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STATEWIDE MOBILE RADIO EQUIPMENT INSTALLATION/REMOVAL SERVICES

PRICING:

The following tables illustrate our subcontractors payment per line item. The table shows the State of California for all State Agencies in the estimated quantities indicated. The quantities listed below are estimated based on previous supplier reports, and the State will not guarantee any specific amounts or be held responsible for any reduction in usage.

CRE has entered clearly legible figures a UNIT PRICE and EXTENSION for each service line item in the respective spaces provided for this purpose. The sum of all the line item EXTENSIONS shall be entered in the space as provided below. The following is a list of the State's estimated install/removal service requirements for a three-year period. CRE will subcontract your business for the Installs and Removals and pay the following amounts per line item. Please review the description of cost items for what each line item will entail.

PRICING - INSTALLS

ITEM NO.	INSTALL	3 YEAR QUANTITY	UNIT PRICE	EXTENSION
1	Mobile Radio (sedans, pickups, station wagons, van, motorcycles) TRUNK MOUNT	7200	\$204.00	\$1,468,800.00
2	Mobile Radio (sedans, pickups, station wagons, van, motorcycles) FRONT MOUNT	900	\$136.90	\$123,210.00
3	Mobile Radio, Heavy Equipment (trucks, buses, tractors, fire trucks, street sweepers) TRUNK MOUNT or FRONT MOUNT	2000	\$230.13	\$460,260.00
4	Scanner Receiver and Antenna	1200	\$129.50	\$155,400.00
5	PA System with Speaker	500	\$155.40	\$77,700.00
6	Radio Outside Speaker (includes undercover installs)	3000	\$62.90	\$188,700.00
7	Cellular Hands Free Kit	120	\$136.90	\$16,428.00
8	Portable Radio Changer System	90	\$136.90	\$12,321.00
9	Portable Radio Charger System and Linear Amplifier	270	\$115.51	\$31,187.70
10	Radio Console	600	\$109.15	\$65,490.00
11	Flashlight Holder	300	\$62.90	\$18,870.00
12	PA Mike Jack	75	\$62.90	\$4,717.50
13	Speaker Mute Switch	225	\$62.90	\$14,152.50
14	Map Reading Light	1050	\$46.55	\$48,877.50
15	Glass/Roof Mount Antenna	8100	\$62.90	\$509,490.00
16	Disguise Antenna (Sti-co or cowl mount)	450	\$62.90	\$28,305.00
17	Bumper Antenna	500	\$136.90	\$68,450.00
18	Spotlight, Pillar Mount	225	\$81.40	\$18,315.00
19	Spotlight, Overhead (Questar QS1)	600	\$136.90	\$82,140.00
20	Power Tamer	250	\$105.27	\$26,317.50
21	Neutral Tap	500	\$96.20	\$48,100.00
22	Electronic Siren complete with speaker	1350	\$136.90	\$184,815.00
23	Light-Bar	360	\$186.48	\$67,132.80
24	Wig-Wag Flasher, complete	1050	\$96.20	\$101,010.00
25	Arrow Stick with Controller	500	\$159.21	\$79,605.00
26	Rear Warning Lights, complete	450	\$136.72	\$61,524.00
27	Red/Blue Flashing Lights behind Vehicle Grille, complete	105	\$133.20	\$13,986.00
28	Front Mirror Light	90	\$99.90	\$8,991.00

29	Front Corner Strobes	90	\$193.13	\$17,381.70
30	Backflash	90	\$99.90	\$8,991.00
31	Tape Recorder Jack	225	\$99.90	\$22,477.50
32	Concealed Trunk Radio Unit	300	\$136.72	\$41,016.00
33	Concealed Control Head/Mic	450	\$123.77	\$55,696.50
34	Concealed PTT Switch	450	\$123.77	\$55,696.50
35	Headliner Mic	450	\$70.30	\$31,635.00
36	Concealed Headliner Mic Assembly	500	\$70.30	\$35,150.00
37	Concealed Siren Switch	400	\$99.90	\$39,960.00
38	Rear Light Defeat Toggle Switch	180	\$103.60	\$18,648.00
39	Shotgun Rack/Lock Assembly	900	\$70.30	\$63,270.00
40	Shotgun Release Button and Timer	900	\$70.30	\$63,270.00
41	Vehicle Alarm System Complete	300	\$286.38	\$85,914.00
42	Pistol Lock Box	500	\$66.60	\$33,300.00
43	Moulded Rear Seat	60	\$66.60	\$3,996.00
44	Protective Screen	120	\$192.40	\$23,088.00
45	Window Bar Set	60	\$192.40	\$11,544.00
46	Door Skins	75	\$70.30	\$5,272.50
47	Push Bumper	60	\$136.90	\$8,214.00
48	Hourly Installation rate – Labor (*See bid Specifications, Exhibit A, Section B.3. B.21. B.25. B.26)	1800	\$70.30	\$126,540.00
			\$ -	\$ -
ITEM NO.	REMOVALS	3 YEAR QUANTITY	UNIT PRICE	EXTENSION
1	Mobile Radio – TRUNK MOUNT	6000	\$107.30	\$643,800.00
2	Mobile Radio – FRONT MOUNT	600	\$70.30	\$42,180.00
3	Mobile Radio, Heavy Equipment	450	\$107.30	\$48,285.00
4	Scanner Receiver and Antenna	840	\$70.30	\$59,052.00
5	PA System with Speaker	500	\$110.99	\$55,495.00
6	Outside Speaker	1950	\$65.86	\$128,427.00
7	Cellular Hands Free Kit	120	\$110.99	\$13,318.80
8	Portable Radio Charger System	90	\$65.86	\$5,927.40
9	Portable Radio Charger System and Linear Amplifier	150	\$110.99	\$16,648.50
10	Radio Console	600	\$70.30	\$42,180.00
11	Flashlight Holder	150	\$50.88	\$7,632.00
12	PA Mike Jack	60	\$50.88	\$3,052.80
13	Speaker Mute Switch	120	\$50.88	\$6,105.60
14	Map Reading Light	180	\$50.88	\$9,158.40
15	Glass/Roof Mount Antenna	6600	\$62.90	\$415,140.00
16	Disguise Antenna	30	\$62.90	\$1,887.00
17	Bumper Antenna	500	\$129.50	\$64,750.00
18	Spotlight, Pillar	210	\$62.90	\$13,209.00
19	Spotlight, Overhead (Questar QS1)	60	\$140.60	\$8,436.00
20	Power Tamer	100	\$50.88	\$5,088.00
21	Neutral Tap	500	\$50.88	\$25,440.00
22	Electronic Siren, complete with speaker	1200	\$110.99	\$133,188.00
23	Lightbar	300	\$110.99	\$33,297.00
24	Wig Wag Flasher	500	\$70.30	\$35,150.00
25	Arrow Stick with controller	500	\$129.50	\$64,750.00
26	Rear Warning Lights	90	\$110.99	\$9,989.10
27	Red/Blue Flashing Lights behind Vehicle Grille, with flasher	75	\$110.99	\$8,324.25
28	Front Mirror Light	90	\$50.88	\$4,579.20
29	Front Corner Stobes	90	\$50.88	\$4,579.20
30	Backflash	90	\$50.88	\$4,579.20
31	Tape Record Jack	120	\$50.88	\$6,105.60
32	Concealed Trunk Unit	500	\$110.99	\$55,495.00
33	Concealed Control Head/Mic	90	\$50.88	\$4,579.20
34	Concealed PTT Switch	90	\$50.88	\$4,579.20
35	Headliner Mic	30	\$50.88	\$1,526.40
36	Concealed Headliner Mic Assembly	500	\$50.88	\$25,440.00
37	Concealed Siren Switch	400	\$50.88	\$20,352.00
38	Rear Light Defeat Toggle Switch	75	\$50.88	\$3,816.00
39	Shotgun Rack/Lock Assembly	210	\$50.88	\$10,684.80

