AUTOMOBILES

CITROËN

AFTER-SALES TECHNICAL DIVISION

INFORMATION BULLETIN EXPORT
N° XT 2 S

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SM VEHICLES

(SB series SB)

U.S.A. and CANADA

Models

GEARBOX

Borg - Warner option

As from 28th February 1972, SM models for U.S.A. and CANADA can be fitted with an optional BORG-WARNER automatic gearbox and a hydraulic converter (VERTO-FERODO).

MAIN CHARACTERISTICS.

I. CLUTCH

There is no clutch pedal.
The three element torque converter ϕ = 250 mm (reference 1681) gives a gear ratio which varies between 2,3 and 1.

II. GEARBOX.

The gearbox is automatic and hydraulically controlled. It consists of an epicyclic gear train giving three forward gears and one reverse gear.
The differential housing is separate from the gearbox housing and contains a different type of oil.

III. DRIVING.

A lever gives a choice of six positions :
- P : Park
- R : Reverse
- N : Neutral
- D : Drive (Automatic)
- 2 : 1,2 Exceptional
- 1 : 1 Exceptional

The accelerator pedal activates an additional « KICK-DOWN » cable controlling a cam in the gearbox allowing the automatic operation of the gears to be controlled at will (lenght of time during which the gear ratios are used).

1. Position « P » :

In this position the drive wheels are locked by a safety locking mechanism, separate from the parking brake. This position is used either when parked, when starting up, or when adjusting the engine.

Note : NEVER SELECT « P » WHEN THE VEHICLE IS MOVING.

2. Position « R » :

Only engage this position when the vehicle is stationary and the engine idling.

3. Position « N » :

Only use when starting up or in exceptional circumstances when being towed at low speed over a very short distance.

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4. Position « D » :

To be used when driving in forward gear in towns and on open roads. In this position the vehicle moves off in 1st gear, 2nd and 3rd gears being engaged automatically at engine speeds varying with the position of the accelerator and the speed of the vehicle. Changing down is also done automatically. The « KICK - DOWN » system allows a change from 3rd to 2nd or from 2nd to 1st, independantly of the automatic change-down described above, by pressing the accelerator right down.
Gear selection becomes automatic again when the accelerator is released (see table below).

5. Position « 2 » :

This allows the use of 1st and 2nd but not 3rd. It should be used for driving in mountains and for rapid overtaking.

6. Position « 1 » :

This position is for exceptional circumstances, allowing the use of 1st gear only. It is recommended for steep downward slopes (mountainous areas - garage ramps), when the breaking effect of the engine is at its greatest.
It is possible to change from « D » into « 2 » whilst the vehicle is in motion but only at speeds less than 125 km/h (78 M.P.H) to prevent over-revving the engine.
It is possible to change from « 2 » into « 1 » provided that the vehicle is not travelling at more than 50 km/h (31 M.P.H) (A safety device prevents the engagement of 1st gear at speeds higher than this).
In every case, ensure that the engine does not exceed 6500 r.p.m.
It is possible to change from « 1 » to « 2 » and « 2 » to « D » whilst moving.

NOTE : Positions « P » , « N » and « R» should only be engaged when the vehicle is stationary.

GEAR CHANGE SPEEDS WITH LEVER AT « D »			
a) DEPENDING ON THE POSITION OF THE ACCELERATOR			
1 → 2	2 → 3	3 → 2	2 → 1
6.21 to 24.86 m.p.h.	9.32 to 43.50 m.p.h.	6.21 to 27.96 m.p.h.	3.10 to 6.21 m.p.h.
b) ACCELERATOR IN « KICK - DOWN » POSITION			
1 → 2	2 → 3	3 → 2	2 → 1
34.18 to 37.29 m.p.h.	62.15 to 65.25 m.p.h.	57.79 to 62.15 m.p.h.	31.07 to 34.18 m.p.h.

The table above shows how the « KICK - DOWN » system makes it possible to change down from « 3 » to « 2 » or from « 2 » to « 1 » at a higher engine speed than normally permitted by the automatic mechanism and consequently allows faster acceleration.

