



BORG & BECK CLUTCHES

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AUTOMOTIVE PRODUCTS LIMITED

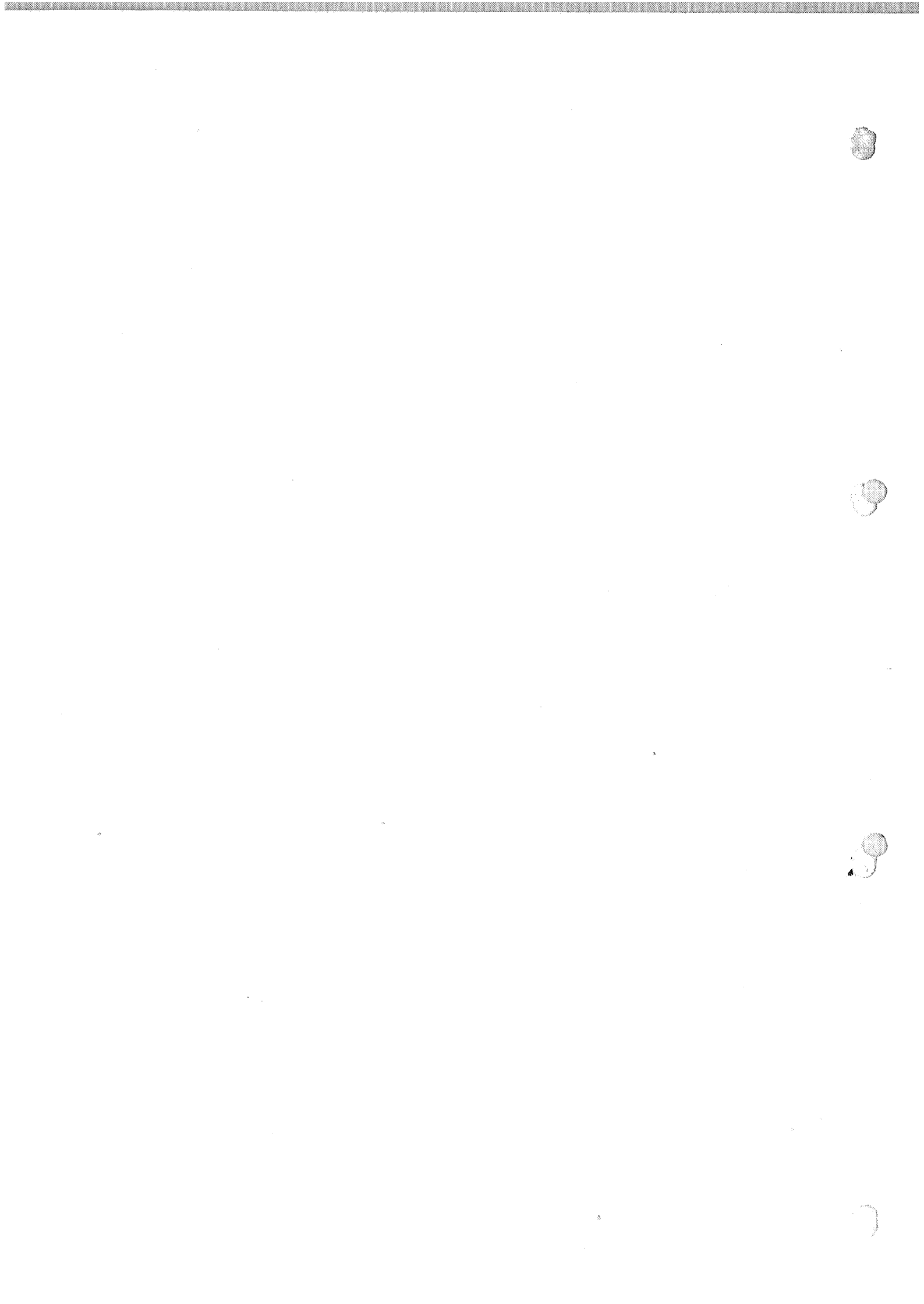
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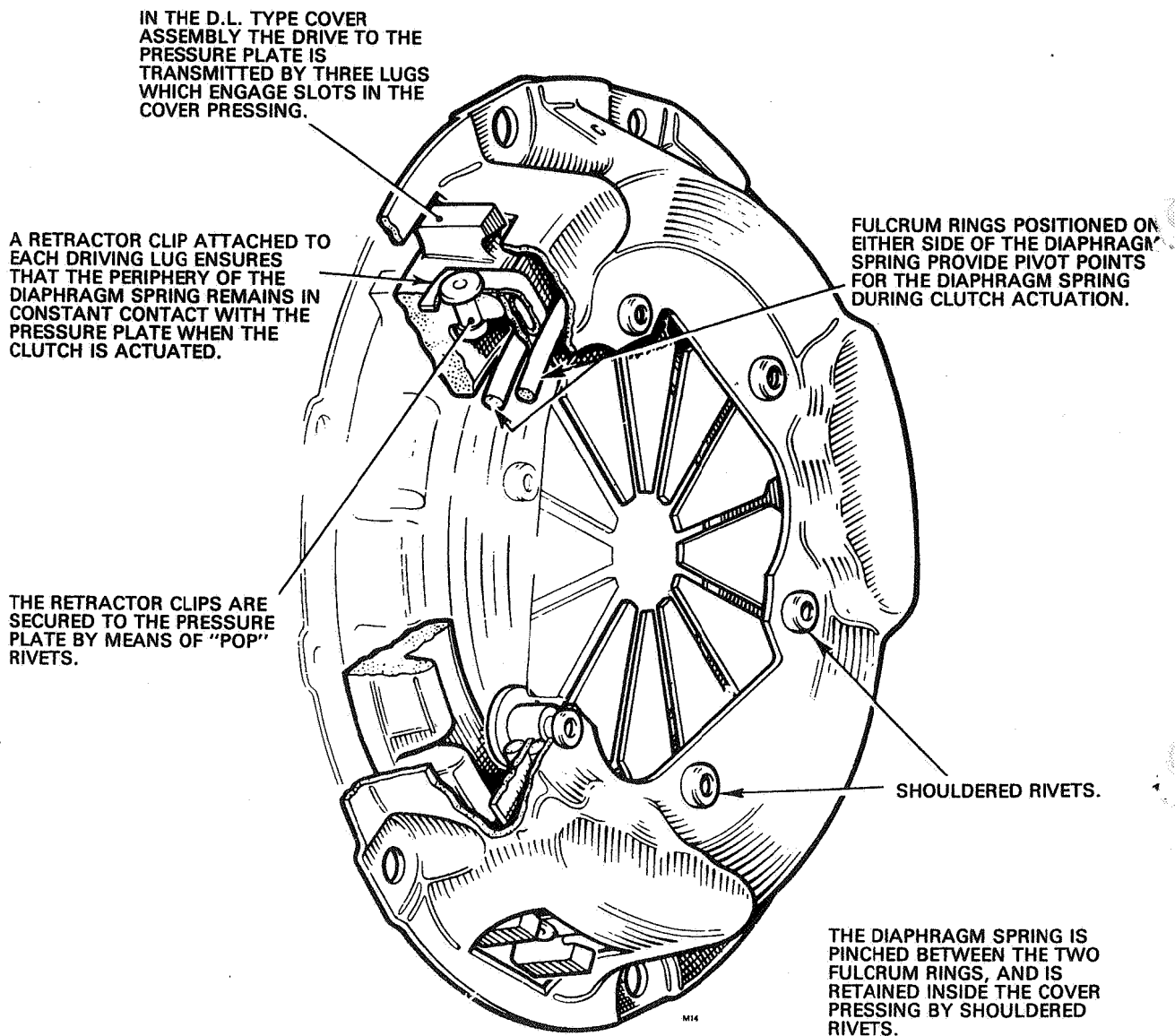




