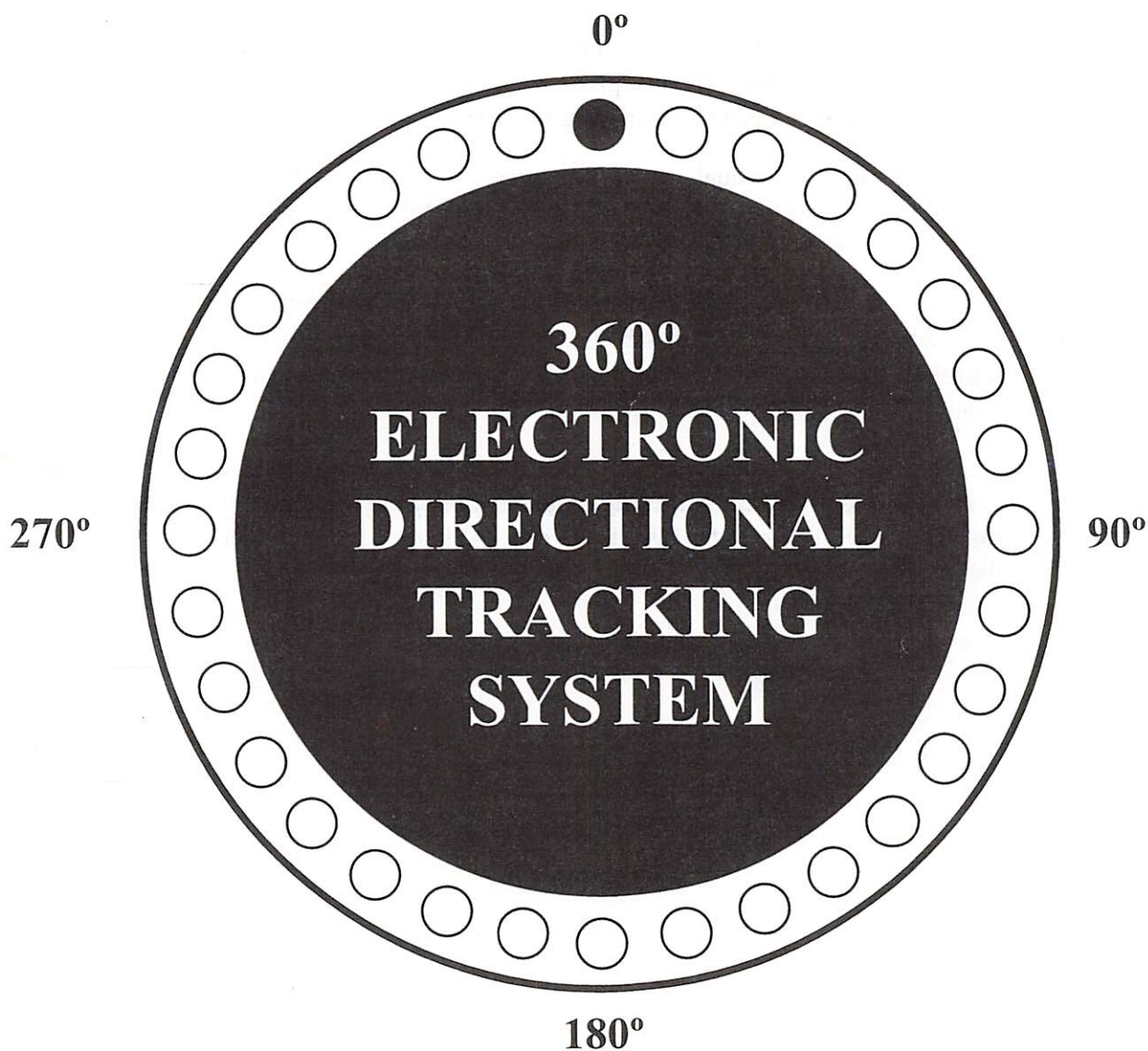


INSTRUCTION MANUAL BIRD DOG® 360XT



Audio Intelligence Devices, Inc.

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INTRODUCTION

AID is the world's largest manufacturer of electronic surveillance devices. We are proud to be your chosen supplier of intelligence equipment. Our products are available exclusively to certified law enforcement personnel, and are precisely engineered and carefully manufactured to serve your professional needs.

This instruction manual explains the correct way to operate the device for optimal performance. To insure reliability, the operator should study this manual before using the equipment.

If there are any questions concerning the proper operation or application of any of our products, please contact your personal regional sales representative or our factory for immediate assistance.

Courses in the use and techniques of intelligence equipment are available at our *National Intelligence Academy*, the law enforcement training division of *AID*. Please call (954) 418-1440 for further course information.

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INTRODUCTION

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INTRODUCTION - BIRD DOG® 360XT SYSTEM

The Bird Dog® 360XT Electronic Directional Tracking System has been developed as a valuable extension to visual surveillance techniques and provides a full 360° indication of the position of the subject transmitter. Through the use of a small transmitter which is easily attached to the subject vehicle, and a Direction Finding (DF) receiver located in the tracking vehicle, the Bird Dog® System provides consistent and accurate directional information of the subject. The direction of the tracking transmitter is displayed by a circular array of light emitting diodes on the 360° Direction Finding Indicator. A three-digit numerical display of the relative bearing of the transmitter is also provided. Additionally, the system provides an indication of the subject vehicle's motion or stationary status and a single digit numerical display of the relative signal strength of transmitter Radio Frequency (RF) radiation. The Bird Dog® System provides an effective method of maintaining constant surveillance of a subject vehicle from a discrete distance with a minimum of personnel and without the necessity of continuous visual contact, and its accompanying risk of compromise.

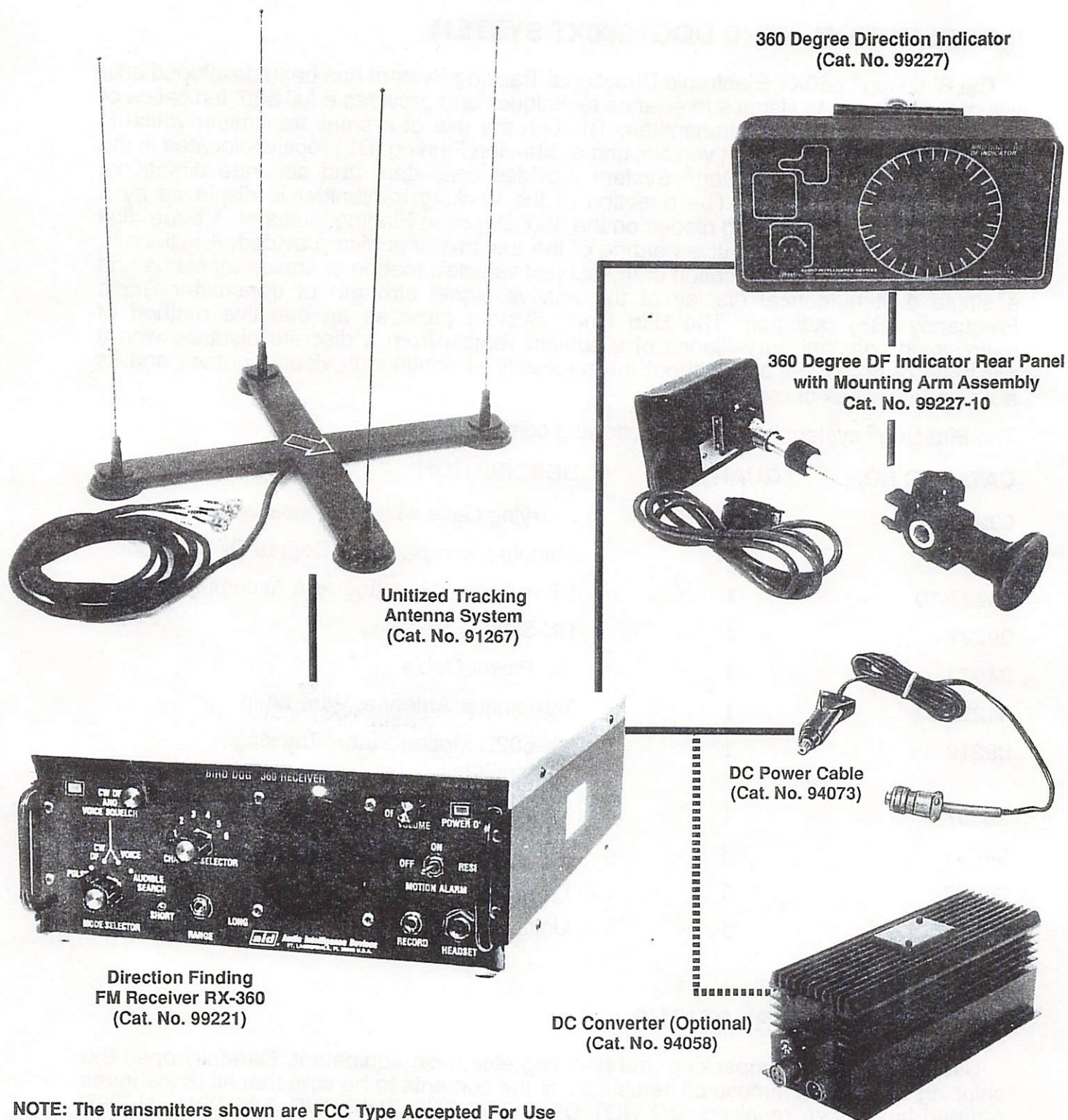
The Bird Dog® system includes the following components:

CATALOG NO.	QUANTITY	DESCRIPTION
99225-01	1	Carrying Case with foam inserts
99227	1	Thin-line, compact 360 Degree DF Indicator
99227-10	1	DF Indicator Mounting Arm Assembly
99221	1	RX-360 DF Receiver
94073	1	DC Power Cable
91224-01	1	Transmitter Antenna, Wire Whip
99219	1	TX-602D Motion Status Tracking Transmitter
96307	1	Scraper for Transmitter Installation
94081	3	9 Volt Alkaline Transmitter Batteries
96306	1	Phillips Screwdriver
91267	1	Unitized Tracking Antenna System

UNPACKING INSTRUCTIONS

Use **caution** when unpacking and handling electronic equipment. Carefully open the shipping carton and remove all items. Check the contents to be sure that all of the items ordered have been received. **DO NOT DESTROY THE SHIPPING CARTON. IN THE EVENT IT SHOULD BECOME NECESSARY TO RETURN THE ITEM TO aid FOR ANY REASON, IT IS BEST RETURNED IN THE ORIGINAL CARTON.** Inspect the equipment thoroughly as soon as possible after receiving the shipment. If any part of the equipment exhibits evidence of damage in shipment, **REPORT THE EXTENT OF DAMAGE TO THE TRANSPORTATION COMPANY IMMEDIATELY.**

BIRD DOG® 360XT SYSTEM COMPONENTS



NOTE: The transmitters shown are FCC Type Accepted For Use
Under Part 90, Section 90.19(f), FCC Rules and Regulations

Figure 1. Bird Dog® 360XT Receiving Components.

BIRD DOG® SYSTEM TRANSMITTERS AND OPTIONAL EQUIPMENT

NOTE: MS = Motion Sensing ST = Static Transmitter

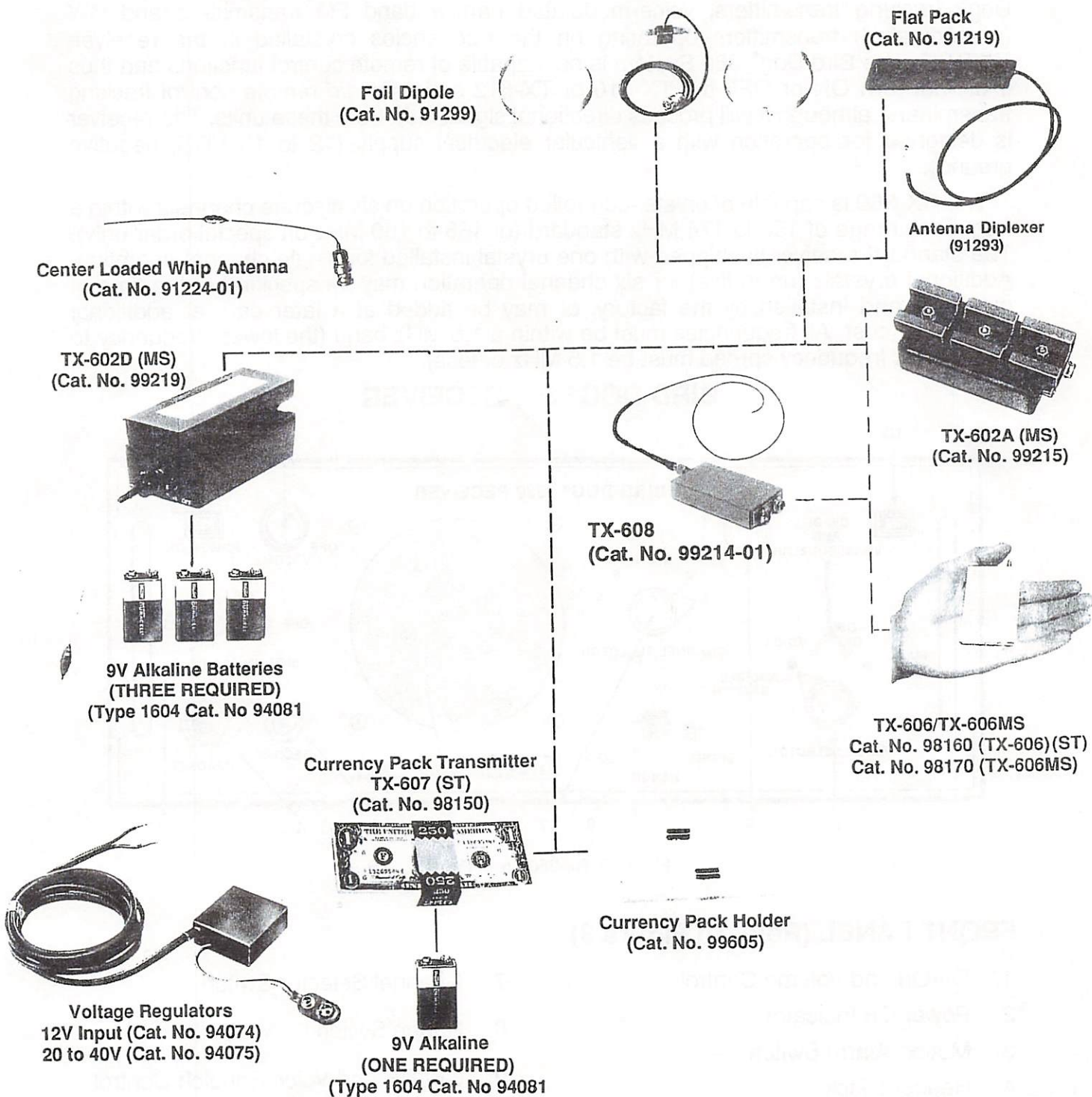


Figure 2. Bird Dog® 360 Transmitters and Optional Accessories.

