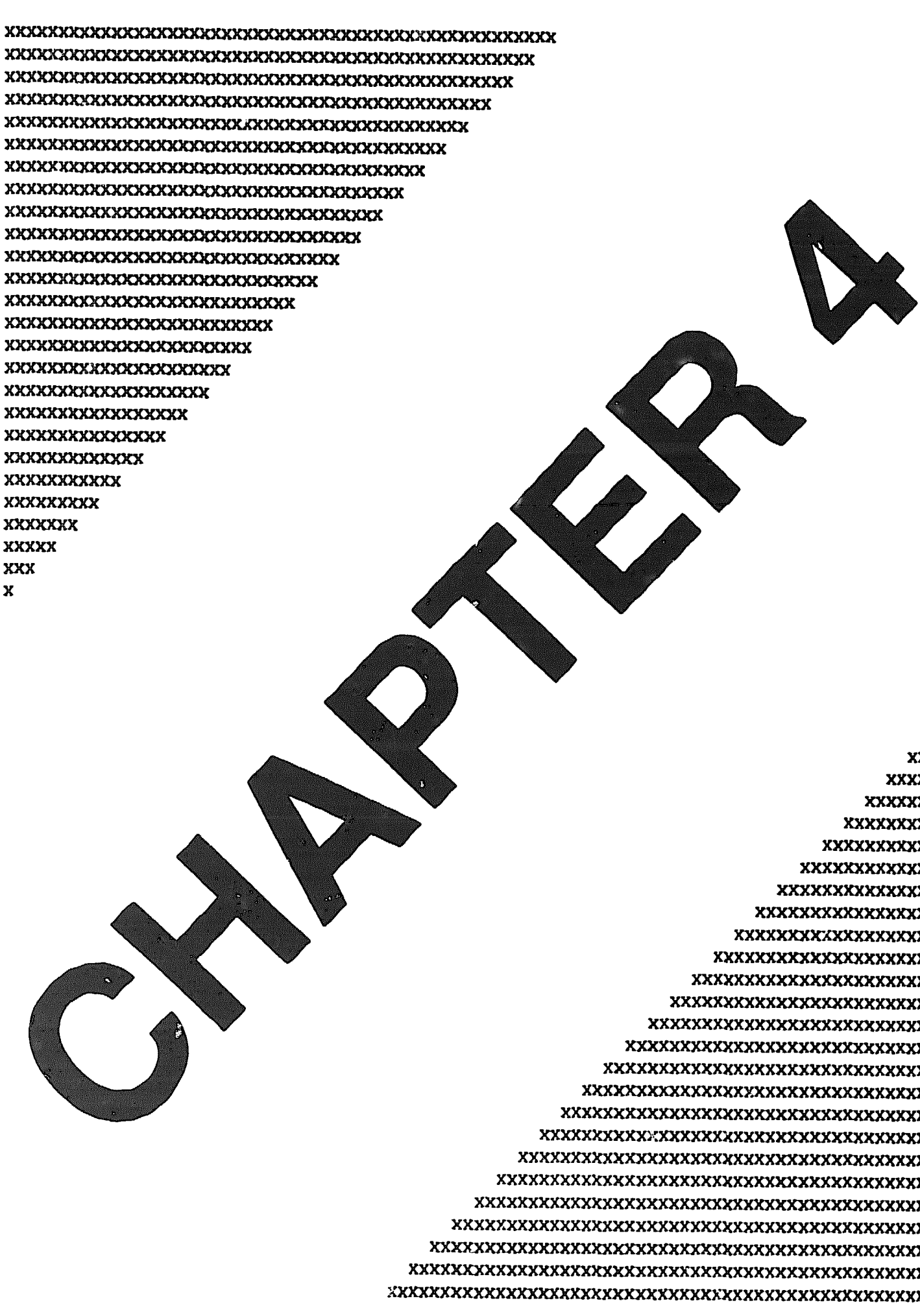
Figure 3–4: DEMWA Collision Presence Test Signal Flow Diagram



The heartbeat signal (see Figure 3-5) enables the output of the heartbeat and collision signaling control. This output is asserted approximately 0.8 µs after the data presence signal is deasserted and remains asserted for approximately 1.4 µs. This provides a 0.6 µs window following each transmission interval in which heartbeat signaling is performed.