SECTION 1

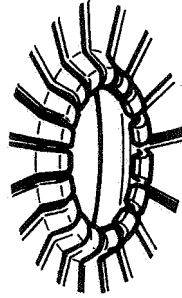
DESCRIPTION & OPERATION

DL TYPE TYPICAL ASSEMBLY



CUTAWAY VIEW OF DL COVER ASSEMBLY (LUG DRIVE)

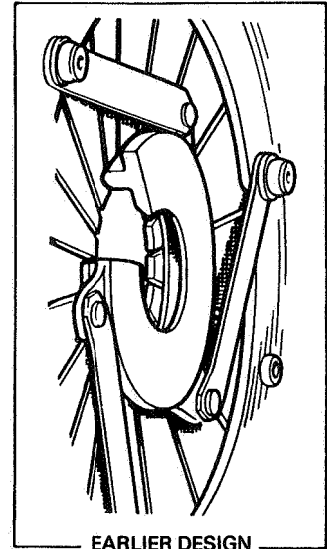
DS TYPE TYPICAL ASSEMBLY



DIAPHRAGM SPRING 'CURVED FINGERS' ON SOME ASSEMBLIES WILL TOLERATE SOME RELEASE BEARING MISALIGNMENT.

SHOULDERED RIVETS POSITIONED AS SHOWN SECURE THE DIAPHRAGM SPRING AND FULCRUM RINGS INSIDE THE COVER PRESSING.

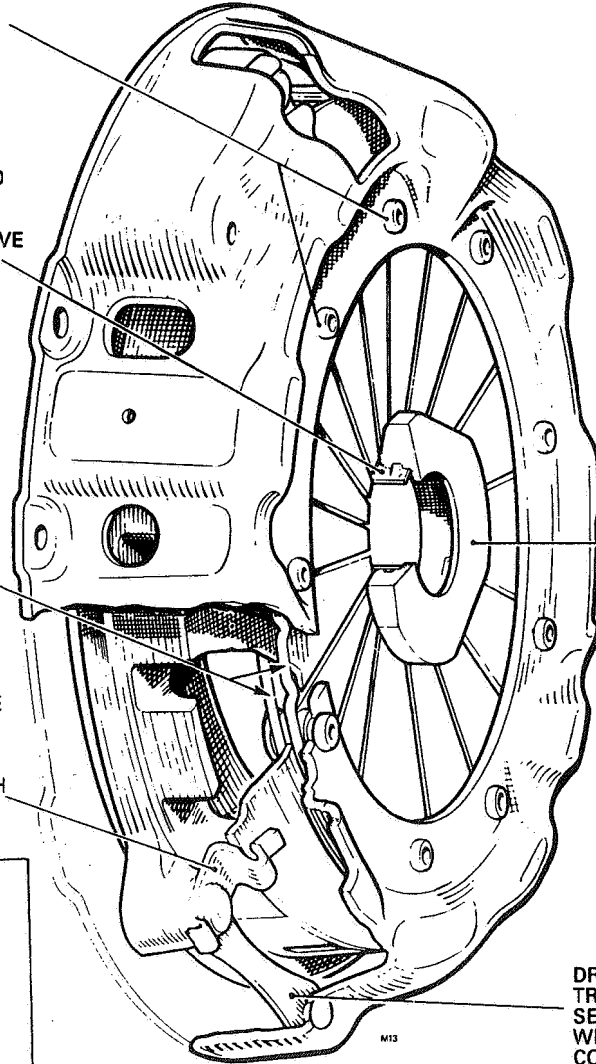
RELEASE PLATE IS SECURED TO THE DIAPHRAGM SPRING BY MEANS OF A CENTRE SLEEVE WHICH IS STAKED INTO A GROOVE IN THE RELEASE PLATE.



EARLIER DESIGN

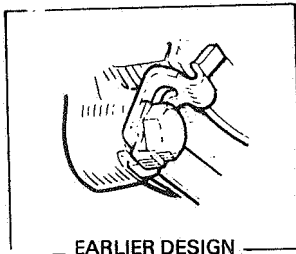
TWO FULCRUM RINGS RIVETED INTO POSITION INSIDE THE COVER PRESSING PROVIDE PIVOT POINTS FOR THE DIAPHRAGM SPRING. WHEN THE CLUTCH IS IN THE ENGAGED POSITION THE LOAD IS CARRIED BY THE FULCRUM RING ADJACENT TO THE COVER PRESSING, AND THE OTHER RING CARRIES THE LOAD WHEN THE CLUTCH IS DISENGAGED.

THE CLUTCH RELEASE PLATE PROVIDES A BEARING SURFACE FOR THE RELEASE BEARING



THREE RETRACTOR CLIPS ENSURE THAT THE PERIPHERY OF THE DIAPHRAGM SPRING REMAINS IN CONSTANT CONTACT WITH THE RELEASE PLATE DURING CLUTCH OPERATION

NOTE: D.S. COVER ASSEMBLIES ARE ALSO SUPPLIED WITHOUT A RELEASE PLATE FOR USE WITH A BALL TYPE RELEASE BEARING



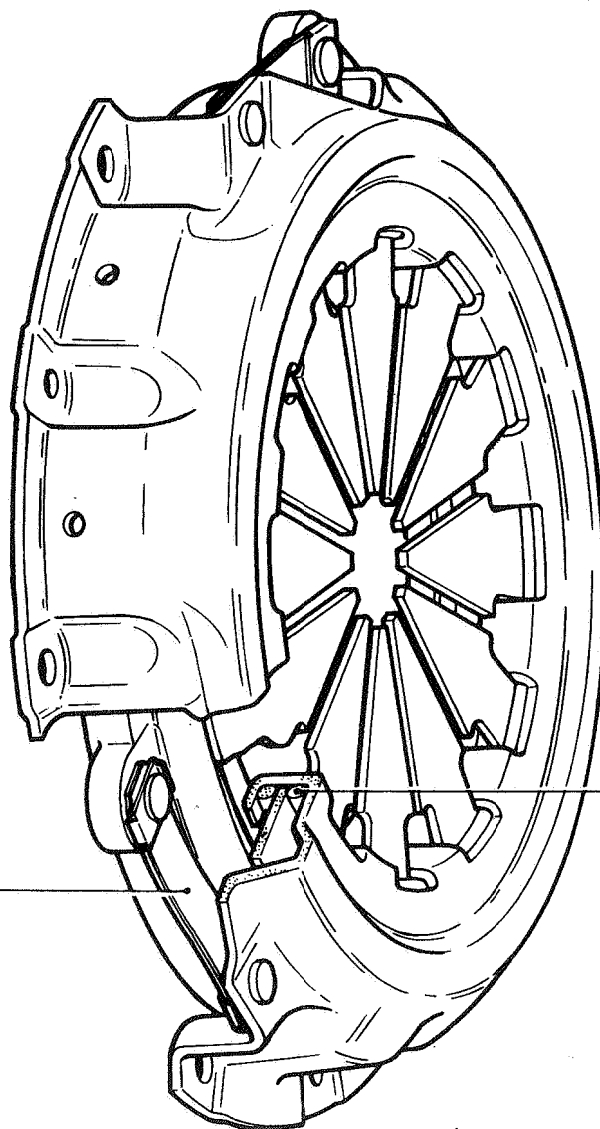
EARLIER DESIGN

DRIVE TO THE PRESSURE PLATE IS TRANSMITTED BY MEANS OF THREE SETS OF STRAPS, ONE END OF WHICH IS ATTACHED TO THE COVER PRESSING AND THE OTHER TO THE PRESSURE PLATE.