DIRECTION FINDING, FM RECEIVER MODEL RX-360 (Cat. No. 99221)

The RX-360 is a direction finding, motion sensing receiver compatible with all *aid* Bird Dog® tracking transmitters, voice-modulated narrow band FM transmitters and CW (unmodulated) transmitters operating on the frequencies crystallized in the receiver. **NOTICE:** The Bird Dog® 360 System is not capable of remote control functions and thus it will not turn ON or OFF the TX-610 or TX-612 series of *aid* remote control tracking transmitters, although it will process directional signal data from these units. The receiver is designed for operation with a vehicular electrical supply (12 to 15 VDC, negative ground).

The RX-360 is capable of crystal-controlled operation on six discrete channels within a frequency range of 150 to 174 MHz standard (or 136 to 150 MHz on special order only). The standard receiver is shipped with one crystal installed for single-channel operation. Additional crystals (up to five) for six channel operation may be specified at the time of purchase and installed by the factory, or may be added at a later date at additional installation cost. All frequencies must be within a 1.5 MHz band (the lowest frequency to the highest frequency spread must be 1.5 MHz or less).

BIRD DOG® 360 RECEIVER

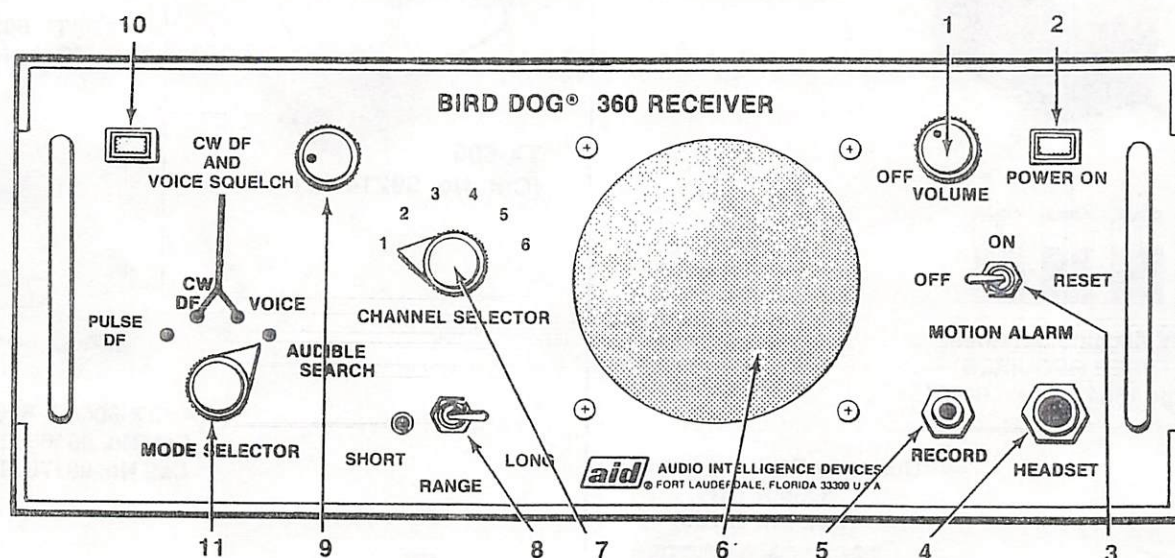


Figure 3. RX-360 Front Panel.

FRONT PANEL (Refer to Figure 3)

- | | |
|------------------------------|---------------------------------------|
| 1. Off/On and Volume Control | 7. Channel Selector Switch |
| 2. Power On Indicator | 8. Range Switch |
| 3. Motion Alarm Switch | 9. CW DF And Voice Squelch Control |
| 4. Headset Jack | 10. CW DF And Voice Squelch Indicator |
| 5. Record Jack | 11. Mode Selector Switch |
| 6. Speaker | |

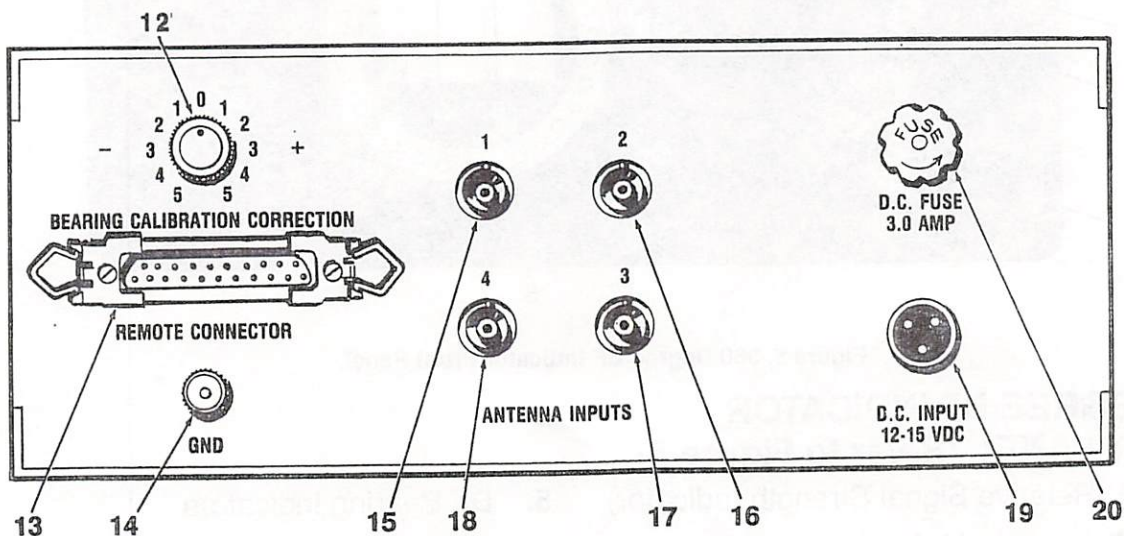


Figure 4. RX-360 Rear Panel

REAR PANEL (Refer to Figure 4).

- | | |
|--|-------------------------------------|
| 12. Bearing Calibration Correction Control | 17. Antenna Connector No. 3 |
| 13. Remote Connector (See Note 1) | 18. Antenna Connector No. 4 |
| 14. Ground | 19. DC Input 12-15 VDC (See Note 2) |
| 15. Antenna Connector No. 1 | 20. DC Fuse 3.0 Amp |
| 16. Antenna Connector No. 2 | |

NOTE 1: The cable from 360 Degree DF Indicator connects to the Remote Connector on the rear panel of the RX-360.

NOTE 2: The RX-360 is designed to operate with vehicle electrical systems of 12 to 15 VDC, negative ground. The receiver will not function properly when connected to cigarette lighters with internal current limiting resistors. If the receiver is to be operated from aircraft, boat or other electrical systems with 24 to 32 VDC, it will be necessary to use a DC Converter with a 24 to 32 VDC Input and with a 12 to 15 VDC Output (Cat. No. 94058).

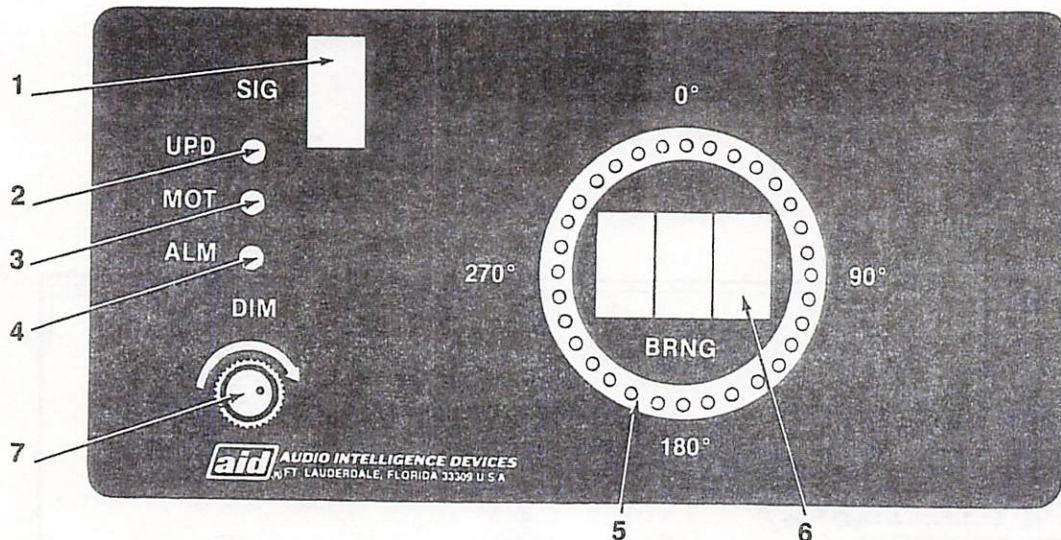


Figure 5. 360 Degree DF Indicator Front Panel.

360 DEGREE DF INDICATOR FRONT PANEL (Refer to Figure 5)

- | | |
|---|---------------------------------|
| 1. SIG (Relative Signal Strength Indicator) | 5. DF Bearing Indicators |
| 2. UPD (Updated Information Indicator) | 6. Three Digit Bearing Display |
| 3. MOT (Motion Information Indicator) | 7. DIM (Display Dimmer Control) |
| 4. ALM (Motion Status Alarm Indicator) | |

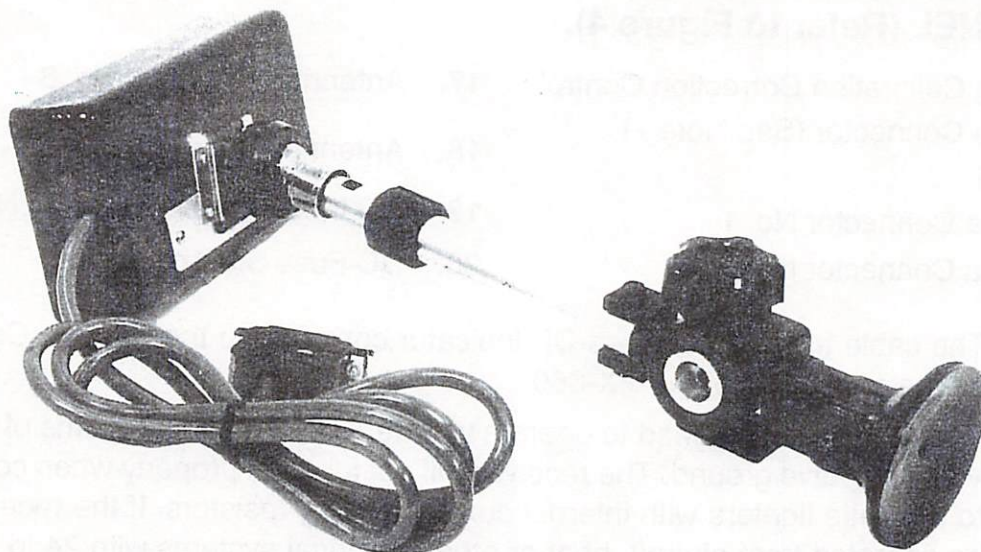


Figure 6. 360 Degree DF Indicator Rear Panel with Mounting Arm Assembly.

The DF Indicator Mounting Arm Assembly allows the operator to mount the DF Indicator to the end of the mounting arm, and attach the mounting arm suction cup to the windshield. The telescoping and swiveling features of the mounting arm allows the operator to place the DF Indicator at the optimum viewing and operating position.

STANDARD TRACKING TRANSMITTERS

NOTE: The new Bird Dog® 360XT System includes a TX-602D transmitter as Standard Equipment. Please confirm which transmitter you will use before proceeding.

MODEL TX-602D TRACKING TRANSMITTER

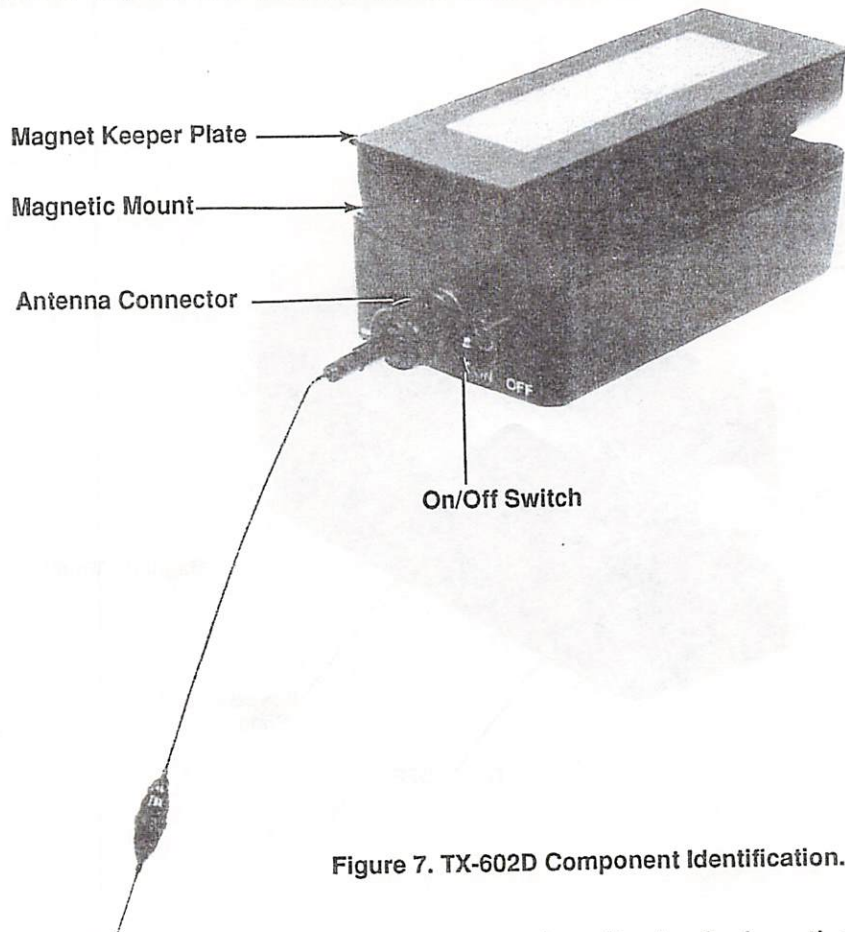


Figure 7. TX-602D Component Identification.

NOTE: The Magnet Keeper Plate must be attached when the transmitter is not in use.

Model TX-602D is the new standard tracking transmitter supplied with all Bird Dog® Systems. It transmits the tracking and motion status information at an RF power output of 1 Watt (pulse train transmission).

Model TX-602D has a heavy duty weatherproof case with a strong alnico magnet for fast attachment to the subject vehicle. It is powered by three internal nine-volt alkaline batteries (type 1604) and has a battery life of approximately six days of continuous operation (factory fresh batteries @ 68°F [20°C] ambient temperature). The unit includes an external OFF-ON switch and a center-loaded wire whip Antenna.

For complete Operating Instructions for the TX-602D, including the switch-selectable pulse interval capabilities, please reference the appropriate Manual supplied with the device and included in the Bird Dog® 360XT System.