Figure 3–5: Heartbeat Signal Timing




CHAPTER 4

Chapter 4

DEMWA TECHNICAL DESCRIPTION

This chapter describes the following technical characteristics:

- Communication Interfaces
- Input/Output Circuit and Signal Characteristics
- Input Power Requirements
- Environmental Requirements

4.1 COMMUNICATION INTERFACES

The DEMWA communication interfaces are effected through the Port A connector and the Port B connector. The Port A connector links the DEMWA to the LAN Bridge. The Port B connector links the DEMWA to the microwave equipment.

This section describes the following:

- Port A Connector Interface
- Port B Connector Interface
- Input/Output Signal Flow and Timing Relationships

4.1.1 Port A Connector Interface

The Port A connector is physically isolated from the metal chassis. The backshell of the connector is connected electrically to chassis ground through a capacitor to maintain electrical isolation. The electrical isolation characteristics are:

- Impedance (connector backshell to chassis) 3 MHz to 30 MHz
  - — 10 Ω maximum
  - — 0.5 Ω minimum
- Isolation at 60 Hz
  - — 280 KΩ typical
  - — 250 KΩ minimum
- Breakdown voltage at 60 Hz
  - — 270 V rms

The Port A connector provides the signal line interface defined in Table 4–1.

Table 4–1: Port A Connector Signal Line Interface

Port A Connector Pin	Interface Signal Designation
1	No Connection
2	Port A Collision Presence (+)†
3	Port A Transmit (+)‡
4	Reserved
5	Port A Receive (+)†
6	No Connection
7	Reserved
8	Reserved
9	Port A Collision Presence (-)†
10	Port A Transmit (-)‡
11	Reserved
12	Port A Receive (-)†
13	No Connection
14	Reserved
15	Reserved

† Denotes output signals
‡ Denotes input signals

4.1.2 Port B Connector Interface

The Port B connector is physically and electrically connected directly to the DEMWA chassis (chassis ground) by the metal shell of the connector. The electrical characteristics of this connection are:

Resistive at dc	0.10 Ω maximum
Inductive at 10 MHz	50 nH

The Port B connector provides the signal line interface defined in Table 4–2.

Table 4–2: Port B Connector Signal Line Interface

Port B Connector Pin	Interface Signal Designation
1	No Connection
2	No Connection
3	Port B Transmit (+)†
4	Reserved
5	Port B Receive (+)‡
6	No Connection
7	Reserved
8	Reserved
9	No Connection
10	Port B Transmit (-)†
11	Reserved
12	Port B Receive (-)‡
13	No Connection
14	Reserved
15	Reserved

† Denotes output signals
‡ Denotes input signals

4.1.3 Input/Output Signal Flow and Timing Relationships

The Port A Transmit pair signal, when asserted, is routed to the Port A Receive pair and the Port B Transmit pair. Following termination of the signal asserted on the Port A Transmit pair, a heartbeat signal is asserted on the Port A Collision Presence pair.

The time delay between assertion of the signal on the Port A Transmit pair and assertion of the signal on the Port A Receive pair and the Port B Transmit pair is due to DEMWA squelch circuit characteristics. The time delay between the data content of the Port A Transmit pair signal and the data content of the Port A Receive pair signal and the Port B Transmit pair signal is due to steady-state propagation delay through the DEMWA unit.

The Collision Presence pair of Port A of the DEMWA unit is asserted at the end of the each transmission interval (Collision Presence Test or heartbeat signaling) and when a collision is detected. For heartbeat signaling, a short duration 10 MHz signal is asserted on the Collision Presence pair. For collision signaling, a 10 MHz signal is asserted on the Collision Presence pair until the conflicting Port A Transmit pair is deasserted.

