MicroRadar

An Automotive Safety Warning System

Installation Manual

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GENERAL DESCRIPTION

The Microtek MicroRadar System is a low cost automotive safety warning system which measures the distance between the obstacle and the motor vehicle, and provides the proximity warning for the vehicle operator with voice and visual warning. The system has a range detection of 8 feet. The system operates in 5.8 Ghz ISM (Industrial, Scientific, and Medical) band.

The Microtek MicroRadar system consists of two modules-a sensor module and a display module. The sensor module contains the radar system and the display module contains the voice synthesizer, beeper and LED display or a simple beeper for low cost system. In vehicle back-up parking or collision warning application, the sensor module is installed behind the rear bumper of the motor vehicle, and the display module is installed inside the passenger compartment. Both modules are interconnected by a multi-wire cable. The MicroRadar system is wired into the motor vehicle back-up light circuit, and is automatically powered on when the motor vehicle is shifted into the reverse gear during backing up.

FEATURES:

- It shall function only when the vehicle is in reverse gear.
- The vehicle back-up lamp power supply line will provide the sole source of power for the MicroRadar system.
- The system can be fully concealed inside the plastic bumper without altering the present bumper design.
- The display module or a beeper system shall alert the driver of some potentially dangerous object behind the vehicle, when relative motion exists. The relative target speed is approximately 0.3 mile/hr (0.5km/h) to 20mile/hr (32km/h).
- The display module or the beeper shall provide the relative distance information to the closest object.
- The voice synthesizer of the display module will provide command as " RADAR SYSTEM ACTIVATED" and 3 green LEDs will light on for 1 second for self-test when the system is powered-on.
- The following table indicates the actuation of warning segments in display module.

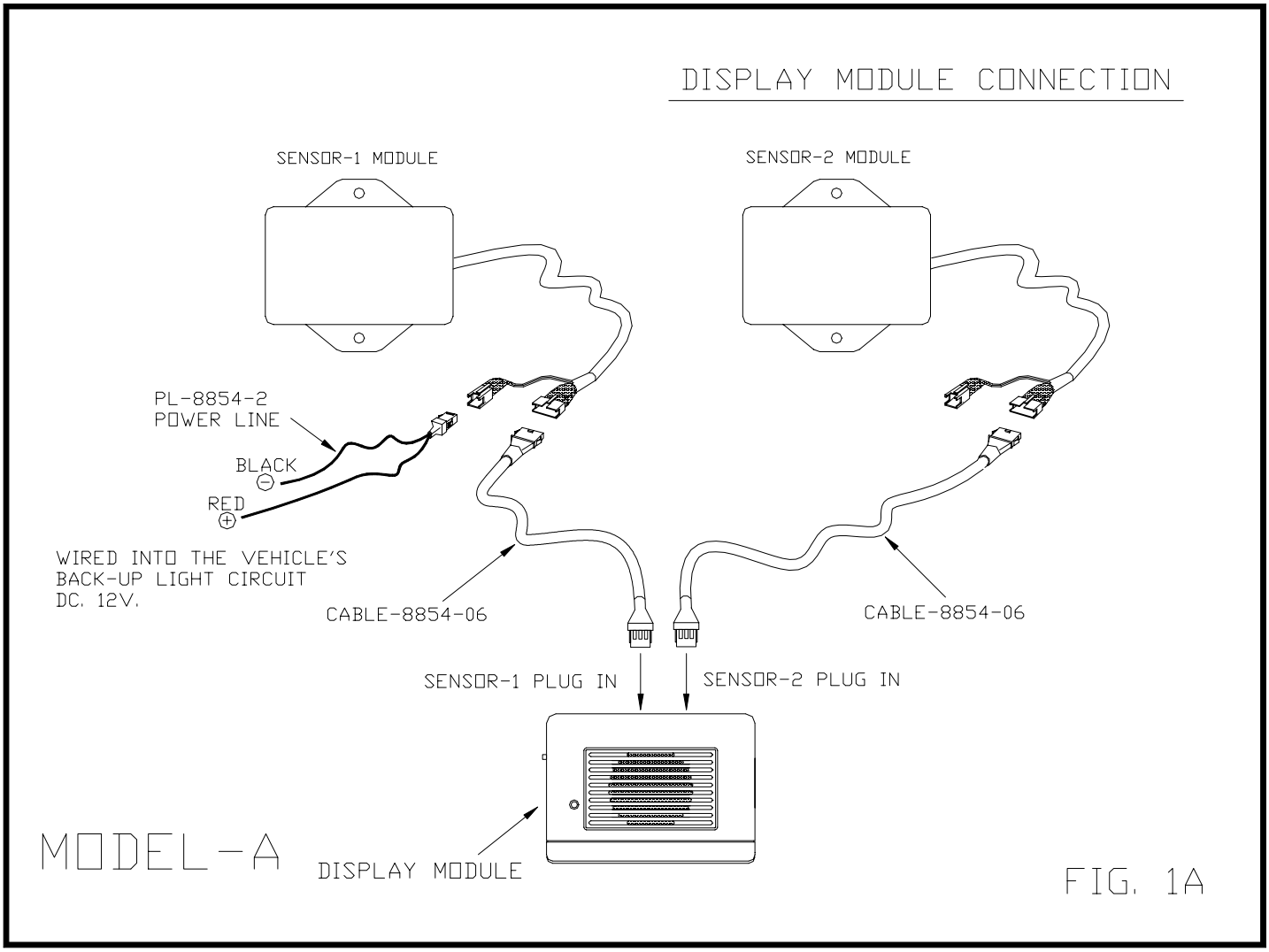
LED Segments	Voice Warning	Beeper Tone	Approximate Distance
Green	CAREFUL	Low Pitch	~ 8 Feet (~ 240cm)
Green			~ 7 Feet (~ 210cm)
Yellow			~ 6 Feet (~ 180cm)
Yellow	SLOW	Medium Pitch	~ 5 Feet (~ 150cm)
Yellow			~ 4 Feet (~ 120cm)
Red	STOP		~ 3 Feet (~ 90cm)
Red		High Pitch	~ 2 Feet (~ 60cm)
Red	LOOK OUT		~ 1 Foot (~ 30cm)