MODEL TX-602A TRACKING TRANSMITTER

NOTICE: The tracking transmitter used in Models TX-602A, TX-602B described herein is Type Accepted under F.C.C. Identifier B348PRTX602D

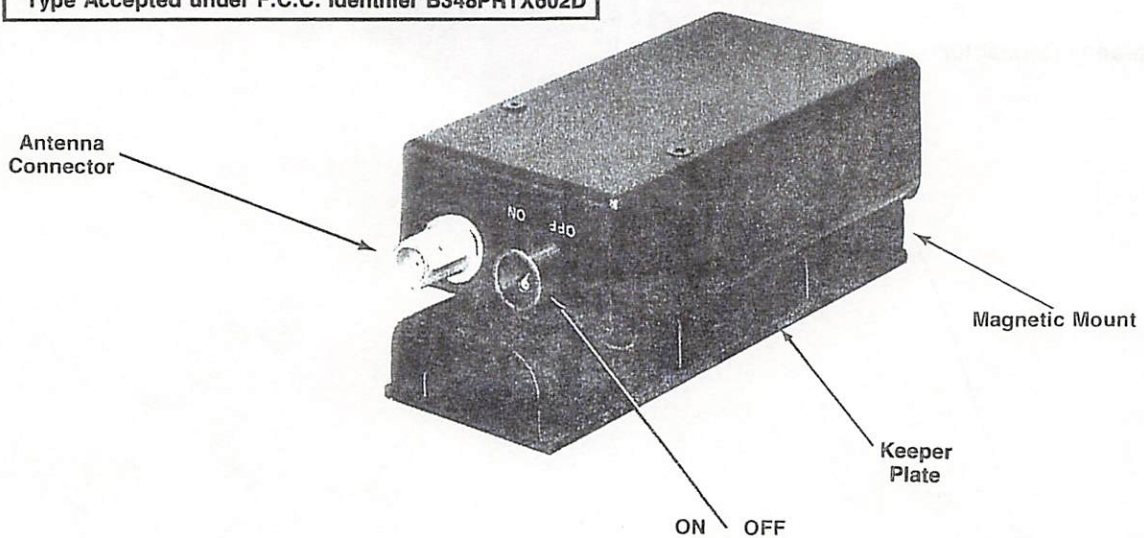


Figure 7. TX-602A Component Identification.

NOTE: The Magnet Keeper Plate must be attached when the transmitter is not in use.

Model TX-602A is an effective tracking transmitter compatible with all Bird Dog® systems. It transmits the tracking and motion status information at an RF power output of 1 Watt (pulse train transmission).

Model TX-602A has a heavy duty weatherproof case with a strong ceramic magnet for fast attachment to the subject vehicle. It is powered by three internal nine-volt alkaline batteries (type 1604) and has a battery life of approximately six days of continuous operation (factory fresh batteries @ 68°F [20°C] ambient temperature). The unit includes a protected external OFF-ON switch and a center-loaded wire whip Antenna.

BIRD DOG® INSTALLATION PROCEDURE

DIRECTION FINDING RECEIVER MODEL RX-360

1. Place the supplied Antenna System on the roof of the vehicle (illustrated below in Figure 8). Make sure that the arrow symbol on the antenna system points toward the front of the vehicle. **Antenna placement is critical to assure that the Bird Dog® performs accurately.**

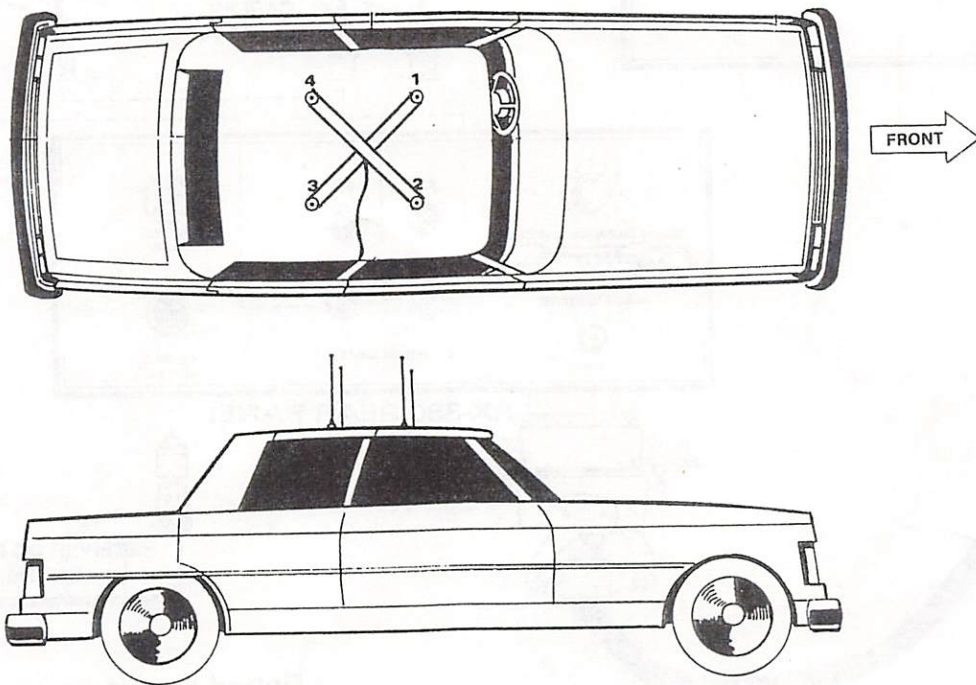


Figure 8. Antenna Placement.

Route the cables from the antenna system through the window of the vehicle to the RX-360 location. Be careful not to crush the antenna system cable in the vehicle's doors or windows.

2. Route the antenna cable to the rear of the RX-360 receiver and connect to the antenna jacks. Be sure that the Antenna No. 1 cable is connected to Antenna Jack No. 1; Antenna No. 2 cable to Antenna Jack No. 2; Antenna No. 3 cable to Antenna Jack No. 3 and Antenna No. 4 cable to Antenna Jack No. 4. See Figure 9.

3. Connect the Interconnect Cable from the DF Indicator to the REMOTE Connector on the rear panel of the RX-360.

360 DEGREE DF INDICATOR

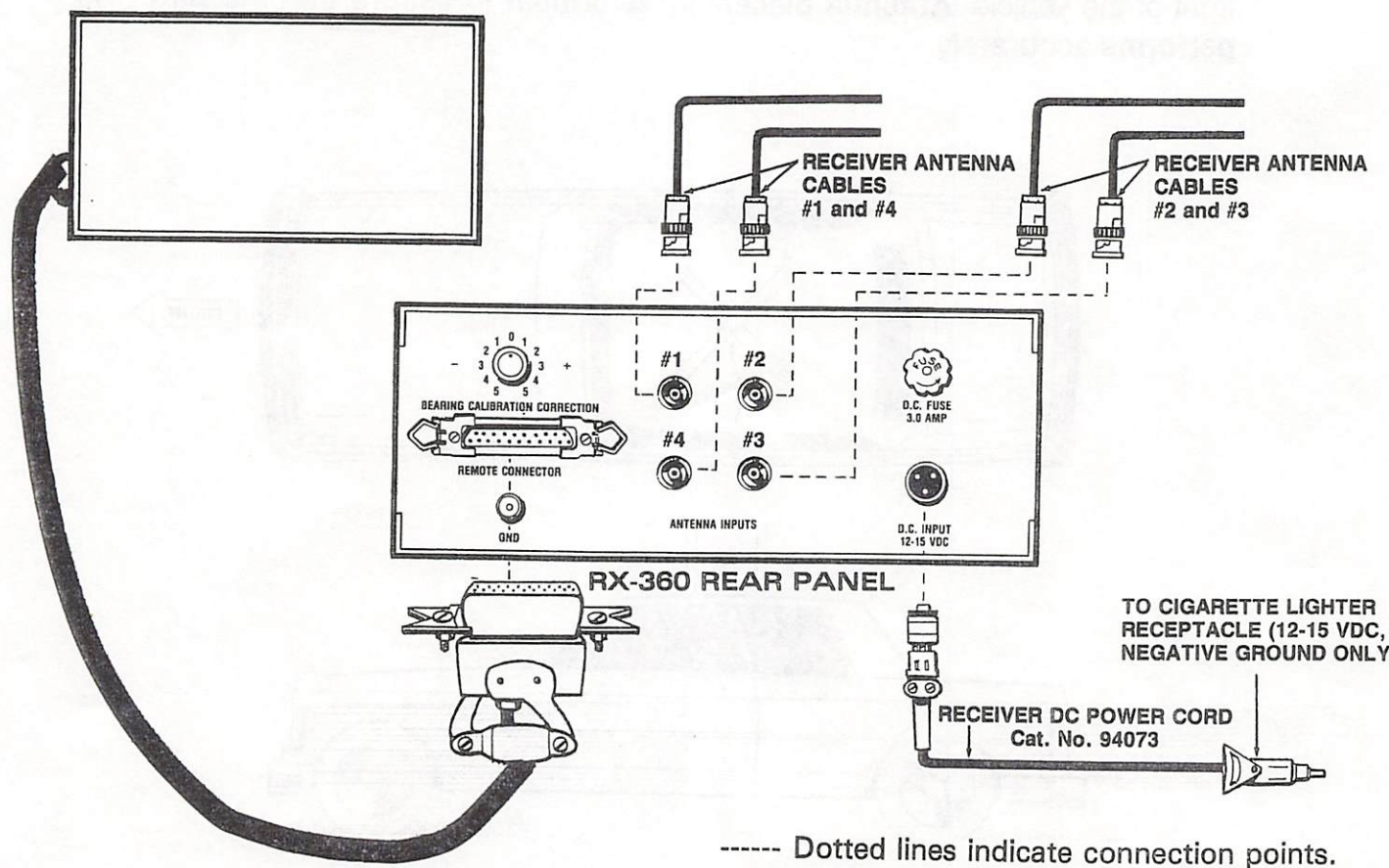


Figure 9. RX-360 Receiver and 360 Degree DF Indicator.

Attach the appropriate end of the supplied DC Power Cord to the rear of the RX-360. Connect the other end of the Cord to the vehicle's cigarette lighter receptacle.

NOTE: The system will not operate properly when connected to cigarette lighters with internal current limiting resistors. If the system is to be used in an Aircraft or Boat with a 24 to 32 VDC electrical supply, a DC to DC Power Adapter (24 to 32 VDC input, 12-15 VDC output) must be used (Cat. No. 94058). **Always turn the receiver OFF before starting the vehicle.**

TRANSMITTER INSTALLATION

CAUTION: Never operate the transmitter with the Antenna disconnected, as serious damage to the internal electronics may result. Do not bend or change the length of the transmitter Antenna, as reduced range and shortened battery life will result.

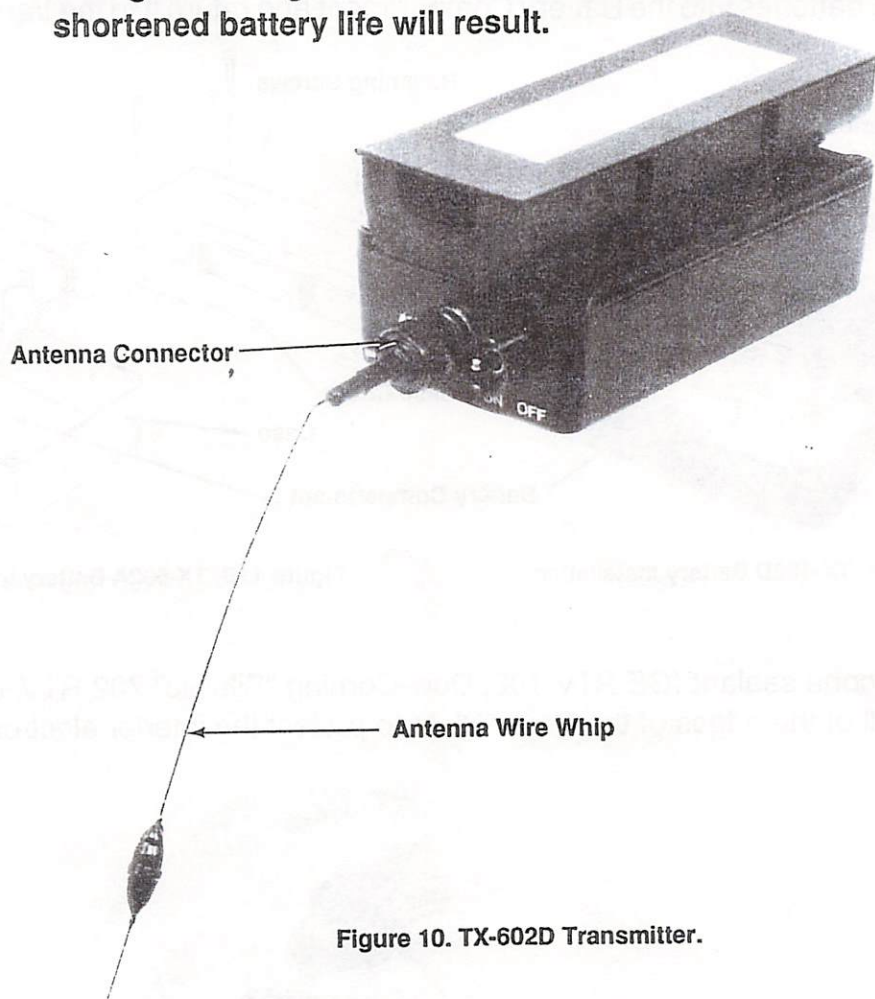


Figure 10. TX-602D Transmitter.

Connect the Antenna to the transmitter's Antenna Connector, as shown in Figure 10. Secure the Antenna in place by turning the connector clockwise. The position of the Antenna may be changed by (1) rotating the Connector counterclockwise (2) rotating the Antenna by grasping it at the base where it comes out of the Connector and (3) rotating the Connector counterclockwise. **NEVER** bend the wire portion of the Antenna.

CAUTION: Do not allow the transmitter's Magnetic Mount to remain unattached to its Keeper Plate or to a magnetic surface for long periods of time.

TRANSMITTER BATTERY INSTALLATION AND REPLACEMENT

Fresh batteries should be installed in the transmitter prior to each use. Three nine-volt alkaline batteries (type 1604) are required. To install fresh batteries, proceed as follows:

1. Remove the four Retaining Screws located at each corner of the transmitter Case and lift the Case Cover free (see Figure 11 on the following page).

2. Remove each of the depleted batteries. Discard all depleted batteries immediately.
3. Snap the batteries into the Battery Compartment and return it to the transmitter Case.