CUTAWAY VIEW OF DS COVER ASSEMBLY (STRAP DRIVE)

DST TYPE (SIZES 180 & 190 mm)

THIS IS A LATER VERSION OF THE STRAP DRIVE COVER ASSEMBLY WHICH DIFFERS IN ITS METHOD OF CONSTRUCTION. THE MAJOR DIFFERENCE IS THAT THE FULCRUM RINGS ARE CLAMPED INTO THE COVER PRESSING BY TABS, WHICH ARE EXTENSIONS OF THE COVER, INSTEAD OF RIVETS.



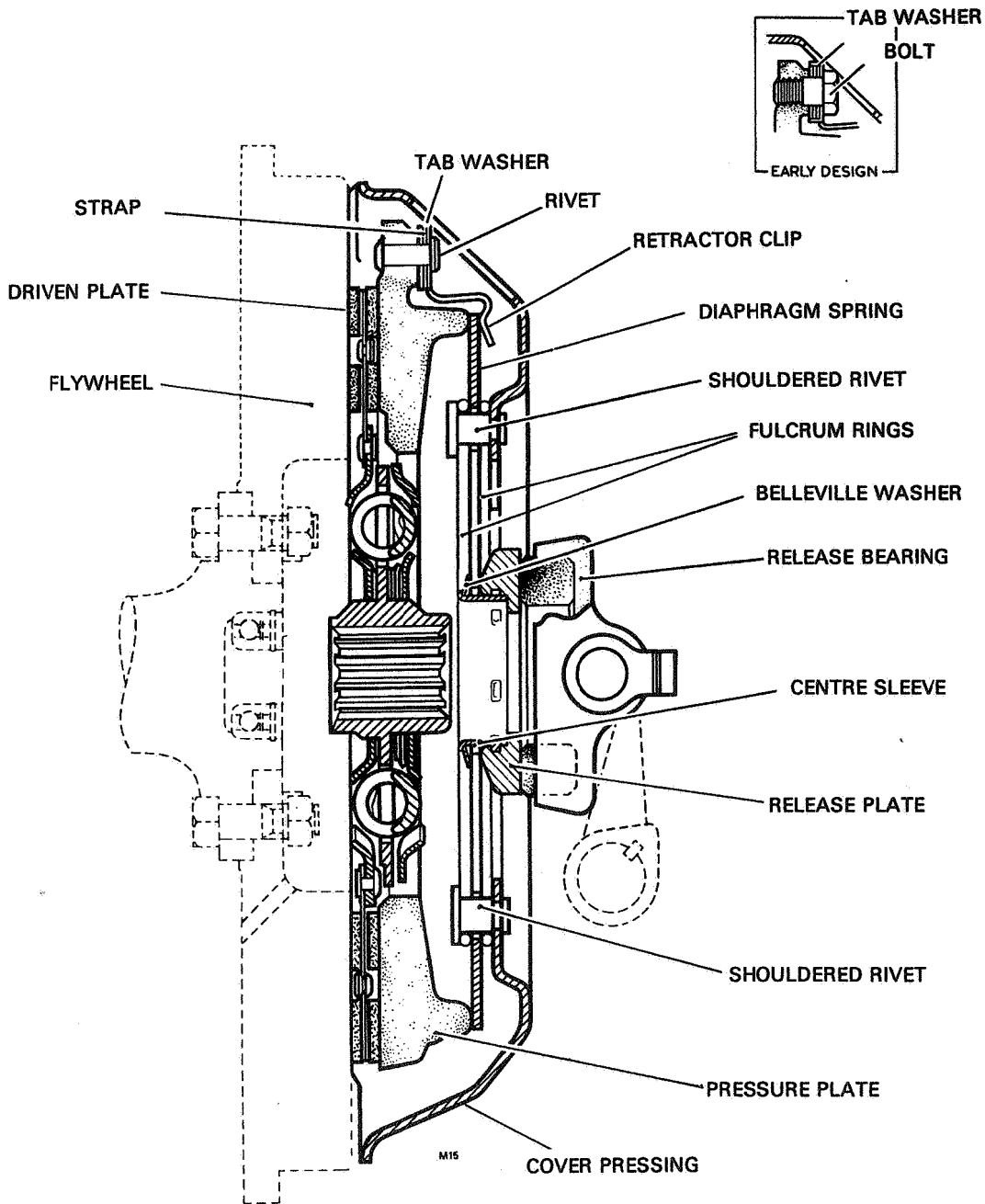
DRIVE TO THE PRESSURE PLATE IS TRANSMITTED BY THREE SETS OF STRAPS, ONE END OF WHICH IS ATTACHED TO THE COVER PRESSING AND THE OTHER TO THE PRESSURE PLATE.

THE POSITIONING OF THE DRIVE STRAPS ENSURES THAT THEY PULL THE PRESSURE PLATE TOWARDS THE DIAPHRAGM SPRING DURING CLUTCH RELEASE. THIS MAKES RETRAC-TOR CLIPS UNNECESSARY.

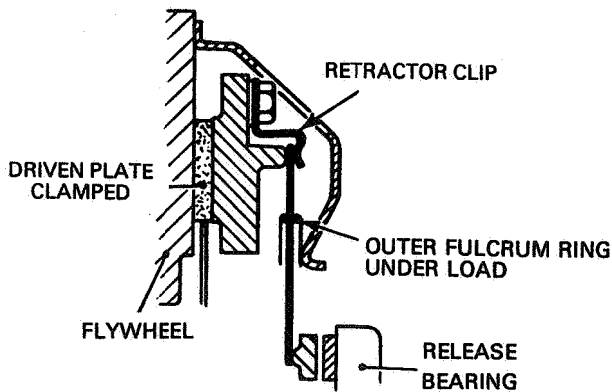
FULCRUM RINGS, ONE EITHER SIDE OF THE DIAPHRAGM SPRING, PROVIDE PIVOT POINTS FOR THE SPRING DURING ACTUATION, THE RINGS ARE CLAMPED INTO THE COVER BY TABS WHICH ARE PART OF THE COVER PRESSING.