40	Shotgun Release, Buttons and Timer	210	\$50.88	\$10,684.80
41	Vehicle Alarm System	60	\$155.03	\$9,301.80
42	Pistol Lock Box	500	\$50.88	\$25,440.00
43	Moulded Rear Seat	60	\$50.88	\$3,052.80
44	Protective Screen	75	\$110.99	\$8,324.25
45	Window Bar Set	30	\$110.99	\$3,329.70
46	Door Skins	20	\$50.88	\$1,017.60
47	Push Bumper	90	\$70.30	\$6,327.00

DEFINITION OF COST ITEMS

Trunk mount radio -- The complete installation or removal of a basic two-way radio where the control head is mounted within reach of the driver, and the transmit/receive unit is typically mounted in the trunk of the vehicle. The T/R unit can also be mounted in the cab of a pickup truck or the rear of a utility vehicle. Typical components include control head, microphone mount, TR unit, control cabling, power cabling with fuses, antenna cabling/connectors, and antenna.

Front mount radio -- The complete installation or removal of a basic two-way radio where the control head and transmitter/receiver are combined as one unit typically mounted within reach of the driver. Typical components include the main body, microphone mount, power cabling with fuses, antenna cabling/connectors, and antenna.

Heavy equipment radio -- The complete installation of a basic front-mount or trunk-mount two-way radio into a heavy or specialized vehicle. Examples of heavy vehicles include bulldozers, street sweepers, dump trucks, sanders, truck tractors (semi-truck and trailer), etc. A heavy vehicle does not include passenger cars, passenger vans, cargo vans, SUV's, pickup trucks, and truck chassis up to 2 tons.

Scanner receiver and antenna -- The complete installation or removal of a basic receiver or scanner typically mounted within reach of the driver. Typical components include the main body, power cabling with fuses, antenna cabling/connectors, and antenna.

PA system with speaker -- The complete installation or removal of a public address system where controls and microphone are typically mounted within reach of the driver. Components include main amplifier unit, microphone mount, power cabling with fuses, and outside speaker.

Radio outside speaker -- The installation and connection, or removal of an outside speaker with cabling. This item applies to radios with available outside speaker feature with built-in on/off switch.

Cellular hands-free kit -- The complete installation or removal of a cellular phone hands-free kit. Typical components include cradle, amplifier/speaker, miscellaneous wiring, antenna cabling/connectors, and antenna.

Portable radio charging system -- The complete installation or removal of a unit allowing use of a portable two-way radio within a vehicle while the radio battery is being charged and radio is connected to an external antenna. Typical components include the main body (portable radio pocket), power cabling with fuses, antenna cabling/connectors, and antenna.

DEFINITION OF COST ITEMS (Cont.)

Portable radio charging system with linear amp -- The complete installation or removal of a unit allowing use of a portable two-way radio within a vehicle while the radio battery is being charged and radio is connected through an amplifier to an external antenna. Typical components include the main body (portable radio pocket), linear amplifier unit, power cabling with fuses, antenna cabling/connectors, and antenna.

Radio console -- The complete installation or removal of a frame intended to hold multiple radios, control heads, and code-3 components within reach of the driver. Typical console manufacturers include Troy and Gamber-Johnson.

Flashlight holder -- The complete installation or removal of a unit intended to hold and charge a police-style flashlight. Components include the holder/charger and power cabling with fuse.

PA mic jack -- The complete installation or removal of a jack, sometimes concealed, to accommodate a public address microphone connection often to a Unitrol 80K siren unit. Typical components include a receptacle (jack), and wiring to the siren amplifier.

Speaker mute switch -- The complete installation or removal of a switch, typically concealed, to allow muting the audio of the internal radio speaker. Typical components include a toggle switch, 8 ohm resistor load, and wiring.

Map reading light -- The complete installation or removal of a gooseneck style reading light usually mounted to the radio console. Typical components include the light assembly and power wiring with fuse.

Glass or roof mount antenna -- The complete installation or removal of an antenna, cable, and connector. The antenna can be glass-mount or roof-mount style.

Disguise antenna -- The complete installation or removal of an antenna intended to appear as an AM-FM antenna.

Typical components include the antenna/mount assembly, antenna cabling, splitter box for broadcast radio reception, cable to broadcast radio, and connectors. Sometimes this antenna is not removed per instructions from the owning agency. Typical antenna manufacturers include Sti-co.

Bumper antenna -- The complete installation or removal of an antenna system inside the front and rear bumpers.

Disassembly and reassembly of front and rear bumpers is required. Typical components include antenna stubs, splitter box, cabling, and connectors.

Pillar spotlight -- The complete installation or removal of an external spotlight assembly on the front pillar of the vehicle cab. Typical components include the light assembly, cabling, and fuse.

