2CV DIM-DIP HEADLIGHTS

Graeme Dennes

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Purpose

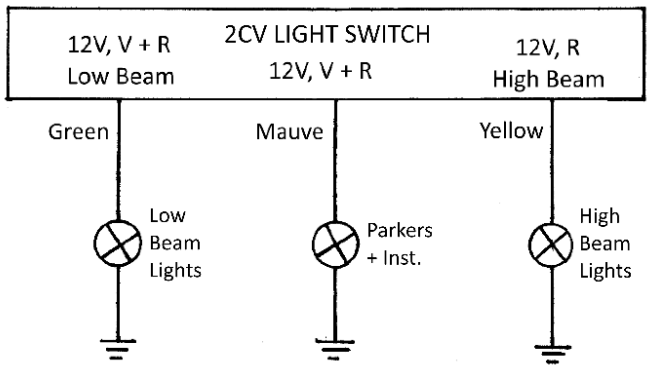
This article briefly describes the origin, purpose and operation of dim-dip headlights. It also describes the potential damage that can occur to the 2CV's light switch caused by the method chosen by Citroen to implement dim-dip lighting in the 2CV. The article shows how the dim-dip "feature" may be easily disabled.

Background

If your 2CV was manufactured for the UK market during 1987 or 1988, it will be fitted with "dim-dip" headlights to meet the mandatory UK vehicle regulations at the time. Front parking lights were commonly used around dusk in built-up areas but were considered to be of insufficient brightness in some conditions, while low-beam headlights were considered to be too glaring for safe use in built-up areas. Dim-dip headlighting was a feature designed to provide night-time illumination using a "town beam" which had greater brightness than contemporary front parking lights but less brightness than low-beam intensity. (The UK was the only country to mandate a dim-dip headlights system.)

2CV Standard Lights Circuit

The Haynes 2CV Workshop Manual (1990) shows the standard 2CV electrical wiring diagram on page 198. The 2CV light switch assembly includes three separate light switches. The wiring diagram below, drawn from the Haynes Manual, shows the light switch connections:



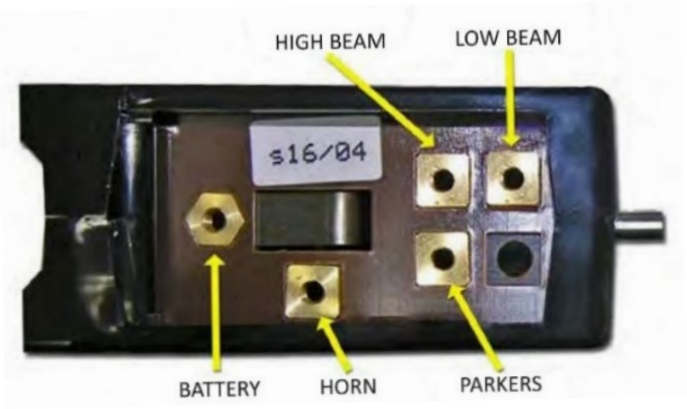
1. **Green** wire: low-beam lights (2 x 40W = 80W) plus fog light (21W), a total of 101W.
2. **Mauve** wire: parking lights (2 x 4W = 8W front, 2 x 5W = 10W rear) and instrument light (2W), a total of 20W.
3. **Yellow** wire: high-beam lights (2 x 45W), a total of 90W.

Note: Your wire colours may differ!

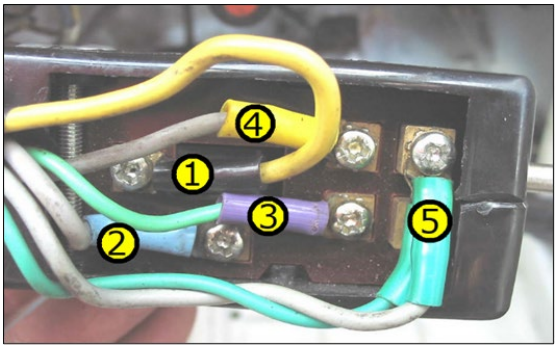
Light Switch Rotary Positions

The diagram above includes references to the light switch rotational positions "V" and "R". The light switch "V" position is the first clockwise position from the "O" (off) position, while the "R" position is the second clockwise position from "O". The "V" is for Ville (City) driving and provides low beam operation only, while "R" is for Route (highway) driving and provides low and high beam operation.

