SYS5000-62 11/10/93
HME#400220 Rev A

Systems 2000A, 2000D and 2010

Wireless Drive-Thru Audio Systems

Installation and Maintenance Instructions

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1.2 PRODUCTS COVERED IN THIS MANUAL

This manual covers the installation and maintenance of the following HM Electronics Wireless Drive-Thru Communications Systems:

System 2000A
System 2000D
System 2010

This manual does not cover system operation. For operation information, refer to the Operator's Manual for your system.

1.3 OPTIONS

The following options can be added to each system:

VDB100/VDB101/VDL100 Vehicle detector and loop
DU1 Ultrasonic Vehicle detector
ANT3000 Remote Antenna
AD3000 Antenna Diversity System
EMG2000 Emergency Backup System

1.4 TERMS USED IN THIS MANUAL

This list contains some unique terms used in this manual.

System	A system consists of several components, such as, the base station, antenna, communicators, etc. that make up the operating system.
Base Station	General term for all WBS 2000 series base stations.
Communicator	COM2000 communicator.
HME	HM Electronics

HME ships with hardware needed for installation. These are found in a package in the shipping container. Other items, not supplied by HME, may be needed for installation:

- Wire Nuts
- TieWraps
- Wire Ease
- Electrical Tape or shrink tubing
- Solder

Tools Required For Installation

Use the following tools:

- Phillips Screwdriver #2
- Adjustable (Slip Joint) Pliers
- Wire Stripers
- Flashlight
- Sharpie
- 1/4" Drill Bit
- Flat Blade Screwdriver #0
- Diagonal Cutters
- Soldering Iron
- Fish Tape
- Measuring Tape
- Drill

1.5 RECEIVING AND UNPACKING

Inspect for damaged boxes and equipment for damage.
Save the packing material. Always try to return the equipment in its original packing material and boxes. If you use inadequate packing material, you must pay repair costs for any reshipment damage, because carriers will not pay claims on incorrectly packaged equipment.

Call HME for a return authorization. HME's Customer Support representative will ask for the name of the person returning the equipment, telephone number, company name, equipment type, and a description of the problem. Call 1-800-848-4468.

SECTION 2
INSTALLATION

2.1 INSTALLING THE SYSTEM

Before mounting the system hardware, check the preinstallation check list (appendix A), make sure the outside cables have been installed, and, if needed, install the vehicle detector loop.

2.1.1 WBS2000 BASE STATION

Typically the base station is mounted in, or close to, the drive-thru booth as high on the wall as practical. The base station must be conveniently reachable by the user. Appendix B describes testing for alternate locations. To mount the base station:

1. Hold the base station against the wall over the NEMA box and mark the mounting holes. (Appendix B contains a Base Station Mounting Template.)
2. Drill four 1/4 inch holes 1-1/4 inch deep to hold the wall anchors.
3. Insert the wall anchors.
4. Secure the base station housing to the wall using the screws provided with the system.

For base station wiring instructions, refer to the following figures:

Figure 2-6 System 2000A.
Figure 2-9 System 2000D.
Figure 2-10 System 2010.

2.1.2 SP2000A Menu Board Speaker/Microphone

Mount the Menu Board Speaker Microphone to the speaker post or menu board (see figure 2-1).

IMPORTANT
To minimize vehicle engine noise pick up, mount the SP2000A speaker at least 42 inches (1.07m) above the surface of the drive-thru lane.

1. Hold the speaker against the mounting surface, and mark the mounting holes through the base of the speaker. Drill the holes, and mount the speaker flush to the grill using the hardware supplied.
2. Connect the wires from the speaker to the **Green** and **White** wires in the CBL100 cable.
3. Solder the connections and wrap the wires with electrical tape, shrink tubing, or wire nuts. Tape the shield out of the way.

For wiring instructions for the SP2000A, refer to figure 2-6.

2.1.3 SP2000D Menu Board Speaker/Microphone

Mount the Menu Board Speaker/Microphone to the speaker post or menu board. Be certain there is enough clearance in all directions for the speaker to fit front flush against the speaker grill; see figure 2-2. For system wiring, see figure 2-9.

IMPORTANT
Always install the SP2000D vertically with arrows up. However If the SP2000D must be installed horizontally, position it so the arrows point toward approaching traffic. Mount the SP2000D speaker at least 42 inches (1.07m) above the surface of the drive-thru lane to minimize pickup of vehicle engine noise.

To mount the speaker (figure 2-2):

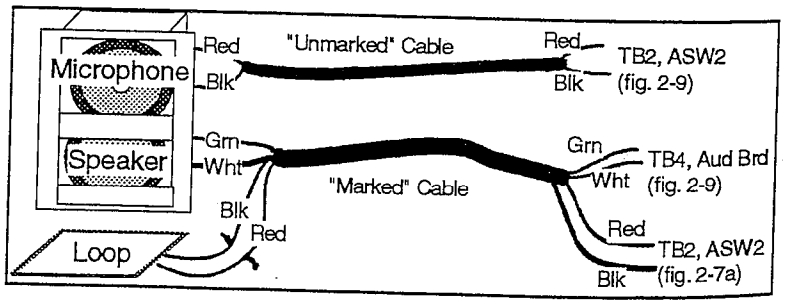
1. Hold the SP2000D front flush against the speaker grill.
2. Mark and drill four 1/8 inch (3.175mm) holes in the grill. Use the SP2000D Template shipped with the SP2000D.
3. Position the plastic flat against the speaker grill inside the speaker post or menu board. Trim the plastic to fit so the plastic blocks the unused grill area.
4. Place the plastic sheet between the grill and the speaker.
5. Secure the speaker unit flush and tight against the back of the speaker grill with the plastic sheet between using the screws and nuts.

Cables

The SP2000D Speaker and Microphone uses two sets of cables. One cable (CBL100) connects the lower speaker of the SP2000D to TB4 on the Audio Board (figure 2-9) and the vehicle detector loop to TB1 on the VDB100 or VDB101 Vehicle Detector Board (figure 2-7a). You should "Mark" this cable to ease cable identification when connecting the wires. The other cable (CBL101) connects the upper microphone on the SP2000D to TB2 on ASW2 (figure 2-9). You should leave this cable unmarked to identify the cable when connecting the wires.

Splice, solder, and insulate the wires as shown in figure 2-2.

CAUTION
Always run the microphone in a separate cable. The speaker can be run with the loop, if installed.



2.1.4 VBD Vehicle Detector

This detector consists of a buried loop (not included with the system) and a detector board. If a Vehicle Detector was ordered with a new System, the Vehicle Detector Board, VDB100 or

VDB101, may come installed and wired in the Base Station. Refer to appendix A, Loop Installation for installation of the loop. Figures 2-6, 2-9, and 2-10 illustrate system wiring. To add a Vehicle Detector,

1. Open the Base Station lid.
2. See figure 2-3. Place the Vehicle Detector board on the three nylon edge supports at upper left corner of the lid. Press the board onto the edge supports until it snaps into place.
3. Connect the white end of the interface cable to the 3-pin nylon connector (P1) on the Vehicle Detector Board, and connect the black end to the black connector J2 ASW2.
4. Connect the loop to the terminal block, see figures 2-6, 2-9, and 2-10.

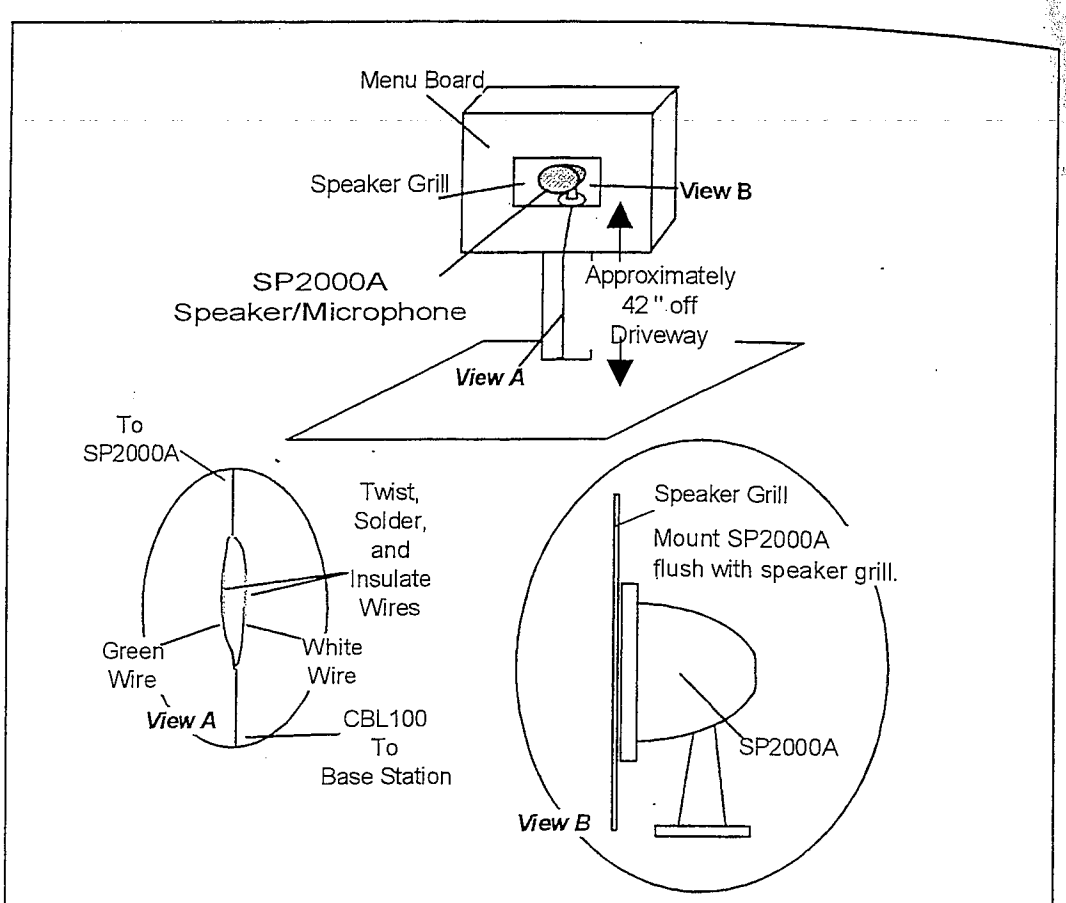


Figure 2-1. SP2000A Installation

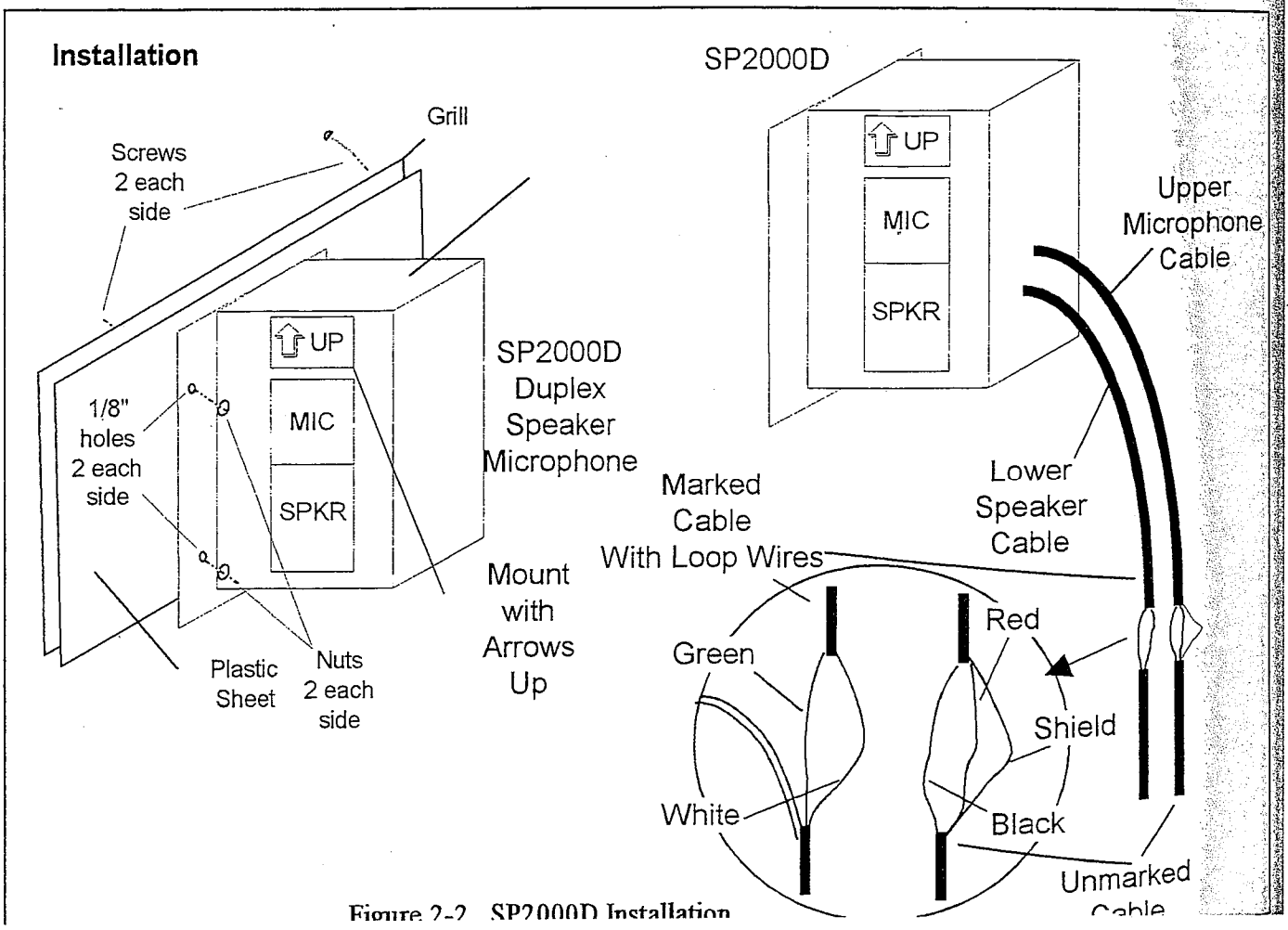


Figure 2-2. SP2000D Installation

2.1.5 DU1 Ultrasonic Vehicle Detector

The DU1 consists of two parts: the detector and the electronic unit. Figure 2-4 summarizes the installation. For installation details, refer to *DU1 Unit Installation Instructions*. Figures 2-6, 2-9, and 2-10 show DU1 to Base Station wiring.

2.2 OTHER SYSTEM COMPONENTS

2.2.1 AC 2000 Battery Charger

Place the AC 2000 Battery Charger in any low-traffic area, away from dust, splashing water, and grease. Plug the AC Adapter cord into the connector on the back of the case, and plug the adapter into an AC electrical outlet. A red CHARGING light on the front panel shows a charging battery. When the battery is fully charged, the green READY light on the front panel lights.

CAUTION

Never remove batteries from the Battery Charger until the green READY light is lit, otherwise the charger resets and the charge cycle begins again.

2.2.2 EMG2000 Emergency Backup System

The EMG2000, backup intercom, interfaces with any System. The EMG2000 uses the speaker/microphone and vehicle detector of the wireless system while bypassing the wireless Communicators and transceiver of the Base Station. The Emergency Backup System comes with detailed installation instructions that are summarized below.

1. Locate the EMG2000 on the wall near the POS (point of sale) terminal.
2. Place the EMG2000 within 4 feet of an electrical outlet and about 4 feet from the floor.
3. When the desired location is found, hold the EMG2000 against the wall, and mark the wall with a pencil through the two screw holes on the top bracket
   Drill two 7/16 inch (11.11mm) holes in the wall at the marked spots.
4. Use the enclosed hardware to mount the unit on the wall at the two drilled holes.
5. Plug the 4-pin XLR connector on the XLR cable into the 4-pin XLR receptacle on the top of the EMG2000 control unit.
6. Route the cable along the wall or the ceiling to the Base Station. Fasten the XLR cable to the wall with clips or route the cable through the conduit.
7. Connect one end of the enclosed cable (115087) to the EMG2000 AC Adapter, and the other end to the top of the control unit..

For EMG2000 installation wiring, refer to figures 2-6, 2-9, and 2-10. Note: When the EMG2000 is used with System 2010, the EMG2000 only receives inbound audio.

IMPORTANT

Always disconnect the EMG2000 from the AC outlet when not in use.

