STEERING GEAR

RAPIER & ALPINE

CONTENTS

STEERING GEAR

STEERING COLUMN COWLING

Description

The plastic cowling is made in two halves.

In the case of the Alpine the two halves are held together by spring clips, while on the Rapier the two halves are held together by two screws. On both models the cowling is positively located on the steering column by dowels. The cowling encloses the indicator switch.

To remove—(Alpine)

1. Give the off-side half of the steering column cowl a sharp pull to release the spring clips from the steering column.

   If an overdrive is fitted, disconnect the overdrive switch wiring at the two snap connectors under the facia panel.
2. Release the near-side half of the cowling in a similar manner and ease it clear of the indicator switch.

To remove—(Rapier)

1. Remove the two clamping screws.
2. Part assembly, easing one side over the flasher switch.

To refit

The procedure in both cases is a reversal of the removing instructions. When refitting, take great care to ensure that both halves fit together correctly before tightening the screws and that the flasher switch aperture clears the flasher switch lever. If necessary reposition the switch.

DIRECTION INDICATOR SWITCH

Description

The switch for the flashing direction indicators is secured to the steering column by a clip, and locates on a raised key in the outer column immediately below the steering wheel hub.

A cancelling ring clamps around the upper end of the inner column. When the steering wheel is returned to the straight ahead position, a pawl on the cancelling ring operates a trip mechanism on the switch which cancels the flasher. For wiring details, see Section N.

To remove

1. Disconnect battery.
2. Remove column cowling as previously described.
3. Mark the position of the indicator switch on the steering column (to facilitate correct re-assembly) and remove by withdrawing the clamping screws.
4. Disconnect wiring at snap connectors under facia panel near steering column to release switch.

To refit

1. Locate switch on column keyway, set it axially so that the pawl of the striker ring fully engages the trip mechanism, but does not foul the steering column cowling. The position of the switch relative to the column cowling may easily be checked with the switch side of the cowling fitted and the other side removed to give access for adjustment.
2. Refit the other half of cowling.
3. Reconnect the wiring at snap connectors.
4. Reconnect battery.

OVERDRIVE SWITCH

The overdrive switch when fitted to the Alpine is mounted in the off-side half of the steering column cowling and will be removed with it. (See "Steering Column Cowling—to remove and refit"). Furthur dismantling is unnecessary when removing and refitting the steering unit.

In the case of the Rapier, the overdrive switch is mounted on the off-side of the steering column by a clip. The procedure for removing the overdrive switch in this case is identical to that given for the removal of the direction indicator switch.

HORN RING, COVER AND MOTIF ASSEMBLY

Description

The horn ring consists of a circular central plate with two spokes, to which the outer ring is joined. The horn ring is secured to the underside of the centre cover by three screws. The upper and lower contact plates are connected to each other by studs and nuts, but are held apart by three light springs. The whole unit is retained in the hollow centre of the steering wheel boss by three grub screws clamping on to the lower contact plate.

The lower contact plate is earthed by the grub screws to the steering column, via the splined centre of the steering wheel boss. A wire from the horn is attached to an insulated terminal on the direction indicator switch feeding a spring-loaded plunger which is in constant contact with a slip ring recessed into the lower face of the steering wheel centre boss. From this slip ring a wire with a snap connector feeds the upper contact plate. For further wiring details see Section N.

To remove and refit

1. Disconnect the battery.
2. Slacken three grubscrews recessed into, and equally spaced around the steering wheel boss.
3. Lift up horn ring assembly, withdraw snap connector from its socket inside steering wheel boss and then remove the assembly.

Reverse this procedure for refitting, ensuring that the lower contact plate of the horn ring assembly is correctly and securely located over the key inside the wheel boss.

STEERING WHEEL

To remove

1. Remove horn ring assembly as previously described.
2. Undo centre securing nut using special tool RG.197.
3. Mark position of steering wheel boss on splines, if existing wheel is to be refitted.
4. Draw off wheel.

To refit

1. Place wheel over column splines in correct position and push on. With the wheels in the straight ahead position the spokes should be horizontal.
2. Refit and tighten centre securing nut.
3. Refit horn ring assembly.

STEERING UNIT

Description (See Figs. 1 & 2)

The unit is known as the "F" type recirculating ball unit.

Movements of the inner column and worm (23), are transferred to the nut (14), through the medium of recirculating balls (16) housed within the nut. Movement of the nut is transferred to the rocker shaft arm (13), which causes the rocker shaft to rotate and turn the drop arm (swing lever), (19), which is secured to the rocker shaft by a tapered spline, a nut and lock-washer. A felt bush and washer (1), are fitted at the upper end of the steering column (2). Ball bearings (15 & 20), fitted at each end of the worm, support the inner column (23), inside the steering box (9). Shims (4) control the inner column end float. The rocker shaft is located by the top cover (8), end float being controlled by shims (5). A double coil spring (10) and damper button (11), serve to damp the rocker shaft against road reaction.