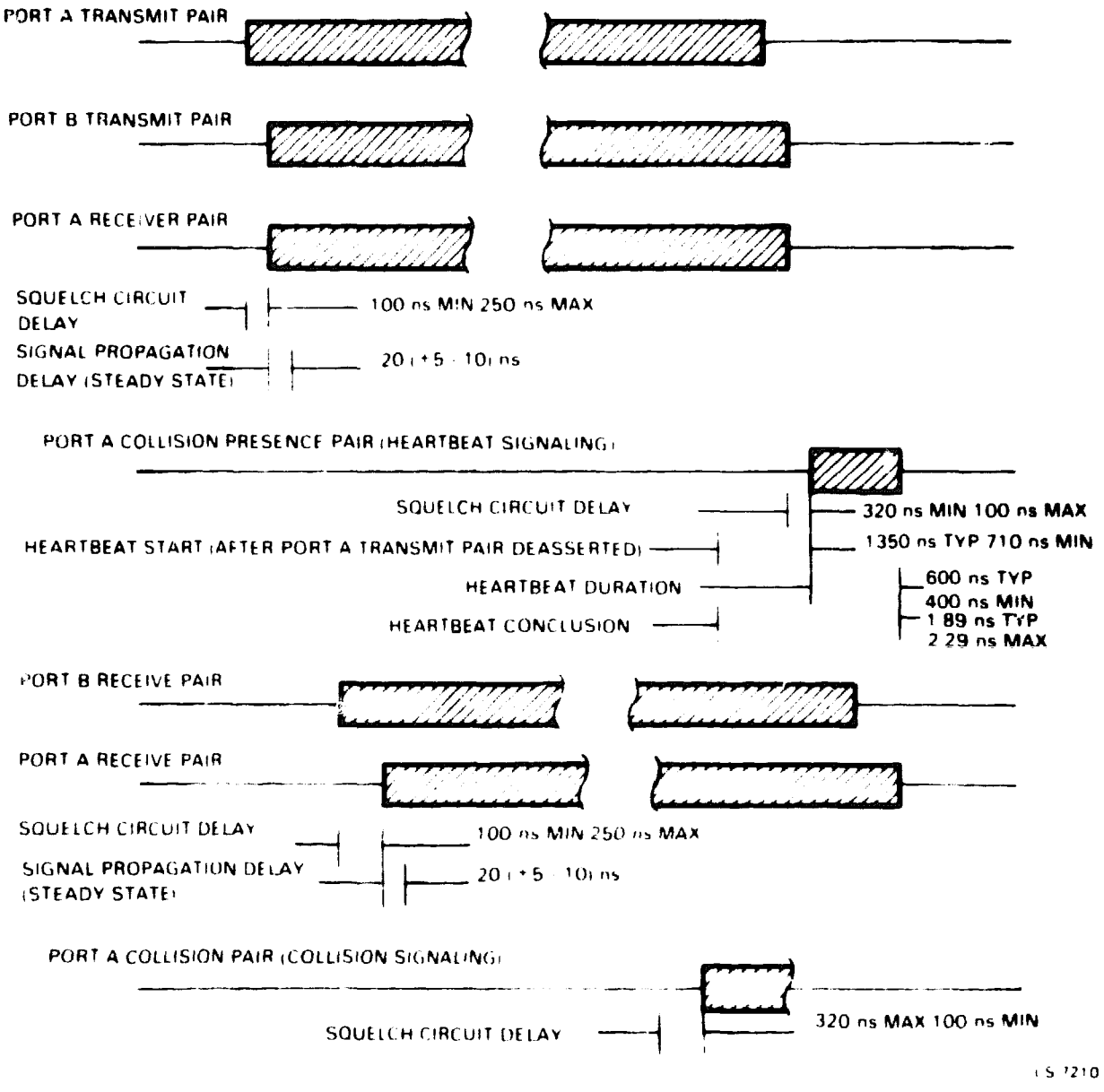
The DEMWA unit detects the signals asserted on the Port B Receive pair and routes the signals to the Port A Receive pair.

The time delay between assertion of the signal on Port B and assertion of the signal on Port A is due to DEMWA squelch circuit characteristics. The actual time delay between the data content of the Port B Receive pair signal and the data content of the Port A Receive pair signal is due to steady-state propagation delay through the DEMWA unit.

When a collision condition is detected (Port B Receive and Port A Transmit both asserted), the DEMWA unit interrupts the normal data path to the Port B Transmit pair and asserts a 5 MHz signal on the Port B Transmit pair. This ensures that a signal that meets Ethernet requirements is asserted on the Port B Transmit pair. The 5 MHz signal remains asserted until the conflicting Receive and Transmit pairs are deasserted. Also, the occurrence of a collision causes a 10 MHz signal to be asserted on the Port A Collision Presence pair for the duration of the conflicting transmits. In addition, data is disabled on the Port A Receive pair during a collision.