CUTAWAY VIEW OF DST COVER ASSEMBLY (STRAP DRIVE)

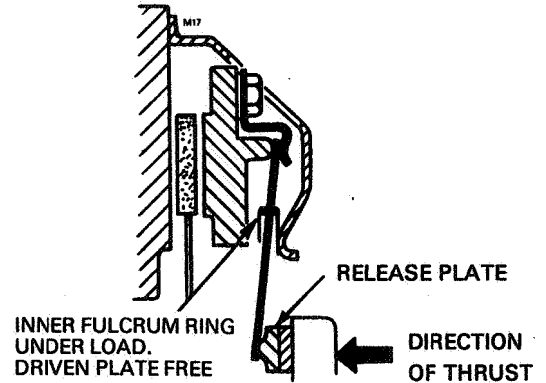
PRINCIPLE OF OPERATION



SECTION VIEW OF DS COVER ASSEMBLY



ENGAGED



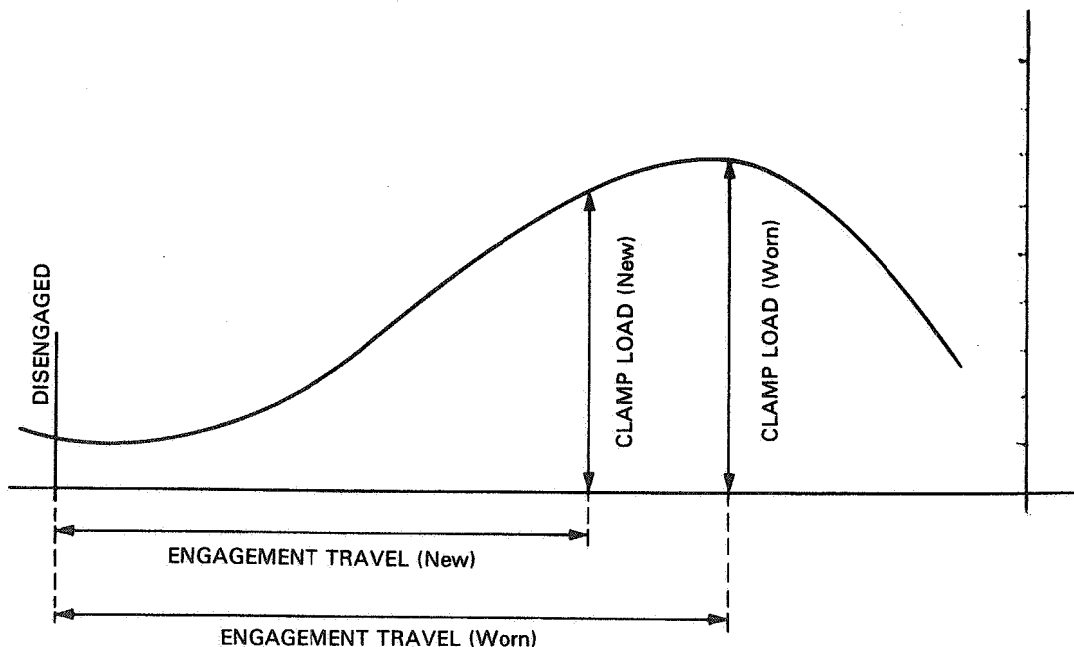
DISENGAGED

The cover, bolted to the engine flywheel, drives the pressure plate via the pressure plate lugs or drive straps dependent on the type. With the clutch engaged — as above — the diaphragm spring forces the pressure plate towards the flywheel clamping the driven plate between them. Thus the engine, clutch cover, pressure plate and driven plate all rotate together to transmit the drive to the gearbox.

Clutch release is effected by moving the release bearing into contact with the release plate which in turn applies pressure to the ends of the diaphragm spring fingers. The movement of the fingers is transmitted via the fulcrum rings and the retractor clips and/or drive straps to the pressure plate, moving this away from the driven plate. The flywheel and cover assembly thus revolve alone, not turning the driven plate, and the transmission is therefore disconnected.

An important feature of the diaphragm spring type of clutch is that as the driven plate wears the clamp load of the cover assembly does not diminish.

In fact, as facing wear occurs the spring pressure will be increased to a limited degree as shown below.