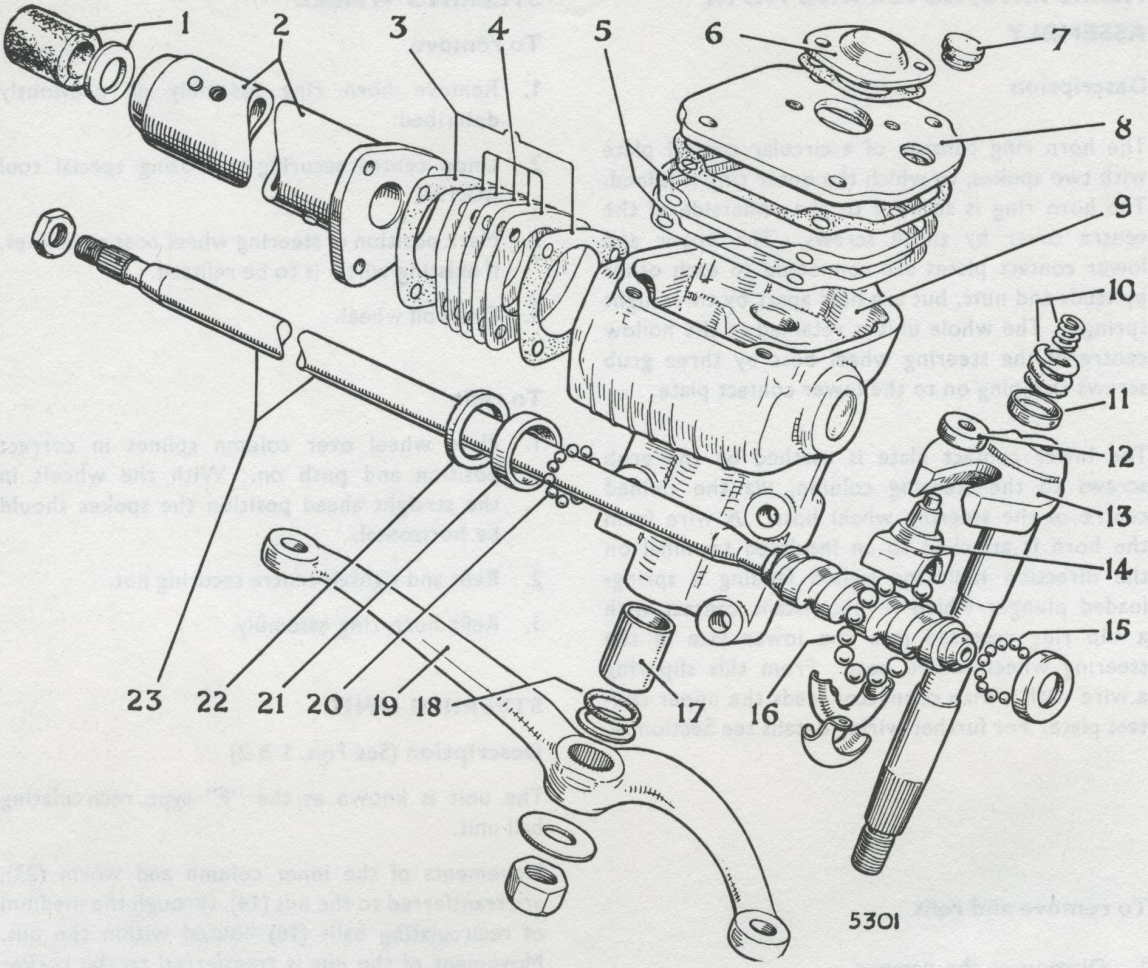

Fig. 1. *Exploded view of "F" type steering unit*

1 Felt bush and washer.
2 Outer column.
3 Paper gaskets (joint washers).
4 Shims.
5 Shims.
6 Spring cap.
7 Filler plug.
8 Top cover.
9 Steering box.
10 Double coil spring.
11 Damper button.
12 Guide roller.
13 Rocker shaft.
14 Nut.
15 Steel balls (lower track).
16 Steel balls (nut).
17 Rocker shaft bush.
18 Oil seal.
19 Drop arm (swing lever).
20 Steel balls (upper track).
21 Upper track.
22 Distance piece.
23 Inner column and worm.

To remove from car—(Alpine)
(Left-hand drive cars only)

1. Disconnect and remove the bonnet which is attached to its hinges by eight bolts.
2. Remove battery cover panel in rear compartment by withdrawing the securing screws and disconnect the battery at the positive terminal.
3. Separate the inner and outer steering column cowls. See under "Steering Column Cowling —to remove and refit".
4. Remove the direction indicator switch as previously described, and the striker ring from the inner column. Also remove the overdrive switch if fitted.
5. Remove the horn ring assembly as described under "Horn Ring Assembly—to remove and refit".
6. Remove the steering wheel as previously described.
7. Remove the bolts securing the left-hand side scuttle bracing tube to the bulkhead and the forward mounting.
8. Disconnect the brake fluid reserve tank from its mounting on the wing valance. Disconnect the brake fluid pipe at the master cylinder union and remove the reserve tank and pipe from the car, draining the fluid into a suitable container.
9. Disconnect the steering column hanger clip from hanger on the bulkhead leaving the hanger itself in position.
10. Jack up the front of the car and remove the nut and tab washer securing the drop arm to the rocker shaft.
11. Mark the rocker shaft and drop arm with a punch at two adjacent points to facilitate correct assembly.
12. Loosen off the three bolts securing the steering unit to the front side member to enable the drop arm remover to be fitted.
13. Remove the drop arm from its spline using special tool RG.198.
14. Lower the jack.
15. Remove the bolts securing the steering column to the upper column bracket under the facia panel, leaving the bracket itself in position.
16. Disconnect and remove the facia crash roll pad. This is secured by nuts and bolts to the underside of the facia panel and to the steering column bracket.
17. Remove the facia reinforcement which is held by two spire fixings and two nuts at each end.
18. Remove the three bolts securing the steering unit to the front side member.
19. Lower the upper end of the steering column clear of the facia panel.
20. Remove the steering column grommet from the hole in the bulkhead.
21. Draw the steering unit back against the bulkhead and twist it through 180 degrees so that the rocker shaft is facing vertically upwards. Tilt the steering box upwards and lift out through the bonnet aperture.

To Refit

1. Position the steering unit horizontally with the splined end of the steering column inserted into the hole in the bulkhead, and the rocker shaft pointing vertically upwards.
2. Push the steering column through the hole in the bulkhead, turning the complete unit through 180 degrees as it becomes clear of the radiator header tank.
3. Refit the steering column grommet in the hole in the bulkhead.
4. Loosely attach the steering column to the dash and bulkhead brackets, and bolt the steering box to the front side member.