COMPONENTS LAYOUT:

The Microtek MicroRadar consists of the following components:

A. *Advanced Display Module Model* (Figure 1A)

- Sensors (2 pieces)
- Display Module (includes LEDs, Beeper, and Voice Synthesizer)
- Power Lines
- Connecting Cables for Sensor and Display Module Connection (2 pieces)
- Mounting Brackets (2 pieces)



A-a Detailed Description of Display Module (Figure 1B)

- Beeper with HI LOW Selector
- Voice Speaker with Volume Control
- Sensor 1 and Sensor 2 Indicators
- Module Power On/Off Switch

NOTE: Connection of power line to either left or right Sensor Module is based on the convenience or preference of the installation, however it is recommended that the power line cable be connected to the SENSOR-1 PLUG IN port of the display module as shown in Figure 1A.

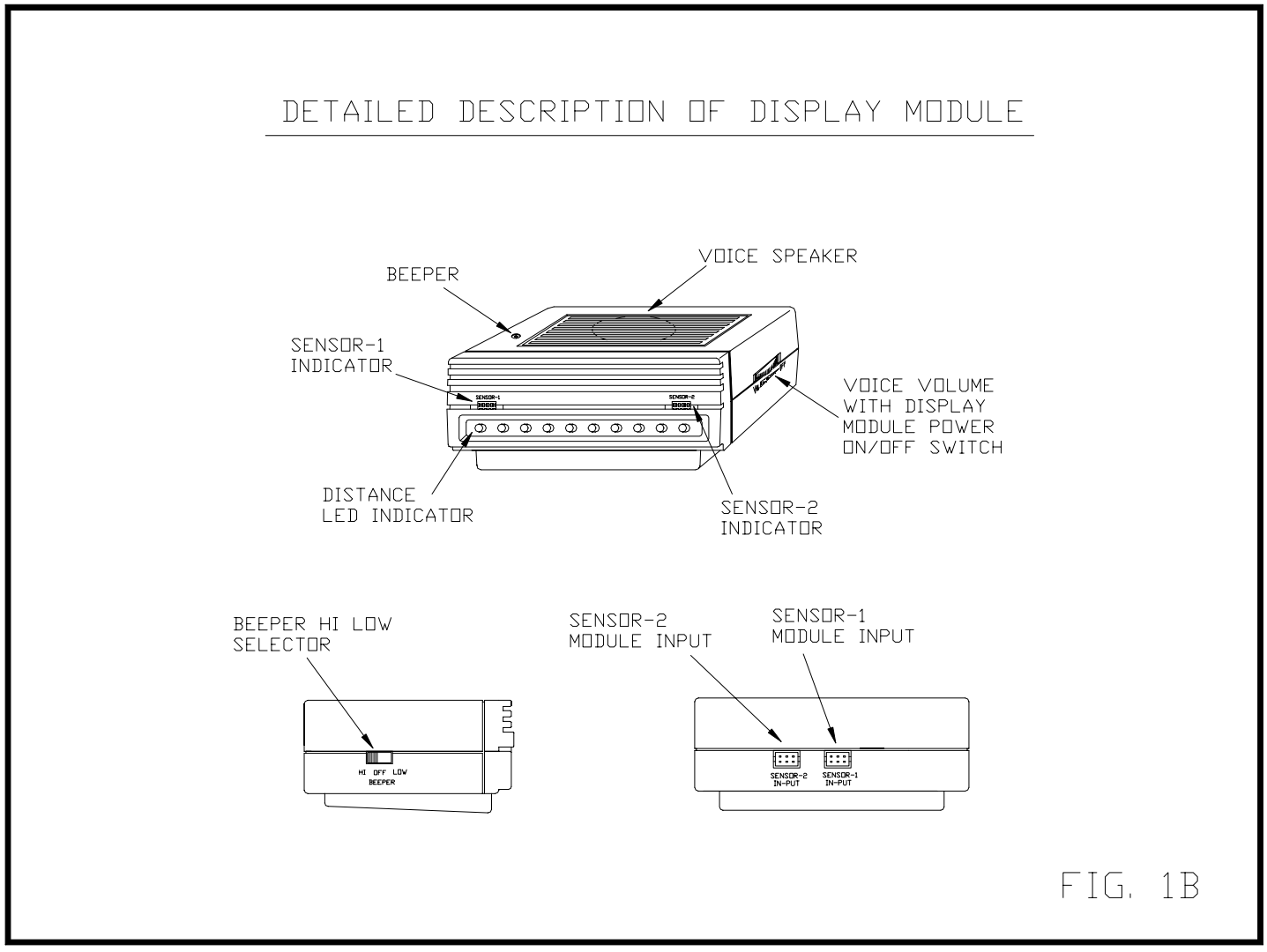