Overhead spotlight -- The complete installation or removal of an external spotlight assembly on the roof of a vehicle. Components include light assembly, cabling, and fuse. Typical manufacturers include Questar.

Power tamer -- The complete installation or removal of a module used to disconnect power after a pre-determined length of time. Sometimes called Battery Saver, it is usually installed in the radio console. Typical components include module and wiring harness.

DEFINITION OF COST ITEMS (Cont.)

Neutral tap -- The complete installation or removal of a module used to stop the operation of a siren, take-down lights, etc. when the vehicle transmission is placed in "Park" position. The module is usually mounted under the hood of a vehicle. Components typically include the module and wiring.

Electronic siren, complete -- The complete installation or removal of a siren controller and speaker which operates various code-3 equipment. Typical components include siren controller, siren speaker, and cabling.

Lightbar -- The complete installation or removal of an assembly mounted on the roof of a vehicle containing various emergency lights (LED or halogen) wired to the siren controller. Typical components include lightbar assembly, cabling, and mounting kit.

Wig-wag flasher, complete -- The complete installation or removal of a module mounted under the hood of a vehicle to alternate flashing of the left and right headlights. Typical components include wig-wag module and cabling.

Arrow stick with controller -- The complete installation or removal of an assembly capable of flashing directional lighting (LED or halogen) usually for traffic control. Typical components include the arrowstick lighting assembly, controller box, and cabling harness.

Rear warning lights, complete -- The complete installation or removal of a lighting assembly consisting of one or more emergency lights mounted in the rear window or other rear location and connected to the siren controller.

Typical components include lighting assembly and cabling.

Red/blue flashing lights behind vehicle grill, complete -- The complete installation or removal of a lighting assembly consisting of one or more emergency lights mounted in the front of the vehicle behind the grill and connected to the siren controller. Typical components include lighting assembly and cabling.

Front mirror light -- The complete installation or removal of a lighting assembly consisting of one or more emergency lights mounted inside the vehicle, behind the rear view mirror, and connected to the siren controller.

Typical components include lighting assembly and cabling.

Front corner strobes -- The complete installation or removal of a set of strobe lights usually mounted inside the vehicle front left and right corner lights, and connected to the siren controller. Typical components include a set of strobe lights, strobe power supply module, and cabling.

Back flash -- The complete installation or removal of a module usually mounted in the rear of the vehicle used to alternate the flashing of the left and right tail lights, and connected to the siren controller. Typical components include the back flash module and cabling.

Tape recorder jack -- The complete installation or removal of a receptacle or jack for recording audio from the radio receiver. Typical components include the receptacle, cabling, and a 110K ohm resistor.

Concealed trunk radio unit -- The labor needed to install the trunk portion of a radio so as to conceal the unit. This option requires selection of the complete installation of a truck-mount radio on the TD-213 form.

DEFINITION OF COST ITEMS (Cont.)

Concealed control head/mic -- The labor needed to install the radio control head and microphone so as to conceal these units. This option requires selection of the complete installation of a truck-mount radio on the TD-213 form.

Concealed PTT switch -- (Listed on older version TD-213 forms.) The complete installation or removal of a foot switch mounted on the left side underneath the floor mat used to key the radio transmitter. This switch is installed in conjunction with the headliner microphone. Components include foot switch, radio interface box, and cabling.

Headliner mic -- (Listed on older version TD-213 forms.) The complete installation or removal of a small microphone and cable so as to be concealed under the headliner. Components include the microphone, radio interface box, and cable.

Concealed headliner mic assy -- The complete installation or removal of a small headliner microphone and push-to-talk foot switch mounted so as to be concealed, and connected to an interface box wired to the radio transceiver. Typical components include headliner microphone, foot switch, radio interface box, and cabling to radio.

Concealed siren switch -- The complete installation or removal of a concealed 3-position toggle switch to control the siren amplifier, usually connected to a Unitrol 80K siren unit. Typical components include the toggle switch and wiring.

Rear light defeat toggle switch -- The complete installation or removal of a switch used to disable the vehicle rear backup and brake lights. Typical components, depending on configuration, could include a toggle switch (if not provided on the siren controller), and wiring. Upon removal of switch, all affected vehicle functions shall be restored.

Shotgun rack and lock -- The complete installation or removal of a shotgun rack and lock assembly inside the cab of a vehicle, but outside the airbag deployment area. Typical components include the rack assembly, lock assembly, and cabling.

Shotgun release button/timer -- The complete installation or removal of a momentary switch and timer module used to release the shotgun lock. The switch is usually mounted under the vehicle dash. Components include a push button switch, release timer, and wiring.

Vehicle alarm system -- The complete installation or removal of a vehicle alarm system and wiring. Typical components include alarm module, pin or magnetic hood switches, alarm speaker, two key-ring remote controls, starter kill relay, and wiring.

Pistol lock box -- The complete installation or removal of a pistol lock box within the vehicle. Components include the lock box.

Moulded rear seat -- The complete installation or removal of a plastic moulded rear seat installed in police vehicles. The factory seat must be removed upon installation. Components include the moulded seat.

DEFINITION OF COST ITEMS (Cont.)

Protective screen -- The complete installation or removal of a protective metal screen used to separate the front and rear portions of a vehicle. Components include the screen partition, lower kick panel, and two side protector panels.

Window bar set -- The complete installation or removal of a metal bar set used to protect the rear door windows, both left and right, in police vehicles. Typical components include two window bar assemblies.

Door skins -- The complete installation or removal of two metal protector panels used to cover the inside of both rear doors in police vehicles. Door moulding, locks, handles, and arm rests must be removed upon installation. Typical components include two metal protective panels.

Push bumper -- The complete installation or removal of a push bumper assembly at the front of a vehicle.

Components include the push bumper assembly.

Hourly installation rate (labor) -- The labor needed to install or remove any items or equipment not otherwise listed above. Examples include exterior decals, specialized mounting with fabricated brackets, and installations in boats.