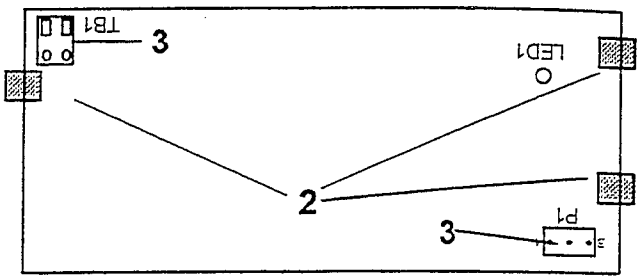


Figure 2-3. VDB100 & VDB101 Installation

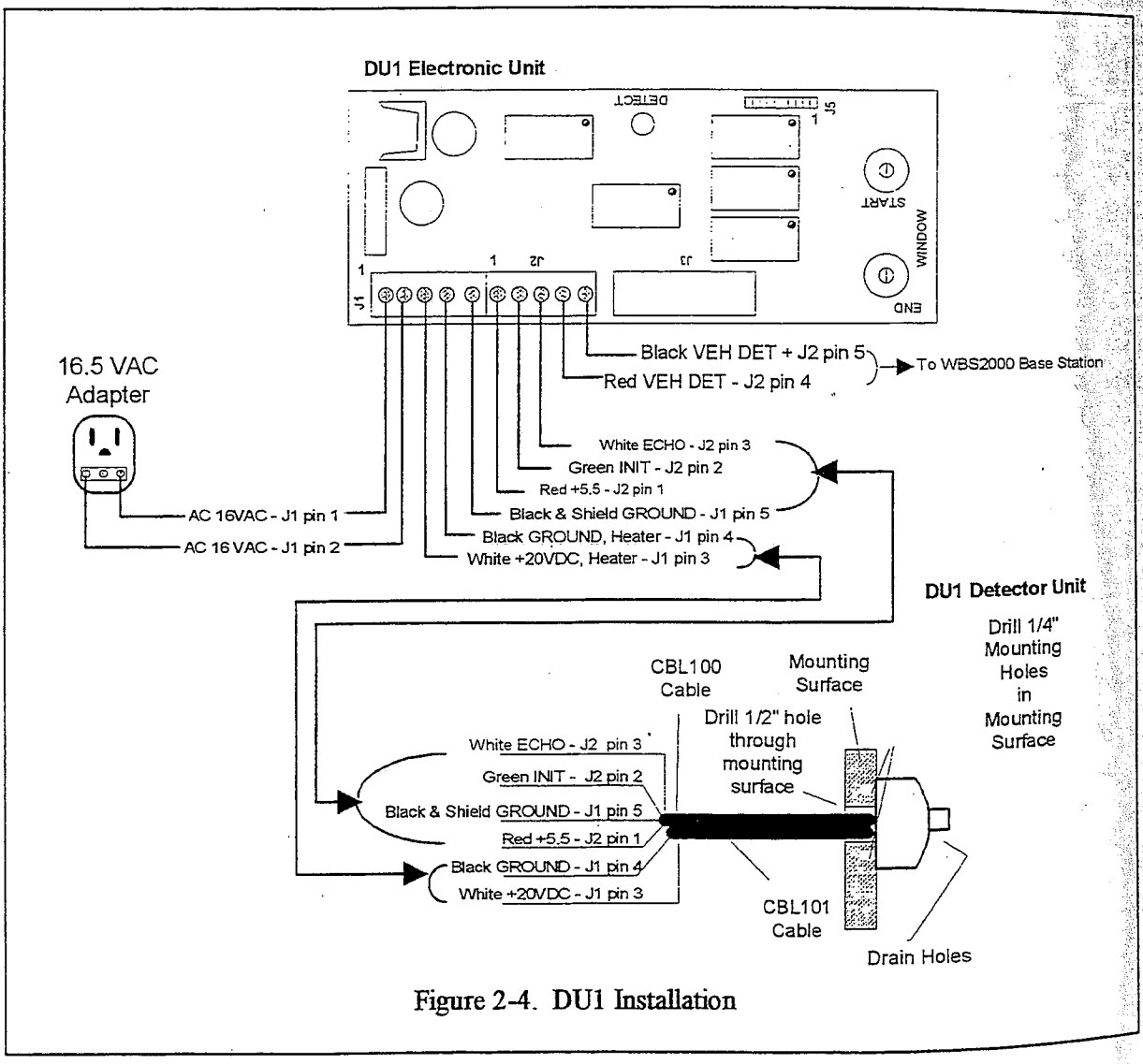


Figure 2-4. DU1 Installation

2.2.3 Message Repeater Installation

Message Repeater, MR100 comes with its own set of installation and wiring instructions.

2.2.4 Monitor/Grill Speaker

To install the MM100 Monitor/Grill Speaker, see figure 2-5. For installation wiring, refer to figures 2-6, 2-9, and 2-10.

2.2.5 System 2010 Microphone

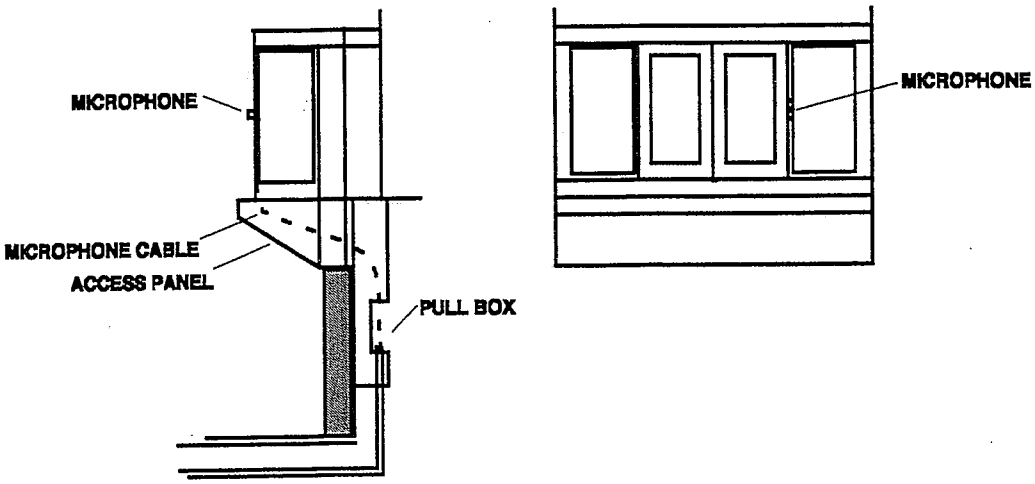
Go outside the order-taker booth. Mark the right window mullion and mark the sill where the mullion meets the sill. Remove the window and check the sill at the marked point for a predrilled hole. If none, drill a hole for the microphone cable into the sill, 0.75" in diameter. The hole should be placed directly beneath the point where the mullion would meet the sill.

Drill a 0.5" diameter hole on the exterior of the right-hand window mullion at mid-point. Insert the microphone into the hole and use the bracket as a template to mark the screw holes. Drill the two screw holes, 0.12" in diameter, 3.75" apart, and each 1.875" from the microphone hole.

Place the rubber gasket over the microphone hole on the inside of the window mullion. Run fishtape through the microphone hole, the rubber gasket, the mullion, and the sill hole. Use access panel under the window. Run the fishtape through the wall to the pull-box inside the order-taker booth.

Go to the outside of the booth. Attach the fishtape to the base station end of the microphone cable. Pull the cable through the mullion and the sill into the wall from the access panel under the booth window. Go inside and pull the cable through the wall to the pull box.

Go outside and insert the microphone through the rubber gasket and into the window mullion. Attach the microphone assembly to the mullion with the screws provided. Go inside. Measure and cut the microphone cable to reach the audio board in the base station. Connect the cable wires as shown in figure 2-10.



HOW TO USE FIGURES 2-6, 2-7, 2-8, 2-9, AND 2-10

The standard system consists of an Audio Board, Transceiver Board, ASW2 Audio Switcher Board, and SP2000A speaker as shown in figure 2-6.

Identify the Vehicle Detector Option that will be used in the system;see figures 2-7a, 2-7b, 2-7c, and 2-7d.

If using a Wired Backup System, identify which Wired Backup System will be used; see figures 2-8a, 2-8b, and 2-8c.

Connect the Options to the ASW2 Audio Switcher Board (figure 2-6) by matching the reference designator of the option to the corresponding reference designator on the ASW2.

For Example, if a HME DU1 Ultrasonic is used, connect D1 on figure 2-7b to D1 on figure 2-6 and D2 on figure 2-7b to D2 on figure 2-6.

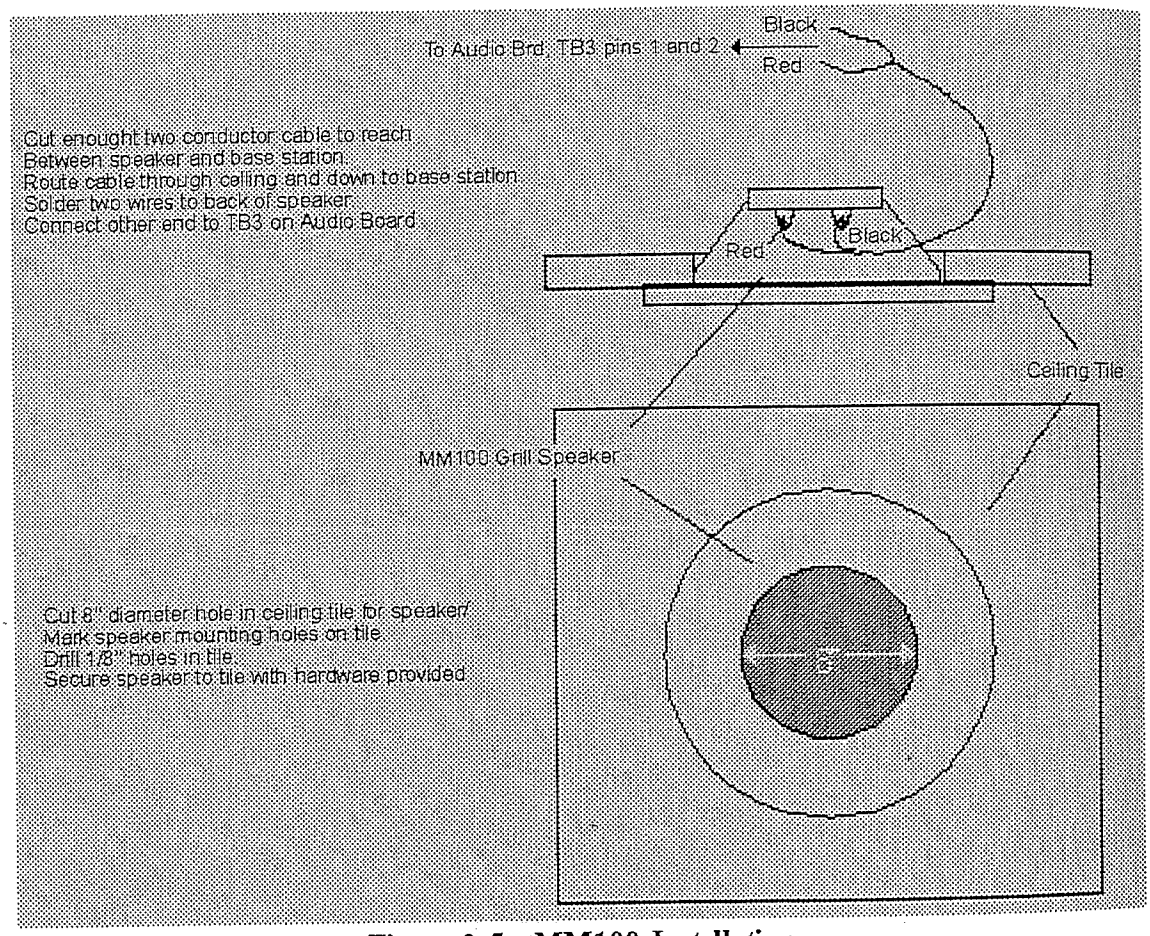


Figure 2-5. MM100 Installation

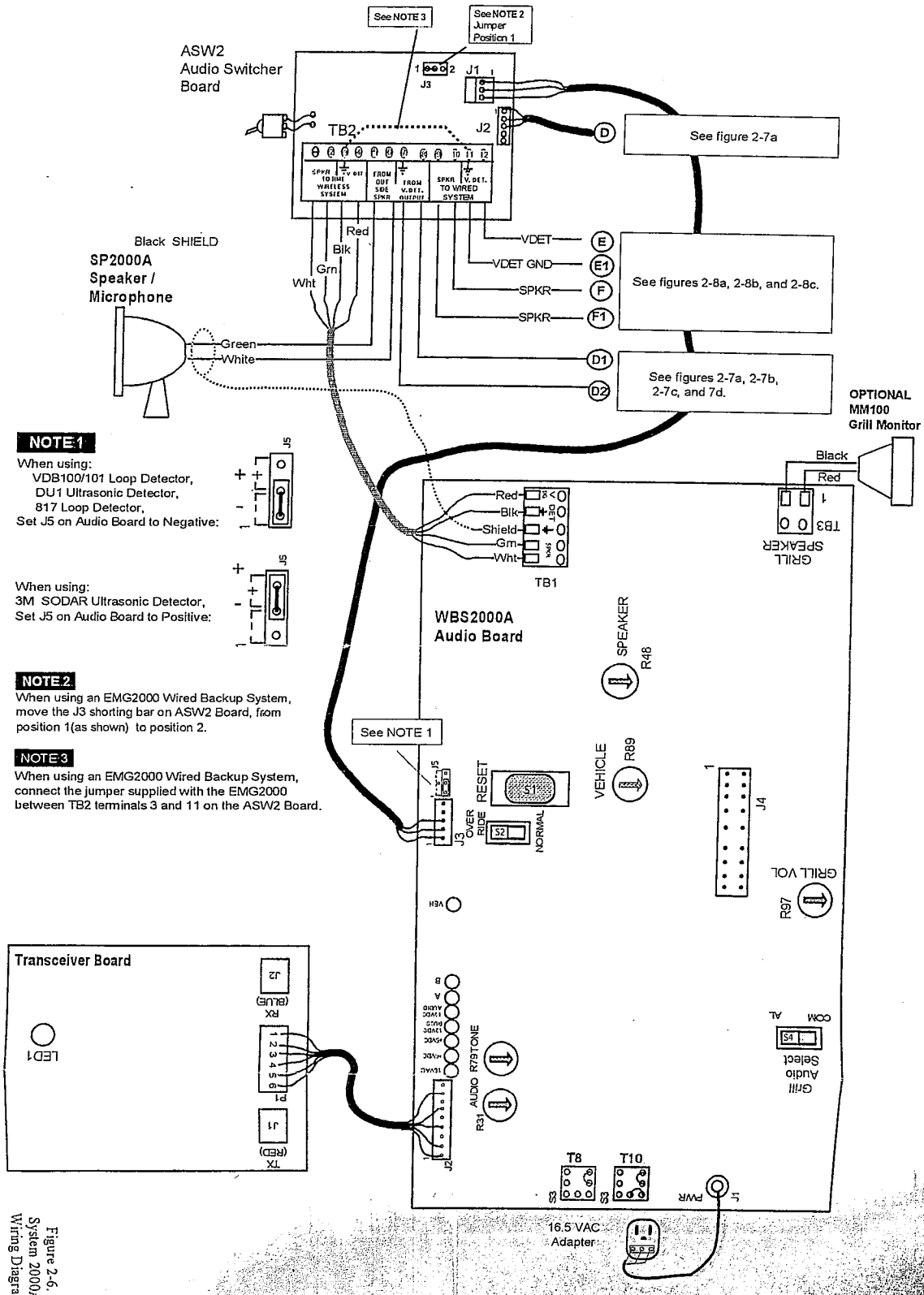


Figure 2-6. System 2000A Wiring Diagram

For instructions, refer to "HOW TO USE".

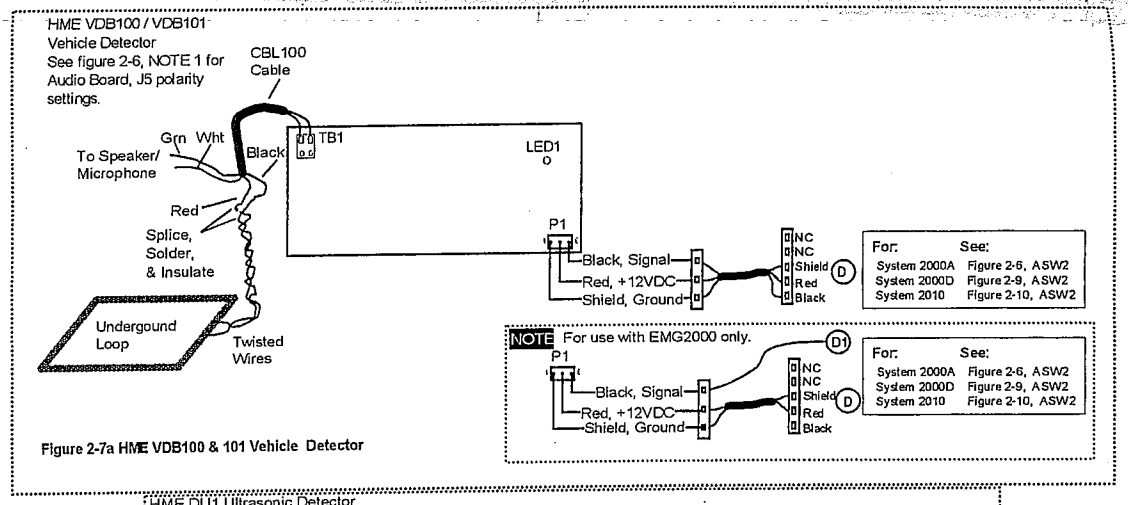


Figure 2-7a HME VDB100 & 101 Vehicle Detector

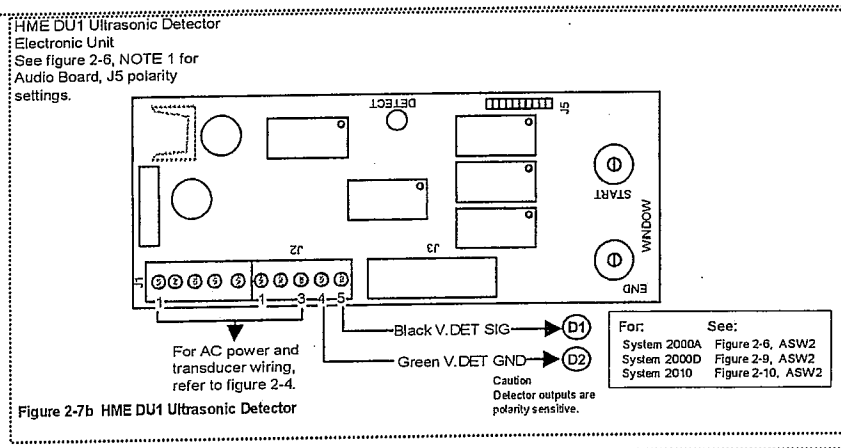


Figure 2-7b HME DU1 Ultrasonic Detector

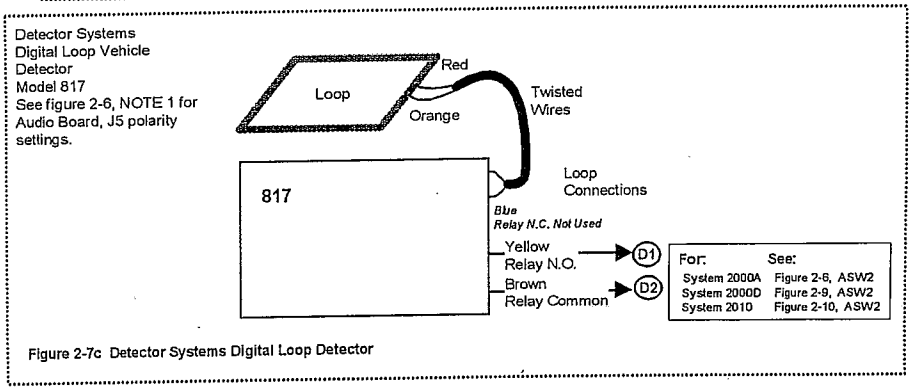


Figure 2-7c Detector Systems Digital Loop Detector

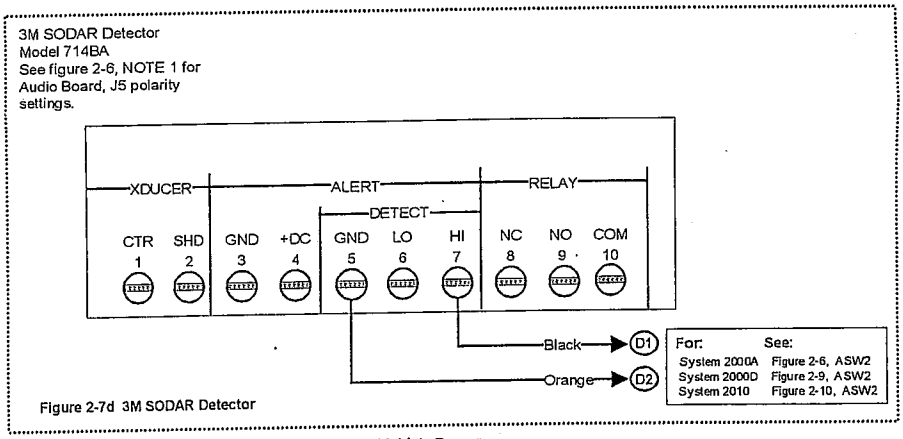


Figure 2-7d 3M SODAR Detector

Figure 2-7. Vehicle Detectors
For instructions, refer to "HOW TO ..."