Figure 4–1 shows signal timing relationships.

Figure 4–1: DEMWA Signal Timing Diagram



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4.2 INPUT/OUTPUT CIRCUIT AND SIGNAL CHARACTERISTICS

This section describes the following characteristics:

- Port A Signal Characteristics
- Port B Signal Characteristics

4.2.1 Port A Signal Characteristics

This section describes the following Port A signals:

- Port A Transmit Pair Signal Requirements
- Port A Transmit Pair Circuit Response
- Port A Receive Pair Circuit Characteristics
- Port A Receive Pair Signal Characteristics
- Port A Collision Presence Pair Circuit Characteristics
- Port A Collision Presence Pair Signal Characteristics

4.2.1.1 Port A Transmit Pair Signal Requirements

- DEMWA Port A connector pins
  - — Port A Transmit (+) Pin 3
  - — Port A Transmit (-) Pin 10
  - — Signal level (measured differentially)
  - — 800 mV minimum
  - — 2400 mV peak-to-peak maximum

NOTE

During the idle state, the output of the circuit driving the Port A Transmit pair must be high. However, during the idle state, the output voltage decays to zero due to transformer coupling at the DEMWA input. The first transition of the signal asserted on the Port A Transmit pair must be negative going; the last transition must be positive going.

4.2.1.2 Port A Transmit Pair Circuit Response

The Port A Transmit pair is transformer-coupled to a squelch circuit, line receiver, and data gate.

The characteristics of the input circuitry associated with the Port A Transmit pair are as follows:

- Input impedance
  - Differential mode @10 MHz — ±3.9 Ω
  - Common mode (3 MHz to 20 MHz) — 18.5 Ω minimum
- Isolation transformer
  - Magnetizing inductance — 30 µH ±10%
  - Isolation withstanding voltage — 270 V rms minimum
  - Common mode voltage — ±30 V
- Squelch parameters
  - — The squelch circuit turns off only in response to valid Ethernet signals, remains off during the transmission interval, and turns on again after the end of the transmission interval. While the squelch is off, it allows the data asserted on the Port A Transmit pair to pass through the data gate.
  - — The squelch circuit has three parameters: turn-off, stay-off, and turn-on. The following information specifies squelch action relative to input signal parameters. Note that in the following list of parameters, -400 is less than -500.

Turn-off voltage	-350 mV typical, -400 mV minimum
Turn-off time	100 ns minimum, 250 ns maximum
Stay-off voltage	-100 mV minimum
Turn-on voltage	-150 mV typical, -100 mV maximum
Turn-on time	120 ns minimum, 270 ns maximum

4.2.1.3 Port A Receive Pair Circuit Characteristics

The characteristics of the circuitry associated with the Port A Receive pair are as follows:

- Source impedance of driver
  - — 430 Ω typical
  - — 408 Ω minimum
- Isolation transformer

- Magnetizing inductance	30 µH ±10%
- Isolation withstanding voltage	270 V rms minimum

4.2.1.4 Port A Receive Pair Signal Characteristics

- DEMWA Port A connector pins
  - — Port A Receive (+) Pin 5
  - — Port A Receive (-) Pin 12
- Signal level into 78 ±5 Ω (measured differentially)
  - — 1100 mV peak-to-peak minimum
  - — 1500 mV peak-to-peak maximum
- Timing asymmetry (duty cycle timing variance for a minimum voltage 10 MHz signal having a 50% duty cycle)
  - — 1 ns typical
  - — 2 ns maximum
- Signal rise/fall time (20% to 80%)
  - — 3.5 ns typical
  - — 1.5 ns minimum
  - — 5.0 ns maximum

NOTE

During the idle state, the output of the circuits driving the Port A Receive pair is high. However, during the idle state, the output voltage decays to zero due to transformer coupling. The first transition of the signal asserted on the Port A Receive pair is negative going; the last transition is positive going.