SCOPE OF WORK

1. Contractor/subcontractor shall perform an inspection of the vehicle before and after installation with the client agency representative. The results shall be recorded on the CUSTOMER QUALITY ASSURANCE CHECKLIST FORMS (TD-213 job ticket, Vehicle Check-In Form, Pre-Installation / Removal Checklist and Post Installation / Removal Checklist)
2. All work shall be performed at or within Ten (10) miles of the contractor's/subcontractor's place of business unless otherwise requested by the Agency / Contractor.
3. Service Call charges for work performed at locations greater than ten (10) miles from contractor's/subcontractor's place of business shall be in accordance with the following schedule:
 - a. Greater than 10 miles: \$70.30Service Call charges at an agency site greater than ten (10) miles from contractor's/subcontractor's place of business will be allowed only one time each day that work is being performed under the contract. When additional installers are provided for the same Agency at the same location for multiple items or multiple TD-213s, Service Call charges will be allowed for each installer for each day. Special Service Call charges may be arranged through mutual agreement of the client agency and the contractor, the contractor, and the Telecommunications Division. These Service Call charges must be documented prior to start of work and will remain the same throughout the contract period.
4. All work shall be performed by bondable and qualified journeyman installers. All training as required will be at the expense of the contractor/subcontractor.
5. The unit prices as listed on the Price Sheet shall include all labor, final tune-up, and final on-the-air operational checkout.
6. The Agency will furnish the equipment to be installed, including control and power cables, special brackets, and antennas.
7. Unless otherwise specified on the TD-213 or other work instructions, all radios shall be installed so that they are turned off when the ignition key is removed.
8. All fused leads to the battery supply shall be marked according to their function. Fuses shall be placed no more than 18 inches from the 12-volt source.
9. Radio control cables shall be routed on the opposite side of the vehicle in relation to the vehicle's emission control computer module unless specified otherwise, however, the cables shall not be laid over the catalytic converter area.
10. Vehicle alarm system installation work (labor) will be warranted by the contractor for 30 days after completion.

11. When removing radio equipment from undercover cars, contractor/ subcontractor shall leave the headliner microphone, disguised antenna, and antenna coupler in the old vehicle, unless otherwise instructed. Removed items which are excess due to their replacement in a new installation should be returned to the nearest Telecommunications Division Communications Shop for reuse.

12. Antenna hole plugs provided by the contractor/subcontractor shall be used to fill the hole left by removal of a vehicle antenna or spotlight.

13. During removal of equipment all vehicle functions shall be reconnected and rendered operational. Such functions include headlights, high beams, horn, rear lights, AM-FM radio, etc.

14. After removed equipment is disassembled from racks, boards, and brackets, it shall be packaged in a box clearly marked to identify the State Agency and vehicle from which it was removed, boxed and given to Agency personnel, unless other arrangements have been made.

15. Verify proper operation of the radio and or code-three equipment in all installations. The FCC check is included in the installation price. FCC check must be performed at the time of all mobile radio installations.

16. The Subcontractor will schedule the work for a single mobile installation/removal, within three working days after notification by the Agency/Contractor.

17. The contractor/subcontractor will complete all work within two working days for a single mobile installation/removal unless otherwise mutually agreed upon.

18. For unforeseen tasks not covered by the line items on the COST SHEET, additional work may be ordered at the Hourly Installation Rate (Labor). This work may only be authorized by Telecommunications Division personnel and the Contractor and will generally be limited to one (1) hour or less of labor.

19. Any one-line item constitutes a job order.

Upon State Agencies contact to Subcontractor to schedule work to be performed, Subcontractor shall contact Comradio, Inc. (CRE) at 1 (800) 927-2346 to inform CRE of date for Installation and/or Removal of Electronic Equipment and which State Agency is requesting work.

Subcontractor shall fax one signed TD-213 job ticket, Vehicle Check-In / Check-Out Form, Pre-Installation / Removal Checklist and Post Installation / Removal Checklist for each job completed during the day by 10AM the following day to (707) 445-9518 C/O: State Installation and Removal Project.

Note: The order number on the TD-213 must be referenced on all Subcontractor's forms for each job.

Subcontractor shall also mail the actual Signed TD-213's, Vehicle Check-In / Check-Out Form's, Pre-Installation / Removal Checklist's and Post Installation / Removal Checklist's for each job on a monthly basis (1st of each month mail the prior months paperwork for all jobs performed)

UNDERCOVER INSTALLATION STANDARD PRACTICE

1. GENERAL DESCRIPTION

This practice is for the undercover installation of a trunk mounted mobile radio and electronic siren/pa system. This standard has been established to provide uniformity of all undercover installations for the user agency(s). This practice shall be used for all undercover mobile installations for the following agencies:

- 1.1 Department of Justice
- 1.2 Department of Corrections
- 1.3 Other miscellaneous agencies

The physical location and orientation of all operator controls and switches shall be strictly followed. These parameters have been adopted as standards and have been developed as utilizing safety policies of the above agencies. This practice covers the undercover installation of mobile radios, including disguise antennas, disguise microphones and foot operated push-to-talk switches, and of Unitrol System 80K electronic sirens. These instructions shall be utilized for installing any or all of the above items.

2. OBJECTIVES

The procedures outlined in this practice have been developed with the following goals:

2.1 Undercover Installation

All controls, wires, speakers, antennas, etc. associated with the mobile radio and the electronic siren shall be installed into the vehicle in such a manner that it shall not be apparent from either outside or inside the vehicle, that a mobile radio system or electronic siren/pa system is installed (or transmitting).

2.2. Standardized Configuration

Each undercover radio installation shall be as physically identical as possible. It is important that all radio and siren controls (switched, jacks etc.) be installed and oriented in a uniform manner in all installations.

2.3 Interference Reductions

Due to the potential for electromagnetic interference of radios to (and from) the electronic equipment in late model vehicles, the radio and siren equipment, and, interconnect cables shall be installed into specific locations of the vehicles.

3. OUTLINE OF PROCEDURES

The installation instructions contained in this standard practice are provided in the following major phases:

3.1 Physical Installation

This section describes the physical installation of all mobile radio, electronic siren and peripheral equipment.

3.2 Cable/Wire Routing

This section describes the physical routing of all cables, wires, etc. for interconnection of the mobile radio, electronic siren and peripheral equipment.

3.3 Interconnection

This section describes the interconnection of all mobile radio, electronic siren and peripheral equipment.

3.4 Reassembly

This section notes details in reassembling the vehicle.

4. REFERENCES

- 4.1. Installation section of the instruction manual for the particular mobile radio.

5. INSTALLATION INSTRUCTIONS

5.1. Physical Installation

This section of the installation instructions is for the physical installation of all equipment and controls into the vehicle. These physical installation locations have been developed to provide uniformity in operation of all radios within the agency, and to minimize the possibility of radio frequency interference between the mobile radio, the electronic siren systems and the automobiles electronic and computer systems.