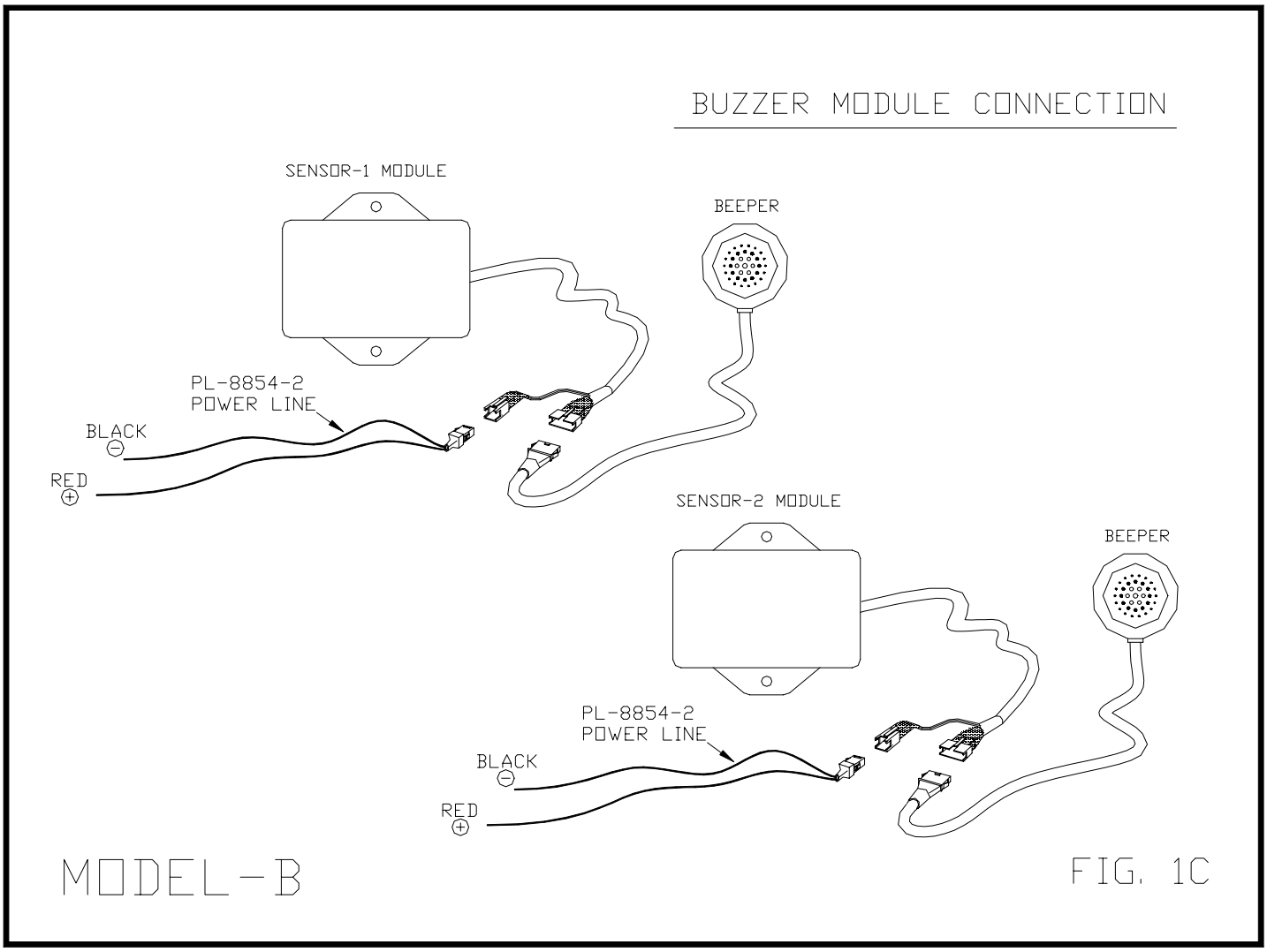


FIG. 1B

B. *Buzzer Module Model* (Figure 1C)

- Sensors (2 pieces)
- Beepers (2 pieces)
- Power Lines (2 pieces)
- Mounting Brackets (2 pieces)



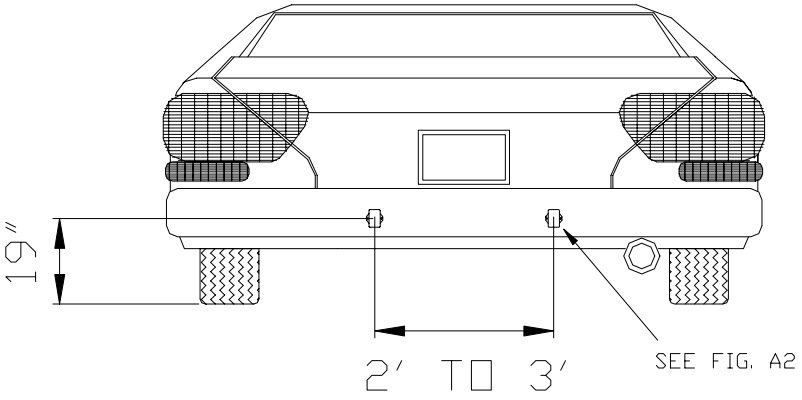
INSTALLATION:

A. *Installation of the sensor inside the plastic bumper:*

1) Disassemble the rear bumper and identify places for installing two sensor modules. For the optimum performance, 2 feet to 3 feet spacing between two sensors with the center of the bumper as the midpoint of the two sensors is highly recommended. The optimum mounting configuration is that the mounting holes are placed on the horizontal plane with the sensor cable toward upward. The orientation of the sensor is also shown to provide the optimum solution (Figure 2 and Figure 3). Mounting brackets may not be necessary with this kind of arrangement.