4.2.1.5 Port A Collision Presence Pair Circuit Characteristics

The characteristics of the circuitry associated with the Port A Collision Presence pair is as follows:

- Source impedance of drivers
  - — 430 Ω typical
  - — 408 Ω minimum
- Isolation transformer

- Magnetizing inductance	30 µH ±10%
- Isolation withstanding voltage	270 V rms minimum

4.2.1.6 Port A Collision Presence Pair Signal Characteristics

The characteristics of the signals associated with the Port A Collision Presence pair are as follows:

- DEMWA Port A connector pins
  - — Port A Collision Presence (+) Pin 2
  - — Port A Collision Presence (-) Pin 9
- Signal level into 78 ±5 Ω (measured differentially)
  - — 1100 mV peak-to-peak minimum
  - — 1500 mV peak-to-peak maximum
- Signal frequency
  - — 10 ±1 MHz
- Timing asymmetry (duty cycle timing variance for a minimum voltage 10 MHz signal having a 50% duty cycle)
  - — 1 ns typical
  - — 2 ns maximum
- Signal rise/fall time (20% to 80%)
  - — 3.5 ns typical
  - — 1.5 ns minimum
  - — 5.0 ns maximum

NOTE

During the idle state, the output of the circuits driving the Port A Collision Presence pair is high. However, during the idle state, the output voltage decays to zero due to transformer coupling. The first transition of the signal asserted on the Port A Collision Presence pair is negative going.

4.2.2 Port B Signal Characteristics

This section describes the following Port B signal characteristics:

- Port B Transmit Pair Circuit Characteristics
- Port B Transmit Pair Signal Characteristics
- Port B Receive Pair Signal Requirements
- Port B Receive Pair Circuit Response

4.2.2.1 Port B Transmit Pair Circuit Characteristics

The characteristics of the circuitry associated with the Port B Transmit pair are as follows:

- Source impedance of driver
  - — 680 Ω typical
  - — 646 Ω minimum

4.2.2.2 Port B Transmit Pair Signal Characteristics

- DEMWA Port B connector pins
  - — Port B Transmit (+) Pin 3
  - — Port B Transmit (-) Pin 10
- Signal level into 78 ±5 Ω (measured differentially)
  - — 800 mV minimum
  - — 1500 mV peak-to-peak maximum
- Timing asymmetry (duty cycle timing variance for a minimum voltage 10 MHz signal having a 50% duty cycle)
  - — 1 ns typical
  - — 2 ns maximum
- Signal rise/fall time (20% to 80%)
  - — 3.5 ns typical
  - — 1.5 ns minimum
  - — 5.0 ns maximum

NOTE

During the idle state, the output of the circuit driving the Port B Transmit pair is high. However, during the idle state, the output voltage decays to zero due to transformer coupling in the DEMWA Adapter, to which the signal is asserted. The first transition of the signal asserted on the Port B Transmit pair is negative going; the last transition is positive going.

4.2.2.3 Port B Receive Pair Signal Requirements

- DEMWA Port B connector pins
  - — Port B Receive (+) Pin 5
  - — Port B Receive (-) Pin 12
- Signal level (measured differentially)
  - — 800 mV minimum
  - — 2400 mV maximum

NOTE

During the idle state, the output of the circuit driving the Port B Receive pair is high. However, during the idle state, the output voltage decays to zero due to transformer coupling. The first transition of the signal asserted on the Port B Receive pair must be negative going; the last transition must be positive going.

4.2.2.4 Port B Receive Pair Circuit Response

The Port B Receive pair is asserted to a squelch circuit and data gate.

The characteristics of the input circuitry associated with the Port B Receive pair are as follows:

- Input impedance

- Differential mode @ 10 MHz	78 ±3.9 Ω
- Common mode (3 MHz to 20 MHz)	18.5 Ω minimum

- Squelch parameters
  - — The squelch circuit turns off only in response to valid signals, remains off during the transmission interval, and turns on again after the end of the transmission interval. While the squelch is off, it allows the data asserted on the Port A Transmit pair to pass through the data gate.
  - — The squelch circuit has three parameters: turn-off, stay-off, and turn-on. The following information specifies squelch action relative to input signal parameters. Note that in the following list of parameters, -400 is less than -500.