5.2 Mobile Radio

UNDERCOVER INSTALLATION STANDARD PRACTICE (Cont.)

5.2.1 The best location for trunk-mounted radio is on the passenger side of the vehicle as near to the vehicle body as possible. Radios to be installed in pickup trucks should be mounted on the wall directly behind the seat.

5.2.2 Radios mounted in the trunk shall be secured to a plywood platform permanently installed in the trunk. The radio shall be oriented to provide service access to the cables and latches (locks).

5.2.3 Radios installed in vehicles such as hatchbacks and utility vehicles will require special enclosures to disguise the mobile radio. These enclosures shall be provided locally by the Agency.

5.3 Radio Control Head

5.3.1 The radio control head shall be installed in one of the following locations

5.3.1.1 Inside a console between the driver and passenger seats.

5.3.1.2 Inside the glove compartment subject to agency approval.

5.3.2 Installation Steps:

5.3.2.1 Orient the front of the control head toward the driver's position and mount the trunion bracket using bolts or sheet metal screws. (Use of two sided tape or tie wraps is not acceptable).

5.3.2.2 Install the microphone hang-up clip within the same compartment and adjacent to the control head, located such that the microphone shall be easily accessible. Insure that the microphone cable does not interfere with other vehicle controls.

5.4 Antenna

5.4.1 The disguise antenna provided for this job is a near exact replacement for the 'Broadcast' antenna for the particular vehicle make, model and year, and is tuned to the primary operating frequency of the mobile radio. If the automobile has a windshield type broadcast radio antenna, the disguised antenna shall be installed in the fender similar to the location of antennas on other vehicles subject to agency approval.

5.4.2 A good ground is basic requirement for an efficient antenna system achieved by a solid connection between the bare metal on the fender or trunk and the antenna base. Spring clip 'nuts' are provided for antennas that utilize sheet metal screws mounting the antenna to the fender of the vehicle. These are to be used to prevent the screws from working loose. (Numerous RFI problems have been traced to poor antenna grounding).

5.4.2.1 All undercoating around the antenna hole must be scraped off to bare metal on the inside of the fender.

5.4.3 Remove the old broadcast radio antenna, leaving as much antenna lead as possible.

5.4.4 Install the new disguised antenna into the fender.

5.4.5 Align the antenna vertically before tightening in place.

5.4.6 Install the AM/FM VHF High-Band antenna coupler into a convenient location or behind the instrument panel.

5.5 Undercover Microphone

5.5.1 Placement of the microphone element is critical to the clarity and amplitude of the voice in undercover vehicle applications. The Department of Justice indicates that the microphone element is to be positioned directly in front of the driver, centered to the driver seat. This will ensure the driver's voice is concentrated towards the microphone and minimize noise.

5.5.1.1 All applications for other agencies that use undercover microphones are installed in the same manner unless indicated beforehand by the coordinator for that agency. There may be unusual applications where the microphone needs to be closer to center of the windshield to pick up voices of both driver and passenger.

5.5.2 With modern vehicles and headliner composition, it is fairly easy to route and secure the microphone element and cable with minimum of materials and labor. The rubber weather seal along the door frame can be pulled back and the microphone cable run along the channel over to the driver's side of the windshield. There is no need to pull down the headliner fully as the cable can be tucked into the headliner material as well.

5.5.3 To ensure the microphone stays in place, duct tape is used to secure the element and cable to the back side of the headliner.

5.5.4 Once the microphone has been installed and secured, the rubber weather seat can be put

UNDERCOVER INSTALLATION STANDARD PRACTICE (Cont.)

back in place along with any other molding or trim that has been disturbed.

5.5.5 Depending on the type of radio model used and the placement of the control head, it may or may not be practical to locate the "black box" close to the control head; it may need to be placed near the main body of the radio.

5.5.6. RF may intrude into the black box if it is installed in the glove box near a fender-mounted undercover antenna. This problem is exacerbated by the use of high power low-band radios and is difficult to remedy. Placing the black box as far from the antenna as possible helps significantly with resolution.

5.5.7. The radio hand held microphone must be modified so as to be "off" when an external push to talk switch is used with an undercover microphone system. The user agency needs to know this prior to installation so the microphone can be modified accordingly. Without the hand held microphone muted there will be reduced audio deviation and distortion of the transmitted signal.

5.5.7.1. The Kenwood microphones will require the addition of a transistor to mute their talk elements when not in use.

5.5.7.2. Other brands will have to be evaluated on an as-needed basis.

5.5.8. Mount the footswitch under the carpet near or on the left front wheel well. The switch should be easily accessible, requiring no unusual movement or foot placement for operation.

5.6 Electronic Siren Modules

5.6.1 The electronic siren control module shall be mounted in the trunk adjacent to the mobile radio. The siren driver shall be installed between the radiator and the front grill and shall be in accordance with the California Administrative Code, title 13. The output audio from the siren must be directed to the **front** of the vehicle

5.7 Switches/Jacks

5.7.1 The speaker mute switch and the siren control switch shall be mounted where the client wishes. DOJ has a switch pack that includes all switches and recorder jack. These are usually mounted in the center console.

5.7.2 Position the switches so that the direction of the toggle's movement is towards the driver of the vehicle, and the operation of the switches is as follows:

5.7.2.1 The mute switch shall disable the speaker when positioned away from the driver.

5.7.2.2 The siren switch shall disable the siren when positioned toward driver. The center position of the siren switch shall enable the siren "yelp" function through the vehicles horn button. The siren switch shall enable the siren "wail" function when positioned away from driver. (When the siren is operating in the "wail" function, the "yelp" function shall be activated by pressing the horn button).

5.7.3 The public address microphone jack for the siren shall be installed in the glove box (or center console) per the client's request. The installed location of the jack should allow the P.A. microphone to be easily connected, and accessible to the driver or to a passenger.

5.7.4 The tape recorder jack is located in the switch pack.

5.8 Mobile Radio Speaker

5.8.1 The mobile radio speaker is to be installed under (behind) the dashboard. In many instances, the only facility to mount the speaker is to use tie-wraps and secure the speaker to existing wires, braces, etc. Use caution with this practice to insure that the added weight of the speaker does not unplug cables, hoses or interfere with mechanical parts such as windshield wipers and heater/air conditioning systems. When selecting a location for the speaker, observe the following guidelines:

5.8.1.1 Install the speaker between the steering column and the left side of the automobile.

5.8.1.2 Orient the speaker face toward the driver as much as possible. (The sound becomes easily muffled when mounted under the dashboard).