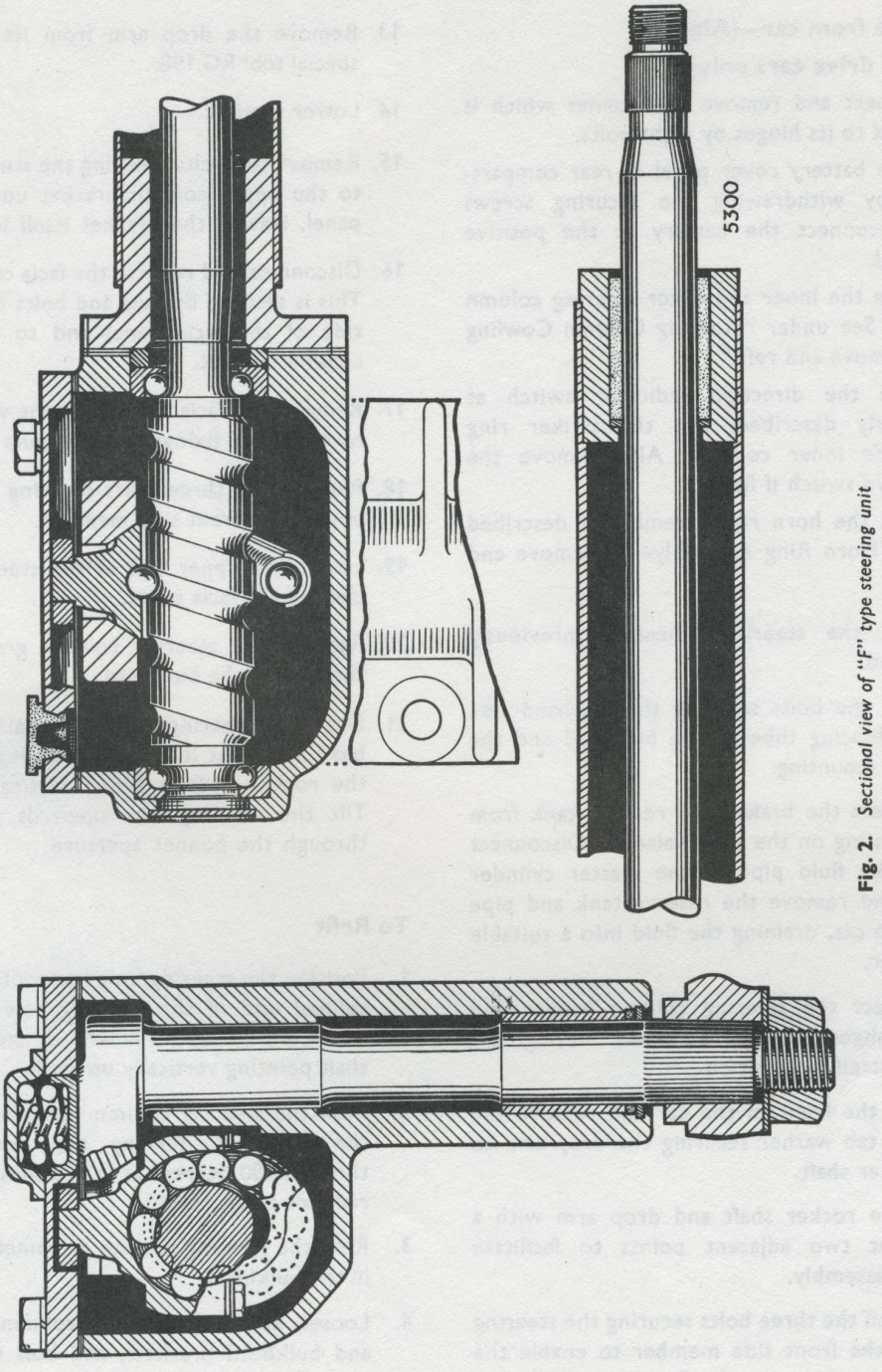

Fig. 2. *Sectional view of "F" type steering unit*

5. Check the alignment of the steering column clip relative to the upper column bracket. If there is malalignment, remove the steering box from the front side member and refit with packing washers as required. It is most important to ensure that there is no tension in the steering column.
6. Tighten the nuts and bolts securing the steering column to the dash and bulkhead brackets.
7. Jack up the car and refit the drop arm on to its correct splines. Secure with a nut and new tab washer. Lower the jack.
8. Refit the bonnet, dash reinforcement, crash roll pad, trafficator switch, overdrive switch, steering column cowls, handwheel, horn switch assembly, scuttle bracing tube, brake fluid reserve tank and pipe, battery terminal and battery cover. The fitting procedures for all these items will be the reversal of those given under "To remove".
9. Test.

To remove from car—(Alpine) (Right-hand drive cars only).

Operations 1.—6. as for left-hand drive cars.

7. Remove the bolts securing the right-hand side scuttle bracing tube to the bulkhead and the forward mounting.
8. Remove the dipstick.
9. Remove the distributor from the engine. (See under Section B—"Distributor—to remove and refit").
10. Disconnect tachometer drive from the engine.
11. Remove the fuel pump from the engine. (See under Section C).
12. Drain the oil from the filter housing by undoing the hexagonal headed drain plug. (See Section B, Fig. 35). Remove the outer casing and filter element by undoing the centre bolt.
13. Disconnect the steering column hanger clip from the hanger on the bulkhead, leaving the hanger itself in position.
14. Jack up the front of the car and remove the nut and tab washer securing the drop arm to the rocker shaft.
15. Mark the rocker shaft and drop arm with a punch at two adjacent points to facilitate correct re-assembly.
16. Loosen off the three bolts securing the steering unit to the front side member to enable the drop arm remover to be fitted in place.
17. Remove the drop arm from its spline using special tool RG.198.
18. Lower the jack.
19. Disconnect and remove the facia crash roll pad. This is secured by nuts and bolts to the underside of the facia panel and to the steering column bracket.
20. Remove the bolts securing the steering column to the upper column bracket under the facia panel.
21. Remove the facia reinforcement which is held by two spire fixings and two nuts at each end.
22. Remove the three bolts securing the steering unit to the front side member.
23. Lower the upper end of the steering column clear of the facia panel.
24. Remove the steering column grommet from the hole in the bulkhead.
25. Ease the steering unit forward until the steering box is positioned immediately behind the header tank. Twist the steering unit through 180° so that the rocker shaft is facing vertically upwards. Tilt the steering box upwards and lift out through the bonnet aperture.

To refit

1. Position the steering unit horizontally with the splined end of the steering column inserted in to the hole in the bulkhead, and the rocker shaft pointing vertically upwards.
2. Push the steering column through the hole in the bulkhead, turning the complete unit through 180 degrees as it becomes clear of the radiator header tank.

3. Refit the steering column grommet in the hole in the bulkhead.
4. Loosely attach the steering column to the dash and bulkhead brackets, and bolt the steering box to the front side member.