Turn-off voltage	-350 mV typical, -400 mV minimum
Turn-off time	100 ns minimum, 250 ns maximum
Stay-off voltage	-100 mV minimum
Turn-on voltage	-150 mV typical, -100 mV maximum
Turn-on time	120 ns minimum, 270 ns maximum

4.3 INPUT POWER REQUIREMENTS

The input power requirements for the DEMWA unit are as follows:

- Voltage/frequency
  - — 90-128 Vac, 47-63 Hz, single phase
  - — 180-256 Vac, 47-63 Hz, single phase
- Current (steady state)
  - — 0.35 A at 120 Vac
  - — 0.18 A at 240 Vac
- Inrush current
  - — 10 A at 120 Vac
  - — 5 A at 240 Vac
- Surge current
  - — 2 A for 5 cycles at 120 Vac
  - — 1 A for 5 cycles at 240 Vac
- Apparent power
  - — 36 W at 120 Vac
  - — 36 W at 240 Vac
- Maximum power consumption
  - — 26 W at 120 Vac
  - — 26 W at 240 Vac
- Input power protection
  - — Fuse (3AG, 0.5 A, Slo-Blo (U.S. version))

4.4 ENVIRONMENTAL REQUIREMENTS

The DEMWA unit is designed for use in a Digital Equipment Corporation Class C Environment (a non-air-conditioned or exposed area in an industrial site).

The specific operational environmental conditions are as follows:

- Temperature
  - — 5°C (41°F) to 50°C (122°F)

NOTE

Temperature based on operation at sea level; 760 mm H (29.92 in H). Maximum allowable temperature is reduced by a factor of 1.8°C/1000 m (1°F/1000 ft) for operation at high altitude sites.

- Relative humidity
  - — 10% or less to 95% with maximum wet bulb 32°C (90°F) and minimum dew point 2°C (36°F)


APPENDIX A

Appendix A
NETWORK CONFIGURATION GUIDELINES

This appendix describes some configuration considerations for the METROWAVE Bridge that are necessitated by the Ethernet local area networks that it connects.

A.1 CONFIGURATION LIMITATIONS AND CONSIDERATIONS

Although use of a METROWAVE Bridge system extends the limitations of a single LAN, configuration guidelines for METROWAVE should be followed in order that network performance not be degraded.

A.1.1 LAN Bridge Performance Considerations

A message frame may have to travel through a number of bridges before reaching its destination. Note that increasing the number of bridges in the data path causes corresponding increases in the data path delay. This delay could have a negative impact on network performance, especially with time-critical protocols or with interactive tasks such as character echoing for users on terminal servers. Performance may start to degrade if a message frame must travel through more than seven bridges to get from its source station to its destination station. Each METROWAVE bridge system counts as two bridges in this calculation.

A.1.2 DEMWA Configuration Guidelines

The DEMWA is specifically designed to be installed in the METROWAVE Bridge System. The DEMWA is the component that physically connects the LAN Bridge to the microwave equipment by way of the DEMWA Adapter. Another configuration limitation of the DEMWA is the maximum length of Transceiver cable that can be used to interconnect the DEMWA to the LAN Bridge. It is recommended that the two-meter Transceiver cable (BNE4D-02) be used.

