

# Installation Manual

LBI-38901

Rev. V, Dec/06

## *future* The Future of Mobile Radio



## Orion™ Mobile Radio

**tyco**  
Electronics

**M/A-COM**

## MANUAL REVISION HISTORY

REV.	DATE	REASON FOR CHANGE
U	Apr/05	Updated USA Front Mount Standard Accessory Cable drawing.
V	Dec/06	Added caution for programming cable during keyloading. Replaced speaker 19A149590P12 with speaker LS-102824-005, updated programming procedure.

M/A-COM Technical Publications would particularly appreciate feedback on any errors found in this document and suggestions on how the document could be improved. Submit your comments and suggestions to:

Wireless Systems Business Unit  
M/A-COM, Inc.  
Technical Publications  
221 Jefferson Ridge Parkway  
Lynchburg, VA 24501

fax: 1-434-455-6851  
e-mail: [techpubs@tycoelectronics.com](mailto:techpubs@tycoelectronics.com)

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# REGULATORY AND SAFETY INFORMATION

## Safety Conventions

The following conventions may be used in this manual to alert the user to general safety precautions that must be observed during all phases of operation, service, and repair of this product. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the product. M/A-COM, Inc. assumes no liability for the customer's failure to comply with these standards.



The **WARNING** symbol calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in personal injury. Do not proceed beyond a **WARNING** symbol until the conditions identified are fully understood or met.



The **CAUTION** symbol calls attention to an operating procedure, practice, or the like, which, if not performed correctly or adhered to, could result in a risk of danger, damage to the equipment, or severely degrade the equipment performance.



The **NOTE** symbol calls attention to supplemental information, which may improve system performance or clarify a process or procedure.

# INTRODUCTION

This manual contains installation instructions for the Orion™ Mobile radio unit and associated accessories. These instructions cover the mounting and cabling of the radio. Interconnection and wiring diagrams are provided for reference. Before the installation, program the radio using the following:

- IBM® compatible personal computer
- TQS3385 – ProGrammer™ PC Software  
or  
TQS3389 - Conventional ProGrammer PC Software
- TQ3370 - Serial/Flash Programming Interface Module  
(required with TQ3377 cable only)
- One of the following programming cables:
  - TQ3377 (19B802554P15) – Shop Programming Cable (requires TQ3370)
  - TQ3409 (CA101288V15) - Shop Programming Cable (does not require TQ3370)



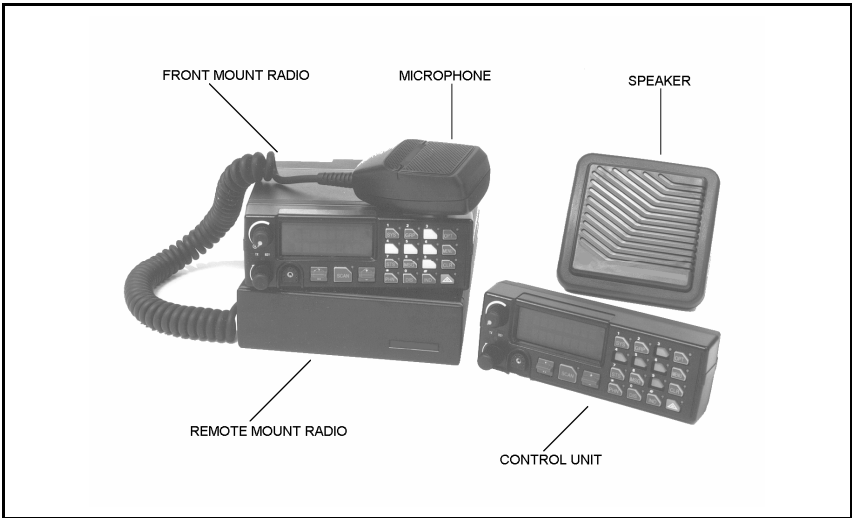
## ORION UHF MOBILES

The PC programmer automatically defaults the receiver oscillator shift to position No. 2. When field programming the receive frequencies for Orion UHF mobiles, the oscillator shift must be programmed to position No. 1 or No. 3. Enter the CONVENTIONAL and/or TRUNKED FREQUENCY SET screen of the PC programmer and set the values in the “OS” column to “1” or “3”.

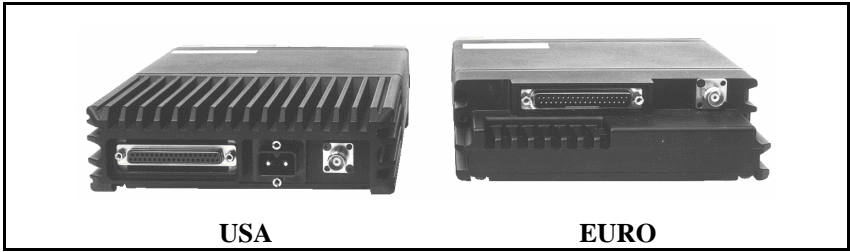
# UNPACKING AND CHECKING EQUIPMENT

Carefully unpack the radio and identify each item in the shipping container as listed below. The available options for the Orion Mobile Radio are covered in Table 1. If damage has occurred to the equipment during shipment, file a claim with the carrier immediately.

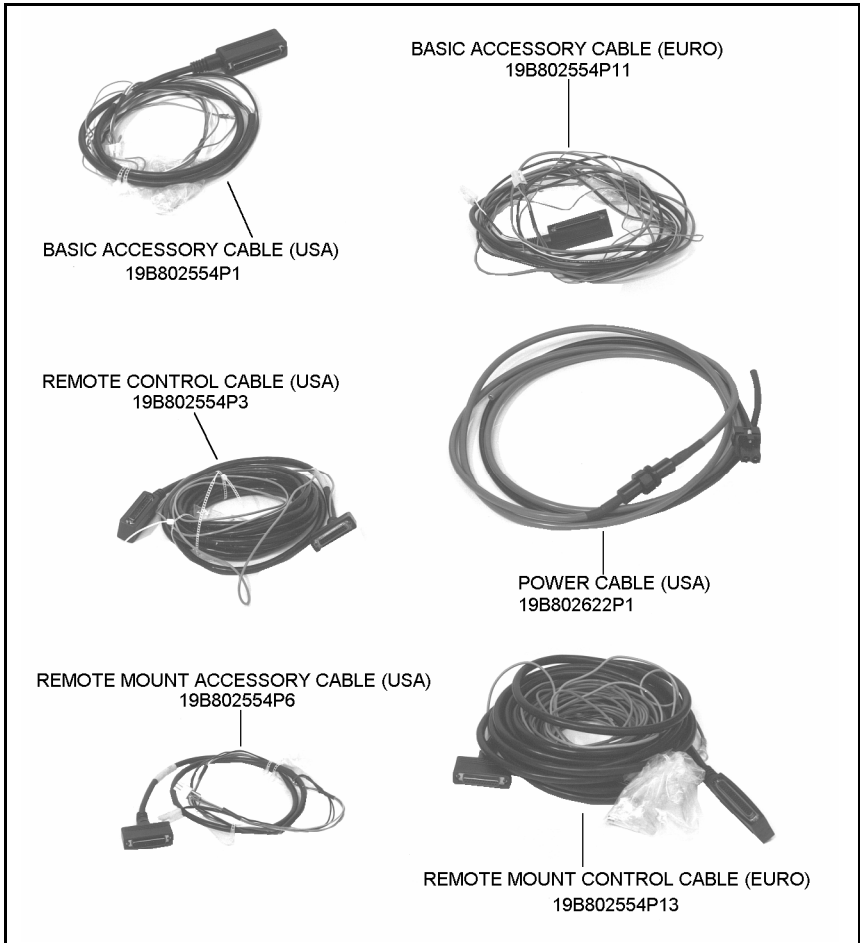
- Orion Mobile radio unit
- Microphone D2MC3Z
- Speaker D2LS1H
- Power Cable D2CE1V  
or  
Control Cable D2CF9A  
D2CE1Y
- Front Mount Bracket Kit or  
Remote Mount Kit with  
Control Unit Mount Kit D2MA3N  
D2MA3R  
D2MA3J
- Operator's Manual LBI-38888
- Installation Manual LBI-38901



**Figure 1: Orion Mobile Radio Components**



**Figure 2: Rear View of Radios**



**Figure 3: Option Cables**

At the time this manual was published, M/A-COM, Inc. was in the process of offering additional programming cables and replacing some of the accessory cables for the Orion mobile radio. This manual provides information on both the existing cable offerings and the replacement cables. The following cables are impacted:



CA101288V2 will replace 19B802554P2  
CA101288V4 will replace 19B802554P4  
CA101288V10 will replace 19B802554P10  
CA101287V2 and V3 will be added  
CA101288V15 and V30 will be added  
CA101287V1 will be added

Remote Mount  
Dual Radio Cable  
CA101288V10  
OR  
19B802554P10



Remote Mount  
Extended Option Control Cable  
CA101288V4  
OR  
19B802554P4



Front Mount  
Extended Option Accessory Cable  
CA101288V2  
OR  
19B802554P2

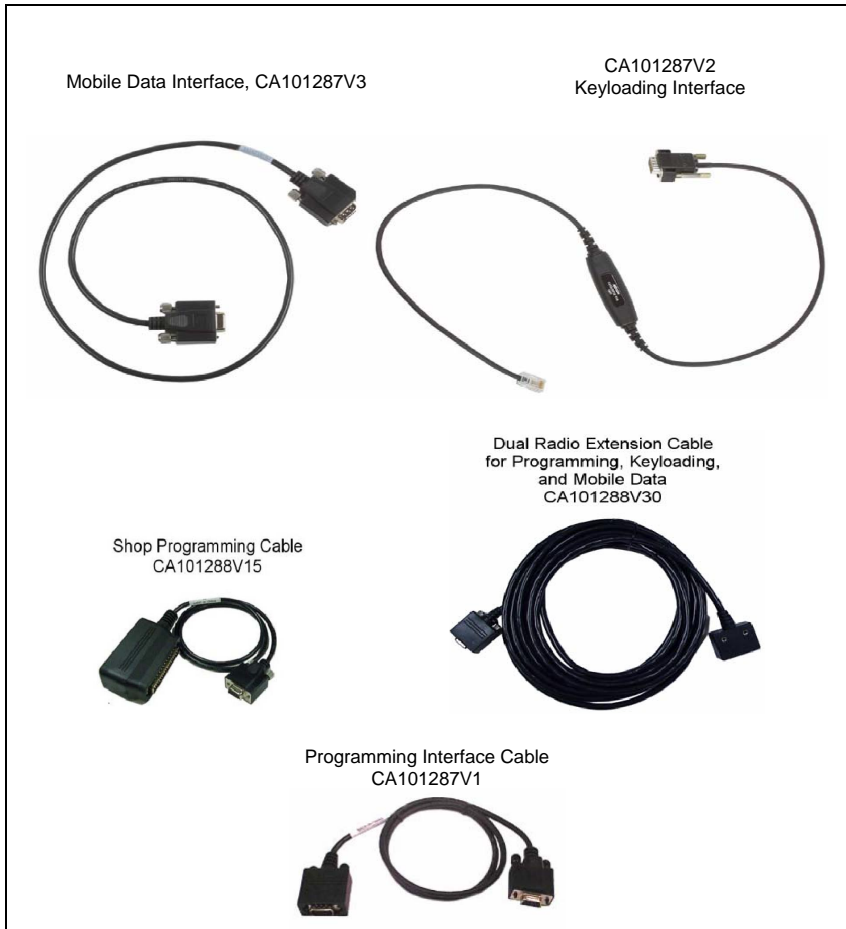


**Figure 4: Option Cables cont'd**





The programming cables shown in Figure 5 do not require the TQ3370 interface box. The field programming cables shown in Figure 5 are **ONLY** compatible with accessory cables CA101288V2, CA101288V4, and CA101288V10.



**Figure 5: Programming/Interface Cables**

**Table 1: Orion Mobile Radio Options and Accessories**

OPTION	DESCRIPTION
<b>Z OPTIONS</b>	
D2ZN1A	Accessory Kit–Front Mount with Standard Option Cable
D2ZN1B	Accessory Kit–Front Mount with Extended Option Cable
D2ZN1C	Accessory Kit–Front Mount Euro with Standard Option Cable
D2ZN1D	Accessory Kit–Front Mount Euro with Extended Option Cable
D2ZN1F	Accessory Kit–Remote Mount with Standard Option Cable, 50W TX and below
D2ZN1G	Accessory Kit–Remote Mount with Standard Option Cable, 60W TX and above
D2ZN1H	Accessory Kit–Remote Mount with Extended Option Cable, 50W TX and below
D2ZN1J	Accessory Kit–Remote Mount with Extended Option Cable, 60W TX and above
D2ZN1K	Accessory Kit–Remote Mount with Standard Option Cable, Low Band
D2ZN1L	Accessory Kit–Remote Mount with Extended Option Cable, Low Band
D2ZN1M	Accessory Kit–Remote Mount Euro with Standard Option Cable
D2ZN1N	Accessory Kit–Remote Mount Euro with Extended Option Cable
D2ZN1P	Accessory Kit–Remote Mount Motorcycle with Extended Option Cable
D2ZN1R	Accessory Kit–Remote Mount Motorcycle with no Option Cable
D2ZN1S	Accessory Kit–Remote Mount Euro Motorcycle with Extended Option Cable
D2ZN1T	Accessory Kit–Remote Mount Euro Motorcycle with no Option Cable
D2ZN1U	Dual Control, Scan Control Unit
D2ZN1V	Dual Control, System Control Unit
D2ZN1W	Dual Radio (50 watt TX and below)
D2ZN1X	Dual Radio (60 watt TX and above)
D2ZN1Y	Motorcycle Conversion, Field Upgrade, Remote Mount Radio
D2ZN1Z	Motorcycle Conversion, Field Upgrade, Remote Mount Euro Radio
<b>4 DIGIT OPTIONS</b>	
D2AN1E	Antenna, Low Band WB, 29.7-38 MHz
D2AN1F	Antenna, Low Band WB, 33-43 MHz
D2AN1G	Antenna, Low Band WB, 37-49 MHz
D2AN1L	Antenna, 800 MHz, ¼ Wave Whip
D2AN1M	Antenna, 900 MHz, ¼ Wave Whip
D2AN1R	Antenna, VHF/UHF, ¼ Wave Whip
D2CE1V	Power Cable, 7.5M (60W TX and above)
D2CE1W	Accessory Cable, Front Mount
D2CE1X	Accessory Cable, Remote Mount
D2CE1Y	Radio Control Cable, Remote Mount, 5.5M
D2CE1Z	Accessory Cable, Euro Front Mount
D2CE5R	Extended Option Accessory Cable, Front Mount
D2CE5S	Radio Control Cable, Extended Option, Remote Mount, 5.5M
D2CE5T	Extended Option Accessory Cable, Remote Mount
D2CE5U	Extended Option Accessory Cable, Euro Front Mount

OPTION	DESCRIPTION
D2CE5V	Radio Control Cable, Euro Remote Mount, 5.5M
D2CE5W	Radio Control Cable, Extended Option Euro Remote Mount, 5.5M
D2CE5Z	Dual Control Cable, Remote Mount, 9.0M
D2CE7A	Dual Radio Cable, Remote Mount, 2.0M
D2CF7B	Extended Option Accessory Cable, Motorcycle
D2CF7C	Radio Control Cable, Extended Option Remote Mount Motorcycle, 2.3M
D2CF7D	Radio Control Cable, Extended Option Euro Remote Mount Motorcycle, 2.3M
D2CF7E	Power Cable, Motorcycle, 1.0M
D2CF9A	Power Cable, 7.5M (50W TX and below)
D2CP5L	Scan Control Unit (4 BTN), Front Mount (including Label)
D2CP5M	System Control Unit (16 BTN), Front Mount (including Label)
D2CP5R	Scan Control Unit (4 BTN), Remote Mount (including Label)
D2CP5S	System Control Unit (16 BTN), Remote Mount (including Label)
D2LS1H	Speaker (4 OHM)
D2LS1U	Speaker (8 OHM, Parallel Audio Appl)
D2MA3J	Mounting Bracket Kit, Remote Mount Control Unit
D2MA3N	Mounting Bracket Kit, Front Mount Radio/Euro Remote Mount Radio
D2MA3R	Mounting Bracket Kit, Remote Mount Radio
D2MA5G	Mounting Bracket Kit, Motorcycle CU (Microphone Hanger included)
D2MA5H	Mounting Bracket Kit, Motorcycle Radio Case
D2MA5J	Mounting Bracket Adapter Kit, Motorcycle Radio Case
D2MC3Z	Microphone
D2MC5A	Desk Microphone
D2MC5L	Noise Canceling Microphone
D2MC5N	DTMF Microphone
D2MK3B	Radio Front (Remote Mount) (including Label)
D2MK3E	Keycap Kit, Scan Control Unit
D2MK3F	Keycap Kit, System Control Unit
D2MN1A	Microphone Hanger
D2PD1T	Filter, Power, Motorcycle Appl
1016	Siren and Light Control Module
1020	100W Speaker TS100
1021	100W Speaker BP100
<b>RADIO PROGRAMMING OPTIONS</b>	
TQ3409	Programming Cable, Shop (CA101288V15). Does not require TQ3370
TQ3370	Programming Interface Module Kit 110 VAC, only needed for 19B802554P15
TQ3370-220	Programming Interface Module Kit 220 VAC, only needed for 19B802554P15
TQ3377	Programming Cable for Orion (19B802554P15). Requires TQ3370
TQ3385	ProVoice™/EDACS® Windows® Radio ProGrammer Only
TQ3389	Conventional Windows Radio ProGrammer Only

# INSTALLATION (SINGLE CONTROL UNIT)

## STEP 1 – PLAN THE INSTALLATION

Figure 6 provides an example of a typical mobile radio (remote mount) installation. Before starting, plan the radio installation carefully so that it will be:

- safe for the operator and passengers
- away from airbag deployment area
- convenient for the operator to use
- protected from water damage
- neat and easy to service
- safe and out of the way for passengers and auto mechanics

M/A-COM, Inc. recommends the radio be installed by one of the many M/A-COM, Inc. Authorized Service Centers located throughout the United States. Experienced service centers can provide a proper radio installation and make any required final adjustments.

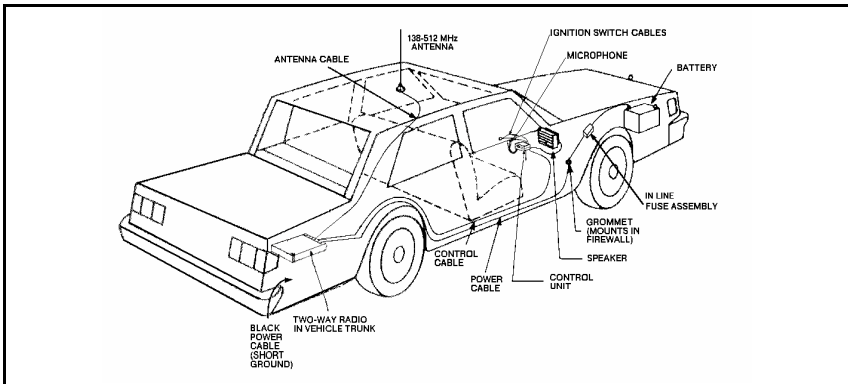


Figure 6: Typical Installation (Remote Mount Shown)



- **Vehicular Electronics** – fuel injection systems, anti-skid braking systems, cruise control systems, etc., are typical of the types of electronic devices which may be prone to malfunction, due to the lack of protection from radio frequency energy present when a radio is transmitting. If the vehicle contains such equipment, consult dealer to determine if such electronic equipment will perform normally when the radio is transmitting.
- **For passenger safety**, mount the radio securely so the unit will not break loose in the event of a collision.

## STEP 2 - LOCATE TOOLS REQUIRED

The equipment required for installing the Orion Mobile Radio is listed below:

- Crimping tool for fuse holder
- Electric drill for drilling mounting holes
- Drills and circle cutters as follows:
  - No. 31 (1/8") drill
  - No. 27 (9/64") drill
  - 5/8" drill or circle cutter
  - 3/4" circle cutter, hole saw or socket punch
- Phillips and flat-blade screwdrivers
- POZIDRIV® driver
- No. 20 TORX® driver



Be careful to avoid damaging vital part (fuel tank, transmission housing, etc.) of the vehicle when drilling mounting holes. Always check to see how far the mounting screws will extend below the mounting surface before installing.

If pilot holes must be drilled, remove all metal shavings from drilling holes before installing screws.

### Vehicles Powered By Liquefied (Lp) Gas

**Radio installation in vehicles powered by liquefied petroleum gas, where the LP gas container is located in the trunk or other sealed-off space within the interior of the vehicle, must conform to the National Fire Protection Association Standard NFPA 58. This requires that:**

- The space containing radio equipment be isolated by a seal from the space containing the LP gas container and its fittings.
- Outside filling connections be used for the LP gas container.
- The LP gas container space be vented to the outside of the vehicle.

## STEP 3 – INSTALL CABLES

To ensure the feasibility of the planned cable routings, it is recommended that the cables be run before mounting the radio. The radio can be installed as a Front Mount, Remote Mount or Cassette Mount. The type of mount, the application, and the options to be installed should be considered when planning the cable runs. The following figures should be referenced throughout the installation:

- Front Mount Installation Diagram - Figure 8 through Figure 12
- Front Mount Cable Diagrams - Figure 13 through Figure 17
- Remote Mount Installation Diagrams – Figure 18 through Figure 24
- Remote Mount Cable Diagrams – Figure 25 through Figure 29

Be sure to leave some slack in each cable going to the radio, so the radio can be pulled out for servicing with the power applied and antenna attached. Coil any surplus cables and secure them out of the way. Try to route the cables away from locations where they will be exposed to heat (exhaust pipes, mufflers, tailpipes, etc.), battery acid, sharp edges, or mechanical damage, or where they will be a nuisance to automobile mechanics, the driver, or passengers. In order to prevent interference, keep wiring away from electronic computer modules, other electronic modules, and ignition circuits.

In addition, try to utilize existing holes in the firewall, trunk wall, and the channels above or beneath doors. Channels through door and window columns, convenient for running cables, can also be used unless rigid or flexible conduit is to be installed for cable runs.

### **Power Cable**

The USA power cable (19B802622P1 or P3) consists of a red lead (A+) and a black lead (A-) connected to a molded 2-pin power connector and supplied with ring terminals. The EURO power cable also consists of a red lead (A+) and a black lead (A-) terminated with ring terminals, but it is connected to P1 of the accessory cable or P1 of the control cable (in remote applications).