5.8.1.3 In vehicles that have insulation material completely enclosing the under-side of the dashboard, a modification of this insulation material will be necessary.

5.8.1.4 When using tie-wraps, insure that the wires etc. used to mount the speaker is securely mounted to the vehicle and that it will not loosen from the added weight of the speaker.

UNDERCOVER INSTALLATION STANDARD PRACTICE (Cont.)

5.9 Cable/Wire Routing

5.9.1 This section describes the physical routing (through the vehicle) of the cables used for the radio and electronic siren systems. These instructions shall be closely followed in order to minimize interference with the vehicle's electronic systems.

5.9.1.1 Radio

5.9.1.1.1 Route both the positive and negative power leads (battery and ground) from the radio unit in the trunk to the ISO ground and fuse panel. Install rubber grommets into any new holes cut into vehicle.

* Connect power leads to an accessory terminal, not directly to the battery terminals.

5.9.1.1.2 Insure that the power cables do not run near the vehicle's electronic control module. High electrical currents (ac or dc) through these cables can induce destructive electromagnetic interference to electronic components in the vehicle such as the ECM (Engine Control Module).

5.9.1.2 Control Head Cable

5.9.1.2.1 Run the control cable along the path of the power leads from the trunk to the firewall. Route the cable under the dashboard to glove box. If the control head is mounted in the center console or under the seat, run the cable from the floor molding under the carpet to the control head location. Position the cable so that it does not run under the seat mounting rails. Be sure the cable is not visually obvious beneath the carpet.

5.9.1.3 Antenna Cable

5.9.1.3.1 Route the antenna cable from the antenna, under the dashboard to the location of the control cable and the radio power leads, and follow the radio cables into the trunk compartment, Install rubber grommets into any new holes cut into the vehicle.

5.9.1.4 Undercover Microphone Cables

5.9.1.4.1 Route the headliner microphone cable inside the vertical windshield molding down under the dashboard. Insure the cable is well secured. Do not bend or crush the `very' fragile miniature microphone element.

5.10 Siren Power and Control Cables

5.10.1 Route the siren cable from the trunk mounted electronic siren module to the switch following the path of the radio cables. Route the siren driver and power cables from the siren switch through the firewall to the siren driver mounted in front of the radiator.

5.11 Interconnection

5.11.1 Automobile manufacturers tests have revealed that all radio and electronic siren equipment should not utilize ground connections to any portion of the vehicle body or frame. All grounds shall be connected to the ISO ground system.

5.11.1.1 Antenna

5.11.1.1.1 Connect the antenna to the antenna coupler and the antenna coupler to the radio using the correct connector and using care to insure the antenna is connected to the correct socket on the coupler.

5.11.1.1.2 Install the broadcast radio antenna tip (provided with the antenna coupler) onto the old broadcast antenna lead and then connect this cable to the antenna coupler.

5.11.1.1.3 Firmly secure all connectors on the AM/FM antenna coupler. (Loose connections have often been diagnosed as the cause of interference problems).

5.11.1.2 Undercover Microphone

5.11.1.2.1 Connect the footswitch to the microphone processor using the provided two-wire cable. The cable connects to the footswitch at the top and lower right connectors (viewed facing connectors) and to the processor utilizing a Motorola (speaker) connector. Insure that the

UNDERCOVER INSTALLATION STANDARD PRACTICE (Cont.)

cable is hidden and well secured.

5.11.1.2.2 Connect the microphone processor cable to the radio options jack.

5.11.1.3 Audio Speaker

5.11.1.3.1 Connect the speaker and the 10 OHM-10 Watt load resistor to the speaker mute switch.

5.11.1.3.2 If no mute switch is to be utilized connect the speaker directly to the control head.

5.11.1.4 Tape Recorder Jack

5.11.1.4.1 Connect the tape record jack to the radio as shown in the DOJ installation print.

5.12 Reassembly

5.12.1 Secure all vehicle trim, hardware, carpets and wires and insure that the vehicle's controls and pedals are not obstructed nor their operation impeded by this installation. Reassemble the vehicle interior insuring all radio and siren components are completely disguised.

5.12.2 Insure that the headliner padding above the disguise microphone is not bulky or obvious. If it is, redistribute the padding to achieve a more normal appearance.

6. FUNCTIONAL TESTING

6.1 Disguised Microphone

6.1.1 Test the quality of communications using the new undercover microphone and the hand held microphone.

6.1.2 If excessive noise exists, the microphone may require extra padding or relocation to a new position. **Note: That the microphone gain control is not to be adjusted to compensate for road noise.

6.2 Tape Record Jack

6.2.1 Connect an audio voltmeter (AC) to the tape record jack and insure that adequate audio is present on the tape record jack. This audio level should be within the range of 0.1 to 0.7 volts AC.

6.3 Speaker Mute Switch

6.3.1 Unsquench the mobile radio receiver and check to insure that the speaker is completely muted when the switch is toggled toward the front of the vehicle.

6.4 Disguise Antenna

6.4.1 Use a thru-line wattmeter to check the forward and reflected power of the antenna system.

6.5. Electronic Siren/PA System

6.5.1 Toggle the siren switch toward the driver and check to insure that the siren is completely disabled and that the vehicle horn works properly.

6.5.2 Toggle the siren switch to position 2 and check to insure that the siren 'yelps' when the vehicle horn button is pressed.

6.5.3 Toggle the siren switch away from driver and check to insure that the siren 'wails' continuously, except that it 'yelps' when the vehicle horn button is pressed.

6.5.4 Plug the PA system microphone into the PA jack and test to insure that the PA system operates satisfactorily.

7. MOBILE RADIO

7.1 Perform normal checkout and FCC tests on the mobile radio using the radio palm mic and the undercover mic.

UNDERCOVER MOBILE RADIO AND ELECTRONIC SIREN/PA SYSTEM REMOVAL STANDARD PRACTICE

1. GENERAL

This practice is for the removal of undercover mobile radio and/or electronic siren/pa equipment.