INSTALLATION OF THE SENSOR MODULES INSIDE PLASTIC BUMPER

THE HEIGHT OF THE SENSOR MODULE FOR MOUNTING LOCATION
IS AROUND 19″ FROM THE GROUND.



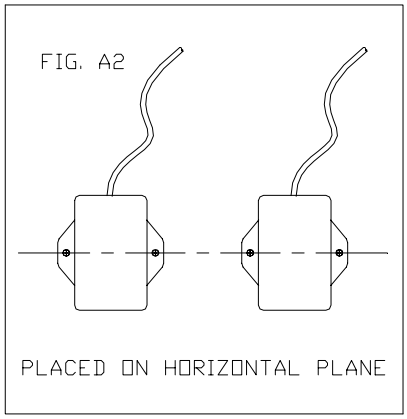
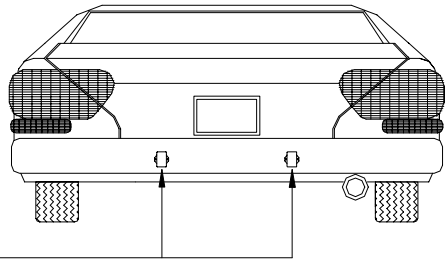
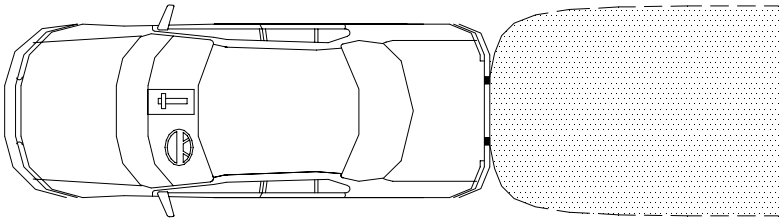