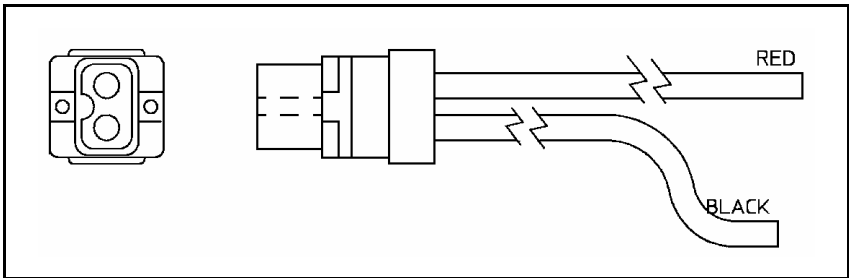
To install the power cable:

1. Drill a 5/8" hole in the firewall for the cable run and insert the rubber grommet. Run the cable through this grommet to the battery location. Secure the cable at several locations within the engine compartment to prevent possible damage to cable.
2. Strip back the insulation approximately 3/8" from the end of the black lead. Slide one of the large heat shrink sleeves onto the wire and crimp a battery ring terminal onto this lead. Heat shrink the sleeve over the crimp connection. Connect the black lead directly to the battery negative (-) or ground frame member.

- Cut off 12-18" from the red lead. Strip back the insulation approximately 3/8" on each end of the wires. Insert the wire ends into the small openings at the end of each fuse holder section and crimp a fuse connector to each wire. Prepare the other end of the short wire in the same manner as in (2) and connect to the positive (+) terminal of the battery.



- Do not install fuse into fuse holder until installation is completed and all connections have been checked.
- USA Power Cable 19B802622P3 is used only with radio with 50 watts or less RF power output.



**Figure 7: Power Cable 19B802622P1 or P3 (USA Only)**

### **Ignition Sense (All Applications)**

The fuse holder must be attached to the yellow sense lead along with the ring terminal as follows:

- Cut the yellow sense lead approximately 6-12" from the end to be connected to the power source.
- Strip the insulation from each end of the short lead and from the end of the long lead by at least 3/8".
- Insert the stripped end of the long lead and one end of the short lead into the narrow end of each fuse holder half.
- Crimp the leads in the fuse holder halves with a crimping tool.
- Insert the 3 amp fuse into one end of the fuse holder and join the two fuse holder halves firmly together.
- Attach the ring terminal to the end of the short lead and connect this lead to the ignition "ON" sense point. (Preferably to an "Accessory" point in the vehicle fuse panel that is switched on when the vehicle ignition switch is in the ACCESSORY and RUN positions.)



**NOTE**

- The radio, as shipped from the factory, has the "ignition sense" feature disabled. As such, the radio is powered ON or OFF as determined by the front panel ON/OFF/ VOLUME control only (assuming A+ and A- are connected). To enable "ignition sense" feature, open top cover of radio and remove shield from logic PWB. Slide switch SW601 from position 3-2 to 1-2. Replace shield and top cover. Be sure to apply correct torque to screws holding top cover in place. See Maintenance Manual.
- The "Accessory" point should drop to ZERO volts when the engine is cranked and return to +12 volts after the engine is started. If a point is chosen that drops to a voltage between zero and +12 volts, the radio may execute a power-up cycle several times during start up. It is recommended that the terminal be measured with a voltmeter to ensure it shuts off (goes to zero volts) during engine cranking.



**CAUTION**

Certain problems may be encountered when accessory equipment is connected to the ignition or accessory lines of the vehicle, where these lines may have large filter capacitors and a leakage path present. If the radio does not turn off within a reasonable amount of time after the ignition is turned off, first try a different accessory or ignition sense pick up point in the vehicle. Many vehicles have more than one circuit that is switched by the ignition switch, and one may be available that does not have large filter capacitors or a leakage path present.

If a different pickup point cannot be found, add a 470-ohm, 1-watt resistor from the ignition sense pick point to ground. This will discharge the capacitor(s) or reduce the leakage voltage to a low value. Current drain through this resistor will be minimal (less than 0.03A) when the ignition is switched on.



## **Accessory Cable (Front Mount)**

The basic accessory cable consists of, at one end, the basic accessories connector (P3), the speaker connector (P2), and the ignition sense lead. At the other end, plug P1 connects to the Option/Remote Control connector (ORCC), which is mounted on the back of the radio. The EURO accessory cable contains the red and black leads of the power cable.

The Extended Option accessory cable is the same as the basic accessory cable, but has an Extended Option plug (P4). The CA101288V2 Extended Option Accessory Cable has a pigtail (P5) at P1 that provides easy access to the front of the radio for programming, keyloading, and mobile data.

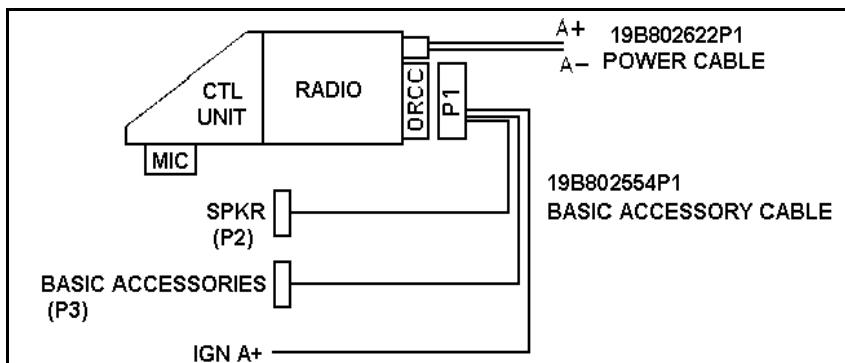


**NOTE**

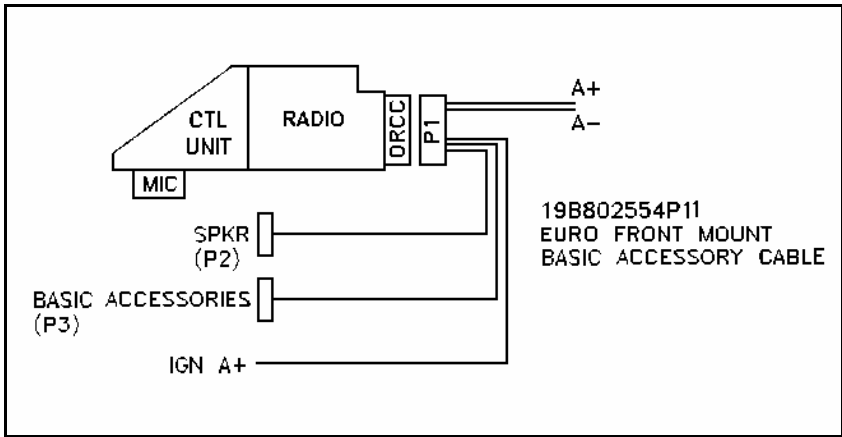
The EURO ORCC is the opposite gender from the USA ORCC. Interconnect diagrams for each of these cables are provided on pages 20-24.

The following cables are available for Front Mount applications:

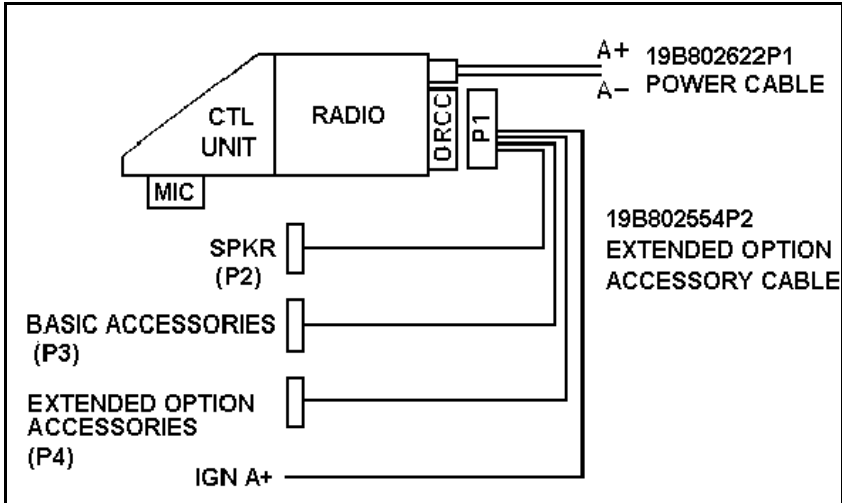
- 19B802554P1 - Basic Accessory Cable (USA Models)
- 19B802554P11 - Basic Accessory Cable (EURO Models)
- 19B802554P2 - Extended Option Accessory Cable (USA Models)
- CA101288V2 - Extended Option Accessory Cable (USA Models)
- 19B802554P12 - Extended Option Accessory Cable (EURO Models)



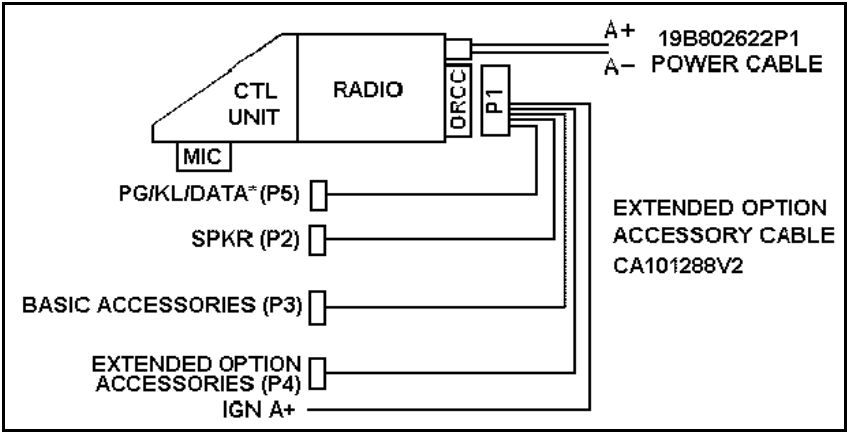
**Figure 8: Front Mount Basic Accessory Interconnections  
(USA Models Only)**



**Figure 9: Front Mount Basic Accessory Interconnections (EURO Models Only)**

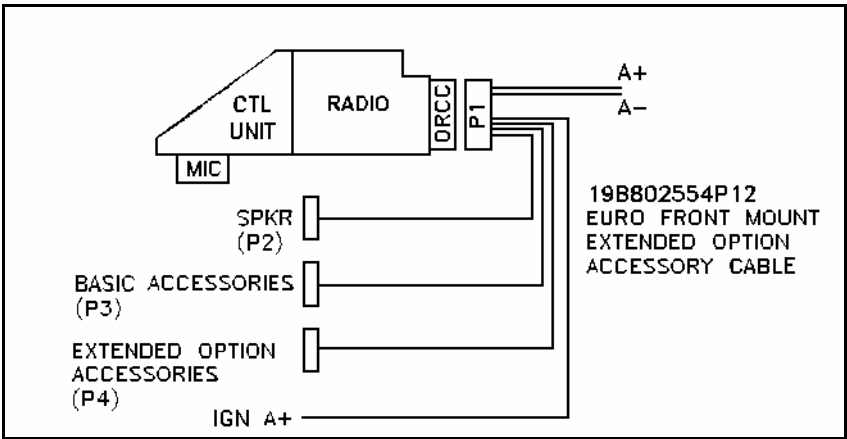


**Figure 10: Front Mount Extended Option Accessory Interconnections using 19B802554P2 (USA Models Only)**

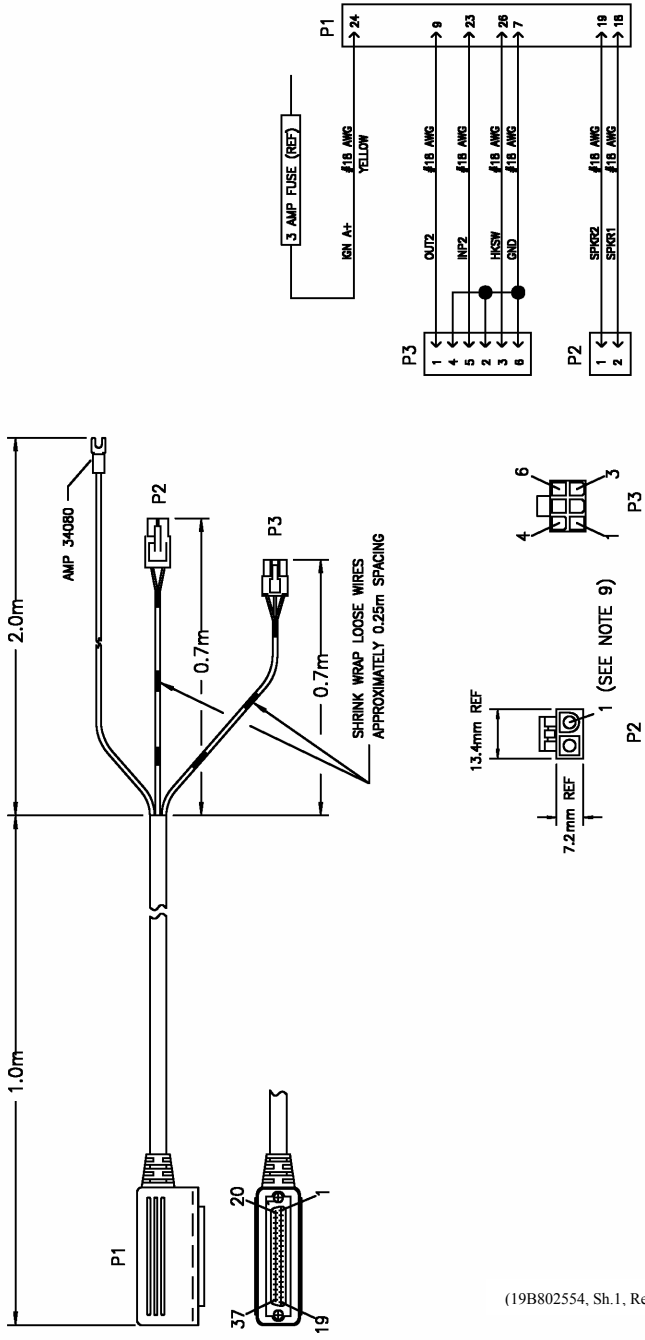


\*(P5) Provides access for Programming/ Keyloading/ Mobile Data

**Figure 11: Front Mount Extended Option Accessory Interconnections using CA101288V2 (USA Models Only)**

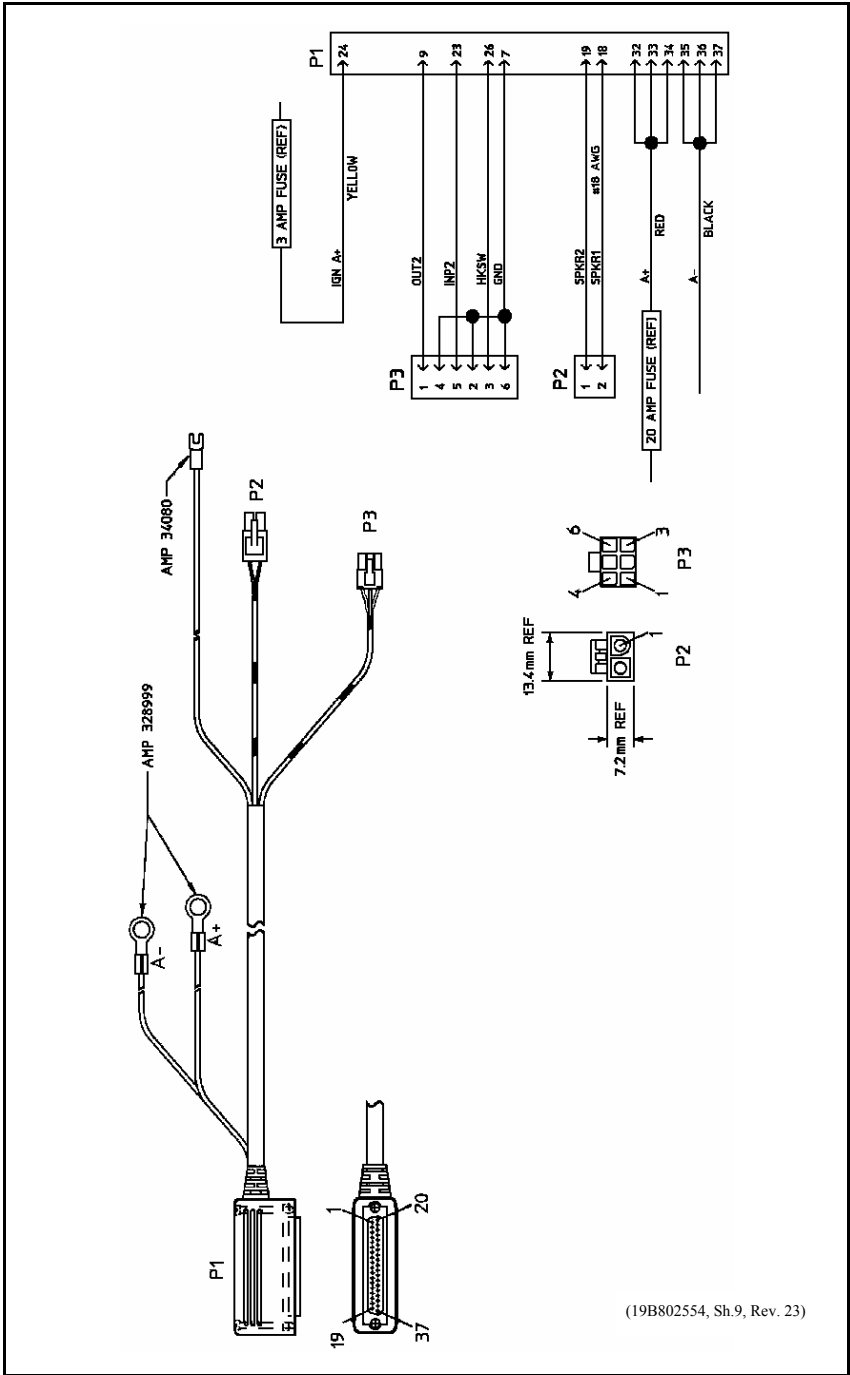


**Figure 12: Front Mount Extended Option Accessory Interconnections (EURO Models Only)**



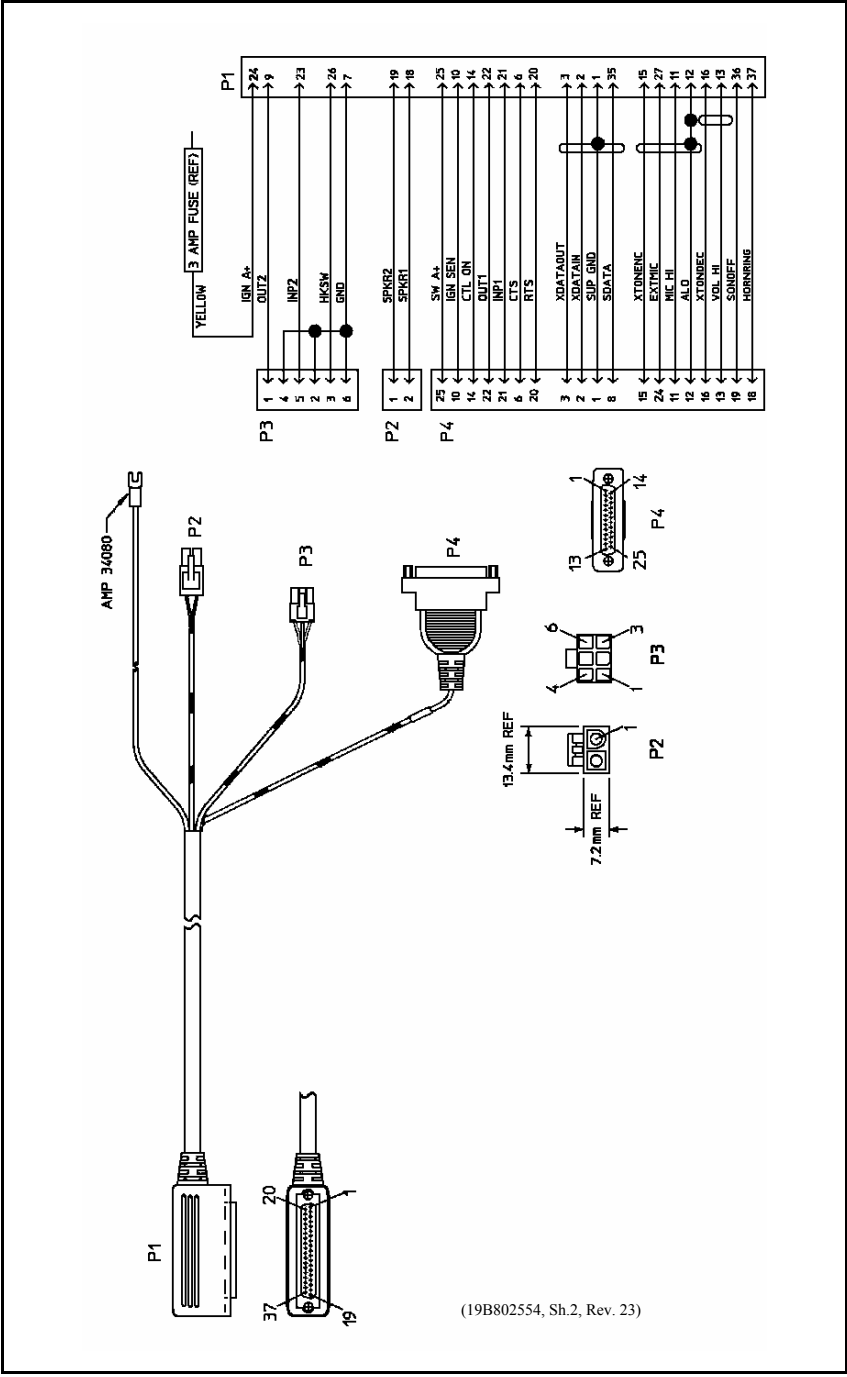
(19B802554, Sh.1, Rev. 27)

Figure 13: USA Front Mount Standard Accessory Cable 19B802554P1



(19B802554, Sh.9, Rev. 23)

Figure 14: EURO Front Mount Standard Accessory Cable  
19B802554P11



(19B802554, Sh.2, Rev. 23)

