Beige Mirabello

FULVIA

2nd SERIES

COUPE
SPORT

OWNERS NOTES:
2. RESTORATION (Part 2)

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April 2025

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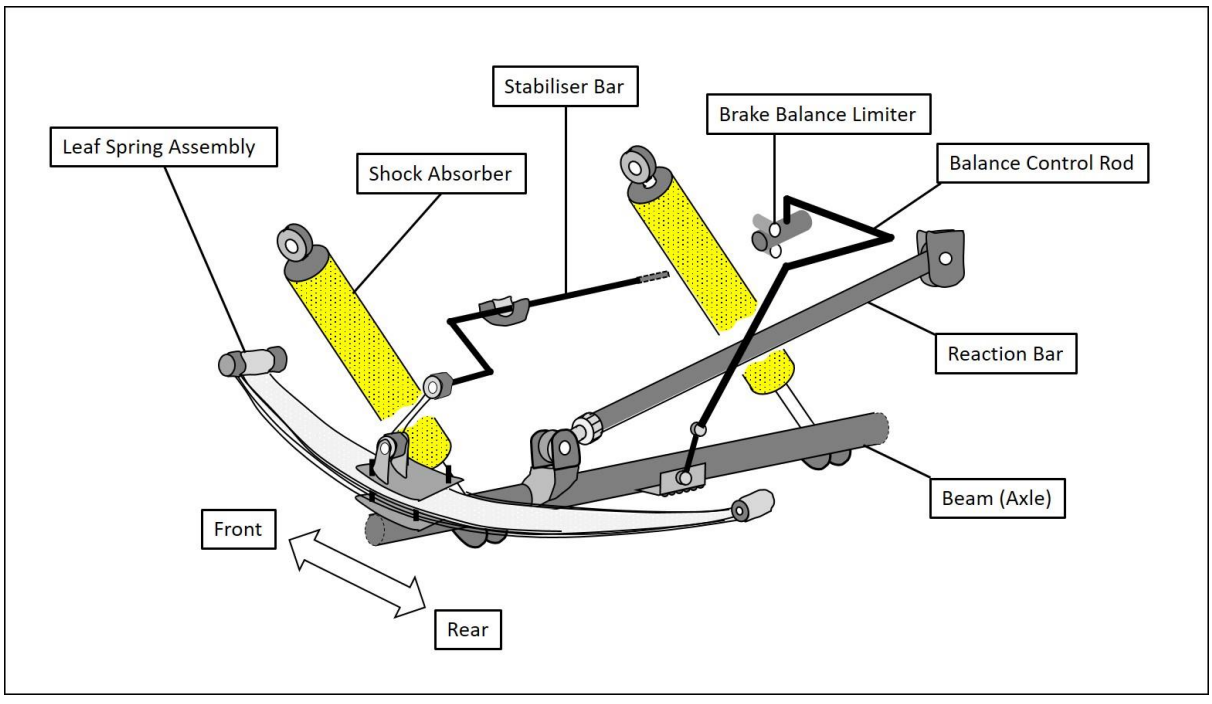
4.1 Fulvia Suspension

Many items that make up the Fulvia suspension would require full workshop facilities, and some experience, to repair or replace. However, some knowledge is helpful in order to detect and interpret problems and to be able to plan ahead for maintenance. For this reason, we have included an overview of the front and rear suspension, as well as more detailed descriptions of the hubs, bearings, brake discs and drives shafts. Since cars of this age are not currently subject to an annual MOT inspection in the UK, careful attention should be paid to the condition of items such as shock absorbers, CV-joints and boots and brake pads/discs after purchasing a car or preparing it for road use after storage.

4.1.1 Overview

One of Lancia's strengths was their determination and ability to make a dynamically excellent car by careful integration of suspension components, even when other manufacturers offered more modern designs. The Fulvia was Lancia's last car to use leaf springs for front and rear suspension and, while less tuneable than 'coil-over-shock' set-ups, they took Fulvias to European Rally Drivers' Championships in 1969 and 1973.

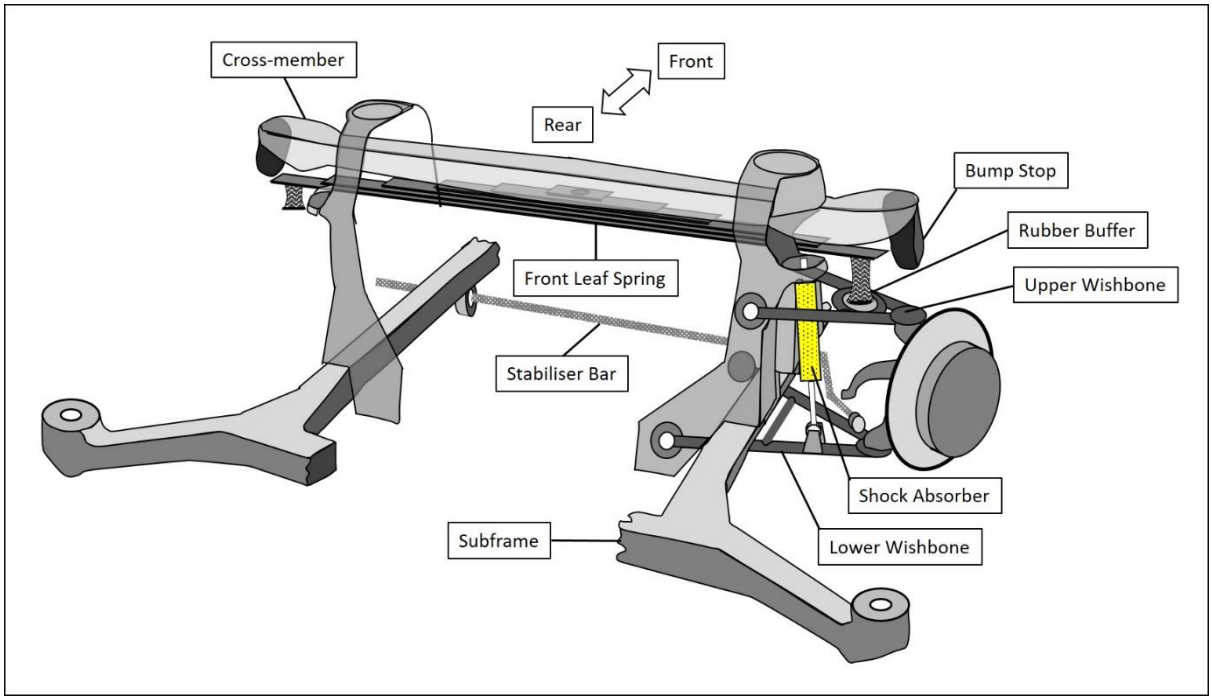


The layout of the rear suspension is shown in the diagram above. Sideways motion of the Beam (Axle) is limited by a sturdy Reaction Bar (also called a Panhard Rod) which is hinged at both ends to

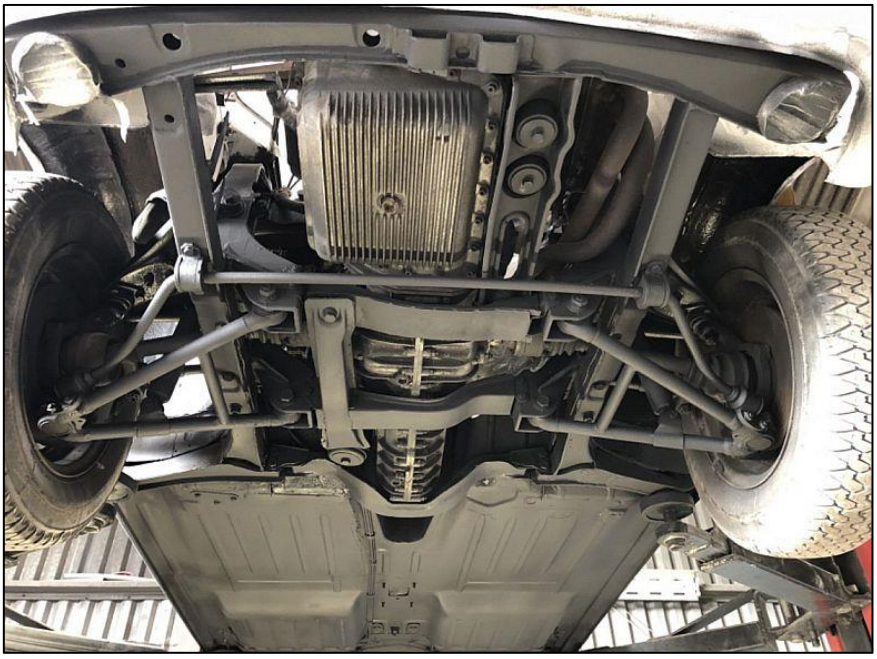
allow the axle to move in a vertical plane. Vertical movement of the axle and its rotation/twisting in the vertical plane is controlled by the Leaf Springs and limited by the Stabiliser Bar (Anti-Roll bar). Damping is provided by the shock absorbers which connect each end of the Beam to the body of the car. Some additional damping is provided by the Stabiliser Bar, which also acts as a stiff spring to absorb some of the more rapid impacts on the wheels and axles from the road surface. All of these items are flexibly connected to the car and, in some cases to each other, by bolts and axles which pass through rubber bushes.

When restoring the Fulvia suspension, attention should be paid to the rubber bushes, as well as the mechanical components. Bushes may be either be too hard (if exposed to heat) or too soft (if exposed to oil) and all benefit from replacement after 50 years. Fortunately, replacements are available for most suspension bushes (wishbones, front and rear Anti-Roll bars, Panhard Rod, spring mounts, subframe mounts) from trusted suppliers (Omicron, Tanc Barratt, Pieces Fulvia and Cavalittos/OldLanciaSpares in Europe). Options for replacing springs are more limited. Very few original replacement (OEM) springs remain and, while Cavalittos/OldLanciaSpares.com currently offer remanufactured springs, their availability is limited. If replacing the rear springs, this should be done in pairs and from the same supplier - spring rates can vary and it is important that both sides are similar. Lancia used two different designs for Fulvia rear springs and their mounts (‘one silentbloc’ and ‘two silentblocs’), corresponding to Series 1 and Series2/Fulvia3 cars, so care must be taken when ordering replacements. To add to the problem, a number of early S2 cars used some remaining S1 parts and have been retrospectively described as Series 1 ½; the S2 1600HF Coupe included in this Guide is one such car.

