

SABER™  
Vehicular Adapter  
Instruction Manual

68P81068C70-0

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SABER UHF Service Manual .....	68P81043C95
SABER SECURENET™ VHF Service Manual.....	68P81045C70
SABER SECURENET UHF Service Manual .....	68P81045C75
SVA Operating Instructions.....	68P81061C60
SABER SECURENET Mid-Band Service Manual .....	68P81063C30
SYSTEMS SABER™ SECURENET UHF Service Manual .....	68P81066C95
SYSTEMS SABER SECURENET VHF Service Manual .....	68P81067C10
12-Watt Speaker .....	68P81108C39

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## SPECIFICATIONS

<b>UNIT CAPACITY:</b>	One SABER I, II, or III, or SYSTEMS SABER I, or III Portable Radio
<b>DIMENSIONS (L x H x W):</b>	9.85" (over rf connector) x 3.03" x 6.64" (over knob) (250 x 76 x 168 mm) 9.59" (without rf connector) x 3.03" x 6.26" (without knob) (243 x 76 x 159 mm)
<b>WEIGHT:</b> (without portable radio)	3.16 lbs. (1434 g)
<b>NOMINAL INPUT VOLTAGE:</b>	13.8 Vdc (negative ground)
<b>CURRENT DRAIN</b>	<b>CHARGED BATTERY</b> <b>DISCHARGED BATTERY</b>
Standby:	0.4A    0.8A
Receive with 12W Audio:	2.3A    2.7A
Transmit:	1.8A    1.8A
<b>CHARGE RATE:</b>	Three hours (Medium- and Ultra-High-Capacity Batteries)
<b>ANTENNA INPUT IMPEDANCE:</b>	50 Ohms

Specifications subject to change without notice

## MODEL CHART

MODELNUMBER					DESCRIPTION	
NTN1043B					SVA PACKAGE 1 (SVA WITH MOBILE [PALM] MIC)	
NTN1044B					SVA PACKAGE 2 (SVA WITH MINI-MOBILE MIC)	
NTN1045B					SVA PACKAGE 3 (SVA WITH SABER DISPLAY/KEYPAD MIC)	
NTN1066B					SVA PACKAGE 4 (SVA WITH SYSTEMS SABER DISPLAY/KEYPAD MIC)	
					<b>ITEM NO.</b>	<b>DESCRIPTION</b>
X	X	X	X		NTN5487B	CONSOLE
X					HMN1035A	MOBILE (PALM) MICROPHONE
	X				HMN1056A	COMPACT (MINI-MOBILE) MICROPHONE
		X			NMN6150A	SVA DISPLAY/KEYPAD MICROPHONE (SABER)
			X		NMN6169A	SVA DISPLAY/KEYPAD MICROPHONE (SYSTEMS SABER)
X	X	X	X		NSN6054A	12-WATT SPEAKER
A	A	A	A		HAD4006A	ANTENNA, 1/4 WAVE ROOFTOP (136-144MHz)
A	A	A	A		HAD4007A	ANTENNA, 1/4 WAVE ROOFTOP (144-150.8MHz)
A	A	A	A		HAD4008A	ANTENNA, 1/4 WAVE ROOFTOP (150.8-162MHz)
A	A	A	A		HAD4009A	ANTENNA, 1/4 WAVE ROOFTOP (162-174MHz)
A	A	A	A		RAE4012ARB	ANTENNA, 5dB GAIN ROOFTOP (406-420MHz)
A	A	A	A		RAE4014ARB	ANTENNA, 5dB GAIN ROOFTOP (445-470MHz)
A	A	A	A		RAE4015ARB	ANTENNA, 5dB GAIN ROOFTOP (470-494MHz)
A	A	A	A		RAE4016ARB	ANTENNA, 5dB GAIN ROOFTOP (494-512MHz)

**KEY:** X = INCLUDED A = ALTERNATE ITEM SUPPLIED; CHOICE DEPENDS ON CARRIER FREQUENCY

# DESCRIPTION

## 1. GENERAL

The Motorola SABER Vehicular Adapter (SVA) adapts SABER and SYSTEMS SABER Handie-Talkie® portable radios for mobile operation. The vehicular adapter consists of a console, an external 12-watt speaker/amplifier, a hand-held mobile microphone, a rooftop antenna, mounting hardware, and cables.

When the radio is inserted into the console, the resulting combination acts as a mobile radio, with the following functions occurring automatically:

- The vehicular adapter's external antenna is connected to the radio, and the radio's internal antenna is disconnected.
- The vehicular adapter's mobile microphone is connected to the radio, and the radio's internal microphone is disconnected.
- The console's charging circuits are connected to the radio to charge the radio's battery.
- The radio's audio output is connected to the external 12-watt speaker/amplifier, and the radio's internal speaker is disconnected.

## 2. CONSOLE

The NTN5487B Console is the vehicular adapter's central unit. The console includes an illuminated front control panel, a radio battery charger, a radio latching mechanism with lock, and circuitry for interconnecting the radio, microphone, 12-watt speaker, and external antenna.

