

Total solder points: 185

Difficulty level:

beginner 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ advanced

velleman.kit

HIGH-Q



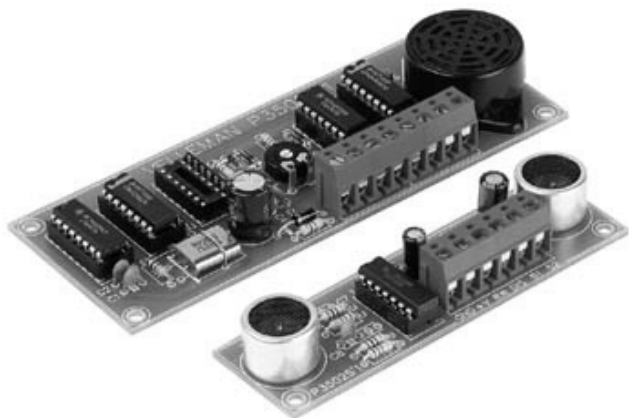
Parking Radar

Specifications :

K3502

- ☒ Detection range : 5cm - 1,5m (adjustable)
- ☒ Detection angle : 5°
- ☒ Transmitter frequency : 40KHz.
- ☒ Sample frequency : 26Hz.
- ☒ Power supply : 10 - 15VDC / 16mA max.
- ☒ Dimensions :
 - Sensor PCB : 28 x 95mm / 1,1 x 3,8"
 - Base PCB : 48 x 125mm / 1,9 x 5"

Modifications reserved.

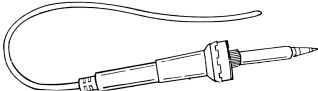

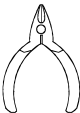
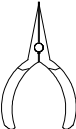


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1. Assembly (Skipping this can lead to troubles !)

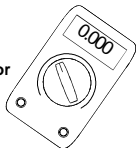
Ok, so we have your attention. These hints will help you to make this project successful. Read them carefully.

1.1 Make sure you have the right tools:

- A good quality soldering iron (25-40W) with a small tip. 
- Wipe it often on a wet sponge or cloth, to keep it clean; then apply solder to the tip, to give it a wet look. This is called 'thinning' and will protect the tip, and enables you to make good connections. When solder rolls off the tip, it needs cleaning.
- Thin raisin-core solder. Do not use any flux or grease. 
- A diagonal cutter to trim excess wires. To avoid injury when cutting excess leads, hold the lead so they cannot fly towards the eyes.
- Needle nose pliers, for bending leads, or to hold components in place. 
- Small blade and Phillips screwdrivers. A basic range is fine. 



For some projects, a basic multi-meter is required, or might be handy



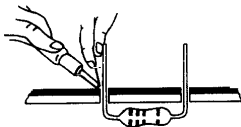
1.2 Assembly Hints :

- ⇒ Make sure the skill level matches your experience, to avoid disappointments.
- ⇒ Follow the instructions carefully. Read and understand the entire step before you perform each operation.
- ⇒ Perform the assembly in the correct order as stated in this manual
- ⇒ Position all parts on the PCB (Printed Circuit Board) as shown on the drawings.
- ⇒ Values on the circuit diagram are subject to changes.
- ⇒ Values in this assembly guide are correct*
- ⇒ Use the check-boxes to mark your progress.
- ⇒ Please read the included information on safety and customer service

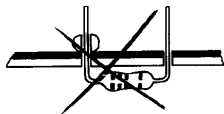
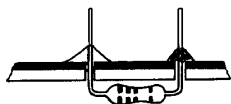
* Typographical inaccuracies excluded. Always look for possible last minute manual updates, indicated as 'NOTE' on a separate leaflet.

1.3 Soldering Hints :

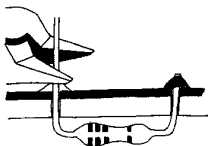
Mount the component against the PCB surface and carefully solder the leads



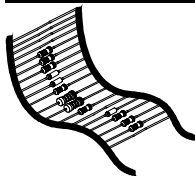
Make sure the solder joints are cone-shaped and shiny



Trim excess leads as close as possible to the solder joint



AXIAL COMPONENTS ARE TAPED IN THE CORRECT MOUNTING SEQUENCE !