High-pressure, gas-filled shock absorbers from De Carbon were originally supplied by Lancia and are much missed by those that have used them. However a wider range of adjustable types are now available and expert advice should be sought in order to select one that is compatible with the intended use of the car. Other suspension hardware (front and rear stabiliser bars, reaction rod, beam axle and brake balance control rod) have long-lifetimes and may not need replacement unless accident damaged, although it is also worth checking the areas that are hidden under rubber bushes for possible corrosion.



The Front suspension (shown above) is simpler, with a single leaf spring, mounted transversely across the top of the engine bay, above the gearbox bellhousing, and secured at its mid-point to the front subframe cross-member. Each end of the spring is attached to a rubber buffer which sits between the spring and one of the upper wishbones and which can damp small, rapid, vertical movements of the front wheels. Larger motions of the wheels are controlled by the spring and a Stabiliser (Anti-Roll) bar which connects the two lower wishbones. Oscillations are damped by the Stabiliser bar and shock absorbers which are mounted between the lower wishbones and the subframe towers.

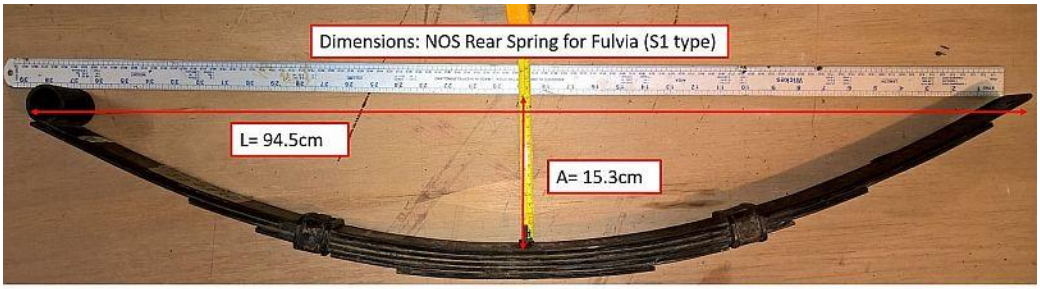


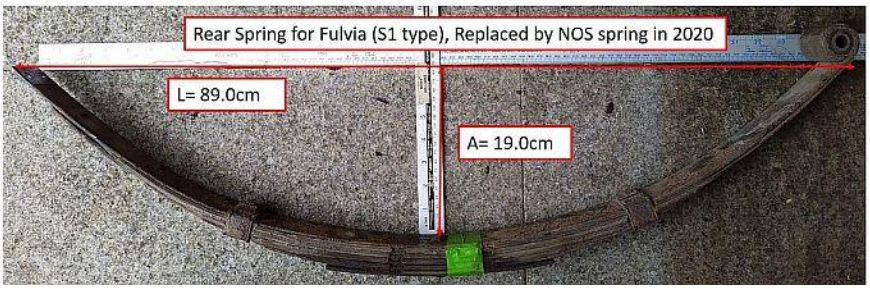
4.1.2 Springs

Replacement of the front spring, or the rubber buffer that connects it to the upper wishbone, should be approached with caution. The spring exerts considerable pressure on the buffer, and this must be relieved before the buffer can be safely removed. Detailed descriptions of procedures can be found online and should be consulted before work is started. Some methods involve constructing a clamp, for example, one made from two steel bars and connected by two threaded rods. One bar is placed on top of the cross-member while the other sits below the end of the spring with a threaded rod on each side of the spring. By tightening the nuts which secure the lower bar, the spring end can be drawn up until the rubber buffer is no longer compressed and can then be safely removed. Alternatively, the spring can be compressed by raising the car using a jack placed under the lower wishbone. The spring must then be secured to the cross-member with a strong clamp or two or more turns of chain held with a suitable shackle.

While assessing the options, refurbishment of the existing springs may also be considered. While the transverse front spring is within the engine bay and protected by the U-shaped cross-member, the rear springs are exposed to the road. Rust between the leaves of the spring acts as an abrasive, wearing away the plastic separating strips and increasing friction. Removing, dismantling and cleaning the individual leaves can allow them to return to their original shapes (although not their spring rates) and any broken leaves can usually be replaced by more-readily available second-hand items. After painting and replacing the separating strips and clamps, the spring can often be re-used. Re-tempering of springs can be considered as a last resort; however this requires expertise and, without factory data on spring dimensions and rates, its success cannot be determined.

Factory measurements of the curvature of original springs are not available and are probably less important than the spring rates. However, the authors have been able to compare a well-used (135,000miles / 217,000km), refurbished (but not re-tempered) spring with a new, original spare (NOS) Fulvia item and the dimensions are shown below, for information.





The NOS springs shown were obtained in 2020 with their factory paint and stencilling intact and so, in order to preserve this and prolong the life of the spring, some thought was given to their protection while in use. The use of spring gaiters was considered but rejected, since any failure of the seal leads to the trapping of water and enhanced, unobserved corrosion.

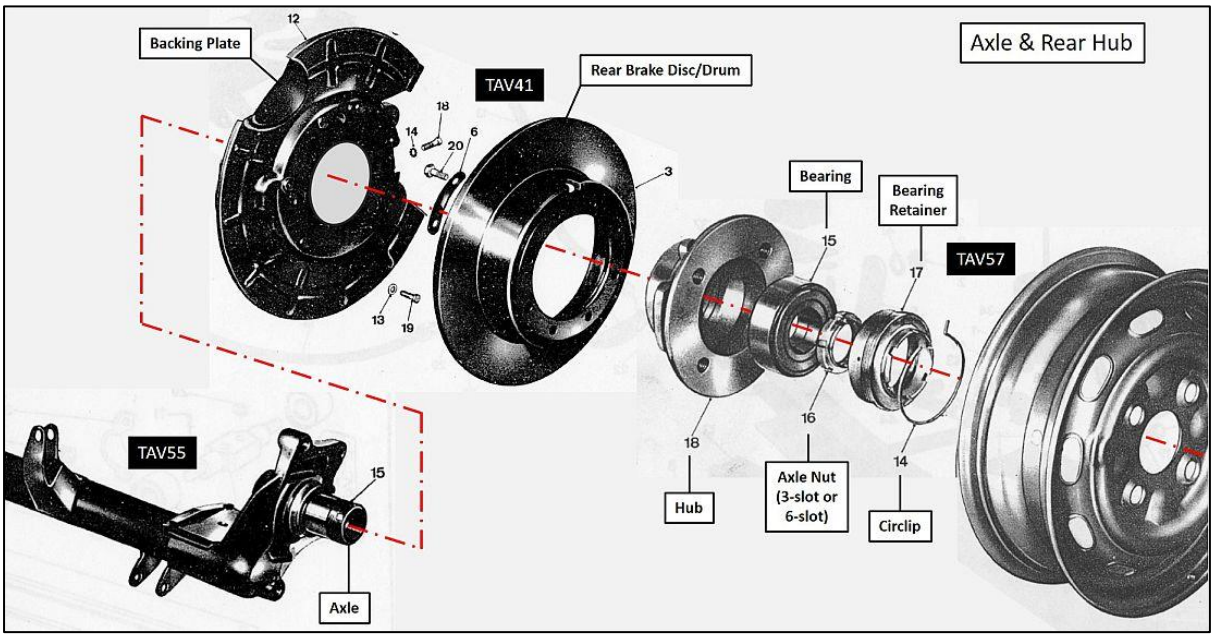
Instead the rear springs were first treated with a coat of proprietary spray-wax (Comma Wax Seal Spray) and then wrapped in protective grease tape (Denso Tape, 50mm wide). After that, an outer layer of rubber self-amalgamating tape was applied. The central portion of the spring which, when fitted to the car is protected by the shackle plate, was left uncovered. The springs were checked after 18 months of use and the covering was found to be intact and still flexible.

4.1.3 Hubs, Discs and Driveshafts

The Rear Hub and Axle

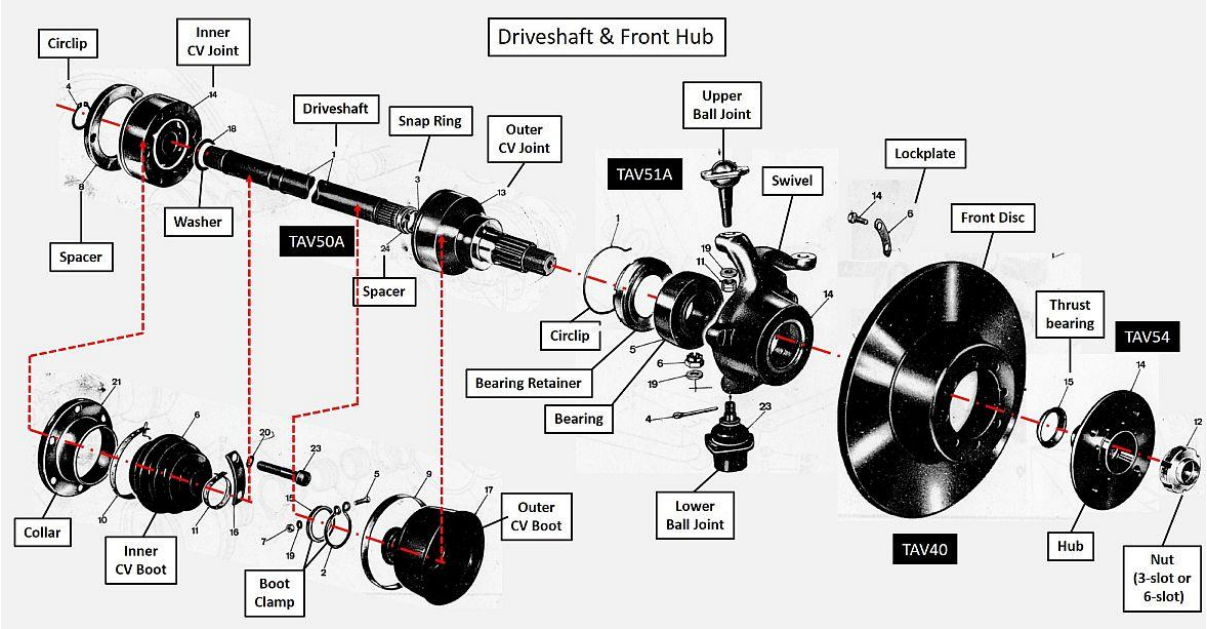
The rear Beam (item [15] in the diagram below and described in Section 4.1.1) terminates on each side in a raised carrier and a short, threaded axle, to which a brake backing plate is bolted. The backing plate [12] provides mounting points for the rear brake shoe mechanism (used as a handbrake) and protects the rear of the disc and the contents of the drum from dirt and water.