When the radio is mounted in the console, the combined radio/console operates as a mobile two-way radio. The radio must have a battery attached when it is inserted into the console; this battery will be automatically charged when the radio is inserted. A key lock is provided on the console to minimize theft when the vehicle is left unattended. Appropriate mounting hardware is provided with the console to facilitate mounting at any suitable location.

# INSTALLATION

## 3. EXTERNAL 12-WATT SPEAKER

The NSN6054A 12-Watt Speaker provides 12 watts of audio output power for use in high noise level environments. The audio level of the speaker can be adjusted from the console's control panel.

## 4. MOBILE MICROPHONE

Four different types of mobile microphones are available for the SABER Vehicular Adapter: the HMN1056A Compact Microphone, the HMN1035A Palm Microphone, the full-featured NMN6150A Display/Keypad Microphone (for SABER radios), and the full-featured NMN6169A Display/Keypad Microphone (for SYSTEMS SABER radios).

All four mobile microphones are palm-type, weatherproof, cartridge microphones, with transistorized preamplifiers as an integral part of the cartridge. Each microphone is equipped with a push-to-talk (PTT) switch on the side, and has a coiled cord with an 8-pin connector which plugs into a jack on the left side of the console. Mounting hardware is provided as part of the console package.

In addition to the above, the NMN6150A and NMN6169A Display/Keypad Microphones have a keypad and a display which duplicate the functions of the appropriate radio's keypad and display.

## 5. ROOFTOP ANTENNA

To enable the vehicular adapter to function as a mobile vehicular radio, an external rooftop antenna must be ordered from C & E Parts. This antenna is cut to correspond to the frequency band of the radio used with the vehicular adapter. Refer to the MODEL CHART for specific antenna model numbers and frequencies.

### CAUTION

If possible, avoid mounting the console in a vertical position. This will minimize the danger of foreign substances being dropped or spilled into the console pocket.

### CAUTION

Do not attach the microphone mounting bracket to the console housing.

### WARNING

FOR VEHICLES WITH ELECTRONIC ANTI-SKID BRAKING SYSTEMS, REFER TO THE "ANTI-SKID BRAKING PRECAUTIONS" SECTION OF THIS MANUAL.

## 1. INSTALLATION PLANNING

### a. General

Before starting the installation, determine the location of the console, microphone, and 12-watt speaker. Also, check the mounting penetrations required. On most vehicles, it is necessary to penetrate the firewall to reach the battery. Check the opposite side of the firewall for cable clearance before drilling holes, and protect the cable where it passes through the firewall by using the supplied grommets or other similar protective measures. Because of the wide variations in vehicle design, these instructions may be modified to suit each particular installation.

A properly installed SVA will minimize service calls and equipment downtime. Consider the following guidelines when planning the installation:

- **DO** use all mounting holes provided.
- **DO** use lockwashers where provided.
- **DO** ensure that unit cables are not placed under

- **DO** follow proper A+ and A- connections.
- **DO** tape all splices securely.
- **DON'T** attach the units to any part of the vehicle that is not rigid or is subject to excessive vibration.
- **DON'T** install units in areas where rain or snow can easily get into them, such as next to a vehicle window which may be left open.

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*Figure 2. Microphone Bracket Installation Detail*

- **DON'T** dress cables over sharp edges that could cause wear or tearing of cable insulation.
- **DON'T** install the units in locations where they might interfere with the vehicle operator or operating controls.
- **DON'T** install the units where they will be difficult for the operator to reach.

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stress, are not weathered, and are not subjected to damage due to engine heat.

*Figure 1. Console Installation Detail*

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Figure 3. 12-Watt Speaker Installation Detail

**b. Console Location**

The console should be mounted to provide 12 inches of clearance in front of the console for inserting and removing the radio. A 4-inch clearance at the rear and left side of the console is necessary for connection of power, microphone, antenna, and speaker cables; a 1-inch clear-

**NOTE**

The rf jack, J3, on the SVA console is a mini-UHF jack, and must be mated with either a mini-UHF plug (P3) or a UHF-to-mini-UHF adapter (Motorola part number 5880367B22).

ance is required above the vents on the top of the console. Consider accessibility to the controls by the operator. When possible, mount the console on the floor near the center of the vehicle.

**c. Microphone Bracket Location**

When possible, mount the microphone bracket on the dash near the left side of the console. The loca-

**CAUTION**

Remove the 5-ampere fuses from the power cable (red, green, and yellow wires) before proceeding.

tion should be within easy reach of the operator, and it should be convenient to remove and replace the microphone without interfering with any of the vehicle controls.

**d. Speaker Location**

Select a location for the speaker that will be neither dangerous to the operator nor damaging to the speaker. A trunnion bracket is provided for mounting the speaker. The speaker is normally hung under the dash near the right side of the console; however, the trunnion bracket permits mounting the speaker against a wall or other vertical surface, if desired.