   Check the alignment of the steering column clip relative to the upper column bracket.
5. If there is malalignment, remove the steering box from the front side member and refit with packing washers as required. It is most important to ensure that there is no tension in the steering column.
6. Tighten the nuts and bolts securing the steering column to the dash and bulkhead brackets.
7. Jack up the car. Refit the drop arm on its correct splines and secure with a nut and new tab washer. Lower the jack.
8. Refit the dash reinforcement, crash roll pad, trafficator switch, overdrive switch, steering column cowls, hand wheel, horn switch assembly, dipstick, oil filter outer casing and element, petrol pump, distributor, and scuttle bracing tube. The fitting procedures for all these items will be the reversal of those given under "to remove".
9. Reconnect tachometer drive.
10. Test.

To remove from car—(Rapier)

1. Disconnect the battery at the positive terminal.
2. Remove the steering column cowling as previously described.
3. Remove the direction indicator switch, as previously described, and the striker ring from the upper end of the inner column. Also remove the overdrive switch if fitted.
4. Remove the horn ring assembly as previously described.
5. Remove the steering wheel as previously described.
6. Disconnect the parcel tray on the driver's side and drop it clear of the steering column.
7. Jack up the front of the car and remove nut and tab washer securing the drop arm to the rocker shaft.
8. Loosen the three bolts securing the steering unit to the front side member to enable the drop arm remover to be fitted.
9. Remove the drop arm using special tool No. RG.198.
10. Lower the jack.
11. Disconnect the steering column support clip from the upper column bracket leaving the bracket itself in position.
12. To simplify the withdrawal of the steering unit, move the front seat back as far as it will go and loosen off the bolts securing the clutch and brake master cylinders to the bulkhead.
13. Remove the three bolts securing the steering unit to the front side member.
14. Lower the upper end of the steering column and remove the column grommet from hole in the bulkhead.
15. Raise the forward end of the unit, twist it sideways and ease out over the bonnet aperture.

Note.—On left-hand drive cars it will also be necessary to remove the battery and cradle before the steering unit can be withdrawn.

To refit

1. Position the steering unit so that the splined end of the column is inserted into the hole in the bulkhead and the rocker shaft is pointing upwards.
2. Push the steering column through the hole in the bulkhead, turning the rocker shaft the right way round as it comes clear of the bonnet aperture.
3. Refit the bulkhead grommet.
4. Secure the unit to the front side member and check the alignment of the upper column bracket and support clip. If the support clip

cannot be secured to the upper column bracket without being strained into place, shims should be inserted between the steering unit and front side member to ease the condition. It may also be necessary to file the upper column bracket. It is most important to ensure that there is no tension in the steering column.

5. Jack up the car, refit the drop arm onto its correct splines and secure with nut and new tab washer. Lower the jack.
6. Retighten the bolts securing the clutch and brake master cylinders to the bulkhead.
7. Refit steering wheel, horn ring assembly, direction indicator switch, and striker ring, overdrive switch, steering column cowling and battery terminal. The fitting procedures for these items will be a reversal of those given under "to remove".
8. Test.

To dismantle (See Fig. 1)

1. Remove steering unit from car as previously described.
2. Thoroughly clean the outside of the unit.
3. Remove the spring cap (6), double coil spring (10), and damper button (11).
4. Undo bolts securing top cover (8), to the steering box and remove together with joints and shims (5). Drain off oil.
5. Remove guide roller (12), from the main nut (14).
6. Withdraw the rocker shaft (13).
7. Undo the three bolts securing the outer column (2), to the steering-box (9), and remove together with paper gaskets (3), shims (4), and distance piece (22).
8. Unscrew the inner column (23), from the nut (14), and withdraw through the aperture in the upper end of the box. This operation will release the twelve balls (20), from the upper track (21), which should be immediately recovered.

   The nut assembly is supplied complete and there is no advantage to be gained by dismantling it.
9. Lift out the main nut assembly and remove the thirteen steel balls (16).
10. Remove the twelve balls (15) from the lower track.
11. If necessary remove the top bush (1), from the outer column. The rocker shaft bush (17), is also a renewable item.

To re-assemble (See Fig. 1)

1. Smear the lower track with grease and insert the twelve balls (15).
2. Smear the transfer channel of the main nut with grease and load with thirteen balls (16).
3. Pass the main nut assembly (14), through the cover plate aperture and hold it in position whilst the inner column is passed through the top aperture of the box. Revolve the inner column in order to screw it into the main nut assembly and gently lower onto the bottom bearing.
4. Smear the upper track (21), with grease and slide it over the inner column. Insert twelve balls and place the upper track squarely in position in the top aperture of the steering box.
5. Slide the distance piece (22), over the inner column (23), followed by the outer column (2), taking great care not to disturb the upper track. Bolt the outer column to the steering box but do not fully tighten the bolts at this stage.
6. Refit the rocker shaft (13), locating the arm on the spigot of the nut assembly.
7. Refit the guide roller (12).

To pre-load the inner column bearings

8. Using a feeler gauge, measure the gap between the bottom face of the outer column and the upper face of the steering box.

9. Remove the outer column, taking great care not to disturb the upper track (21), and refit together with shims equal in thickness to the gap previously measured less 0·0015″ (0·038 mm.). Take into account the thicknesses of the paper gaskets (joint washers), (3), which are as follows:—

   K.29826 ... 0·002″ (0·051 mm.).
   K.21724 ... 0·005″ (0·127 mm.)

To adjust rocker shaft end float

10. Refit the top cover (8) together with a small quantity of shims (5), and two paper gaskets (joint washers).

11. With the spring cap (6) removed, measure the gap between the rocker shaft (13), and top cover with a feeler gauge. Alternatively, clamp a dial test indicator to the steering box so that the stylus bears on the top of the rocker shaft, move the rocker shaft up and down and check the indicator reading. With the steering in the straight ahead position, the clearance or reading on the gauge should be 0·004″-0·008″ (0·10-0·20 mm.).

12. Remove the top cover (8) and adjust the thickness of shims to achieve the required end float.

13. Fit the damper button (11), double coil spring (10), and spring cap (6), securing with two bolts and washers.

14. Top up the unit with the correct grade of oil (see Section P), and refit the filler plug (7).

15. Refit the steering unit to the car as previously described.

BURMAN TELESCOPIC STEERING UNIT

A Burman telescopic steering unit is similar in design to the previous steering unit and the changes are confined to the steering wheel end. The upper end of the inner steering column is swaged out to accommodate a sliding splined extension and locking device. There is 2½in. (63·5 mm.) of height adjustment for the steering wheel.