**Figure 15: USA Front Mount Extended Option Accessory Cable 19B802554P2**

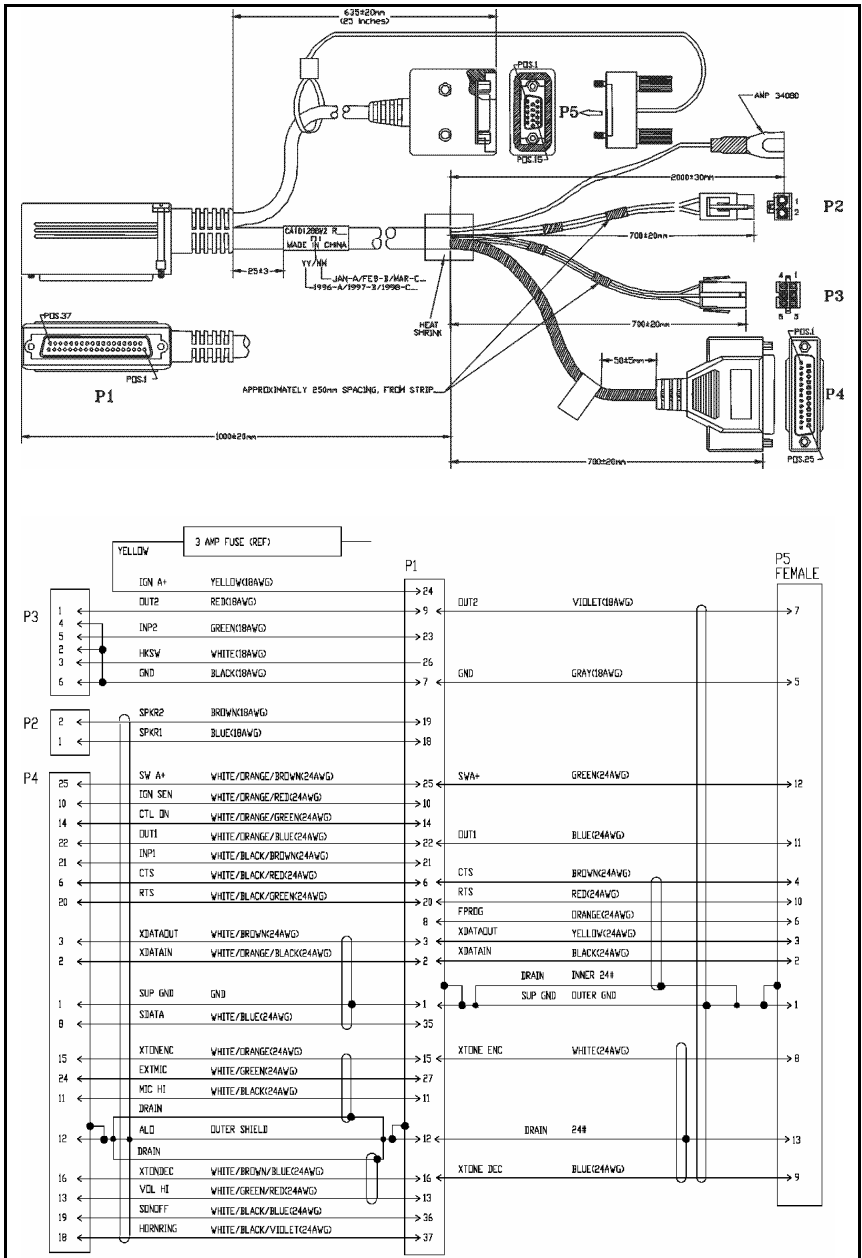


Figure 16: Front Mount Extended Option Accessory Cable CA101288V2

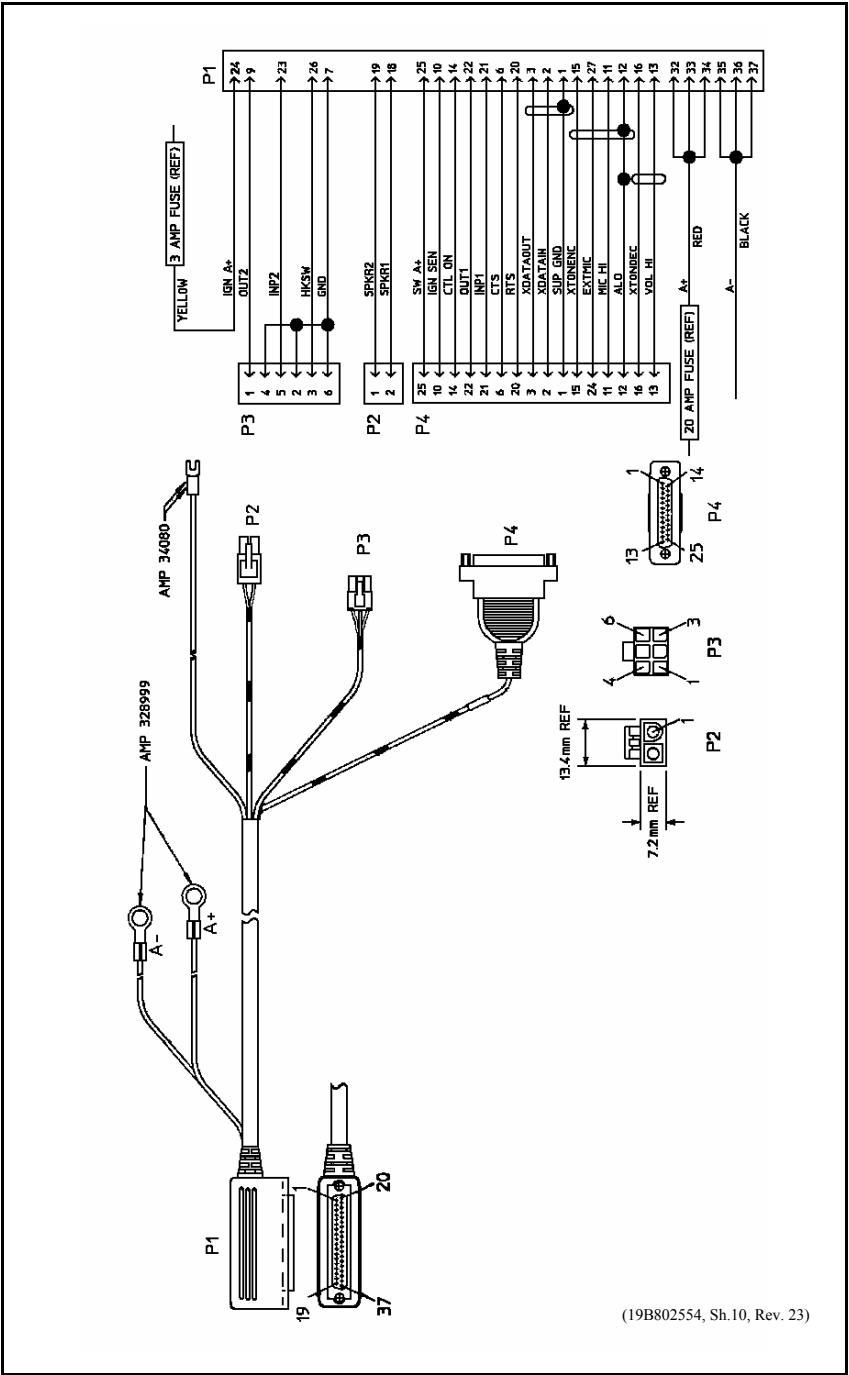


Figure 17: EURO Front Mount Extended Option Accessory Cable 19B802554P12



## **Accessory and Control Cable (Remote Mount)**

The control cable connects the Control Unit (through the R1A) to the Radio Transceiver in remote applications. Plug P2, at one end, connects to the Remote Control Cable connector (RCCC) mounted on the back of the R1A. The Ignition Sense wire is also part of P2. The other end of the control cable (P1) connects to the ORCC mounted on the back of the radio. P1 of the EURO control cable contains the power cable leads.

The CA101288V4 Extended Option Control Cable has a pigtail (P5) at P2 that provides easy access to the front of the remote control unit for programming, key loading and mobile data. The Extended Option accessory cable is the same as the basic accessory cable, but has an Extended Option plug (P4).

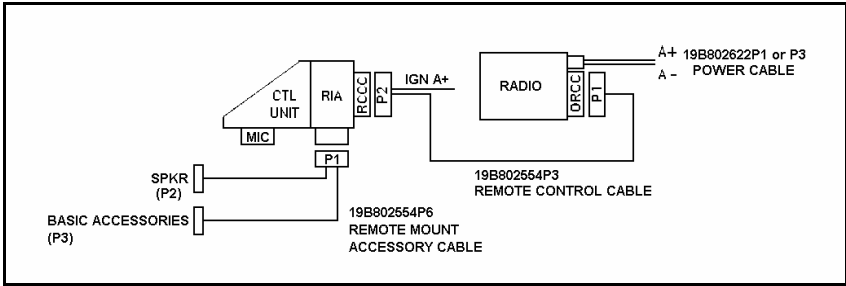


**NOTE**

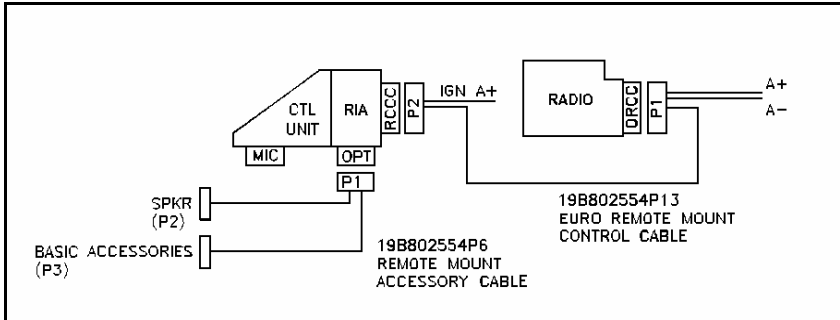
The EURO ORCC is the opposite gender from the USA ORCC. Interconnect diagrams for each of these cables are provided on pages 28 - 34.

The following cable combinations are available for Remote Mount applications:

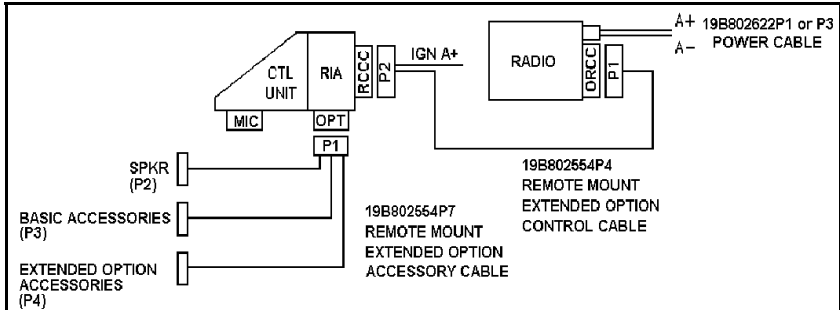
- 19B802554P6 - Basic Accessory Cable (USA Models)  
19B802554P3 - Remote Control Cable (USA Models)
- 19B802554P6 - Basic Accessory Cable (EURO Models)  
19B802554P13 - Remote Control Cable (EURO Models)
- 19B802554P7 - Extended Option Accessory Cable  
19B802554P4 - Remote Control Extended Option (USA Models)
- 19B802554P7 - Extended Option Accessory Cable  
CA101288V4 - Remote Control Extended Option (USA Models)
- 19B802554P7 - Extended Option Accessory Cable  
19B802554P14 - Remote Control Extended Option (EURO Models)



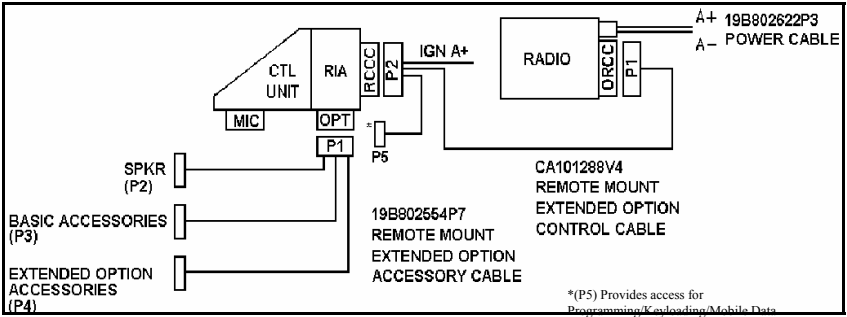
**Figure 18: Remote Mount Basic Accessory Interconnections  
(USA Models Only)**



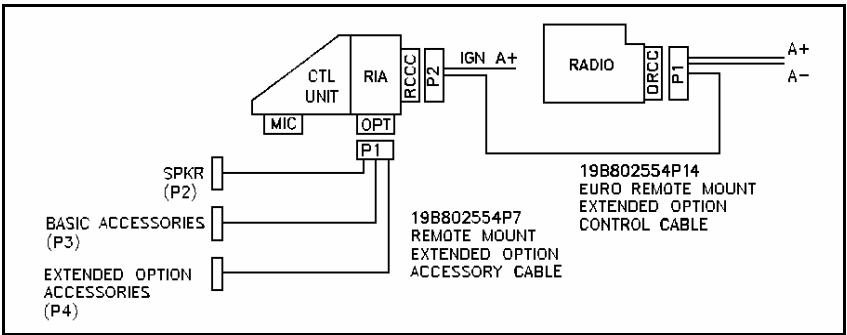
**Figure 19: Remote Mount Basic Accessory Interconnections  
(EURO Models Only)**



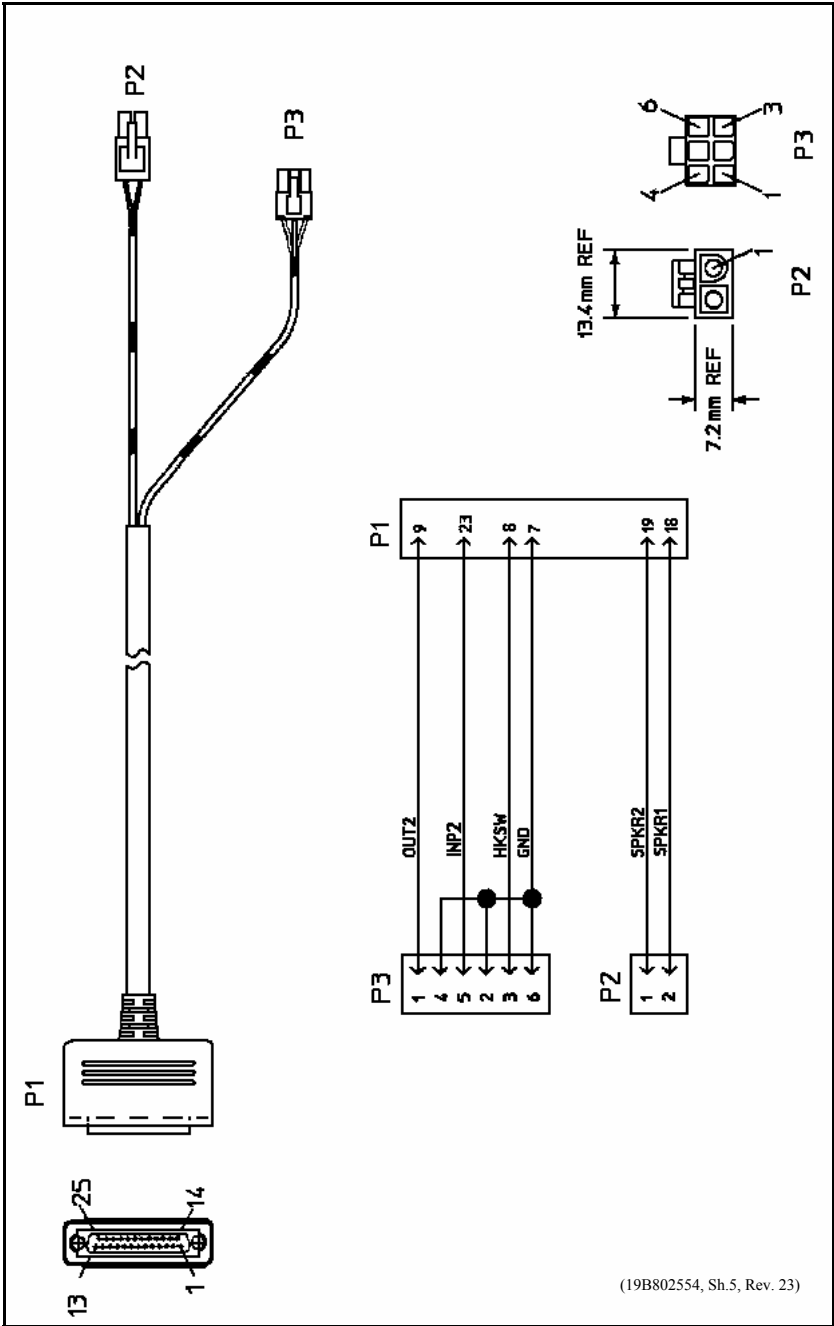
**Figure 20: Remote Mount Extended Option Accessory Interconnections  
(USA Models Only)**



**Figure 21: Remote Mount Extended Option Accessory Interconnections using CA101288V4 (USA Models Only)**

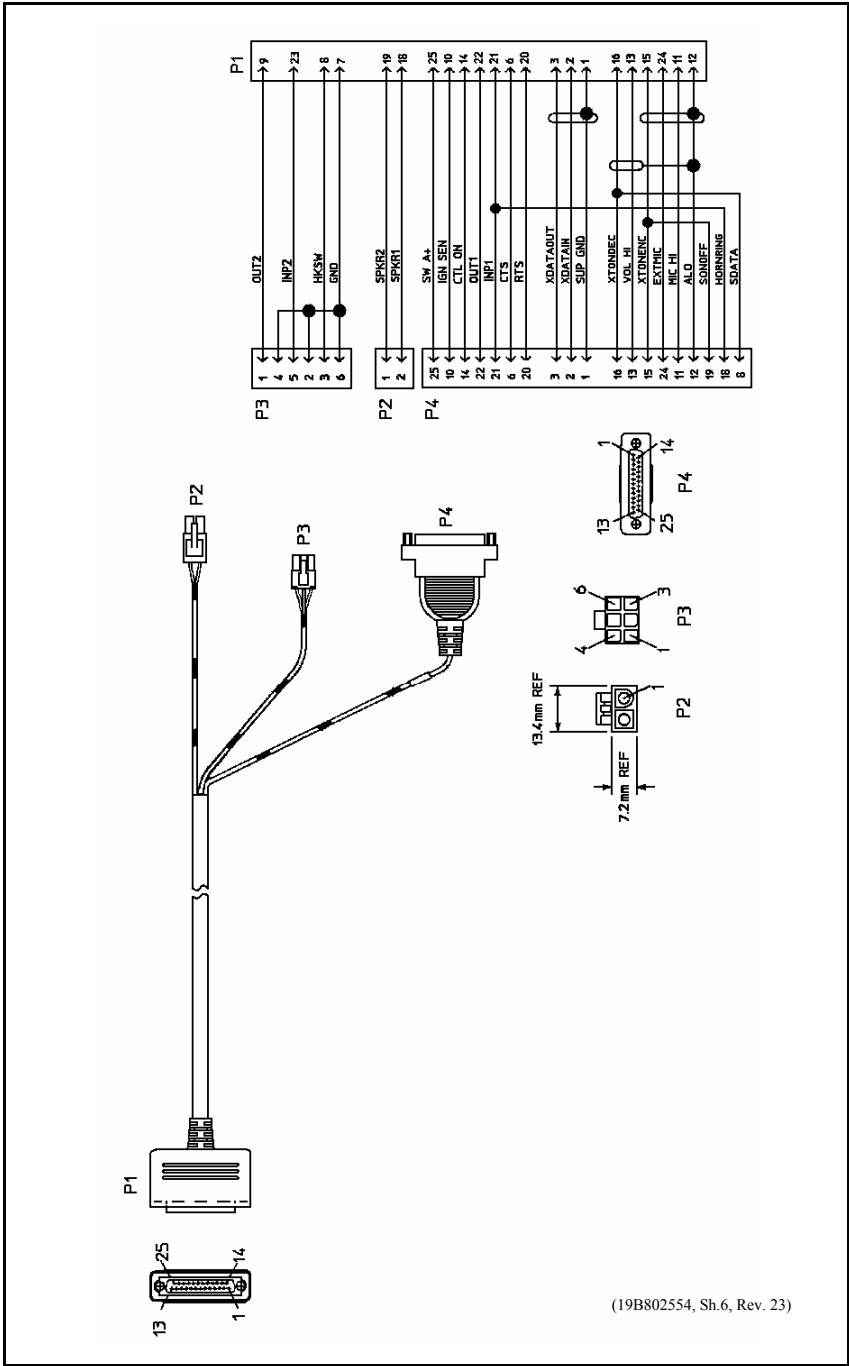


**Figure 22: Remote Mount Extended Option Accessory Interconnections (EURO Models Only)**



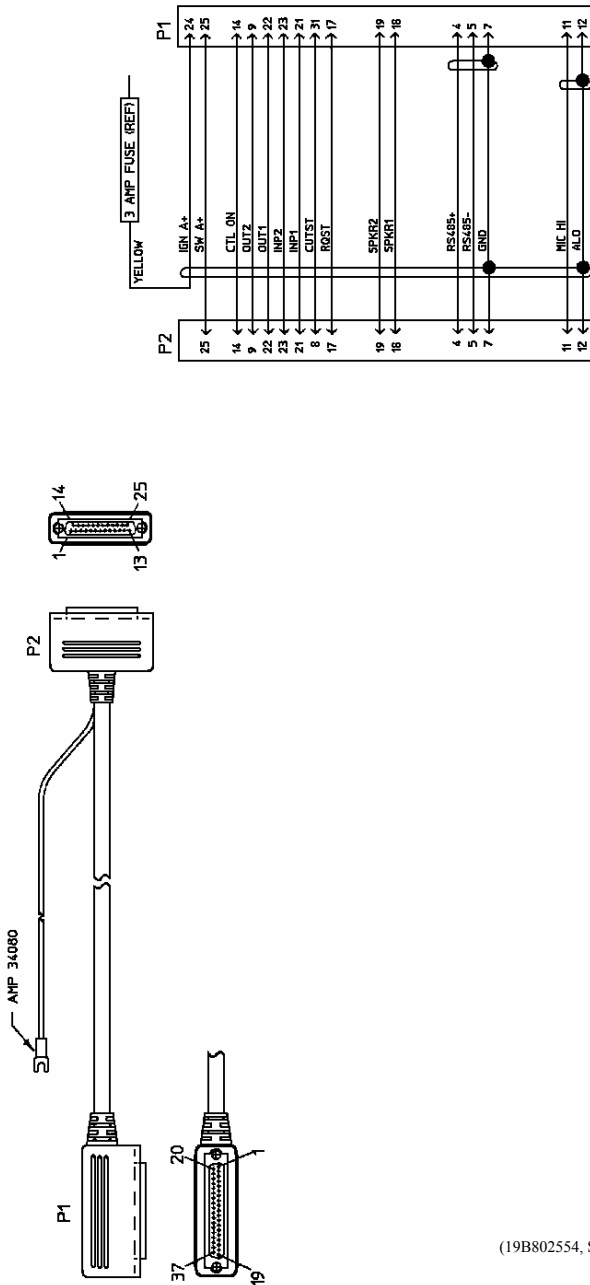
(19B802554, Sh.5, Rev. 23)