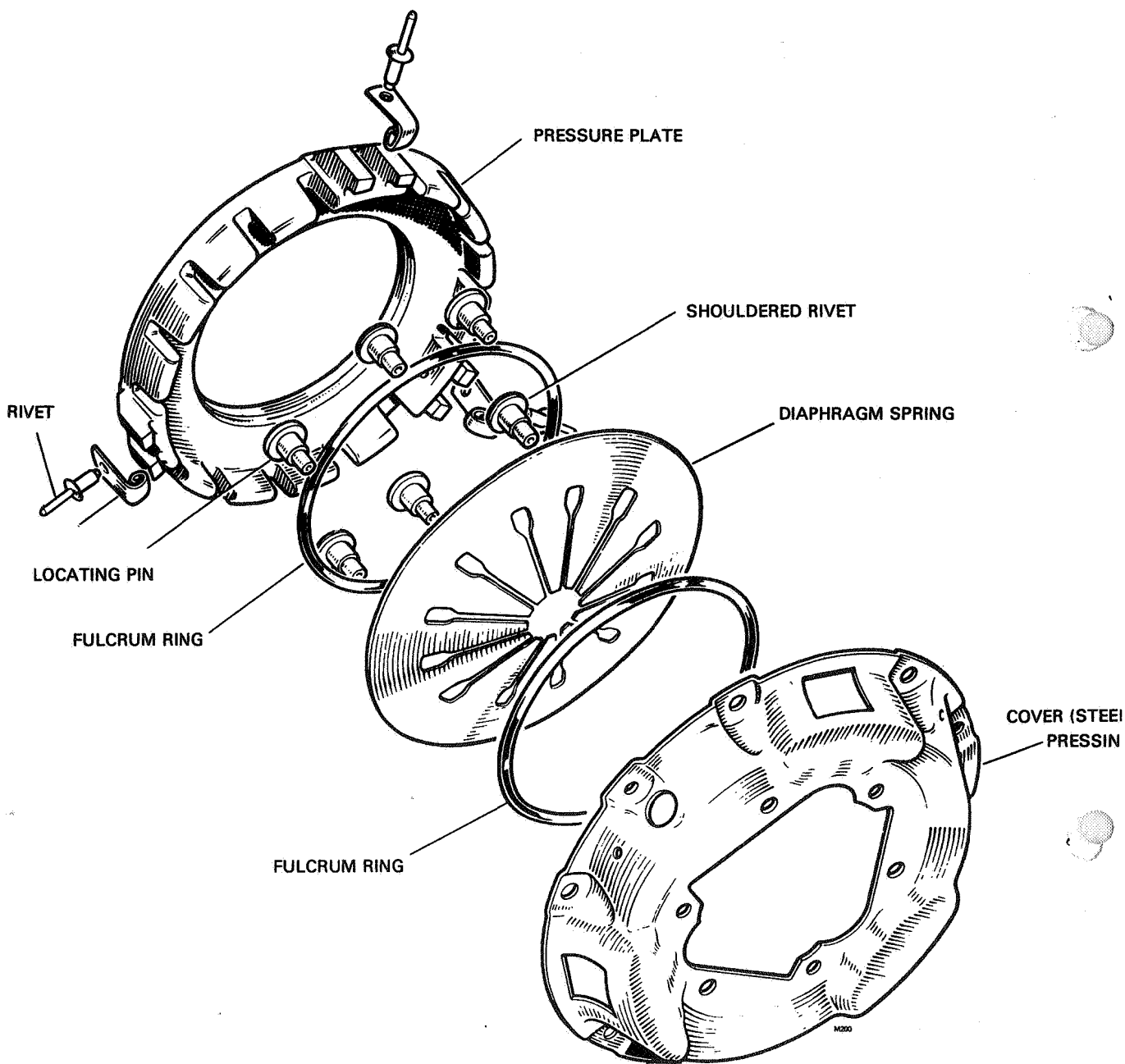




SECTION 2

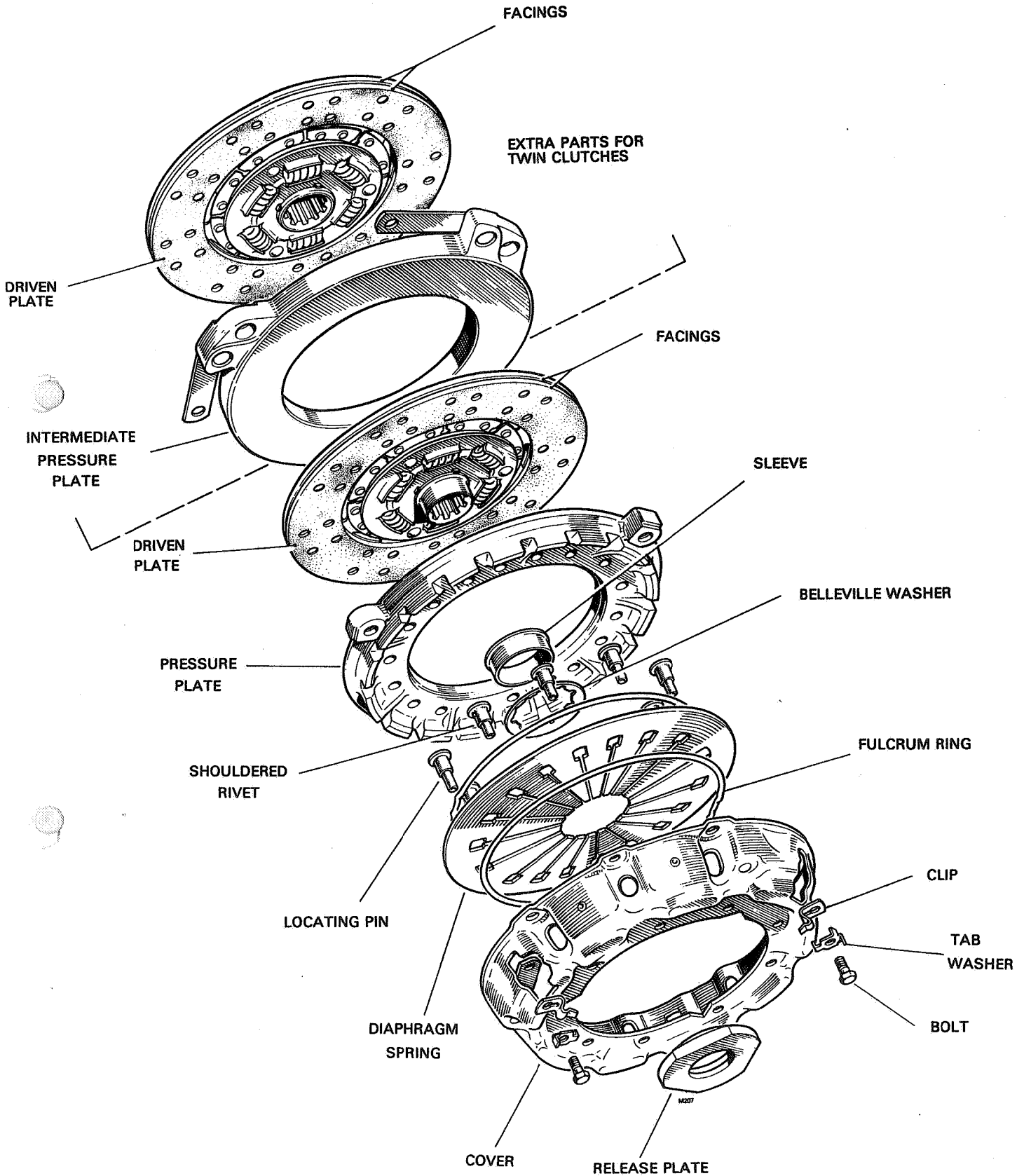
COMPONENT PARTS

DL TYPE TYPICAL ASSEMBLY



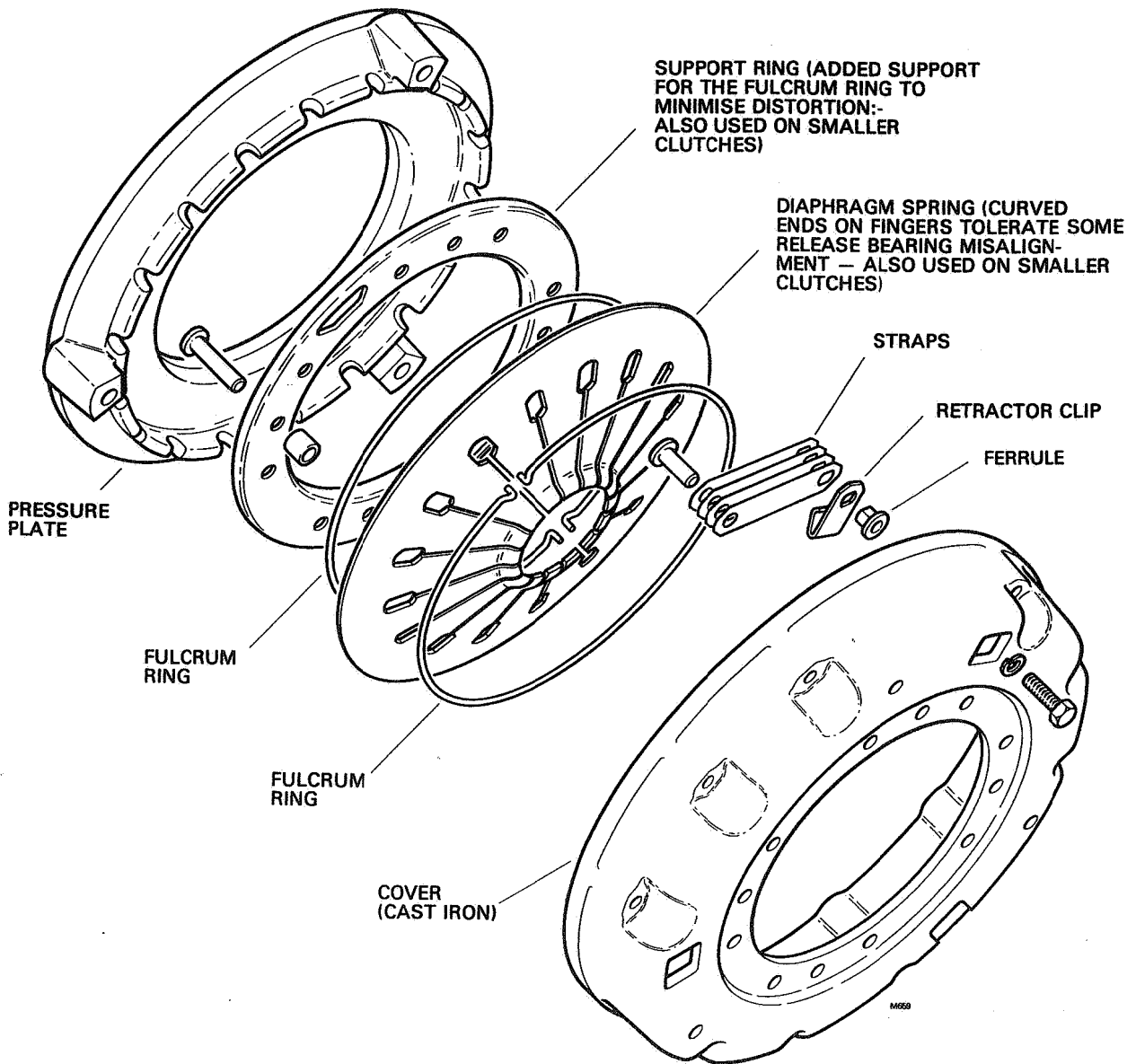
SIZE 6½"