Light Switch Connection Terminals:



Light Switch Wiring:



The photo above left shows the five wiring terminals on the rear of the 2CV light switch. The Low Beam terminal connects to the **green** wire, the Parkers terminal connects to the **mauve** wire, and the High Beam terminal connects to the **yellow** wire.

The photo above right shows one example of the wiring colours used for the 2CV light switch. Your colours may differ! In the right photo, the wiring connections 1 to 5 are:

1. Battery: yellow wire-black sleeve.
2. Horn: grey wire-blue sleeve
3. Parkers: green wire-violet sleeve:
4. High beam lights: grey wire-yellow sleeve:
5. Low beam lights: grey wire-green sleeve and green wire-green sleeve.

2CV Dim-Dip Vehicles

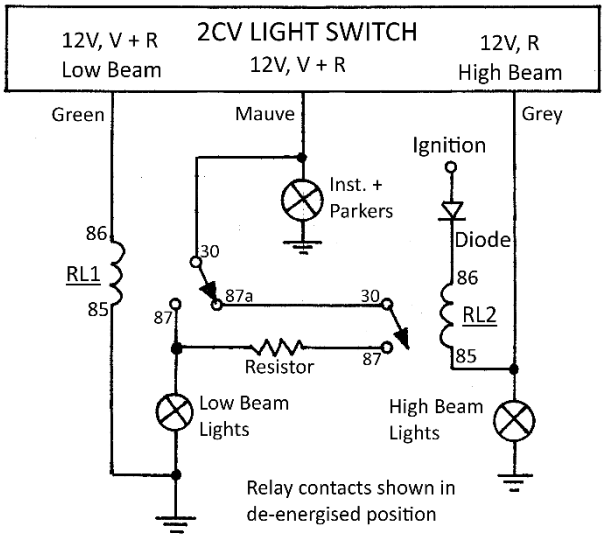
For the 2CV "town beam" or dim-dip lighting, Citroen chose to provide a reduced voltage to the low-beam headlights by inserting a 1.0 ohm resistor – the dim-dip resistor, in series with the low beam lights, dropping the 2 x 40W = 80W low-beam power to perhaps half that figure.

Dim-Dip Lights Operation

The light switch operation in the 2CV with dim-dip lighting is as follows. *With the ignition switch on and the light switch in the "V" position*, if low-beam is selected, the normal low-beam headlights are operated, while if "high-beam" is selected, the low-beam headlights are operated at reduced brightness – the dimmed dip or "dim-dip" brightness.

In 1988, the European Commission successfully prosecuted the UK government in the European Court of Justice, arguing that the *mandatory* UK regulations requiring dim-dip headlights were illegal under EC directives prohibiting member states from enacting vehicle lighting requirements not contained in pan-European EC directives. As a result, the UK regulations mandating dim-dip headlights were quashed in 1989. This did not, nor was it intended to, prevent vehicle manufacturers from continuing to fit dim-dip headlights, but it was no longer mandatory. Several manufacturers continued to fit dim-dip lighting to their vehicles for several years afterwards. (My thanks to Wikipedia.)

2CV Dim-Dip Lights Circuit

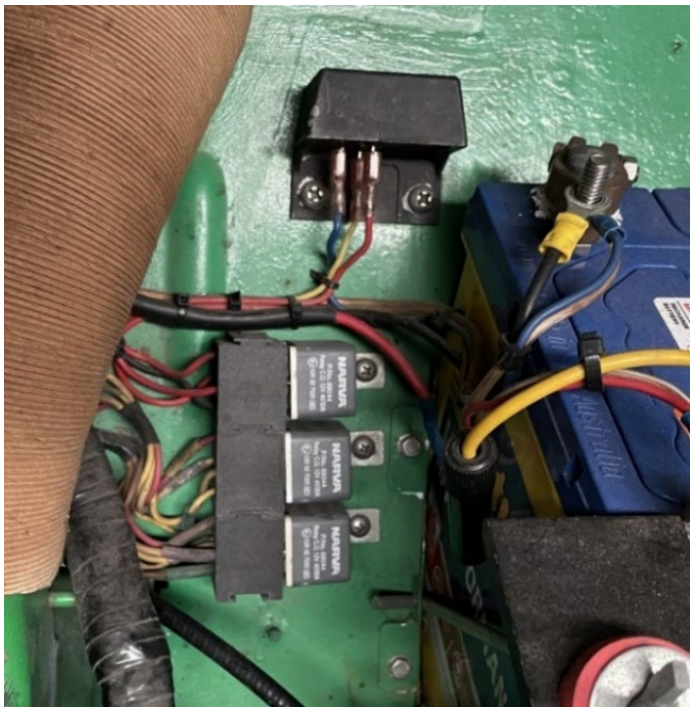


The dim-dip wiring diagram at left is based on the diagrams shown on pages 198 and 199 of the Haynes book, where page 199 shows the dim-dip wiring. The complete 1987 2CV dim-dip wiring diagram is shown as a composite of pages 198 and 199 at the end of the article.