The rear hub, bearing, retainer and circlip ([14], [15], [17], and [18]) form a unit that is then attached to the brake disc/drum, using 8 bolts [20], inserted into the rear of the hub from inside the drum. The end of a large wire circlip [14] locates in a hole on the inside of the hub to lock the assembly together. The disc/hub assembly can then be slid onto the axle, locating on the thrust bearing surface at the base of the axle, and secured using the axle nut [16].



The bearing retainer and the axle nut have fine threads and are difficult to remove when dismantling the hub to change the bearing or gain access to the brake drum. Special Lancia tools are available and should be sought out, but usually need to be used in conjunction with (or welded to) a long bar. Note that 3- and 6-slot versions of the axle nuts were used by Lancia on both front and rear axles and it is important to know which are present on your car.

The Front Hub and Axle



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The arrangement of components that make up the front axle are shown in the composite diagram above, which was assembled from TAV40, TAV50A and TAV51A of the Fulvia Parts Manual, 1970. The front wheel bearing [5], retainer [15] and circlip [1] are fitted inside a swivel-hub [14] which is attached to the upper and lower wishbones (23], [24]) using ball joints. The drive shaft assembly, consisting of the driveshaft with its inner [14] and outer [13] CV joints, is inserted through the bearing, where it engages with a spline inside the front hub/front disc assembly and is secured with the driveshaft nut [12].

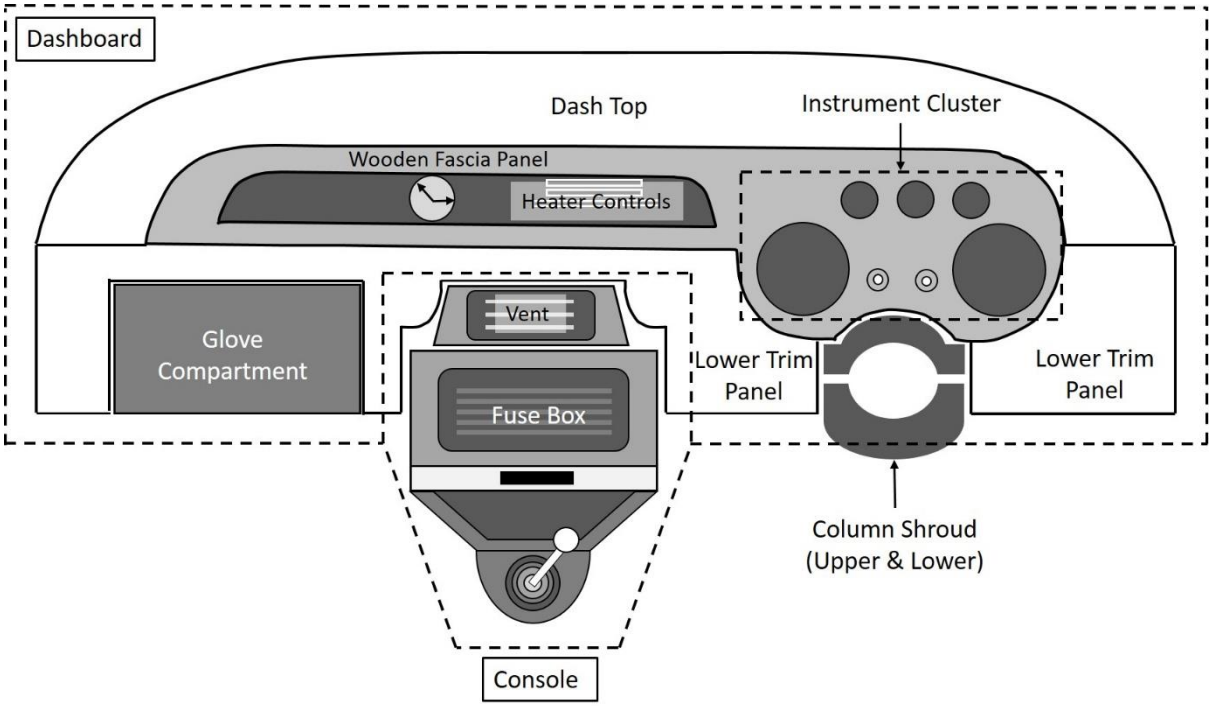
To replace the CV boots, the inner CV joint is first disconnected from its mounting plate on the gearbox and the driveshaft nut removed. By moving the steering wheel, the swivel can be rotated to a position where the inner end of the driveshaft can be lowered. Once lowered, a few firm blows with a soft mallet on the inner CV joint should allow the outer CV joint to be withdrawn from the hub. With the driveshaft removed, the outer CV boot can be slid back and the outer CV joint freed using a soft mallet. Once the outer CV joint has been removed, replacing the boots and the CV joints is straightforward. The outer CV joint is supported by a small spacer [24] and secured by a snap ring [3], which should be replaced if it is absent. During reassembly the snap ring should be slid onto the shaft, outboard of its groove, and the CV joint knocked on, until the ring is properly located and the CV joint is locked in place.

5.1 Fulvia Interior

5.1.1 Dashboard and Console Layout

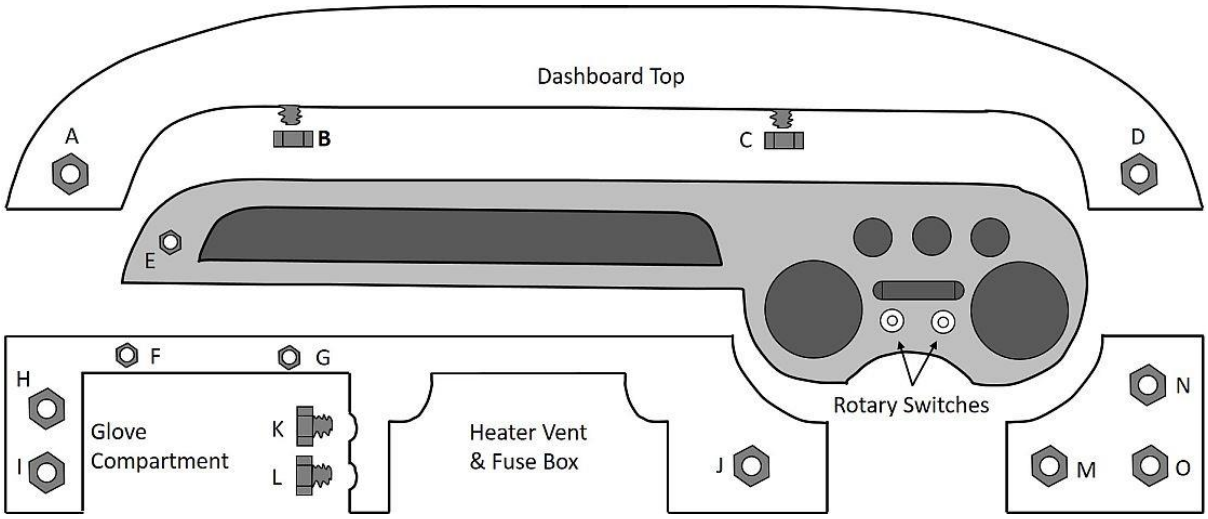
At some point in a full restoration, it will become necessary to repair or refurbish one or more of the items that are contained in the driver's dashboard and console. Ideally this would be done only after major structural work has been completed, at a stage when the interior can be kept relatively clean and dust-free, to prevent any ingress of dust into the instruments after refurbishment.

For clarity, the terms used in this section refer to the items and groups of items illustrated in the diagram below.



5.1.2 Removing the Dashboard

To gain access to the instrument cluster, only the dashboard top must be removed. However visibility and access to retaining nut C is greatly improved if the lower panels are also removed or loosened (recommended).



The process starts with removing the lower plastic panel of the steering column (4 long screws) and the right-hand panel of the lower dashboard, which is held by three nuts (M-O) behind the panel. Nut M attaches the panel to a small bracket near the steering column. At this point, nut D can be removed.

Nuts A and B are accessible from the glove compartment, although this first requires removal of the radio, if fitted. The wooden fascia panel can then be loosened by carefully removing nut E and the knurled rings which secure the rotary switches to the front of the panel. The bolt that attaches nut E is glued into the back of the wooden instrument panel and will be loosened if too much force is applied to it. If resistance is encountered, use penetrating oil to free nut E or first add a lock nut (or two locked nuts) to stop the bolt rotating.