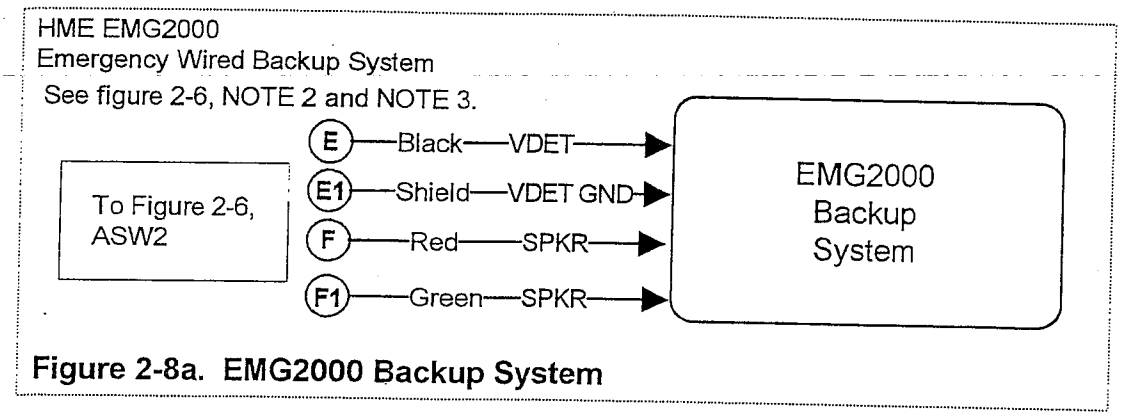
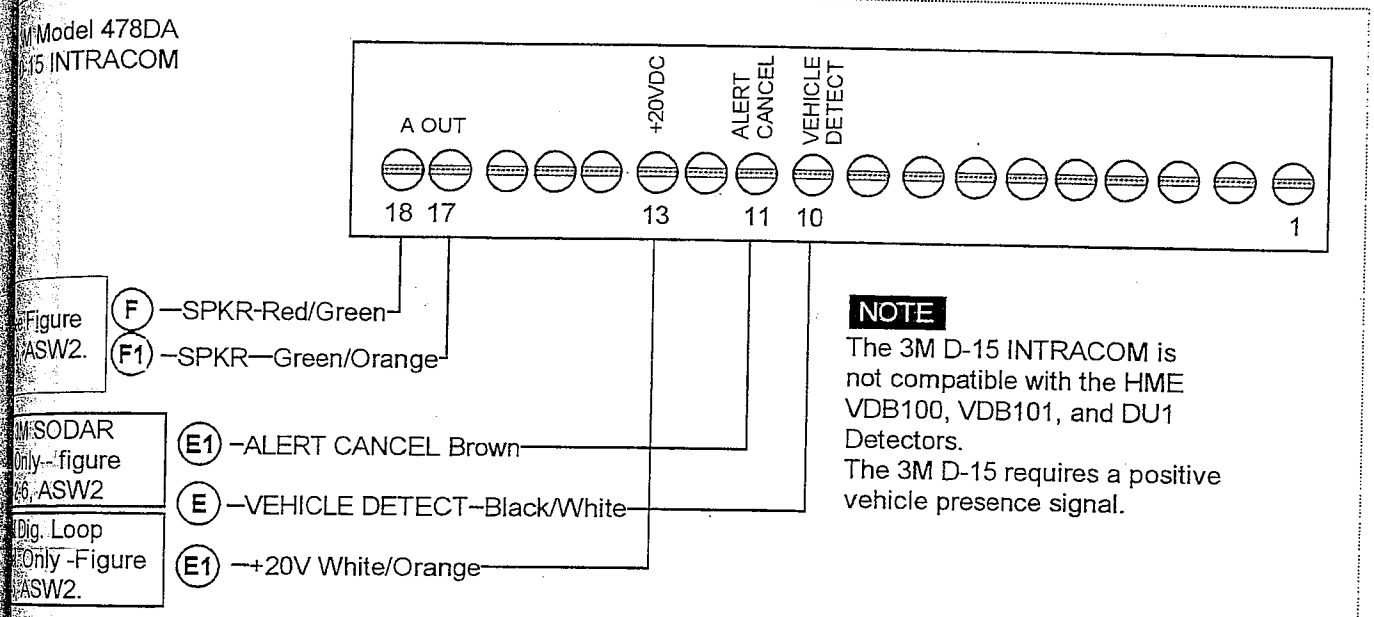
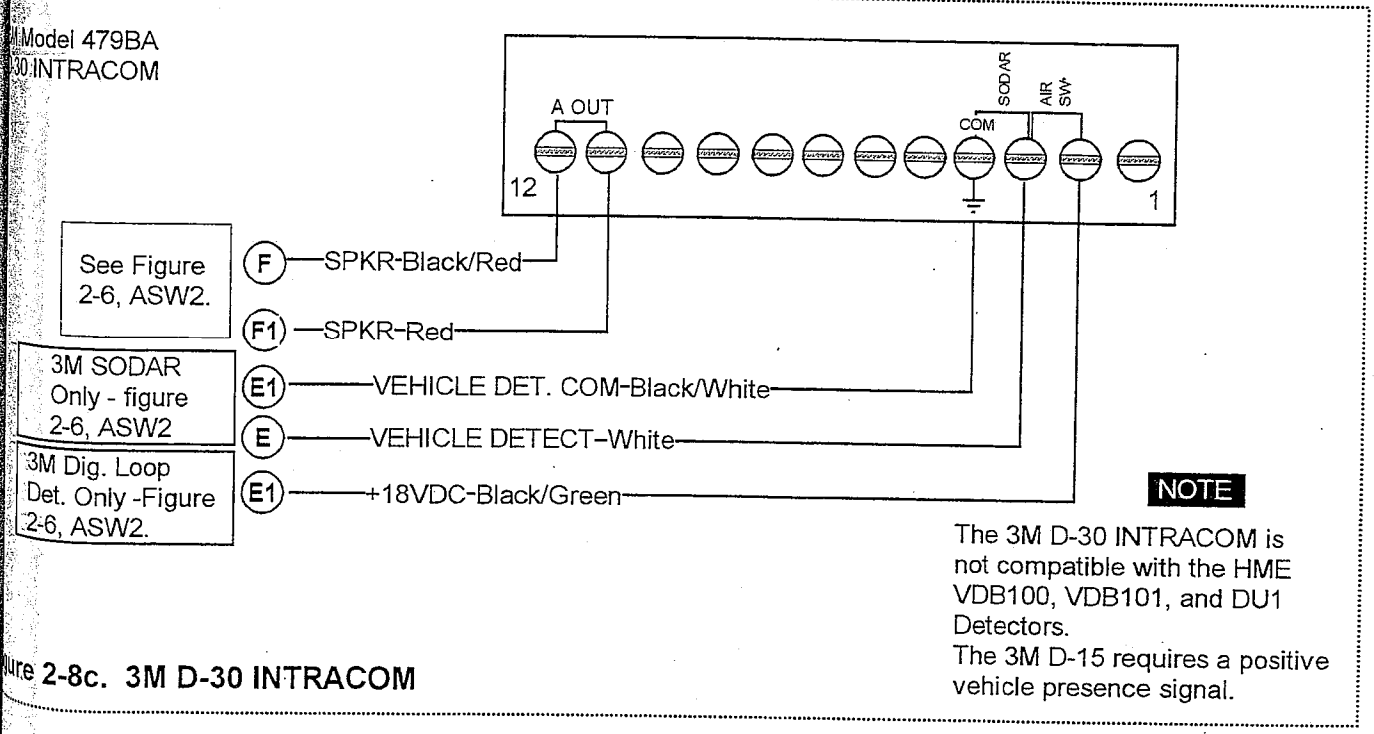


Figure 2-8a. EMG2000 Backup System



re 2-8b. 3M D-15 INTRACOM



ure 2-8c. 3M D-30 INTRACOM

Figure 2-8. Backup Systems

For instructions, refer to "HOW TO USE ..."

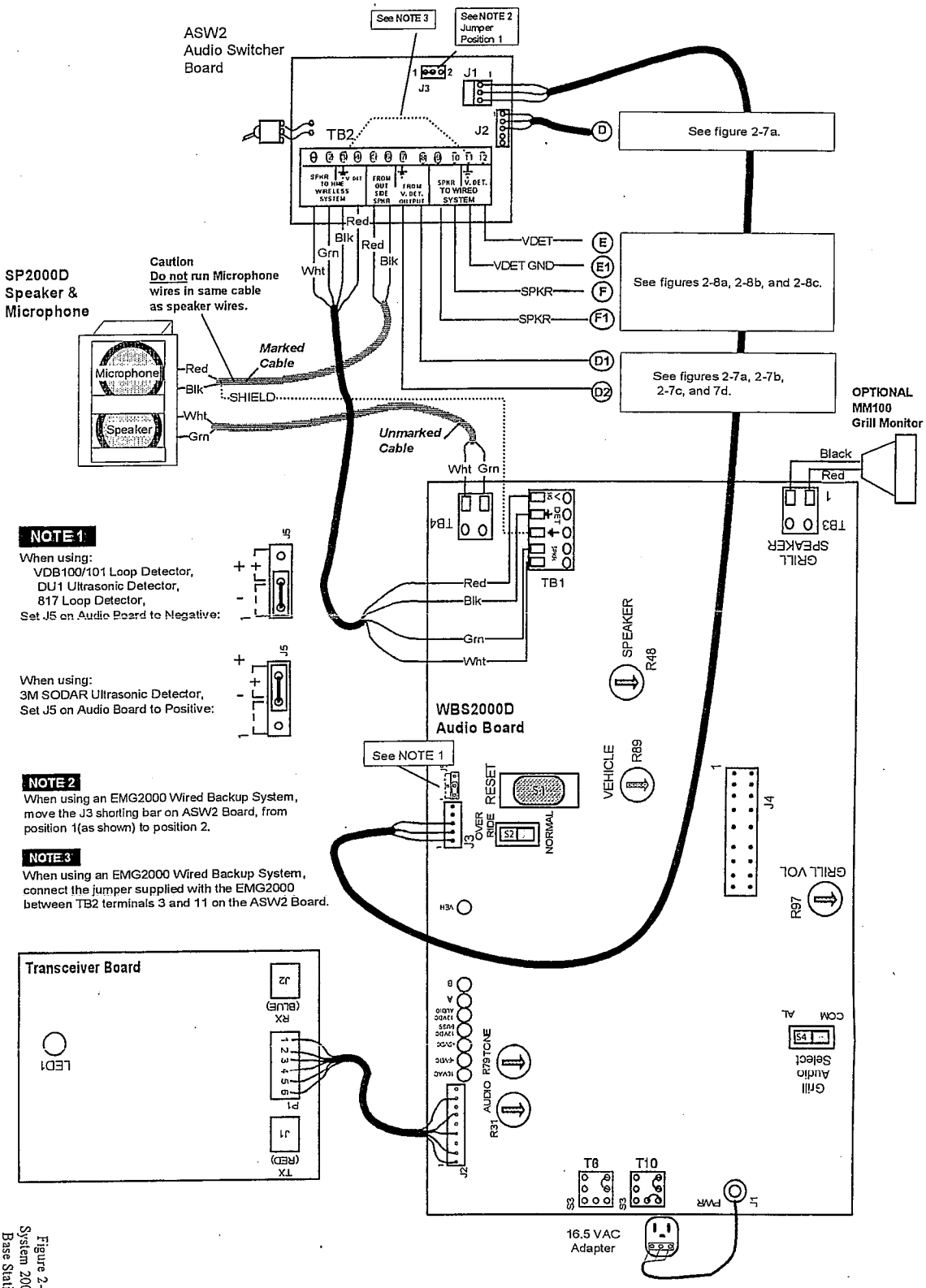


Figure 2-9. System 2000D Base Station
For instructions, refer to "HOW TO USE ..."

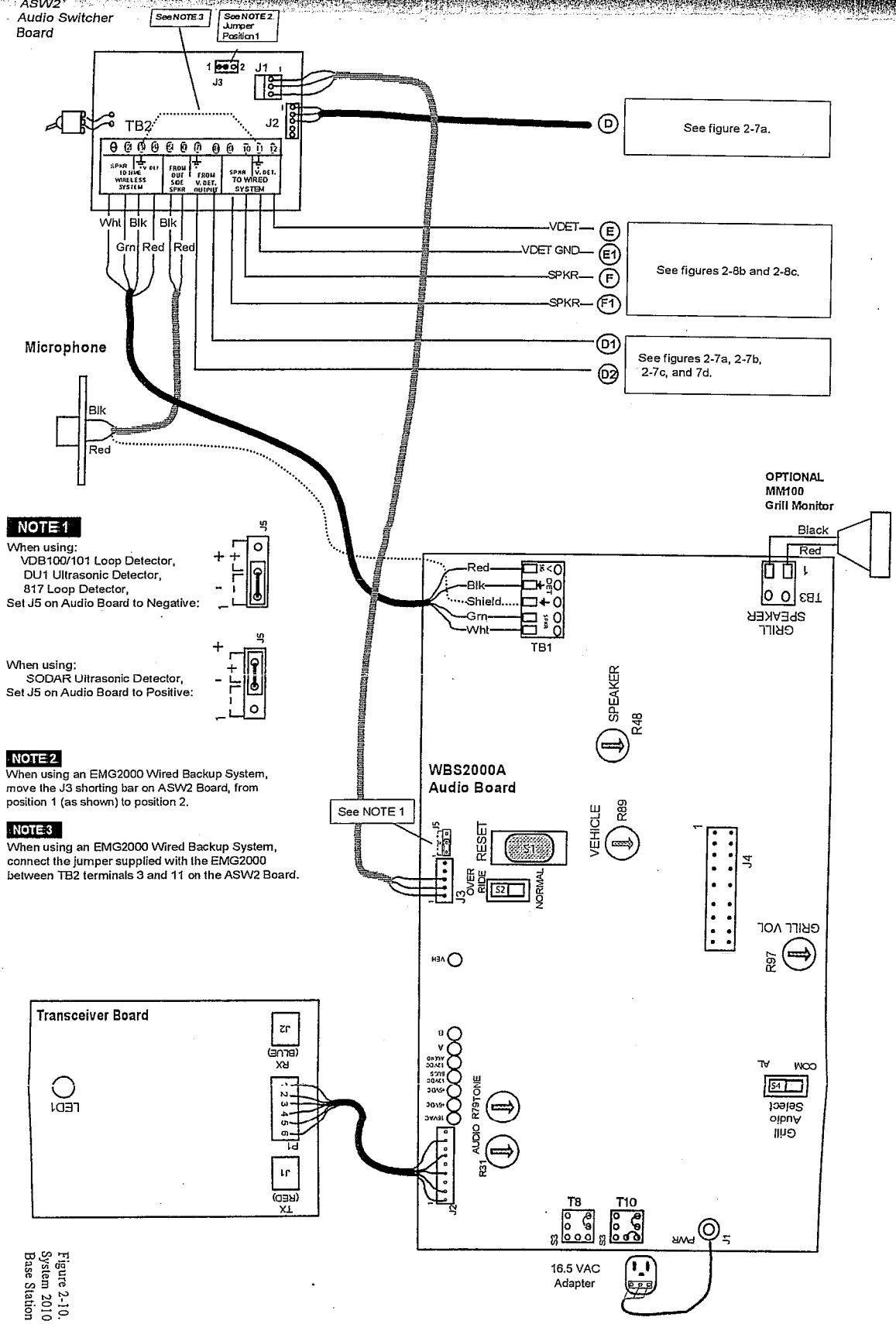


Figure 2-10. System 2010 Base Station

Figure 2-10. System 2010 Base Station
For instructions, refer to "HOW TO USE ..."