FIG. 2

SENSOR CONFIGURATIONS



SENSOR MODULES INSTALLED
INSIDE THE BUMPER



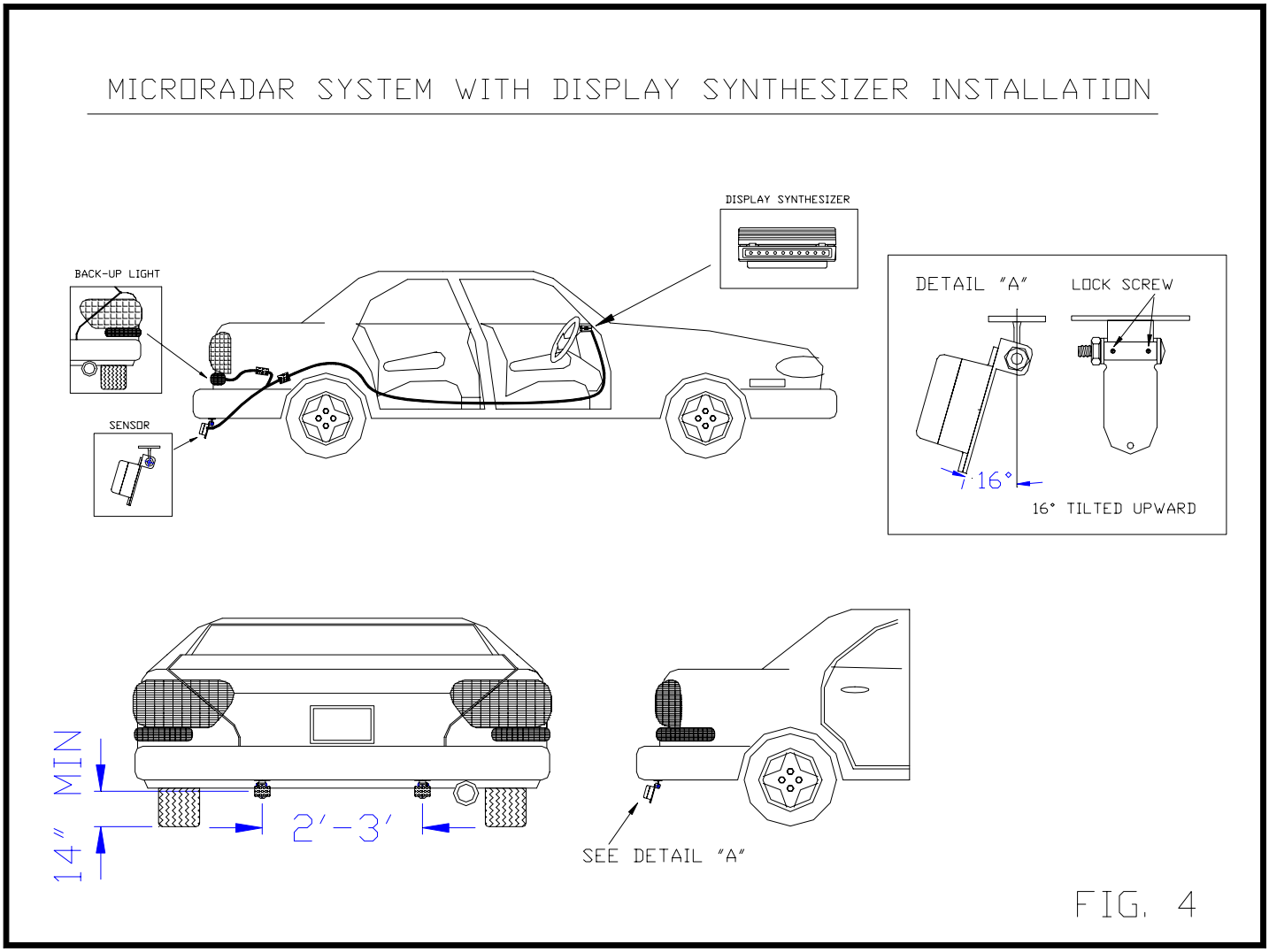
REAR SENSOR DETECTION ANGLE

FIG. 3

2) Carry the cable through the existing hole in the trunk and connect the cable as follows:

BLACK to the ground of the car

RED to the positive cable that has +12 volt when the reverse white lamp is on in reverse gear (Figure 4).



3) Put the display module inside the car on the dashboard (Figure 4) and carry the connecting cables to the trunk through the existing hole (ex. exit of the safety belt) For the low cost system which only equipped beeper as display module, put the buzzer inside the car, on the rear plan (Figure 5).

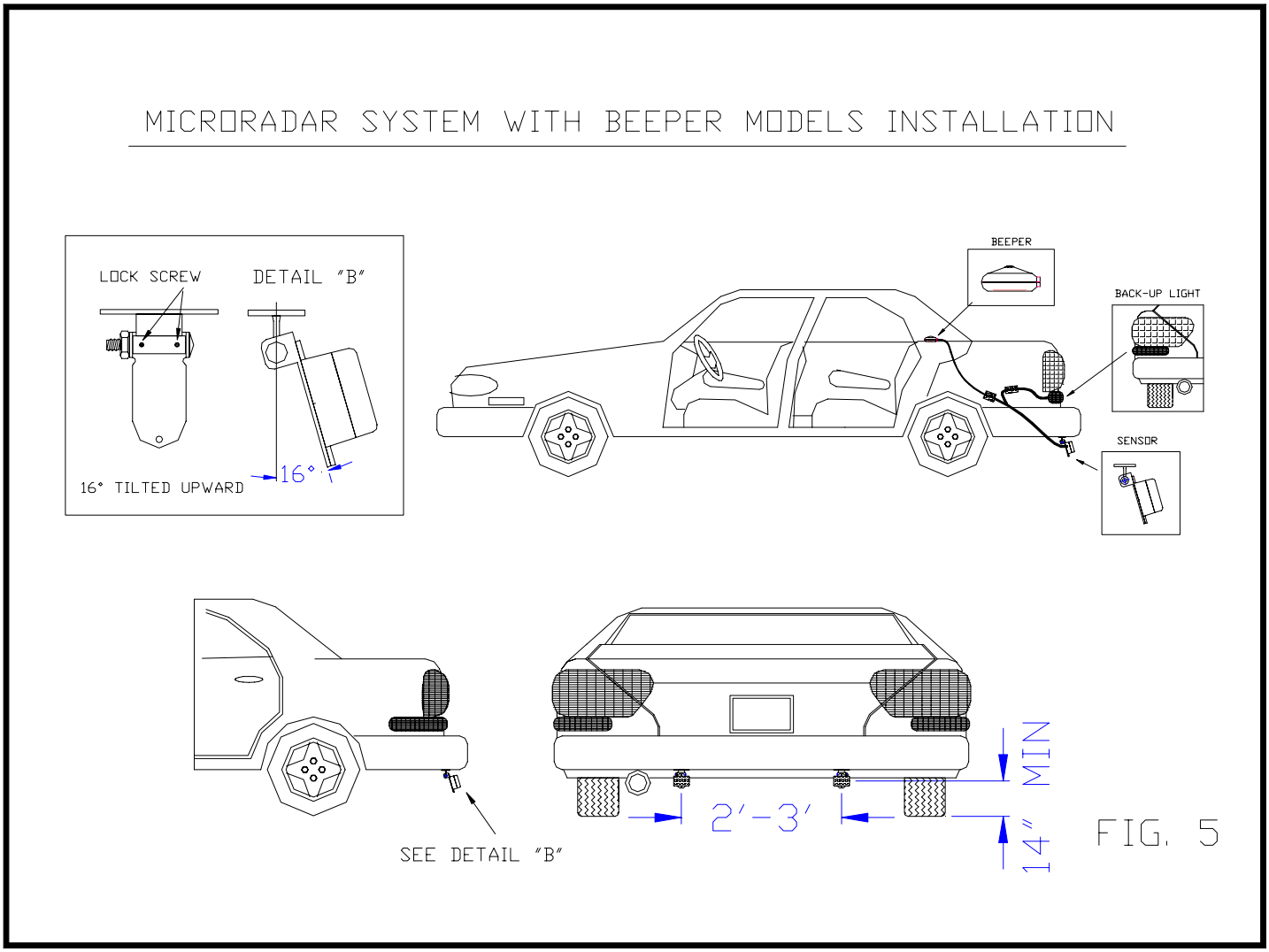


FIG. 5

B. *Installation of the device on a metallic bumper or without disassembling the plastic bumper:*

1) Using the provided mounting bracket, mount two sensors right underneath the bumper with about 3 feet spacing between two sensors (Figure 4 and Figure 5). For optimum performance, the sensor is recommended to mount so that the sensor cable is oriented toward right hand side while facing the bumper.