The dim-dip modification adds two relays, a diode and the resistor. The Haynes book refers to relay RL1 as the "Dipped beam" relay and relay RL2 as the "Dim-dip" relay. The two relays and sockets are usually mounted on the firewall near the battery.

The diode ensures the engine is turned off if the ignition switch is turned off while the headlights are on high beam. Without the diode, the engine could continue to run, the ignition system drawing its power via the high beam light switch. The diode is located in the wiring "nest" behind the instrument panel in a small protective holder.

The 1-ohm dim-dip resistor, shown at left, is encased in a small aluminium cannister, held by a clamp on the left side of the front engine mount cross-member, guaranteeing it received a good dose of salt, dirt, grit, water, etc. This eventually leads to corrosion of the aluminium cannister, rendering it faulty. Its failure (shorting to ground) could cause the light switch to be damaged beyond repair should it occur when the low beam headlights are on.



In the photo at left from the writer's 1987 2CV, the two lower relays are the dim-dip relays.

The top relay is part of the writer's **Bosch RE57** voltage regulator modification, which locks the battery voltage to **exactly** 14.2 volts. Refer to the writer's article, *2CV Battery Problems Solved*.

Note that the three Narva sockets holding the relays are designed to clip neatly together as an assembly.

2CV Dim-Dip Light Switch Positions and Connections

Read the following in conjunction with the 2CV Dim-Dip Lights Circuit above.

Light switch in "O" position:

All lights off.

Light switch in "V" position:

Low beam selected:

Green wire has 12V
Yellow wire has 0V
Relay RL1 activated
Low-beam lights on

High beam selected, *Ignition off:*

Green wire has 0V
Yellow wire has 0V
All lights off

High beam selected, *Ignition on:*

Green wire has 0V
Yellow wire has 0V
Relay RL2 activated via diode
Resistor inserted in low-beam circuit
Dimmed low-beam lights on

Light switch in "R" position:

Low beam selected:

Green wire has 12V
Yellow wire has 0V
Relay RL1 activated
Low-beam lights on

High Beam selected:

Green wire has 0V
Yellow wire has 12V
High-beam lights on

2CV Dim-Dip Light Switch Wiring Changes

Based on the standard 2CV wiring diagram on page 198 of the Haynes book, the dim-dip wiring modification on page 199 shows two changes were made to the light switch wiring:

1. The **green** wire no longer connects to the low beam lights. It connects to the Dipped-beam relay coil only.
2. The **mauve** wire remains connected to the parkers and instrument light, but it also connects to the low beam lights, the fog light and the dim-dip resistor.

Problem #1 With the 2CV Dim-Dip Design

When dim-dip lighting is operating in the 2CV, the reduced voltage supplied to the low-beam headlights has the following ramifications:

a. For standard incandescent headlight globes: **No harm is done.**
b. For halogen headlight globes: Under-voltage operation can impair the globes because it interrupts the halogen cycle. The lower voltage reduces the temperature of the glass envelope, preventing the tungsten silvering deposited on the inside of the glass from evaporating and returning to the filament. Thus the globes become **darkened beyond use.**
c. For LED headlight globes: LED globes will often not tolerate under-voltage situations and **may be destroyed.**

Problem #2 With the 2CV Dim-Dip Design

The dim-dip solution chosen by Citroen changes the operational usage of the light switch green and mauve wires. We'll compare the standard 2CV and the dim-dip 2CV light switch wiring shown in the two wiring diagrams above.

Standard 2CV:

a. The **green** wire operates the low-beam headlights and the fog light. Total power is 101W. At 12V, the current through the switch is 101/12 = **8.4 amps**.
b. The **mauve** wire operates the parking lights (18W) plus the instrument light (2W). Total power is 20W. At 12V, the current through the switch is 20/12 = **1.66 amps**.
c. The **yellow** wire operates the high-beam headlights. Total power is 90W. At 12V, the current through the switch is 90/12 = **7.5 amps**.