**e. Antenna Location**

**CAUTION**

It is not good practice to connect the black lead to the negative ( - ) battery terminal; the SVA could be damaged if there were to be a malfunction in the vehicle's electrical system.

Complete antenna installation instructions are supplied with each antenna ordered. Refer to those instructions for all information pertaining to the antenna. Also, refer to the SAFETY INFORMATION para-

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Figure 4. Console Connector Locations

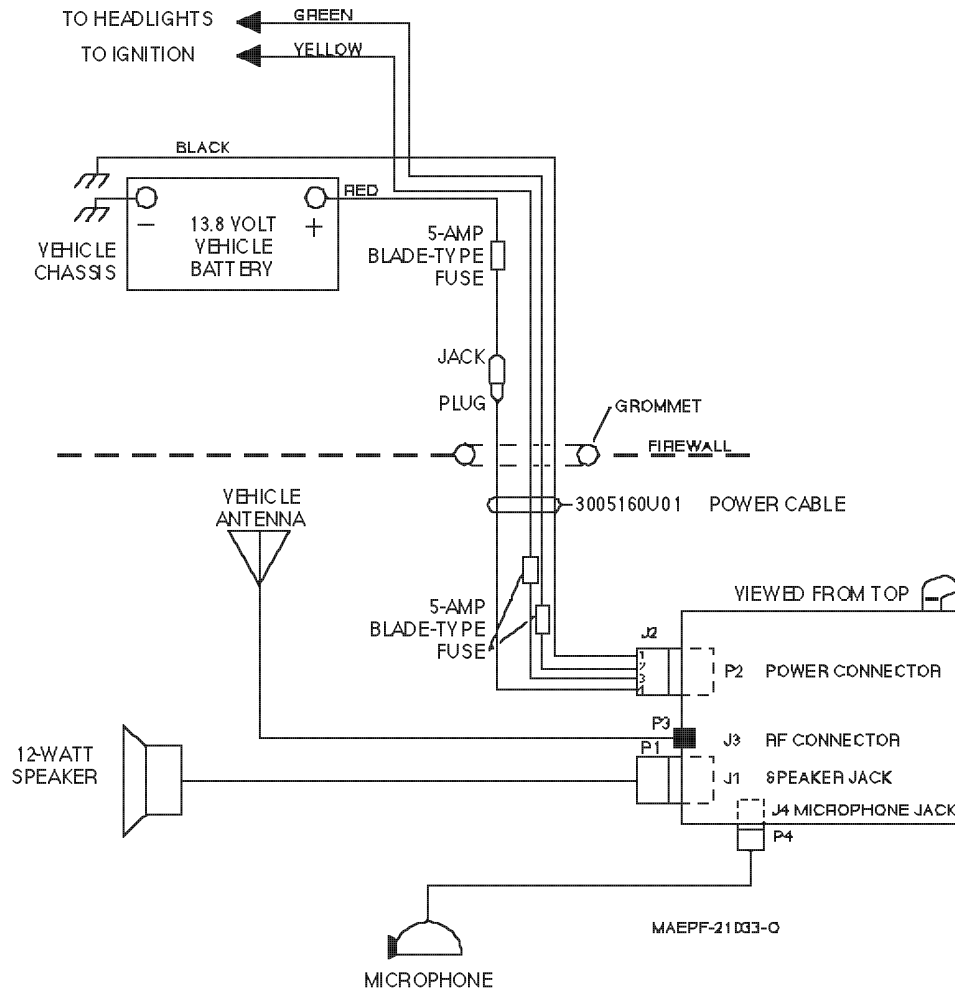


Figure 5. Console Intercabling Detail

graph in the FOREWORD of this manual for additional information.

#### f. Battery Connections

Determine the best cable route from the rear of the console to the vehicle battery through the engine firewall. The best route should include the shortest path to the battery terminals, yet provide the cable with protection from engine heat. Cut off any excess cable. Be sure the supplied grommet or similar protective measure is used wherever a cable must pass through a hole in a metal panel, such as a firewall. The power cables must be routed in a way that protects them from being pinched or crushed.

## 2. CONSOLE INSTALLATION

Referring to Figure 1, install the console using the following procedure, or modify the procedure as necessary to conform to the vehicle type:

- a. Using the trunnion bracket as a template, drill the mounting holes, and mount the bracket with the hardware supplied. If the trunnion bracket is to be mounted on the floor or vehicle console, bend the tabs on the bracket to conform to the shape of the floor or vehicle console (see Figure 1).
- b. Position the console onto the trunnion bracket so that the knurled fittings of the console and trunnion bracket mesh together.
- c. Place the lockwashers on the Allen-head screws, then insert the screws through the trunnion bracket and screw them into the console. Since the console will have to be removed later to connect the cables, do not tighten the screws at this time.