IV. GEARBOX RATIOS

Gear	Epicyclic gear - train ratio	Pinion ratio	Gear box ratio	Crown wheel and pinion	Total reduction ratio	Speed at 1000 R.p.m.
1	28/67 (2.39 : 1)		0.455 (2.20 : 1)		0.104 (9.62 : 1)	7.83 M.P.H.
2	$\frac{28}{67} \times \left(\frac{32}{67} + \frac{32}{28}\right)$ (2.39 × (2.09 +0.88)	37/34 (0.92 : 1)	0.750 (1.33 : 1)	8/35 (4.375 : 1)	0.171 (5.85 : 1)	12.92 M.P.H.
3	1/1		1.088 (0.92 : 1)		0.248 (4.03 : 1)	19.10 M.P.H.
Reverse	32/67 (2.09 : 1)		0.520 (1.92 : 1)		0.119 (8.40 : 1)	8.96 M.P.H.

Speeds in miles at 1000 r.p.m. are given for 195 HR 380 XAS tyres with a rolling circumference of 2.013 m (6.602 feet).

CAPACITIES.

1. **Converter** : 2.8 litres (4.9 Imp. pints) **Gearbox housing** : 2 litres (3 1/2 Imp. pints) **Exchanger** (oil cooler) and piping : 1.2 litre (2.1 Imp.pints) total : 6 litres (10 1/2 Imp. pints).
   Type of oil : TOTAL ATF 33.
   The dipstick for the gearbox housing and the converter is situated on the front R.H. side It has two notches the first « a » : cold oil, the second « b » : hot oil. The oil level should be checked with the engine running and the gear selection lever in position « P ».
2. **Differential housing** : 1.2 litre (2.1 Imp. pints).
   Type of oil : HIGH PRESSURE SAE 80 TOTAL.
   The dipstick for the differential housing is situated behind the steering rack, it has a minimum - maximum notch « c ». The oil level should be checked with the *engine stopped.*
   NOTE : TOTAL ATF 33 fluid is in conformity with the FORD M 2 C 33 F standard, to which the following products also correspond :

ESSO GLIDE	ESSO
ATF 210	MOBIL
DONAX T 7	SHELL
HYDRAULIC TFBW 4	B.P.
CASTROL TQF	CASTROL
ANTAR DEXRON	ANTAR

V. MOVEMENT IN GARAGE (without engine running)

The vehicle should be moved with the lever in position « N ».

VI. STARTING THE ENGINE.

The engine can only be started using the starter. It is impossible by towing.

VII. TOWING THE VEHICLE.

Towing must be done with the front of the vehicle raised.
In exceptional circumstances the vehicle can be towed over very short distances with the selection lever in position « N ».

MODIFICATIONS CARRIED OUT ON VEHICLES FITTED WITH AUTOMATIC GEARBOX.

I. ENGINE.

The crankshaft has a bush to ensure the centring of the converter.
The engine mountings are modified (10 mm supplementary spacer integral with engine mountings)

II. ACCELERATOR CONTROL.

The control of the carburretors is modified to allow the attatchment of the « KICK - DOWN » cable.

III. COOLING.

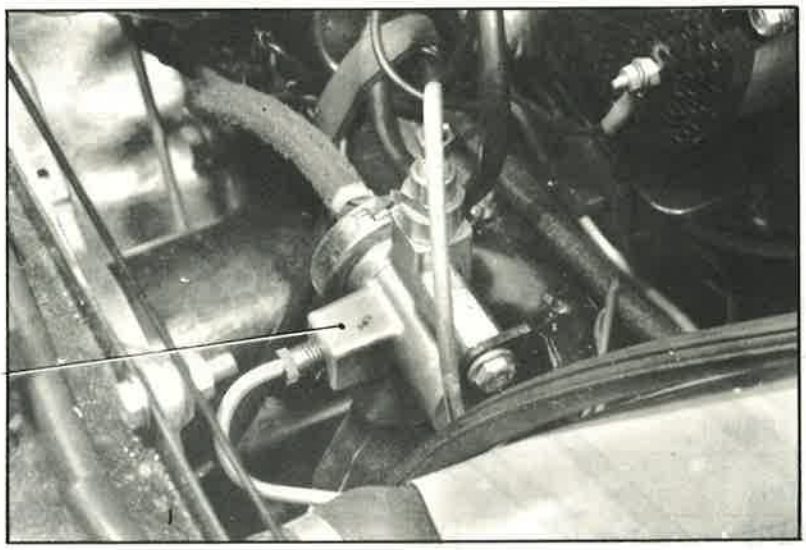
The output tube of the cover of the thermostatic regulator on the radiator is modified to receive the gearbox heat exchanger.
The electric fan motors are modified, their power being increased.