Dim-Dip 2CV:

a. The **green** wire operates the 75-ohm coil of relay RL1. Total power is 2W. At 12V, the current through the switch is 2/12 = **0.16 amps**.
b. The **mauve** wire operates the parking lights (18W), the instruments light (2W), the low-beam headlights (80W) and the fog light (21W), for a total power of 121W. At 12V, the current through the switch is 121/12 = **10.1 amps**.
c. The **grey** wire operates the high-beam headlights. Total power of 90W. At 12V, current through the switch is 90/12 = **7.5 amps**.

Analysis

a. In the standard 2CV, the **green** wire passes **8.4 amps**. In the dim-dip 2CV, the **green** wire passes **0.16 amps**. All good.
b. In the standard 2CV, the **mauve** wire passes **1.66 amps.** In the dim-dip 2CV, the **mauve** wire passes **10.1 amps**, more than six times the standard 2CV current. All bad!
c. The **yellow** wire in the standard 2CV and the **grey** wire in the dim-dip 2CV each pass **7.5 amps**. No change. All OK.

Using 65W/60W Headlight Globes

The light switch currents above are based on 45W/40W globes (45W high beam filaments and 40W low beam filaments). For 2CVs using 65W/60W globes, the light switch problem is exacerbated by the additional 40W of power or 40 /12 = 3.3 amps of current being added to the mauve wire and the grey wire.

The **mauve** wire passes **10.1 + 3.3 = 13.4 amps when on low beam, nine times the standard 2CV current of 1.5 amps.** The mauve wire light switch contacts were never designed to accommodate a continual current overload of this magnitude. The excessive current can harm the switch contacts through resistive heating, leading to burning or melting of the switch materials and the destruction of the light switch.
Likewise, the **grey** (and **yellow)** wire passes **7.5 + 3.3 = 10.8 amps**, an almost 50 percent increase, which is probably manageable. In the view of this electronics engineer, the 2CV light switch is underrated for its task - in the standard 2CV and the dim-dip 2CV.

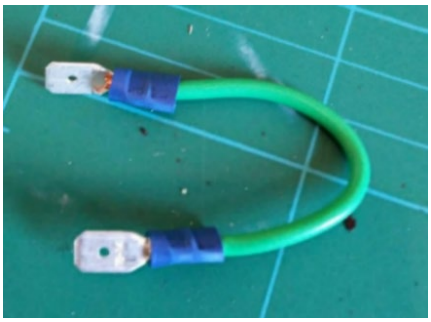
Summary and Recommendation

In the dim-dip 2CV, the **mauve** wire light switch contacts are being **hammered** by excessive current whenever the **low-beam** headlights are on (and to a lesser extent, the dim-dip headlights) because of the fiendish dim-dip wiring arrangement implemented by Citroen! The writer recommends **urgently** disabling the dim-dip function in your 2CV.

The Solution

The following simple (and non-permanent) solution devised by Mike Phelan (2CVGB) will disable the dim-dip "feature" and effectively return the dim-dip lights wiring back to the standard lights wiring to help save the light switch.

Disabling the Dim-Dip Feature



1. Remove both dim-dip relays from their wiring sockets.
2. Cut a 75mm length of 1.5mm diameter (copper diameter) multi-stranded insulated copper wire, and crimp a blue spade connector at each end. See photo at left.
3. Use the wire link to join pins 86 and 87 of relay RL1 socket, **the socket with five wires connected to it.** Refer to the socket numbering diagram shown below.
4. Turn on the low beam headlights. If the lights operate, continue to step 5. If the lights do not operate, move the wire link connection at pin 86 over to pin 85. The low beam lights should now operate.
5. Disconnect and remove the dim-dip resistor from the chassis cross-member.
6. Tie a small polythene bag over the two relay sockets and the wire link to keep water and dirt out, and tape the sockets to the wiring harness in a safe and tidy manner.
7. Tie a small polythene bag over the connector to which the resistor was fitted to keep water and dirt out.

To reinstate the dim-dip feature, remove the jumper wire, refit the two relays to the sockets, remount the relays to the firewall and refit the dim-dip resistor.