### 3. MICROPHONE BRACKET INSTALLATION

Referring to Figure 2, use the microphone mounting bracket as a template and drill two 1/8-inch holes. Attach the microphone bracket to the mounting surface with the two self-tapping screws provided. Be sure to leave sufficient room above the bracket for insertion and removal of the microphone.

### 4. 12-WATT SPEAKER INSTALLATION

The 12-watt speaker includes a trunnion bracket, a hanger bracket, and a wall-mount bracket, permitting the speaker to be mounted in a variety of ways.

- The trunnion bracket is used to permanently mount the speaker on the dashboard or accessible firewall areas, while permitting the speaker to be tilted to a desired angle.
- The hanger bracket permits temporary mounting, such as on an automobile window. The speaker must be removed from the trunnion bracket to use the hanger bracket.
- The wall-mount bracket can be used for permanent mounting if the trunnion bracket is too large to fit in the desired area. In this case, the trunnion bracket is removed, and the speaker is attached to the wall-mount bracket by the hanger bracket.

Referring to Figure 3 for installation information, perform the following procedure:

- a. Using the trunnion bracket as a template, drill the necessary mounting holes and secure the bracket with the self-tapping screws provided.
- b. Position the 12-watt speaker onto the trunnion bracket, and secure it using the wing screws provided.

#### WARNING

Disruption of the anti-skid braking system may cause the vehicle to move forward in addition to the lights and audible sounds mentioned above.

### 5. ANTENNA INSTALLATION

Install the antenna and antenna cable as outlined

#### WARNING

Severe disruption of the electronic anti-skid braking system may cause loss of control of the vehicle in steps (6), (7), and (8).

in the installation instructions supplied with the antenna. Pertinent information on frequency matching, and mounting details are also provided with each antenna.

### 6. CONSOLE CABLING

Refer to Figures 4 and 5 before routing or connecting any console cable. As shown in Figure 5, the console is used with a negative ground system only. The console should be cabled using the following procedure:

#### NOTE

Due to space restrictions, it may be necessary to remove the console before making connections to the connectors at the back of the console. If this is the case, make the connections and re-mount the console before replacing the 5-amp fuses.

- a. After setting the 2-foot section of the main power cable aside for later use, route the main power cable through the firewall and into the battery compartment. Use an existing opening or, if necessary, drill a 3/4-inch hole through the firewall. Insert the grommet provided with the mounting kit into the hole to prevent damage to the power cable.
- b. Cut the black lead to the desired length, then connect it to the chassis of the vehicle.
- c. On the engine side of the firewall, connect the red (A+) lead to the vehicle's battery as follows:
  - (1) Cut the long, red lead to the desired length, then connect (crimp) it to the plug on the 2-foot section of red lead which was set aside in step a. Make sure that the plug and jack in the lead are connected securely together.
  - (2) Connect the red lead to the positive ( + ) terminal on the vehicle's battery.
- d. Cut the yellow lead to the desired length, then connect it to the fused, switched side of the ignition circuit.
- e. Cut the green lead to the desired length, then connect it to the fused, switched side of the headlight circuit.

# THEORY OF OPERATION

## 1. GENERAL

The Motorola SABER Vehicular Adapter (SVA) is designed to work in conjunction with SABER and SYSTEMS SABER portable fm two-way radios.

### NOTE

When the SVA is used with a SYSTEMS SABER radio in the trunked mode, the "busy channel" indicator (bottom volume LED) will flash continuously, indicating the presence of a carrier signal on the radio control channel.

Connection between the radio battery and the SVA console is made through the charger contacts (P8) at the rear of the console pocket. Through these contacts, the console's charger circuitry automatically charges the radio battery.

Other connections between the SVA console and the radio are made via the universal and rf connectors

on the back of the radio.

When the radio is inserted into the console pocket, and the radio is latched in place by rotating the knob on the side of the console 90° clockwise, the contacts of the console's universal connector assembly are automatically mated with the radio's universal and rf connectors. This makes control of all the basic radio functions available to the SVA. The hand-held microphone and rooftop antenna are also automatically connected to the radio when it is latched into the console.

With the exception of the volume control, all controls on the top of the radio can be used. The radio's volume control is disabled by the SVA, and the volume control buttons on the front of the SVA console must be used instead.