Figure 23: Remote Mount Standard Accessory Cable 19B802554P6



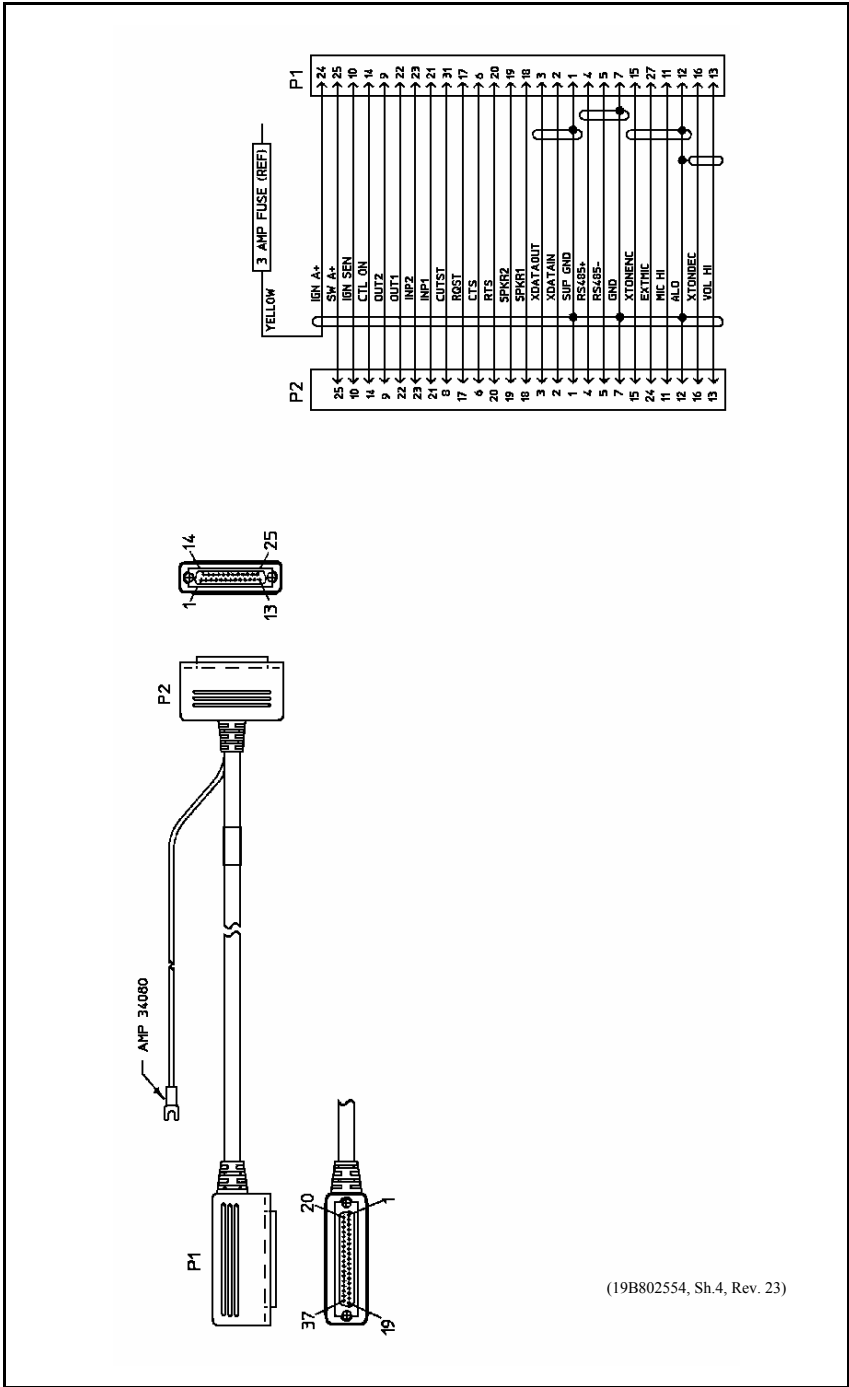
(19B802554, Sh.6, Rev. 23)

**Figure 24: Remote Mount Extended Option Accessory Cable 19B802554P7**



(19B802554, Sh.3, Rev. 23)

Figure 25: USA Remote Control Cable 19B802554P3



(19B802554, Sh.4, Rev. 23)

Figure 26: USA Remote Extended Option Control Cable 19B802554P4

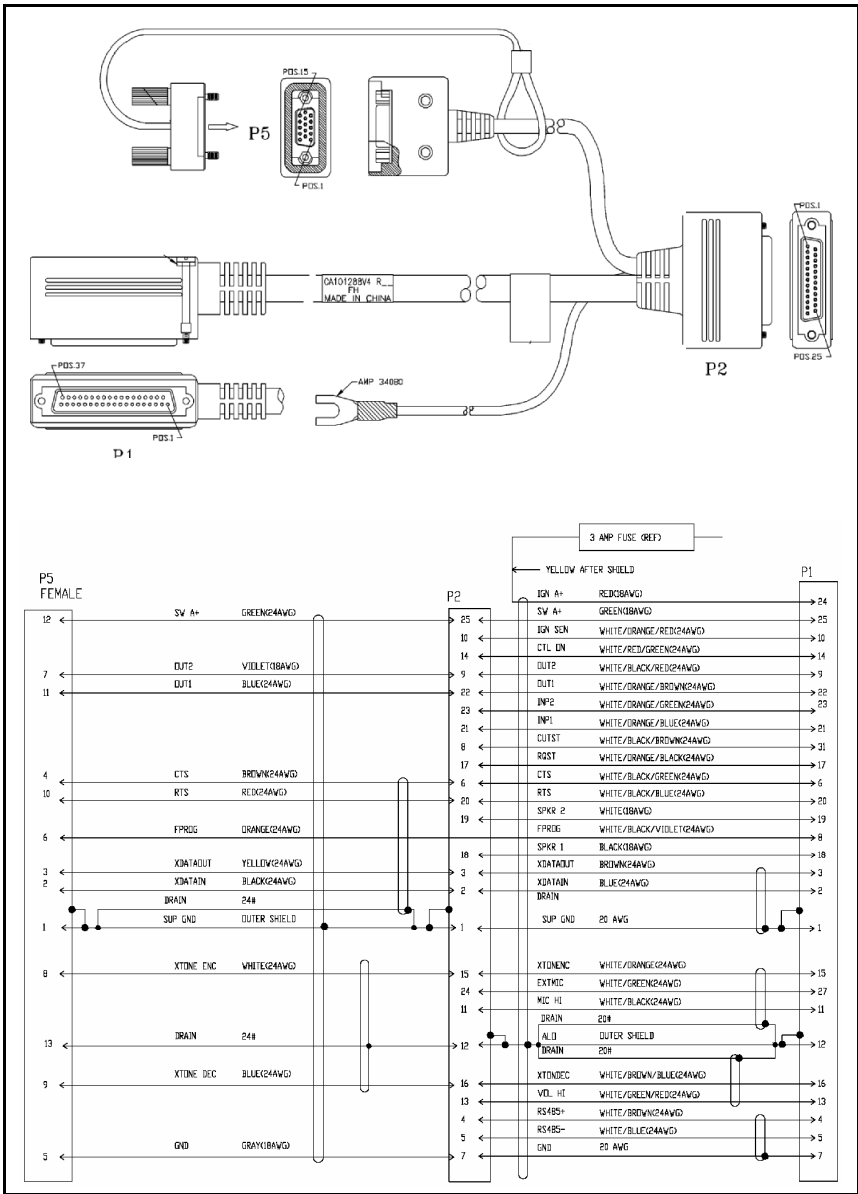
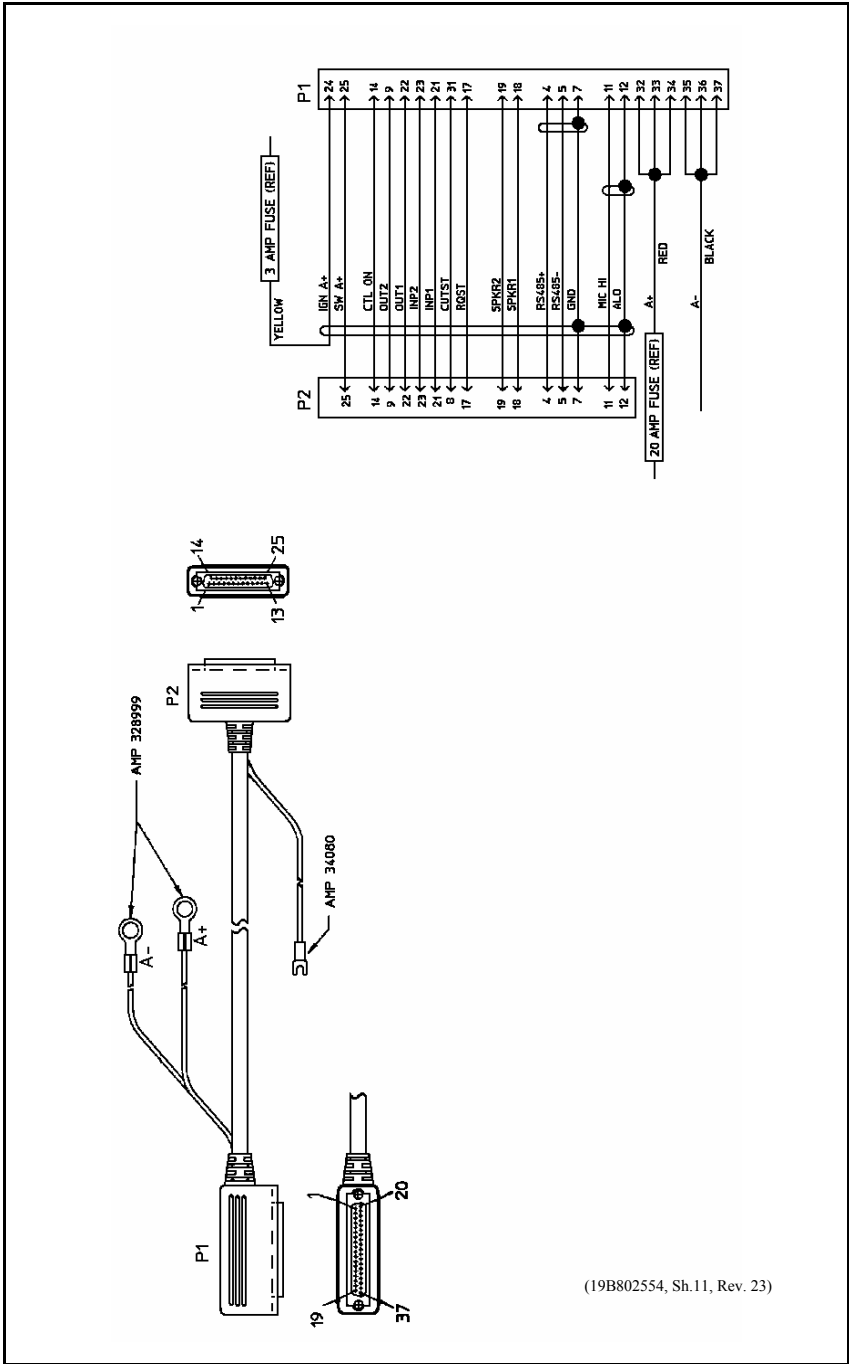


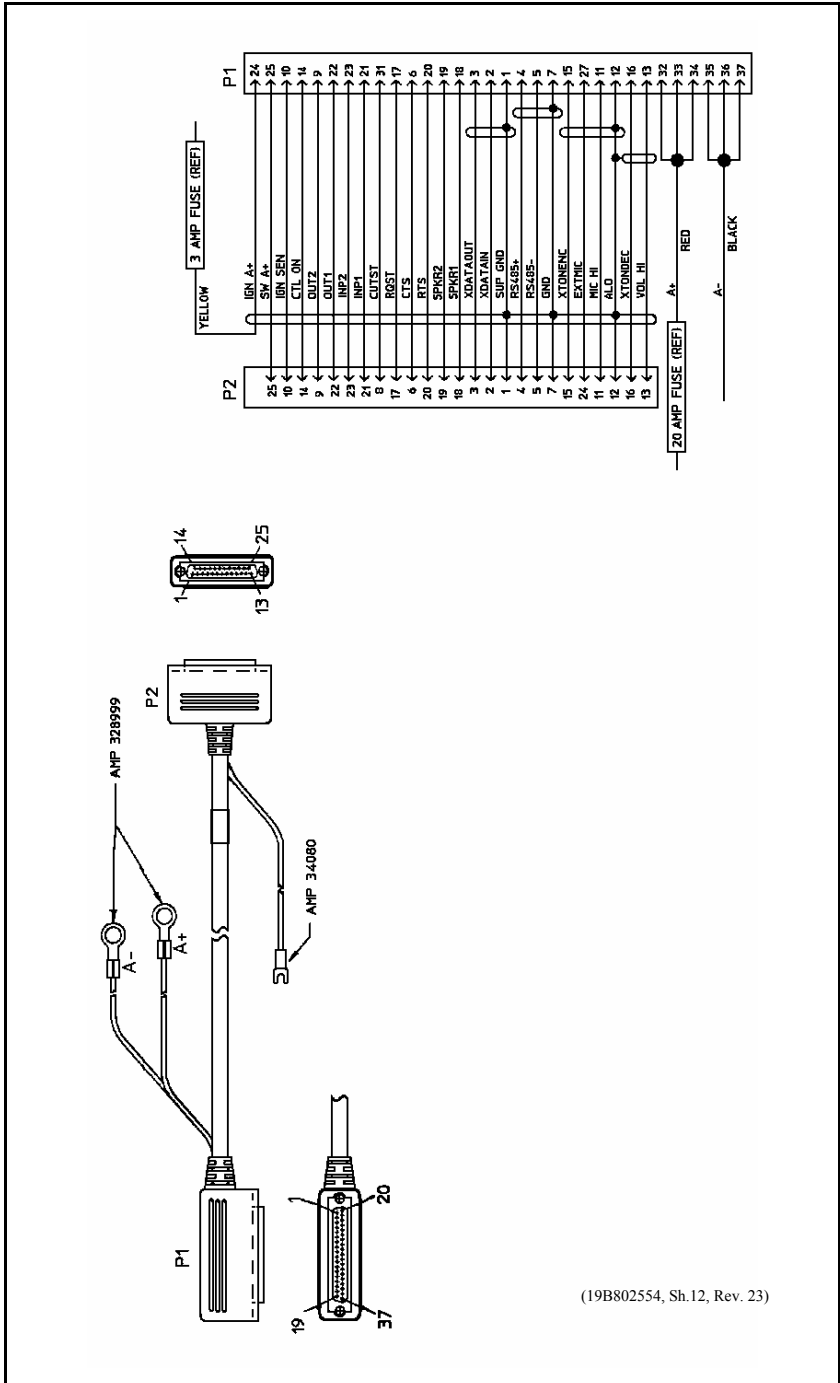
Figure 27: Remote Extended Option Control Cable CA101288V4





(19B802554, Sh.11, Rev. 23)

**Figure 28: EURO Extended Options Remote Control Cable  
19B802554P13**



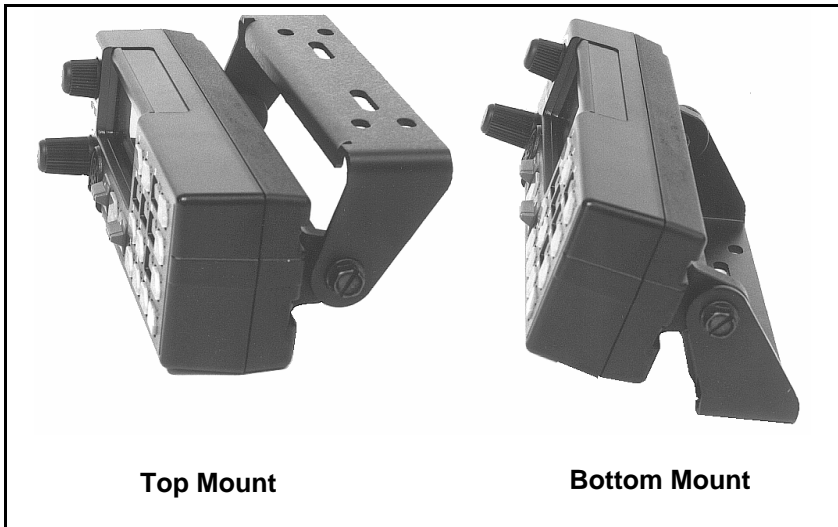
(19B802554, Sh.12, Rev. 23)

**Figure 29: EURO Extended Options Remote Control Cable  
19B802554P14**

## STEP 4 – MOUNT CONTROL UNIT AND RADIO

### Control Unit Mounting (Remote Applications Only)

1. Use the bracket as a template to mark and drill the mounting holes. Be sure to leave enough room at the rear of the control unit for the cable connector. Refer to Figure 30 for control unit mounting bracket installation.
2. Secure the mounting bracket using the four No. 10 x 3/4 self-tapping screws supplied. (Use No. 10 x 1 1/2 if needed.)
3. Secure the control unit to the bracket with the two 1/4-20 x 5/8 hex head screws and lock washers provided.



**Figure 30: Control Unit Mounting Brackets**

### Pigtail Bracket

The Pigtail Bracket mounts the DB15 connector for easier user access. The DB15 connector facilitates radio programming and keyloading by the customer without the need to dismantle the radio or Control Unit. There are two Pigtail Brackets, one for use with the Control Unit and one for use with the radio-mounting bracket. This section includes procedures to mount the Pigtail Brackets in each of these configurations.

### **Control Unit Mounting**

For Control Unit mounting, attach the Pigtail Bracket to the side of the Control Unit bracket using existing mounting bracket hardware. The Pigtail Bracket can be mounted to the left or right side of the Control Unit. Hardware

Kit, KT101533V6, contains Pigtail mounting bracket and hardware required to attach Pigtail to bracket.



**NOTE**

When mounting two DB-15 connectors to the control unit, mount one Pigtail Bracket on each side of the existing mounting hardware of the control unit.

1. Attach DB15 connector to the rectangular end of bracket with 2 pan head machine screws and washers. See Figure 31.
2. Remove the 1/4-20 x 5/8 hex head screw and washer from the side of the Control Unit bracket where the Pigtail installation is desired. Retain the hardware for Step 4.
3. Align the single hole at the end of the Pigtail Bracket with the holes in the Control Unit bracket and the Control Unit.
4. Replace washer and insert hex head screw and tighten. See Figure 31.



**Figure 31: DB15 connector mounted on Control Unit Pigtail Bracket and Pigtail Bracket installed on Control Unit**

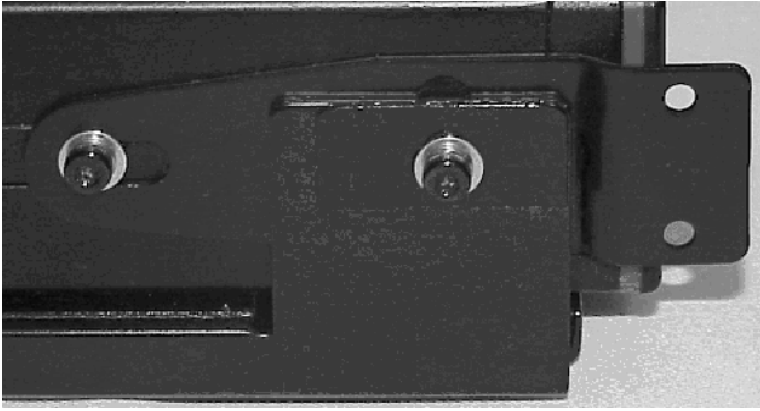


**Figure 32: Control Unit with Bracket for Pigtail**

### **Radio Bracket Mounting**

For Radio Bracket mounting, the Pigtail Bracket is attached to either side of the Radio mounting bracket. Hardware Kit, KT101533V5, contains the Pigtail Bracket hardware to attach the Pigtail to the bracket.

1. Remove the plastic spacer/glide from the left or right side of the Orion transceiver mounting bracket. This will get reapplied to the other side of bracket where it is currently installed.
2. Slide the Orion into the transceiver bracket.
3. Slide the pigtail mounting bracket between the Orion radio casting and the transceiver bracket (right or left).
4. Place the plastic spacer/glide you removed in step #1 back on the transceiver bracket.
5. Re-use the Orion mounting hardware to fasten the Pigtail Bracket to the side of the Orion. Make sure you use a flat washer under each screw (See Figure 33).
6. Before tightening Pigtail Bracket down, position the bracket up or down to suit the installation requirements. Then tighten down all screws using the proper torque specifications.



**Figure 33: Pigtail Bracket Mounted on Radio**

### **Radio Front Mount and Final Hook-Up**

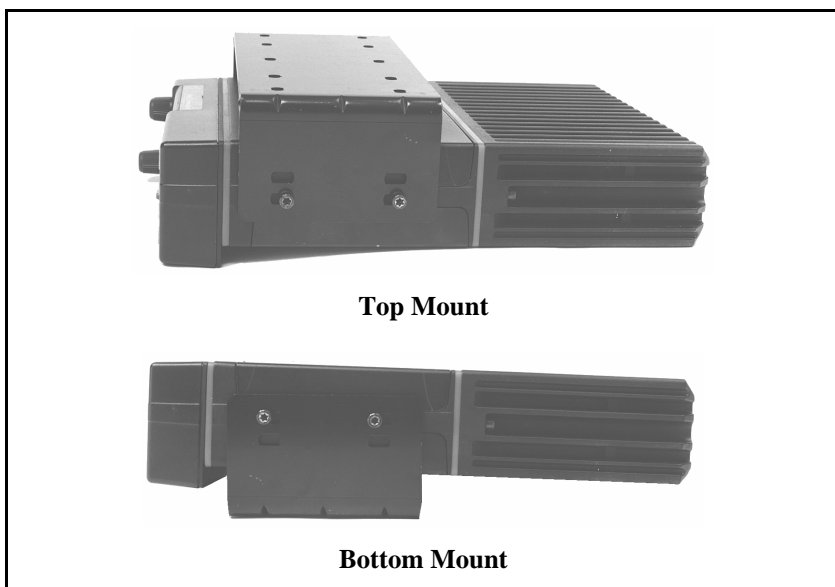
Typically, the bracket shown in Figure 34 is used for Front Mount applications. The bracket can be mounted so that it is either above or below the radio as convenient. The bracket shown in Figure 30 can also be used for Remote Mount applications but is **not recommended for 110 watt VHF radios or 100 watt UHF radios**. The following instructions are for a Front Mount installation using the bracket shown in Figure 34.