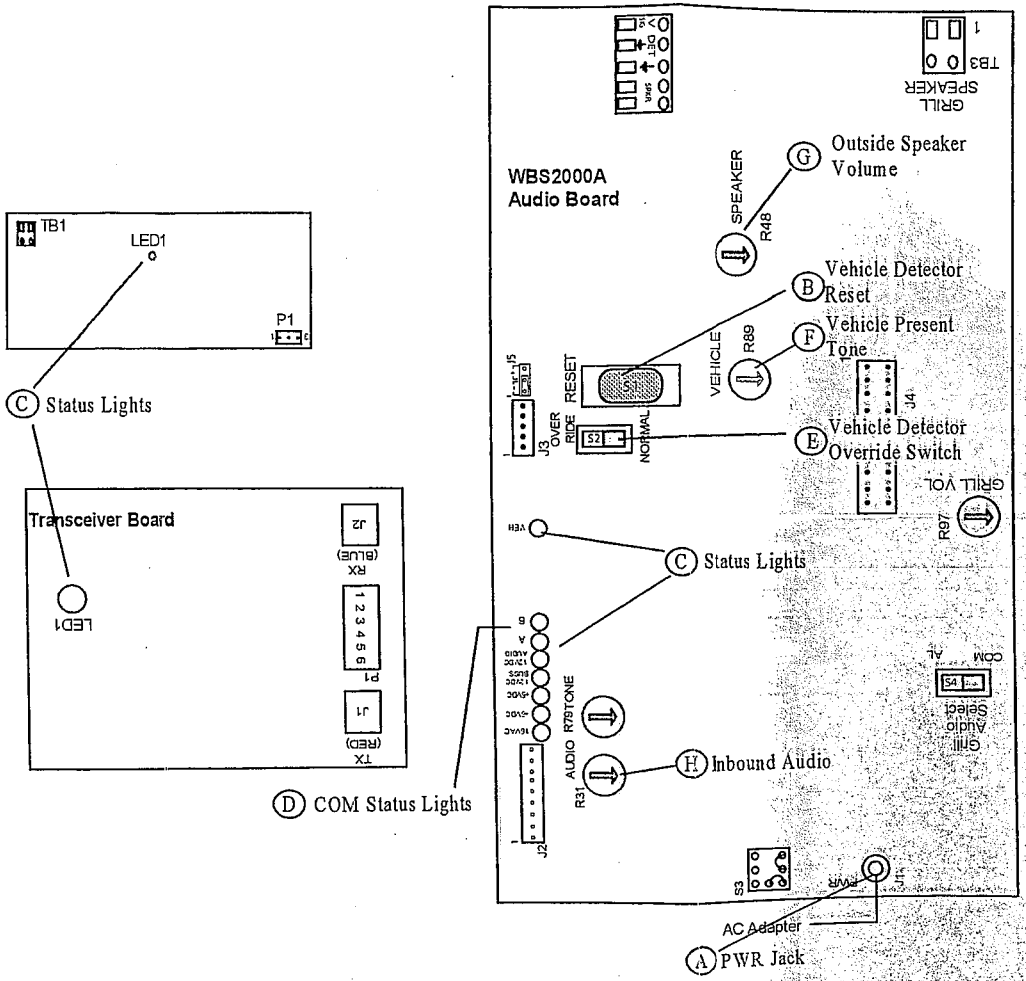


Figure 2-11. System Check Out

2.3 FUNCTIONAL CHECKOUT

The following procedure provides a quick and simple method of checking out your HME wireless system.

First, plug the connector on the AC Adapter into the PWR jack (figure 2-11 [A]) on the Audio Board.

Then,plug the AC Adapter into the AC outlet - secure the adapter with the grounding screw.

Note

Make sure any backup wired system connected to the System through ASW1 or ASW2 is unplugged from its power source otherwise the audio quality could be degraded.

If the System uses a Vehicle Detector Loop and VDB100 or VDB101 Vehicle Detector Board, make sure the Vehicle Detector Switch (figure 2-11 [E]) is set to NORMAL. Then, reset the loop by pressing the vehicle detector loop RESET (figure 2-11 [B]) button on the Audio Board when no vehicle is present.

Base Station Checkout

Before beginning:

Open the lid to the Base Station and make sure all cables are in place.

Check to see if all setscrews on the terminal blocks are tight.

Verify all jumper cables between boards are pressed firmly in place.

Observe the status lights on the Base Station and confirm their condition: see table 2-1 and figure 2-11 [C].

In the event of an electrical power outage ——

such as from a lightning storm or power generator failure, if you experience problems with your HME equipment after the electricity comes on again, unplug the AC power adapters from their electrical outlets, then plug them back in.

TABLE 2-1 STATUS LIGHTS

Function		Color	Correct Condition[1]
Audio Board			
	16VAC Power	Red	On
	+6 VDC Power	Red	On
	+5 VDC Power	Red	On
	12 VDC BUSS	Red	On
	12 VDC Audio	Red	On
	A (CUST) Receive	Red	Off
	B (INT) Receive	Red	Off
	Vehicle Present	Red	Off
Transmit/ Receive Board	Power On	Red	On
Vehicle Detector Board	Vehicle Detection	Clear	Off

COM2000 Communicator (Optional) Checkout

1. Remove the COM2000 from the belt-pac pouch. Do not misplace the spare battery cover packed in the bottom of the pouch. Insert a fully charged battery, and plug in the headset.
2. Turn on the COM2000 by rotating the Off/Volume control, and observe a lit ON/POWER indicator. If the indicator is not lit, replace the battery.
3. Press the B button and speak into the microphone. You will hear your own voice (Base Station must be turned on). Adjust the Off/Volume control for a comfortable listening level.
4. Repeat for each Communicator.

System Operational Check

1. Press the A button on the Communicator. Check to be sure the A light in the Base

[1] Condition - No vehicle activity in drive-thru area and no radio communication activity.

Station goes on. See figure 2-11 [D].

2. Press the B button on the Communicator. See if the B light in the Base Station goes on. Refer to figure 2-11 [D].

Vehicle Detector System Checkout

If the system uses an underground loop and HME VDB100 Vehicle Detector board, make sure the area over the loop is clear of automobiles and any other metallic object that would trigger the vehicle detector system.

Note

If there is a momentary power interruption in the Base Station while there is a vehicle over the loop, the system gives a false indication that no vehicle is present. Correct this by pressing the Vehicle Detector Reset button (figure 2-11 [B]) when no vehicle is present.

1. Be sure the Vehicle Detector Override switch (figure 2-11 [E]) on the Audio Board works by sliding the switch to OVERRIDE. This turns on the Menu board microphone though no vehicle is present. Return the Override switch to NORMAL.
2. Drive an automobile over the loop. A tone should be heard in all Communicators in use.
3. The audio channel from the menu microphone to the Communicators should be open.

Order Taker/Customer "A" Communication Checkout

If using System 2000A:

1. After hearing the tone, press the A button on the Communicator and speak into the microphone on the headset. Make sure the person in the vehicle hears the transmission.
2. Ask the person in the vehicle to simulate an order.
3. Release the A button on the Communicator and make sure the customer's voice is clear and understandable.
4. Have the vehicle drive off the loop, then the system should become silent.

If using System 2000D:

1. After hearing the tone, press the A button on the Communicator and speak into the microphone on the headset. Make sure the person in the vehicle hears the transmission.
2. Ask the person in the vehicle to simulate an order and make sure the customer's voice is clear and understandable.
3. Have the vehicle drive off the loop, then the system should become silent.

If using System 2010:

After hearing the tone, ask the person at the Microphone to simulate an order and make sure the "customer's" voice is clear and understandable.

Intercom "B" Mode Checkout

1. Turn on all Communicators. Press the B button on one Communicator and speak into the microphone on the headset. All other Communicators should hear the transmission.
2. Repeat the previous steps for all Communicators.
3. Make sure B communications cannot be heard through the Menu board speaker.

Audio Level Adjustment

The audio level for communications between the Communicator and Menu board speaker/microphone is preset at the factory, and normally does not need adjustment. If the level of the tone or voice signal needs adjustment, do the following.

1. Set the OFF/VOLUME control on one Communicator to mid-level.
2. Check the tone level by having a vehicle drive over the loop to the Menu board speaker/microphone. If necessary, adjust the Vehicle Present Tone Level (R89) on the Audio Board (figure 2-11 [F]).
3. If needed adjust the audio level to the Menu board speaker by adjusting Outside Speaker Volume (Speaker)(R48) on the Audio Board (figure 2-11 [G]).

System Shutdown

After completing the Checkout, turn off all Communicators. Plug in the Battery Charger and place the spare batteries in it to recharge.

Never disconnect the Base Station from AC power unless servicing it.

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SECTION 3
CIRCUIT DESCRIPTION

3.1 THE SYSTEM 2000

This section describes the basic operation of the System 2000 Wireless Drive-Thru Audio System using block diagrams and brief descriptions.

The basic system consists the Audio Board, the Transceiver (transmitter and receiver) Board, and the Communicator. The System can be expanded by adding an optional vehicle detector, grill speaker, and back-up system.

The Audio Board (figure 3-1) supplies the DC voltage to the Transceiver Board and the optional VDB 100 Vehicle Detector Board. It also decodes and encodes subaudible tones for routing audio, A/B (Customer / Intercom), and vehicle present signals. System 2000D Audio Board includes a Voice Activated Attenuator.

The SP2000A Speaker / Microphone, a single element horn speaker, serves as combination speaker and microphone, and the SP2000D consists of two elements for full duplex operation.

The transmitter on the Transceiver Board (Figure 3-2A) modulates the audio signal from the Audio Board and supplies the outgoing radio signal to the Communicators. The receiver portion (Figure 3-2B) demodulates the radio signal from the Communicators and routes the demodulated audio to the Audio Board.

The optional Vehicle Detector recognizes the presence of an automobile and "triggers" the system. There are two types of vehicle detectors: VDB 100 Loop Detector and DU1 Ultrasonic Detector. Both detectors send a logic low to the Audio Board indicating the presence of a vehicle.

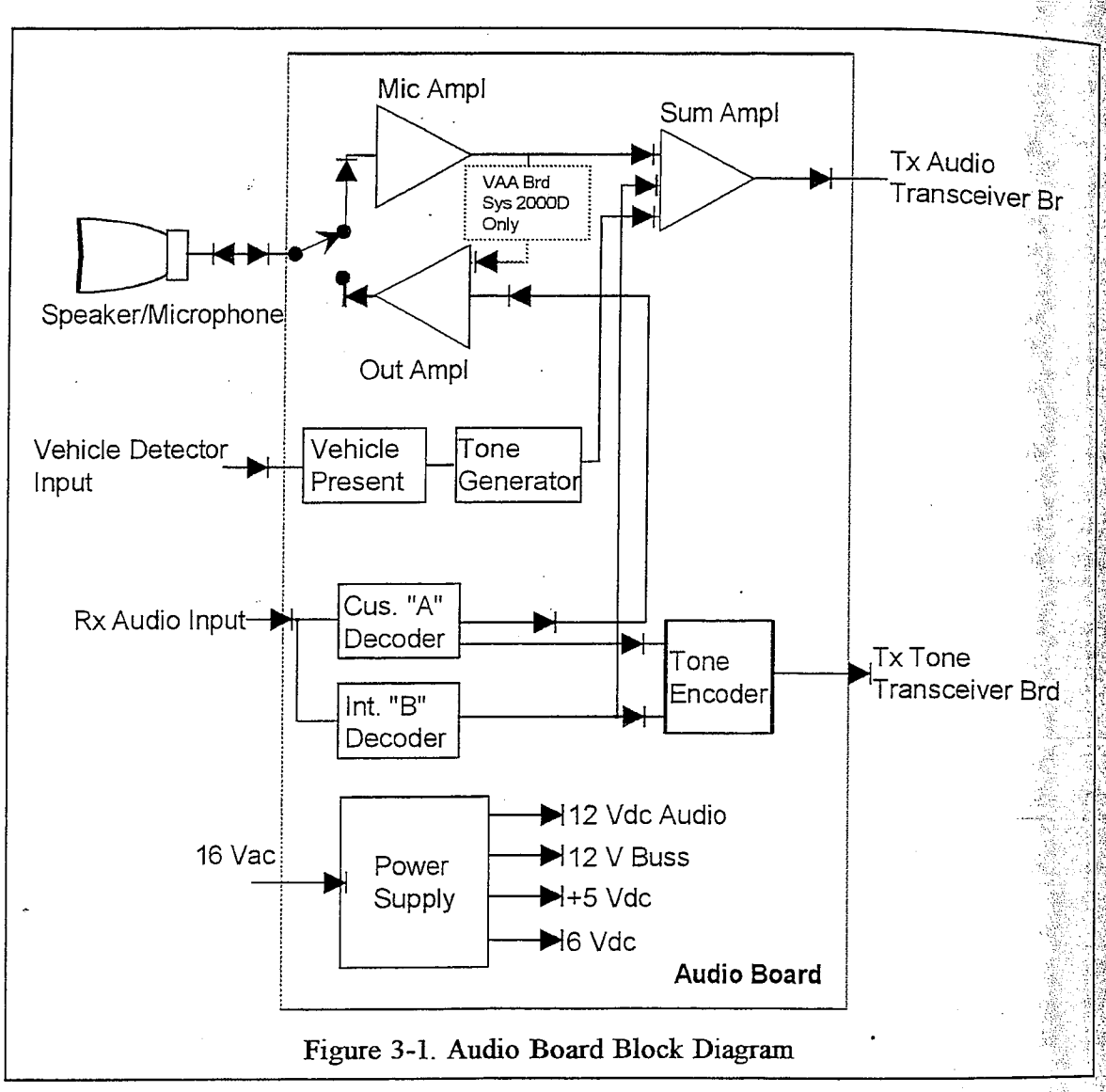

Figure 3-1. Audio Board Block Diagram

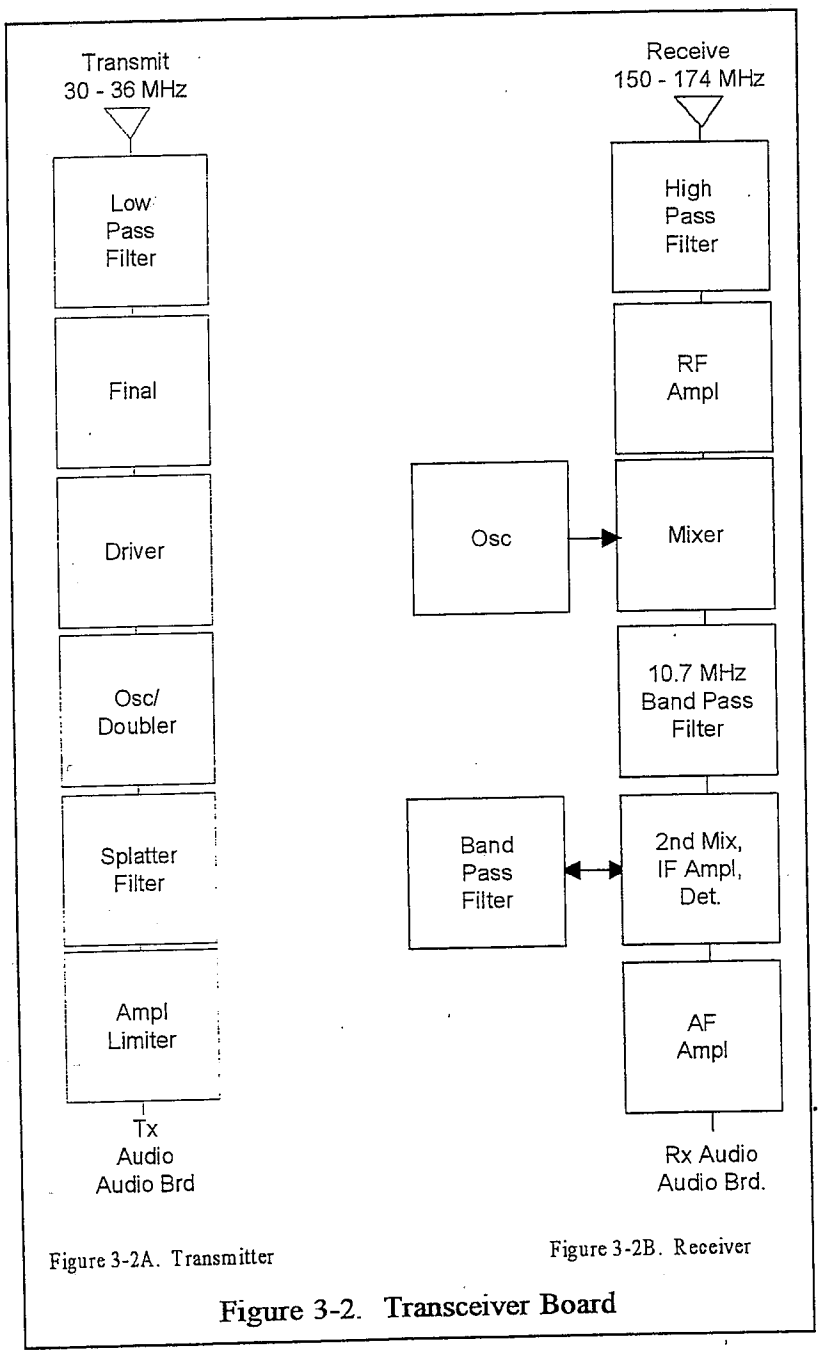

Figure 3-2A. Transmitter

Figure 3-2B. Receiver

Figure 3-2. Transceiver Board

3.2 BASIC OPERATION

The system operates quite simply. When a car drives up, a detector (Loop and VDB100 loop detector) senses the presence of the vehicle and sends a low going signal to the Audio Board in the Base Station. The Audio Board sends a coded tone and vehicle present tone to the Transceiver Board also in the Base Station. The Base Station then transmits as radio signals the coded tone vehicle present tone to COM2000 Communicators worn by store personnel. The coded tone activates the Communicator and the vehicle present tone alerts the order-taker that a customer has arrived. The order-taker presses the "A" button on the COM2000 Communicator to speak to the customer and releases the button to hear the customer. All personnel using COM2000 Communicators can hear the order at the same time. Store personnel using the COM2000 can communicate between each other (intercom) by pressing the "B" button on the COM2000 to speak and releasing the button to listen. When using the System 2000D (full duplex), the order-taker does not need to release the A button to talk and listen to the customer.

3.3 SYSTEM 2000A

The System 2000A (figure 3-3) consists of the Audio Board with Speaker/Microphone and Grill Speaker (an option), the transceiver, and Communicators. Figure 3-3 also illustrates the two vehicle detectors: the VDB100 and DU1 Vehicle Detectors.

3.4 SYSTEM 2000D

The System 2000D (figure 3-4), a full-duplex wireless audio system, allows the order-taker to simultaneously hear and speak to the customer . Thus, the customer can correct or add orders before their transactions to the order-taker is completed. The System differs from the System 2000A in the following ways:

The SP2000D contains a separate Speaker and Microphone.

The Audio Board contains a terminal set (TB4) that connects to the lower or outbound speaker to the system. Also, the Audio Board contains an additional board (VAA board) that attenuates the input signal from the microphone when the order taker talks which minimizes audio feedback between the SP2000D Speaker and Microphone.

3.5 SYSTEM 2010

In the System 2010 (figure 3-5), a microphone is mounted in the order booth allowing face-to-face communications with the customer. This system does not use a menu board speaker microphone.