STEERING COLUMN COWLING

The steering column cowling is fabricated in two halves, upper and lower. The upper half is held in position on the steering column by a clip and four screws; the lower half is secured to the upper by three screws.

To remove and refit

1. Remove the lower cowling from the upper by withdrawing three screws from the underside of the lower cowling.

2. Detach the overdrive switch, if fitted, from the upper cowling and lay aside.

3. Remove the upper cowling from the steering column by withdrawing four bolts and a clip.

4. Refitting is the reverse of the removal sequence but particular attention must be given to the following.

   i. The upper cowling is located by a dowel fitting a drilling in the outer column.

   ii. The upper cowling securing clip is fitted so the spire nut is fitted toward the front of the car.

   iii. The overdrive switch, if fitted, or a blank is positioned between the edges of the two cowlings before the lower is fitted.

   iv. Check that there is a gap of 0·050 in. (1 mm.) between the top edge of the cowlings and the steering wheel centre when the latter is in its lowest position.

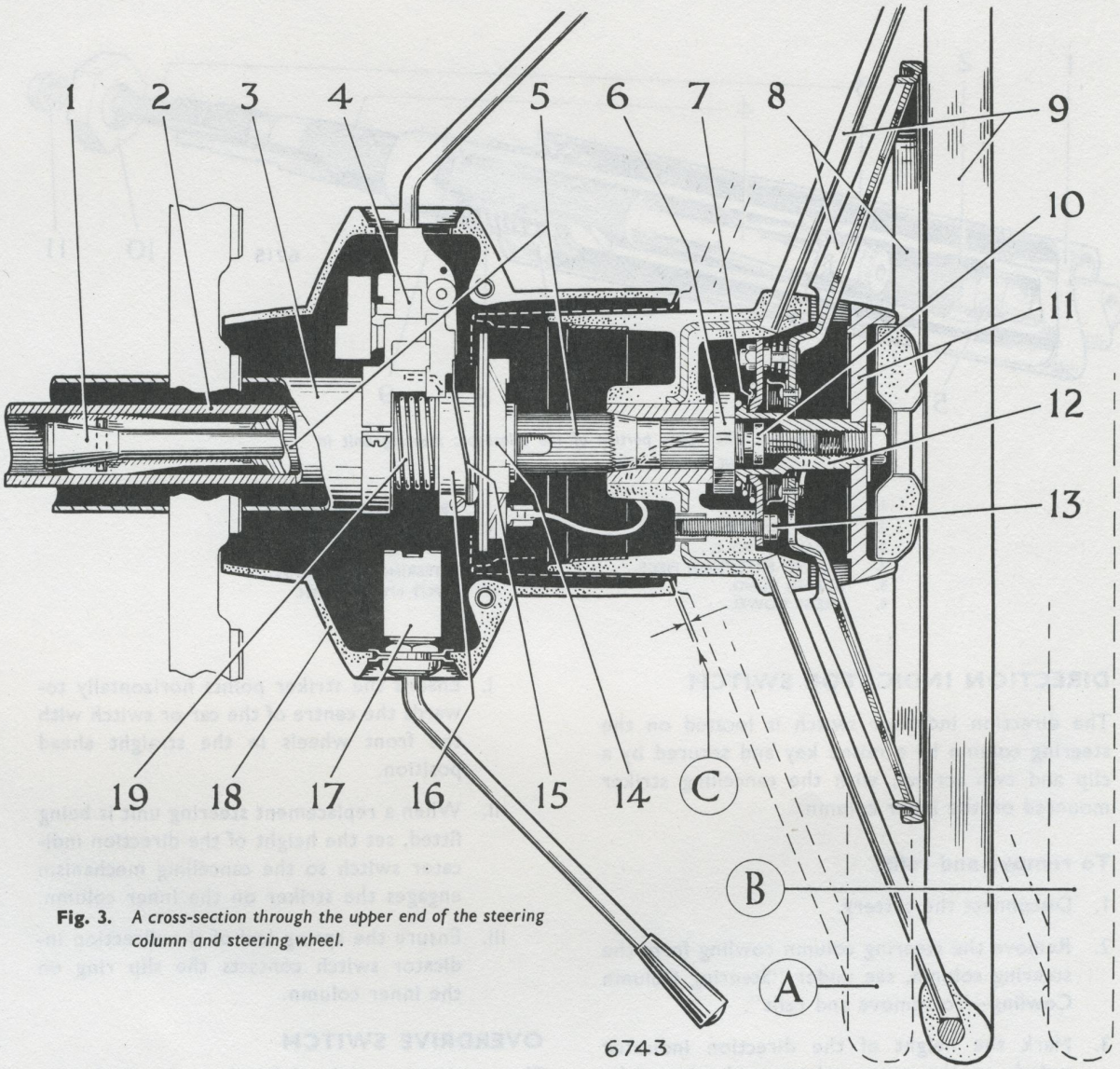

Fig. 3. *A cross-section through the upper end of the steering column and steering wheel.*

1. EXPANDER BOLT.
2. INNER COLUMN.
3. OUTER COLUMN.
4. DIRECTION INDICATOR SWITCH.
5. SPLINED EXTENSION PIECE.
6. STEERING WHEEL NUT.
7. CONICAL SPRING.
8. HORN RING.
9. STEERING WHEEL
10. SPLIT NYLON BUSH.
11. STEERING WHEEL ADJUSTING NUT AND MOTIF.
12. EXPANDER BOLT EXTENSION.
13. SCREW, HORN RING ASSEMBLY TO STEERING WHEEL.
14. SLIP RING.
15. LEAF SPRING.
16. STRIKER RING.
17. OVERDRIVE SWITCH.
18. STEERING COLUMN COWLING.
19. COLUMN BEARING SPRING.