If access to the heater and its controls is also required, remove nuts F- L and the lower panel. You will also need to remove the grab handle (two machine screws and nuts) and the fusebox surround (not shown). To access the instruments only, remove nut J and pull this part of lower panel forwards. At this point nut C can be reached with a socket, square drive and a long (20-30cm) extension.

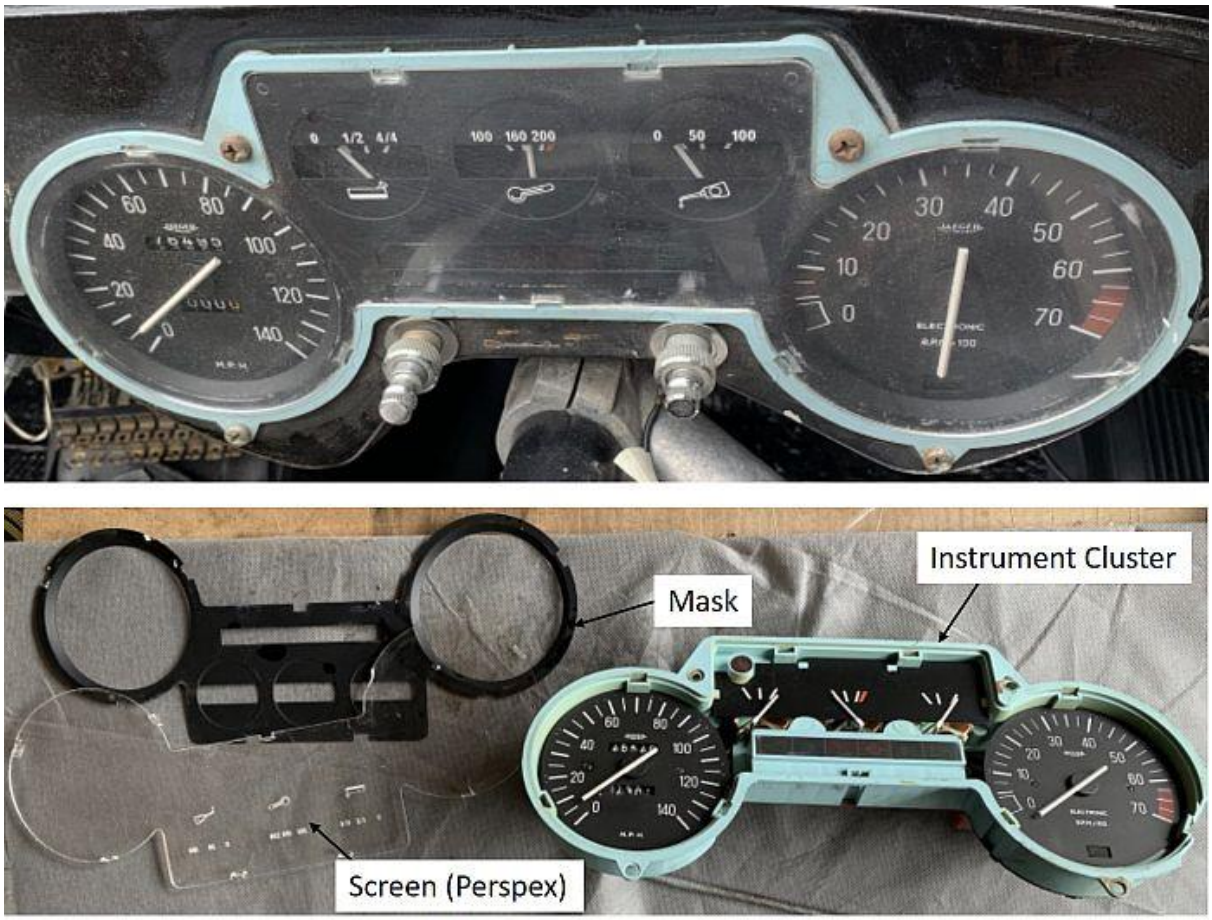
The dashboard top should now be loose and is removed by pulling the ends carefully forwards and upwards. Do not use force – the top has a narrow central section where there is a cut-out for a loudspeaker and it may break. The vinyl of the top can adhere to the windscreen corners over time

and, if stuck, should be freed by gentle pressure or by using soft tools to separate them. When refitting, do not overtighten the nuts, to avoid loosening the threads in their panels.

Removal of some of the vinyl-covered, foam-backed panels is also an opportunity to inspect their condition and make repairs. With the passage of time and the effects of heat and sunlight, the foam backing can become brittle and may disintegrate. The first step should be to remove any decayed foam, clean and, if necessary, rustproof and paint the underlying metal, and then stabilise the remaining foam using paint or a suitable spray on coating. Any treatment should first be tested on a small area, in case its solvent causes damage to the surviving foam. Missing areas of foam could be replaced using a rigid, closed-cell foam, carved to the correct shape. While not tested by us, high-density blocks of closed-cell polyethylene (PE) foam, intended for use in camera and flight cases, are available online and should be suitable. Aerosol cans of expanding foam have also been used by others, although there are also reports that these cause mess and can distort panels as the foam dries and contracts.

With the dashboard top removed, sufficient access to the rear of the instrument panel is gained to allow replacement of the upper bulbs, used for panel illumination and for low-fuel warning. Access to the lower, warning-light bulbs may require further dismantling. All bulbs are 12V, 5W capless type and are mounted in plastic holders which push into the rear of the instrument cluster.

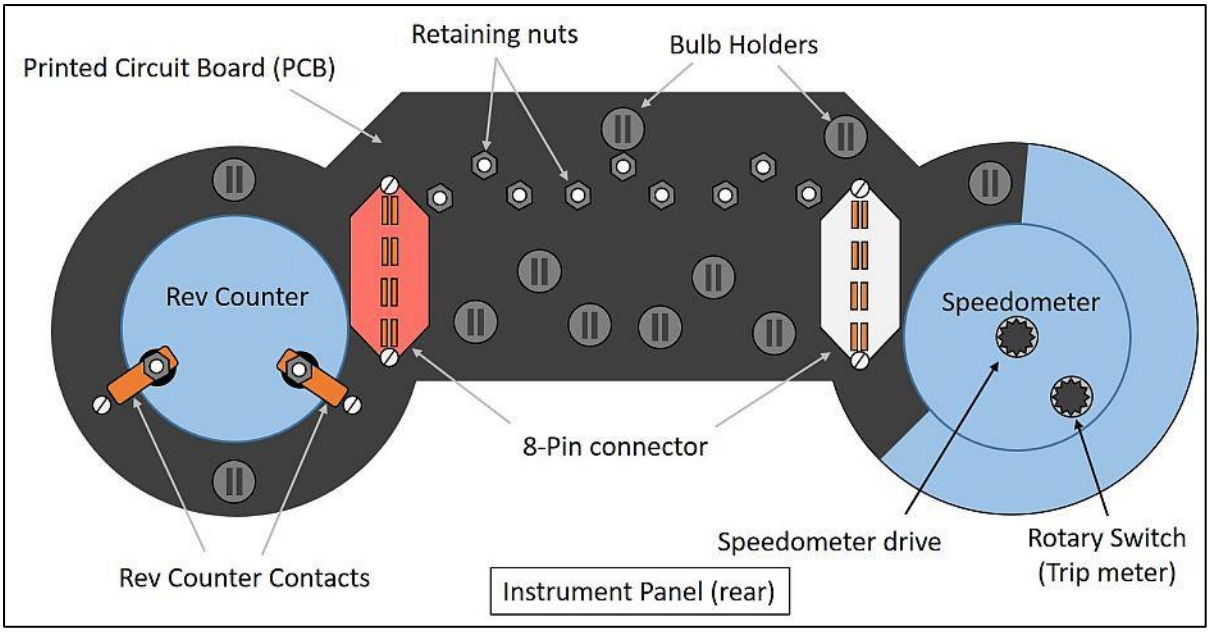
After removal of the dashboard top, unscrewing the knurled rings around the rotary switches allows the wooden fascia to be removed. The fascia sits in a groove formed by the lower panels and, if necessary, these should be loosened or removed first. With the fascia removed, access to the central instrument cluster (speedometer, rev counter, warning lights and gauges) is obtained. In the case of Jaeger instruments, removal of four securing screws allows the cluster, contained in a light-blue plastic case, to be pulled forward to access the wiring behind. The cluster is attached to its wiring loom by two 8-pin connectors, one white and one red, which are numbered 37 and 42 on the S2 Fulvia Coupe wiring diagram (see Owners Notes 1: Electrical Systems, Appendix 1). Once these connectors have been separated, the instrument cluster can be extracted and dismantled on the bench.



5.1.3 Restoring a Jaeger Instrument Cluster

The Perspex screen is removed from the cluster by using a small screwdriver to gently push its tabs from the rear [*caution: care is needed since these tabs are fragile*], after which the mask can be pulled forward and lifted off. These items should then be cleaned, polished and retouched as necessary.

Electrical problems (intermittent failure of gauges, dim bulbs or faulty bulb holders etc.) will require further dismantling. The blue instrument cluster is mounted on a black printed circuit board (PCB) which also provides the base for the 8-pin connectors.



Two nuts secure the rev counter to the PCB and another nine small retaining nuts attach it to a pod containing the three gauges (fuel, water and oil). These nuts also mark the points where the instruments make electrical contact with the hidden face of the PCB. Once all of the nuts and six self-tapping screws have been removed, the PCB can be lifted off and inspected.

The bulbs that provide panel illumination use a common PCB circuit which is connected to a potentiometer, operated by one of the dashboard rotary switches. The 12V supply to the potentiometer is controlled by the main lighting switch (Fuse 1, sidelights). While the instrument panel is absent, this potentiometer should also be removed, tested and cleaned. Bulbs that are used for the warning lights (fuel level warning, handbrake and choke) also share a common +12V ignition-controlled circuit but are earthed separately, through their switches, using individual circuits on the PCB.