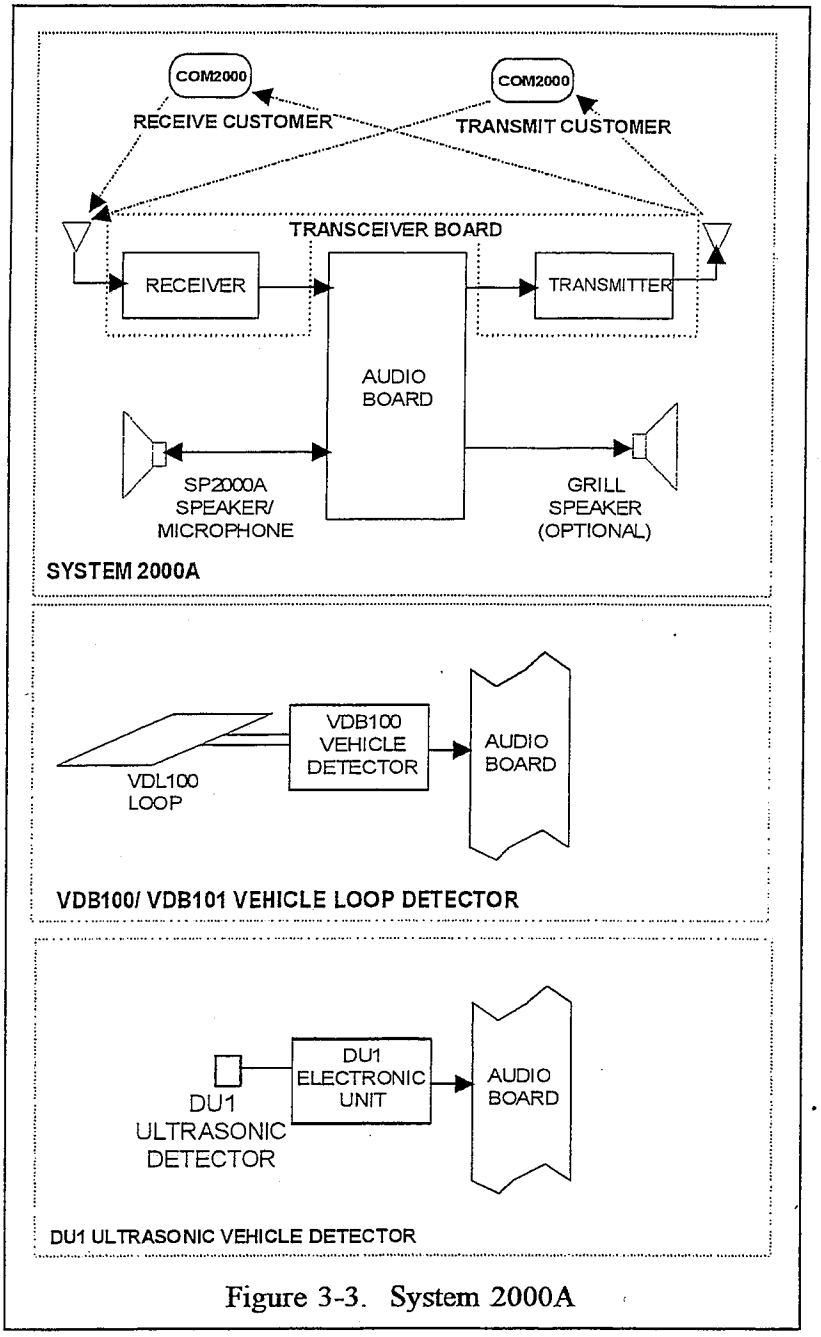

Figure 3-3. System 2000A

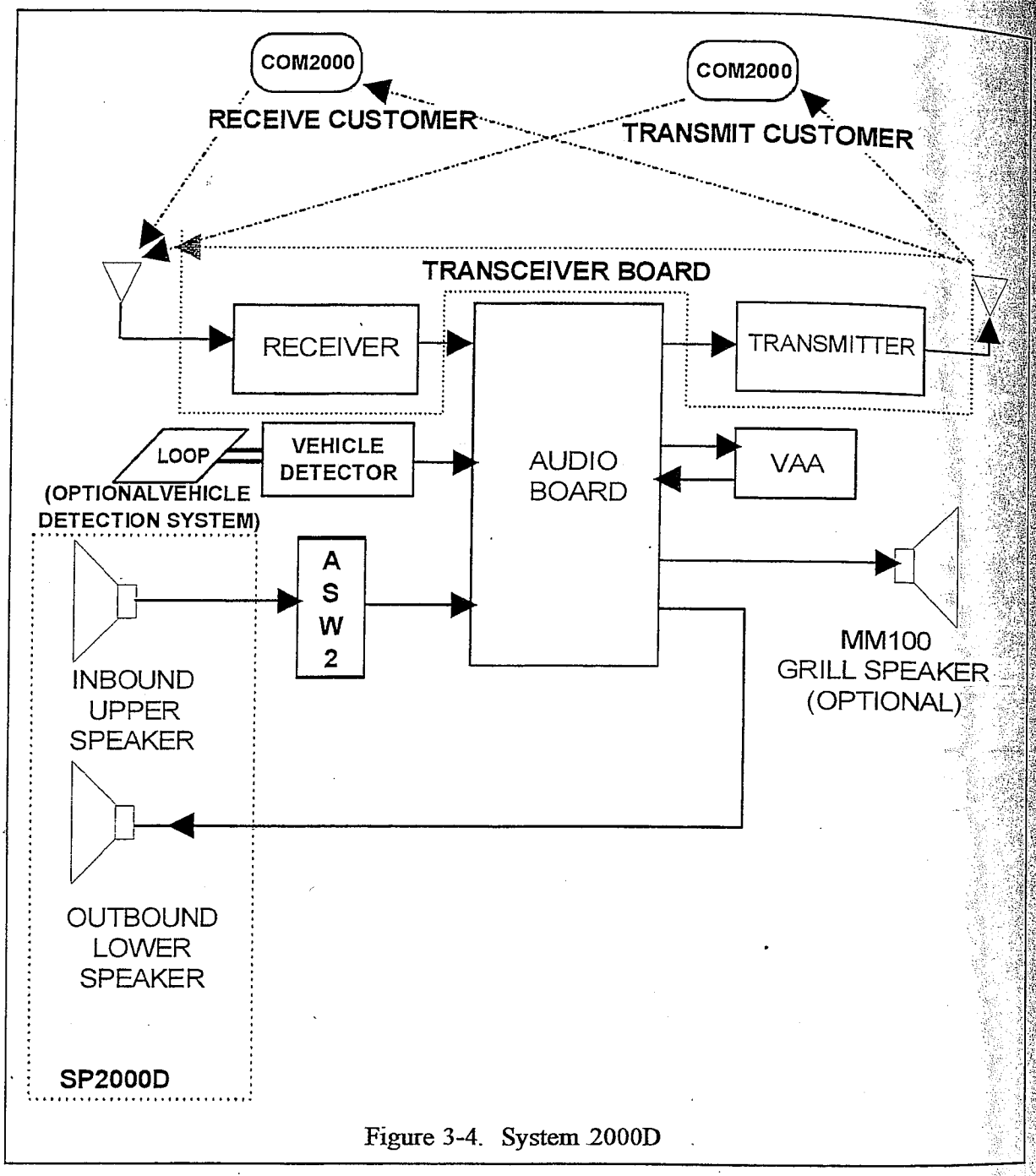

Figure 3-4. System 2000D

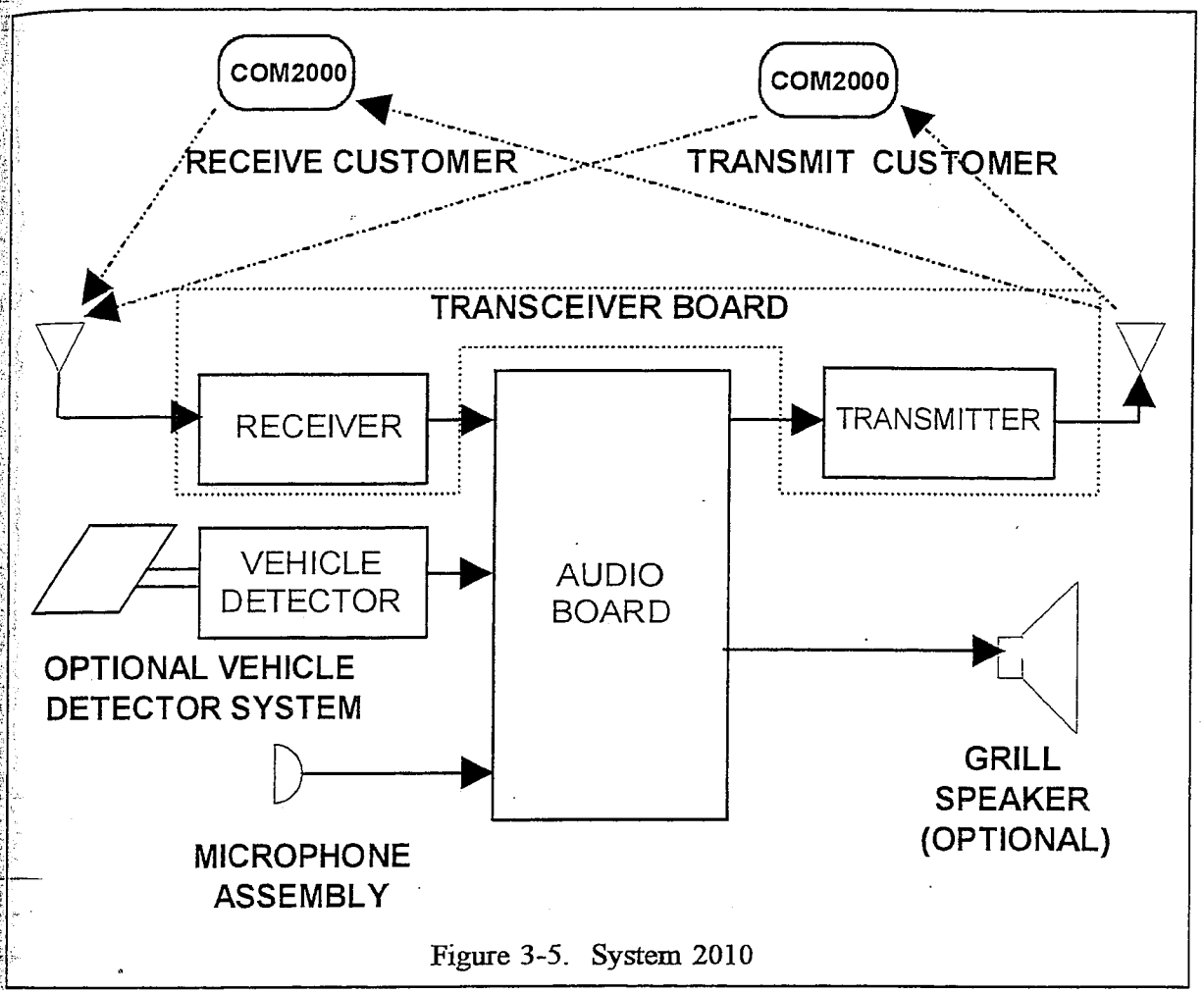

Figure 3-5. System 2010

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SECTION 4

MAINTENANCE

4.1 INTRODUCTION

Use this section to aid in identifying faulty boards in your wireless communication system. For routine maintenance, refer to "Cleaning and Maintaining the Equipment" in the *Operating Instructions* manual for your system.

First	Verify the equipment is set up correctly - refer to the *Operating Instructions* manual that came with the system.
Second	Perform the Initial Checks on page 4-2 and using figure 4-1.
Third	Locate a faulty board by using either paragraph 4.2 - Symptoms and Solutions, or paragraph 4.3 - Board Isolation Tables and Figures.
Fourth	Remove and replace the board as described in paragarph 4.4.
Fifth	When finished, test out the system as described in paragraph 4.5.

HM Electronics maintains a network of authorized service centers for those customers not possessing the personnel or equipment to troubleshoot their wireless communication systems. For the name and address of your nearest authorized service personnel contact:

HM Electronics
6675 Mesa Ridge Road
San Diego, CA 92121
USA
(619) 535-6030
or Customer Support 1-800-848-4468

If returning equipment for service, call HME and ask for a Return Authorization Number. Also include a detailed description of the problem to minimize turnaround time.

1. Check the circuit breaker or fuse for the AC outlet that powers the base station. Make sure the AC Adapter is plugged into the AC outlet.

2. Open the base station lid and verify the AC Adapter is plugged into the PWR connector on the Audio Board.

3. Inspect the boards for physical damage.

4. Inspect the wires at the terminal blocks. Make sure the wires are inserted correctly and the setscrews are tight.

5. Make sure the connectors on the cable are firmly seated. Make sure the connectors are oriented correctly in the sockets.

6. Check the Power indicators.
   16VAC - Lit.
   +6VDC - Lit.
   +5VDC - Lit.
   12VBUSS - Lit.
   12VAUDIO - Lit.

7. "A" (Customer) indicator is OFF unless "A" button on COM2000 is pressed.

8. "B" (Intercom) indicator is OFF unless "B" button on COM2000 is pressed.

9. VEH indicator is OFF unless there is a vehicle on the Loop or Override switch set to OVERRIDE.

10. Vehicle Detector - VDB100 or VDB101 installed. Verify indicator on VDB100 or VDB101 is OFF with no vehicle on loop. Press the RESET button , if necessary with no car on loop.

INITIAL CHECKS

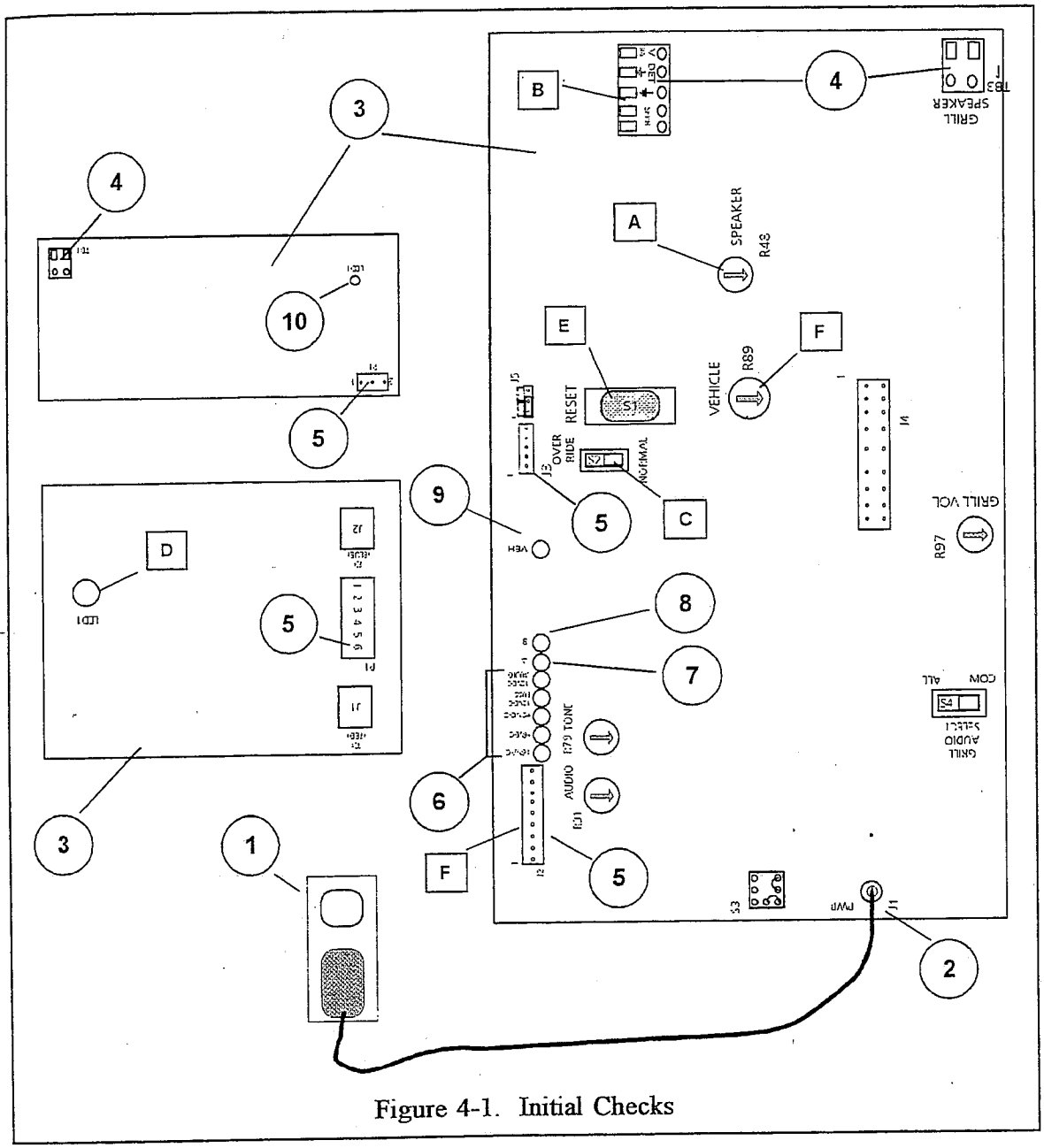

Figure 4-1. Initial Checks

4.2 SYMPTOMS AND SOLUTIONS

Symptoms and Solutions consists of a series fault conditions, table 4-1, that could occur in your System and does not require the use of any test equipment. Locate the *Symptom* closest to your problem. Then follow the instructions to isolate and solve the problem.

Table 4-1. Fault Symptoms

Symptom	See paragraph
No sound in the headset when you press button A on Communicator and speak into the headset microphone.	4.2.1
Communicator Channel A or B functions not working.	4.2.2
Outbound sound too low.	4.2.3
No outbound sound; the customer cannot hear anything.	4.2.4
No outbound or inbound signal	4.2.5
Personnel hear static only in headsets or grill speaker.	4.2.6
Personnel hear a customer in headsets or grill speaker, but cannot hear each other.	4.2.7
No tone or sound in headset or grill speaker when vehicle approaches speaker post.	4.2.8
Personnel cannot hear drive-thru customers in head set or grill speaker.	4.2.9
Communicator has intermittent sound.	4.2.10
Battery charger not working.	4.2.11
Vehicle Detector does not key system.	4.2.12

4.2.1 Symptom: No sound in the headset when you press button A on Communicator and speak into the headset microphone.

1. Power is off at base station.
   Check building circuit breakers.
2. Base Station power supply is not working.
   Check the power supply indicators (figure 4-1 [6]).
   If all lights are not lit, make sure the AC Adapter is plugged in at PWR (J1) connector on the Audio Board (figure 4-1 [2]).
3. Communicator not turned on.

