

SERVICE HANDBOOK

**SILVER WRAITH — SILVER DAWN — BENTLEY MK. VI.
R. TYPE BENTLEY — PHANTOM IV.**

SECTION E CLUTCH

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SECTION E.

CLUTCH

List of Illustrations:-

<u>TITLE</u>	<u>NO:</u>
Borg and Beck Adjustment Gauge	E.4
Clutch - Sectional Drawing	E.1
Friction and Pressure Plates	E.5
Gearbox Rear Mounting	E.2
Jig for Checking Driven Plates	E.3

SILVER WRAITH — SILVER DAWN — BENTLEY MK. VI.

R. TYPE BENTLEY — PHANTOM IV.

C L U T C H

Make	- Borg and Beck
Type	- Single dry plate
Size	
Silver Wraith	- 11" (Heavy)
Silver Dawn	- 10" (Long) SBA.2 - SCA.25
	11" (Light) SCA.27- SDB.74
	11" (Heavy) SDB.76-
Bentley	- 10" (Long) B.2.AK- B.401.GT
	11" (Light) B.2.HR- B.298.LJ
	11" (Heavy) B.300.LJ -
Phantom IV	- 11" (Heavy)
Facing material	- Mintex H.14
Pedal free travel	- 10" (Long) $1\frac{1}{4}" - 1\frac{1}{2}"$
	11" (Light) $\frac{7}{8}" - 1"$ (short lever)
	11" (Heavy) $1\frac{1}{4}" - 1\frac{1}{2}"$

As an easy means of recognition between the 11" "Light" and 11" "Heavy" type of clutch, the clutch external operating lever for the "Heavy" type is 4.250" long, between centres, whereas for the "Light" type it is 3.625". Thus the difference in clutch pedal adjustment, see above.

CLUTCH PEDAL ADJUSTMENT:

As the driven plate facings wear, the pressure plate moves closer to the flywheel and the weighted ends of the three release levers follow. This causes the inner ends of the release levers to travel further towards the gearbox and decrease the clearance between the levers and the clutch release bearing. The effect is to decrease the free travel of the clutch pedal.

Periodically check and adjust to correct dimensions, see above.

CLUTCH SPRINGS:

Number of pressure springs - 9.

The original 10" clutch was fitted with "Orange" coloured pressure springs. These have now been superseded by "Red" coloured springs, and whenever these units are being overhauled a check should be made that "Red" springs are fitted.

"Red" springs - Load required to compress to $1\frac{9}{16}" = 150 - 155$ lbs.

The 11" Light type and the 11" Heavy type are both fitted with "Orange" coloured pressure springs, except for Phantom IV.

"Orange" springs - Load required to compress to $1\frac{9}{16}" = 130-140$ lbs.

The 11" Heavy type when fitted to Phantom IV is fitted with "Red" coloured pressure springs as above specification.

The driven plate damper springs are "Red" coloured for all series except Phantom IV, which should be "Yellow".

Damper springs:-

"Red" - Load required to compress to 15/16" = 140 - 154 lbs.

"Yellow" - Load required to compress to 15/16" = 155 - 169 lbs.

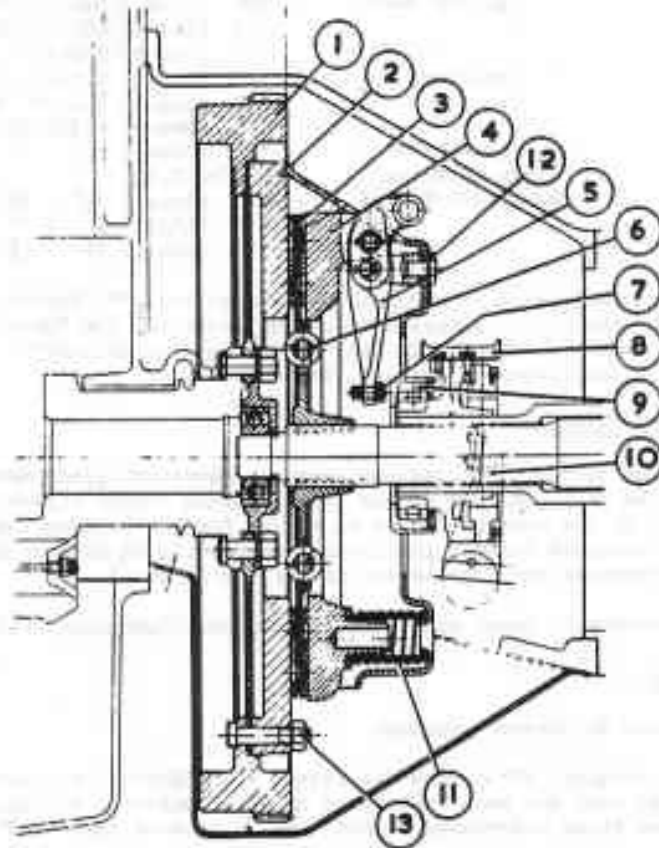


FIG. B1. SECTION - CLUTCH.