A. LOWER POSITION OF STEERING WHEEL.
B. UPPER POSITION OF STEERING WHEEL.
C. 0·050 IN. (1 MM.) CLEARANCE

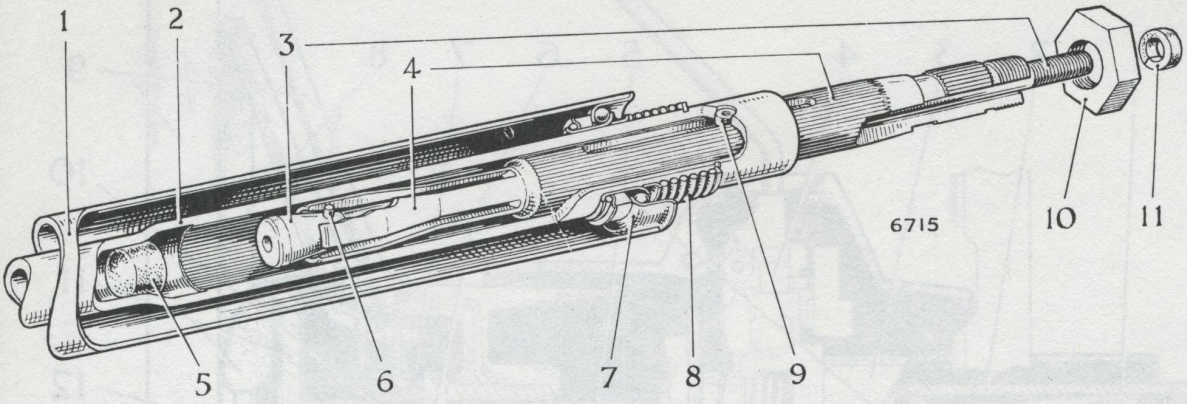

Fig. 4. *The upper portion of the telescopic steering unit in cut away section.*

1. OUTER COLUMN.
2. INNER COLUMN.
3. EXPANDER BOLT.
4. SPLINED EXTENSION PIECE.
5. RUBBER BUNG.
6. CROSS DOWEL.
7. BALL BEARING RACE.
8. SPRING AND CIRCLIP.
9. DOWEL.
10. STEERING WHEEL NUT
11. SPLIT NYLON BUSH.

DIRECTION INDICATOR SWITCH

The direction indicator switch is located on the steering column by a raised key and secured by a clip and two screws, with the cancelling striker mounted on the inner column.

To remove and refit

1. Disconnect the battery.
2. Remove the steering column cowling from the steering column, see under "Steering Column Cowling—To remove and refit".
3. Mark the height of the direction indicator switch on the outer column and remove by withdrawing two screws and washers.
4. Mark the position of the striker on the inner column and remove by slackening off the pinch bolt.
5. Refitting is the reverse of the removal sequence but particular attention must be given to the following points.

i. Ensure the striker points horizontally towards the centre of the car or switch with the front wheels in the straight ahead position.

ii. When a replacement steering unit is being fitted, set the height of the direction indicator switch so the cancelling mechanism engages the striker on the inner column.

iii. Ensure the spring leaf of the direction indicator switch contacts the slip ring on the inner column.

OVERDRIVE SWITCH

The overdrive switch, if fitted, is mounted on a plate and positioned between the upper and lower steering column cowlings on the opposite side to the direction indicator switch.

To remove and refit

1. Disconnect the battery.
2. Remove the lower steering column cowling from the upper by withdrawing three screws.

Withdraw the overdrive switch from the upper
3. cowling and disconnect at the snap connectors.

4. Refitting is the reverse of the removal sequence.

HORN RING ASSEMBLY

The horn ring fitted to the telescopic steering units differs from that described earlier in this Section to accommodate the varying height of the steering wheel on the inner column.

The upper contact plate is incorporated in the horn ring and the complete assembly is retained in the centre of the steering wheel by three screws fitted internally through the lower contact plate.

The motif is a press fit in the centre of the steering wheel adjusting nut which is set in the centre of the steering wheel.

The live cable from the horns connects with an insulated spring leaf mounted on the direction indicator switch and the spring leaf is set to connect with a slip ring mounted on but insulated from the inner column of the steering column.

A cable, fitted to a Lucar connector on the upper face of the slip ring, passes through holes in the steering wheel centre and lower contact plate to connect with the upper contact plate. The length of the cable is such that it allows for the adjustable height of the steering wheel.

The lower contact plate is "earthed" to the inner column by a conical shaped coil spring.

Pressure applied to the horn ring "tilts" the upper contact plate onto the lower thus completing the circuit. The three coil springs between the contact plates returns the horn ring to the "off" position when pressure is removed from the horn ring.

To remove and refit Fig. 3

1. Disconnect the battery.

2. Lift the steering wheel (9) to its highest position.

3. Remove the lower steering column cowling from the upper by withdrawing three screws, disconnect the cable from the Lucar connector on the upper face of the slip ring (14).

4. Prise the motif from the centre of the steering wheel adjusting nut (11).

5. Remove the steering wheel adjusting nut (11) from the top of the expander bolt extension (12) by withdrawing a bolt and washer.

6. Remove the horn ring (8) from the steering wheel centre (9) by withdrawing three screws (13) and washers, easing the cable through its hole in the steering wheel centre (9).

7. Refitting is the reverse of the removal sequence but particular attention must be given to the following.

   i. The amount of "tilt" on the horn ring required to sound the horns can be increased or decreased by slackening or tightening the three self-locking nuts on the underside of the lower contact plate but it is essential that the contact surfaces are kept an equal distance apart all the way round.

   ii. Ensure the split nylon bush (10) is at the bottom of the thread on the expander bolt (1).

STEERING WHEEL

Adjusting the height (Fig. 3)

1. Slacken off the steering wheel (9) by gripping the adjusting nut (11) in the centre of the steering wheel and rotating it anti-clockwise.

2. Slide the steering wheel (9) up or down the steering column to the desired height.

3. Lock the steering wheel (9) by rotating the adjusting nut (11) clockwise.

To remove and refit (Fig. 3)

1. Remove the horn ring assembly (8) from the steering wheel centre (9) see under "Horn Ring Assembly—To remove and refit".
2. Remove the conical spring (7) from inside the steering wheel centre by unscrewing the expander bolt extension (12).
3. Remove the steering wheel nut (6) from the steering wheel centre (9) using the special tool R.G. 197.
4. Identify the position of the steering wheel centre (9) on the splined extension piece (5) if the existing steering wheel is to be refitted and remove from the splined extension piece (5)
5. Refitting is the reverse of the removal sequence but particular attention must be given to the following.
   i. The front wheels are set in the straight ahead position and the steering wheel is fitted so the two spokes are in the horizontal position.
   ii. The conical spring is fitted, small end downward on top of the steering wheel nut before the expander bolt extension is fitted and the contact surfaces are smeared with Shell Grease S.B. 2498.