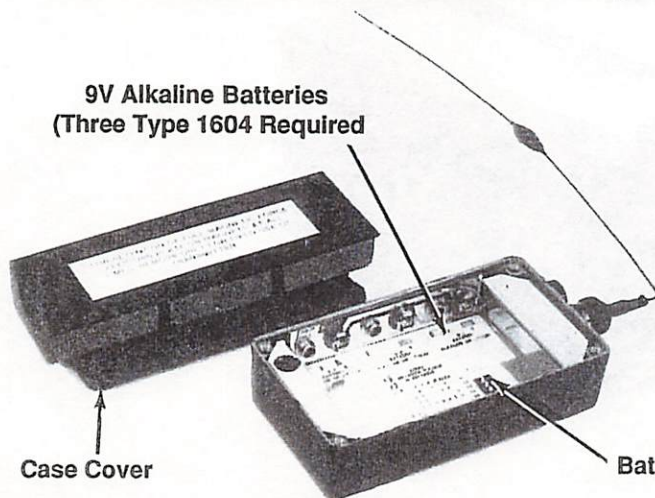


Figure 11. TX-602D Battery Installation.

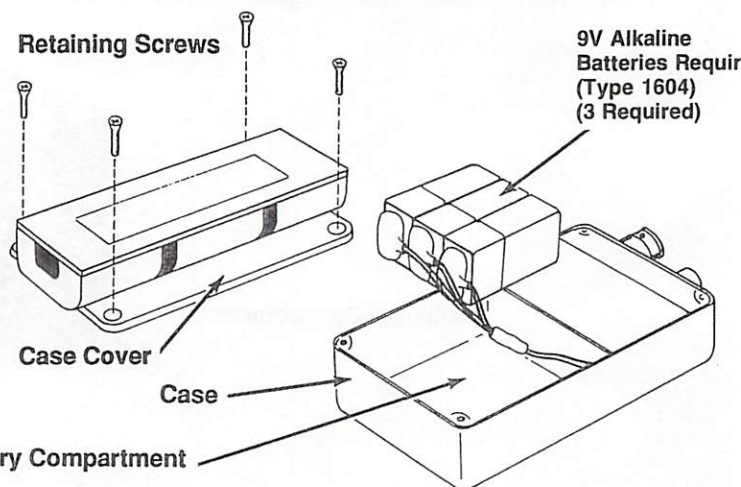


Figure 11B. TX-602A Battery Installation

4. Apply silicone sealant (GE RTV 108, Dow-Corning "Silastic" 732 RTV, or equivalent) around all of the edges of the Cover Plate to protect the interior electronics.



Figure 12. Applying Silicone Sealant to a Tracking Transmitter Case.

5. Replace the Case Cover and secure with the four retaining screws removed in Step 1.

CAUTION: Always apply silicone sealant to the Case Cover before placing the Cover onto the Case. This prevents moisture from contaminating the internal electronics and preserves the important weatherproof characteristics of the transmitter.

TRACKING TRANSMITTER INSTALLATION: ATTACHMENT TO THE TARGET'S VEHICLE

IMPORTANT:

- (1) BE SURE TO TURN THE TX-602D ON.**
- (2) REMOVE THE KEEPER PLATE BEFORE INSTALLING THE TRANSMITTER.**
- (3) DO NOT INSTALL THE TRANSMITTER DIRECTLY ONTO THE FUEL TANK.**

The transmitter may be attached to any substantial metal area in various locations on the vehicle. A good location to attach the transmitter is onto the section of the vehicle's chassis between either of the rear wheelwells and the fuel tank. This area affords good accessibility and provides excellent concealment. Additionally, this area provides relatively good transmitter signal propagation.

Be sure that the Antenna does not touch any metallic object. The Antenna must be oriented in free space to be effective.

Be sure the location chosen for transmitter attachment is metallic, clean, free of grease, undercoating and etc. A putty knife is useful for scraping the underbody location prior to attaching a tracking transmitter to the metal surface.

NOTE: Any residue falling to the street from scraping should be removed from the area to avoid suspicion or possible detection by the suspect.

When the transmitter is to be operated in ambient temperatures above 45°F (7°C), it is important that the transmitter be positioned at least six (6) inches away from the exhaust system, which reaches high temperatures that could damage electronic components.

When the transmitter is to be operated in ambient temperatures below 45°F (7°C), the battery life may be extended by placing the transmitter in close proximity, but not touching, the exhaust system. **BE CAREFUL** that the Antenna is always at least three (3) inches away from all of the exhaust system's components.

EXAMPLES OF CORRECT TRANSMITTER INSTALLATION

The TX-602D is relatively insensitive to placement on a vehicle. Changing the magnet's position from horizontal to vertical may be required to change the motion sensitivity of the transmitter.

The placement of the TX-602A or TX-602B Motion Sensing Transmitters on a target vehicle is critical for the proper operation of the motion-sensing circuitry. Normally, the transmitter should be located so that its center line is horizontal to the ground plane. This placement results in maximum motion-sensing sensitivity.

It is important to remember that the Antenna on the TX-602D, TX-602A and TX-602B **MUST ALWAYS** be oriented in free space to be effective. This means that the transmitter's Antenna **MUST NOT** be in contact with any part of the automobile

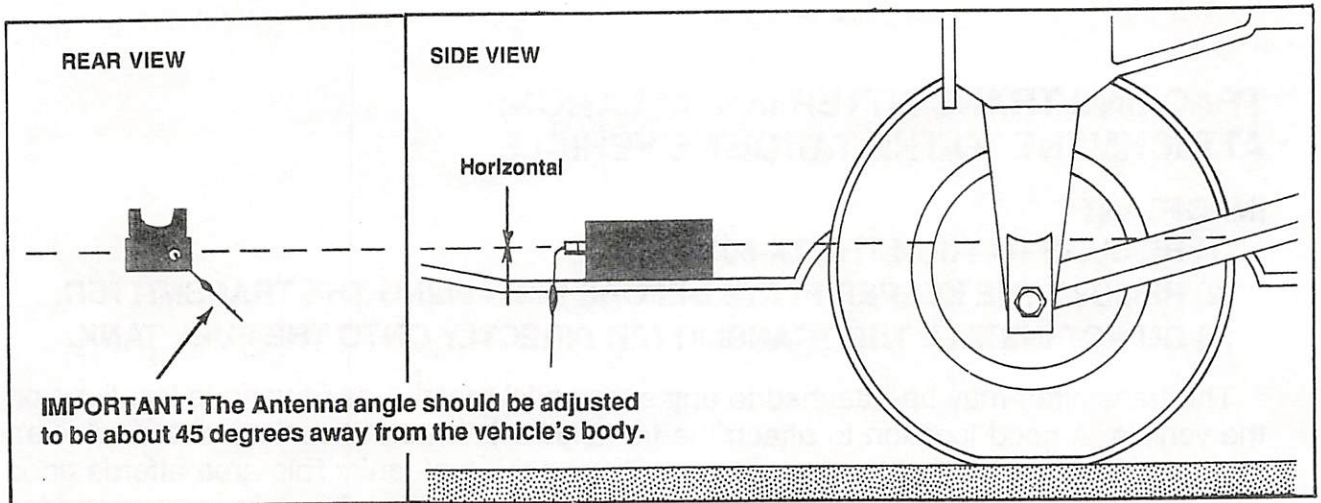


Figure 13. Correct Transmitter Installation.

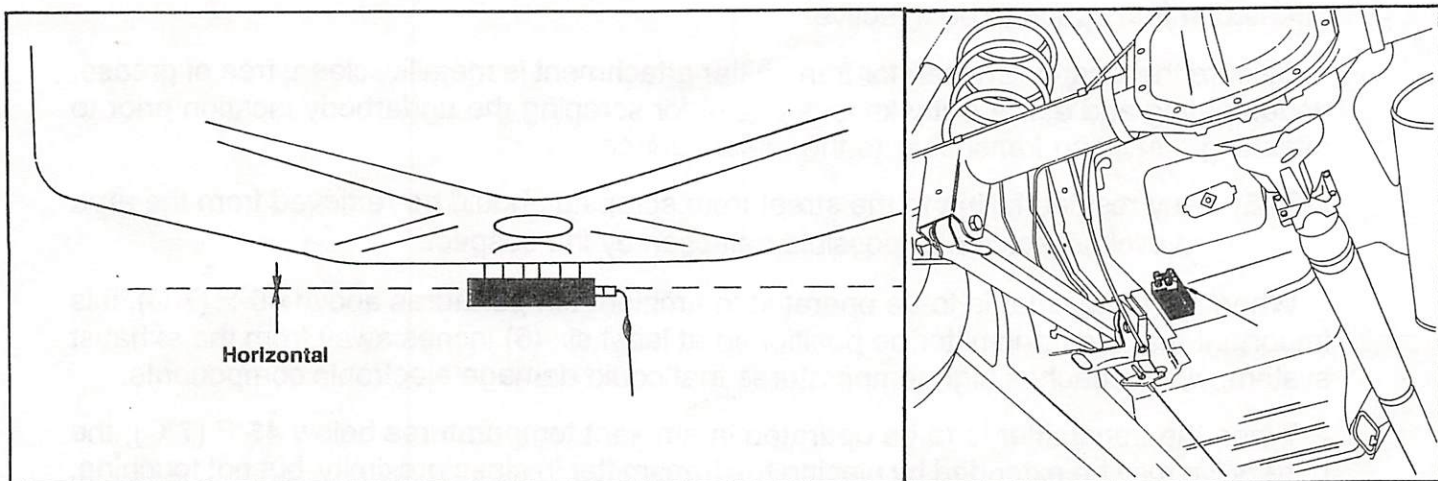


Figure 14. Transmitter Installed on Rear Underside of an Automobile Chassis

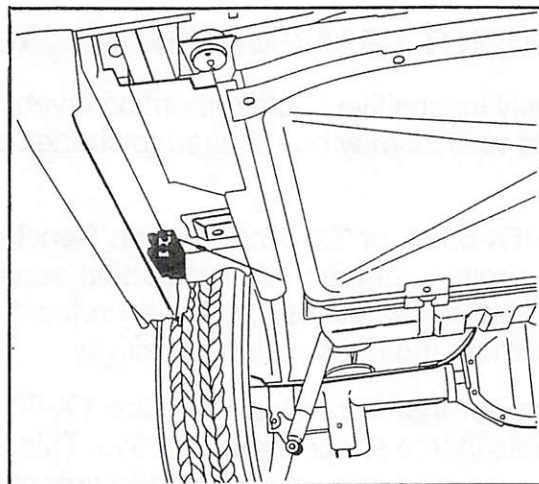


Figure 15. Transmitter installed on inside of Left Rear Fender.

There may be instances when it is necessary to reduce the sensitivity. This is especially important when the TX-602A/B transmitter is installed on light vehicles. To reduce the sensitivity, tilt the Antenna-end of the transmitter downward *slightly* to an angle of 12° to 20° from the horizontal plane. If motion indications are not received when the vehicle is moving, more sensitivity is required. The transmitter should therefore be repositioned to be closer to the horizontal ground plane. See Figure 16 below.

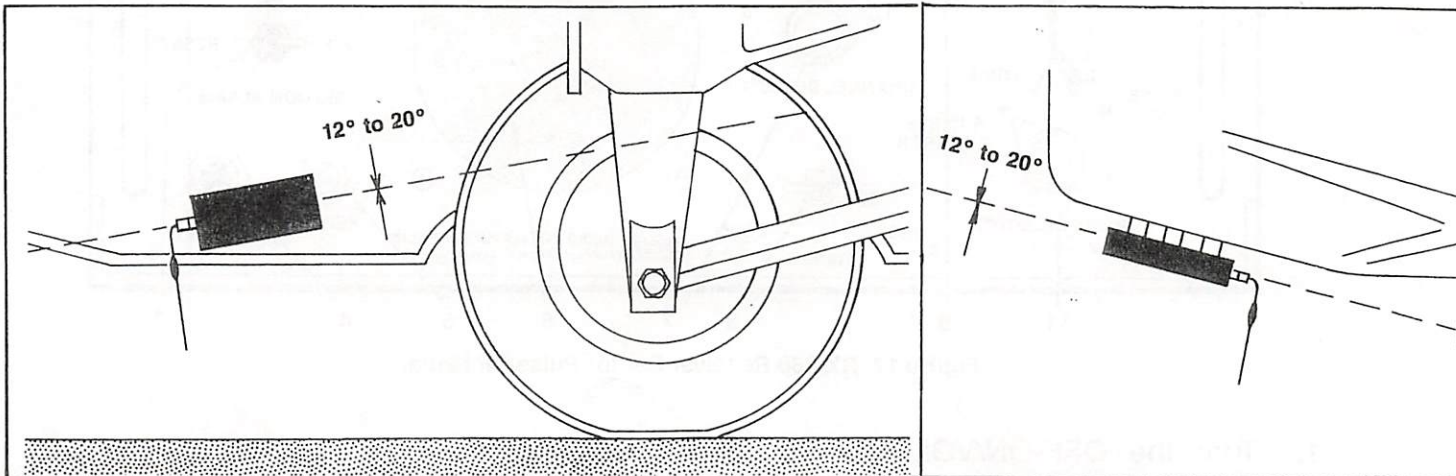


Figure 16. Tipping the TX-602A/B Transmitter Downward Slightly to Reduce Sensitivity.

FALSE MOTION INDICATIONS

Depending upon the terrain encountered and the maneuvers of the target vehicle, a false motion indication may sometimes result, even though the transmitter is properly positioned. For example, when the target vehicle is traveling up and down steep inclines, motion indications may cease. Additionally, if the target vehicle goes into a long sweeping turn, such as found on expressway entrance and exit ramps, the motion indications may cease, but only for the duration of the target vehicle's turn.

BIRD DOG® 360 RECEIVER OPERATION MODES

The RX-360 has four selectable modes of operation: PULSE DF, CW DF, VOICE and AUDIBLE SEARCH. In the PULSE DF mode, the system will track the pulse transmissions of the Bird Dog® Tracking Transmitters. In the CW DF mode the system will track CW (unmodulated) transmitters, pulsed FM transmitters or voice modulated narrow band FM transmitters. In the VOICE mode, the system can be used to monitor or to record FM narrow band transmitters. In the AUDIBLE SEARCH mode, which is designed to assist in relocating lost signals, the receiver is compatible with tracking transmitters, pulsed FM transmitters, CW transmitters and voice modulated FM transmitters.

The receiver may be switched between modes while operating. For example, switching between modes while tracking a voice transmitter may help the operator in tracking the transmitter. However, the DF indicator will not display direction or signal strength information in the VOICE or AUDIBLE SEARCH modes.