1. Using the bracket as a template, mark and drill the mounting holes using a No. 27 drill. Be sure to leave enough room at the front and rear of the radio for cable connections.
2. Mount bracket using four 1/4"-14 x 3/4" sheet metal screws. (Use 1/4"-14 x 1-1/2" screws if needed.)
3. Place radio into mounting bracket and secure using four M4 x 10 mm hex head screws, M4 flat washers and M4 lock washers (supplied) using the No. 20 Torx Driver.
4. Connect antenna coaxial cable to antenna connector (TNC).
5. Connect front mount accessory cable connector P1 to the Option/Remote Control Connector (ORCC) and secure with the two captive screws in the connector to the radio.
6. Connect front mount accessory cable connector P2 to speaker cable connector.
7. Connect power cable to power connector on rear of radio unit and secure with the two captive screws to the radio unit.
8. Connect microphone connector to connector on front panel and secure with captive screw.



Do not torque microphone connector screw greater than 2 in-lb. Alternatively, finger tight plus ¼ turn is acceptable.

9. If there are no other accessory connections, tie back plug P3 to main cable.
10. Recheck all connections before inserting fuse into transmit fuse assembly.



**Figure 34: Mounting Bracket Installation**

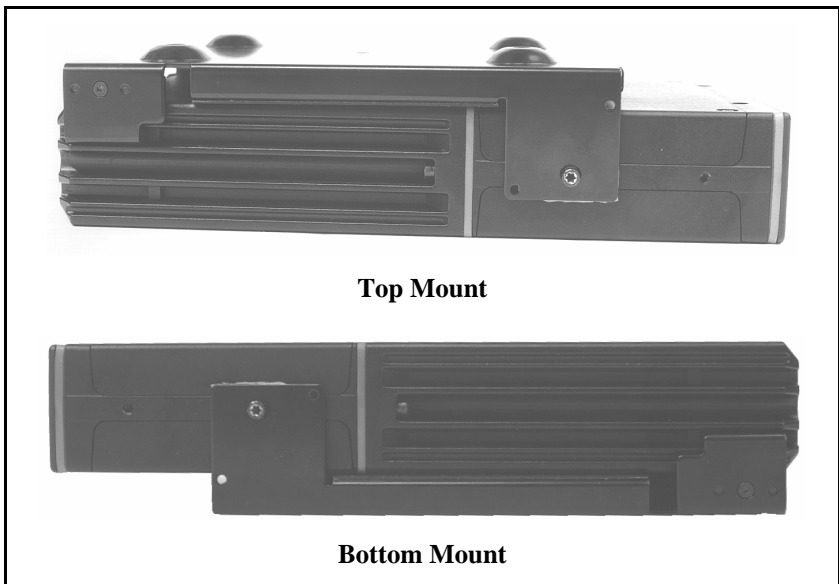
### **Radio Remote Mount and Final Hook-Up**

The bracket shown in Figure 35 is used for Remote Mounting (USA only). In some applications, the bracket shown in Figure 34 can also be used. The following instructions are for a Remote Mount installation using the bracket shown in Figure 35.

1. Using the bracket as a template, mark and drill the mounting holes using a No. 27 drill. Be sure to leave enough room at the rear of the radio unit for the cable connections.
2. Mount bracket using four 1/4"-14 x 3/4" sheet metal screws. (Use 1/4"-14 x 1" if needed.) The bracket can be mounted so that it is either above or below the radio as convenient.
3. Slide the radio unit into the bracket by aligning bracket guides with grooves on each side of radio (rear of radio should be inserted first). Slide

radio back until screw holes in front of bracket align with screw holes in side of radio. See Figure 35.

4. Secure radio to the bracket with two M4 x 10 mm socket head screws provided.
5. Connect antenna coaxial cable to antenna connector (TNC).
6. Connect remote control cable connector P1 to the ORCC connector on the radio unit and secure with the two captive screws.
7. Connect other end of the remote control cable to the remote control cable connector (RCCC) on the remote control unit.
8. Connect remote mount accessory cable connector P1 to the option connector (OPT) on control unit. Then, connect the speaker to connector P2 and accessory connector P3 to any options (hookswitch, etc.). If connector P3 is not used, insulate and tie back to main cable.
9. Recheck all connections and cables before inserting fuse into transmit fuse assembly.



**Figure 35: Remote Mounting Bracket Installation (USA Only)**

### **Cassette Mounting (EURO Only)**

The cassette mounting assembly is designed to mount in a standard DIN space in the instrument panel or console. This mounting permits rapid insertion and removal of the radio unit from the vehicle. All connections are made through a quick disconnect connector at the rear of the cassette mounting assembly to



the radio unit. This connector is part of the cassette assembly. The cassette assembly is shown in Figure 36.



**Figure 36: Cassette Assembly (EURO Only)**

### **Cassette Assembly Mounting**

1. Insert the cassette assembly in the mounting location. Secure the cables with the sheet metal screws and retaining straps provided.
2. Secure the back of the cassette assembly using the mounting stud (located at the back of the cassette assembly), No. 6 flat washer, No. 6 split lock washer and No. 6 wing nut.
3. Several tabs are located on the top, bottom and sides of the cassette assembly. These tabs are conveniently located near the front of the assembly and can be bent out as needed to further secure the cassette assembly to the vehicle.
4. Next, install the handle assembly:
  - a. Turn the radio upside down. Remove the two small machine screws on the bottom of the radio, near the front. Use upward pressure on screws to engage captivated threads for removal.
  - b. Using the machine screws and flat washers provided with the handle assembly, attach the handle to the bottom of the radio. The two holes on the handle should align with the two holes on the radio created by step (A). Once installed, the rubber handle should rotate freely from over top of the radio to just out in front of the control unit (approximately 90 degrees). Be sure to torque the two mounting screws within 6.5 to 8.25 in/lb limits.

5. Connect the antenna coaxial cable to the cassette mounting assembly rear connector.
6. Connect the power leads and the ignition sense leads as described in previous sections. See Figure 38.
7. Connect the speaker cable connector P2 to the speaker and the basic accessory connector P3 to the following options (if used, see Figure 38.)

OPTION	PLUG AND PIN
Ext. Hookswitch	P3-3 (HOT)
	P3-6 (GND)
Foot Switch	P3-5 (HOT)
	P3-2 (GND)
Horn Relay	P3-1 (HOT)
	P3-4 (GND)

8. Connect the extended option accessory plug P4 to the following options (if used, see Figure 36.)
  - Mobile Data Terminal
  - Public Address (External Amplifier)
  - External Microphone
  - External Tone Encoder
  - External Tone Decoder
  - Output (User Defined)
  - Input (User Defined)



Refer to accessory manual supplement for details regarding the extended options listed above. **DO NOT CONNECT DIRECTLY TO A PC OR DATA TERMINAL. DAMAGE COULD RESULT!**

9. With the handle assembly in the UNLOCKED position (out in front of the control unit), insert the radio into the cassette assembly. Slide the radio into the cassette assembly until the back of the radio meets the back of the cassette assembly.

Caution should be used while engaging the radio in the cassette the first few times until the cabling in the cassette mount assembly has settled into its permanent location. To insure proper first time engagement, the following procedure should be followed:



**NOTE**

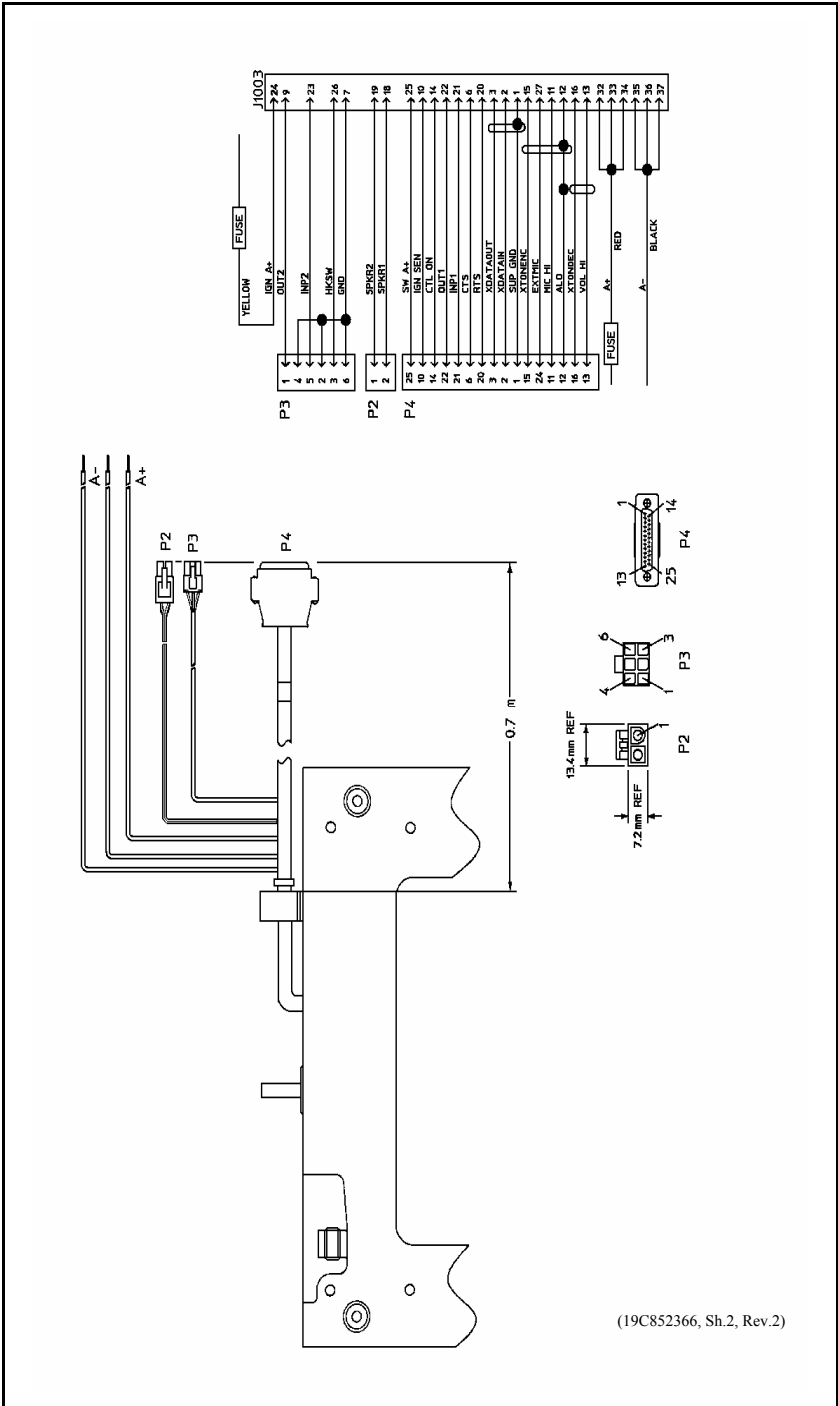
Insert radio into cassette mount opening and slide in until some spring resistance is felt. Holding the handle, move the radio gently from side to side until the unit locates the necessary connectors. Engage the radio handle in the sheet metal hooks, which protrude from the lower corners of the cassette mount casing. Rotate the handle upward to fully engage the radio. See Figure 37. **DO NOT FORCE THE CONNECTOR ENGAGEMENT.**

If the radio does not engage using the above method, a large flat blade screwdriver may be used to slightly re-position the 37-pin connector.

10. Recheck all connections and cables before inserting fuse into transmit fuse assembly.



**Figure 37: Handle Assembly in LOCKED Position**



(19C852366, Sh.2, Rev.2)

Figure 38: Cassette Assembly Schematic Diagram

## STEP 5 - INSTALL OPTIONS AND ACCESSORIES

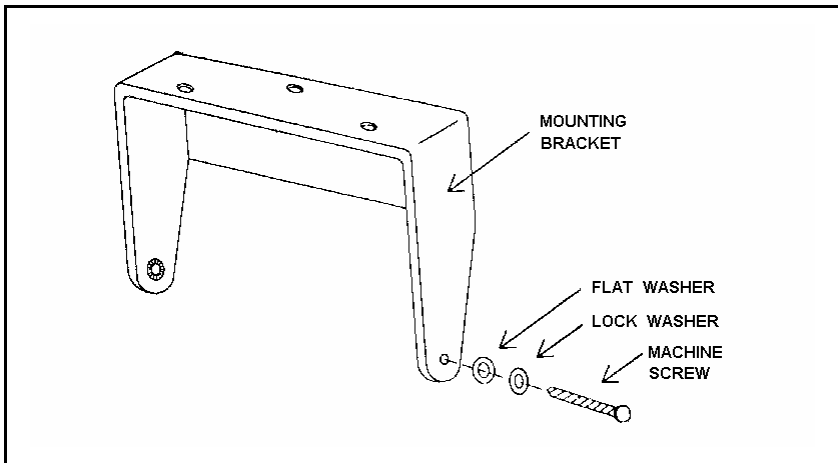
### Speaker D2LS1F

The speaker kit includes the speaker, mounting bracket, and connecting cable. Mount the speaker so it is directed to the operator but does not present a hazard in the event of an accident. The speaker can be mounted on the lower edge of the instrument panel, the firewall or above the windshield in some trucks.

- Use the mounting bracket as a template for locating the mounting holes, and mount the speaker as shown in Figure 39.
- To connect the speaker to the accessory cable, refer to the applicable installation procedures.

### Microphone Hanger and/or Hookswitch Mounting

The microphone hanger, or hookswitch, should be mounted in a location convenient to the operator where it will not interfere with the safe operation of the vehicle or pose a hazard to vehicle passengers. The hanger, or hookswitch, is designed to be mounted with the open end of the mounting button slot pointed upward. Use the hanger or hookswitch as a template to mark and drill the mounting holes. Mount with the self-tapping screws provided.



**Figure 39: Speaker Mounting Bracket**

## **Siren and Light**

For instructions about installing the Federal Signal Corporation Siren and Light Kit, refer to the Federal Signal Corporation Installation Instructions (Federal Systems part number 255287B, rev. B or higher).

Program the radio to work with the Federal Systems Siren and Light Kit, using the instructions outlined in the ProGrammer On-Line Help under “Siren and Light Options.”



The following issues have been reported on some Orion Siren/Light installations using the Federal Signal Corporation Siren and Light Kit:

- Occasional false activation of Siren and Light functions when the ignition is turned to the “on” position and/or when the vehicle is started.
- Occasional failure to enable Siren or Light functions via control head, which can be temporarily resolved by either power cycling the radio or turning the car ignition “off” and then “on” again.
- Occasional re-activation of Siren and Light function after siren module has been turned off

**To resolve the first two issues, modify the Federal Systems control cable as follows:**

1. Remove the outer shell from the DB25 side of the Federal Systems control cable.
2. Add a jumper from pin 1 to pin 19.

This modification to the SS2000 cable harness will disable the Orion’s capability to turn on and off the SS2000 from the front of the control head. The SS2000 will now be turned on and off strictly by its own ignition switch trigger line. (Red wire from 12 pin Molex<sup>®</sup> connector on SS2000 siren box.) Follow the SS2000 Federal Signal installation instructions to attach the red ignition line correctly.

**To resolve false activation, refer to TSM Vol. 25, #2 problem/solution below:**

**Problem:** Siren/Light functions change or turn off when switching between radios in Dual Radio installations with a SS2000 siren box.

**Solution:** Keyboard maps and Siren/Light configuration must be identical in both radio personalities to prevent this.

Additionally, in a Remote Mount Installation, there are three jumpers that must be reconfigured in the Orion Remote control Unit for Siren/Light operation. These jumpers are located on the Remote Interface Adapter (RIA), a PC board in the back half of the unit. To access these jumpers, the RIA must be removed from the control unit, as follows:

1. Disassemble the Orion control unit using steps given in LBI-38909, page 4, “Disassembly Procedures”.
2. Flex circuit PC2 does not need to be disengaged from J2, providing care is taken to avoid excessive bending.
3. Reconfigure jumper “AB” from center to “B”, jumper “CD” from center to “D”, and jumper “EF” from center to “F”.
4. Carefully reassemble RIA to the front control panel making sure that there is adequate alignment and lubricant for the black O-ring gasket at the mechanical interface between the RIA and the control panel. This maintains the moisture seal of the control panel. Refer to LBI-38909, Figure 1B.

# INSTALLATION (DUAL CONTROL UNITS)

The Dual Control feature can be configured for either front or remote mount radio units. Each configuration provides for a Main Control Unit and an Auxiliary Control Unit. In front mount configurations, the Main Control Unit is mounted to the radio unit and the Auxiliary Control Unit is located in a convenient location. In remote mount configurations, the Main Control Unit is mounted separate from the radio unit, typically located in the vehicle cab and the Auxiliary Control Unit located in a convenient location.

The units should be programmed at a Service Center first, then transferred to the user's installation. All radio units in the Dual Control Unit configuration **MUST BE PROGRAMMED PRIOR** to final installation.

## STEP 1 - PROGRAMMING

In order to provide each control unit with the proper identification code, the radio and control units must be programmed sequentially. The following sections provide the personality parameter settings required for installing dual control units. These parameters are defined in the personality by the radio programming software (ProGrammer – TQS-3385 or TQS-3389).

### Front Mount, Step A

1. Setup the Front Mount radio with one of the two programming cables as shown in Figure 40. Program the radio with the following configurations:

#### **Network Options:**

Dual Control	Enable
Audio Mode	Active or Parallel
Switching Mode	Independent or Slaved
Siren Light Controller	Unit A
Siren Light Connection	Unit A
Speaker	Enable (Active Low: Output 2)
Multiple Radio	Disable

2. Initiate programming.
3. Select Mobile Options from the Program Radio Setup.
4. Write Keypad File.
  - Select the type of control unit: System, Scan or Hand Held Controller.
  - Select Control Head ID CUB.



- After selecting the keypad file, select Load Saved Keypad Data or OK.



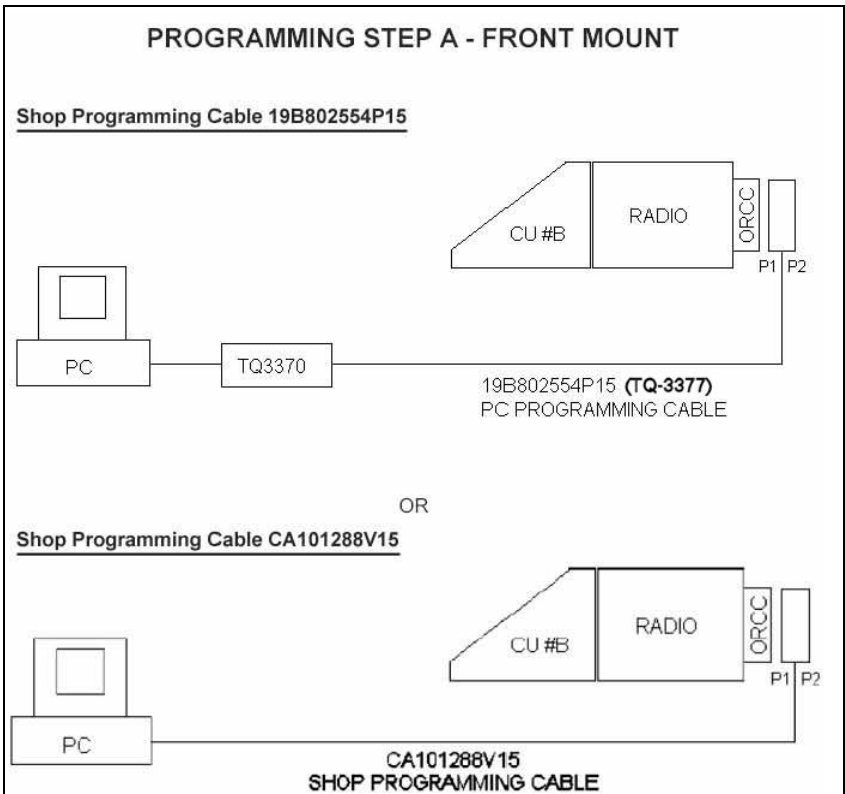
**NOTE**

If the wrong control is enabled, the control unit will not work.



**NOTE**

The **Load Saved Keypad Data** selection is available in ProGammer revision R19A and later.



**Figure 40: Step A Programming Diagram for Front Mount Dual Control Unit**

## **Front Mount, Step B**

1. Setup the Front Mount radio and the Auxiliary Control Unit with one of the two programming cables, as shown in Figure 41.
2. Initiate Programming.
3. Select Mobile Options from the Program Radio Setup.
4. Write Keypad File.
  - Select the type of control unit: System, Scan or Hand Held Controller.
  - Select Control Head ID CUA.
  - After selecting the keypad file, select Load Saved Keypad Data or OK.

In Dual Control Unit Front/Remote mount installations, the Main Control Unit is “B” and the Auxiliary Control Unit is “A”.



**NOTE**

If the wrong control is enabled, the control unit will not work.

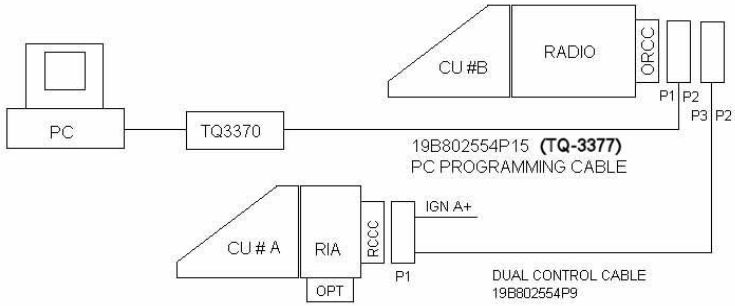


**NOTE**

The **Load Saved Keypad Data** selection is available in ProGrammer revision R19A and later.