IV. STEERING.

The steering has been modified; the non-adjustable angle of lock is now 43° 30' $^{0}_{-1}$ instead of 45° $^{0}_{-1}$. This is because of the new position of the gearbox (20 mm farther forward and 30 mm higher) which also produces a new position for the transmission.
The gearbox crossmember and the reinforcement crossmember have been modified.

V. HYDRAULICS.

The centrifugal governor at the end of the gearbox has been replaced by a pressure regulator. It does the same job i.e. allows an increase in pressure in the variable flow steering regulator proportional to the speed of the vehicle, this occurs mechanically by means of weights in the case of the centrifugal governor and hydraulically in the case of the pressure regulator. The pressure produced by the automatic gearbox increases in proportion to the speed of the vehicle. This pressure, when applied to the pressure regulator cup together with a slide-valve changes the intake of high-pressure into the flow regulator in proportion to the speed of the vehicle and in this way renders the steering firmer.



The hydraulic fluid reservoir is different, the feed pipe for the clutch cylinder has been suppressed.

VI. ELECTRICAL SYSTEM.

The alternator has been modified to give it more power (It is now 70 amps. instead of 55).
A switch on the gearbox controls starting up, via a relay fixed on the wheel arch which works only when the selection lever is at « P » or « N ». It also controls the lighting of the reversing lamps when the selection lever is at « R ».

VII. 1000 km (625-miles) SERVICE (chief points) :

Draining the gearbox :

With the vehicle on a lift, slacken the gearbox drain plug (1) (round head screw), and let the oil drain out.

Draining the differential housing :

Slacken differential housing drain plug (2) (H head screw), and let the oil drain out.

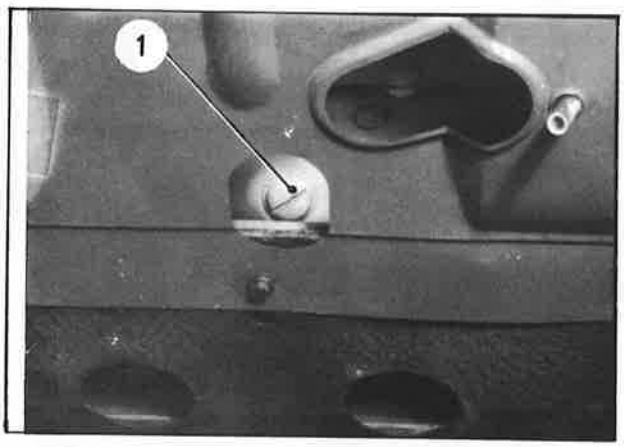
Replace the plugs and fill up with oil.

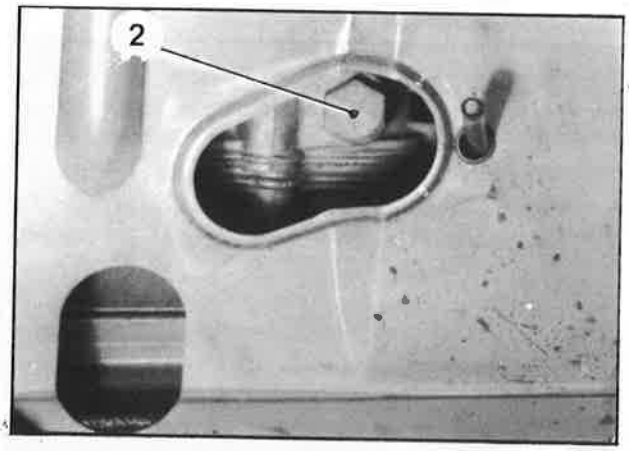
Re-filling the gearbox :

Pour about 2.5 litres (4 1/2 Imp. pints) of ATF 33 TOTAL oil down the dipstick shaft (4) (the oil contained in the converter and part of the oil contained in the cooler does not drain out).