2. OBJECTIVES

The objective of this practice is to define what equipment is to be removed from a vehicle and what equipment is to be left in a vehicle. This practice also defines procedures for recording the condition of the radio and accessory equipment.

3. EQUIPMENT TO BE REMOVED

3.1 The following mobile radio equipment and accessories are to be removed from the vehicle:

- 3.1.1 Mobile Radio
- 3.1.2 Control Head
- 3.1.3 Control Cable
- 3.1.4 Speaker
- 3.1.5 Speaker Mute Switch
- 3.1.6 Power Cable
- 3.1.7 Hand Microphone
- 3.1.8 Undercover Microphone Processor Box
- 3.1.9 Foot Operated Push-To-Talk Switch
- 3.1.10 Tape Record Jack

3.2 The following electronic siren/PA system equipment and accessories are to be removed from the vehicle:

- 3.2.1 Electronic Siren Control Unit
- 3.2.2 Siren Driver
- 3.2.3 Siren Control Switch
- 3.2.4 Siren Control Cable
- 3.2.5 Siren Power Cable

3.3 The following items are not re-usable or are not cost effective to remove, and shall be left in the vehicle unless otherwise instructed:

- 3.3.1 Disguised Antenna
- 3.3.2 Headliner Microphone Element
- 3.3.3 Antenna Coupler

4. JOB INSTRUCTIONS

4.1 Before removing this equipment, make an operational test of the mobile radio, the electronic siren, and the various accessories associated with both. Also, discuss the operational condition of the radio with the agency and note on a `RED-TAG' any deficiencies found.

4.2 Inform the local state communications shop of any malfunctions.

4.3 Remove all mobile radio and electronic siren equipment as listed above, ensure that the vehicle functions are restored to its original condition (AM-FM broadcast receiver is connected to the disguise antenna, vehicle horn is connected, etc.).

5. DISPOSITION OF EQUIPMENT

5.1 If the equipment is to be re-installed at the same location, re-install the radio in accordance with the particular installation instructions.

5.2 If the equipment is not to be re-installed, return all items to the agency. Advise the agency of any items that are missing from the radio or the siren, and notify them of any `Red-Tagged' equipment deficiencies.

MOBILE RADIO INSTALLATION STANDARDS AND PRACTICES

1. General

1.1 This section describes methods required for satisfactory installation of a vehicular two-way radio in a standard (non-undercover) configuration.

1.2 Contact the state public safety communications shop if equipment repairs are needed.

2. Control Head and Accessories

2.1 Safety — Items requiring operator access, such as a microphone and control head shall be located so that the operator's attention to driving is not compromised. Driver's access to vehicle controls shall not, be hampered by the location of radio components. All sharp edges or burrs shall be removed during installation. All installed items must be located away from the air bag deployment area.

2.2 Reliability - Situations which may cause a premature malfunction shall be avoided or corrected during installation, such as: poorly fitting pins, cracked insulation on any wire and fatigued metals. All nuts and sheet metal screws shall have star washers under them. Holes in sheet metal for sheet metal screws shall be punched, rather than drilled, with the appropriately sized punch. Avoid placing wire connections under carpet where moisture can cause corrosion.

2.3 Functional — The operation of vehicle accessories shall not be hampered by radio components and the operation of the radio shall not be hampered by vehicle accessories. The angle at which the equipment is oriented should provide the most comfortable operation.

Microphones should be located so they are not exposed excessively to the sun.

2.4 Maintenance Accessibility — To minimize time spent in future maintenance, all radio equipment should be located so that no vehicle assemblies require removal for access. If held in place by bolts where nuts are difficult to remove or replace, nut-serts shall be used.

2.5 Appearance — Control heads and accessories shall be cleaned to provide a unit with which the operator will feel comfortable. Obvious tool marks on surfaces visible to the operator or passengers are to be avoided. Equipment mounting should be symmetrical, level, flush, in—line, or aesthetically oriented, whichever applies.

3. Cables

3.1 Safety — All cabling should be routed so that it cannot hamper the operator's access to vehicle controls. Cabling should not restrict any passenger's legroom. All power cabling should be protected by fuse or circuit breaker to prevent electrical fire and equipment damage. If cables must be run by a metal edge which may cause injury during future maintenance, the edge should be bent over, or covered with a plastic jacket, or covered with RTV (silicon rubber compound).

3.2 Reliability - Cabling shall be bundled when appropriate and the length of each lead shall preclude its acting as strain relief for other leads (unless specifically designed to do so). All leads to the control head shall be bundled to a point where each lead leaving the bundle can be provided adequate support. Plastic ties or equivalent shall be used to contain bundles and to fix leads to supports — plastic tape is not to be used for this purpose. All cabling should be diverted away from exhaust pipes or metal heated during vehicle operation to a temperature which may cause insulation failure. Cable terminations should be clean and sized appropriately for the receiving connector. Only those terminating devices used widely in two-way radio or approved by Telecommunications Division should be used. Wire to wire connections, other than crimp connections, should be soldered and protected with heat-shrink insulation. Cables run under seats should not be subjected to squeezing or squashing. Metal edges which may puncture insulation should be treated to prevent damage. Power cables shall not be terminated on battery posts. Star washers shall be used under all bolt heads where cables terminate.

3.3 Maintenance Accessibility — Cabling to control heads or T/R units should be of sufficient length to permit adequate movement of those units when maintenance is required. The bundling technique described in 3.2 should be done in such a way that removing a cable tie, for purposes of maintenance, releases all wires to the unit being moved. Cabling under the hood should be located to:

- a) prevent insulation failure due to heat or abrasion
- b) prevent accumulation of oil and dirt on terminations
- c) allow easy inspection for preventive maintenance
- d) minimize interference with vehicle maintenance in engine area

MOBILE RADIO INSTALLATION STANDARDS AND PRACTICES (Cont.)

3.4 Appearance - Cabling under the dash should not hang down below the edge of the dash. Cabling should not be routed over floor mats. Cabling in the trunk area should not reach out into otherwise usable storage area. Where the T/R unit is in a compartment, cabling should store neatly and be bundled.

4. T/R Unit

4.1 Safety Before installing, inspect the area and avoid drilling into gas tank or other critical parts of the vehicle.

4.2 Reliability —The T/R unit tray or base plate should be mounted on ½” plywood. Star washers should be used under nuts, bolts, and sheet metal screws. Control and antenna connectors should take a minimum of abuse from articles which may be placed in their vicinity during vehicle use. The lowest portion of a trunk or storage well should not be used for T/R unit location, to minimize the possibility of water damage.