BIRD DOG® 360 RECEIVER PULSE DF MODE OPERATION

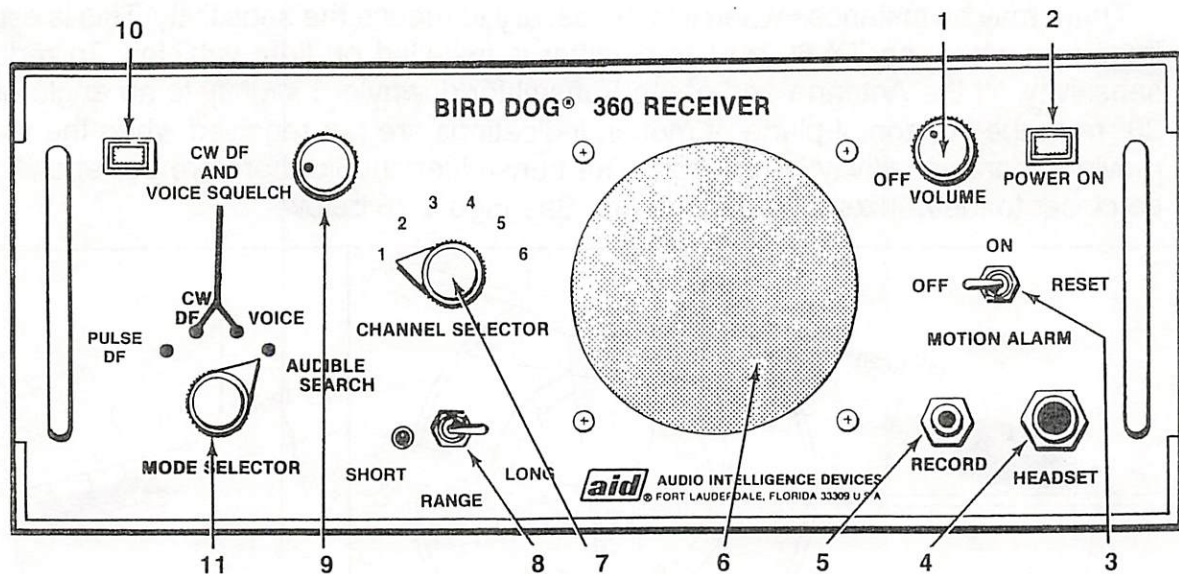


Figure 17. RX-360 Receiver Set for Pulse DF Mode.

1. Turn the OFF-ON/VOLUME Control clockwise to approximately the 10 o'clock position to turn the DC power ON and to set the initial VOLUME level for the SPEAKER output. The POWER ON Indicator will illuminate.
2. Place the MODE SELECTOR Switch in the PULSE DF (Direction Finding) position.
3. Set the CHANNEL SELECTOR to the proper operating channel frequency in accordance with the operating channel frequency of the transmitter.
4. Set the RANGE switch to the LONG position.
5. When the Bird Dog® 360 Receiver is within the range of the tracking transmitter, the DF Indicator will respond as follows:
 - a. The UPD (Update) Indicator will "blink" when a pulse is transmitted from the transmitter.
 - b. The appropriate LED in the CIRCULAR BEARING display will indicate the relative bearing of the transmitter.
 - c. The three-digit display will indicate the relative bearing of the transmitter.
 - d. The SIGNAL STRENGTH Indicator will display the Relative Signal Strength.
 - e. A "beeping" sound will be heard from the SPEAKER. This sound will occur each time the UPD Indicator "blinks"

NOTE: Should the tracking signal be interrupted for a period of six seconds (approximately), all Signal Acquisition Indicators will extinguish.

OPERATOR FUNCTIONS IN THE PULSE DF MODE

In Step 4, the RANGE Switch was placed in the LONG position. This setting allows the RX-360 to operate at its maximum sensitivity. As the tracking vehicle nears the target vehicle, the signal from the transmitter will become stronger. This will be indicated by the Signal Strength Indicator (SIG) increasing its reading to a larger number.

The SIG Indicator will display a number between 0 and 9. As the transmitter's signal becomes stronger, the SIG Indicator will approach or reach number 9.

When the SIG Indicator reaches number 9, switching the RANGE Switch to SHORT will lower the receiver's sensitivity and lower the SIG Indicator number. This allows the receiver to operate in close proximity to the transmitter without being overloaded by a strong signal. The SIG Indicator setting also allows the experienced operator to estimate the relative distance to the transmitter (in the LONG range, the SIG Indicator would continuously read number 9 when the receiver is close to the transmitter).

MOTION STATUS

The Model RX-360 DF FM Receiver is compatible with all Bird Dog® tracking transmitters. However, the motion-sensing circuitry, which permits the operator to monitor the motion status of a target vehicle, is only functional when motion-sensing transmitters are installed on the vehicle or the object to be tracked and located.

The three-position toggle-switched MOTION ALARM, located on the front panel of the RX-360, is operational only in the PULSE DF mode. In the OFF position, the MOTION ALARM circuitry is disabled and there will be no indication of motion status change about the tracking transmitter. However, if the transmitter is in motion, the MOTION INDICATOR (MOT) on the 360 Degree DF Indicator will be illuminated.

In the ON position, the MOTION ALARM circuitry is armed and will be seeking a change in the motion status of the transmitter. If the transmitter is in motion, the MOTION ALARM circuitry will be seeking a status change to stationary. If the transmitter is stationary, it will be seeking a status change to motion.

Once a motion status change is detected, and the ALARM INDICATOR (ALM) on the front panel of the 360 Degree DF Indicator illuminates (along with an AUDIBLE ALARM from the SPEAKER), it will remain illuminated and the AUDIBLE ALARM will continue until the operator moves the toggle switch to RESET and back to ON. Moving the Motion Alarm Switch to RESET momentarily and then back to ON rearms the MOTION ALARM circuitry to seek a motion status change opposite to the last one detected.

It is recommended that the ALARM function be turned ON only when it is anticipated that the target vehicle will remain stationary for a long period of time (over night). When the target vehicle motion begins again, the ALARM will sound, alerting the tracking vehicle operator of the resumption of activity.

SYSTEM CHECK OUT AND PRACTICE RUN

1. (a) Install the tracking transmitter on the target vehicle, following the procedures described previously in the section titled, "TRANSMITTER ATTACHMENT TO TARGET VEHICLE." (b) Turn the tracking transmitter ON.
2. Be sure that the antenna system is properly installed on the tracking vehicle. The arrow symbol on the antenna system must point toward the front of the vehicle.
 - a. The four Antennas form a square, precisely one/fourth wavelength apart.
 - b. Be sure the four Antenna cables are each connected to their correct Antenna Connectors: Antenna Cable number 1 should be attached to Antenna Connector number 1; Antenna Cable number 2 should be attached to Antenna Connector number 2, and etc. **CAUTION:** Do not crush the Antenna Cables in the doors or windows of the tracking vehicle.
4. Be sure the DC Power Cable is connected between the DC INPUT Jack on the back of the receiver and the vehicle's cigarette lighter receptacle. **Turn the RX-360 OFF.**

CAUTION: The cigarette lighter must be a 12-15 VDC, negative ground unit, clean and free of corrosion and residue. The system will not operate properly when connected to cigarette lighters with internal current limiting resistors.

5. Start the engine on the tracking vehicle and move into a position directly behind the target's vehicle. **Turn the RX-360 ON.** Point the front end of the tracking vehicle toward the target's vehicle from a distance of about 100 feet (30 meters).
6. Set the receiver's controls for operation in the PULSE DF mode (refer to Figure 17).

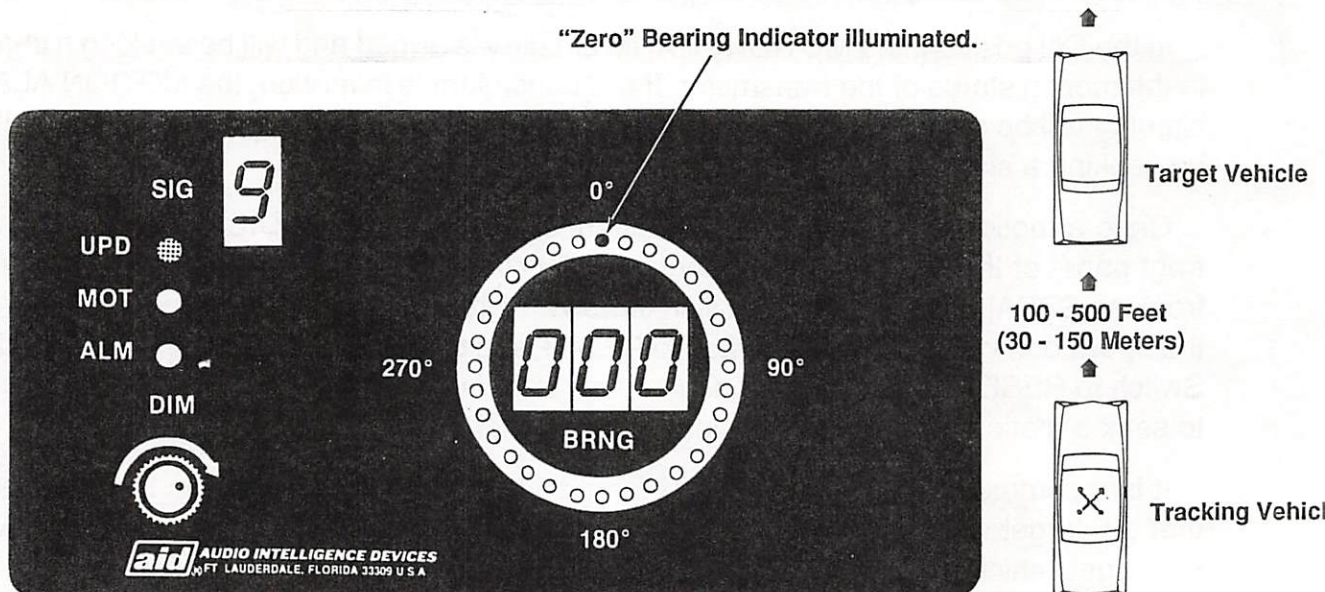


Figure 18. "Zero" Bearing Conditions.

The following Signal Acquisition Indicators will be displayed:

- a. The update (UPD) information indicator will "blink" at two second intervals (approximately) in response to the tracking signal from the stationary transmitter.
 - b. The Relative Signal Strength (SIG) Indicator will display a high number with the presence of a very strong signal. It may be necessary to place the RANGE Switch in the SHORT position.
7. The DF Indicator should appear as in Figure 18 on the previous page. Use the BEARING CALIBRATION CORRECTION Control to set the BRNG display to read "000".
 8. Move the tracking vehicle so that the target vehicle is to the right of the tracking vehicle. Maintain 100 feet (30 meters) of distance between the two vehicles. The DF Indicator should appear as Figure 19 below (090 ± 10 degrees).

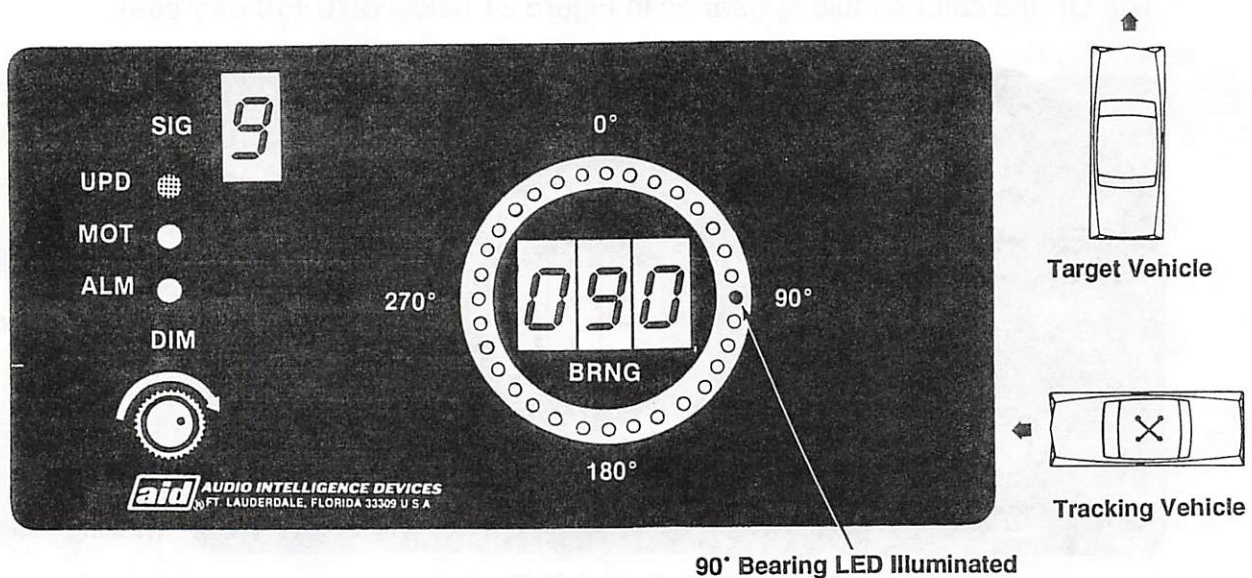


Figure 19. 90° Bearing Conditions

9. Move the tracking vehicle so that it is pointing away from the target vehicle. The DF Indicator should appear as in Figure 20 on the following page (180 ± 10 degrees).

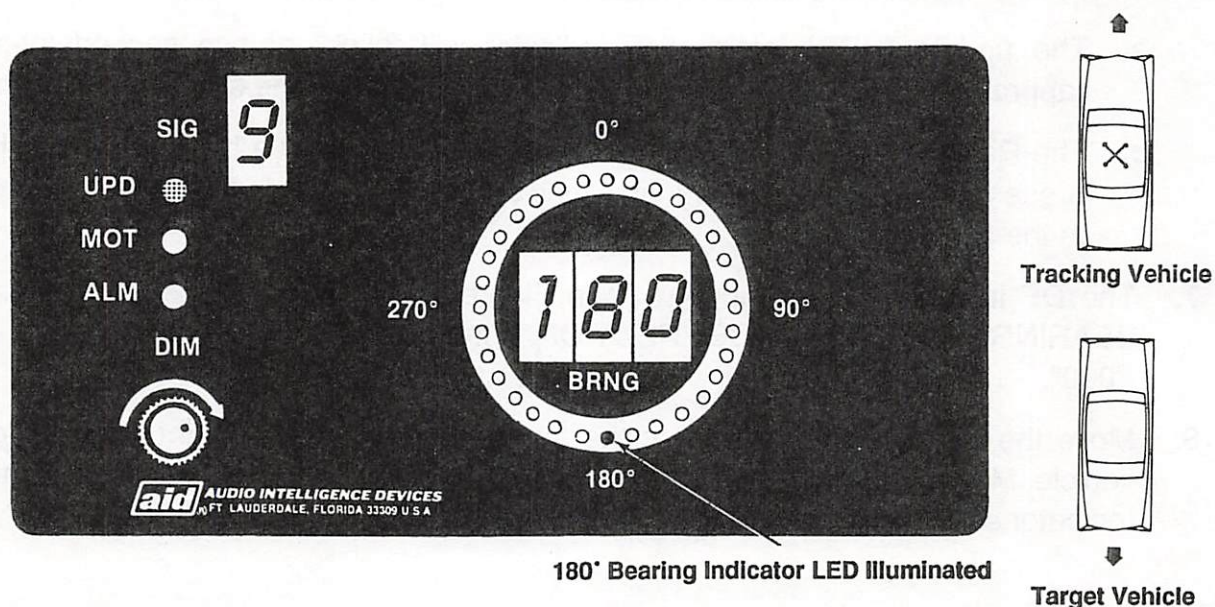


Figure 20. 180° Bearing Conditions

10. Move the tracking vehicle so that the target vehicle is to the left of the tracking vehicle. The DF Indicator should appear as in Figure 21 below (270 ± 10 degrees).