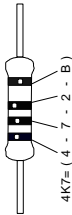


REMOVE THEM FROM THE TAPE
ONE AT A TIME !



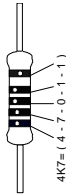
TIP : The pictures on the packaging can be used as a guideline.
However, due to possible modifications they are not 100% reliable.

5%



4K7 = (4 - 7 - 2 - B)

1%



4K7 = (4 - 7 - 0 - 1 - 1)

COLOR= 2...5

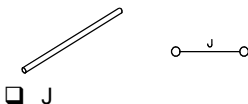


4K7 = (4 - 7 - 2 - B)

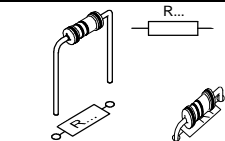
	I	P	E	SF	S	DK	N	D	GB	F	NL
C O D E	CODICE COLORE DE CORES	CODIGO DE CORES	CODIGO DE COL-ORES	VARI KODI	FARG SCHEMA	FARVE-KODE	FARGE-KODE	FARB KODE	COLOUR CODE	CODIFI-CATION DES COU-LEURS	KLEUR CODE
0	Nero	Preto	Negro	Musta	Svart	Sort	Sort	Schwarz	Black	Noir	Zwart
1	Marrone	Castanho	Marrón	Ruskea	Brun	Brun	Brun	Braun	Brown	Brun	Bruin
2	Rosso	Encarnado Rojo	Punainen	Punainen	Röd	Röd	Röd	Rot	Red	Rouge	Rood
3	Aranciato	Laranja	Naranjado	Oranssi	Orange	Orange	Orange	Orange	Orange	Orange	Oranje
4	Giallo	Amarelo	Amarillo	Keltainen	Gul	Gul	Gul	Gelb	Yellow	Jaune	Geel
5	Verde	Verde	Verde	Vihreä	Grön	Grön	Grønn	Grün	Green	Vert	Groen
6	Blu	Azul	Azul	Sininen	Blå	Blå	Blå	Blau	Blue	Bleu	Blauw
7	Viola	Violeta	Morado	Purppura	Lila	Violet	Violet	Violet	Purple	Violet	Paars
8	Grigio	Cinzeno	Gris	Harmaa	Grå	Grå	Grå	Grau	Grey	Gris	Grijs
9	Bianco	Branco	Blanco	Valkoinen	Vit	Hvidt	Hvidt	Weiss	White	Blanc	Wit
A	Argento	Plateado	Plata	Hopea	Silver	Sølv	Sølv	Silber	Silver	Argent	Zilver
B	Oro	Dourado	Oro	Kulta	Guld	Guld	Guldi	Gold	Gold	Or	Goud

1. ASSEMBLING THE BASE PCB P3502B

1. Jumpers



2. Resistors



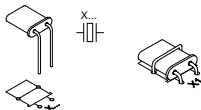
- ☐ R1 : 10M (1 - 0 - 6)
- ☐ R2 : 22K (2 - 2 - 3)
- ☐ R3 : 27K (2 - 7 - 3)
- ☐ R4 : 27K (2 - 7 - 3)
- ☐ R5 : 47 (4 - 7 - 0)
- ☐ R6 : 10K (1 - 0 - 3)

3. Diode. Watch the polarity !



- ☐ D1 : 1N4148
- ☐ D2 : 1N4148
- ☐ D3 : 1N4148
- ☐ D4 : 1N4148
- ☐ D5 : 1N4007

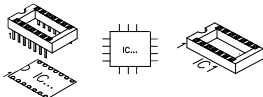
4. Quartz crystal



- ☐ X1 : 5.0688

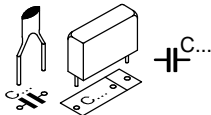
Fix the quartz crystal by means of a jumpwire.