The speedometer is purely mechanical, with inputs from two cables that are connected to the gearbox (speed and mileage) and to one of the dashboard rotary switches (trip distance). The rev-counter has two electrical contacts, connected via pins at its rear to circuits of the PCB. One is the common earth, and the other receives a ‘chopped’ 12V signal from the distributor via a pin on the red connector. Repairs to either of these instruments should probably be left to specialists, although it may be possible to adjust their zero positions by gentle manipulation of the needles.

The PCB and its contacts to the instruments are subject to corrosion and so cleaning with fine emery paper or wire wool is advised. Dirty contacts can cause erratic movement and incorrect calibration of the gauges and rev counter, as well as poor illumination of the instruments. Particular attention should be given to the areas where the bulbs and gauges make contact with the boards. These contacts are visible as small holes in the PCB in the photographs below.

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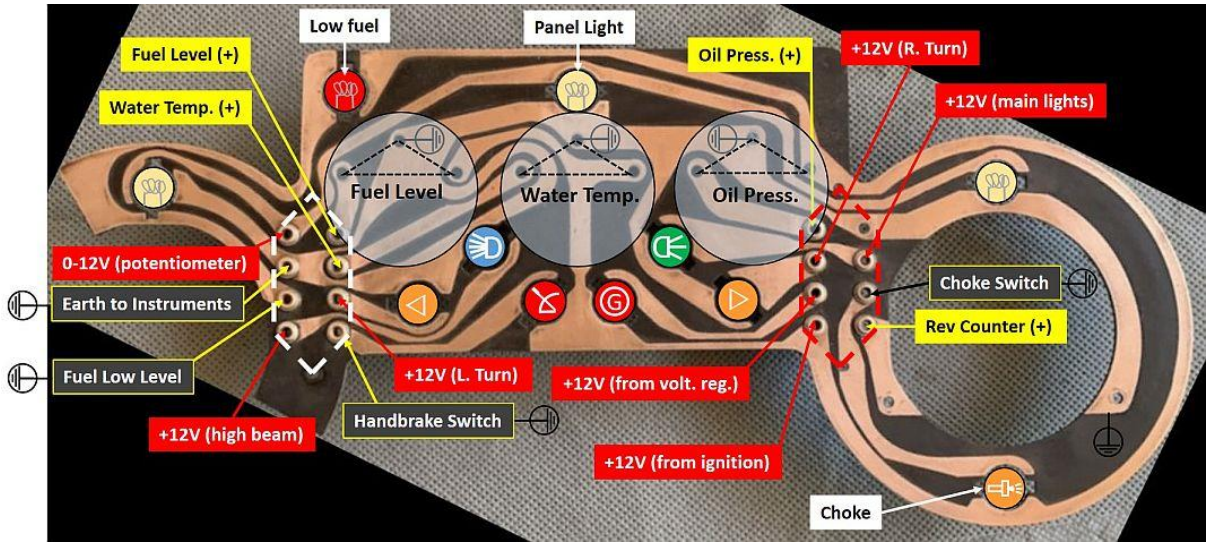
Before re-installation into the instrument cluster, the circuits and the 8-pin connectors on the rear of the board should be tested for continuity and excessive resistance. It is also important to check the quality of the common earth that is provided to the board by a pin on the white 8-pin connector. This is supplied, via a terminal on the white 8-pin connector, from a lead that can be traced back from the connector, but which is usually attached to the body at nut J (lower dashboard panel fixing). This earth should be checked and cleaned before reassembly.

As a guide for later fault finding, the instrument panel PCB layout and its connections to bulbs, instruments and gauges are shown below and at a larger scale in Appendix 9.



5.1.4 Variations for cars with Veglia Instruments

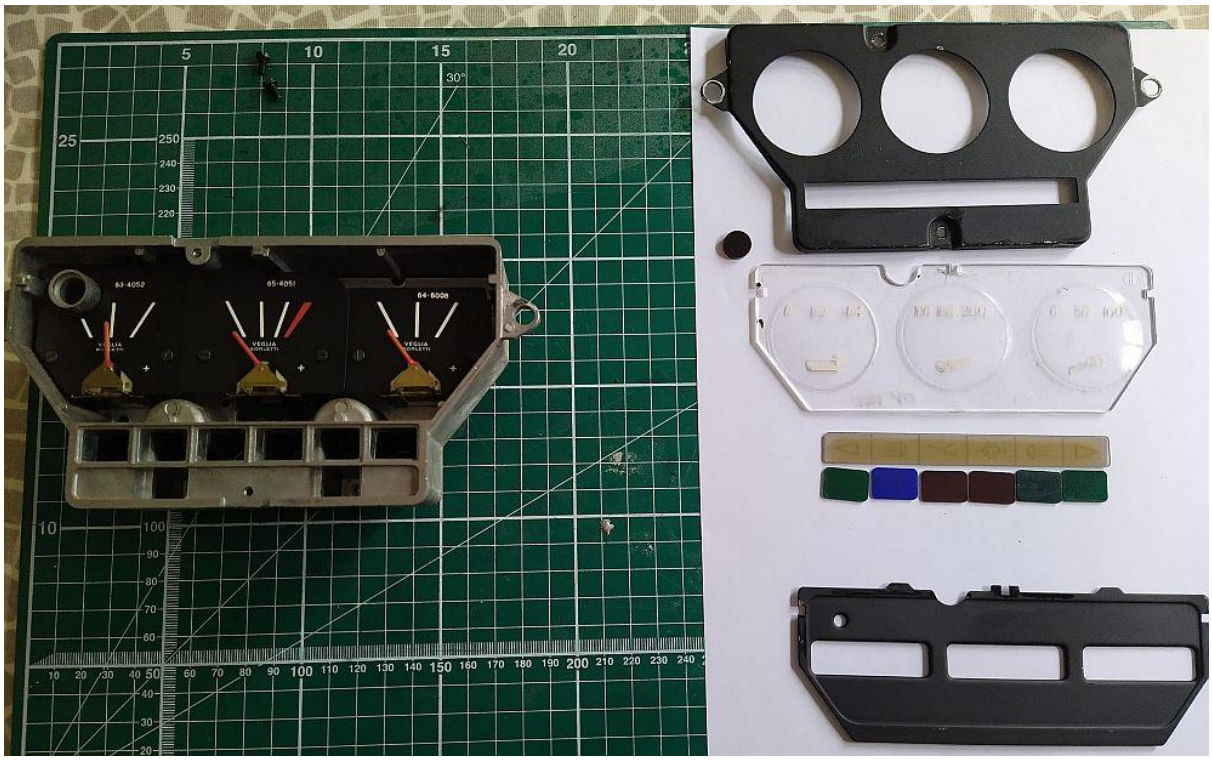
The same procedure can be followed to remove the dashboard and dashboard-top and so gain access to the rear of the Veglia instruments. However in the case of a Veglia installation, the speedometer and rev counter have their own wiring and are not part of the central cluster, which contains only the gauges and warning lights. Since they share mounting points, and tabs on the speedometer and rev counter fit between corresponding tabs on the instrument cluster, in practice it is best to remove all three instruments at the same time.

After removing two screws on each unit and extracting the speedometer and rev counter, the instrument cluster can be pulled forward. The rear of the cluster includes mounting points for eight bulb holders and a single, 6-pin male connector. After removing and labelling the bulbs, the connector can be separated from the wiring loom and the cluster removed.

In contrast to the Jaeger unit described in section 5.1.3 above, the Veglia PCB is accessible from the outside of the case, at the rear of the cluster. The copper tracks are protected by a clear plastic mask which contains small holes to expose six mounting points for the three gauges. The gauges are secured to the PCB using 6mm nuts and small washers, which should be removed and cleaned. The exposed copper under the washers should also be cleaned using fine emery paper before reassembly.

Bulb holders can be cleaned externally using wire wool and internally using a piece of emery paper wrapped around, and taped to, a 6mm socket. Where possible, all connections should be checked to ensure low resistance before re-installation.

After cleaning the rear of the cluster, the front of the cluster should then be opened to blow out dust and any dirt and that may have entered during cleaning, clean the plastic parts and also to retouch any scratches present in the matt black paintwork.



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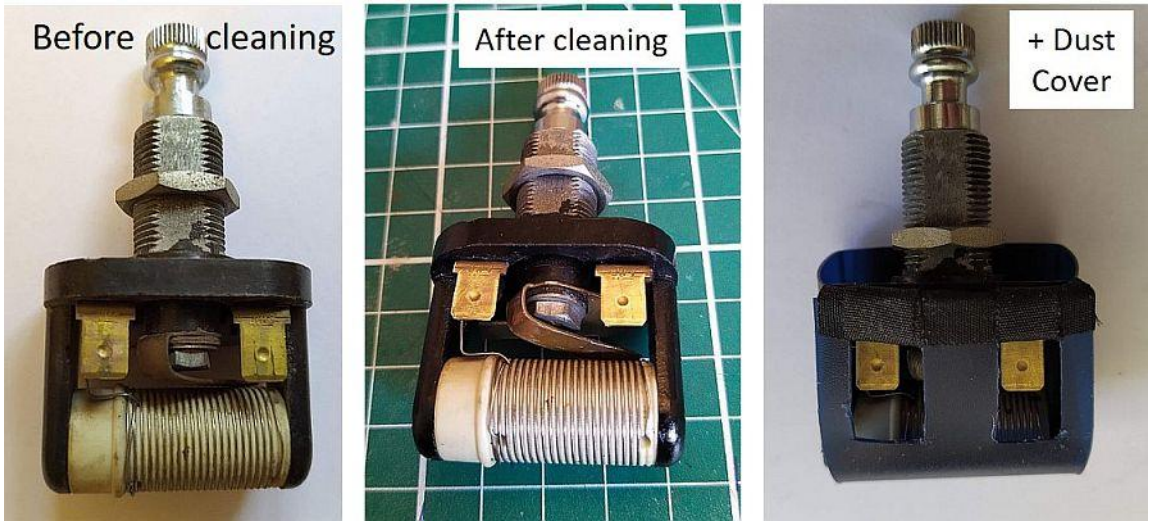
5.1.5 Instrument panel bulbs and lighting rheostat

While the instruments are accessible, it is recommended to replace all the bulbs for new items and to clean and to test the bulb holders to ensure that they make good contacts with their mounting points. While some owners have replaced incandescent bulbs with LED items, these are significantly brighter than the original bulbs and may not be dimmable using the instrument lighting rheostat.