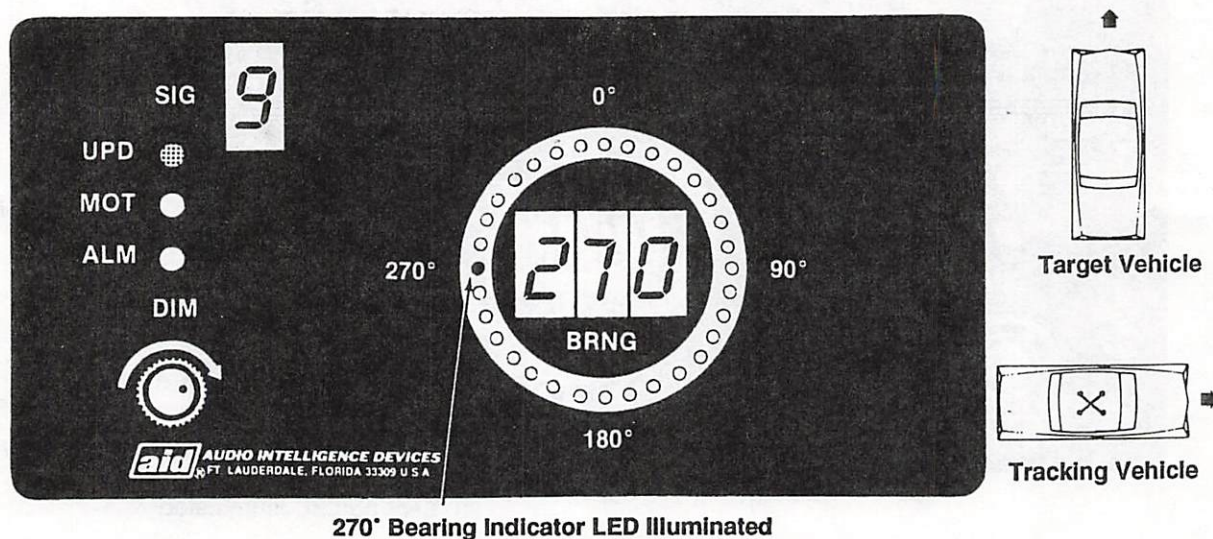


Figure 21. 270° Bearing Conditions

This procedure completes the System Check Out. If the system fails to operate as described, please check all component connections. If the Antennas are not properly connected, the Display will show False Bearing indications. Refer to the OPERATIONAL CHECK LIST and TROUBLESHOOTING sections of this manual.

BIRD DOG®360 RECEIVER CW DF MODE OPERATION

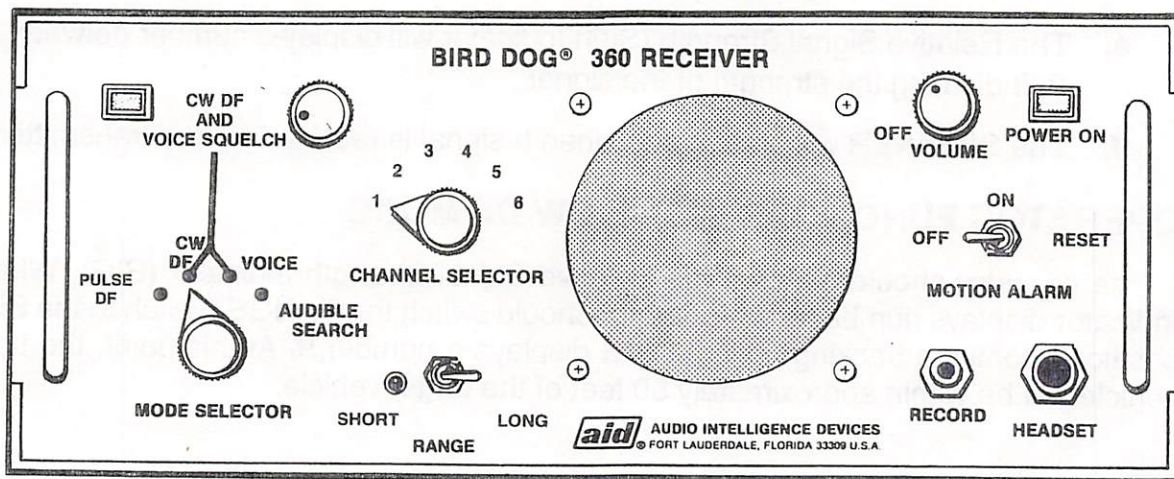


Figure 22. RX-360 Receiver Set for CW DF Mode.

1. Rotate the OFF-ON/VOLUME Control clockwise to approximately the 10 o'clock position to turn the DC power ON and to set the initial VOLUME level for the SPEAKER output. The POWER ON Indicator will illuminate.
2. Set the MODE SELECTOR Switch to the CW DF position.
3. Set the RANGE Switch to the LONG position.
4. Set the CHANNEL SELECTOR to match the transmitter's operating channel and wait until there is no transmission, or set the CHANNEL SELECTOR Switch to a crystallized but unused channel, and adjust the VOICE CW SQUELCH as follows:
 - a. Observe the VOICE CW SQUELCH Indicator and rotate the VOICE CW SQUELCH Control counterclockwise until the Indicator illuminates and a "rushing" sound is heard from the SPEAKER.
 - b. Slowly rotate the VOICE CW SQUELCH Control clockwise until the Indicator Extinguishes and the "rushing" noise quiets. DO NOT over-adjust. Be sure the Control is rotated clockwise JUST FAR ENOUGH to extinguish the Indicator.
5. If the CHANNEL SELECTOR was switched to an unused channel, return it to the transmitter's operating channel. When the tracking vehicle is within range of the tracking transmitter, the DF Indicator will respond as follows:

- a. The Update (UPD) Indicator will "blink" at one/half second (approx.) intervals.
- b. The VOICE CW SQUELCH Indicator will illuminate.
- c. The appropriate LED in the CIRCULAR BEARING Display will indicate the relative bearing of the transmitter.
- d. The three-digit Display will indicate the relative bearing of the transmitter.
- e. The Relative Signal Strength (SIG) Indicator will display a number between 0 and 9, indicating the strength of the signal.
- f. The SPEAKER will emit a tone when a signal is received from a transmitter.

OPERATOR FUNCTIONS IN THE CW DF MODE

The operator should observe the Relative Signal Strength Indicator (SIG). When the Indicator displays number 9, the operator should switch the RANGE Switch to the SHORT position. Continue tracking until the SIG displays a number 9. At this point, the tracking vehicle will be within approximately 50 feet of the target vehicle.

BIRD DOG® 360 RECEIVER VOICE MODE

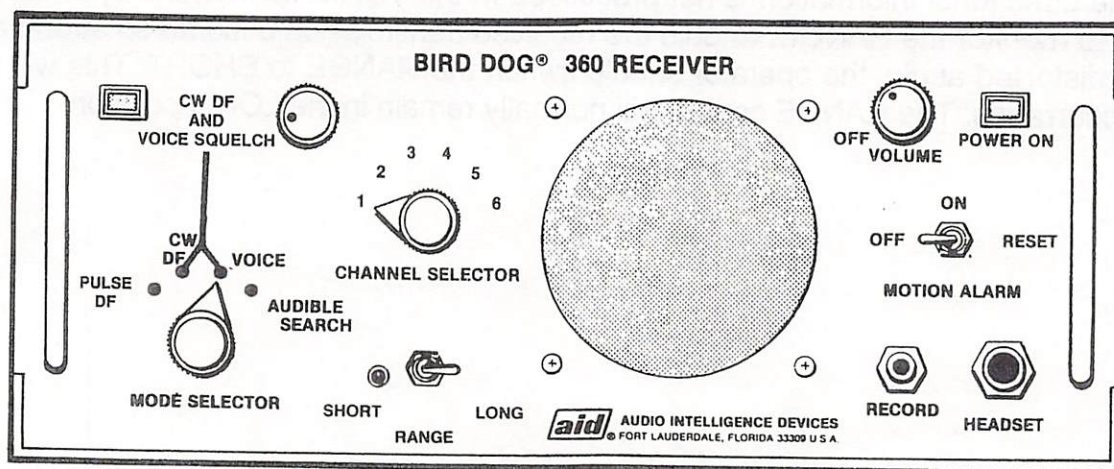


Figure 23. RX-360 Set for Voice Mode.

In the VOICE MODE, the RX-360 functions as a narrow band FM communications receiver. The 360 Degree DF INDICATOR is disabled.

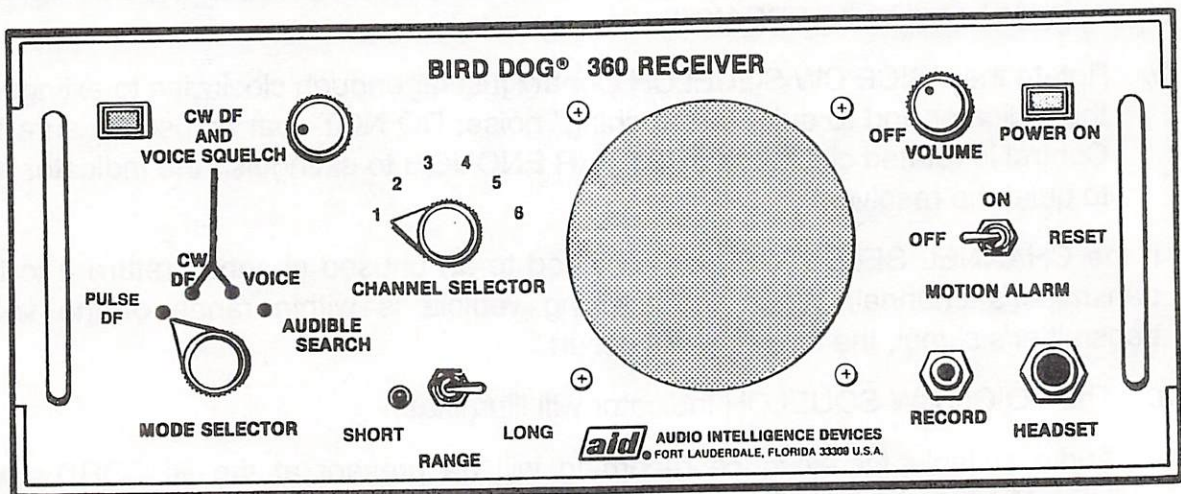
1. Rotate the OFF-ON/VOLUME Control clockwise to approximately the 10 o'clock position to turn the DC power ON and to set the VOLUME level of the Speaker.
2. Set the MODE SELECTOR to VOICE.
3. Set the RANGE Switch to the LONG position.
4. Set the CHANNEL SELECTOR to match the transmitter's channel. Under no signal conditions (or on a crystallized but unused channel) adjust the VOICE CW SQUELCH as follows:
 - a. Observe the VOICE CW SQUELCH Indicator and rotate the VOICE CW SQUELCH Control counterclockwise until the Indicator illuminates and a "rushing" noise is heard in the SPEAKER.
 - b. Rotate the VOICE CW SQUELCH Control just far enough clockwise to extinguish the Indicator and to quiet the "rushing" noise. DO NOT over adjust. Be sure the Control is rotated clockwise JUST FAR ENOUGH to extinguish the Indicator and to quiet the receiver.
5. If the CHANNEL SELECTOR was switched to an unused channel, return it to the transmitter's channel. When the tracking vehicle is within range of the voice transmitter's signal, the following will occur:
 - a. The VOICE CW SQUELCH Indicator will illuminate.
 - b. Audio suitable for evidence recording will be present at the RECORD Jack, HEADSET and SPEAKER OUTPUT.

OPERATOR FUNCTIONS IN THE VOICE MODE

Since directional information is not processed in the VOICE MODE, the operator only needs to monitor the RANGE. Should the received transmission become so strong as to cause distorted audio, the operator should switch the RANGE to SHORT. This will be a rare occurrence. The RANGE control will normally remain in the LONG position.

BIRD DOG®360 RECEIVER AUDIBLE SEARCH MODE OPERATION

1. Rotate the OFF-ON/VOLUME Control clockwise to approximately the 10 o'clock position to turn the DC Power ON and to set the initial VOLUME level of the SPEAKER. The POWER ON Indicator will illuminate.
2. Set the MODE SELECTOR to AUDIBLE SEARCH. The VOICE CW SQUELCH Indicator will illuminate continuously.
3. Set the RANGE Switch to the LONG position.
4. Set the CHANNEL SELECTOR to the desired channel



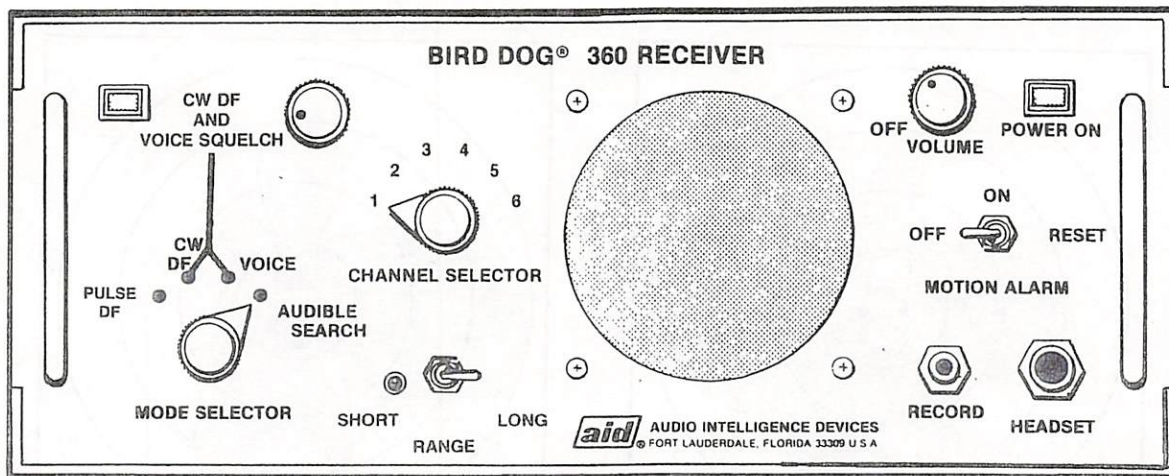


Figure 24. RX-360 Receiver Set for Audible Search Mode.

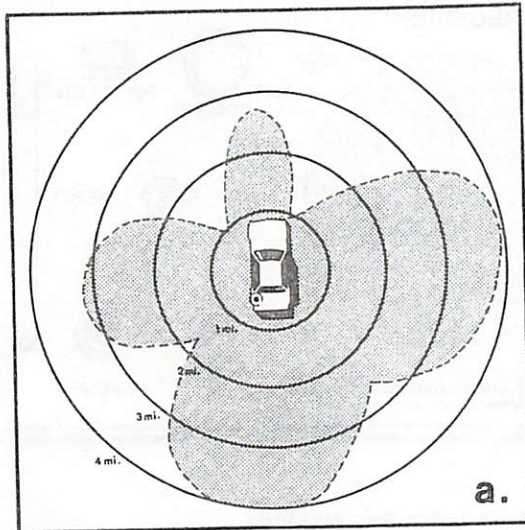
OPERATOR FUNCTIONS IN THE AUDIBLE SEARCH MODE

The AUDIBLE SEARCH Mode is used in the re-acquisition of a lost signal, or in the initial signal acquisition at the start of a tracking operation when the location of the target vehicle is not known. The receiver will be operating "wide open," unsquelched at maximum gain and sensitivity at minimum bandwidth. Inherent noise, normally quieted by the squelch circuits, will be present at the SPEAKER output. However, extremely weak tracking signals (too weak for processing by the DF detection circuits) can sometimes be heard as a weak "rumbling" sound that occurs at one or two second intervals. A weak signal from a voice transmitter will be indicated by weak, noisy audio. A weak signal from a CW transmitter will be indicated by noticeable quieting of the noise level.