5. IC socket, Watch the position of the notch!



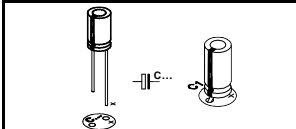
- ☐ IC1 : 16p
- ☐ IC2 : 16p
- ☐ IC3 : 14p
- ☐ IC4 : 14p
- ☐ IC5 : 16p

6. Capacitors



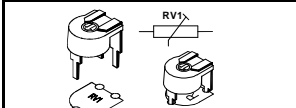
- ☐ C1 : 12pF
- ☐ C2 : 12pF
- ☐ C3 : 22nF (223)
- ☐ C4 : 10nF (103)
- ☐ C5 : 100nF (μ1,104)

7. Electrolytic Capacitors. Watch the polarity !



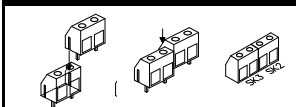
- ☐ C6 : 470 μ F

8. Trim potentiometer



- ☐ RV1 : 470K or 500K

9. Terminal block connectors



- ☐ J1 : 2p + 2p
- ☐ J2 : 2p + 2p

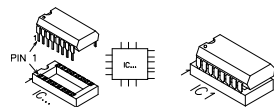
10. Buzzer



- ☐ BUZ1

Be sure to put the longest connection into the bore marked +.

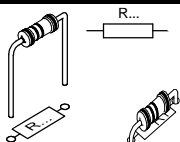
11. IC, Check the position of the notch !



- ☐ IC1 : CD4060 or eq.
- ☐ IC2 : CD4020 or eq.
- ☐ IC3 : CD4068 or eq.
- ☐ IC4 : CD4093 or eq.
- ☐ IC5 : CD4049 or eq.

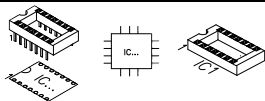
2. ASSEMBLING THE RECEIVER PCB P3502S

1. Resistors



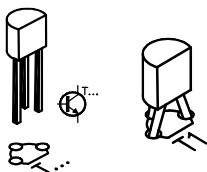
- ☐ R7 : 15K (1 - 5 - 3)
- ☐ R8 : 15K (1 - 5 - 3)
- ☐ R9 : 15K (1 - 5 - 3)
- ☐ R10 : 15K (1 - 5 - 3)
- ☐ R11 : 1K (1 - 0 - 2)
- ☐ R12 : 1K (1 - 0 - 2)
- ☐ R13 : 10K (1 - 0 - 3)
- ☐ R14 : 270K (2 - 7 - 4)

2. IC socket, Watch the position of the notch!



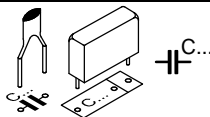
- ☐ IC6 : 14p

3. Transistors.



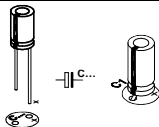
- ☐ T1: BC547 or eq.

4. Capacitors



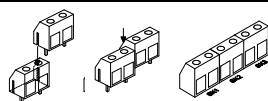
- ☐ C7 : 10nF (103)
- ☐ C8 : 10nF (103)
- ☐ C9 : 100nF (μ 1, 104)

5. Electrolytic Capacitors. Watch the polarity !



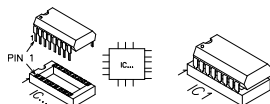
- ☐ C10 : 10 μ F
- ☐ C11 : 100 μ F

6. Terminal block connectors



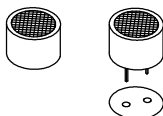
❑ J1 : 3 x 2p

8. IC, Check the position of the notch !



❑ IC6 : TL074

7. Sensors



- ❑ SENS 1 : MA40A5S or eq. (marked with T).
- ❑ SENS 2 : MA40A5R or eq. (marked with CTD)




Either on the print or connect them to the soldering terminals, see chapter concerning the installation in the car.



CHECK THE ENTIRE ASSEMBLED PRINT ONCE MORE VERY CAREFULLY.

3. TEST

- ☐ Connect the points GND, +V, RW, DIS, S1 and S2 of the main PCB to the corresponding points on the receiver PCB.
-  Make sure that the distance between the receiver print and the base print is approx. 50cm.
- ☐ Adjust the trimmer RV1 at the middle position RV1.
- ☐ Connect a 12VDC power supply (or a battery) between the points GND (-) and +.
- ☐ If you hold your hand or a sheet of paper in front of the sensors, you should hear the sound of the buzzer when the distance from the object to the sensors decreases to about 70cm.

4. INSTALLATION IN THE CAR

Mount the receiver print in a synthetic housing, which can be done in two different ways (depending on where it is built in on the car):

A) With the sensors in upright position (fig. 1):

- ☐ Mount the four terminals for SENS1 and SENS2
- ☐ Solder the sensors to the terminals so that they are in a traverse-position regarding the print.
- ☐ Realise the bores in the housing as shown on the drawing (fig. 4).