TELESCOPIC STEERING UNIT (Fig. 3)

The inner column (2) of the telescopic steering unit is similar to that of the rigid units but the hollow upper end is swaged out and its internal surface splined to accommodate the splined extension piece (5).

The upper end of the splined extension piece (5) has external splines, taper and thread, similar to the rigid units and the steering wheel (9) is fitted in the normal manner. Midway along its length is a single axial groove which locates the protruding end of a dowel pressed into the swaged portion of the inner column (2). The dowel retains the splined extension piece within the inner column (2) and limits its upward and downward travel to predetermined amounts. The lower end is slotted and has an internal taper to accommodate the cross dowel and male taper of the expander bolt (1) fitted in the hollow centre of the splined extension piece (5).

An expander bolt extension (12) screws onto the protruding thread of the expander bolt (1) and the steering wheel adjusting nut (11) is located by two flats and attached by a bolt. The bolt extension (12) has a small flange on its lower end which will bear against the underside face of the horn ring (8) and releases the expander bolt (1) as the steering wheel adjusting nut (11) is slackened off.

A split bush (10), situated beneath the expander bolt extension (12) and fitted on the protruding end of the expander bolt (1) prevents the bolt dropping out of the splined extension piece (5) when the bolt extension (12) is removed. The inner column (2) is also plugged with a rubber bung to prevent the expander bolt (1) dropping into the hollow centre of the inner column (2) should ever the nylon bush (10) be inadvertantly removed.

To remove and refit

1. Remove the horn ring assembly from the steering wheel centre, see under "Horn Ring Assembly—To remove and refit".
2. Remove the steering wheel—see under "Steering Wheel—To remove and refit".
3. Remove the slip ring from the inner column followed by the striker by slackening the nut and bolt of the striker.
4. Remove the direction indicator switch from the steering column, see under "Direction Indicator Switch—To remove and refit".
5. Remove the steering unit from the car, see under "Steering Unit—To remove from car Alpine".
6. Refitting is the reverse of the removal sequence.

To dismantle and reassemble (Fig. 4)

The dismantling and reassemble sequences for the telescopic steering unit is similar to the rigid unit concerning the steering box which is fully described earlier in this Section but the following additions must be noted.

1. Before dismantling the steering box remove the ball race at the top ends of the inner and outer columns.

   Push the splined extension piece (4) inward to the limit of its travel, remove the split nylon bush (11) from the expander bolt (3) and the steering wheel nut (10) from the splined extension piece.

   Withdraw the ball bearing race from between the inner and outer column (1 & 2) removing the circlip and bearing tension spring (8).

2. Remove the inner column (2) as described for rigid steering units and dismantle the upper end of the inner column as follows:—

   Withdraw the splined extension piece (4) from the swaged portion of the inner column (2) by extracting the dowel (9) this is tapped to facilitate removal and discarded after extraction.

   Remove the expander bolt (3) from the hollow centre of the splined extension piece (4).

3. The assembly sequence is the reverse of the dismantling sequence but particular attention must be given to the following.

   The tapered end of the expander bolt (3) and the long splines of the extension piece (4) are smeared with Shell S.B. 2498 grease.

   The expander bolt (3) is fed into the splined extension piece (4) so the cross dowel (6) through the tapered end locates in the cuts in the end of the splined extension piece (4) and retained within by fitting the split nylon bush (11) onto the threaded end.

   The splined extension piece (4) is fed into the swaged portion of the inner column (2) so the groove aligns with the dowel hole.

   A new dowel is pressed into the inner column to such a depth that it does not hamper the movement of the splined extension piece.

   The splined extension must be lowered to the fullest extent before the split nylon bush (11) is removed.

STEERING RELAY LEVER ASSEMBLY

The steering relay lever assembly is fitted on the opposite side to the steering unit and relays the movement of the front wheel nearest the steering unit to the other.

The rear end of the steering unit swing lever is connected to the rear end of the relay lever by the centre track rod and movement is transferred to the second front wheel by a short outer track rod fitted to the front end of the relay lever.

The pin in the relay lever is a heavy interference press fit and must never be separated; the circlip on the lower end of the pin is a safety precaution and no useful purpose is served by removing it.

Series I to IIIA Models (Fig. 5)

The bush bearings in the support bracket of the steering relay lever assembly are of the Clevite type and a lubrication nipple is provided for periodical lubrication.

Series IV Models onwards (Fig. 6)

The support bracket bush bearings are of the P.T.F.E. type with P.T.F.E. washers fitted above and below the end faces of the support bracket. No

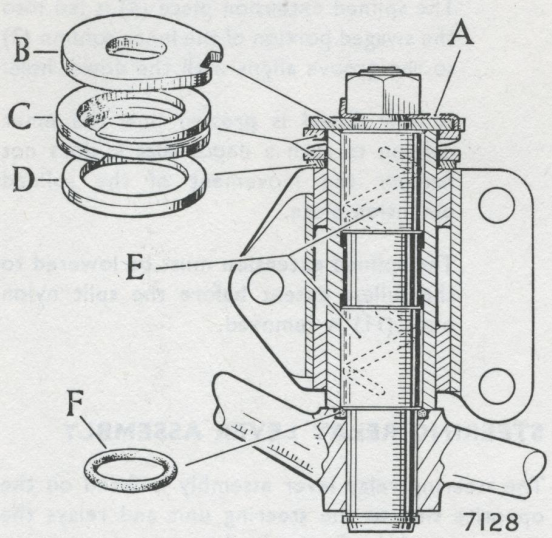

Fig. 5. *Cross section view through steering relay lever assembly, note the position of the lubrication groove in the bush bearings.*

A. TABWASHER
B. THRUST WASHER
C. SPRING
D. WASHER
E. BUSH BEARINGS
F. SEALING RING

periodical lubrication is necessary and the greaser is blanked off with a short bolt, but during re-assembly all parts must be coated with Shell Retinax " A " Grease. The Belleville washer pack, situation below the support bracket, is tensioned during re-assembly by setting the castellated nut on the upper end of the relay lever pin to load the Belleville washers.