2) The height of the sensor mounting location is recommended to be no less than 14 inches. The mounting bracket angle for the sensor is recommended for 16 degree tilted upward (Figure 4 and Figure 5). For those automobile with the bumper height higher than that of regular passenger car, the sensor is recommended to mounted perpendicularly, no tilt needed as long as the mounting height (around 19 to 20 inches from the ground) is the same high as the regular passenger car bumper.

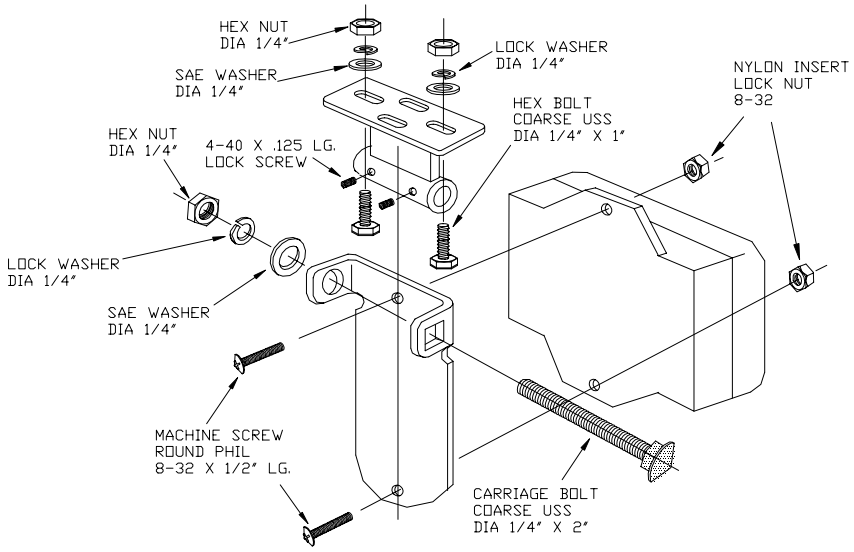
GUIDE TO MOUNTING BRACKET ASSEMBLY (Figure 6)

1) Using the two screws (8-32 x ½" LG.) and lock nuts (8-32), attach the Sensor Module to the Mounting Bracket Plate.

2) Connect the upper portion of the Mounting Bracket to the Mounting Bracket Plate using the carriage bolt (DIA ¼" x 2"). Make sure the bolt is inserted through the square hole of the Mounting Bracket Plate. Place on the Lock washer (DIA ¼") and the SAE washer (DIA ¼") then tighten with the hex nut (DIA ¼").

3) Insert the lock screws (4-40 x .125 LG.) to secure the carriage bolt.
Attach the unit to the assigned bumper location using the hex bolt (DIA ¼" x 1"), SAE washers (DIA ¼'), and Lock Washers (DIA ¼"), then tighten with the hex nuts (DIA ¼").

GUIDE TO MOUNTING BRACKET ASSEMBLY



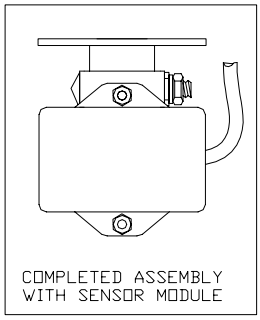


FIG. 6

SCREW TYPE	QTY.	SCREW TYPE	QTY.	SCREW TYPE	QTY.	SCREW TYPE	QTY.
SAE WASHER DIA 1/4"	3 PCS.	MACHINE SCREW ROUND PHIL 8-32 X 1/2" LG.	2 PCS.	CARRIAGE BOLT COARSE USS DIA 1/4" X 2"	1 PC.	HEX BOLT COARSE USS DIA 1/4" X 1"	2 PCS.
HEX NUT DIA 1/4"	3 PCS	NYLON INSERT LOCK NUT 8-32	2 PCS.	4-40 X .125 LG. LOCK SCREW	2 PCS.		
LOCK WASHER DIA 1/4"	3 PCS.						

INITIAL SYSTEM TEST

This system has an operating range up to 8 feet which extends beyond the rear of the vehicle. The area is divided into four sections of warning indication. When the vehicle is first placed in reverse, the display module will provide command as " RADAR SYSTEM ACTIVATED", and 3 green LEDs will illuminate for 1 second to indicate the system is in operation. For the beeper module, the system will activate immediately after the vehicles is placed in reverse and a slow beep will be heard once an obstacle is detected.