Install the print behind the bores using spacing sleeves, so that the sensors are facing the bores properly without touching the housing.

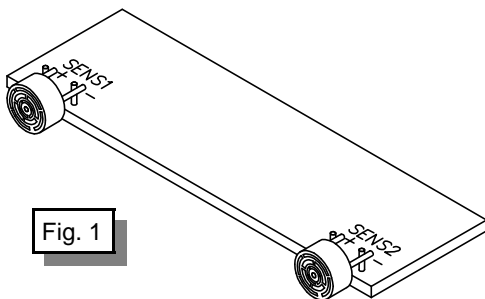


Fig. 1

B) With the sensors in horizontal position (fig. 2):

In this case the sensors are simply mounted on the print.

- ☐ Now realise the gaps in the housing as shown on the drawing. Install the print behind the bores using spacing sleeves, so that the sensors are facing the bores properly without touching the housing.

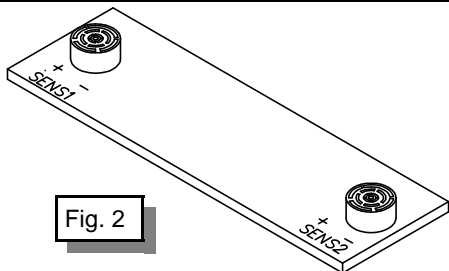


Fig. 2

REMARK: Cover the bores at the inside of the housing with a piece of very fine wire gauze (see fig.3). (if the meshes of the wire gauze are too wide to prevent penetration of splash-water, the gauze should be doubled up two or four times before fixing it to the bores). The sensors should be positioned properly **AGAINST** the wire gauze which has been placed behind the bores.

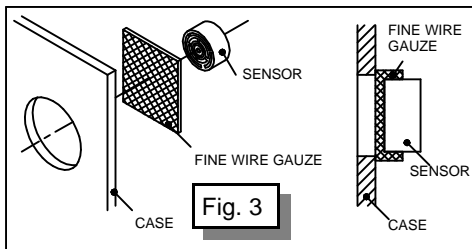


Fig. 3

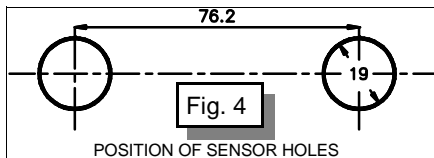
Important:

- ☐ Make a small hole in the bottom of the housing in order to enable the evacuation of the water that eventually has infiltrated.

- ❑ Close the housing as watertight as possible f.i. by using silicone.
- ❑ Search for a suitable place somewhere in the trunk, to built in the base print (by preference as close as possible to the sensor, see below)

Find a suitable place, approximately in the middle of the back-side of the car, for installing the sensors f.i. : underneath or above the bumper. The sensors can be mounted directly behind the bumper as well, but then you will have to perforate the bumper with holes of a corresponding diameter (or wider) there where the sensors are situated.

REMARK : The sensors should be in a 90° angle position to the soil. Before fixing the receiver, first of all you have to connect a piece of cable with 6 conductors (or shielded 5 cable with 5 conductors, the shielding having to be connected to the terminal GND) to its terminals (to the terminals GND, +V, RW, DIS, S1 and S2), so that it can be connected afterwards to the base print (use by preference a color coding cable).