1. Flywheel
2. Friction plate
3. Driven plate
4. Pressure plate
5. Release lever
6. Damper spring
7. Adjuster screw
8. Release bearing
9. Oil trough
10. Trunnion
11. Pressure spring
12. Setscrews
13. Locked bolt

SERVICE HANDBOOK

SILVER WRAITH — SILVER DAWN — BENTLEY MK. VI.

R. TYPE BENTLEY — PHANTOM IV.

RELEASE BEARINGS:

Ball Bearing - 1.75" x 3.00" x .562".

Lubrication of ball bearing and trunion, from chassis Luvax system.

In the event of the existing clutch release bearing becoming noisy it should be renewed. Access to the bearing is obtained by the removal of the wear-box, but it is not necessary to disturb the clutch.

SERVICE FAULTS:

<u>Cause</u>	<u>Remedy</u>
<u>Clutch Slip.</u>	
Insufficient free travel	- Adjust clutch pedal
Weak thrust springs	- Fit replacement cover unit
Worn driven plate	- Renew
Scored pressure plate	- Reface - see page E.6
Oil on driven plate	- Renew, check crankshaft oil seal

Clutch Shudder.

Burnt oil on facing	- Renew driven plate
Incorrect adjustment of release-levers	- Check and adjust
Weak driving springs	- Renew driven plate
Worn driven plate	- Renew driven plate

Clutch Spin or Drag.

Too much free travel	- Adjust clutch pedal
Insufficient total travel	- Adjust clutch pedal
Incorrect adjustment of release-levers	- Check and adjust
Distorted driven plate	- Renew driven plate

Clutch Rattle.

Driving springs broken or weak - Renew driven plate

CLUTCH REMOVAL:

The recommended procedure is to first remove the gearbox:-

- (1) Disconnect speedometer drive and flexible oil pipe from rear of gearbox.
- (2) Disconnect oil damper control rod.
- (3) Slacken back inner nuts (4, Fig. E2), and remove torque reaction rubbers then remove torque bracket.
- (4) Remove tie-bar complete with bracket and packing piece.
- (5) Disconnect centre universal joint; disconnect front propeller shaft from gearbox, slide clear.

SILVER WRAITH — SILVER DAWN — BENTLEY MK. VI.
R. TYPE BENTLEY — PHANTOM IV.

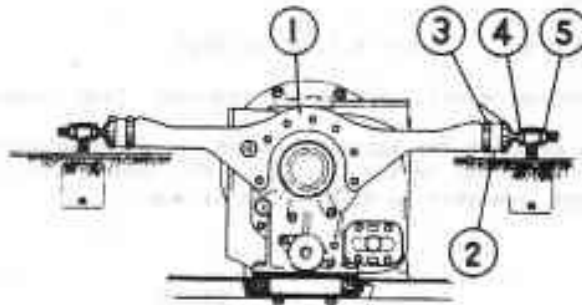


FIG. E2. GEARBOX REAR MOUNTING.

- | | |
|-----------------------------|----------------|
| 1. Gearbox torque bracket. | 4. Inner nuts. |
| 2. Torque reaction rubbers. | 5. Outer nuts. |
| 3. Support cups. | |

- (6) Uncouple change gear lever, remove selector shaft from box.
- (7) Remove pull rods and drag links from servo, ease gearbox sideways and remove servo motor from driving shaft.
- (8) Support rear of engine with jack and draw away gearbox.

If difficulty is experienced in withdrawing first motion shaft from spigot bearing, see appropriate chapter in Gearbox Section.

It is not possible to remove clutch casing from engine whilst in the frame, owing to dashboard preventing it being lifted over flywheel, therefore, extract clutch from casing.

- (1) Remove bottom cover and turn flywheel until one of the three locked bolts (13, Fig. E1), retaining friction plate to flywheel, is at lowest position. Remove nut and bolt to provide required withdrawal clearance.
- (2) Turn flywheel to expose two of the six nuts retaining clutch to flywheel. Slacken off, and at the same time insert between release lever and cover, a Borg and Beck "L" shaped spacer, if not available, use a $\frac{1}{4}$ " B.S.F. nut. Remove bolts. Turn flywheel and repeat above operations to remove remaining nuts.
- (3) Hold clutch, and turn flywheel to bring bolt hole (13) to lowest position and remove clutch, complete with driven plate.

CLUTCH COVER ASSEMBLY:

The assembly need not be dismantled for inspection. The pressure plate should be free from deep scoring. If scoring, distortion or surface cracks are evident, reface pressure plate or fit a new assembly.

The release lever assembly shows a certain amount of slackness even when new, if necessary, the thrust (pressure) springs should be checked as per specification on page E1.

SERVICE HANDBOOK

SILVER WRAITH — SILVER DAWN — BENTLEY MK. VI.

R. TYPE BENTLEY — PHANTOM IV.

To dismantle - Mark the following parts to ensure identical re-assembly and balance, (a) cover, (b) pressure plate, (c) release levers.

- (1) Place cover assembly on the bed of a press with pressure plate on blocks to allow free movement of cover when depressed.
- (2) Place wooden block across cover, resting on spring bosses, and operate press. Remove the setscrews (12, Fig. E1) and then release pressure slowly, remove cover and collect thrust springs and washers.
- (3) Extract split pins, push out pins and collect yokes and rollers. Remove release levers and collect needle bearings.