OPERATIONAL TESTING FOR SYSTEM WITH DISPLAY MODULE:

1) Position the vehicle at least 7 feet (~210cm) from the target. (As shown as the concrete wall in Figure 7)
2) Place transmission into reverse. The display module will voice " RADAR SYSTEM ACTIVATED" and the LED will illuminate green for 1 second to indicate the system is on and operating.
   NOTE: If the LED does not illuminate and no synthesized voice is heard, stop the testing procedure immediately. Check the system to ensure the system is connected and turned on.
3) Slowly back the vehicle towards the target, making sure the vehicle's speed is above 0.5 MPH (0.8km/h).
4) At approximately 5 feet (~150cm) from the target, the LED display is yellow, the voice command is SLOW, and the beeping is moderate.
5) Continue backing the vehicle, at approximately 3 feet (~90cm), the LED display changes from yellow to red, the voice command changes to STOP, and the beeping changes to medium pitch.
6) Continue backing the vehicle, at approximately 1 feet (~30cm), the LED display is red, the voice command is LOOK OUT, and the beeping is continuous to indicate an imminent collision. Apply the brakes immediately to avoid collision with the target.

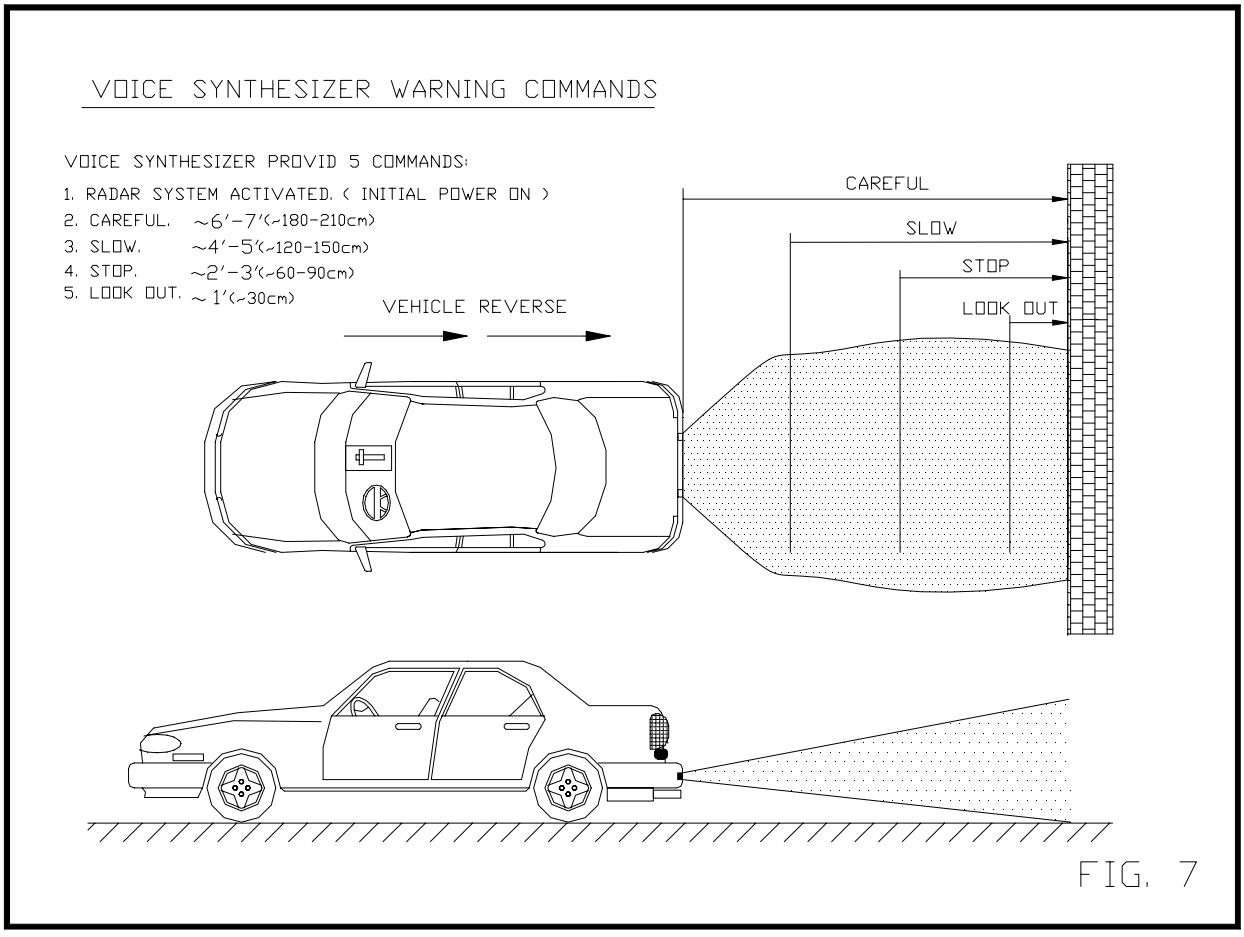


FIG. 7

OPERATIONAL TESTING FOR SYSTEM WITH BUZZER MODULE:

1) Position the vehicle at least 7 feet (~210cm) from the target. (As shown in Figure 8)
2) Place transmission into reverse. The buzzer module automatically activates.
3) Slowly back the vehicle towards the target, making sure the vehicle speed exceeds 0.5 MPH (0.8km/h). At this point, the buzzer will begin emitting a slow beep.
   NOTE: If the indicator beep is not heard, stop the testing procedure immediately. Check the system to ensure the system is connected and turned on.
4) At approximately 5 feet (~150cm) from the target, the buzzer will start beeping moderately.
5) Continue backing the vehicle, at approximately 3 feet (~90cm), the buzzer will beep rapidly.
6) Continue backing the vehicle, at approximately 2 feet (~60cm), the buzzer will beep incessantly to indicate an imminent collision. Apply the brakes immediately to avoid collision with the target.