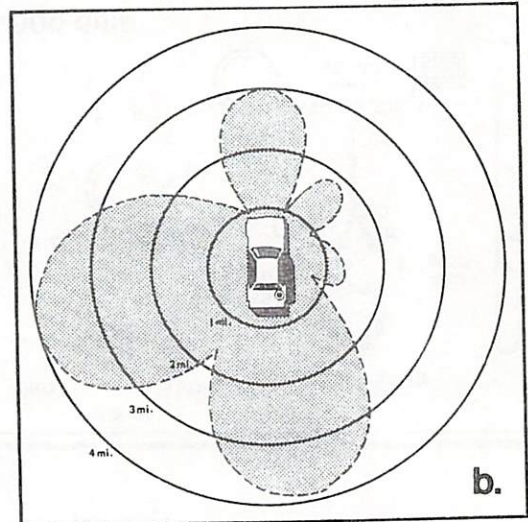
When a weak signal is detected, the tracking vehicle should proceed in the direction that causes an increase in signal-to-noise ratio (stronger signal = weaker noise). When the signal becomes sufficiently strong (with reference to noise), the operator can switch to the desired mode: PULSE DF for tracking transmitters, CW DF for CW or voice modulated transmitters. Normal tracking procedures may now be followed. The Receiver may also be switched to VOICE if audio monitoring is desired.

NOTE: The 360 Degree DF Indicator is inoperative in both the VOICE and the AUDIBLE SEARCH Modes.

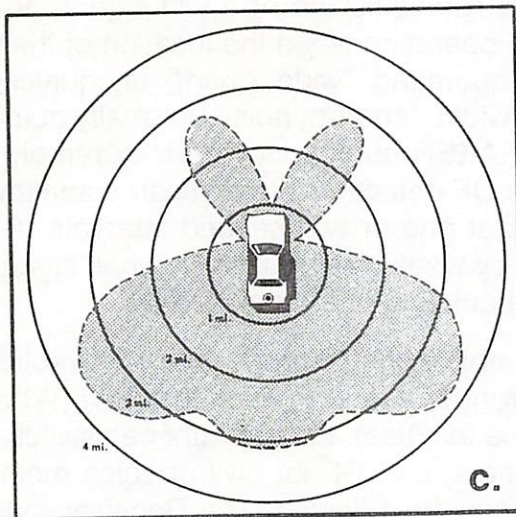
RELATIVE SIGNAL STRENGTH OF TRACKING TRANSMITTERS ACCORDING TO THEIR PLACEMENT ON A TARGET VEHICLE:



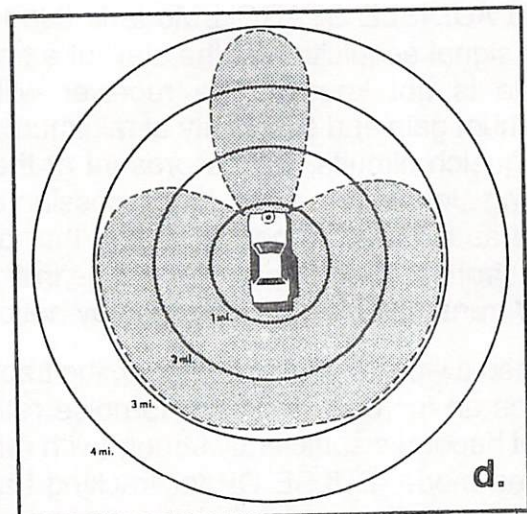
Transmitter Located in the Area
of the Left Rear Fender.



Transmitter Located in the Area
of the Right Rear Fender.



Transmitter Located in the Rear
Center Area of the Vehicle.



Transmitter Located in the Front
Center Area of the Vehicle

Figure 25. Antenna Patterns.

RECOMMENDED TRACKING METHODS

It is advisable that the person operating the tracking system be thoroughly familiar with the area in which the suspect normally travels, and to obtain a street map to plan various routes that will facilitate tracking operations. It is also helpful to drive through the area several times, noting locations of possible strong RF interference, such as radio towers, medical centers, power stations, and etc. Also note the location of large buildings, water towers or other structures that could cause signal reflections.

Instead of following directly behind the target, try to track the target vehicle from behind and to one side, while moving in the same direction as the target vehicle. This method allows Direction Finding accuracy while minimizing the risk of being discovered by the suspect.

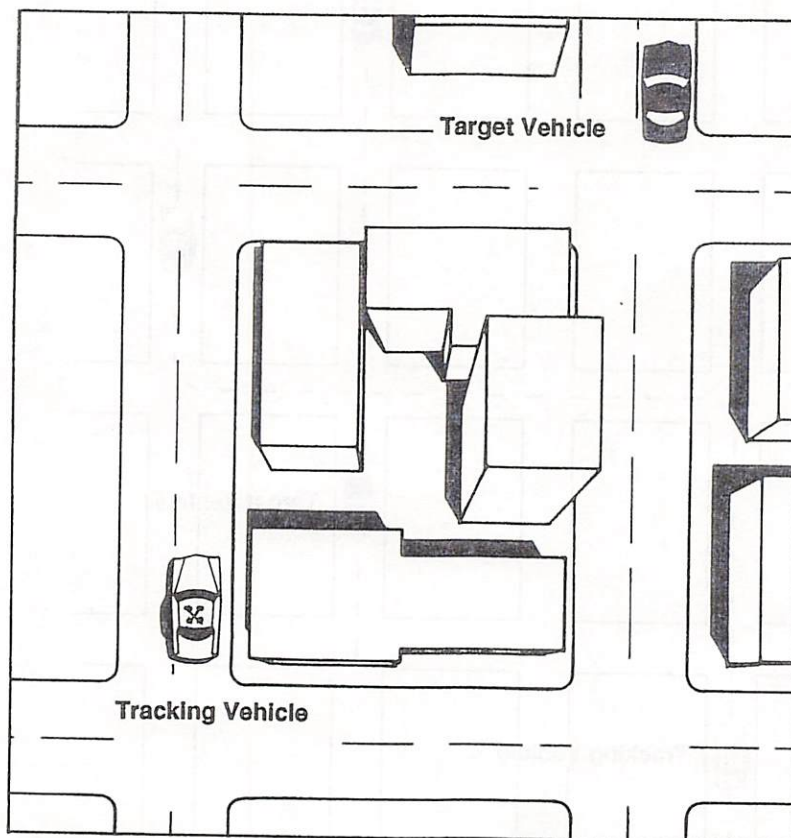


Figure 26. Tracking in the City.

Even when a steady directional signal is being displayed by the 360 Degree DF Indicator, it is advisable to make periodic 90° turns toward the target vehicle and then turn again to resume the tracking operation from the opposite side of the target vehicle. This maneuver will help to minimize errors in tracking caused by signal reflections and other sources of interference, and reduce the possibility of alerting the suspect to the presence of the tracking vehicle.

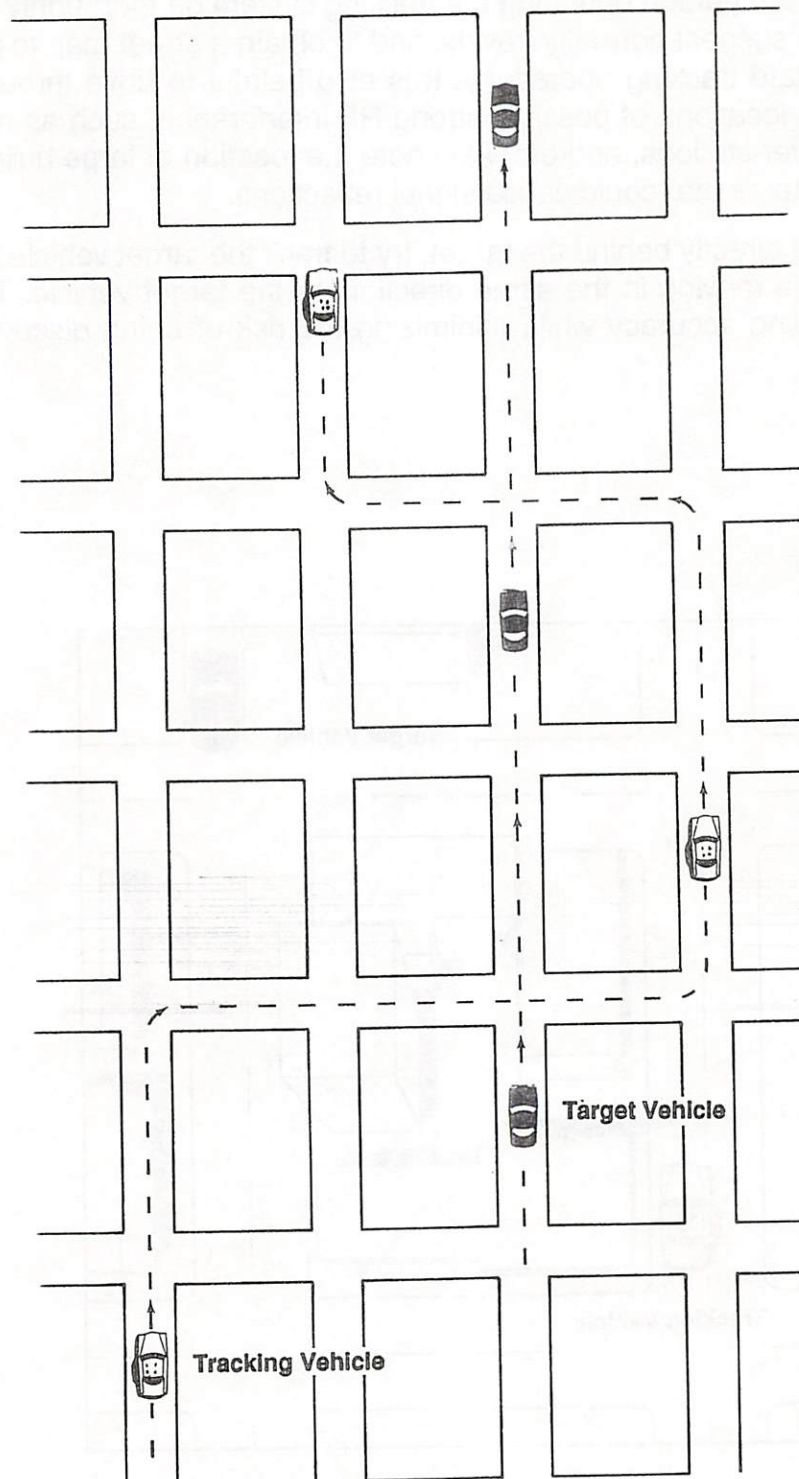


Figure 27. Tracking Method.

REFLECTED SIGNALS AND NOISE INTERFERENCE

False directional indications may be displayed by the DF Indicator when strong reflected signals are received. Large buildings, trucks, lines of trees or other obstacles can reflect the transmitter's original signals and send them on to the receiver from an entirely different direction than the location of the target vehicle. The DF Indicator may display the reflected signals as if they were the original signals. However, reflected signals may be readily identified if fairly steady directional indications suddenly become erratic and change direction, then resume normal steady directional indications. This indicates that reflected signals have probably been received.

Other sources of electrical or structural interference may cause erratic operation of the DF Indicator. In heavily congested areas with dense RF traffic there is always a greater possibility of poor signal reception. Fortunately, the Bird Dog® system is normally operated under mobile conditions, so interference problems are seldom permanent. In general, an average of the directional indications will provide an accurate determination of the location of the Tracking Transmitter.

When it is necessary to track in areas of heavy congestion and interference, with accompanying poor signal reception, the tracking signal can be improved significantly by moving the tracking vehicle to a higher location on a bridge, overpass or hill. Operating in this manner will usually improve signal reception and directional information.

RE-ACQUISITION OF A LOST SIGNAL

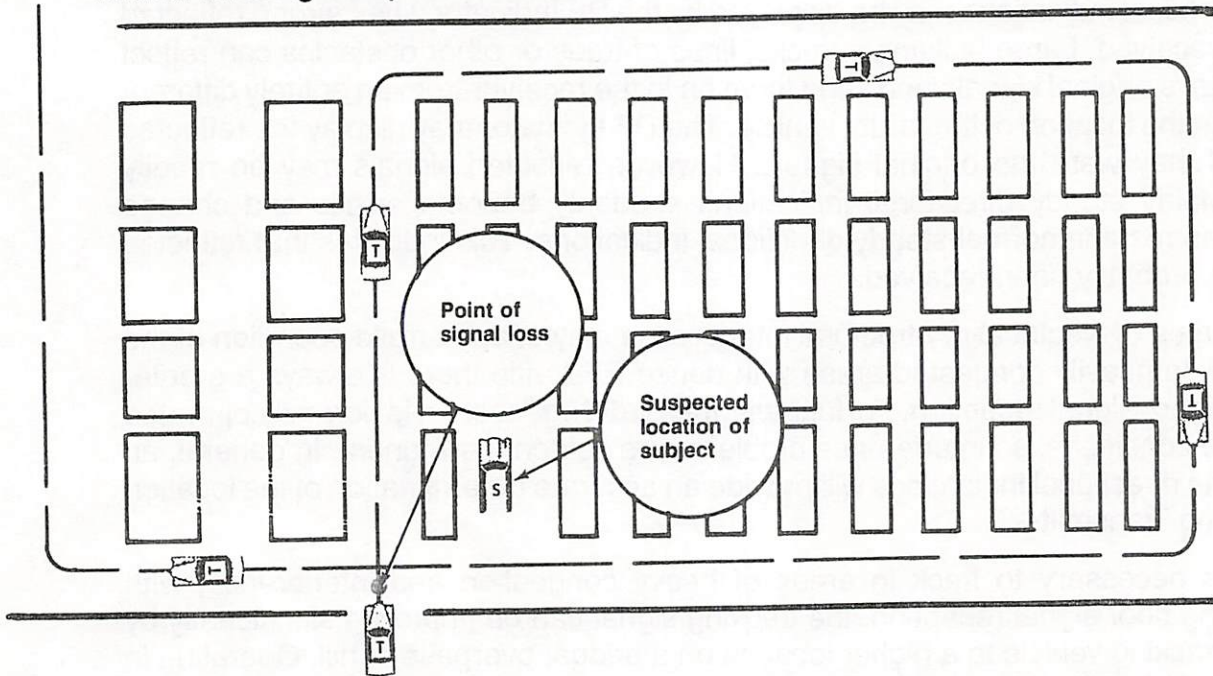
The loss of a tracking signal will be indicated as follows:

- a. The three-digit BEARING Display and the BEARING Indicator will extinguish.
- b. The Update (UPD) Indicator will stop "blinking."
- c. The RELATIVE SIGNAL STRENGTH (SIG) will indicate no signal.
- d. The "beeps," representative of the pulsed transmission, will not be heard.