4.3 Functional — A minimum of storage space should be consumed by the T/R unit or its brackets. Mounting hardware should be located at least one inch away from vehicle fluid lines.

4.4 Maintenance Accessibility — The effort to unlock and remove the T/R unit should be minimal. The unit should be in a position or be capable of being moved to a position where test equipment can conveniently be used.

4.5 Appearance — The T/R unit should be symmetrical, level, in—line, flush, or aesthetically oriented, whichever applies.

5. Antennas

5.1 Safety — The base of a mobile whip should not be located where it is contacted during normal movement into or out of the vehicle (injury or torn clothing may result). A radiating element should not be located where RF burns may result during normal use of the vehicle.

5.2 Reliability — An antenna should be located on a surface which is flat over the area of the antenna base and sealed against weather with a non-hardening silicon grease. Transmission lines should be run and stored in a manner which precludes sharp bends or kinks. Antenna terminations should be installed with the jacket fully inserted into the connector body and so that strain relief is provided by the jacket and braid — not the center conductor. Whenever possible, paint or rust should be removed to insure a satisfactory ground for RF. If a temporary antenna mount is used, it should be secured so that it is not dislodged by wind blast or normal movement of people around the vehicle.

5.3 Functional — The radiating element should be located with the maximum possible clearance between it and body metal, consistent with a neat appearance. Some vehicles have special equipment requiring non-standard antenna installations; the antenna should be mounted to that structure providing the largest ground plane, least restrictions to radiated signal, and most consistent RF ground return to the T/R unit. Radiating patterns are modified substantially by metal which is in—line with the direction of radiation, so care must be exercised to provide a good ground plane and clear horizontal path for radiated power.

5.4 Maintenance Accessibility — There should be no RF connections located behind panels or in blind spots other than where the transmission line terminates on the antenna base.

5.5 Appearance — Antennas should be located carefully. When located in the center, the exact center should be selected. Antenna rods should be perfectly vertical. Headliners should not be torn or otherwise damaged. Transmission lines should be concealed within the body structure whenever practical. There should be no visible tool marks on vehicle.

6. Summary

6.1 Attempting to achieve total compliance with all factors in this section is commendable — but in practice, almost impossible. Cost to the customers is an important consideration, so there must be an awareness of time spent as each job progresses. Compromise must be made accordingly to keep charges to a reasonable value. When compromise is necessary due to physical limitations, priorities may be given to the various factors described in the following order:

1. Safety
2. Reliability
3. Functional
4. Maintenance Accessibility

MOBILE RADIO INSTALLATION STANDARDS AND PRACTICES (Cont.)

5. Appearance

Some agencies have documented guidelines concerning mobile installations. These guidelines must be observed except with prior approval of Telecommunications Division

Radio installations are often driven by one person. Discussion with this person about his/her desires with hardware mounting helps ensure satisfaction with the completed package. However, some ideas may not be technically practical or may conflict with the above guidelines and an explanation to the customer is helpful. The technician's professional judgment regarding technically correct practices and cost effectiveness is important.

PURPOSE AND PROCEDURE OF TD 213 FORM

Introduction:

Form TD-213 is the Agency authorization to have installation/removal work performed on mobile equipment. This form can be used to authorize work to be done either by the contractor shop or a state communications shop.

Purpose:

The purpose of the TD-213 form is to authorize selected tasks through a menu of choices, and provide a means of billing the Agency for each task performed.

General Information:

- Mobile Install/Removal items listed on the TD-213 are at a flat rate.
- Installations/Removals not performed within ten miles of the contractor facility are subject to travel charges
- Any Agency may use the Statewide Mobile Radio Installation and Removal Contract.

Procedure:

All Agencies are required to contact the local State communications shop or supervisor's office for an install/removal appointment. If the state shop is unable to perform the install/removal the work can be taken to the subcontractor with Telecommunications Division approval through a completed form TD-213. In this case the Agency should contact the Contractor or Subcontractor to:

1. Discuss equipment to be installed or removed.
2. Schedule the appointment
3. Provide the completed and signed TD-213 form prior to start of work.

Instructions:

Below is the proper procedure on filling out the TD-213.

1. Enter contractor information (A)

John Doe's Install Shop
111 Install Way
Sacramento CA, 95814
(916) 123-4567

2. Enter Agency Information (B)

3. Enter Agency Billing Code (C)

4. Enter year, make, model of vehicle (D)

5. Enter license plate number of vehicle (E)

6. Enter equipment to be installed/ removed (F)

- Type
- Manufacturer
- Model
- Telecommunications Service number
- Agency property number

7. Check the boxes indicating equipment that will be installed/removed (G)

8. Agency representative signs name (H).

9. Telecommunications Division representative signs or prints name (I)

Vehicle Check-In Check-Out Form

TD-213 Form# _____

Date In: _____

Date Out: _____

Agency User Code: _____

Agency Billing Code: _____

Customer Quality Assurance Checklist

	IN	OUT		IN	OUT
<i>Headlights</i>			AM/FM Radio		
Low Beams			Air Conditioner		
High Beams			Heater		
<i>Turn Signals</i>			Cigarette Lighter		
Left			Interior Lights		
Right			Back-Up Lights		
Flashers			Power Locks		
Brake Lights			Power Mirrors		
Power Windows			Cell Phone		
Trunk Lock					
Vehicle Alarm					
Horn					

VEHICLE BODY DAMAGE: _____

COMMENTS: _____

Pre-Installation and Client Requests Form

TD-213 Form# _____

Year: _____

Make: _____

Model: _____

License / VIN #: _____

Color: _____

Circle One:

INSTALL

REMOVAL

Equipment	Location
Control Head	
Microphone	
Antenna	
Radio Speaker	
RF Package	
Wig-Wag	
Backflash	
Siren Speaker	
Control Switch	

SPECIAL INSTRUCTIONS: _____

If for any reason work cannot be completed as written, work will stop and customer will be consulted.

Signature

Date

COMMENTS: _____

If you have any questions or concerns regarding any work or paperwork requirements please contact us at:



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2416 Broadway
Eureka, Ca. 95501
Tel. (800) 92-RADIO (800-927-2346)
Alt. Tel. (707) 445-9661
Fax. (707) 445-9518