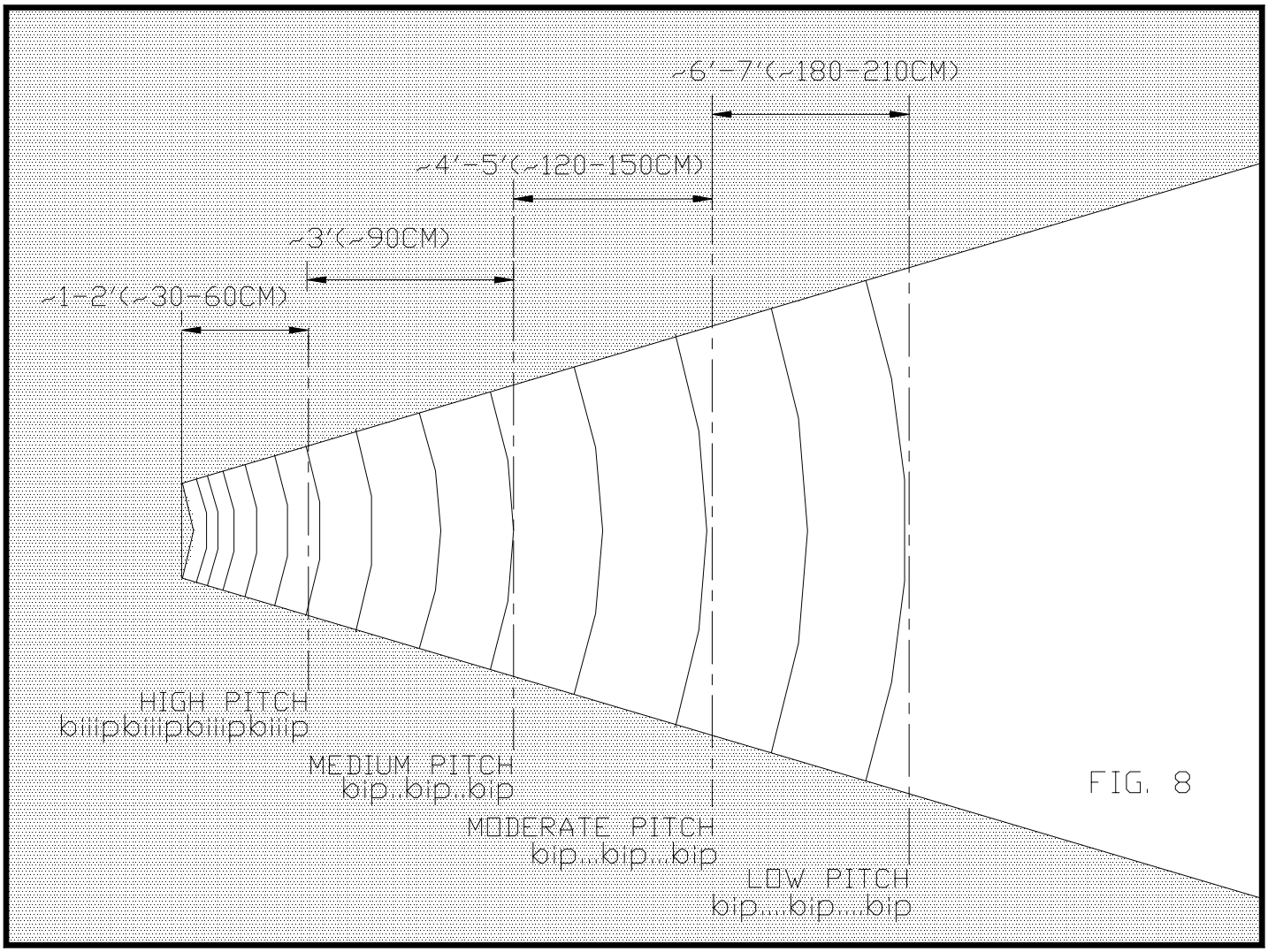


FIG. 8

The system is now ready for operation. It is recommended that future testing be performed to familiarize yourself with the variance in response of this system. Certain objects and driving conditions will not provide adequate safety margins to prevent accidental collisions.

OPERATING VARIABLES:

This system detection range and accuracy may be affected when backing up towards objects described below:

- Small and thin objects such as chains, cable, and rope.
- Cone shape objects
- Objects with sharp angles facing the sensors

TROUBLESHOOTING:

B. *PROBLEM*	**CAUSE:**	**SOLUTION:**
The system operates all the time, even when not in reverse gear	Incorrect power connection	Check to ensure that the correct reverse wires were selected Check to ensure red and black wires are connected according to color
LED display does not illuminate when in reverse Buzzer does not beep when in reverse One or two sensors does not respond	No power Loose or bad connection between sensors and control unit	Check red and black wire connection Check buzzer and buzzer connection Check LED display and LED connection
Buzzer falsely sounds when backing up with no obstacle behind it.	Sensors are picking up the road surface Sensors are incorrectly installed Sensors are loosely attached Sensors are attached to resonating panel	Reinstall, readjust, remount, or relocate the sensors until proper performance is obtained.

The system is designed to assist the driver decision making when operating a vehicle. The system is not designed to substitute the necessary skills or knowledge of a driver when operating a vehicle. The driver should not solely depend on the system as the only indicator of obstacles behind the vehicle. The driver has the sole responsibility to maintain safety and utilize good judgement to prevent accidents and damages.