## 2. CIRCUIT DESCRIPTION

When reading the following circuit descriptions,

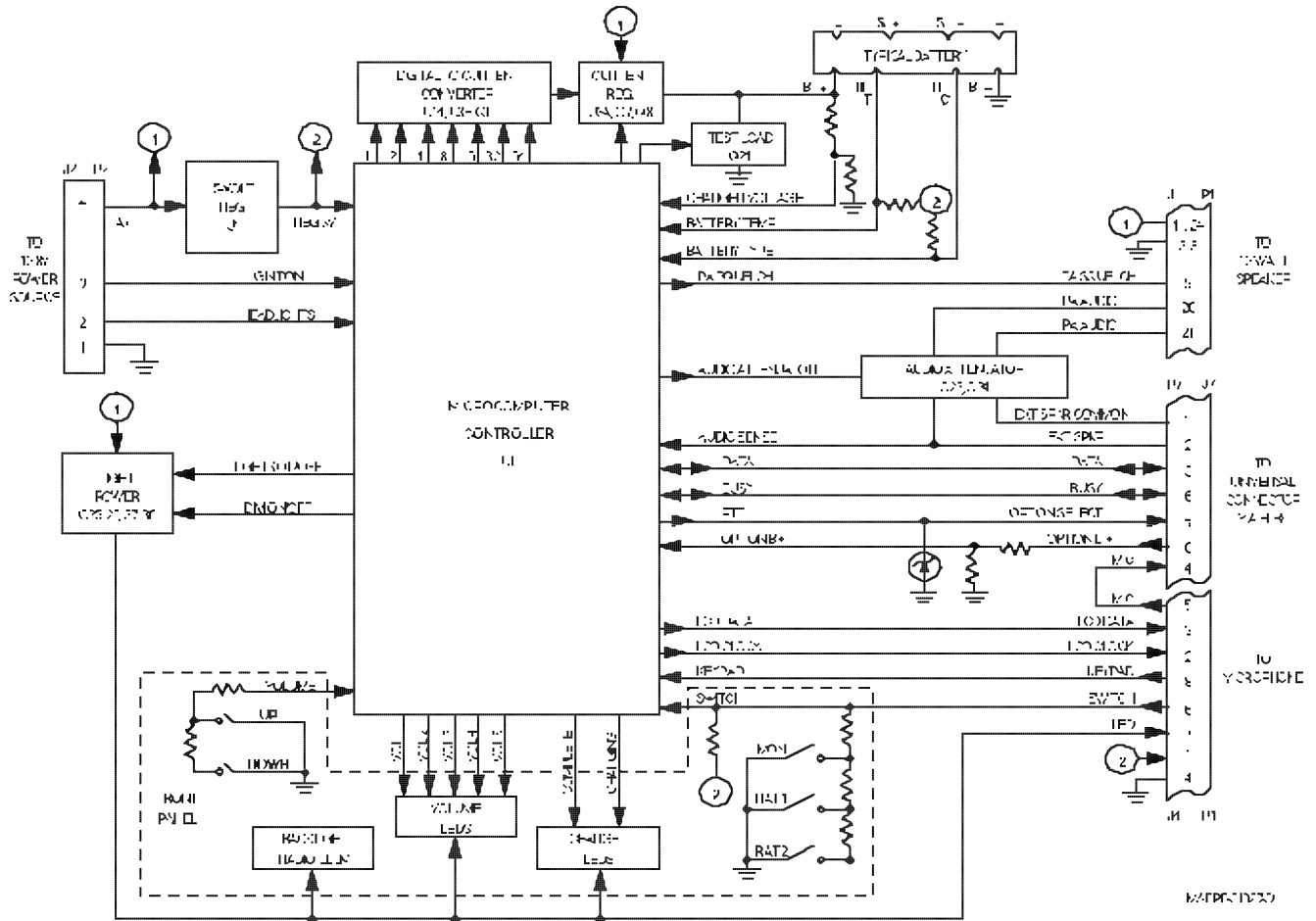


Figure 6. Console Functional Block Diagram

refer to the console functional block diagram, Figure 6, and the schematic diagram at the back of this manual.

### a. Battery Charger Circuitry

Operating A+ for the console is obtained from a 13.8-volt source, such as a car battery. The A+ is applied to a 5-volt regulator (U1) which provides regulated +5Vdc power to the microcomputer.

Four radio/battery combinations will be accepted by the SVA:

- SABER clear radio with 900mAh battery,
- SABER (or SYSTEMS SABER) SECURENET radio with 900mAh battery,
- SABER clear radio with 1500mAh battery, or
- SABER (or SYSTEMS SABER) SECURENET radio with 1500mAh battery.

Once the radio/battery combination is latched into place in the console pocket, the battery sensing, battery charging, and radio sensing begin.

### b. Battery Sensing and Charging

The microcomputer (U6) scans for the insertion of a radio/battery combination by monitoring the voltage at the  $R_C$  and  $R_T$  battery contacts. The valid  $R_C$  values identifying the designated battery type are as follows:

$R_C$ RESISTANCE	BATTERY TYPE
5.1k $\Omega$	900 mAh
18k $\Omega$	1500 mAh

The microcomputer also reads the voltage at the  $R_T$  contact to determine whether the battery may be safely charged at the three-hour rate. The battery temperature must be between 10°C and 40°C. If a valid  $R_C$  value is recognized, and the battery is determined to be within the charge window, charging at the three-hour rate will begin, and the red "charging" LED will light.

If the battery temperature is outside the charge window, but is less than 60°C, the battery will be charged at its ten-hour rate until the battery temperature falls within the window. During this time period the red "charging" LED will be on.