4. Communicator volume not set correctly.
   Turn OFF/VOLUME control.
5. Headset connector not plugged into Communicator.
   Plug headset connector firmly into receptacle.
6. Headset defective.
   Replace the headset.
7. Low or dead battery.
   Replace battery.
8. Communicator failed.
   Use another Communicator. Call your authorized HME representative or HME Customer Support.

4.2.2 **Symptom** **Communicator Channel A or B functions not working.**

1. Communicator is not turned ON.
   Turn ON all units being used.
2. Dead or weak battery in one Communicator.
   Replace battery.
3. Communicator failed.
   Channel B light (figure 4-1 [8]) does not light when button B is pressed.
   Channel A light (figure 4-1 [7]) does not light when button A is pressed.
   Use another Communicator. Call your authorized HME representative or HME Customer Support.

4.2.3 **Symptom** **Outbound sound too low.**

1. Outbound volume too low.
   Adjust SPEAKER Volume (figure 4-1 [A]) with a small screwdriver for sufficient volume. Turn CW to increase volume.

   Note
   Do not turn SPEAKER Volume to full CW.

4.2.4 **Symptom** **No outbound sound; the customer cannot hear anything.**

1. Loose wire on Audio Board or ASW2 in base station.
   Check speaker wire connections to the terminal strip on the Audio Board and ASW2 Switcher board. See figure 4-1 [B].
2. Check wires between board in base station and speaker.
3. Defective speaker.
   Call your authorized HME representative or HME Customer Support.

4.2.5 **Symptom** **No outbound or inbound signal.**

Do the following steps:

1. Find at least one working Communicator - listen for side tone.
2. Vehicle Detector Override Switch in OVERRIDE (see figure 4-1 [C]).
3. Using the Communicator and a person at the menu board, verify there is no inbound or outbound signal, but there is a side tone over the Communicator.

NO OUTBOUND sound - check the Outside SPEAKER Volume Control figure 4-1 [A].

NO INBOUND sound -Contact HME.

4. Inspect audio wires at Audio Board - TB1 (figure 4-1 [B] and Speaker/Microphone connection at the speaker in the Menu Board. Remove shield wire at Audio Board (TB1-3) to see if signal is shorted to ground (figure 4-1 [B]).

If intermittent or noisy, run a temporary bypass cable between the base station and the menu board speaker/microphone. If the bypass cable corrects the problem, the cable is at fault and must be repaired or replaced.

Wireless/wired (if backup system is installed) switch in "Wired" position. Check the switch on the side of base station. Place switch in "Wireless" position.

4.2.6 **Symptom** **Personnel hear static only in headsets or grill speaker.**

1. Loose base station transmitter antenna (red dot).
   Tighten connectors at both ends of the cable.
2. Defective Transceiver board .
   Call your authorized HME representative or HME Customer Support.

4.2.7 **Symptom** **Personnel hear a customer in headsets or grill speaker, but cannot hear each other.**

1. Loose receiver antenna connection (blue dot).
   Tighten connectors at both ends of the cable.

4.2.8 **Symptom** **No tone or sound in headset or grill speaker when vehicle approaches speaker post.**

1. Power interruption has unbalanced detecting circuit.
   When no vehicle is at speaker, press the RESET button (figure 4-1 [E]) on base station.
2. Vehicle detector failed, or J3 connector on the Audio Board (figure 4-1 [F]) or P1 connector on the vehicle detector board (figure 4-1 [5]) is loose. Place the vehicle detector OVERRIDE switch (figure 4-1 [C]) in the OVERRIDE position. In the OVERRIDE position, the audio loop remains open for communication with a customer. Check all cable connections; if loose, reconnect and return override switch to Normal. Call your authorized HME representative.

4.2.9 **Symptom** **Personnel cannot hear drive-thru customers in head set or grill speaker.**

1. Loose wires on audio board in base station.
   Verify white , green, and shield wires are connected to TB1 (figure 4-1 [B]) on the Audio Board and/or pins 1, 2, 5, and 6 on the Switcher Assembly (ASW 1 or ASW2).

2. Outside speaker or audio circuit board has failed.
   Call your authorized HME representative or HME Customer Support.

4.2.10 **Symptom** **Communicator has intermittent sound.**

1. Low battery.
   Replace battery.
2. Defective headset cable.
   Use another headset.
   If the headset still does not work, call your authorized HME representative or HME Customer Support.

4.2.11 **Symptom** **Battery charger not working.**

1. Charger not plugged in.
   Plug in battery charger to the AC outlet using the AC Adapter.
   If still not working, call your authorized HME representative or HME Customer Support.

4.2.12 **Symptom** **Vehicle Detector does not key system.**

1. Check light (unmarked) on Vehicle Detector board (figure 4-1 [10]).
   ON - Car over loop.
   OFF - Car off the loop.
2. If Light does not light, disconnect the loop at TB1 on Vehicle Detector Board. Light will light or flash depending on the version of the board. This shows the Vehicle Board is getting power.

   If the light did not light or flash, check the cable between the Vehicle Detector Board and the Audio Board.

4.3 Board Isolation Tables and Figures

This paragraph, which is organized by system boards, consists of figures and tables that will guide you in taking voltage and resistance measurements. Use these figures and tables to systematically check each board and determining the faulty board. After identifying the faulty board, contact HME before replacing the board.

4.3.1 Audio Board

To isolate the Audio board, perform the *Initial Checks* for the system. Then, make the measurements shown in figure 4-2, Audio Board Troubleshooting. Also make sure the Audio board Subaudible Tone Configuration is correct; see figure 4-3. Verify the Vehicle Detector Polarity Jumper is correct; see figure 4-4. Measure the voltages and continuity for the cables and wiring listed in table 4-1, 4-2, and 4-3.

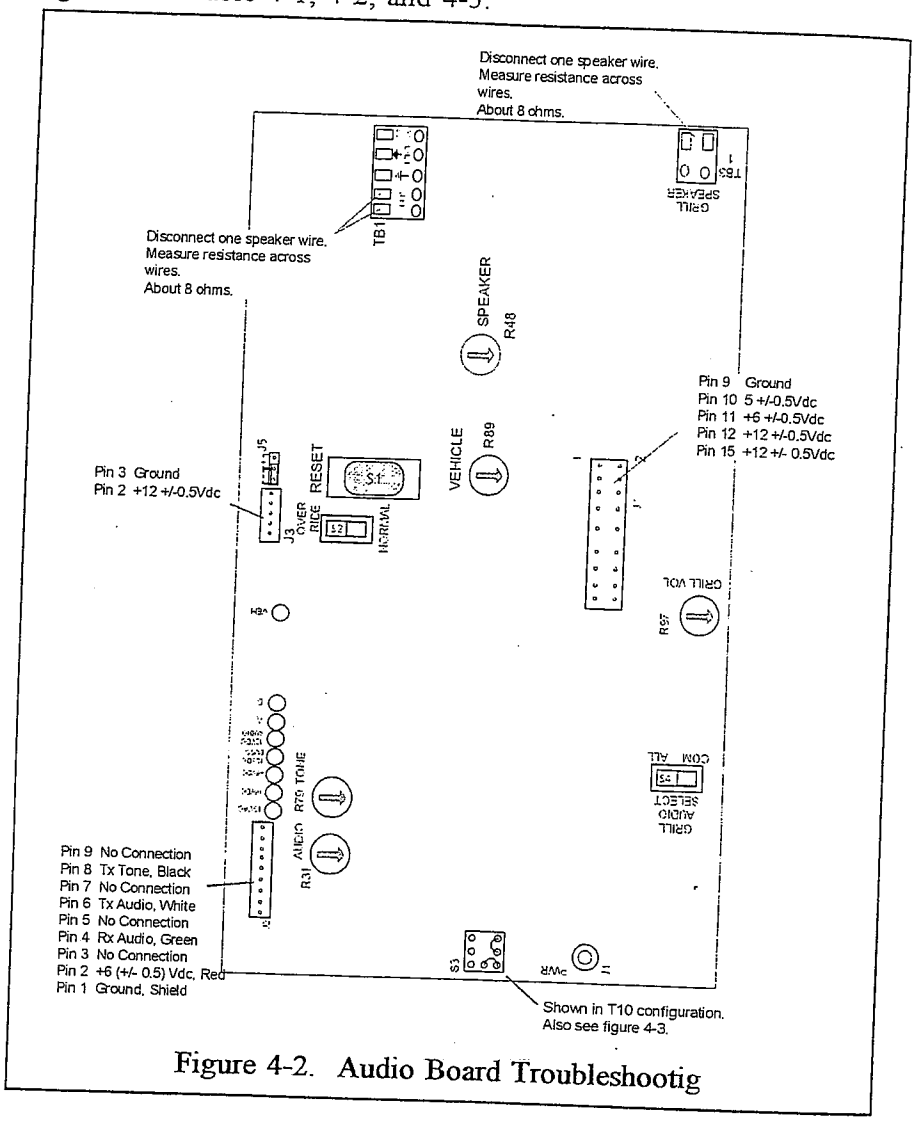

Figure 4-2. Audio Board Troubleshootig

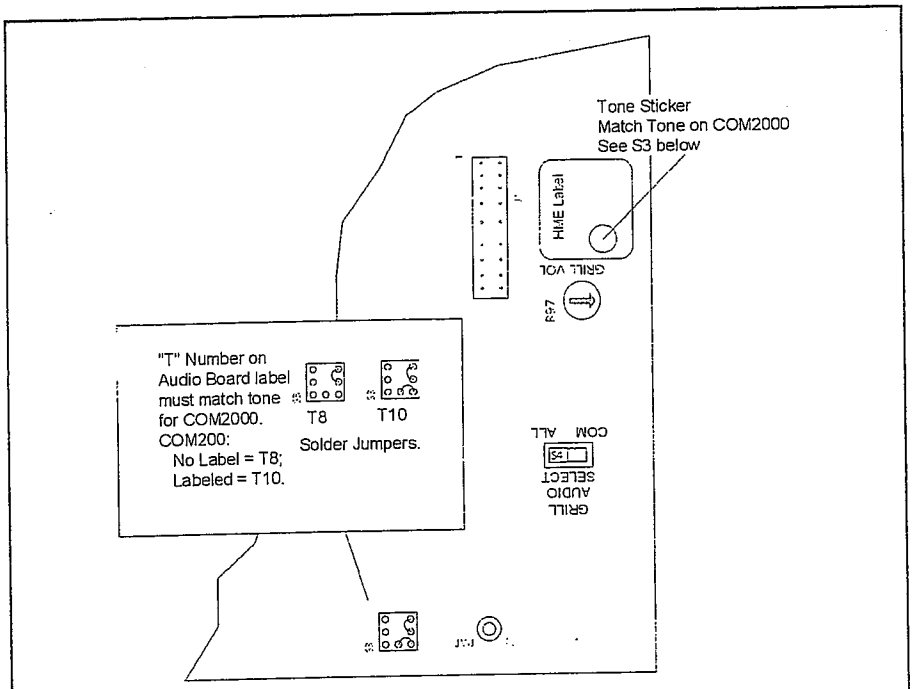

Figure 4-3. Audio Board
Subaudible Tone Configuration

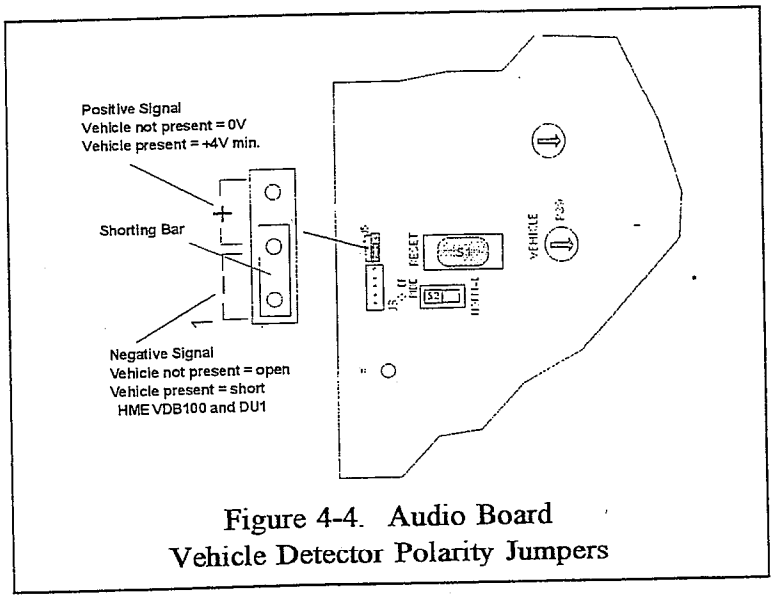

Figure 4-4. Audio Board
Vehicle Detector Polarity Jumpers

Table 4-1. ASW2 TO AUDIO BOARD CABLE

Connector - pin ASW2	Name	Connector - pin Audio Board
J1-1	Ground	J3-3
J1-2	+12Vdc	J3-2
J1-3	Signal (Detector Out)	J3-1

Table 4-2. AUDIO BOARD TO TRANSCEIVER CABLE

Connector - pin udio Board	Name	Connector - pin Transceiver Board
J2-1	Ground	J1-6
J2-2	+6Vdc	J1-5
J2-3	No Connection	
J2-4	Rx Audio	J1-3
J2-5	No Connection	
J2-6	Tx Audio	J1-2
J2-7	No Connection	
J2-8	Tx Tone	J1-4
J2-9	No Connection	
	No Connection	J1-1

Table 4-3. ASW2 TO AUDIO BOARD

Connection ASW2	Name		Connector - pin WBS2000
TB2-2	Speaker	Green	TB1-1
TB2-1	Speaker	White	TB1-2
Cable Shield	Shield	Shield	TB1-3
TB2-3	V. Det Gnd	Black	TB1-4
TB2-4	V. Det	Red	TB1-5

4.3.2 Transceiver Board

To isolate the Audio board, perform the *Initial Checks* for the system. Then, make the measurements shown in figure 4-5, Transceiver Board Troubleshooting. Measure the voltages and continuity for the cables and wiring listed in table 4-2.

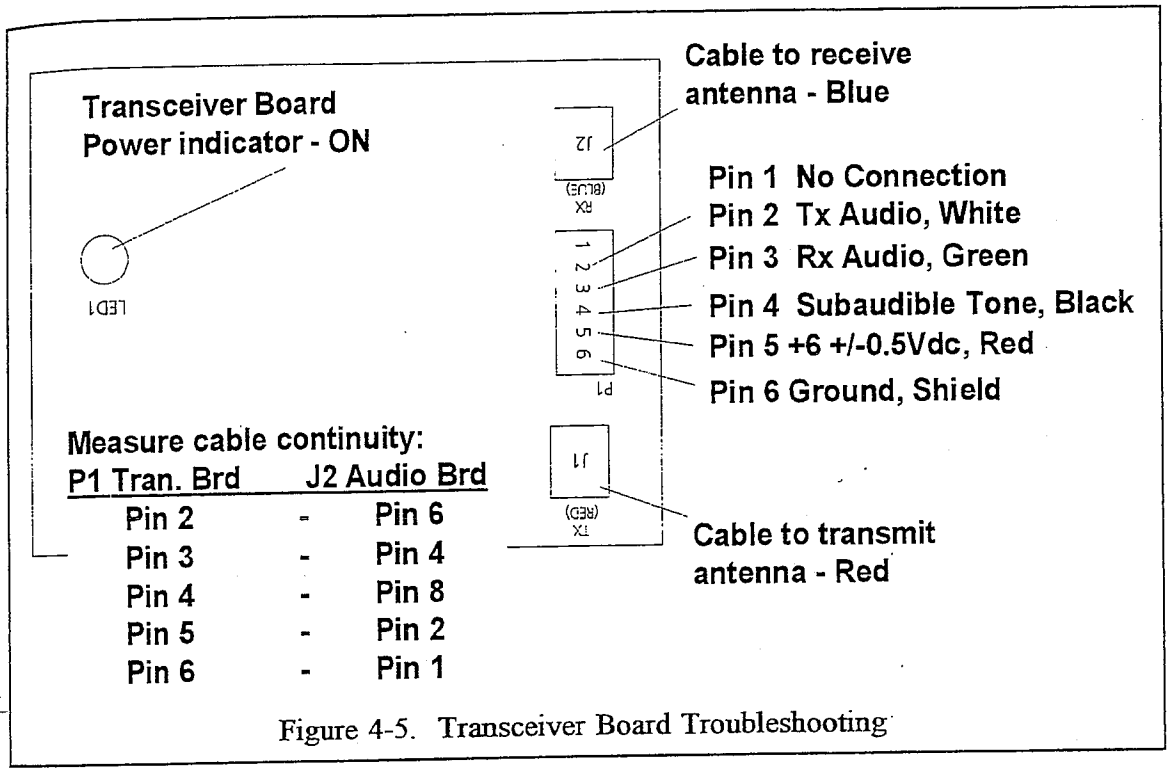

Figure 4-5. Transceiver Board Troubleshooting

4.3.3 Vehicle Detector Board

To isolate the VDB100/101 Vehicle Detector Board, perform the *Initial Checks* for the system. Then, make the measurements shown in figure 4-6, Vehicle Detector Troubleshooting. Also make sure the Polarity Jumper on the Audio Board is correct; see figure 4-4. Measure the voltages and continuity for the cables and wiring listed in table 4-4.