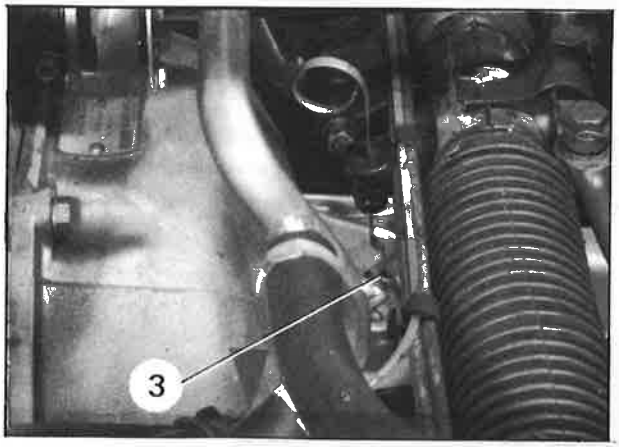
Re-filling the differential housing :

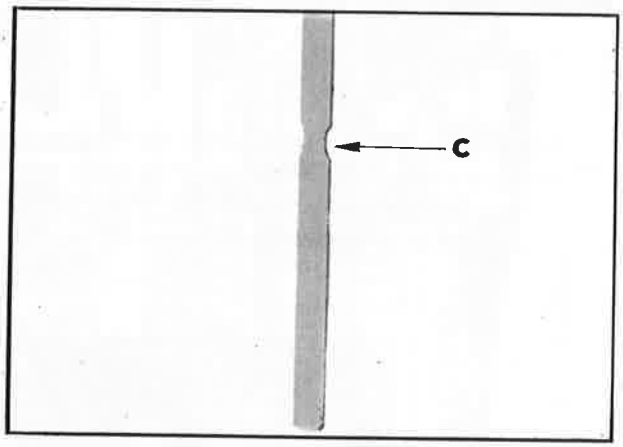
Pour 1.2 litres (2.1 Imp. pints) of TOTAL HIGH PRESSURE OIL SAE 80 down the dipstick shaft (3).





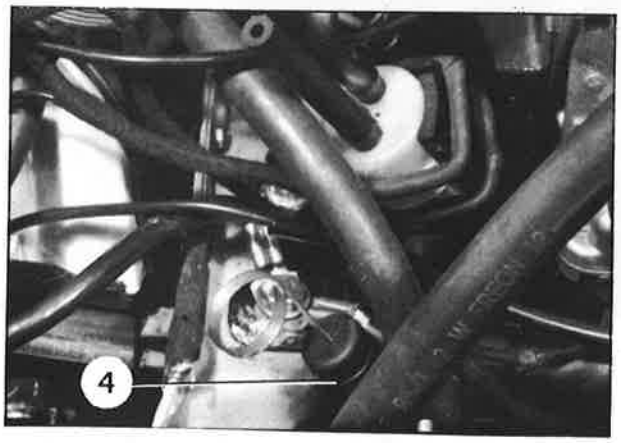
WITH THE ENGINE STOPPED check the oil level in the differential housing with a dipstick

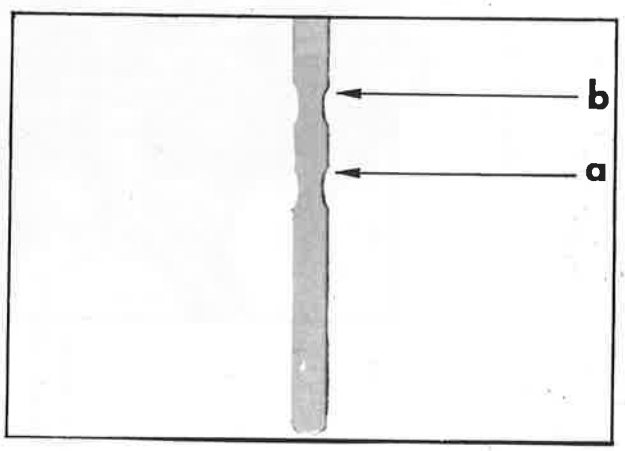




To check the oil level in the gearbox put selector lever in position « P ». WITH THE ENGINE IDLING the oil should reach mark «a» when cold and «b» when warm.

N.B. The screw on the right hand side of the gearbox (axis of rotation of « KICK-DOWN » cable pulley) should only be slackened when overhauling the gearbox.