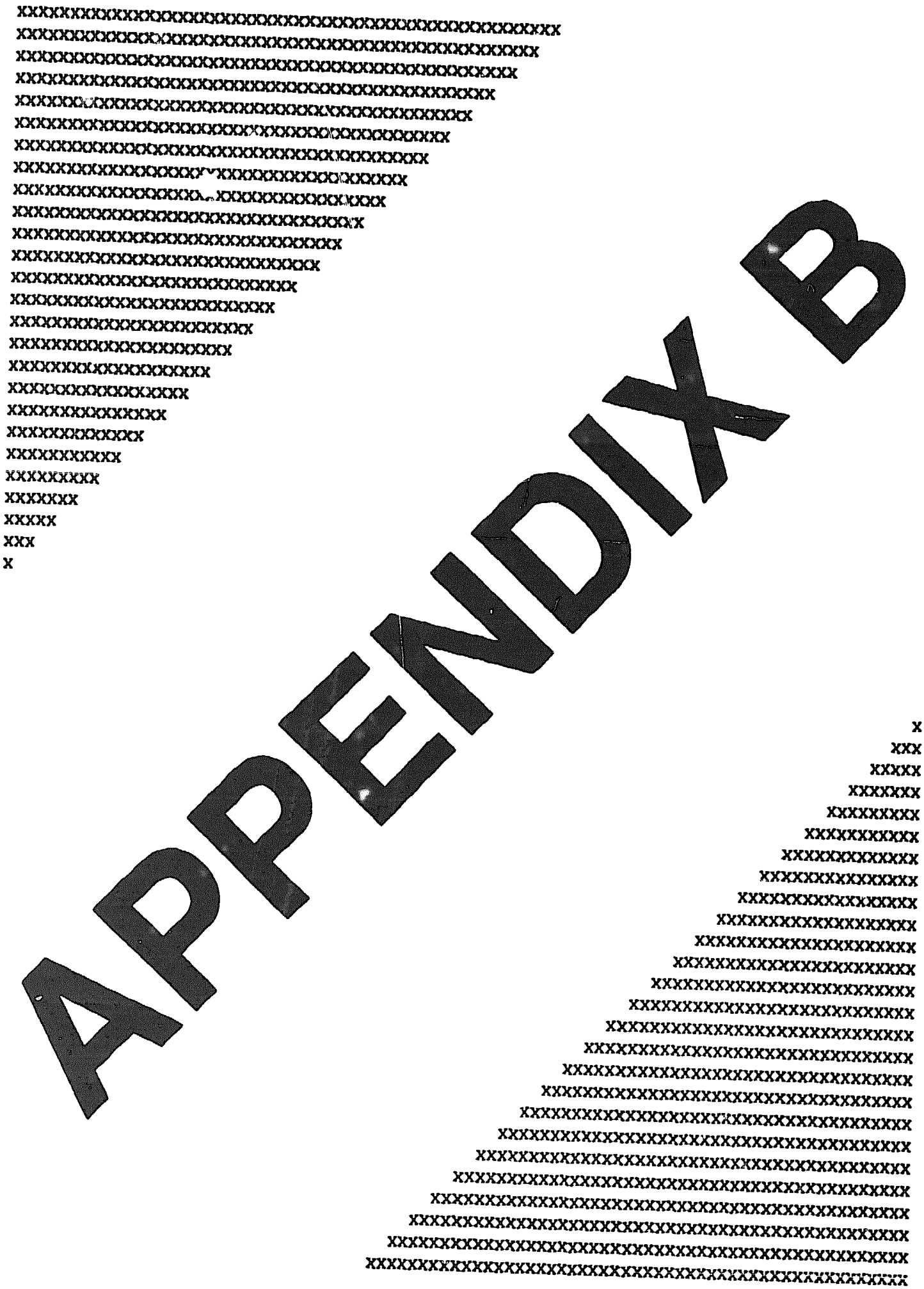
A.1.3 Maximum Microwave Path Length (Two and Four Foot Antenna Sizes)

Due to Ethernet protocol timing consideration between the DEMWB end stations, the maximum microwave path length of a DEMWB Bridge System is 4.5 miles. This distance is determined by the Ethernet Slot Time. That is, the period of time during which a collision can be detected. Propagation delays through the DEMWA and the coaxial cables from the microwave controllers to the antennas on each end were factored in to this calculation.

Table A–1 shows the microwave path length in miles for several different lengths of coaxial cable between the microwave controllers and the microwave radio frequency (RF) units.

Table A–1: Maximum Microwave Path Lengths for Various Cable Lengths

Coaxial Cable (total feet)	Antenna Path (miles)
0	4.56
100	4.53
200	4.50
600	4.38
1000	4.26
2000	3.96


APPENDIX B

Appendix B
DEMWA SPECIFICATIONS

This appendix provides a summary of the operational characteristics for the DEMWA. The following tables are included:

- Table B–1 DEMWA Dimensions and Weight
- Table B–2 DEMWA Port A Connector Electrical Specifications
- Table B–3 DEMWA Port B Connector Electrical Specifications
- Table B–4 DEMWA Port A Interface Signals
- Table B–5 DEMWA Port B Interface Signals
- Table B–6 DEMWA Power Requirements
- Table B–7 DEMWA Environmental Conditions
- Table B–8 Transmit Function Characteristics
- Table B–9 Receive Function Characteristics
- Table B–10 Collision Function Characteristics

Table B–1: DEMWA Dimensions and Weight

Width	17.50 in. (44.5 cm)
Depth	7.00 in. (17.8 cm)
Height	2.50 in. (6.4 cm)
Weight	10 lb (4.6 kg)