If the panel illumination was poor before refurbishment, the lighting rheostat (mounted behind the instrument panel, near the rev counter) should also be removed, tested and cleaned. Access to the rheostat is greatly improved if the rev counter (Veglia) or the instrument cluster (Jaeger) is first removed. The item supplied with the Veglia cluster is a CEAM rheostat. The wire coil and the travelling brass contact that provides a variable resistance are exposed to dust and dirt behind the dashboard and, in this case, had not been maintained in at least 40 years. After removal of the rheostat, its resistance range was measured at approximately 5Ω to 20Ω. However, during the movement of the contact, changes in resistance were not smooth and resistance readings were often unstable, suggesting that the effective contact area was very small.

After cleaning the travelling contact with emery paper and the resistance coil with solvent and switch cleaner, consistent measurements were obtained and the resistance range was re-determined to be 1.1Ω to 9.8Ω. There is no evidence that the rheostat was supplied with a protective cover to keep out dirt and dust. The final picture shows a suitable dust cover, made from flexible plastic sheet (ex-A4 document folder). The rheostat should be re-installed with the wiring and contacts (shown below) on the bottom.



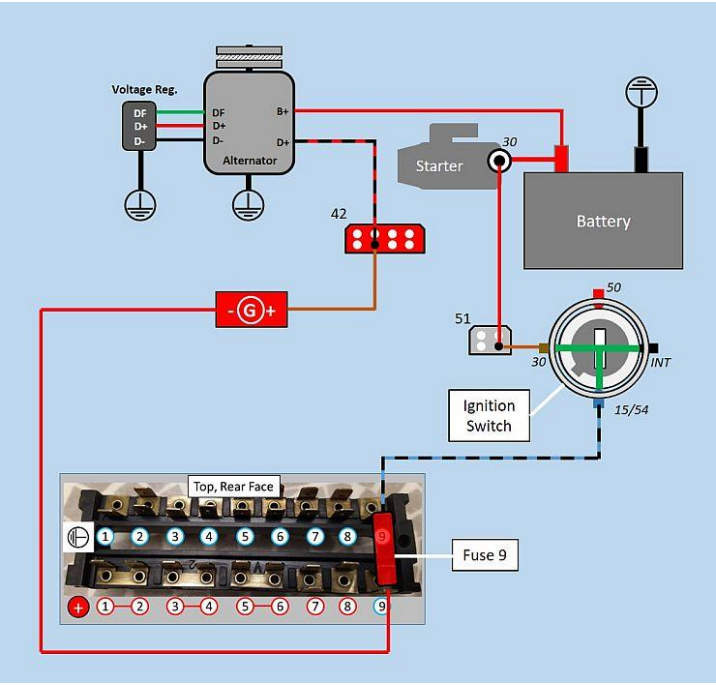
5.1.6 Dismantling and Cleaning the Fusebox

Electrical Problems

The most common Fulvia electrical problems arise from the lack of good earth points in the circuits under investigation. A 25mm^2 earth lead from the battery negative terminal is bolted to the top of the gearbox housing. Secondary, 10-16mm^2 earth leads are taken from other parts of the engine and used to supply an earth connections to the bodywork and large current devices in the engine bay – starter motor, coil, alternator, radiator fan and horns. However, most peripheral electrical items (lights, indicators, instruments, warning lights, accessories etc.) are earthed separately using individual connections to the bodywork.

Connections made at the bodywork, particularly in the engine bay and boot/trunk, are subject to corrosion and should be checked first in the event of electrical problems. Sometimes, where two items are both connected at the same point on the body, the loss of a good earth caused by surface rust can lead to unexpected electrical effects, such as indicators which fail when the brakes are applied and the brake lights operate.

One of the most common Owner concerns, because it is clearly visible, is a permanent glow from the ignition light during normal operation. When the engine is running, the light measures the difference in voltage between the output from the alternator (B+) at the battery and a reference voltage supplied to the alternator by the voltage regulator (D+), and so this is usually attributed to a developing fault with one or both devices. However the first step should be to check the quality of the earths supplied to the alternator (see above) and the regulator (usually earthed to the body). The voltages on either side of the warning light will also be affected by any losses caused by resistance in the connections between the bulb and the B+ and D+ terminals of the alternator. These include the B+ and D+ terminals themselves as well as connections at an 8-way Junction Block ([42] in the 1970 Fulvia Wiring Diagram) and Fuse 9.

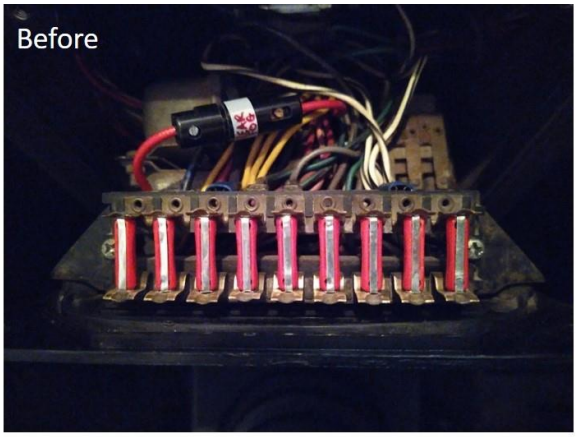


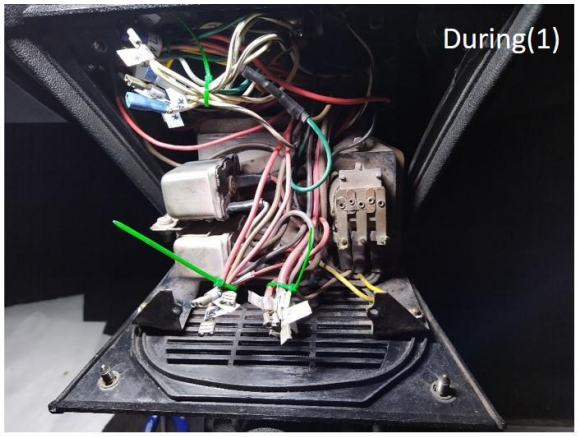
The Fusebox

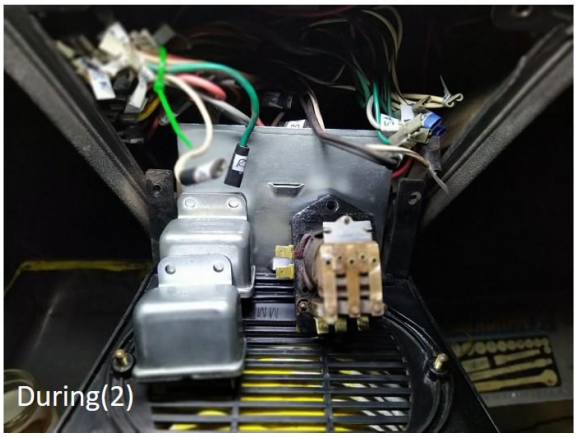
Other electrical issues, such as poor illumination by headlights and intermittent loss of power on some circuits may require cleaning of the relevant fuses and relays that are contained in the fusebox. This is also an opportunity to clean the wiring and detect any changes from the standard arrangement that may have been made prior to purchase. More detail of the electrical systems, including the fusebox, are given in the first publication in this series of Owners Guides: *1. Electrical Systems*.

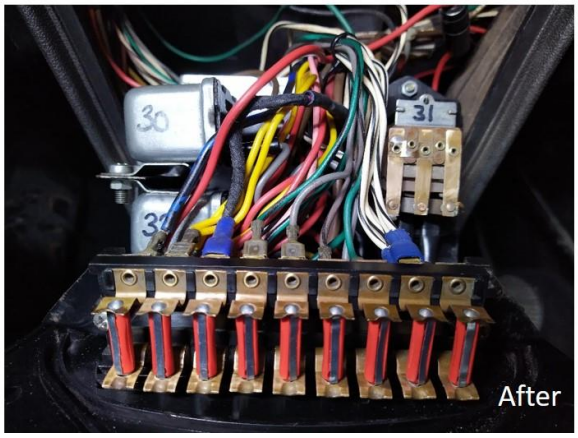
The Fulvia fusebox is easily accessible and relatively straightforward to dismantle. After removing all of the fuses, the two screws holding the fuse block can be removed to allow access to the wiring. Care should be taken to note the positions of all wires attached to the fuse block and label them as they are disconnected during dismantling. These should be grouped and tied together as they are removed, in order to facilitate reassembly.

Relays 30 & 32 can be disconnected and removed for cleaning at this stage. Relay 31 is held by two small bolts that pass through a metal frame and are more difficult to access. However, after removal of the ashtray, these bolts, the relay and the metal frame that supports them can be removed using a small socket, spanner and patience.









After disassembly, the fuse block, relays, contacts and spade connectors were cleaned with wire wool and fine emery paper. Wires can be cleaned with solvent (isopropanol or white spirit).