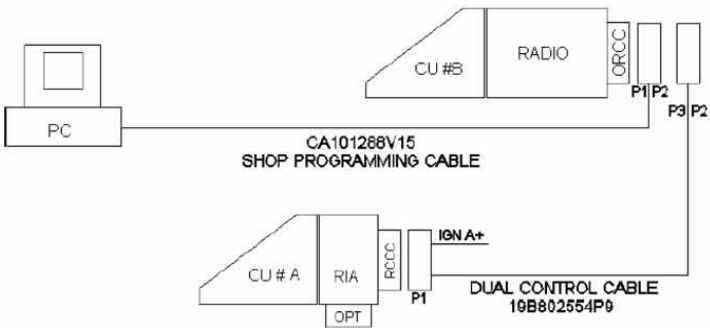
## PROGRAMMING STEP B - FRONT MOUNT

### Shop Programming Cable 19B802554P15



OR

### Shop Programming Cable CA101288V15



**Figure 41: Step B Programming Diagram Front Mount Dual Control**

## Remote Mount, Step A

1. Setup the remote mount radio and the main control unit with one of the programming cables, as shown in Figure 42. Program the radio with the following control configurations:

### **Network Options:**

Dual Control	Enable
Audio Mode	Active or Parallel
Switching Mode	Independent or Slaved
Siren Light Controller	Unit A
Siren Light Connection	Unit A
Speaker	Enable (Active Low: Output 2)
Multiple Radio	Disable

5. Initiate programming.
6. Select Mobile Options from the Program Radio Setup.
7. Write Keypad File.
  - Select the type of control unit: System, Scan or Hand Held Controller.
  - Select Control Head ID CUB.
  - After selecting the keypad file, select Load Saved Keypad Data or OK.



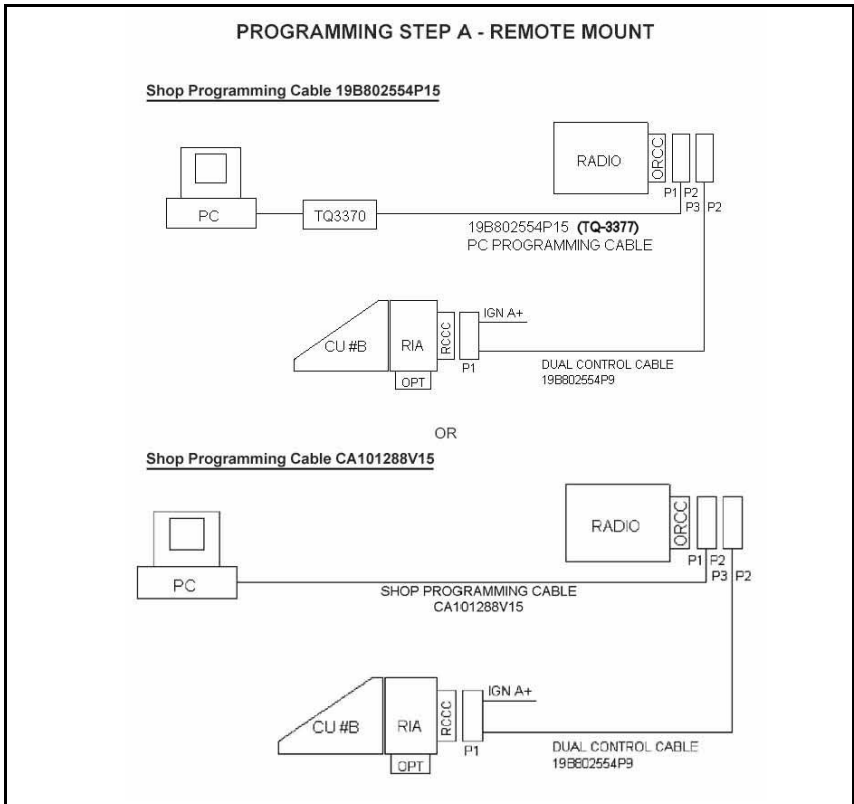
**NOTE**

If the wrong control is enabled, the control unit will not work.



**NOTE**

The **Load Saved Keypad Data** selection is available in ProGrammer revision R19A and later.



**Figure 42: Step A Programming Diagram Remote Mount Dual Control**

### **Remote Mount, Step B**

1. Setup the Remote Mount radio and the Auxiliary Control Unit with one of the programming cables, as shown in Figure 43.
2. Initiate Programming.
3. Select Mobile Options from the Program Radio Setup.
4. Write Keypad File.
  - Select the type of control unit: System, Scan or Hand Held Controller.
  - Select Control Head ID CUA
  - After selecting the keypad file, select Load Saved Keypad Data or OK.

In a Dual Control Unit remote/remote mount installation, the Main Control Unit is “A” and the Auxiliary Control Unit is “B.”



NOTE

If the wrong control is enabled, the control unit will not work.

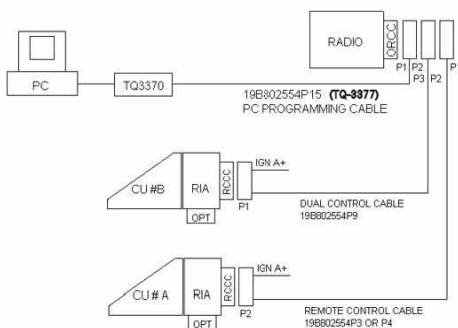


NOTE

The **Load Saved Keypad Data** selection is available in ProGammer revision R19A and later.

### PROGRAMMING STEP B - REMOTE MOUNT

Shop Programming Cable 19B802554P15



OR

Shop Programming Cable CA101288V15

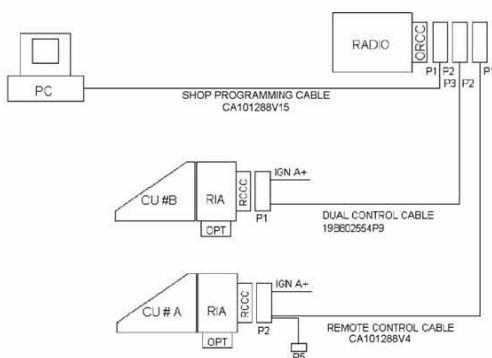


Figure 43: Step B Programming Diagram Remote Mount Dual Control

## STEP 2 – INSTALL DUAL CONTROL UNITS

### Front Mount

The Dual Control Unit feature is configured such that only one Control Unit can be used for Extended Option accessories. Connect all Extended Option accessories through the Main Control Unit.

1. Referring to Figure 44 and Figure 45, run the Dual Control Cable (19B802554P9) between locations for the Radio Unit and Auxiliary Control Unit. Be sure to locate the P2/P3 connector assembly at the radio unit.
2. After installing radio unit mounting hardware in the normal fashion, connect the Dual Control Cable connector (P3) to the radio unit. Tighten the two jackscrews on P3. Next, connect the Accessory cable (19B802554P1, 19B802554P2, or CA101288V2) connector (P1) to the Dual Control Cable connector (P2), and tighten the jackscrews on P2. Connect the power cable, and install radio unit in mounting bracket.
3. After installing the Auxiliary Control Unit in the normal fashion, connect the Dual Control Cable (P1) to Auxiliary Control Unit, and tighten jackscrews.
4. Connect the Remote Mount Accessory cable (19B802554P6) to the Auxiliary Control Unit.
5. A yellow Ignition Sense lead is provided on the Dual Control Cable and the Front Mount Accessory cable. If the **“Ignition Sense”** feature is enabled on the radio unit, it is necessary to connect only one of the yellow leads provided, whichever is convenient. Tape back the unused yellow lead. (See page 15 for details.)
6. Install the Speakers in convenient locations near each radio unit.



**NOTE**

#### **Parallel Audio Installation Requirements**

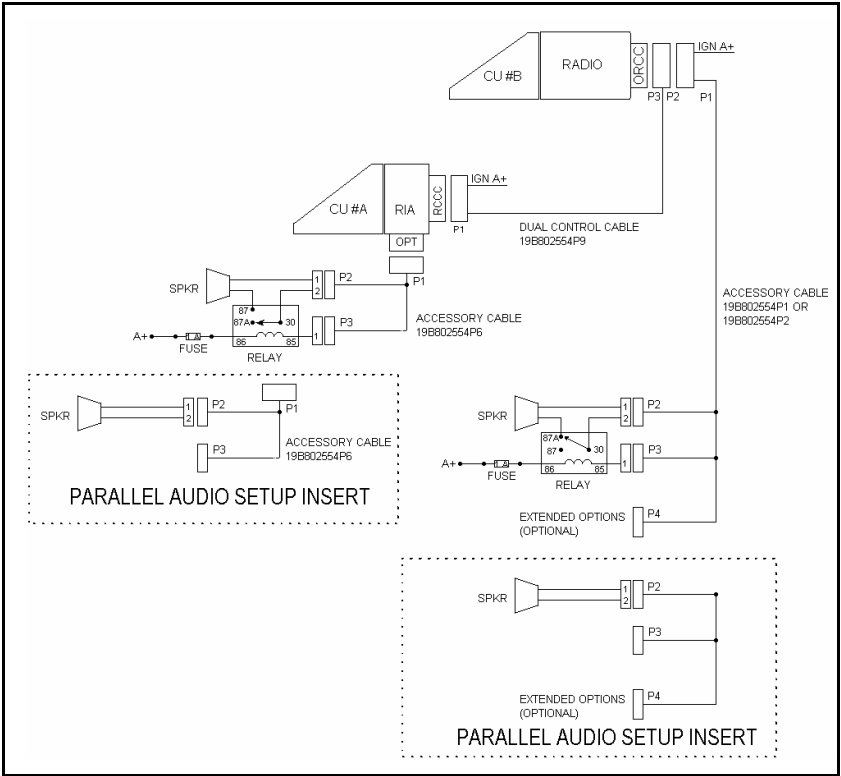
In special configurations that require both speakers to operate at the same time (simultaneous audio), install the speakers for parallel audio operation. For wiring information, refer to the Parallel Audio Setup Insert section of Figure 44 and Figure 45. Perform the following steps to install parallel audio speakers:

1. Use the two 8 $\Omega$  speakers, part number LS-102824-005, in place of the two 4 $\Omega$  speakers, part number LS102824V1.
2. Hardwire each speaker directly (without relays) as shown in Figure 44 and Figure 45.

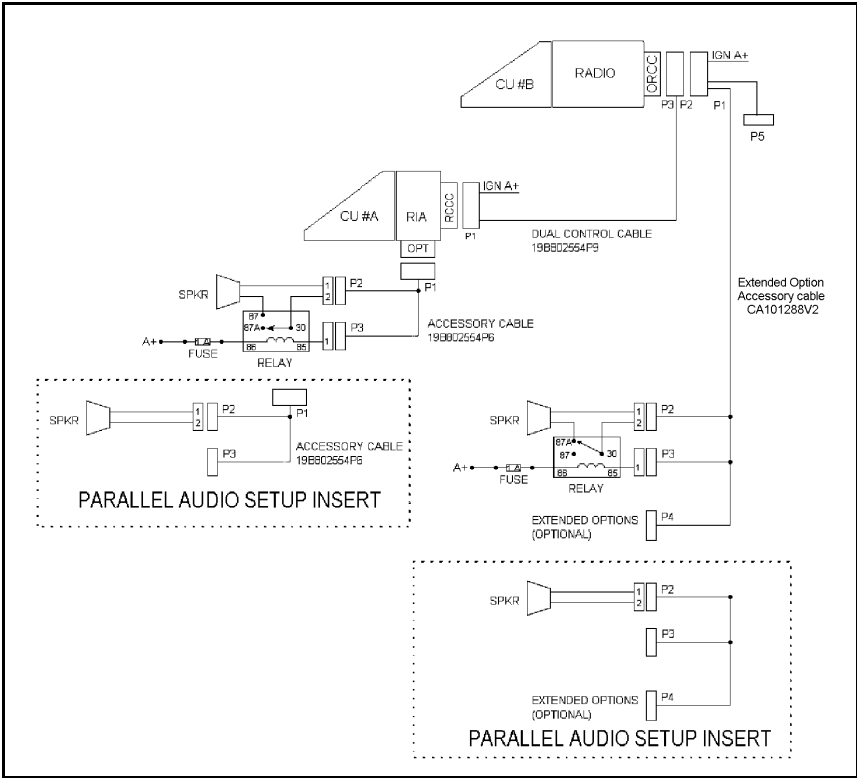
It is very important to use the correct speakers for this application. Wiring 4 $\Omega$  speakers in this configuration may cause damage to the radio.

7. Install a relay (19A149299P1) from the kits supplied at a location near the leads from each speaker. For mounting, use the #8 x 3/4" sheet metal screw and nut plate supplied with each kit.
8. At a convenient point, cut one of the wires in each of the 2-wire speaker cables, spread the leads, and strip the ends. Crimp a 1/4" tab receptacle to each end.
9. Radio Unit Speaker: Connect the lead nearest the speaker to Pin 87A of the relay. Connect the lead nearest the connector to Pin 30 of the relay. Connect the speakers connector to the Accessory cables P2. See Figures 47 and 48.
10. Auxiliary Control Unit Speaker: Connect the lead nearest the speaker to Pin 87 of the relay. Connect the lead nearest the connector to Pin 30 of the relay. Connect the speakers connector to the Accessory cables P2. See Figures 44 and 45.
11. For each relay: Connect a #18 AWG black wire between the relay, Pin 85 and Accessory cable P3-1 (labeled "**OUT2**" on the schematic diagrams in the service manual). Use a 1/4" tab receptacle on the relay side and mating Molex connector and pins on the accessory cable side. Connect the mating Molex connector to the Accessory cables P3 when finished. See Figures 44 and 45.
12. For each relay: Connect a #18 AWG red wire to the relay, Pin 86. Cut to length, and connect to the 1 amp fuse holder supplied. Use crimp on connectors supplied. Connect the other side of the 1 amp fuse holder to A+ battery source or vehicle A+ fuse block. Use #18 AWG red wire and ring lug supplied, if needed. See Figures 44 and 45.
13. Check the dual control operation using the operator's manual as a test guide. In the PC programming software, make sure the "DUAL CONTROL SPEAKER" is programmed to "**ACTIVE LOW**".





**Figure 44: Dual Control Unit Front Mount Installation Configuration using 19B802554P1 or P2**



**Figure 45: Dual Control Unit Front Mount Installation Configuration using CA101288V2**

### **Remote Mount**

1. Referring to Figure 46 and Figure 47, run the Remote Control Cable (19B802554P3, 19B802554P4 or CA101288V4) between locations for the Radio unit and Main Control unit.
2. Run the Dual Control Cable (19B802554P9) between locations for the radio unit and Auxiliary Control unit. Be sure to locate the P2/P3 connector assembly at the radio unit.
3. After installing the radio unit in the normal fashion, connect the dual control cable connector (P3) to the radio unit. Tighten the two jackscrews on P3. Next, connect the Remote Control Cable connector (P1) to the Dual Control Cable connector (P2), and tighten jackscrews on (P2).
4. After installing the Main Control Unit in the normal fashion, connect the Remote Control Cable (P2) to the Main Control Unit and tighten jackscrews.

5. After installing the Auxiliary Control Unit in the normal fashion, connect the Dual Control Cable (P1) to the Auxiliary Control Unit and tighten the jackscrews.
6. Connect the accessory cable (19B802554P6) to the Auxiliary Control Unit. Connect either the accessory cable (19B802554P6) or the extended option accessory cable (19B802554P7) to the Main Control Unit as appropriate.
7. A yellow ignition sense lead is provided on each control cable. If the **“Ignition Sense”** feature is enabled on the radio unit, it is necessary to connect only one of the yellow leads provided, whichever is convenient. Tape back the unused yellow lead.
8. Install the speakers in convenient locations near each control unit.

### Parallel Audio Installation Requirements

In special configurations that require both speakers to operate at the same time (simultaneous audio), install the speakers for parallel audio operation.

For wiring information, refer to the Parallel Audio Setup Insert section of Figure 46 and Figure 47. Perform the following steps to install parallel audio speakers:

1. Use the two 8Ω speakers, part number LS 102824-005, in place of the two 4Ω speakers, part number LS 102824V1.
2. Hardwire each speaker directly (without relays) as shown in Figures 46 and 47.

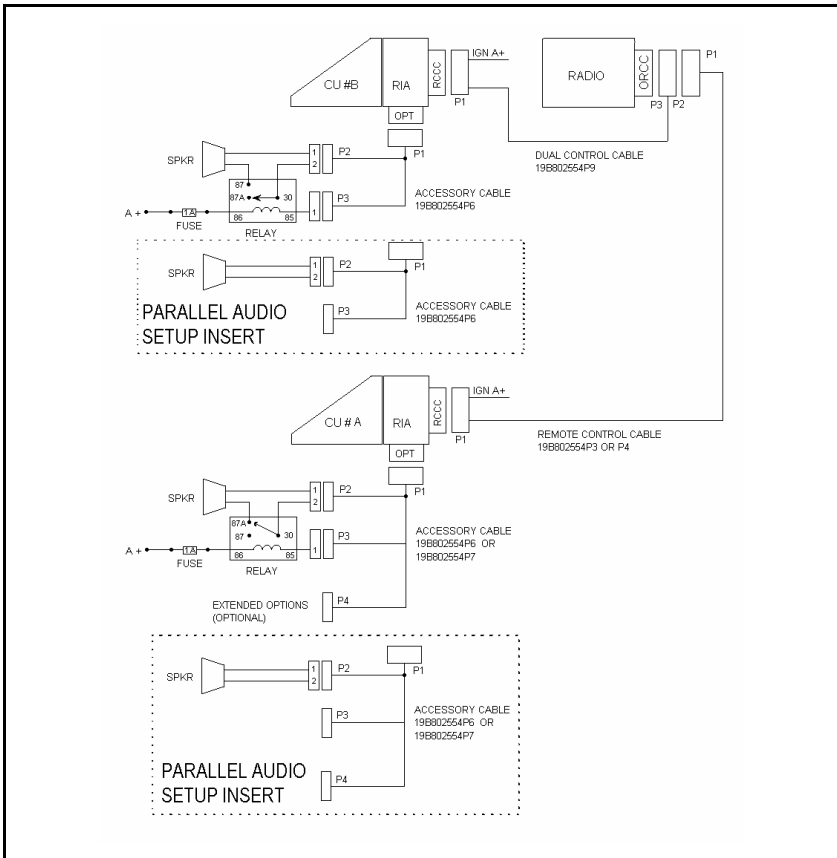
It is very important to use the correct speakers for this application. Wiring 4Ω speakers in this configuration may cause damage to the radio.



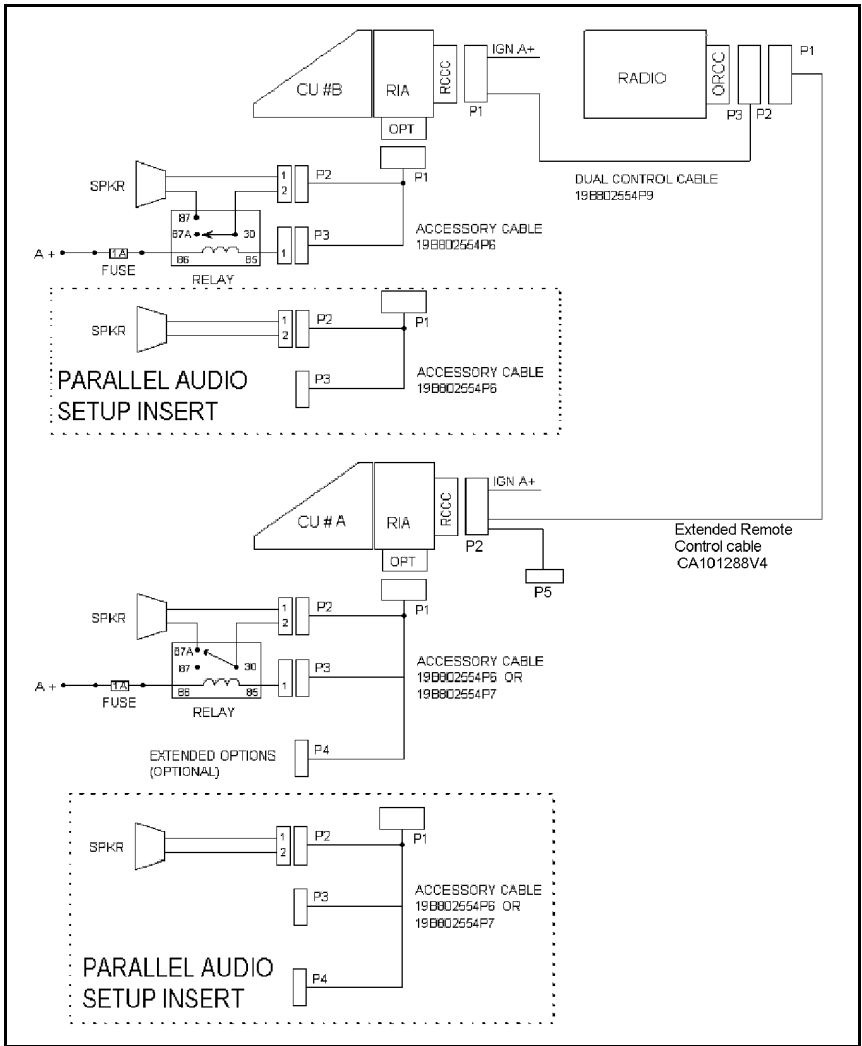
**NOTE**

9. Install a relay (19A149299P1) from the kits supplied at a location near the leads from each speaker. Use the #8 x 3/4" sheet metal screw and nut plate supplied with each kit for mounting.
10. At a convenient point, cut one of the wires in each of the 2-wire speaker cables, spread the leads, and strip the ends. (Crimp a 1/4" tab receptacle to each end.)
11. Main Control Unit Speaker: Connect the lead nearest the speaker to Pin 87 of the relay. Connect the lead nearest the connector to Pin 30 of the relay. Connect the speaker connector to the accessory cables P2. Refer to Figure 46 and Figure 47.
12. Auxiliary Control Unit Speaker: Connect the lead nearest the speaker to Pin 87A of the relay. Connect the lead nearest the connector to Pin 30 of the relay. Connect the speaker connector to accessory cables P2. Refer to Figure 46 and Figure 47.

13. For Each Relay: Connect a #18 AWG black wire between the relay, Pin 85 and accessory cable P3-1 (labeled “OUT2” on schematic diagrams in the service manual). Use a ¼” tab receptacle on the relay side and a mating Molex connector and pins on the accessory cable side. Connect the mating Molex connector to the accessory cable P3 when finished. (Refer to Figure 46 and Figure 47.)
14. For Each Relay: Connect one end of a #18 AWG red wire to the relay, Pin 86. Cut the lead to length, and connect the other end to the 1 amp fuse holder supplied. Use crimp on connectors supplied. Connect the other side of the 1 amp fuse holder to the A+ battery source or a vehicle A+ fuse block. Use a #18 AWG red wire and a ring lug supplied, if needed. (Refer to Figure 46 and Figure 47.)
15. Check dual control operation, using the operator’s manual as a test guide. In the PC programming software, make sure the “DUAL CONTROL SPEAKER” is programmed to “ACTIVE HIGH”.