To remove and refit

1. Detach the steering relay lever assembly from the front chassis side member on the opposite side to the steering unit by removing three nuts, bolts and washers.
2. Remove the outer and centre track rods from the front and rear ends of the relay lever by discarding the split pin and removing the castellated and self locking nuts respectively from the tapered ball pins and using a suitable extractor RG. 191A; withdraw the relay lever assembly from beneath the car.
3. Refitting is the reverse of the removal sequence but particular attention must be given to the following:—

   (i) Set the steering and relay levers in the straight ahead position and fit the centre rod to the rear ends of both levers; failure to observe this instruction will put unnecessary strain on the rubber bushes, in the ends of the centre rod and result in shortening the life of the bushes.

   (ii) Fit a new split pin to the castellated nut on the tapered ball pin of the outer track rod.

   (iii) Check the front wheel alignment (toe-in), see under " Front wheel alignment (toe-in) — To check, Front Suspension, Section F."

To dismantle and reassemble

Series I to IIIA (Fig. 5)

1. Identify the relay lever to the nearest end of the support bracket to facilitate re-assembly; withdraw the relay lever and pin from the support bracket by releasing the tabwasher, removing the nut, tabwasher, thrust washer, spring and washer.
2. Extract the sealing ring from the upper face of the relay lever, when it is seen to be well worn.
3. As the pin is a heavy interference fit in the relay lever no useful purpose is served by separating them.

4. Re-assembly is the reverse of the dismantling sequence but particular attention must be given to the following:—

   (i) Ensure the sealing ring is in good condition and recessed correctly in the relay lever groove.

   (ii) The pin of the relay lever is fed into the support bracket so the front lower bolt hole is closer to the short end of the relay lever.

   (iii) The nut is slackened off to give an assembled endfloat of 0·007 in. (0·18 mm) and then locked with the tabwasher.

   (iv) Lubricate the relay lever assembly through the lubrication nipple provided.

Series IV Models onwards (Fig. 6)

1. Identify the relay lever to the nearest end of the support bracket to facilitate assembly; withdraw the relay lever and pin from the support bracket by discarding the split pin and removing the castellated nut, thrust washer, narrow sealing ring, distance piece, P.T.F.E. and bearing washers from above the support bracket.

2. Remove the wider sealing ring, bearing and P.T.F.E. washers followed by the Belleville washer pack from the upper face of the relay lever.

4. As the pin is a heavy interference fit in the relay lever, no useful purpose is served by separating them.

5. Re-assembly is the reverse of the dismantling sequence but particular attention must be given to the following:—

   (i) In the interests of good steering it is advisable to fit a new pack of Belleville washers.

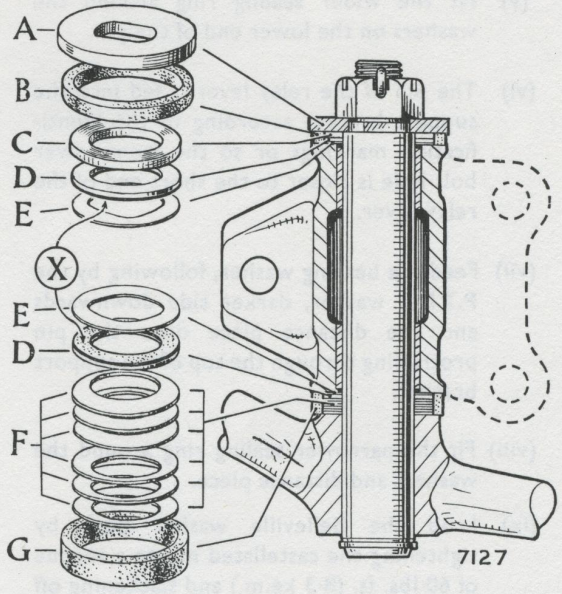

Fig. 6. *Cross section view through later steering relay lever assembly, note the method of assembly for the Belleville washer pack.*

A. THRUST WASHER
B. NARROW SEALING RING
C. DISTANCE PIECE
D. P.T.F.E. WASHER
E. BEARING WASHER
F. BELLEVILLE WASHER PACK
G. SEALING RING
X P.T.F.E. SURFACE

   (ii) Ensure the upper end of the relay lever pin is free from burrs and coat all parts with Shell Retinax " A " Grease.

   (iii) Assemble the six Belleville washers into two parallel packs of three each and place together so the raised outside edges are in contact with one another and feed onto the pin.

   (iv) Position the P.T.F.E. washer, dark face upwards, on the pin followed by the bearing washer.

(v) Fit the wider sealing ring around the washers on the lower end of the pin.

(vi) The pin of the relay lever is fed into the support bracket according to the identification markings or so the front lower bolt hole is closer to the short end of the relay lever.

(vii) Feed the bearing washer, following by the P.T.F.E. washer, darker side downwards and the distance piece onto the pin protruding through the top of the support bracket.

(viii) Fit the narrower sealing ring around the washers and distance piece.

(ix) Load the Belleville washer pack by tightening the castellated nut to a torque of 60 lbs. ft. (8·3 kg.m.) and slackening off 1½ flats, fit a new split pin in the nearest position *back*, DO NOT TIGHTEN THE CASTELLATED NUT.

Steering relay lever bush bearings.

To renew the steering relay lever bush bearings, it will be necessary to remove and dismantle the relay lever assembly, see under " Steering Relay Lever — To remove and refit; To dismantle and reassemble."

Series I to IIIA Models

The bush bearings used in this relay lever assembly are of the " Clevite " type which require periodical lubrication.

The bush bearings are pressed into the support bracket so the ends having the start and finish oi the lubrication groove are towards the lubrication nipple in the centre of the support bracket and until the outer ends of the bush bearings are flush with the two end faces of the support bracket.

Series IV Models onwards

The bush bearings used in this relay lever assembly are of the P.T.F.E. type and do not require periodical lubrication.

IT IS IMPORTANT THAT THE BEARING SURFACE IS NOT DISTURBED BY THE SPIGOT OF THE PRESSING TOOL OR BY REAMING OR SCRAPING.

The bush bearings are pressed into the support bracket so the outer ends are just below the two end faces of the **support bracket, without disturbing the bearing surface of the bush bearing.**