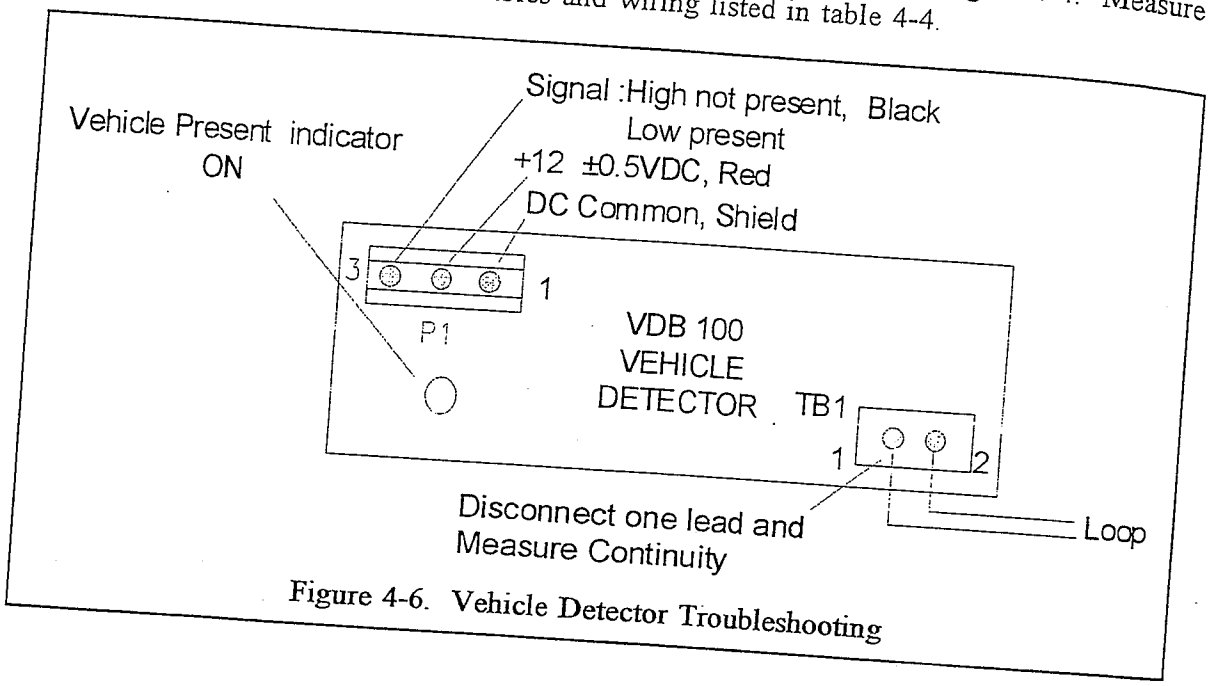

Figure 4-6. Vehicle Detector Troubleshooting

Table 4-4. VDB100 TO ASW2 CABLE

Connector - pin VDB100/101	Name	Connector - pin ASW2
P1-1	Ground	J2-3
P1-2	+12Vdc	J2-2
P1-3	Detector Output	J2-1

4.3.4. ASW2 Switch Board

To isolate the ASW2, perform the *Initial Checks* for the system. Check the switch and make sure it is in the "wireless" position. Then, make the measurements shown in figure 4-7, ASW2 Troubleshooting. Also make sure the jumper on the board is correct; see figure 4-7. Measure the voltages and continuity for the cables and wiring listed in table 4-1, 4-3, 4-4, 4-5, and 4-6.

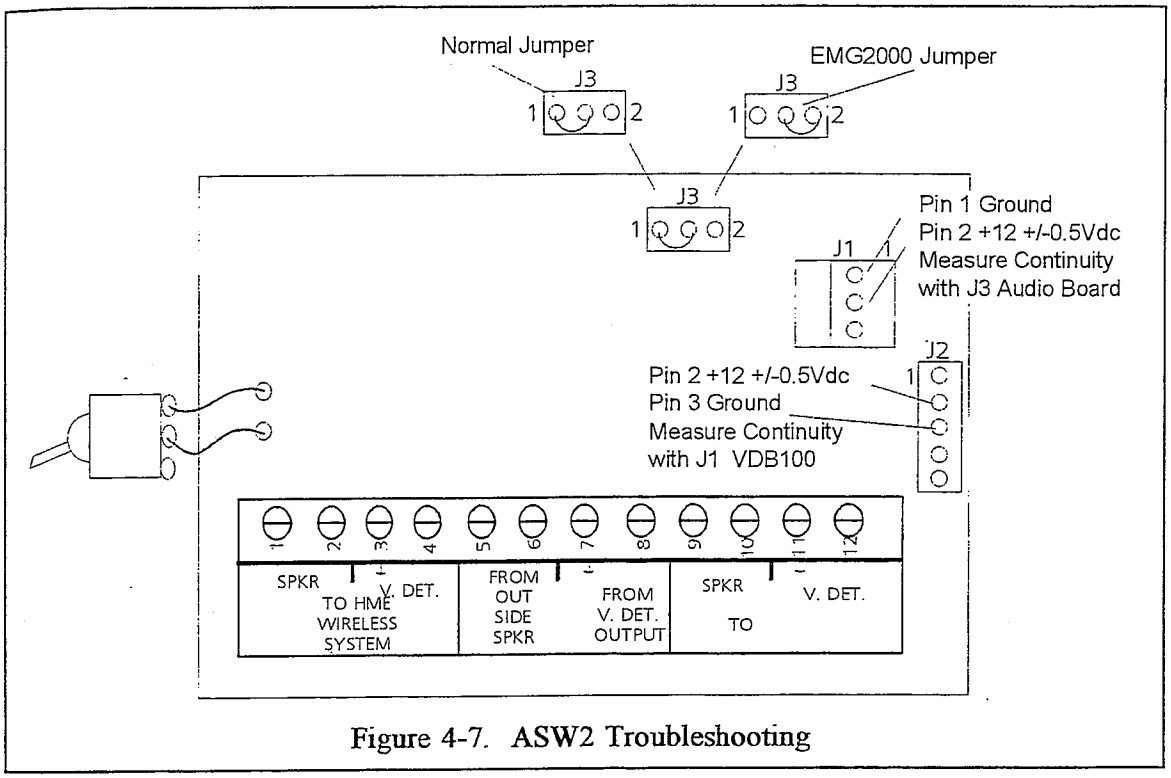

Figure 4-7. ASW2 Troubleshooting

Table 4-5. SP2000A (WITH LOOP) TO ASW2

Connection	Name		Connector - pin
Speaker			ASW2
SP2000A -1		White	TB2-6
SP2000A -2		Green	TB2-5
	Shield	Shield	TB2-4
Loop - 1		Red	TB2-8
Loop - 2		Black	TB2-7

Table 4-6. SP2000D (MICROPHONE) TO ASW2

Connection SP2000D	Name		Connector - pin ASW2
Mic -1	Microphone	Black	TB2-6
Mic -2	Microphone	Red	TB2-5

4.3.5 Other Cables

The following tables provide the following interconnection wiring lists:

Table 4-7	DU1 Connections
Table 4-8	VDB100 to ASW2 with Backup System
Table 4-9	ASW2 to EMG2000
Table 4-10	MM100 to Audio Board

Table 4-7. DU1 CONNECTIONS

Connector - pin Electronic	Name		Connector - pin
J1-1	16VAC Input	AC	AC Power Adapter
J1-2	16VAC Input	AC	AC Power Adapter
J1-3	+20VDC	White	J2-2 Ultrasonic
J1-4	Ground	Black	J2-1 Ultrasonic
J2-1	+5.5	Red	J1-3 Ultrasonic
J2-2	INIT	Green	J1-1 Ultrasonic
J2-3	ECHO	White	J1-2 Ultrsonic
J2-4	Veh Det -	Green	TB2-7 ASW2
J2-5	Veh Det +	Black	TB2-8 ASW2

Table 4-8. VDB100 TO ASW2 CABLE WITH BACKUP SYSTEM

Connector - pin VDB100	Name	Connector - pin ASW2
P1-1	Ground	J2-3
P1-2	+12Vdc	J2-2
P1-3	Detector Output	J2-1
P1-3 (Loose Wire)	Detector Output	TB2-8

Table 4-9. ASW2 TO EMG2000 CABLE

Connector - pin ASW2	Name		Connector - pin EMG2000
TB2-12	Detector Input	Black	Detector Input
TB2-11	Det. Ground	Shield	Detector Ground
TB2-10	Speaker	Red	Speaker
TB2-9	Speaker	Green	Speaker

Table 4-10. MM100 (GRILL MONITOR) TO AUDIO BOARD

Connection Speaker	Name		Connector - pin Audio Board
MM100 -1		Black	TB3-1
MM100 -2		Red	TB3-2

4.4 BOARD REMOVAL

To replace a board in the base station.

1. Disconnect the Base Station from the power source by removing the AC Adapter from the wall outlet.
2. Open the cover on the Base Station by turning the cover screw counter clockwise with a slotted screwdriver and pull the cover down.
3. Disconnect the wires (cables and terminal blocks) from the board. Note how the wires are connected to the terminal blocks. Note the cable connections. Refer to section 2 Installation if needed.
4. Remove the board by pressing back the lock tab and lifting the board off the pin on the board holder. The Audio, transceiver, and ASW2 boards have four lock tabs, and the VDB100 Vehicle Detector Board has three.
5. To install the board place the board over the lock tab pins and press the board down to lock in place. Perform step 4, 3, 2, and 1 to re-install the board.

4.5 TESTING THE SYSTEM

COM2000 Communicator Checkouts

- Remove the COM2000 from the belt-pac pouch. Do not lose the spare battery cover packed in the bottom of the pouch.
- Remove the battery cover of the COM2000, and insert the charged battery. Replace the battery cover.
- Replace the COM2000 in the belt-pack pouch, and slide the belt through the pouch.
- Plug the headset connector into the COM2000.
- Turn on the COM2000 by rotating the Off/Volume control.
- Observe a lit ON/POWER light. If the light is not lit, replace the battery.

- Press the "B" button and speak into the microphone. You will hear your own voice (turn on the base station). Adjust the Off/Volume control for a comfortable listening level.
- Repeat for each Communicator.

System Operational Check

- Press the "A" button on the Communicator. Check to be sure the "A" light in the base station goes on.
- Press the "B" button on the Communicator. See if the "B" light on the base station goes on.

Vehicle Detector System Checkouts

If the system uses an underground loop and HME VDB100/101 Vehicle Detector board, make sure the area over the loop is clear of automobiles and any other metallic object that would activate the vehicle detector system.

Note

If there is a momentary power interruption in the base station while there is a vehicle over the loop, the system gives a false indication that no vehicle is present. Correct this by pressing the Vehicle Detector Reset button (figure 4-1 [E] when no vehicle is present).

- Be sure the Vehicle Detector Override switch (figure 4-1 [C]) on the Audio Board works by sliding the switch to OVERRIDE. This turns on the Menu board microphone though no vehicle is present. Return the Override switch to NORMAL.
- Drive an automobile over the loop. Check for a side tone in all Communicators.

Side Tone Check

Turn up volume on Communicator to near maximum.
Press " A" button on Communicator, and speak clearly into the headset microphone. You should hear your own voice in your headset earpiece .which indicates good transmission between the communicator and the Base Station.

The audio channel from the menu microphone to the Communicators should be open.
Order Taker/Customer Communication Checkouts

1. After hearing the tone, press the "A" button on the Communicator and speak into the microphone on the headset. Make sure the person in the vehicle hears the transmission.
2. Ask the person in the vehicle to simulate an order.
3. Release the button on the Communicator and make sure the customer's voice is clear and understandable.
4. Have the vehicle drive off the loop. The system should become silent.

Intercom Mode Checkouts

1 Turn on all Communicators. Press the "B" button on one Communicator and speak into the microphone on the headset. All other Communicators should hear the transmission.

2 Repeat the previous steps for all Communicators.

3 Make sure "B" mode communications cannot be heard through the Menu board speaker.

Audio Level Adjustment

The audio level for communications between the Communicator and Menu board speaker/microphone is preset at the factory, and normally does not need adjustment. To change the level of the tone or voice signals, do the following steps.

1. Set the OFF/VOLUME control on one Communicator to mid-level.
2. Check the tone level by having a vehicle drive over the loop to the Menu board speaker/microphone. If necessary, adjust the Vehicle Present Tone Level (R89) on the Audio Board (figure 4-1 [F]).
3 If needed adjust the audio level to the Menu board speaker by adjusting Outside SPEAKER Volume (R48) on the Audio Board (figure 4-1 [A]).

System Shutdown

After completing the Checkouts, turn off all Communicators. Plug in the Battery Charger and place the spare batteries in it to recharge.

Never disconnect the Base Station, always leave it turned on.

APPENDIX A
PRE-INSTALLATION WIRING

A.1 NEW INSTALLATION

Use the following check list before installing the HME wireless Drive-Thru System

√

- ☐ Outdoor menu board or speaker post installed before the System is installed.
- ☐ Vehicle detector loop or alternate vehicle detector installed; see paragraph A.4.
- ☐ 6" x 6" NEMA box mounted on the wall in the drive-thru booth.
- ☐ 6" x 6" NEMA pull box mounted inside drive-thru booth.
- ☐ 120 Vac receptacle located beside NEMA box.
- ☐ 1-1/2 inch conduit from the underground vehicle detector loop to the base of the menu board or speaker post.
- ☐ 2-1/2 inch conduit connects outdoor menu speaker board or speaker post to NEMA pull box in the drive-thru area. Distance between outdoor menu board and speaker post is less than 200 feet.
- ☐ 2-1/2 inch conduit connects the NEMA pull box and the NEMA box for the base station.
- ☐ 2-1/2 inch PVC conduit installed between NEMA box and overhead.
- ☐ All conduits open: unblocked by concrete, construction debris, ice, etc.
- ☐ Pull wire inserted in continuous conduit from outdoor menu board or speaker post to NEMA box.

A.2 RETROFIT INSTALLATION

When replacing older systems, the new equipment should be installed before disconnecting the old system. Replace the old cable and speakers last to allow continuous communication during installation. While installing the new system, have an employee stand near the menu board with a COM2000 to relay orders inside the store on the B channel. If installing an HME system with a wired backup system, check the wiring instructions for installing the HME EMG2000 - see the wiring diagrams in section 2. Be sure to check vehicle detector output polarity from other brands - see section 2.

A.3 PULLING WIRES

The Audio Cable set consists of one 4 conductor twisted pair cable for a System 2000A and two 4 conductor twisted pair cable for a System 2000D. Use HME CBL100 cable. Fasten the cable to fish tape or pull wire at the menu board or speaker post. Pull the cable through the conduit to the pull box. Then pull the cable to the base station NEMA box.

Remove approximately 2 inches (5.8cm) of the outer insulation form the ends of both cables. Strip approximately 1/4 inch (0.64 cm) of insulation for each of the four wires in the cable.

If installing System 2000D, pull both sets of cable simultaneously. Be sure to mark one cable as an aid.

CAUTION

When installing the System 2000D, do not attempt to use two pairs of wire in the same cable for the SP2000D speaker and microphone. To minimize feedback, use separate cables for the speaker and the microphone.

A.4 LOOP INSTALLATION

If a vehicle detector loop is not already installed, install the loop as illustrated in figure A-1.
Route the wires from the loop to the Menu Board/Speaker Post.
Connect the wires (red and black) to the loop.
Twist the wires together, then solder the wires, and finally insulate the wires with electrical type or shrink tubing.

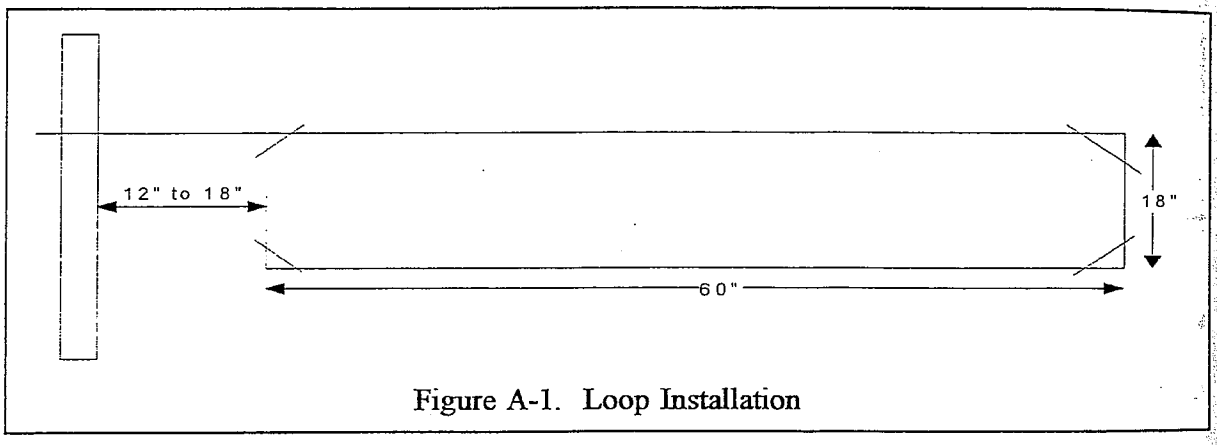

Figure A-1. Loop Installation

Installing the Loop

1. Lay out the chalk lines as shown in figure A-1.
2. Using a concrete cutting saw, cut a slot 1/4 inch wide and 2 to 3 inches deep along the chalk line.
3. Cut 45 degree angle cuts at each of the four corner as shown in figure A-1.
4. Clean the slots with compressed air.
5. Use at least 100 feet of # 16 AWG THHN wire.
   Allow sufficient lead in wire to route into the store or to the menu board junction box.
   Lay the first turn of wire in the slot in a clockwise direction - routing through the 45 degree cuts.
   Gently press the wire down into the slots.

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Appendix B
Base Station Location

Often the location for the WBS2000 base station will be decided in advance. However, it may be necessary to move the base station to another location, or find a location when replacing an existing system. Figure B-1 illustrates the minimum mounting requirements for the base station. At the end of this appendix is a base station mounting template (figure B-3).

To find the best location for the base station;

Locate the base station for maximum coverage through out the facility.
Mount the base station over an NEMA box.
Mount the base station 4 to 6 feet from the floor.
Install the base station away from metal objects and grease.
Mount the base station near an unswitched electrical outlet.
Mount the base station near any wires from the Vehicle Detector, Menu Speaker/Microphone and Emergency Backup System, also any additional components.

HINTS

Before mounting the base station, place it close to the NEMA box.
Connect the antennas to the base station (figure B-2):

Receiving Antenna Blue dot
Transmitting Antenna Red dot

Optional antennas will improve coverage (appendix C).
Connect the AC Adapter by plugging AC plug into the jack on the Audio Board (see figure B-2), then plug the AC Adapter. Turn on the Communicator. Test out the transmission and reception.

Note

Optional antennas, ANT3000 and AD 3000, can replace the Rubber Duck Antennas. See appendix C.