**Figure 46: Dual Control Unit Remote Mount Installation Configuration using 19B802554P3 or P4**



**Figure 47: Dual Control Unit Remote Mount Installation Configuration using CA101288V4**

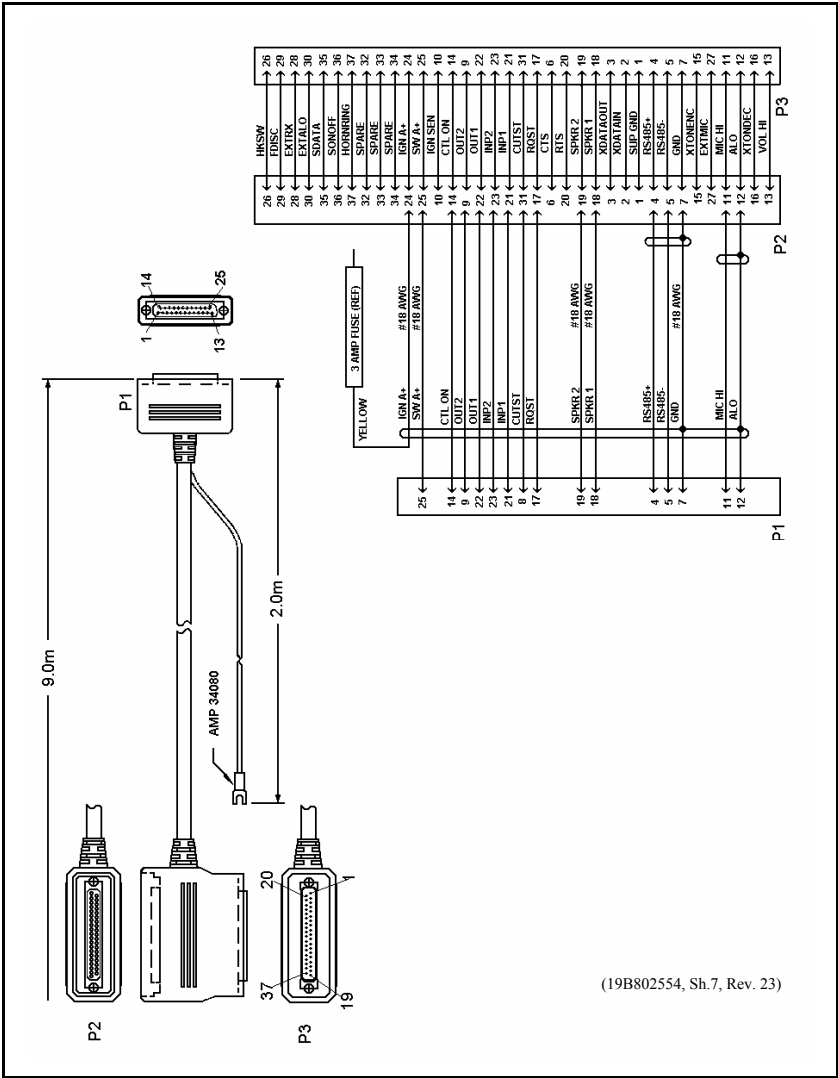


Figure 48: Remote Mount Dual Control Cable 19B802554P9

# DUAL RADIO UNITS



## NOTE

External Speaker can be enabled or disabled from either the MASTER or SLAVE units

PA mode can be enabled or disabled from the MASTER unit only.

Configure the Dual Radio feature for two remote mount radio units, or one front mount unit and one remote mount unit. In remote mount configurations, the control unit is typically located in the vehicle cab, with the radio units located side-by-side in vehicle trunk. In front mount configurations, the front mount radio unit is located in the vehicle cab, with the remote mount radio unit located in a convenient location nearby. The remote mount configuration is the preferred installation, since a separate control unit is required to program the remote unit in a front mount configuration.

The following Dual Radio configurations will not work:

- Any configuration using a DIN cassette mount.
- Any installation where Extended Options are required from both radio units. Extended Options are supported in one radio unit only.

## STEP 1 - PRE-INSTALLATION PROGRAMMING

All radio units in the Dual Radio configuration **MUST BE PROGRAMMED PRIOR** to final installation. These configurations provide for a Master radio unit and a Slave radio unit. In the front mount configuration, the control unit is mounted to the **master radio unit**. In the remote mount configuration, both radio units are installed separate from the control unit and the **master radio unit** is always the radio most directly connected to the control unit. Connect extended options to the Master radio unit only.



## NOTE

- Both the Orion Master and Orion Slave mobiles must be programmed with the same Group version of Flash code. The Group version must be G30 or later.
- If using an Orion in a dual radio configuration with an M7100 or J725M mobile radio, it is recommended that the Orion be the slave radio and contain the latest available version of flash code.

Failure to comply with either of the above may result in inadvertent lockup states in the dual radio configuration.

One radio is programmed as a **master**, and one radio is programmed as a **slave**. It is recommended that the units be programmed at a Service Center first, and

then transferred to the user's installation. However, some installation and programming cables are designed to facilitate field programming, see Figure 49 and Figure 50. The radios and control unit must be programmed in a sequential order to provide each radio with the proper identification code.

Use one of the three programming cables, listed on page 4, to program the Master radio unit and the Slave radio unit, as described in the following sections.

## **Master Radio Programming**

Decide which radio unit shall be the Master Unit. For shop programming, setup the Master radio unit for programming as described in the Service Manual or in the ProGrammer On-Line Help. For field programming, setup the Master radio unit for programming as shown in Figure 49. **THE SLAVE RADIO MUST BE DISCONNECTED.**

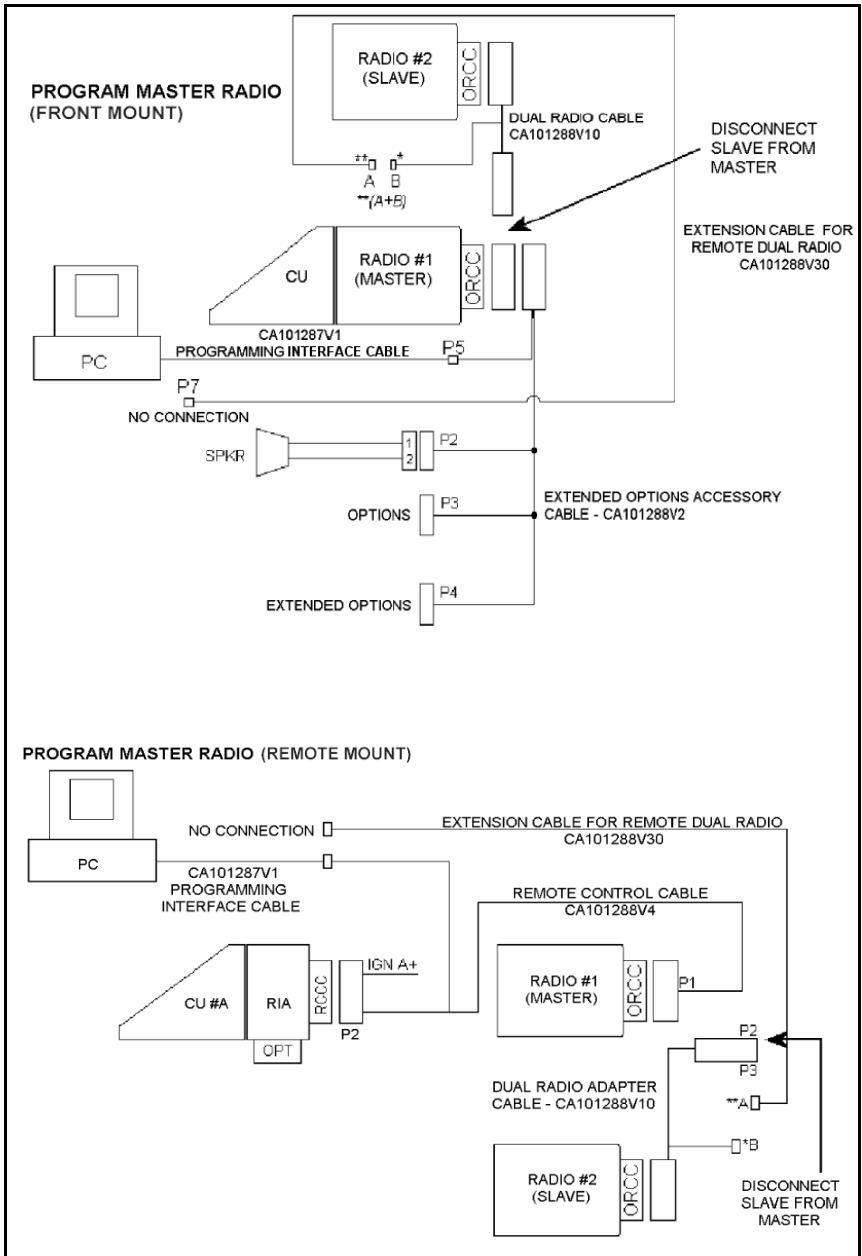
1. Program the Master radio and control unit with the following configurations:

### **Network Options**

Dual Control	Disable
Speaker	Disable
Multiple Radio	Enable
Radio type	Master
Power Up Volume	5
Mute Time Out	30.0
Termination	Enable
Display	Selected
Power Up	Enable
Power Up Radio	Enable
Receive Emergency	Enable
Receive Only	Enable
MuRPS	Disable

2. Initiate programming.
3. Write Keypad File. Select the type control unit: System, Scan, or Hand Held Controller.





**Figure 49: MASTER Radio Field Programming Configuration (Dual Radio)**

## **Slave Radio Programming**

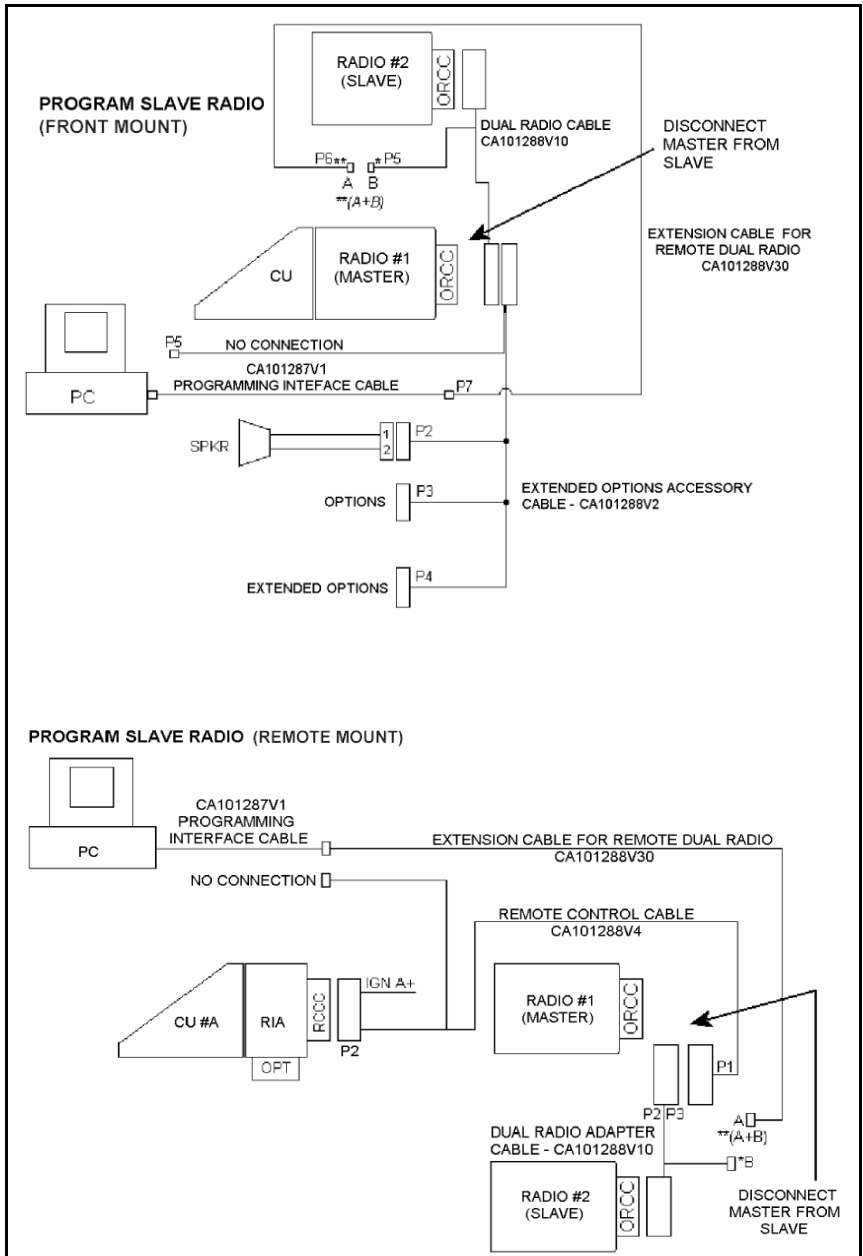
Decide which radio unit shall be the Slave radio unit. For shop programming, setup the Slave radio unit for programming as described in the Service Manual or in the ProGammer On-Line Help. For field programming, setup the Slaver radio unit for programming as shown in Figure 50. **THE MASTER RADIO MUST BE DISCONNECTED.**

1. Program the Slave radio and control unit with the following configurations:

### **Network Options**

Dual Control	Disable
Speaker	Disable
Multiple Radio	Enable
Radio type	Slave
Power Up Volume	5
Mute Time Out	30.0
Termination	Enable

2. Initiate programming.
3. Write Keypad File. Select the type control unit: System, Scan, or Hand Held Controller.



**Figure 50: SLAVE Radio Field Programming Configuration (Dual Radio)**

## STEP 2 – INSTALL CABLES/EQUIPMENT

### Front Mount

1. Plan the mounting locations of the two radio units. Note that the maximum cable length allowed between the two radios is two meters. Referring to Figure 53 and Figure 54, run Dual Radio cable (19B802554P10 or CA101288V10) between locations for Master and Slave radio units. Be sure to locate the P2/P3 connector assembly at the Master radio unit.

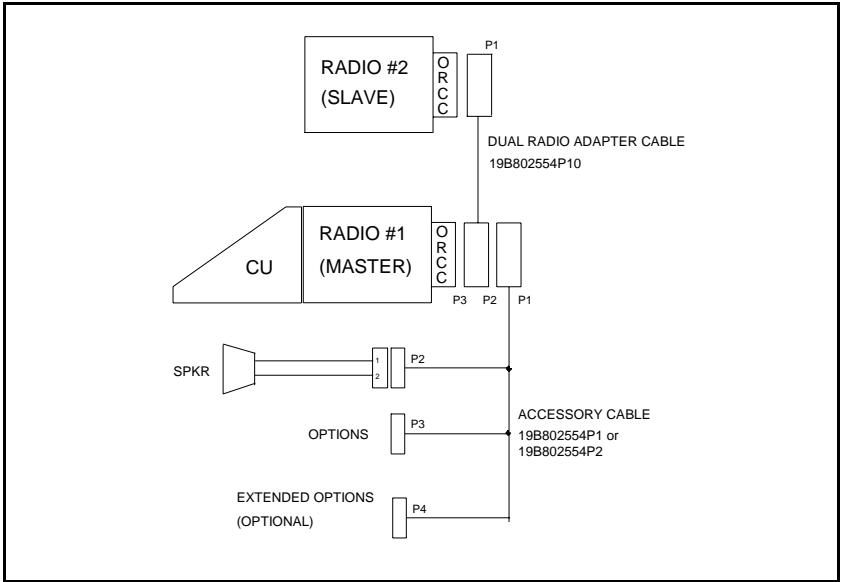


#### NOTE

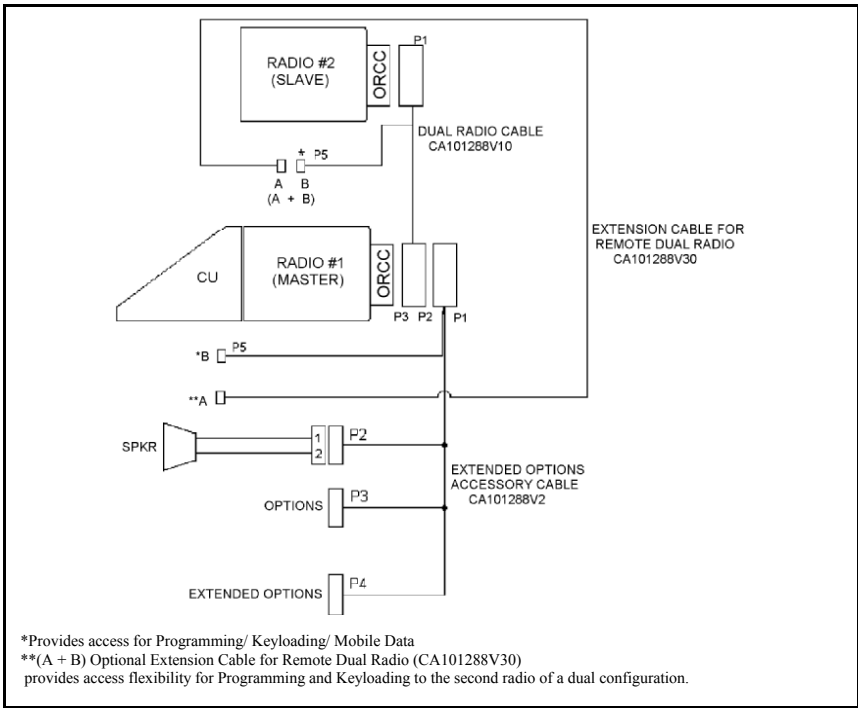
CA101288V10 has a pigtail (P5) at P1, an optional extension cable (CA101288V30) can be connected to P5 and ran to the remote control unit as the pigtail used for easy access. See Figure 54.

For instructions on mounting connector P5 to the Control Unit or the Radio refer to “Pigtail Bracket” section on page 35.

2. After installing Master radio unit mounting hardware, connect the Dual Radio cable connector (P3) to the Master radio unit. Tighten the two jackscrews on P3. Next, connect the accessory cable (19B802554P1, 19B802554P2 or CA101288V2) connector (P1) to the Dual Radio cable connector (P2), and tighten to jackscrews on P2.
3. Connect microphone and accessories. Refer to the Accessory Installation Manual for proper connection of accessories.
4. Connect power cable and antenna, then install Master radio unit in mounting bracket.
5. Connect "IGN A+" lead, if option is desired. Be sure internal switch SW601 is set properly. Refer to NOTE on Page 15 of this manual for details.
6. After installing Slave radio unit in its mounting hardware, connect Dual Radio cable (P1), and tighten jackscrews. Be sure SW601 setting on Slave radio unit is same as for Master radio unit. Connect power cable and antenna to Slave radio.
7. Check Dual Radio operation, using operator's manual as test guide.



**Figure 51: Orion Dual Radio Front Mount Installation Configuration using 19B802554P10 and 19B802554P3 or P4**



**Figure 52: Orion Dual Radio Front Mount Installation Configuration using CA101288V30, CA101288V10 and CA101288V2**

**Remote Mount**

1. Plan the mounting locations of the two radio units. Note that the maximum cable length allowed between the two radios is two meters. Referring to Figure 53 and Figure 54, run Dual Radio cable (19B802554P10 or CA101288V10) between locations for Master and Slave radio units. Be sure to locate the P2/P3 connector assembly at the Master radio unit.



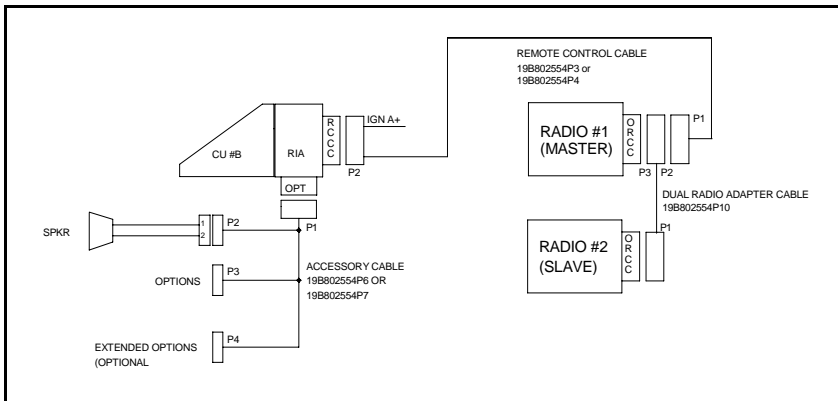
**NOTE**

CA101288V10 has a pigtail (P5) at P1, an optional extension cable (CA101288V30) can be connected to P5 and ran to the remote control unit as the pigtail, used for easy access for programming, keyloading and mobile data. See Figure 56.

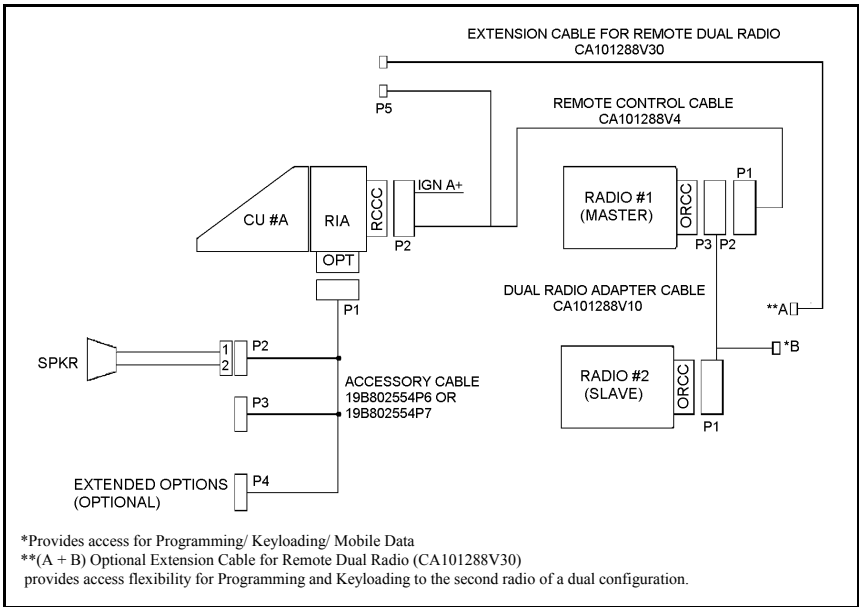
2. After installing Master radio unit mounting hardware, connect the Dual Radio cable connector (P3) to the Master radio unit. Tighten the two jackscrews on P3.
3. Next, route the remote control cable (19B802554P3, 19B802554P4 or CA101288V4) between Control Head and Master radio locations. After

installing Control Head, connect remote control cable connector (P2) to Control Head.