After approximately three hours or when the bat-

tery temperature reaches 45°C (whichever occurs first), the microcomputer (U6) will reduce the charge rate to the ten-hour rate; this rate will be maintained until the battery is removed. The change to this rate is signalled by the red "charging" LED turning off and the green "charge complete" LED turning on.

The microcomputer compensates for current consumed by the radio while the radio is in standby or receive modes. When the microcomputer senses the presence of a radio in the console pocket, it increases the battery charge current by the appropriate amount. When the radio transmits, the charge current is increased to 1.5 amps for the transmit duration.

### c. Radio Sensing

The microcomputer (U6) determines whether the radio is turned on by measuring the voltage from the radio at pin 8 of the universal connector (P7). When the radio is turned on, the microcomputer will sense approximately 7.5V on the pin. The SVA's microcomputer (U6) will then attempt to establish communication with the radio's microprocessor via the serial bus (U6, pin 20).

Once communication has been established, control of radio volume control, monitor, and PTT functions are transferred to the SVA:

- The volume level can be changed via the up/down volume buttons on the console's front panel; five red LEDs indicate the volume level.
- The monitor function can be accomplished by pressing either the monitor button on the console's front panel or the monitor button on the display microphone.
- The PTT function can be accomplished by pressing the PTT button on the external microphone.

Channel selection remains a radio function and can be accomplished via the channel selector knob on the radio. SABER and SYSTEMS SABER radio displays are echoed on the SVA display microphone.

During transmit, the rf signal from the radio is routed to the mini-UHF rf connector, J3, at the back of the console, where it can be either further amplified by an external rf power amplifier, or hooked directly to the rooftop antenna.

When the radio detects an on-channel signal, the

# MAINTENANCE

## 1. PREVENTIVE MAINTENANCE

### a. Periodic Inspections

Slow degradation of equipment performance, if left uncorrected, can lead to costly equipment downtime and repair. Preventive maintenance (PM) differs from corrective maintenance in that minor equipment operating deficiencies can be corrected before breakdown occurs. Periodic and systematic PM inspection schedules should be set up to keep the equipment operational and failure free. The frequency of PM schedules will be determined by the environment in which the equipment is being used.

The periodic inspections should include:

- Visual inspection of cables for frayed or oxidized leads.
- Ensuring that battery connections are free from oxidation or corrosion.
- Checking the external rooftop antenna for clean and rust-free mounting.
- Checking for tight connection of the console-to-antenna cable connectors.
- Checking the system ground lead (black) for clean and proper electrical contact.
- Checking all jack and plug connections for tightness and good electrical pin contact. Pins should be visually checked for wear.
- Checking for loose components. Checking component assemblies and mechanical assemblies for tight and secure installation. The majority of SVA failures is directly related to poor installation.
- Inspecting all mounting brackets and associated mounting screws for secure and tight mounting.
- Checking for overheated or discolored components.
- Checking for proper (13.8Vdc) vehicular alternator charging. Vehicular voltage can vary from as low as 12.9Vdc to as high as 18Vdc without being evident to the operator; however, it can affect SVA operation.

### b. Cleaning Procedures

In areas of high dust or salt conditions, periodically check the mechanical operation of the console's battery contacts. If contact movement requires excessive effort, clean any dust or salt deposits from the moving parts as described below. Cleaning may be accomplished by performing the following procedure:

- (1) Remove the console from the vehicle and place it rightside-up on a flat working surface. The working surface should offer protection from scratching to the console's surfaces.
- (2) Referring to the "Disassembly/Reassembly Procedures" (paragraph d) in the "CORRECTIVE MAINTENANCE" section of this manual, disassemble the unit for cleaning.
- (3) Clean the external surfaces of the console using the recommended cleaning agent. These surfaces should be cleaned whenever a periodic visual inspection reveals the presence of excessive dust, grease, and/or grime.

The only recommended agent for cleaning the internal and external plastic SVA surfaces is a 0.5% solution of a mild dishwashing detergent in water (one teaspoon of detergent per gallon of

#### CAUTION

The effects of certain chemicals and their vapors can be harmful to some types of plastics. Aerosol sprays, tuner cleaners, and other such chemicals should be avoided.

water).

- (4) The internal circuit boards and components should ordinarily be cleaned when the console must be disassembled for servicing or repair. The only factory recommended liquid for cleaning the circuit boards and their components is *isopropyl alcohol* (70% by volume).

#### NOTE

When the SVA is used under adverse marine conditions, the circuit board must be cleaned of salt deposits at least twice a year.

Isopropyl alcohol may be applied with a stiff, non-metallic, short-bristled brush to dislodge embedded or caked-on materials located in hard-to-reach areas. The brush stroke should direct the dislodged material out and away from the inside of the console.

Alcohol is a high-wetting liquid and can carry contamination into unwanted places if an excessive quantity is used. Make sure that the controls are not soaked with the liquid. Upon completion of the cleaning process, use a soft, absorbent, lintless cloth to dry the area.

#### NOTE

Always use a fresh supply of alcohol and a clean container to prevent contamination by dissolved material from previous usage.