DS TYPE TYPICAL ASSEMBLY



SIZES 7½", 8½", 9½", 10½", 12", 13" & 14"

DS TYPE HEAVY DUTY



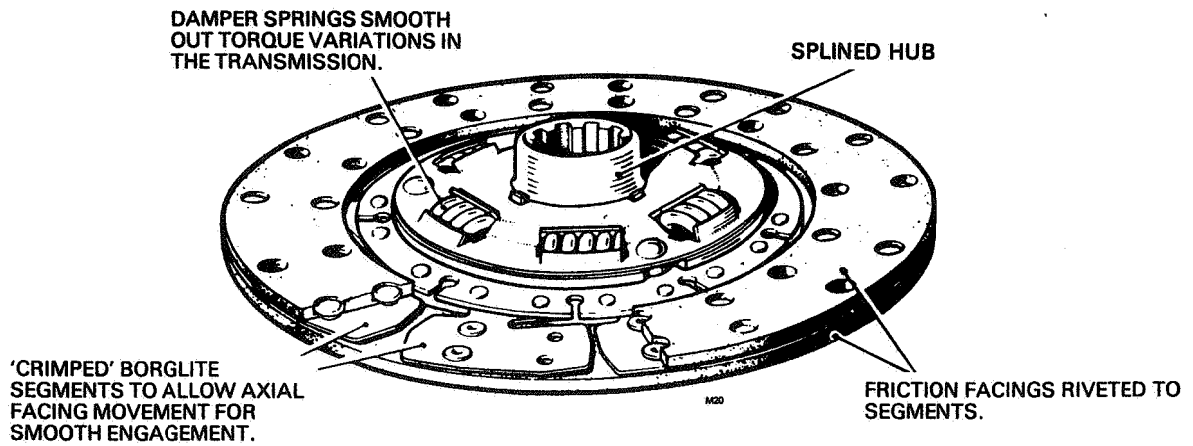
SIZE 14"



SECTION 3

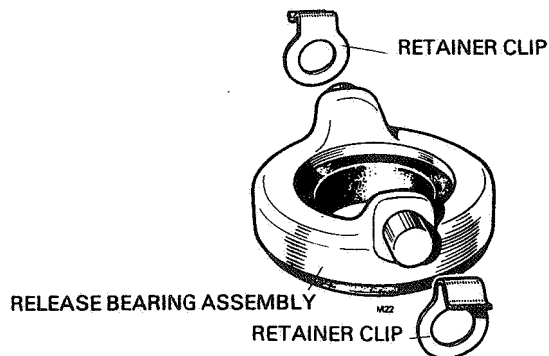
**DRIVEN PLATES
&
RELEASE BEARINGS**

SPRING CENTRE 'BORGLITE' DRIVEN PLATE

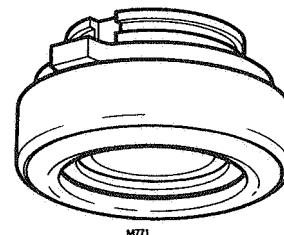


This is the most common design of driven plate; the spring centre and the crimped segments between the facings provide a high degree of cushioning effect on the transmission both in initial clutch engagement and when fully engaged.

RELEASE BEARINGS



CARBON RING TYPE



BALL BEARING TYPE



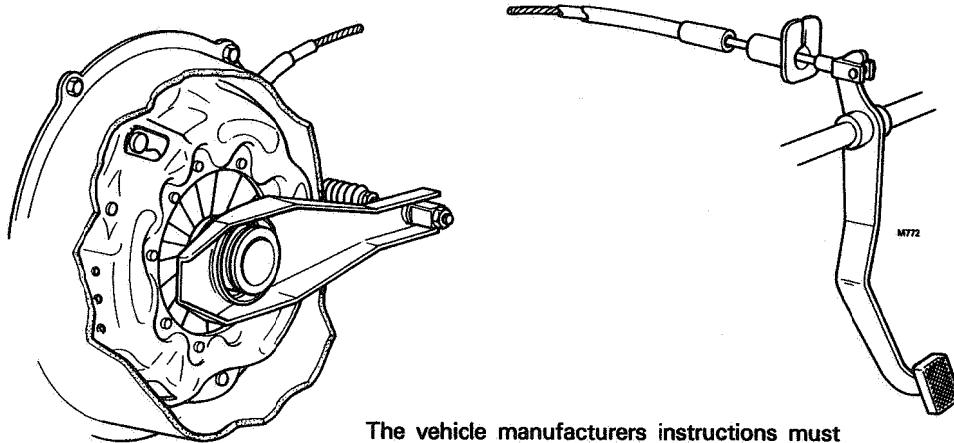
SECTION 4

ADJUSTMENTS

The cover assembly is designed to operate throughout its service life without adjustment of any kind.

As the driven plate facings wear, the relationship of the release bearing to the cover assembly alters, and this will need checking and/or readjustment at the intervals laid down by the vehicle manufacturers. The only exceptions are hydraulic clutch release systems which are "hydrostatic" where the bearing is always in light rubbing contact with the release plate or release levers.

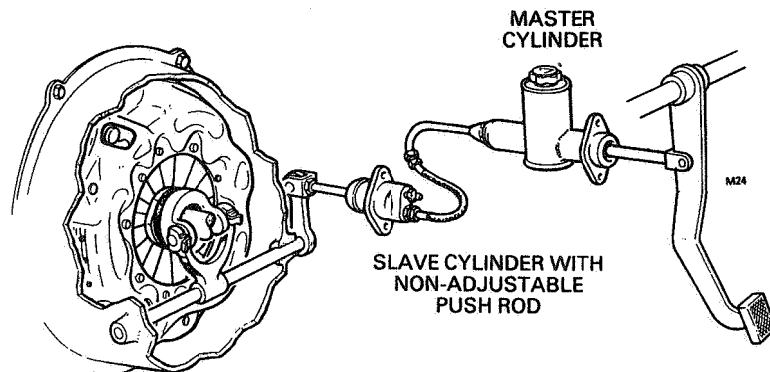
MECHANICAL OPERATION



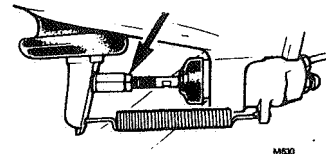
The vehicle manufacturers instructions must be followed to adjust the release bearing position. Some systems of this type are adjusted at the pedal — others in the release fork area.

HYDRAULIC OPERATION

TYPICAL 'HYDROSTATIC'
NON-ADJUSTABLE
CLUTCH OPERATING
SYSTEM



SLAVE CYLINDER WITH
NON-ADJUSTABLE
PUSH ROD



ADJUSTABLE SLAVE
CYLINDER PUSH ROD

Follow the vehicle manufacturers instructions for the correct procedure for adjustable systems.