4. Connect "IGN A+" lead, if option is desired. Be sure internal switch SW601 on master radio is set properly. Refer to page 15 of this manual for details.
5. Connect accessory cable (19B802554P6 or 19B802554P7) connector (P1) to Control Head.
6. Connect microphone and accessories. Refer to Accessory Installation Manual for proper connection of accessories.
7. Now connect Remote Control Cable connector (P1) to the Dual Radio cable connector (P2), and tighten to jackscrews on P2.
8. Connect power cable and antenna, then install Master radio unit in mounting bracket.
9. After installing Slave radio unit in its mounting hardware, connect Dual Radio cable (P1), and tighten jackscrews. Be sure SW601 setting on Slave radio unit is same as for Master radio unit. Connect power cable and antenna to Slave Radio.
10. Check Dual Radio operation, using operator's manual as test guide.



**Figure 53: Orion Dual Radio Remote Mount Installation Configuration**



**Figure 54: Orion Dual Radio Remote Mount Installation Configuration using CA101288V30, CA101288V10, and CA101288V4**



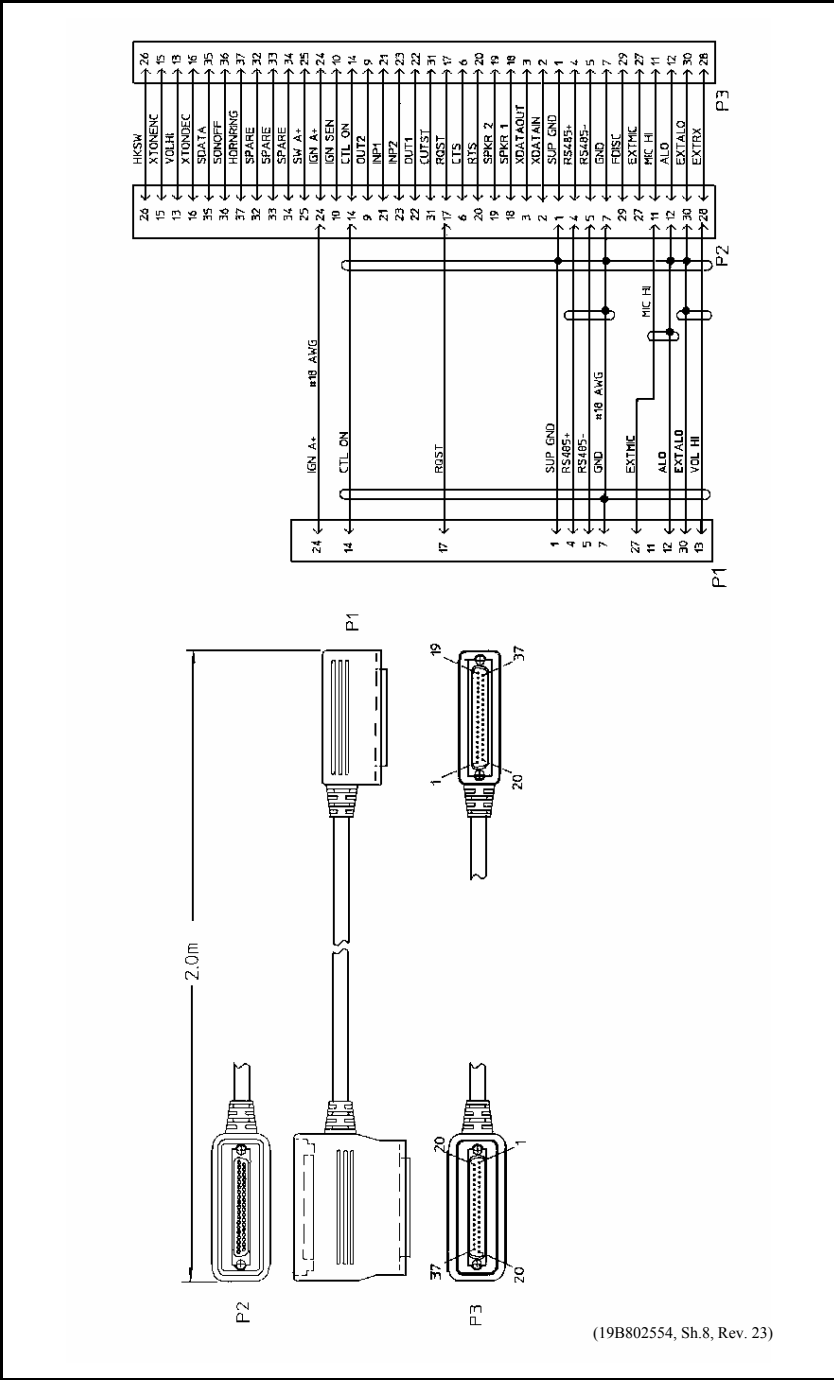


Figure 55: Dual Radio Control Cable 19B802554P10

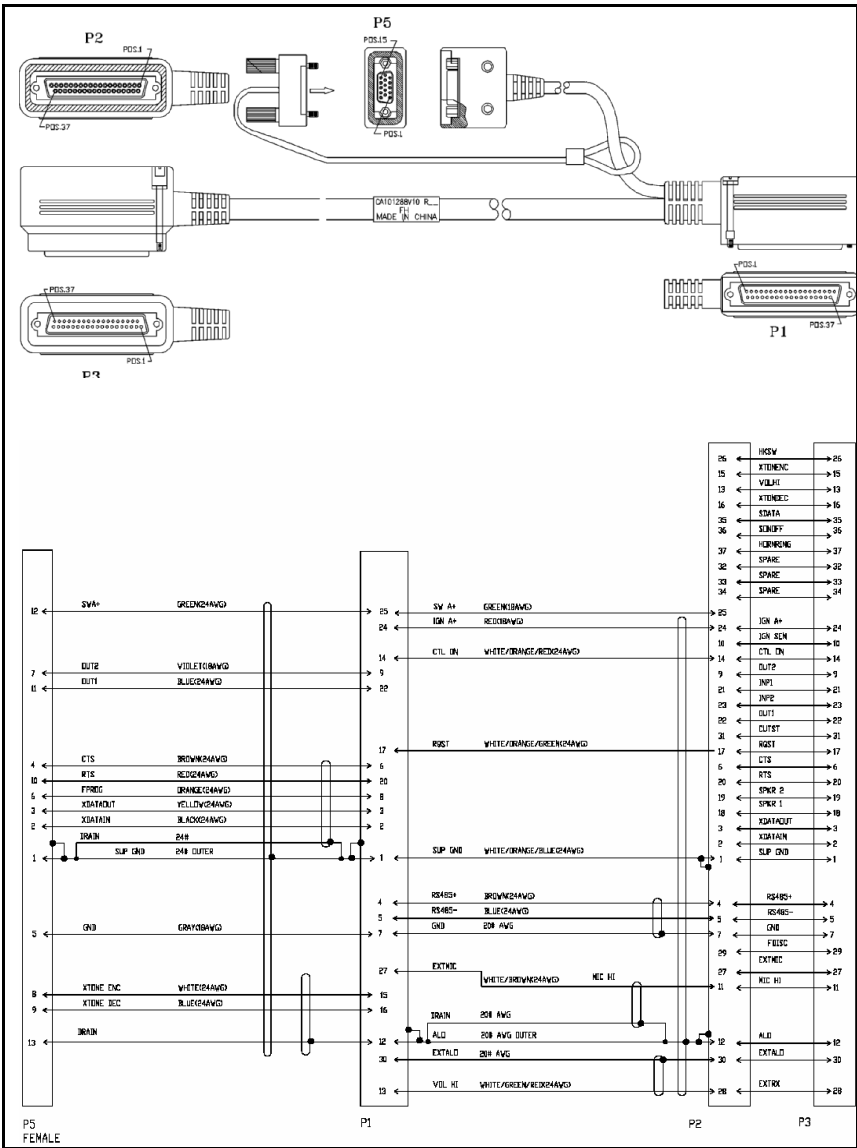


Figure 56: Dual Radio Control Cable CA101288V10

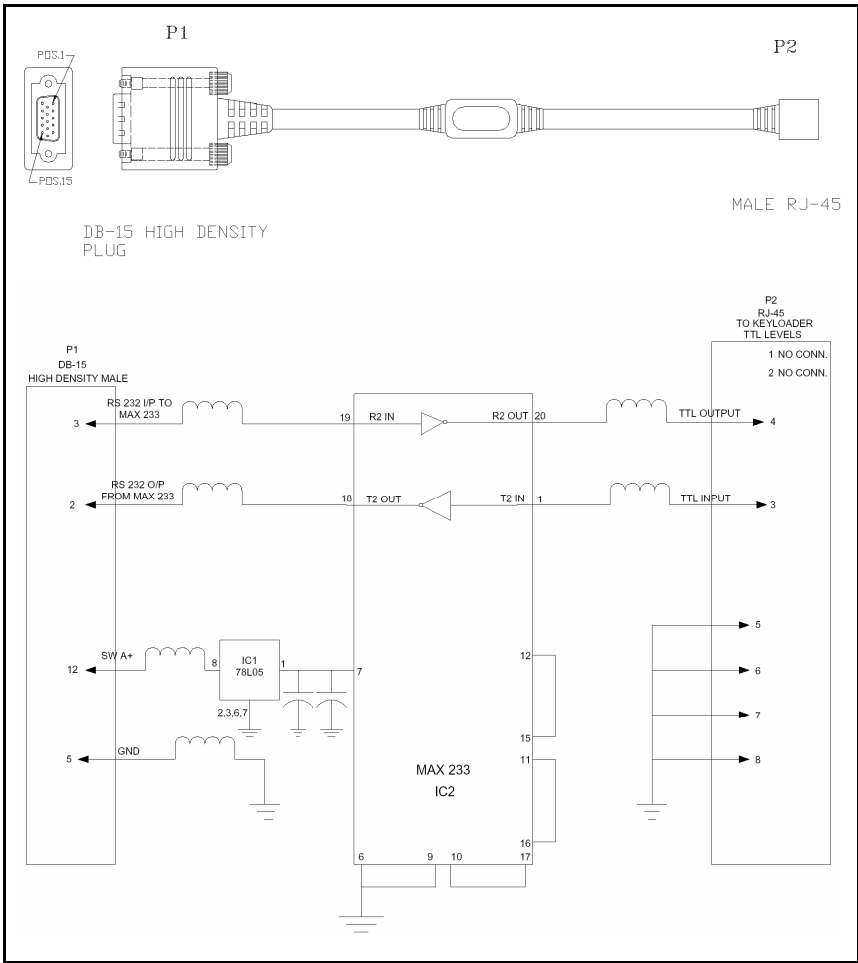
## Keyloading the Radio



**CAUTION**

Do not have a programming cable attached to ORION when keyloading the radio. Having such cable attached will create level conflicts and adversely affect the operation of the radio.

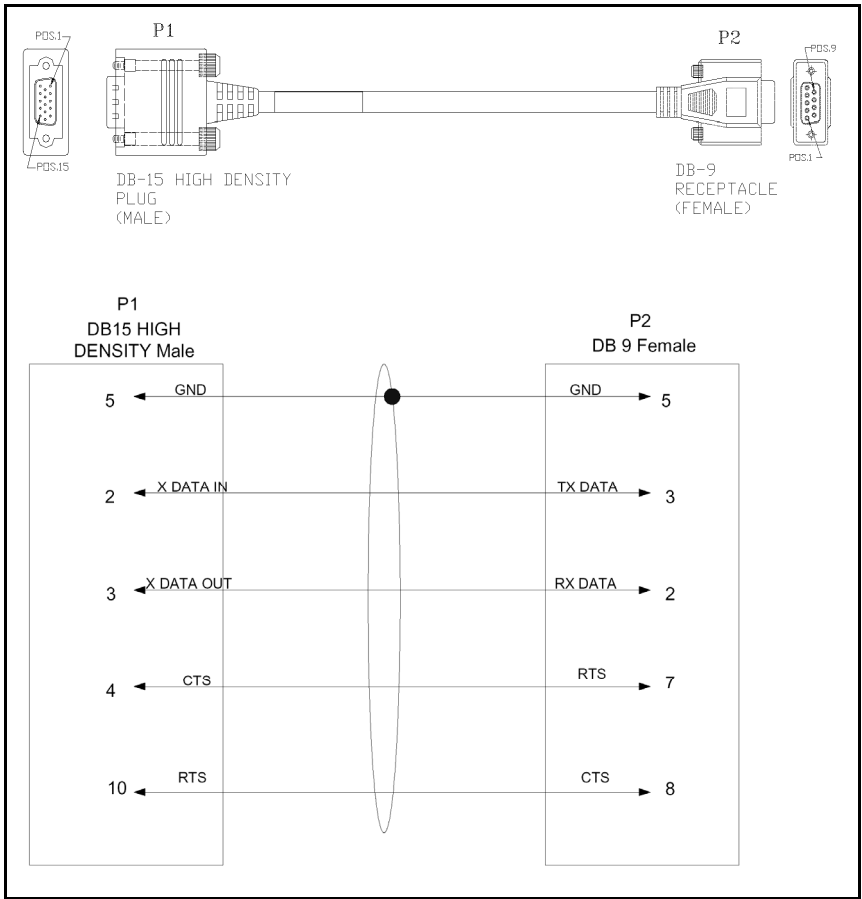
1. Attach the Keyloading Interface Cables', Male DB-15, connector to connector P5 of CA101288V2, V4 or V10, and the Male RJ-45 to the Keyloader.
2. Turn on power of radio to be keyloaded from the control unit.
3. Access the **KEYLOAD** function via the radio's menu. This enables the radio to accept the loading of encryption keys. The parameter settings are up to 8 banks of 7 keys.



**Figure 57: Keyloading Interface Cable CA101287V2**

## **Keyloading a Dual Radio**

1. Attach the Keyloading Interface Cables' DB-15 to the radio to be keyloaded through connector P5, and the RJ-45 connector to the Keyloader.
2. Select the radio to be keyloaded from the control unit by accessing the **RADIO** function via the radio's menu. Toggle to the radio to be keyloaded.
3. Access the **KEYLOAD** function via the radio's menu. This enables the radio to accept the loading of encryption keys.



**Figure 58: Mobile Data Terminal Interface Cable CA101287V3**

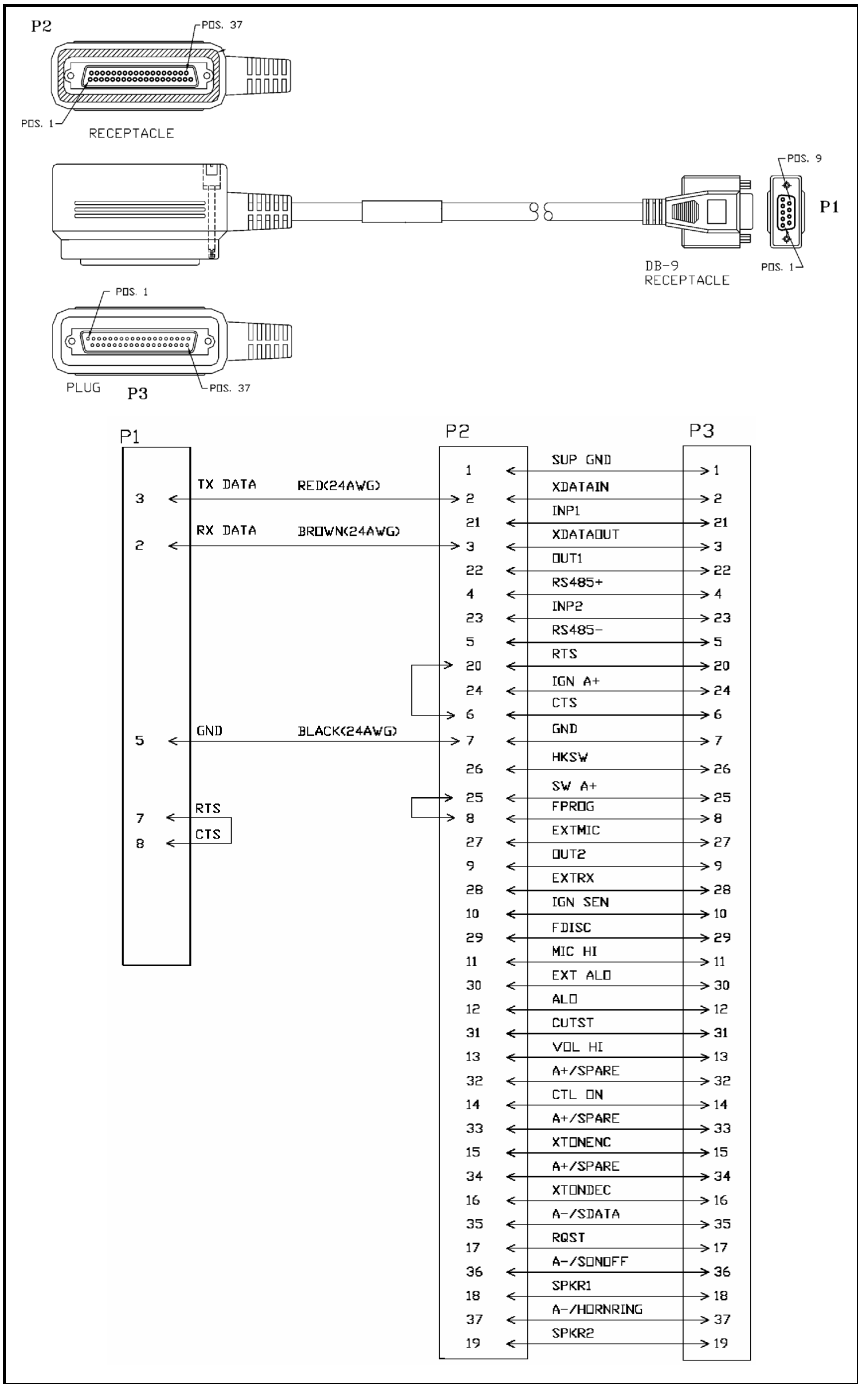


Figure 59: Shop Programming Cable CA101288V15

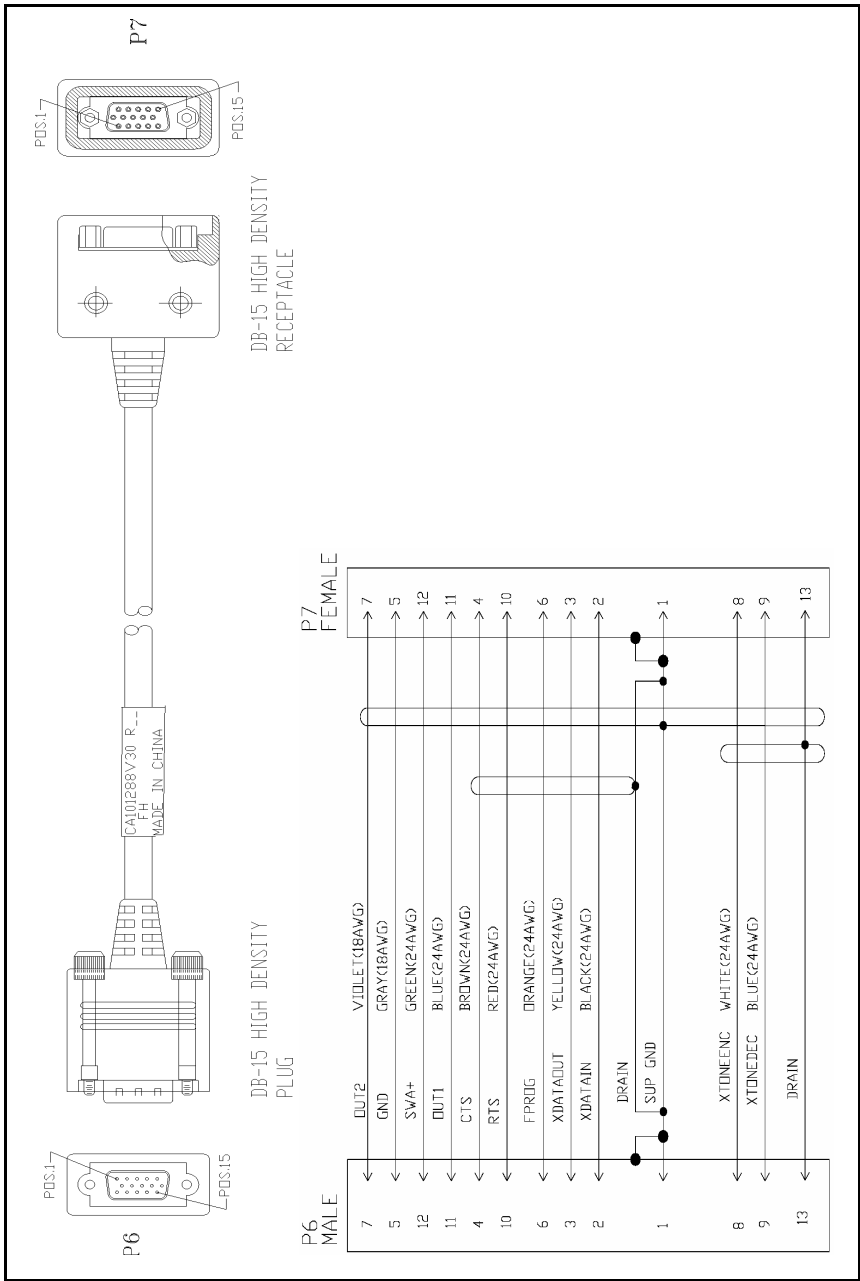


Figure 60: Extension Cable for Dual Remote Radio CA101288V30

## TECHNICAL ASSISTANCE

M/A-COM's Technical Assistance Center (TAC) resources are available to help you with the overall system's operation, maintenance, and product support. TAC is your point of contact when you need technical questions answered. For more information about technical assistance services, contact your sales representative, or call the Technical Assistance Center directly at:

North America: 1-800-528-7711

International: 1-434-385-2400

Fax: 1-434-455-6712

E-mail: [tac@tycoelectronics.com](mailto:tac@tycoelectronics.com)



## NOTES

## NOTES

## NOTES

**M/A-COM Wireless Systems**

221 Jefferson Ridge Parkway

Lynchburg, Virginia 24501

(Outside USA, 434-385-2400) Toll Free 800-528-7711

[www.macom-wireless.com](http://www.macom-wireless.com)