Relay Socket Numbering

The 5-pin relay socket at left is the view seen **when looking directly at the top of the relay sockets** after the relays have been unplugged. The pin numbers are shown.

Other Options

An option would be to mount a small plastic box of sufficient size to the firewall near the original mounting position of the two relays. Its job is to contain and protect the two vacant relay sockets and the wire link, keeping them away from harm and from being disturbed. A split rubber grommet could be used to allow the relay wires to pass through the side of the box without chafing the wires. If possible, mount the box with the wiring extending downwards from the bottom of the box to prevent water entry. Finally, disconnect and remove the dim-dip resistor so it can't cause havoc.

To reinstate the dim-dip feature, remove the plastic box, return the two relays to the sockets, remount the relays to their original positions on the firewall and refit the dim-dip resistor.

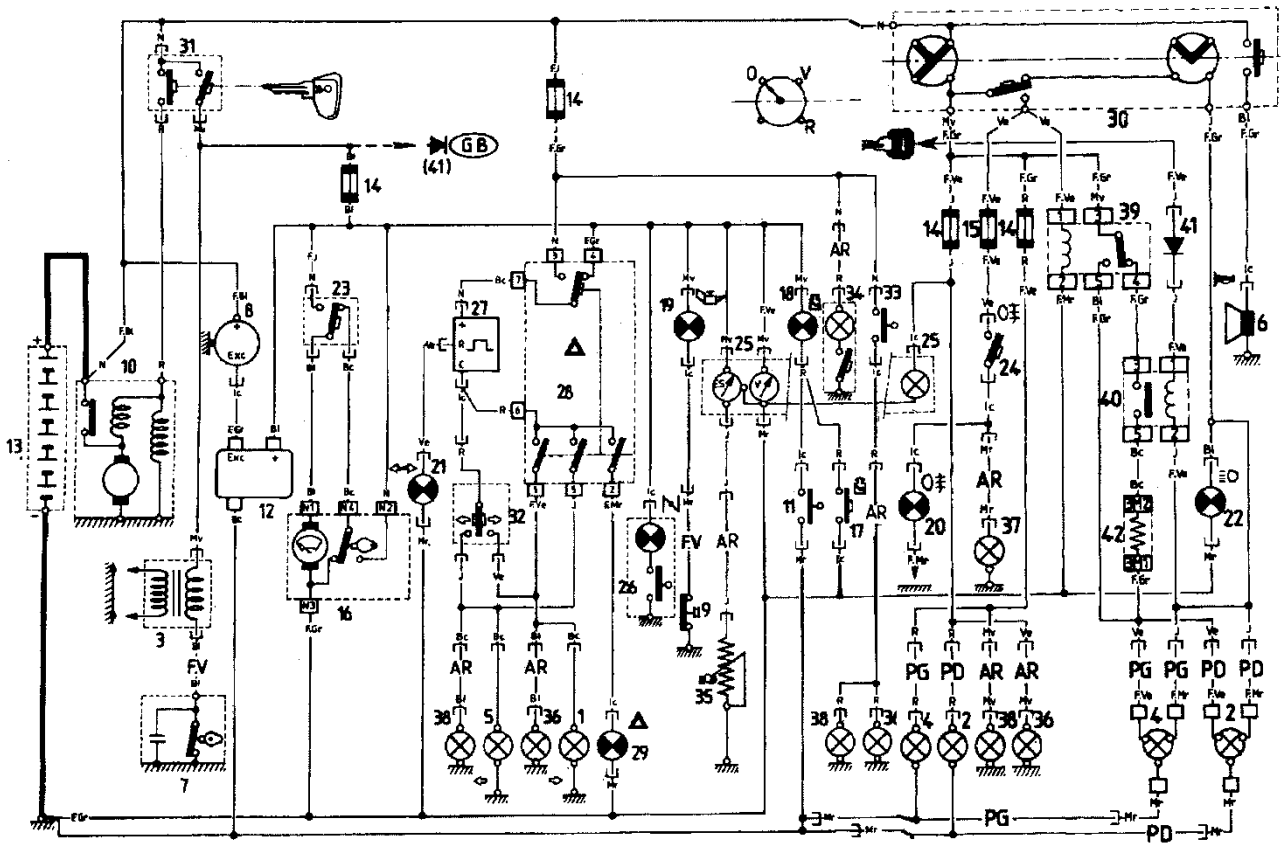
The Method Used by The Writer. On the previous page under Disabling the Dim-Dip Feature, perform steps 1 to 7 **except step 6** to identify whether pins 86 and 87 or pins 85 and 87 should be linked. Prepare **two** modified (dummy) relays which have had sufficient of their internal coils, contacts, structural materials, etc, removed by hacksaw, etc so as to achieve electrical isolation of all five pins, i.e., no electrical connection **between** the five pins. Confirm using a multimeter. (The relays may not look very nice when completed.) In the dummy relay to be fitted to the socket with five wires connected to it, solder a wire link between the identified pair of pins. The dummy relays are then plugged into their correct sockets. (The wire link will not be visible.) Confirm that the low beam lights operate correctly when selected, then remount the relays to their original positions on the firewall. The writer sacrificed two Narva 68044 relays to use for the dummy relays.