To recover a lost signal, place the MODE SELECTOR in the AUDIBLE SEARCH position. This "un-squelches" the receiver so it will operate at maximum gain and sensitivity. A signal too weak for processing by the DF circuits will sometimes be audible in the SPEAKER output.

"Rumbling" sounds may be audible in the AUDIBLE SEARCH Mode. Steer the tracking vehicle in the direction that causes the signal to become stronger. When the signal seems strong enough (strong, distinct "rumbles" with increased noise quieting), return the MODE SELECTOR to PULSE DF and resume normal tracking.

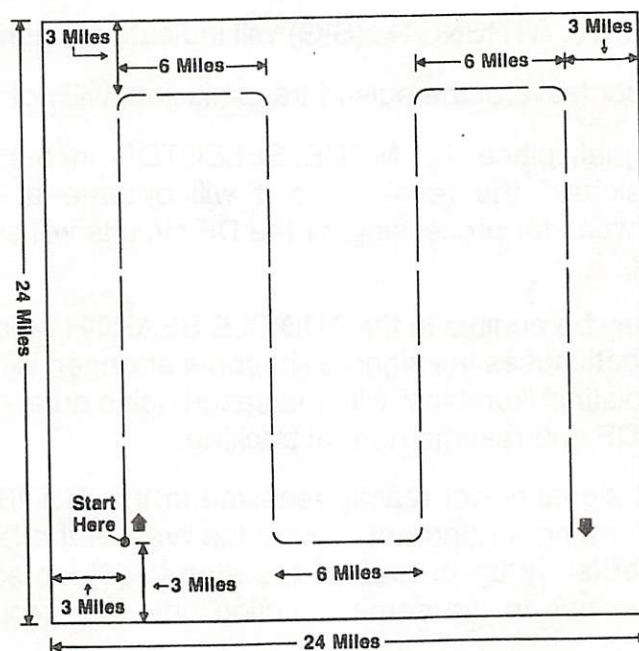
However, if the weak signal is not readily received in the AUDIBLE SEARCH Mode, quickly drive a pattern forming a quadrant around the area of the last known location of the target vehicle. **Immediately upon loss of the signal: (1)** increase the speed of the tracking vehicle and continue in the same direction until it is probable that the target



1

When beginning a tracking operation and the target vehicle location is not known, suspect areas should be sectioned off in squares and a sweep of each area made in segments of approximately three miles each.

When beginning a tracking operation and the target vehicle location is not known, suspect areas should be sectioned off in squares and a sweep of each area made in segments of approximately three miles each.



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PROFICIENCY IN TRACKING OPERATIONS

Proficiency in operating a tracking system comes from a thorough knowledge of the equipment, a working knowledge of the geographic area, and the existing interference problems in the area. An operator should have at least eight hours of practice and orientation before attempting a surveillance operation.

The following exercises can be very helpful in gaining the expertise necessary to conduct a professional surveillance operation:

1. The tracking transmitter is installed on a stationary vehicle in a heavily congested urban area:
(a) Drive through the area in the tracking vehicle. (b) Note the effects and locations of reflected signals, RF interference, and etc. (c) Note the range of the transmitter. (d) Keep in mind at all times where the Tracking Transmitter is in relation to your location. (e) Average the various 360 Degree DF Indicator readings in order to locate areas where you can expect to receive strong signal reflections in the future.
2. The tracking transmitter is installed on a stationary vehicle in a suburban residential area: repeat the above procedures.
3. The tracking transmitter is installed on a stationary vehicle in a rural unpopulated area: repeat the above procedures.

AIRCRAFT TRACKING PROCEDURES

In general, the PRECAUTIONS and OPERATIONAL CHECK LIST in this Manual will also apply to Aircraft Tracking Systems.

NOTE: UNDER NORMAL WEATHER CONDITIONS AND AT ALTITUDES OF OVER 5,000 FEET, THE RECEPTION RANGE OF THE RX-360 WILL BE APPROXIMATELY FORTY TO SIXTY MILES IN ALL DIRECTIONS.

1. Complete the initial set-up for PULSE DF tracking (refer to Figure 17).
2. After take-off, turn the receiver ON and adjust the receiver's VOLUME Level and DIMMER Control, if necessary.
3. Begin climbing by flying a pattern of large circles, continually gaining and increasing the areas of coverage (see Figure 30). The RANGE will increase at higher altitudes (above 5,000 feet).
4. When a signal is received, the three-digit BEARING Display and the BEARING Indicator will register the direction to the transmitter. The Relative Signal Strength (SIG) Display will indicate the relative distance to the transmitter. The use of the SHORT RANGE Switch will allow tracking closer to the target vehicle.

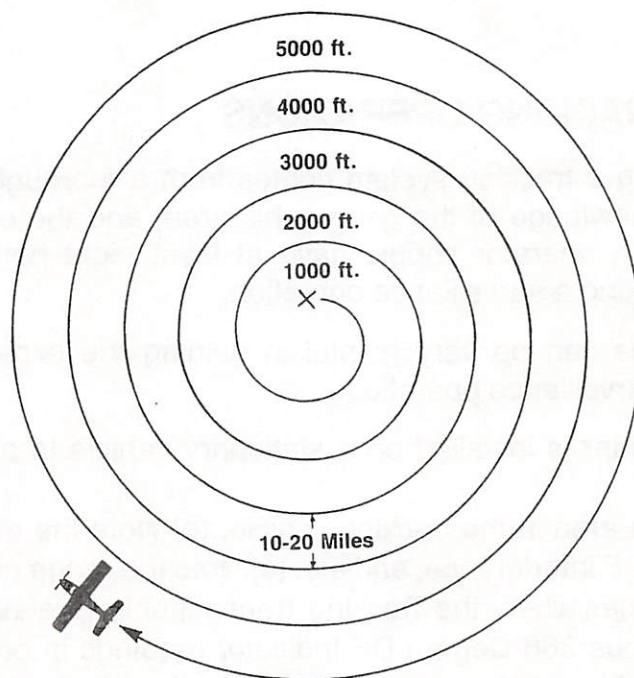
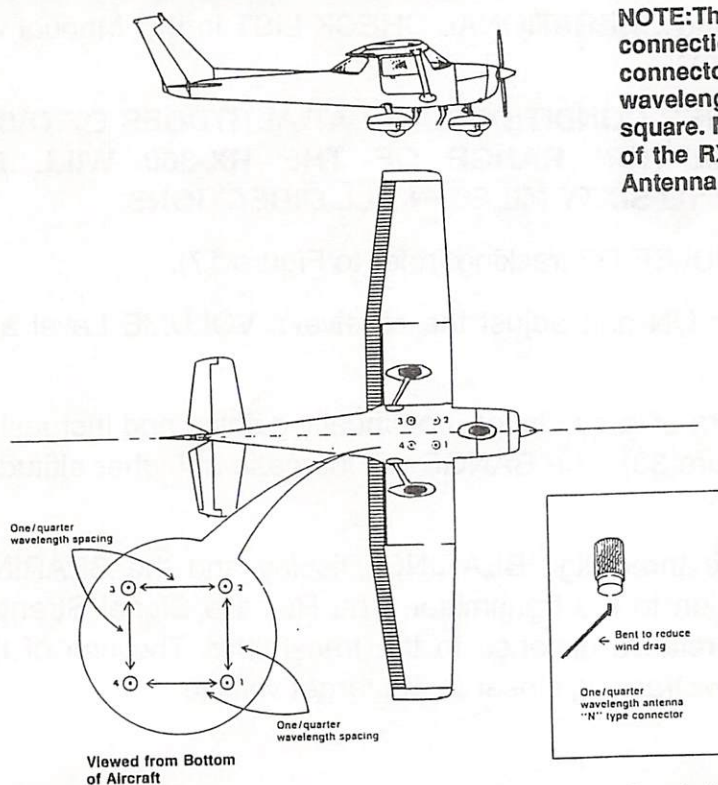


Figure 30. Flight Pattern for Obtaining Initial Tracking Signal.

NOTE: THE WINGS OF A LOW-WINGED AIRCRAFT MAY SHADOW THE ANTENNA OF THE BIRD DOG®. SHALLOW TURNS ARE RECOMMENDED.

The Bird Dog® 360 System is designed to operate with 12 to 15 VDC negative ground electrical systems. If the aircraft has a 24-32 VDC electrical system, a DC-DC Power Adapter (24-32 VDC input, 12-15 VDC output) MUST BE USED (Cat. No. 94058). Be sure that all the antennas are connected as shown in Figure 31.



NOTE: The use of permanent "N" type bulkhead connectors is recommended. The bulkhead connectors are mounted on the aircraft one/quarter wavelength apart in such a manner as to form a square. Matched cables are then routed to the rear of the RX-360 and connected to their appropriate Antenna Jacks.

Figure 31. RX-360 Receive Antennas Mounted on an Aircraft (Typical).

TROUBLESHOOTING AND PRECAUTIONS

1. The Bird Dog® 360 receiver can only be used **WITH 12 TO 15 VDC, NEGATIVE GROUND ELECTRICAL SYSTEMS**. The unit will not operate properly when it is connected to cigarette lighters with internal current limiting resistors.
2. **Always turn the receiver OFF before starting the vehicle.**
3. If operation is to be with 24 to 32 VDC, negative ground systems, a DC to DC Power Adapter (24-32 VDC INPUT; 12-15 VDC OUTPUT) Cat. No. 94058, **MUST BE USED**.
4. **Never** attempt to operate the tracking transmitter with the Antenna disconnected. Serious damage to the transmitter may result.
5. Rechargeable batteries are **NOT RECOMMENDED** for use with *aid* tracking transmitters.
6. Although the Magnetic Base of the Antennas may be painted to match the color of the tracking vehicle, **DO NOT** permit paint to get on the black Insulator located directly above the Base section.

OPERATIONAL CHECKLIST

1. Fresh **batteries** are **installed** in the tracking transmitter.
2. The tracking **transmitter** is properly **installed** on the target vehicle, in accordance with the device's Instruction Manual.
3. The tracking **transmitter** is turned **ON**.
4. The receiver's **Antennas** are correctly **placed** on the tracking vehicle's roof, in accordance with the Instruction Manual.
5. The **Antenna Cables** are **routed** correctly to avoid damage and are **connected** to their appropriate Antenna Connectors on the rear of the RX-360 receiver.
6. The **cable** from the 360 Degree DF Indicator is connected to the REMOTE CONNECTOR on the rear of the RX-360 receiver.
7. The **DC POWER CABLE** is properly **connected** to the automobile's cigarette lighter receptacle, which is a 12 to 15 VDC, negative ground unit. The receptacle is clean, free of corrosion and tobacco residue, and has no current limiting resistor.

SPECIFICATIONS RX-360 DF FM RECEIVER

FREQUENCY RANGE:	150 to 174 MHz (Standard). 136 to 150 MHz (Special Order).
CHANNEL CAPACITY:	Six, One channel crystal installed.
CHANNEL SEPARATION:*	1.5 MHz maximum, lowest channel to highest channel.
SENSITIVITY:	Direction Finding: Better than -120 dBm; Voice: Better than -115 dBm for 12 dB SINAD.
SELECTIVITY:	Direction Finding: 6 dB @ ± 3 KHz 90 dB @ ± 25 KHz Voice: 3 dB @ ± 7.5 KHz 75 dB @ ± 25 KHz.
DIRECTIONAL DISPLAY:	360° 3-digit relative bearing indicator. $\pm 10^\circ$ maximum error.
STATUS DETECTION:	Visual and audible alarm for status change, stationary or motion.
OPERATING MODES:	1. Pulse DF. 2. CW DF. 3. FM Voice. 4. Audible Search.
ANTENNAS:	Set of four matched 50-Ohm magnetic mount whip antennas.
POWER REQUIREMENTS:	12 to 15 VDC, 1 Amp, negative ground.
POWER SOURCE:	12 to 15 VDC vehicular electrical systems. For 24 to 32 V aircraft electrical systems, Power Adapter Cat. No 94058 must be used.
SIZE:	13" x 9" x 3-1/2" (33 x 22.9 x 8.9 cm).
WEIGHT:	6 lbs. 8 oz. (2.95 kg).
360 DEGREE DF INDICATOR:	Provides visual indication of relative bearing to the tracking transmitter. Circular display (360°) with 3-digit relative bearing indicator. Includes motion status indicators, field strength (distance) indicator and dimmer control.

SPECIFICATIONS TX-602A/B/D TRACKING TRANSMITTERS

FREQUENCY RANGE:	150 to 174 MHz (Standard). 136 to 150 MHz (Special Order).
FREQUENCY STABILITY:	Crystal-controlled; ± 10 ppm from -22°F (-30°C) to 122°F (50°C).
CHANNEL CAPABILITY:	One.
RF POWER OUTPUT:	One Watt into a 50 Ohm load with 9 VDC input.
EMISSION (TX-602A/B):	Stationary: one pulse train every two seconds. Motion: one pulse train each second (times are approximate).
EMISSION (TX-602D):	Stationary: switch selectable pulse train every second, 2 seconds, 4 seconds, 8 seconds, 16 seconds, 32 seconds, one minute, two minutes, four minutes, eight minutes. Motion: one pulse train every second. Times are approximate.
SPURIOUS & HARMONIC ATTENUATION:	Better than 43 dBW.
MOTION DETECTION CAPABILITY:	Provided by multiple mercury switches, omni-directional sensitivity.
POWER REQUIREMENTS:	9 VDC.
POWER SOURCE:	Three 9V alkaline (type 1604) batteries.
BATTERY LIFE:	Better than six days continuous operation using factory fresh batteries @ 68°F (20°C).
SIZE:	
(TX-602A):	2.4" X 4.4" X 2.25" (6 X 11 X 5.7 cm).
(TX-602B):	2.4" X 4.4" X 1.25" (6 X 11 X 3.8 cm).
(TX-602D):	2.4" X 4.4" X 2.25" (6 X 11 X 5.7 cm).
WEIGHT:	
TX-602A:	1.5 lbs (0.68 kg).
TX-602B:	0.5 lbs (226.8 g).
TX-602D:	1.5 lbs (0.68 kg).

AIRCRAFT OPERATION

If the BirdDog® 360XT is to be used in aircraft applications with 28 VDC power systems, DC Power Adapter (Cat. No. 94058) must be ordered to adapt the RX-360 Receiver to the aircraft electrical system. For fixed wing application use Aircraft Mount Antenna Kit (Cat. No. 91208-10). For other than fixed wing aircraft, consult factory for antenna needs.

For Customer Use:
Enter below the serial number of your unit.
Retain this information for future reference.

Model No. _____

Serial No. _____

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