Table B–2: Port A Connector Electrical Specifications

Characteristic	Value
Backshell Impedance (3 MHz to 30 MHz)	0.5 Ω to 10 Ω
Isolation at 60 Hz	250 KΩ minimum (280 KΩ typical)
Breakdown voltage at 60 Hz	270 V rms

Table B–3: Port B Connector Electrical Specifications

Characteristic	Value
Resistive at dc	0.10 Ω maximum
Inductive at 10 MHz	50 nH

Table B–4: DEMWA Port A Interface Signals

	Port A Connector Pin
1	No Connection
2	Port A Collision Presence (+)†
3	Port A Transmit (+)‡
4	Reserved
5	Port A Receive (+)†
6	No Connection
7	Reserved
8	Reserved
9	Port A Collision Presence (-)†
10	Port A Transmit (-)‡
11	Reserved
12	Port A Receive (-)†
13	No Connection
14	Reserved
15	Reserved

† Denotes output signals
‡ Denotes input signals

Table B–5: DEMWA Port B Interface Signals

	Port B Connector Pin
1	No Connection
2	No Connection
3	Port B Transmit (+)†
4	Reserved
5	Port B Receive (+)‡
6	No Connection
7	Reserved
8	Reserved
9	No Connection
10	Port B Transmit (-)†
11	Reserved
12	Port B Receive (-)‡
13	No Connection
14	Reserved
15	Reserved

† Denotes output signals
‡ Denotes input signals

Table B–6: DEMWA Power Requirements

Characteristic	120 Vac	240 Vac
Voltage, frequency	90-128 Vac, 47-63 Hz	180-256 Vac, 47-63 Hz
Current (steady state)	0.35 A	0.18
Inrush current	10 A	5 A
Surge current	2 A for 5 cycles	1 A for 5 cycles
Apparent power	36 W	36 W
Maximum power consumption	26 W	26 W

Table B–7: DEMWA Environmental Conditions

Condition	Range
Temperature	5°C (41°F to 50°C 122°F)
Humidity	10% or less to 95%

Table B–8: Transmit Function Characteristics

Characteristic	Transmit Port A-Receive Port B
Signal Level	800 mV peak-to-peak to 2400 mV peak-to-peak
Input Impedance (differential mode @ 10 MHz)	78 ±3.9 Ω
Input Impedance (common mode @ 3 MHz to 20 MHz)	18.5 Ω minimum
Squelch Turn-off voltage	-350 mV typical, -400 mV minimum
Squelch Turn-off time	100 ns minimum, 250 ns maximum
Squelch Stay-off voltage	-100 mV minimum
Squelch Turn-on voltage	-150 mV typical, -100 mV maximum
Squelch Turn-on time	120 ns minimum, 270 ns maximum
Port A Isolation Transformer Magnetizing Inductance	300 ±10% µH
Port A Isolation Transformer Isolation withstanding voltage	270 V rms minimum
Port A Isolation Transformer Common mode voltage	±30 V

Table B–9: Receive Function Characteristics

Characteristic	Transmit Port B-Receive Port A
Source impedance of Port B driver	646 Ω minimum (680 Ω typical)
Port A Signal level into 78 ±5 Ω (measured differentially)	800 mV peak-to-peak to 1500 mV peak-to-peak
Timing asymmetry (duty cycle timing variance for a minimum voltage 10 MHz signal having a 50% duty cycle)	1 ns typical (2 ns maximum)
Signal rise/fall time (20% to 80%)	1.5 ns to 5.0 ns (3.5 ns typical)
Source impedance of Port A driver	408 Ω minimum (430 Ω typical)
Port B Signal level into 78 ±5 Ω(measured differentially)	1100mV peak-to-peak

Table B–10: Collision Function Characteristics

Characteristic	Collision Presence Pair
Source impedance of drivers	408 Ω minimum (430 Ω typical)
Signal level into 78 ±5 Ω(measured differentially)	1100 mV peak-to-peak to 1500 mV peak-to-peak
Signal frequency	10 ±1 MHz
Timing asymmetry (duty cycle timing variance for a minimum voltage 10 MHz signal having a 50% duty cycle)	2 ns maximum (1 ns typical)
Signal rise/fall time (20% to 80%)	1.5 ns to 5.0 ns (3.5 n[illegible]al)