To reinstate the dim-dip function, simply replace the dummy relays with genuine relays and refit the dim-dip resistor.

One Final Thought

There is one further step which could be taken to protect the light switch in dim-dip or non-dim-dip 2CVs. The green, mauve and grey wiring from the light switch could be changed so the three wires operate the coils of three added relays, such as the relay type mentioned above. The contacts of these relays would take the place of the light switch contacts and do the necessary circuit switching. By this means, the green, mauve and grey wires and the light switches would only carry the relay coil currents (0.16 amp), while the contacts of the three relays would do all the heavy lifting of carrying the lighting circuit currents, taking the load, once and for all, off the three light switches. Utopia!

1987 2CV Dim-Dip Electrical Wiring Diagram



1987 2CV Dim-Dip Electrical Wiring Diagram.

This is a composite diagram based on the Haynes Manual pages 198/199 wiring diagrams.

1 Front direction indicator (RH)
2 Headlamp (RH)
3 Coil (HT)
4 Headlamp (LH)
5 Front direction indicator (LH)
6 Horn
7 Ignition contact breaker
8 Alternator
9 Engine oil pressure sensor
10 Starter motor
11 Brake fluid level sensor
12 Voltage regulator
13 Battery
14 Fusebox
15 Rear foglamp fuse
16 Windscreen wiper motor
17 Brake fluid level test switch
18 Brake fluid level warning lamp
19 Engine oil pressure warning lamp
20 Rear foglamp warning lamp
21 Direction indicator warning lamp
22 Main beam warning lamp
23 Windscreen wiper switch
24 Rear foglamp switch
25 Instrument panel lamp
26 Carburettor choke
27 Flasher unit
28 Hazard warning switch
29 Hazard warning indicator lamp
30 Horn and lighting switch
31 Ignition switch
32 Direction indicator switch
33 Stop-lamp switch
34 Interior lamp
35 Fuel gauge transmitter
36 Rear lamp cluster (RH)
37 Rear foglamp
38 Rear lamp cluster (LH)
39 Dipped beam relay
40 Dim-dip relay
41 Dim-dip diode
42 Dipped beam resistor

Colour code

Bc White
Bl Blue
Gr Grey
Ic Colourless
J Yellow
Mr Brown
Mv Mauve
N Black
R Red
Ve Green

AR Rear harness
F Lead
FV Flying lead
PD Headlamp harness (RH)
PG Headlamp harness (LH)

Legend for 2CV dim-dip electrical wiring diagram above.

Not all items are fitted to all models.

LIST OF ARTICLES BY THE WRITER

The articles written by the writer, listed below, may be freely downloaded from either of the following club websites by clicking on the adjacent links and locating the articles. Both websites maintain the latest revisions of the articles. Before using the articles, please ensure the latest revisions are being used, as the articles are updated on an as-required basis by the writer and given new revision numbers.

Citroen Classic Owners' Club of Australia: Technical Articles

Citroen Car Club of Victoria: Tech Tips

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2. 2CV API GL-4 Gearbox Oil
3. 2CV Battery Charging Circuit
4. 2CV Battery Problems Solved
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27. 2CV Spare Parts to Carry
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FINAL STATEMENT

My acknowledgement and grateful appreciation is given to the web sites
from which photos/drawings/diagrams have been sourced.

My acknowledgement and grateful appreciation is given to Haynes Publishing Group for the electrical wiring diagram from the book, Haynes Citroen 2CV Owners Workshop Manual.

This article may be updated in the future and assigned a new revision number.

Before using the information in this article, ensure the latest revision is being used.

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