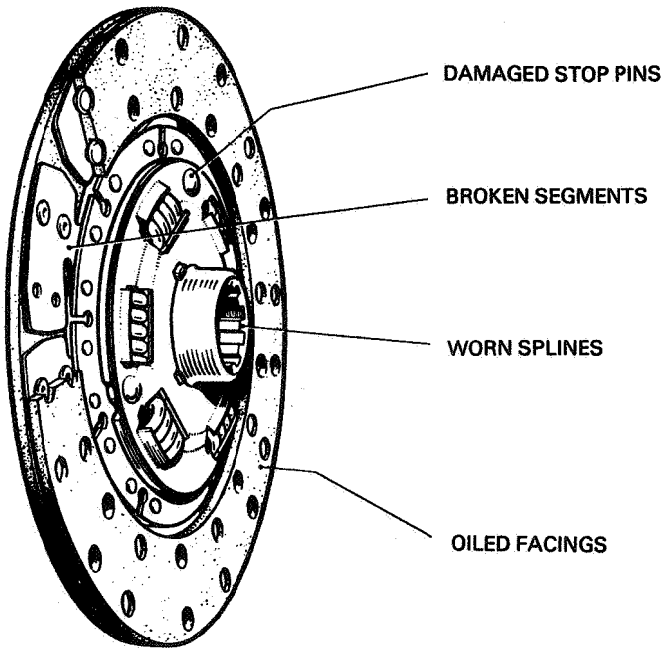
As a guide, a clearance of approximately 2mm (1/16") should be established between the release bearing and the release plate (or diaphragm spring fingers where a ball type release bearing is used and no release plate fitted). This clearance will produce a larger movement at the end of the release fork where the adjustment will be made. After initial setting, operate the clutch several times and re-check.



SECTION 5

TROUBLE DIAGNOSIS

SOME COMMON CLUTCH PROBLEMS & THEIR REASONS



DAMAGED STOP PINS

Overload

BROKEN SEGMENTS

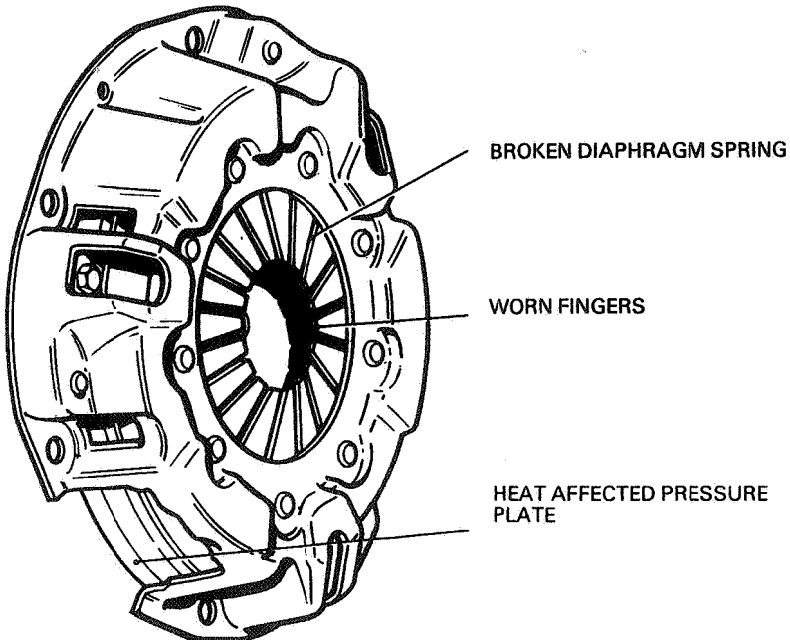
Misalignment. Also caused by severe distortion on fitting, i.e. allowing gearbox to 'hang' in hub.

WORN SPLINES

Misalignment i.e. eccentricity between the clutch housing/flywheel/gearbox such that the drive line and the clutch are not exactly in line.

OILED FACINGS

Defective oil seal, engine or gearbox. Could cause slip or judder.



BROKEN DIAPHRAGM SPRING

Overstroking. Check release bearing adjustment.

WORN FINGERS

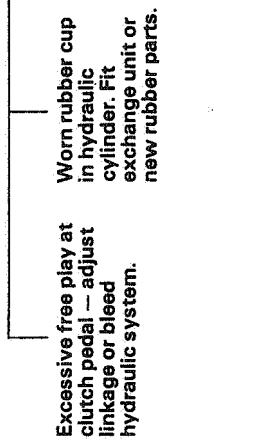
Suspect release mechanism or adjustment — release bearing.

HEAT AFFECTED PRESSURE PLATE

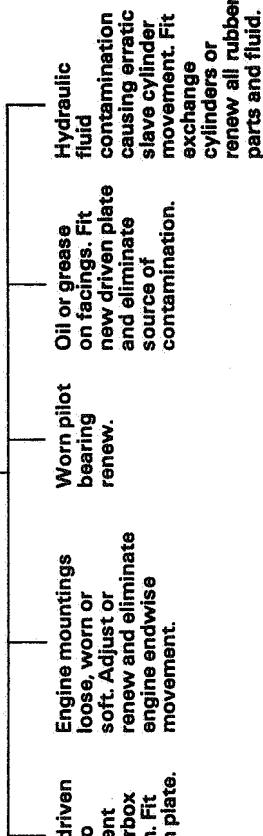
Slip.

TRUBLE DIAGNOSIS

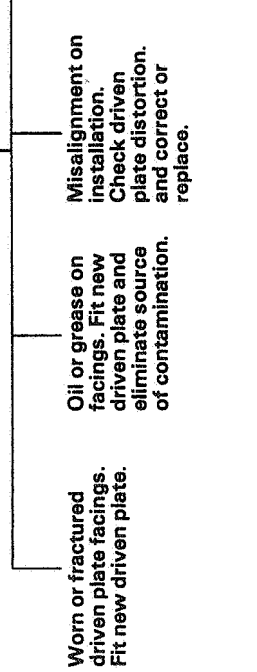
DRAG OR SPIN



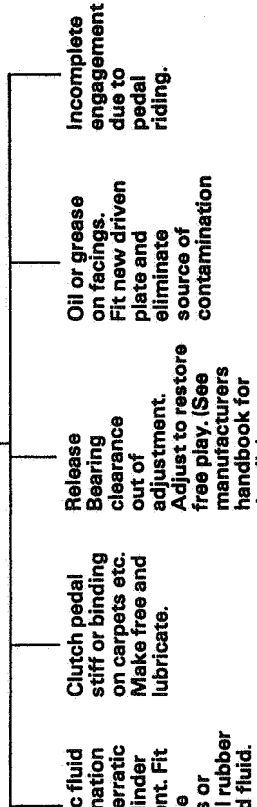
JUDDER



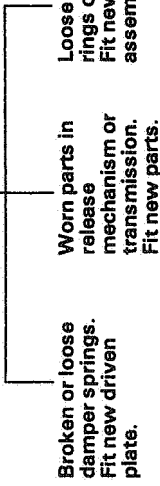
FIERCENESS OR SNATCH



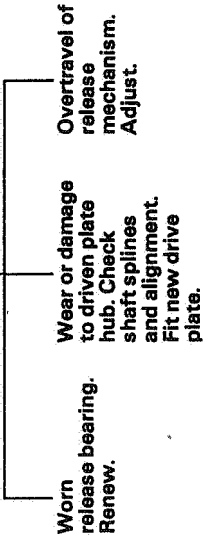
SLIP



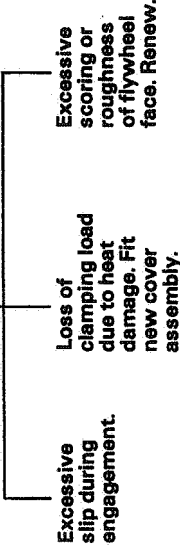
RATTLE



TICK OR KNOCK



ABNORMAL FACING WEAR



NOTE: Those items under DRAG OR SPIN and SLIP will cause rapid facing wear and possible heat damage to the cover assembly.