To re-assemble - Reverse the above instructions, ensuring that all co-relation marks coincide.

Before fitting new clutch driven plate, check plate for parallelism of faces. A simple jig can be made as illustrated in Fig. E3.

Limit of out of parallel - .012".

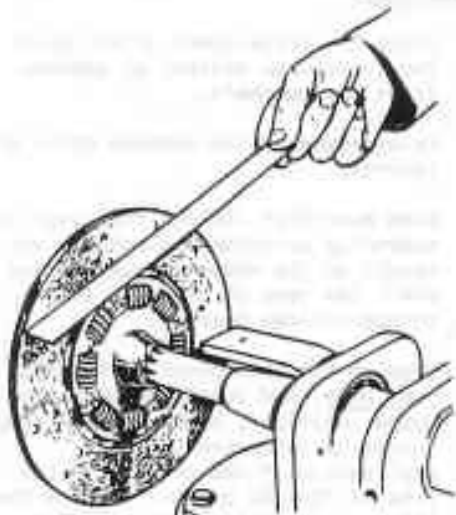


FIG. E3. JIG FOR CHECKING PARALLELISM OF FACES.

External diameter of plate - 8.400"
Thickness of machined lugs - .327" to .330"
Height of central hub - 2.062"

N.B. A special extension piece may be necessary to raise existing hub to this dimension.

Release Lever Adjustments:

Clearance, $2.062" \pm .030"$, between flywheel face and top of hemispherical headed adjusting screws.

Maximum variation between screws - .005".

For accurate adjustment, a Borg and Beck gauge plate is essential. Fig. E4.

The gauge plate should conform to the following dimensions:-

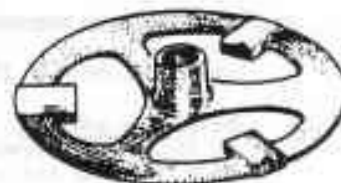


FIG. E4. BORG & BECK LEVER ADJUSTMENT GAUGE.

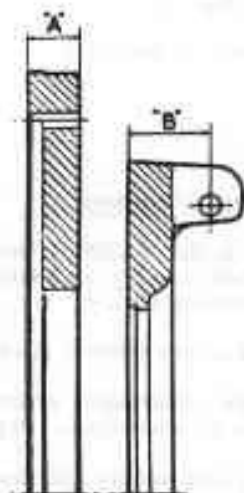
- (1) Position gauge plate centrally against pressure plate, with machined lugs below release levers, bolt complete assembly to surface plate using full compliment of retaining bolts. Check with thin feeler to ensure that cover is tightened down squarely.

- (2) Place a short straight edge across top of central hub, and adjust each release lever separately, the top of the hemispherical headed screw should just make contact with the straight edge. Lock by peening metal into saw cuts.
- (3) Replace spacers for re-erection.

FLYWHEEL FRICTION AND CLUTCH PRESSURE PLATES:

Both these plates may be found scored or subject to slight contraction cracks. It is permissible to regrind to a depth not exceeding .010" on each plate from the original dimensions, as under:-

Flywheel friction plate	- .800" - 10	(A. Fig. E5)
Clutch pressure plate		
10" C.F.	- 1.284" - 6) (B. Fig. E5)
11" Light	- 1.286" - 10	
11" Heavy		



RE-ASSEMBLY:

- (1) Check the replacement driven plate for freedom on splines of gearbox first motion shaft.
- (2) Re-assemble in the reverse order of removing.
- (3) Make sure that the oil feed pipe is correctly positioned above the oil trough on the clutch trunnion, and check the rate of oil flow to the clutch release bearing.

Depress the foot pedal of the oil pump once, and count the number of drops delivered, three to five drops should be delivered at each application of the pedal. If the rate of flow is greater or less than this, re-new the restrictor elbow. Note the correct size number (they are lettered and numbered to indicate their

FIG. E5. FRICTION AND PRESSURE PLATES.

shape and rate of flow, a higher number indicating a greater rate of flow)

- (4) Refitting gearbox - adjusting torque reaction rubbers - replace rubbers in their cups, recessed ends outermost, and then tighten up inner nuts to lock, holding the cups square while doing so. DO NOT disturb the two outer nuts.

NOTE: If the outer nuts have been disturbed or it is necessary to reset the adjustment:-

Fully slacken back the inner and outer nuts, and correctly replace the rubbers, making sure that these are fully pressed home in their cups. Tighten up the inner nuts finger tight, then holding cups square, tighten two more complete turns with spanner. Tighten outer nuts to lock.

SERVICE HANDBOOK

SILVER WRAITH — SILVER DAWN — BENTLEY MK. VI.

R. TYPE BENTLEY — PHANTOM IV.

After refitting flexible oil pipe to shock damper control, bleed the control system:-

Start engine and run slowly in top gear approximately 10 M.P.H., move Ride Control lever to "Hard" and then remove air release plug from damper.

Continue to run engine until a continuous flow of oil runs from damper. Replace plug.

Repeat for damper on opposite side.

Top up gearbox level.