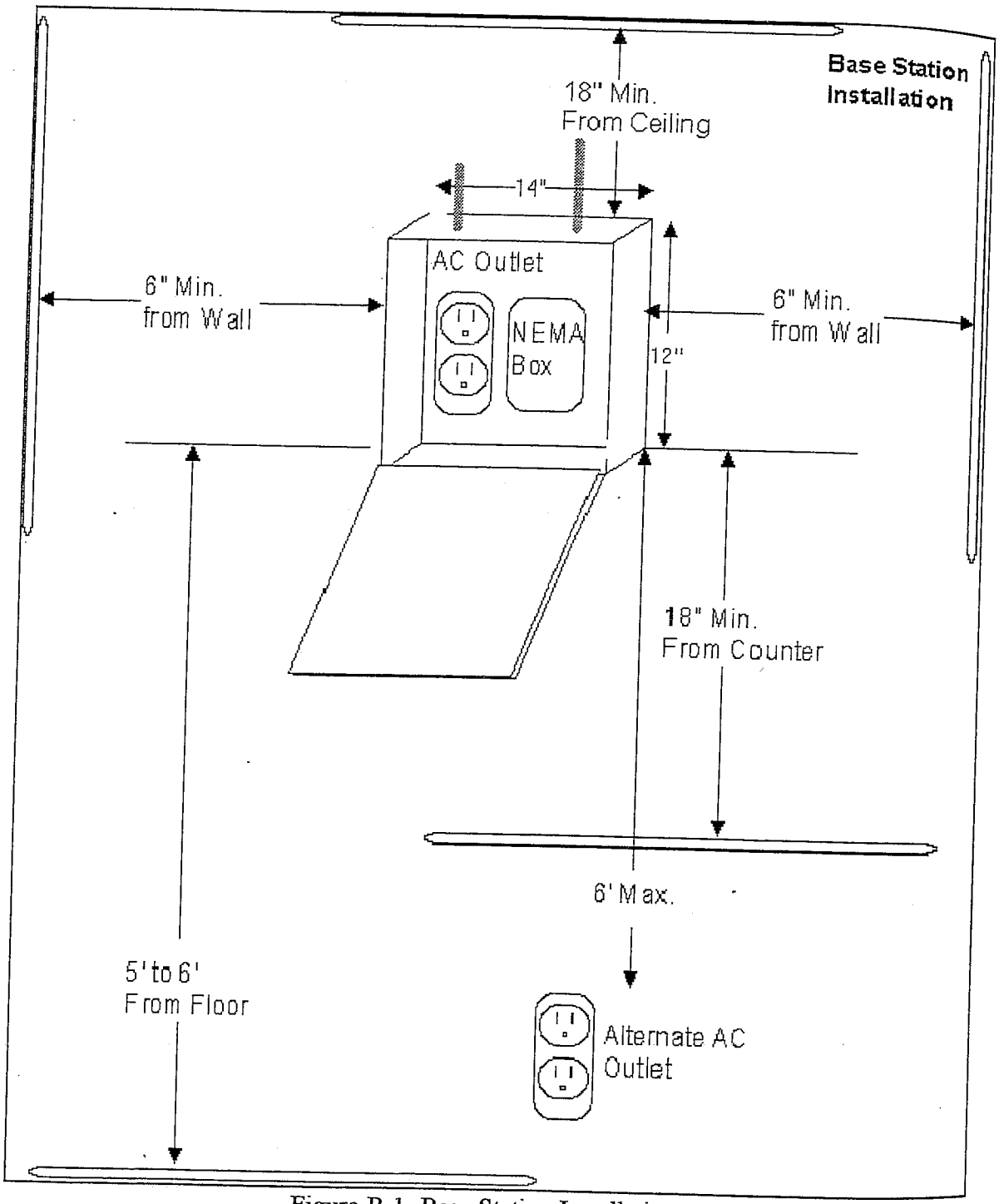

Figure B-1. Base Station Installation

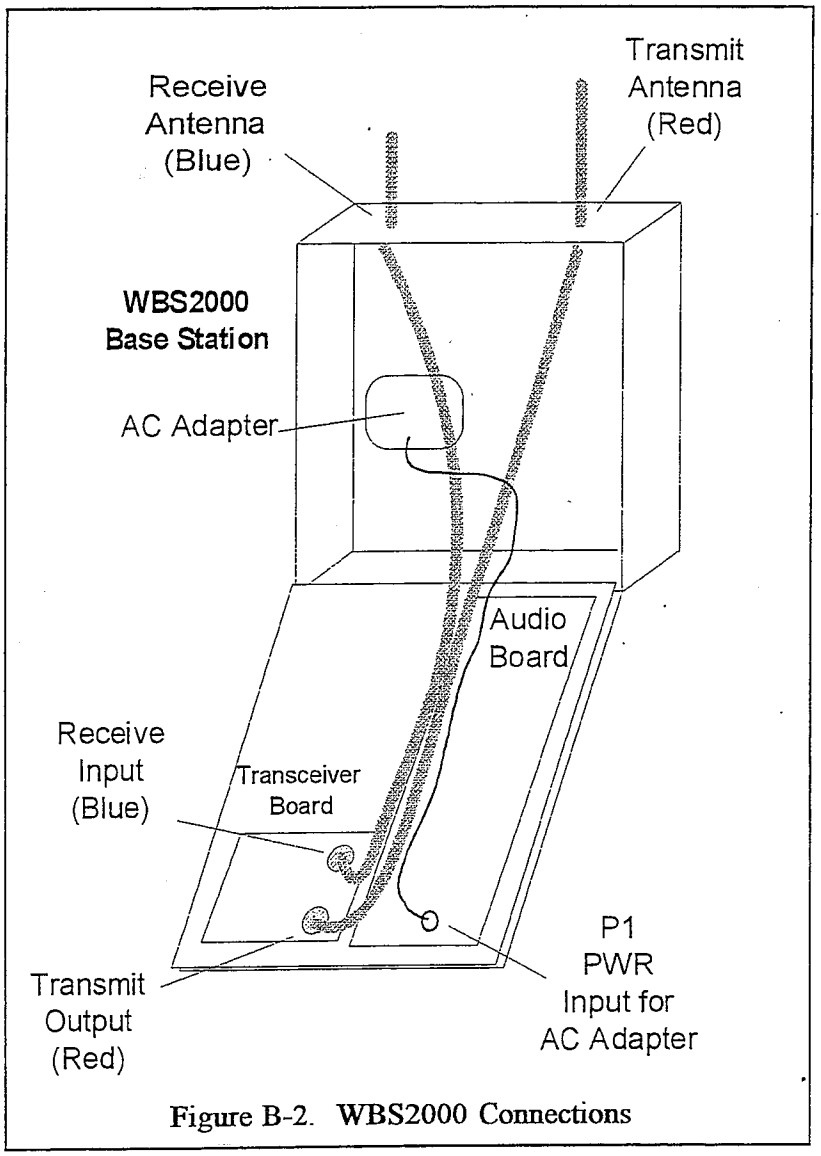

Figure B-2. WBS2000 Connections

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APPENDIX C
OPTIONAL ANTENNAS

C.1 INTRODUCTION

HM Electronics Offers additional antenna systems to improve the transmission and reception of your system. The DA8000 is a Distributive Antenna System and the AD3000 Diversity Antenna.

C.2 DA8000 ANTENNA

Figure C-1 illustrates the DA8000 Antenna. Cables 1, 2, and 3 are not supplied, and must fabricated or obtained for use with the DA8000. Make the cables using standard coaxial cable with Male "F" connectors on both ends. Make the cables of any length needed for placement of the three antennas. Mount the DA8000 on the wall or ceiling wing any type fasteners that are practical. To avoid interference, do not mount the antenna within 3 feet from metal objects. The antennas must hang vertically for the antenna boxes and the end piece.

C.3 AD3000 Diversity Antenna

Figure C-2 illustrates the AD3000 system. Install the splitters to the sides of the Base Station with the hardware enclosed.

Locate the antenna so that it covers the area the base station antennas failed to cover. Test the antennas before mounting the antenna. Route the cables through the wall behind the base station and over the ceiling to the antenna location. Attach the cables according to the color codes, and mount the antenna with the hardware supplied.

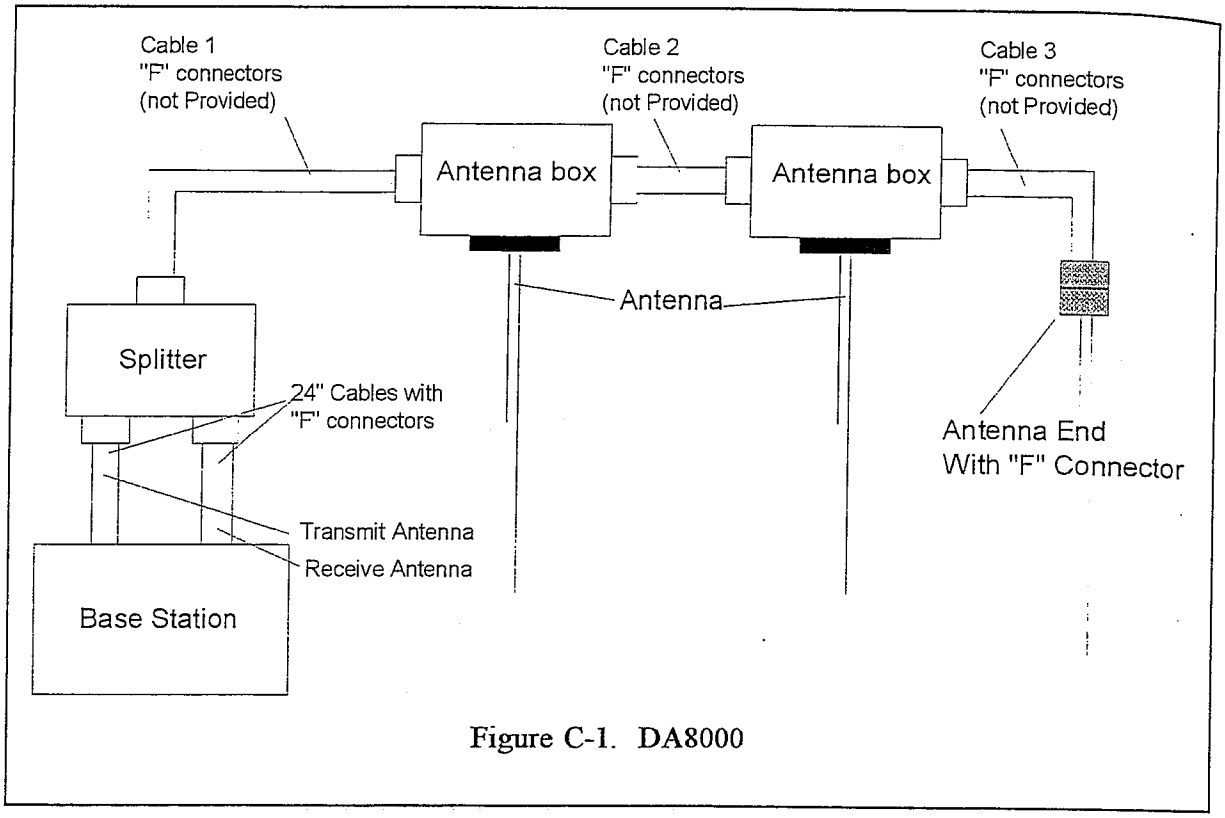

Figure C-1. DA8000

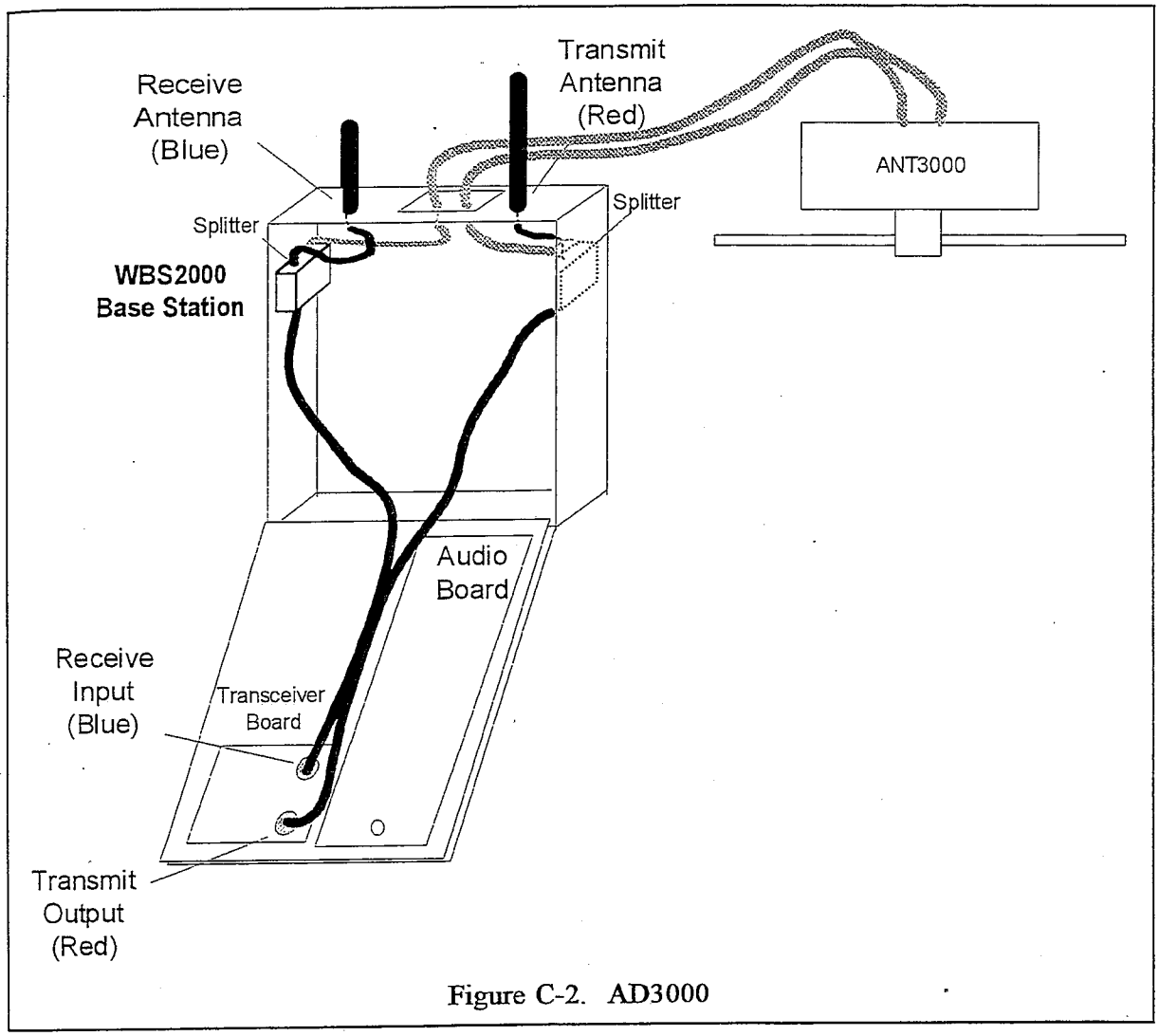

Figure C-2. AD3000

APPENDIX D
INTERFERENCE

D.1 INTRODUCTION

Appendix D discusses interference problems that may occur when the System 2000 is improperly installed. Removal of RF interference is a difficult and time-consuming procedure. The following practice should help to avoid the most common RF interference problems.

1. When the System 2000 is being used, make sure any backup wired system connected to the system through an ASW1 or ASW2 is turned off and unplugged from the wall outlet.
2. Be sure to find the best location for the base station and antenna before permanently mounting them.
3. Solder all joints (including crimp joints) at the Menu Board speaker . This is very important in damp climates.
4. Be sure all joints are tight. Loose joints or connectors make good RF detectors.
5. Avoid using long lengths of unshielded wire in the system.
6. Ground the Menu Board Speaker at TB1 (Audio Board). In severe cases of interference, grounding the shield at the speaker may help.

AM and FM frequency interference may cause similar problems by require different corrective actions. Note the following symptoms carefully to determine the cause of possible interference problems.

D.2 ELECTRICAL INTERFERENCE

1. Menu Board Speaker Post
Faulty electrical wiring /components of the Menu Board Speaker posts can cause symptoms identical to those described in the first paragraph under AM interference. Electrical faults in other devices can also cause problem. Because most lighting systems are controlled by a timer or light sensing device, operational problems/faults that cause interference can go unattended for extended periods of time. The effects of the electrical faults on the operation of the wireless system can render it ineffective in communicating with customers. The most common symptoms are static, hum cracking buzzing, and zip sounds in the Communicator headset when a vehicle is present at the outside speaker or when the Vehicle Detector Override switch is placed in the Override position. Remove power to the Menu Board Speaker post by turning off the System until proper repair of the electrical system can be made.

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2 Improper Earth Grounds in the Building

Improper earth grounds at different points throughout the building can result in random noises on the Communicator when communicating with the Menu Board Speaker Post or when transmitting in either CUSTomer or INTercom modes. The usual symptoms are buzzing and zips. Placing a Surge Protector between the AC115B AC Adapter and the AC outlet will eliminate the problem in most cases.

D.3 RADIO FREQUENCY INTERFERENCE

1 AM Interference

Symptoms of AM radio interference can be identified in the following ways:

- Static or hum is heard in the Communicator headset when a vehicle is present at the Menu Board Speaker or when the Vehicle Detector Override switch is placed in the Override position. The AM interference point of entry is at the Menu Board Speaker via the cables connected to the Base Station. In order to block out the AM signal, first located and identify the AM radio station in the area, and obtain its operating frequency and transmitter output power. The System can then be modified with an inductor/capacitor filter network that will trap the undesirable AM signal at the point of entry into the system.

- Static, hum and voice is heard in the Communicator headset when a vehicle is present at the Menu Board Speaker, when the Vehicle Detector Override switch is placed in the Override position, or when transmitting in either "A" or "B" modes. The point of entry for the interference is at three different locations:
  the outside speaker (menu board) cable,
  the Communicator receiver,
  and the base station transmitter.

The AM station frequency may completely suppress or overpower the System transmitter signal in some cases, depending on the operating frequency, transmitter-tower location and output power of the radio station. Change the operating frequency of the system to correct this type of interferences. In both types of AM radio interference, the symptoms may appear to be less severe at certain times of the day. A 50% reduction of transmitter output power at dusk (5 to 7 p.m.), required in some areas for AM stations rated at or above 100 kW, causes this phenomenon.

2. FM Interference

A common symptom of FM interference is the presence of voices from outside the system in the Communicator headset when transmitting in either the CUSTomer or INTercom mode or when a vehicle is present at the outside speaker (vehicle loop). Be certain that the system owner has a clearly posted, current FCC license, and contact the FCC for assistance.