N.B. WE RECOMMEND THAT WHILE THE ENGINE AND GEARBOX ARE SEPARATED TO CORRECT ANY FAULT, THE OPPORTUNITY BE TAKEN TO FIT A NEW COVER ASSEMBLY, DRIVEN PLATE AND RELEASE BEARING.





SECTION 6

REMOVAL & INSTALLATION

WARNING

WHEN REMOVING FRICTION MATERIAL DUST FROM COMPONENTS DO NOT BLOW OUT WITH AN AIRLINE — IT COULD BE HARMFUL TO INHALE THE DUST — BUT REMOVE WITH A VACUUM CLEANER OR WIPE CLEAN WITH A DAMP CLOTH.

REMOVING THE CLUTCH

Refer to the vehicle manufacturers instructions for removal of the gearbox.

Loosen each of the bolts securing the clutch to the flywheel a turn at a time by diagonal selection. Remove the clutch and examine the working surfaces of the flywheel; grooving will promote rapid wear of the driven plate facing.

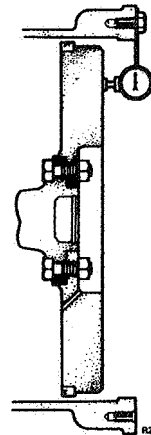
EXAMINE:

The Driven Plate

Check the original plate for worn splines or distortion at the junction of the disc and hub which points to a misalignment condition. If suspected check the flywheel and housings with a clock indicator to the vehicle manufacturers limits.

The Release Bearing

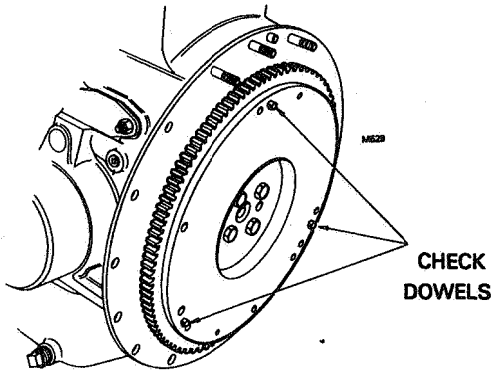
Carbon bearings require no lubrication but incorrect adjustment or "pedal riding" will cause rapid wear. Seized or stiff ball bearings must be renewed.



It is always wise to renew all three parts of the clutch — cover assembly, driven plate and release bearing, if any of the original assemblies have to be renewed for any reason. Remember that all the parts have worked through the same "life" and as on most vehicles the gearbox, and sometimes the engine, have to be removed this work has to be repeated in the event of early failure of any one of the clutch components.

Any oil leakage into the clutch housing must be stopped.

Check condition of engine mountings, steady bars, transmission, universal joints and axle mountings — bad condition or adjustment can cause judder often wrongly attributed to the clutch.

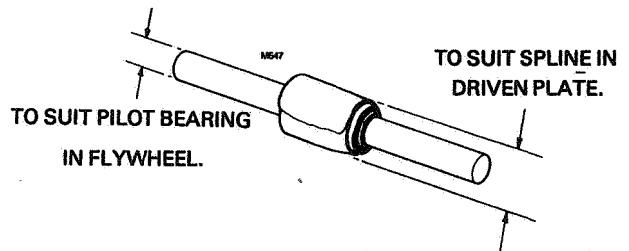


Check the dowels in the flywheel for damage, also the holes in the cover assembly flange if the original unit is to be re-fitted.

Inspect the pilot bearing in the centre of the flywheel — if serviceable apply smear of high melting point grease. Make sure that the working surface of the flywheel is clean and free from grease or oil.

INSTALLATION

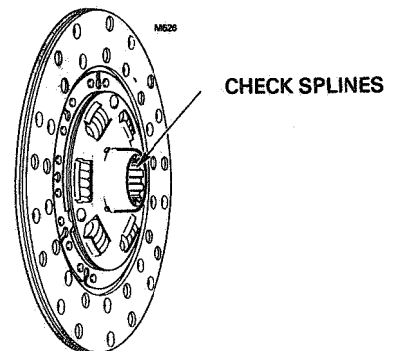
It is important to centralise the driven plate when fitting, and in the absence of a special tool, make up an aligning tool with a piece of dowelling which is a sliding fit in the pilot bearing in the centre of the flywheel. Wrap with insulating tape to match the driven plate splines.



Before installation of the driven plate, check the fit on the spline of the gearbox input shaft. The two parts must be a close sliding fit — the plate must move easily on the shaft.

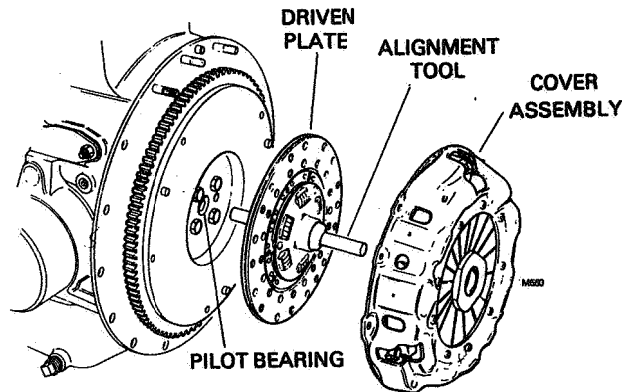
Check for excessive wear on the shaft splines, also note that excessive lift (bearing wear) or run out of the shaft could lead to short life or failure of the driven plate.

Make sure that the driven plate is fitted the right way round — “flywheel side” is normally marked on the plate centre.



Install the aligning tool into the driven plate spline and put the assembly into position with the end of the dowelling in the pilot bearing. Clean any preservative off the pressure plate in the cover assembly, fit over the driven plate and locate onto the dowels in the flywheel. Bolt up to the flywheel, tightening the bolts a little at a time by diagonal selection so that the assembly is bolted up squarely.

Remove the aligning tool.

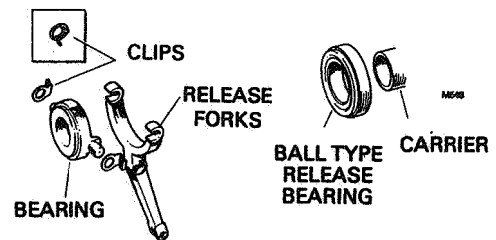


Take note of the position of the retaining clips on the trunnions of the old bearing assembly. Remove old bearing. Clean the release fork and make sure that any pivot points for the fork or bearing are lightly greased.

Fit the bearing and clips.

Where a ball type release bearing is used, remove old bearing and press new bearing on to the carrier.

NOTE: Bearings must be fitted loading the inner track only. On bearings where the inner track is shielded, the bearing must be rotated as it is pressed into position to avoid heavy static load and damage to the tracks and ball bearings. This leads to noisy operation and/or early failure. Ideally use a hydraulic press and a rotating table, but if the bearing and carrier is small enough it is possible to use a bench vice; position a suitable piece of wood between the new bearing and the old one, (just removed), and press the new bearing onto the carrier, at the same time rotating the piece of wood and therefore the bearings.



Re-fit the gearbox to the engine. Take care not to damage the splines in the driven plate when entering the gearbox shaft, and with the box in position fit sufficient bolts to support its weight immediately. Make sure that any dowels are located properly and never allow the gearbox to "hang" on the driven plate i.e. not bolted up, as this could distort the plate and lead to early failure.