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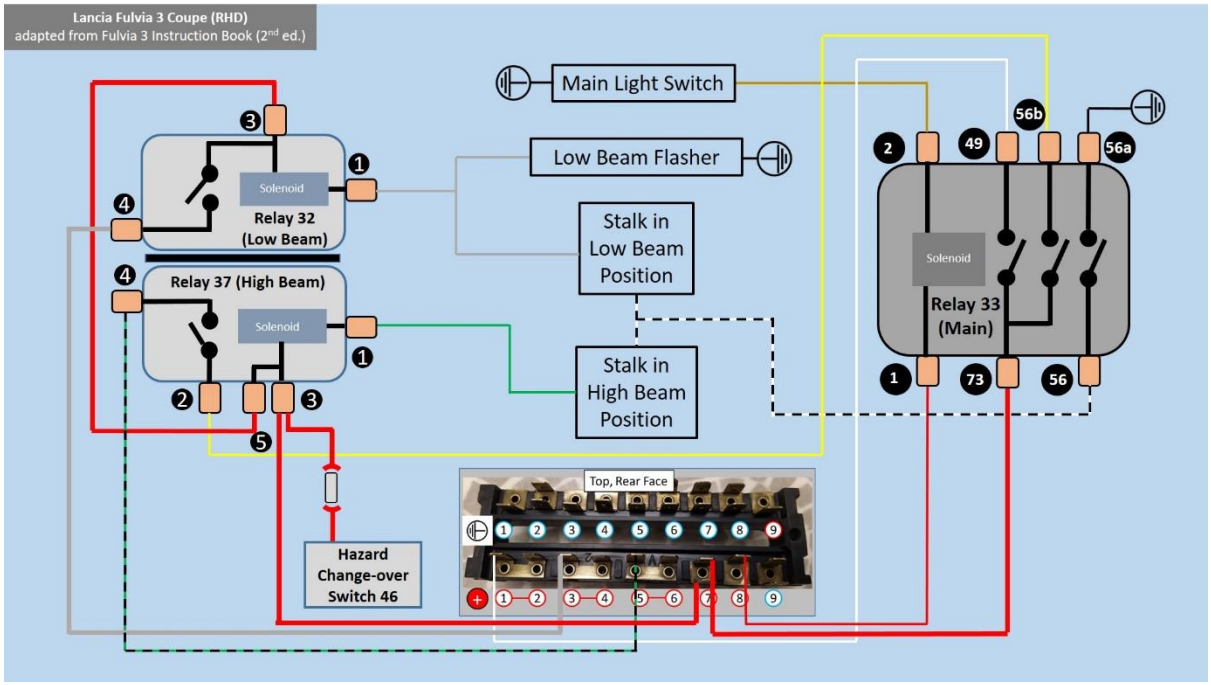
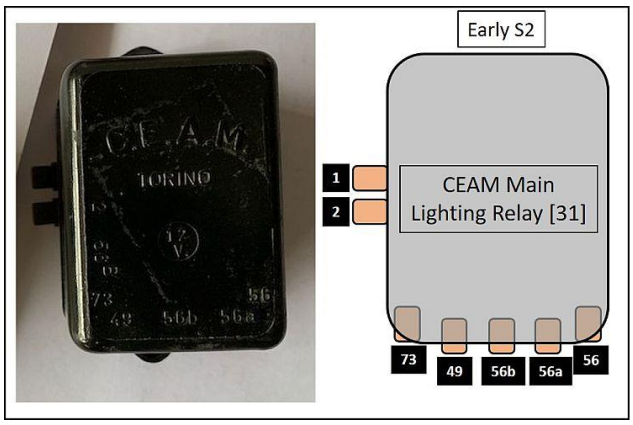
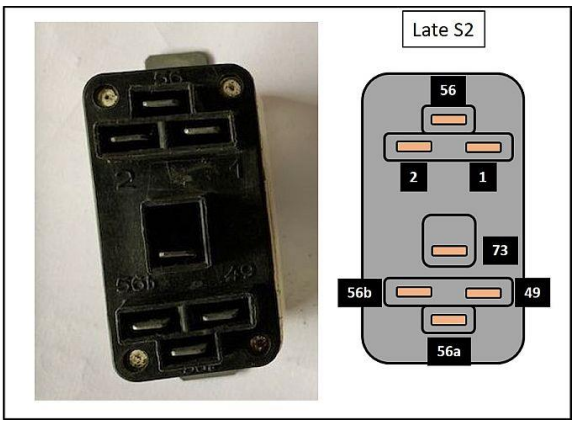
Relays 30 and 32 control the current supplied to the low beam and the high beam of the headlights, respectively. Relay 31 is activated by the main lighting switch on the indicator stalk and is responsible for providing power to the solenoids of relays 30 and 32, as well as to the sidelights.



Relay 31 was supplied to Lancia by CEAM and performs a number of functions via its 7 connections. The same relay was also fitted to Ferraris hence it is very expensive to replace, although, if missing, it would also be possible to replace it with two modern relays.

The arrangement of terminals on early versions of Relay 31 is given below, numbered according to the Lancia Fulvia S2 wiring diagram. A later version of the relay, also fitted to S2/Fulvia3 cars, has a different arrangement of contacts and is mounted with its contacts at the top of the relay where they are more accessible. However the numbering scheme and the terminal connections are unchanged.



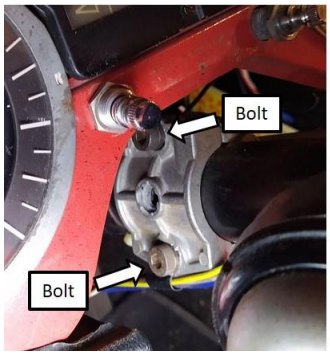


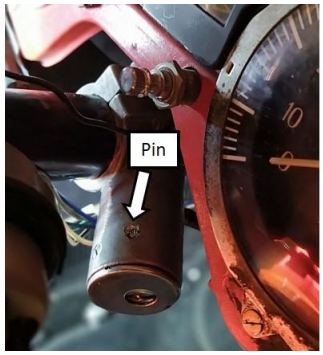
5.2 Maintenance of the Ignition Switch

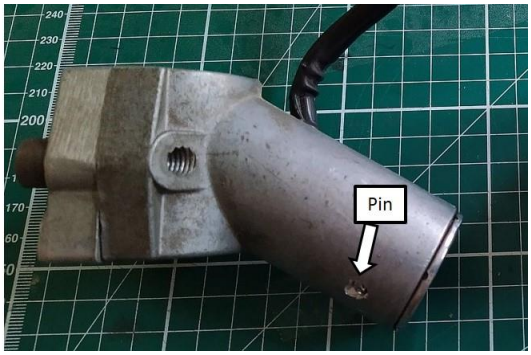
5.2.1 Removing the Ignition Switch

The ignition switch is secured to the steering column by a collar that is secured by two bolts. Access to the bolts minimally requires removal of the upper and lower steering column shrouds. However, in the example described here, the upper steering column shroud could not be extricated without also removing the wooden instrument panel. For this reason, the work was combined with refurbishment of the instrument panel and lighting rheostat, which began with removal of the dashboard, as described in section 5.1.2.

Before any work is done on the ignition, the battery should be disconnected and the ignition switch uncoupled from the wiring loom at its four-way connector, below the steering column. The ignition key is then inserted and the steering lock disengaged from the column. Once this has been done, removal of the two collar bolts should allow the complete ignition switch and lock assembly to be withdrawn from the column.







The photos above show a SIPEA ignition switch, installed in the 1971 1600HF that is featured in this Guide. Some work on the switch had been carried out prior to purchase of the car in 1986 as evidenced by damage to the shroud and the pin as shown in the middle picture. It is possible that the collar bolts, here 8mm cap bolts, had also replaced original M8 security bolts with shear-off heads which leave a plain rounded head. If security bolts have been used, the best option may be to drill a small hole in the flat end of the bolt, through the hole in the shroud, and then to insert a self-tapping screw that can be used to unscrew the bolt.

Other ignition switches, by Magnetti Marelli, were certainly supplied with shear-head bolts and an example is shown below, alongside the refurbished SIPEA item.

The SIPEA switch has a steel pin inserted through a hole in the shroud which engages with the inner barrel. It has been suggested that, after removing two short screws that attach the inner barrel to the shroud and withdrawing the key when the lock is in the GAR position, the pin can be pushed down allowing the barrel to be removed. However, possibly due to previous damage to the pin, this pin could not be depressed and so the decision was taken to drill it out. A pillar-drill was used to reduce the upper section of the pin until the lock barrel was free to move, while taking care not to damage it. Before reassembly, the hole in the shroud was drilled out to 8mm and covered with a small silicone bung (see photo above).

5.2.2 Repairing a SIPEA Ignition Switch

With the increasing age of the Fulvia and the prolonged exposure of their electrical components to dusty conditions in storage and during restoration, electrical problems due to intermittent faults within the ignition switch are becoming more common.

Section 1.4 of our Fulvia Owners Notes1: Electrical Systems guide has described the expected changes in connections between the four wires that are present in the switch, and the resulting actions, as the key is rotated between its three or four positions: ST – (GAR) – MAR – AVV. During the lifetime of the Fulvia, Lancia fitted switches from SIPEA and Magnetti Marelli, which are similar in outward appearance but differ in some details. These include the absence of the GAR (Garage) function, in which all ignition wires are disconnected from each other and so all fuses are isolated from the battery. In switches which lack a GAR function all wires are disconnected at the ST position; locks with a GAR option supply power to one live fuse, which is used to maintain 'essential services' (Servizi), at the ST position.

In the ST and GAR positions, the key can be withdrawn from the lock; this action triggers the release of a short metal bar within the ignition switch which engages with a cut-out in the steering column, acting as a steering lock. When the key is reinserted and turned, the bar is withdrawn into the ignition switch and the car can be driven. The remainder of this section describes the dismantling and maintenance of the SIPEA switch shown in Section5.1.1, taken from a 1971 Coupe, 1600HF. The work was prompted by an intermittent failure of the switch to supply power to the ignition circuit in its MAR and AVV positions. Other circuits were unaffected, thus the service items attached to Fuse 8 remained live in all key positions except GAR, and the starter solenoid engaged when AVV was reached.