- (5) Reassemble the console, reversing the disassembly procedure.

## RECOMMENDED TEST EQUIPMENT

MODEL NO.	NAME	CHARACTERISTICS	APPLICATION
R-2001, R-2002, or R-2200	Service Monitor	-----	Audio circuit, testing, frequency/ deviation, power output.
S-1347	DC Power Supply	0-20Vdc, 0-5 Amps; current limited	Power supply for bench testing.
S-1053	AC Voltmeter	1mV to 300mV RMS, -72dB to +52dB; 10M $\Omega$ input impedance	Audio voltage measurements
R-1028	Solid-state Oscilloscope	-----	Waveform measurements
R-1001	Digital Multimeter	High input impedance	DC voltage, resistance measurements
REX-4063	Test Fixture	-----	Troubleshooting

## 2. CORRECTIVE MAINTENANCE

### a. Introduction

Efficient corrective maintenance requires an orderly and logical troubleshooting procedure for localizing malfunctions in the SVA's internal or external circuits. Troubleshooting and repair will be greatly simplified by becoming familiar with the overall SVA and radio operation.

This section provides detailed information required to isolate malfunctions to the SVA's internal or external circuits. The troubleshooting chart at the end of this section provides information on possible circuit failures, related symptoms, and suspected malfunctioning stages.

Generally it may be assumed that, if the SVA is totally inoperative, then the vehicle's battery is completely discharged, the fuse is blown, or the power lead is opened. However, if the SVA is partially operative, it may be assumed that the batteries are serviceable and that one or more internal or external functional SVA circuits are defective or marginal. Using diagrams, the troubleshooting chart, the voltage table, and deductive reasoning, the defective circuit may readily be found.

To further aid in analyzing the symptoms and possible causes of the malfunction, check: rf power output using an in-line wattmeter, audio deviation, and current drain. Once the general problem area of the SVA is identified, careful use of a dc voltmeter, ohmmeter, and/or oscilloscope should help isolate the problem to a defective component.

### b. Test Equipment and Service Aids

The "RECOMMENDED TEST EQUIPMENT" chart lists the test equipment recommended to properly service the SVA. Refer to the service manual for the associated radio for the recommended radio test

equipment. For field servicing, the vehicle's battery is an adequate power source. Battery-operated test equipment is recommended when available.

See your Motorola sales representative for aid in ordering test equipment. The sales representative will analyze your requirements and help you select the latest available equipment and service aids to suit your individual needs.

(1) *MAV-PACK 3 (VID-952)*

The VID-952 Motorola Audio/Visual Package (MAV-PACK) is a videotape training program on leadless component repair techniques. This VHS format video cassette and supplemental literature describe the removal and replacement of leadless components using the following specialized equipment:

- RRX-4033 Laurier Hot Gas Bonder
- RPX-4234] Regulator and Hardware Kit
- 0180386A62 Heated Tweezers
- RSX-1002 Desoldering Station
- RSX-1008 Weller Soldering Station

This MAV-PACK is strongly recommended for technicians who intend to service this and other Motorola products using leadless components. This VHS videotape is in standard half-inch format. This MAV-PACK, as well as others, is available from:

**Motorola C&E, Inc.  
National Service Training Center  
1300 N. Plum Grove Road  
Schaumburg, Illinois 60173**

**c. Troubleshooting**

Refer to the troubleshooting and voltage charts at the back of this section to isolate a malfunction to a defective circuit. Follow the flow through the chart, check each observation, and answer each question. As an aid in understanding the operation and functioning of a particular circuit, refer to the appropriate paragraphs in the "THEORY OF OPERATION" section of this manual.

If a circuit board must be tested, it may be necessary to remove it from the chassis and test it outside of the enclosure. In this case, leave all wires connected to the board, and use care to protect the board from being accidentally shorted out. Use heat sinks with insulators on transistors Q7 and Q25 while the board is removed from the chassis.

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*Figure 7. Removing the Top Housing*

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*Figure 8. Removing the Insides of the Console*

#### d. Disassembly/Reassembly Procedures

##### (1) Disassembly Procedure

Disassemble the console by performing the following procedure:

*Refer to the exploded view, exploded view parts list, and Figure 7 for steps a through e.*

- (a) Turn off and unlock the SVA, remove the radio from the console, and disconnect all cables (including the microphone). Remove the key from the SVA lock. Place the console on a flat working surface with the rear of the console facing you.
- (b) Locate the first of three screwdriver positions; the two outside positions have features for the screwdriver. Insert a small flat-bladed screwdriver into the left-most slot, then lift up on the handle to allow the snap to release and the top housing to move toward the front of the console.
- (c) Repeat step (b) for the remaining screwdriver positions, working from left to right, until all three snaps are released and the top housing slides forward approximately 1/2 inch. If the top fails to slide forward, make certain that the coaxial connector (J3) is not restricting the top housing's movement.
- (d) Lift off the top housing and put it aside.
- (e) Remove the knob on the side of the console by grasping the extended portion of the blade and pulling it away from the console. The knob is made of a urethane material that can be deformed to allow the knob to be removed.