5. DEFINITIVE CONNECTION

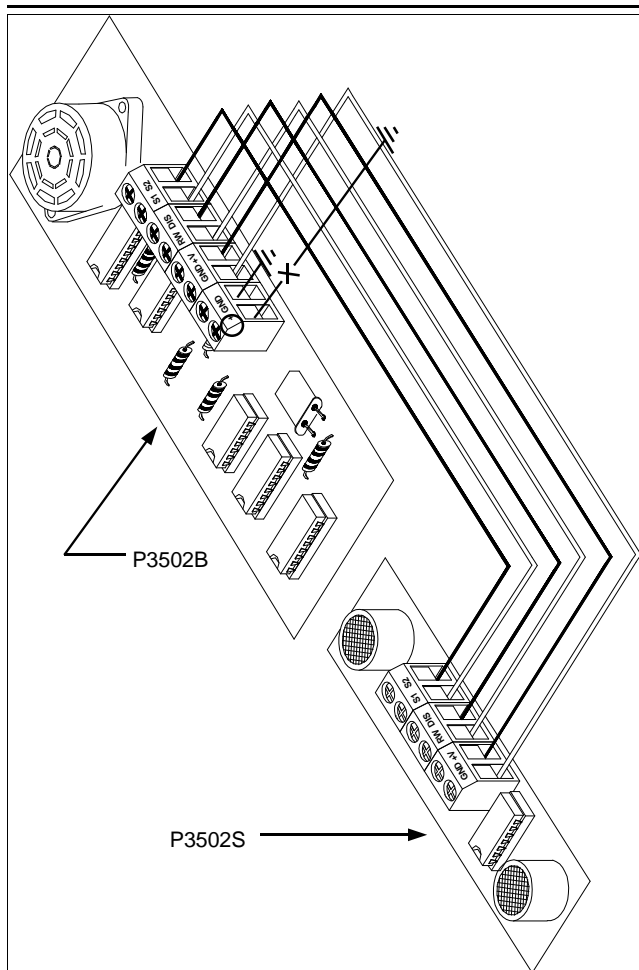
- ☐ Connect the receiver to the base print.
- ☐ Connect the terminal GND of the base print to the - of the car (chassis)
- ☐ Connect the terminal **+V** of the base print to the **+** of the reverse light.

6. USE

The circuit is activated as soon as the gear is shifted in reverse (this is marked by a 'bip' tone) and will detect any obstacle within the range of the sensors, the detection distance (i.e. the sensitivity) being adjusted by means of the trimmer RV1. A distance of approx. 25 to 30cm from the backside of the car seems to be a value of practical use. First of all make some tests with the help of a second person who can survey the distance from the outside (in order to avoid damaging the coach-work).

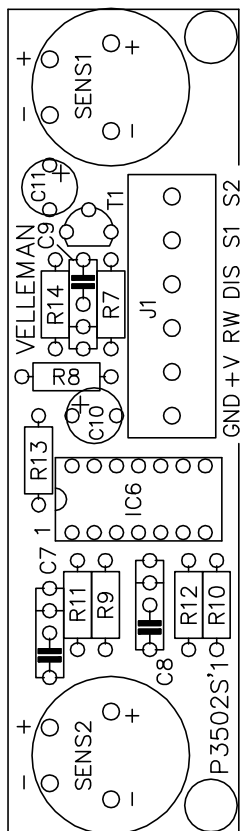
In case the buzzer cannot be heard clear enough, you can bring it closer to the driver by means of a 2 conductor extension cord.

 **REMARK** : Be carefully when washing the car that no water is getting into the receiver (eventually you should cover the sensors by means of adhesive tape).

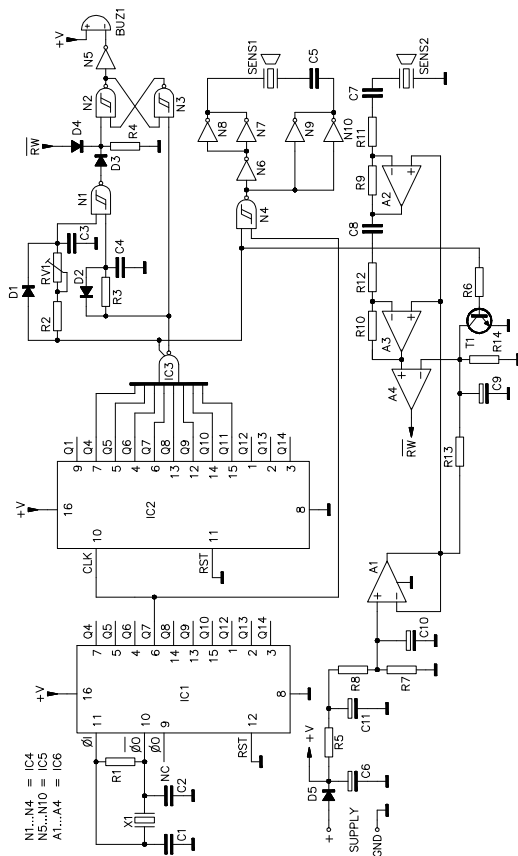


PCB'S & DIAGRAM

7. PCB LAYOUT P3502S



9. SCHEMATIC DIAGRAM



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