The connections within the SIPEA switch are made and broken by three small push-rods that each act on a sprung brass contact, similar to those used in distributor points. Pressure on each rod causes the corresponding contact to open. These contacts are used to connect a common 12V feed from the battery (brown wire) to the other leads:

Contact 1: to Fuse 8 (Servizi, black wire)

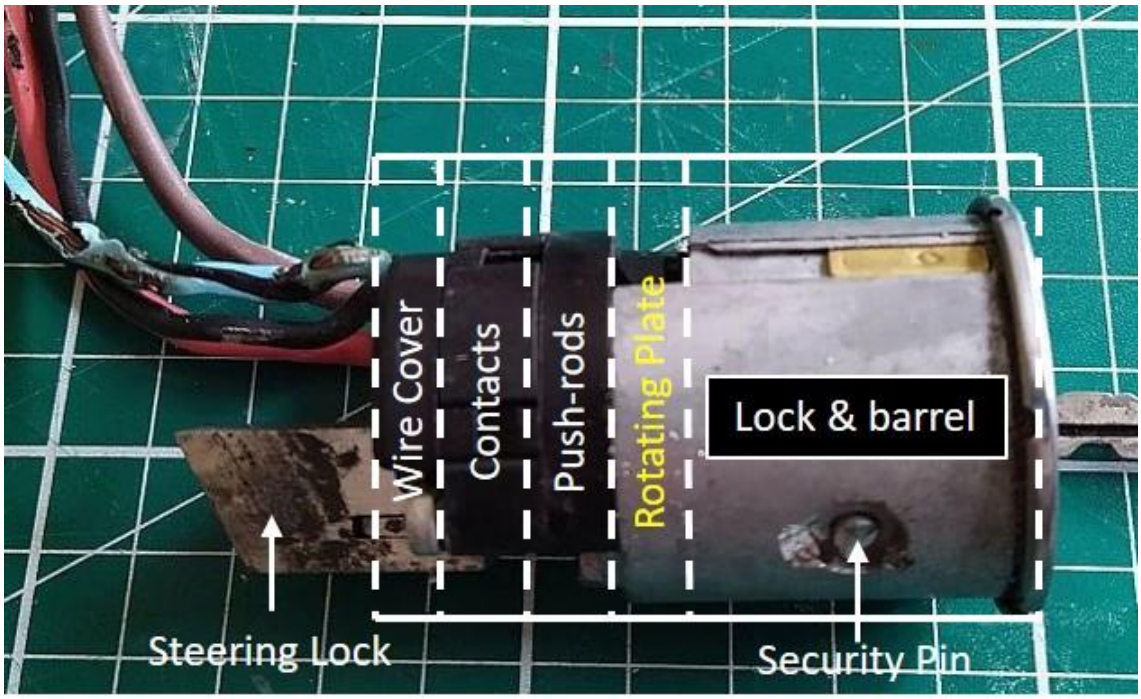
Contact 2: to Fuse 9 (Spie Acciens, blue-black wire)

Contact 3: to the starter solenoid (red wire)

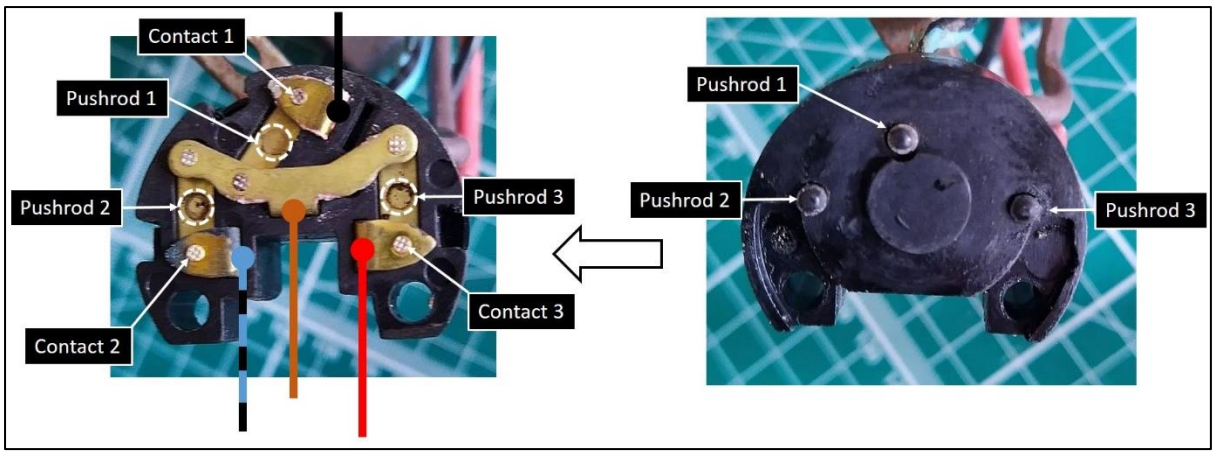
The positions of the rods and the state of the contacts which connect each wire to the brown 12V feed are given in the table below, for each position of the key (red = live).

	Black	Blue-Black	Red		Black	Blue-Black	Red
	Push-rod 1	Push-rod 2	Push-rod 3		Contact 1	Contact 2	Contact 3
ST	Up	Down	Down		closed	open	open
GAR	Down	Down	Down		open	open	open
MAR	Up	Up	Down		closed	closed	open
AVV	Up	Up	Up		closed	closed	closed
Push-Rod Positions				& Contact Closures			

The contacts and their associated wires are mounted on a fixed, plastic plate at the inner end of the lock. The three push-rods pass through a second fixed plate which sits between the contacts and a third plate that is rotated by movement of the key. Two long screws attach the contact and push-rod plates to the end of the lock while the rotating plate fits inside the end of the barrel and is mounted on a cross-shaped spline which extends from the lock.

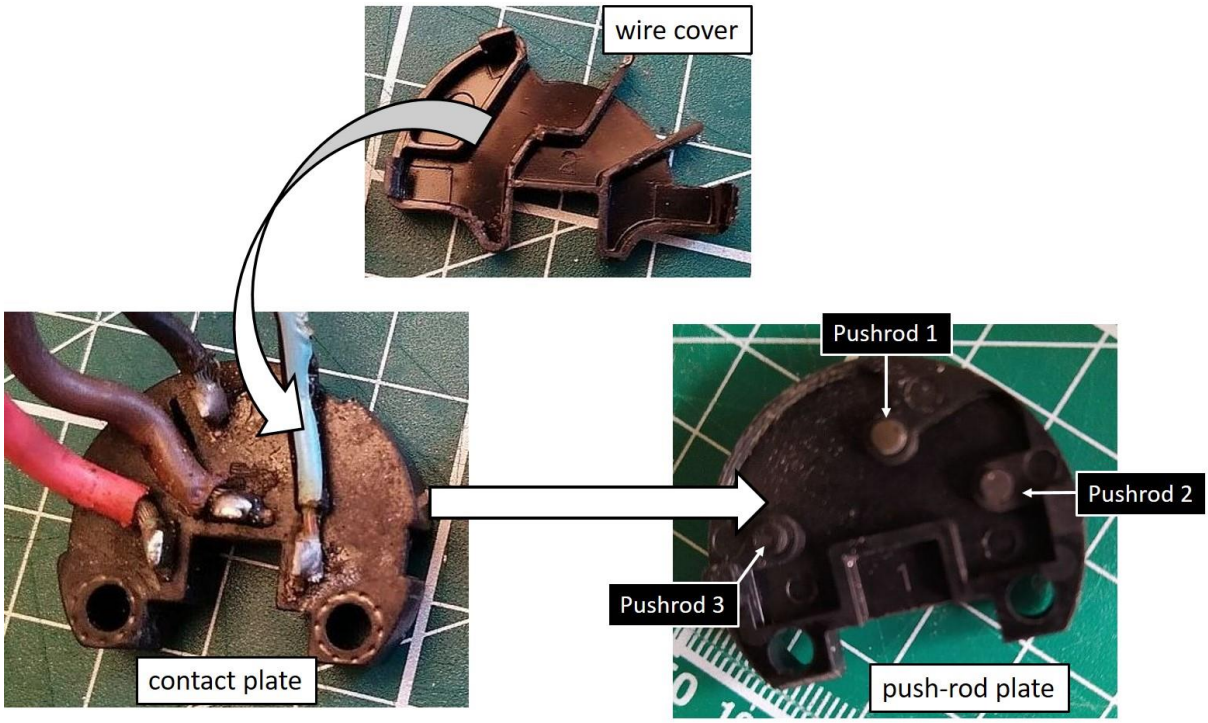


After removing the two long screws, the plates holding the contacts and push-rods can be withdrawn separately. Care must be taken not to lose the small (2mm x 8mm) push-rods which should be free to move in their plate. Note that, when assembled, the rounded ends of the push-rods face towards the rotating plate, while their flat ends rest on the contacts.



The contact and push-rod plates are shown above, seen from the lock side. The observed fault, intermittent activation of the ignition circuit (blue-black wire), localises the problem to push-rod 2 and/or contact 2. All contacts were cleaned with switch cleaner and wire wool and, if necessary, by rubbing a small piece of fine emery paper between the contacts. The push-rods and their plate was also cleaned, checked for wear, and then reinserted after using a spray-lubricant to ensure free movement. All three push-rods should be the same length and, in this case, were measured and found to be 8.4mm ±0.15mm.

The contact and push-rod plates, viewed from the wire side, are shown below. Also shown is a clip-on cover which protects the wires. The wires are soldered to posts which pass through the plate from the contacts below. Any brittle or damaged wires should be replaced at this stage.



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Finally, the rotating plate, mounted on a spline projecting from the barrel lock, is shown below. The plate has various ramps and projections which press on the push-rods to open selected contacts as the key is rotated. Since, in the absence of pressure, the contacts are closed, excessive wear on the plate or the push-rods would be manifested as inappropriate activation of ignition-controlled circuits. However, this does not seem to be an issue in Fulvias yet, even with lock switches that are more than 50 years old.