*Refer to the exploded view, exploded view parts list, and Figure 8 for steps f through j.*

- (f) Locate the two ribbon cables (one originates at the front housing assembly, and the other originates at the universal connector assembly), and follow them to their circuit board connection points (J5/P5 and J7/P7). Unsnap the hold-down clips at the sides of P5 and P7 by pulling them sideward. Then, disconnect the jacks from the plugs by grasping the jacks (J5 and J7) and pulling them

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*Figure 9. Snapping the Console Closed*

directly away from the plugs.

- (g) Remove the hood by locating the four hold-down snaps which extend through the chassis. Place your thumb and index finger around the hood (Figure 8, locations A) and squeeze the hood. This will enable you to pivot the front portion of the hood away from the chassis, clearing the snaps in the middle of the part.
- (h) Insert the small flat-bladed screwdriver through the rear-most opening in the hood (Figure 8, location B), wedge the blade between the hood and the chassis, and twist the screwdriver slightly while pulling upward on the hood in that area. Repeat this step for the remaining snap.
- (i) While gently squeezing the transistor clip against the heat sink fins on the chassis, loosen the clip (Figure 8, location C) by prying and lifting the clip away from the heat sink fins' retaining tab.

#### NOTE

Do not attempt to remove the transistor clip at this time.

- (j) Separate the remaining assembly from the bottom housing and shield by locating the six hold-down snaps (Figure 8, locations D) which are molded into the bottom housing and hang over the sides of the chassis walls. Pull the bottom housing away from the chassis in the areas where the snaps are located, and pull the chassis upward and away from the bottom housing.

**CAUTION**

Leadless component technology requires the use of specialized equipment and procedures for repair and servicing of the SVA. If you are not totally familiar with leadless component repair techniques, it is strongly recommended that you either defer maintenance to qualified service personnel and service shops, or take the recommended video-taped component repair training program, MAV-PACK 3 (VID-952). This is of paramount importance as irreparable damage to the SVA can result from service by unauthorized persons. Unauthorized attempts to remove or repair parts may void any existing warranties or extended performance agreements with the manufacturer.

*parts list for the remaining disassembly steps.*

- (k) Remove the transistor clip by sliding the bottom of the clip toward the heat fins and lifting upward on the clip.
- (l) While lifting gently on the lightpipe, slide the front housing assembly forward away from the chassis. When reassembling the console, the front housing assembly can be snapped in place vertically after the chassis is positioned in the bottom housing.
- (m) Remove the lightpipe by lifting it up and away from the chassis.
- (n) Remove the universal connector assembly by pivoting its end upward 90° to vertical and lifting the assembly out.
- (o) Unsnap and remove the actuator arm from the chassis
- (p) Remove the actuator arm spring from the chassis.
- (q) Remove the camshaft from the chassis.
- (r) Remove the printed circuit board assembly by lifting it up and away from the bottom housing. This assembly is not held in place by any clips, but is oriented to the bottom housing by four pins which line up with four holes in the board.
- (s) Remove the lock by lifting it up and away from the bottom housing. When reassembling the console, make certain that the lock is in its unlocked position, then place the flat side of the lock parallel to the bottom of the housing with the bottom housing standoffs cradled in the lock slots.
- (t) Only if it is necessary, remove the bottom shield by locating the four snaps molded into the inside walls of the bottom housing, deflect the sheet metal tabs of the shield away from the four snaps, and lift the shield up and away from the bottom housing.

When reassembling the console, align the pad





**Exploded View Parts List**

TPLF-3934-O

<b>ITEM NO.</b>	<b>MOTOROLA PART NO.</b>	<b>DESCRIPTION</b>
1	3305183R19	LABEL
2	1505159T01	HOUSING, Top
3	1505157T01	HOOD, SVA
4	0105952Q23	ASSEMBLY, Front Housing
5	3305183R17	LABEL
6	0105952Q28	ASSEMBLY, RF Connector (part of item 8)
7	0905925S01	FLEX (part of item 8)
8	0105952Q26	ASSEMBLY, Universal Connector (includes items 6, 7, and 9)
9	4105169T01	SPRING, Connector (part of item 8)
10	4205294T01	CLIP, Transistor
11	1405329Q03	INSULATOR
12	4505165T01	CAMSHAFT
13	2705172T01	CHASSIS
14	4105170T01	SPRING, Actuator Arm
15	4505164T01	ARM, Actuator
16	7505934Q02	PAD, RF Shield
17	6105357T01	LIGHTPIPE
18	2605471T01	SHIELD, RF Cover
19	0105953R40	ASSEMBLY, Printed Circuit Board
20	2605167T01	SHIELD, Bottom
21	5505173T01	LOCK
22	1505158T01	HOUSING, Bottom
23	3605163T01	KNOB, Snap-On

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