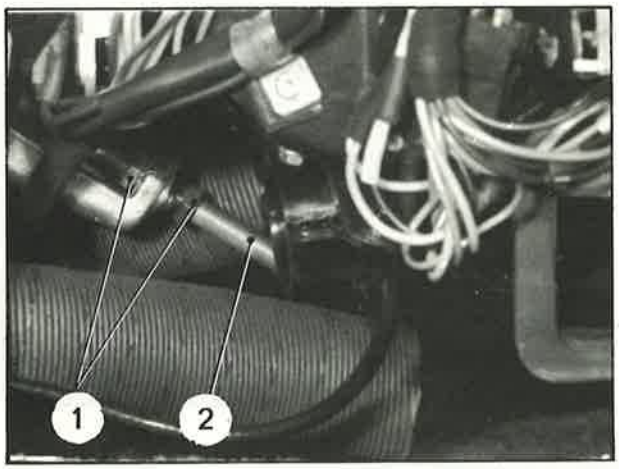


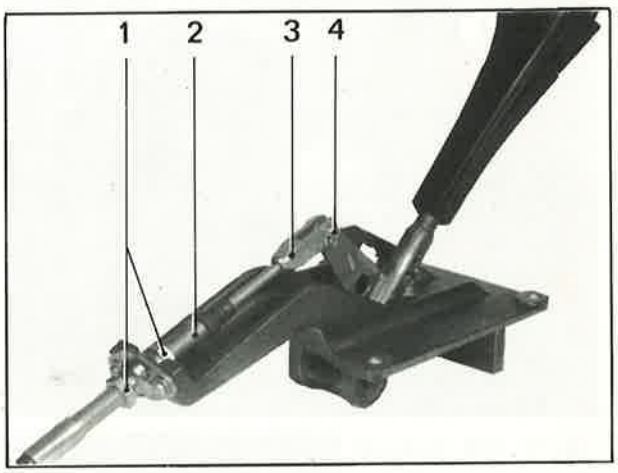
VIII. REPAIR.

1. **Checking the valve clearance :** It is necessary to turn the engine by means of a 6 volt battery in place of the original battery ; give successive impulses to obtain the desired position of the camshafts.

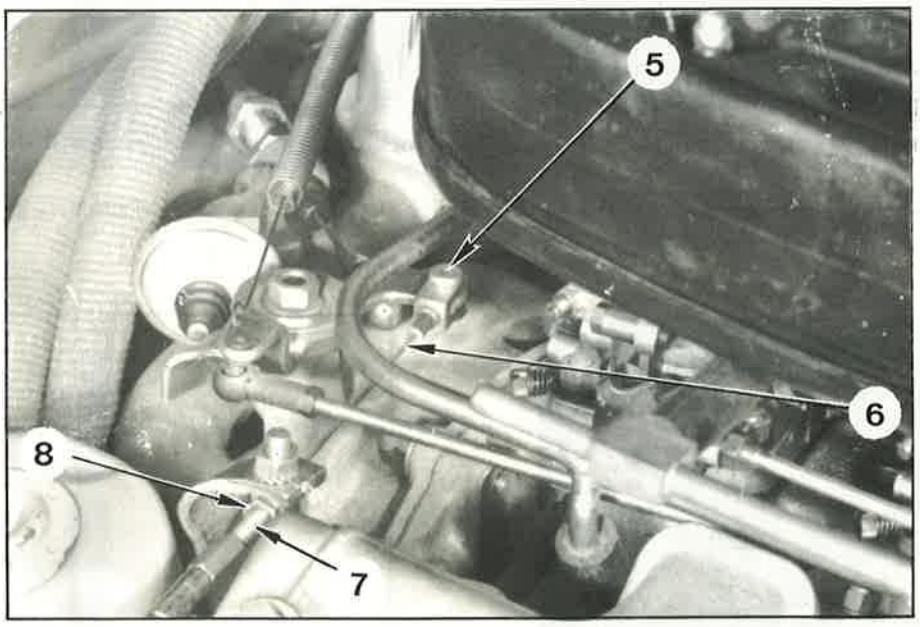
2. **Adjusting the control cables :**

a) **Selection cables :** with the selection lever in position « 1 », the cable fully extended, ensure that the pin (4) of the fork (3) is not strained. If this is not the case, slacken the lock-nuts (1) to adjust the threaded endpiece (2).





b) « **KICK - DOWN** » **cable :** With the accelerator in the rest position, the throttle valves closed, and the idling speed adjusted, pull the cable (6) then allow it to return slowly; with the cable taut but not strained, the spindle (5) should move freely in the fork of the cable and in the lever. If this is not the case, loosen the lock-nut (8) and operate the threaded endpiece (7).



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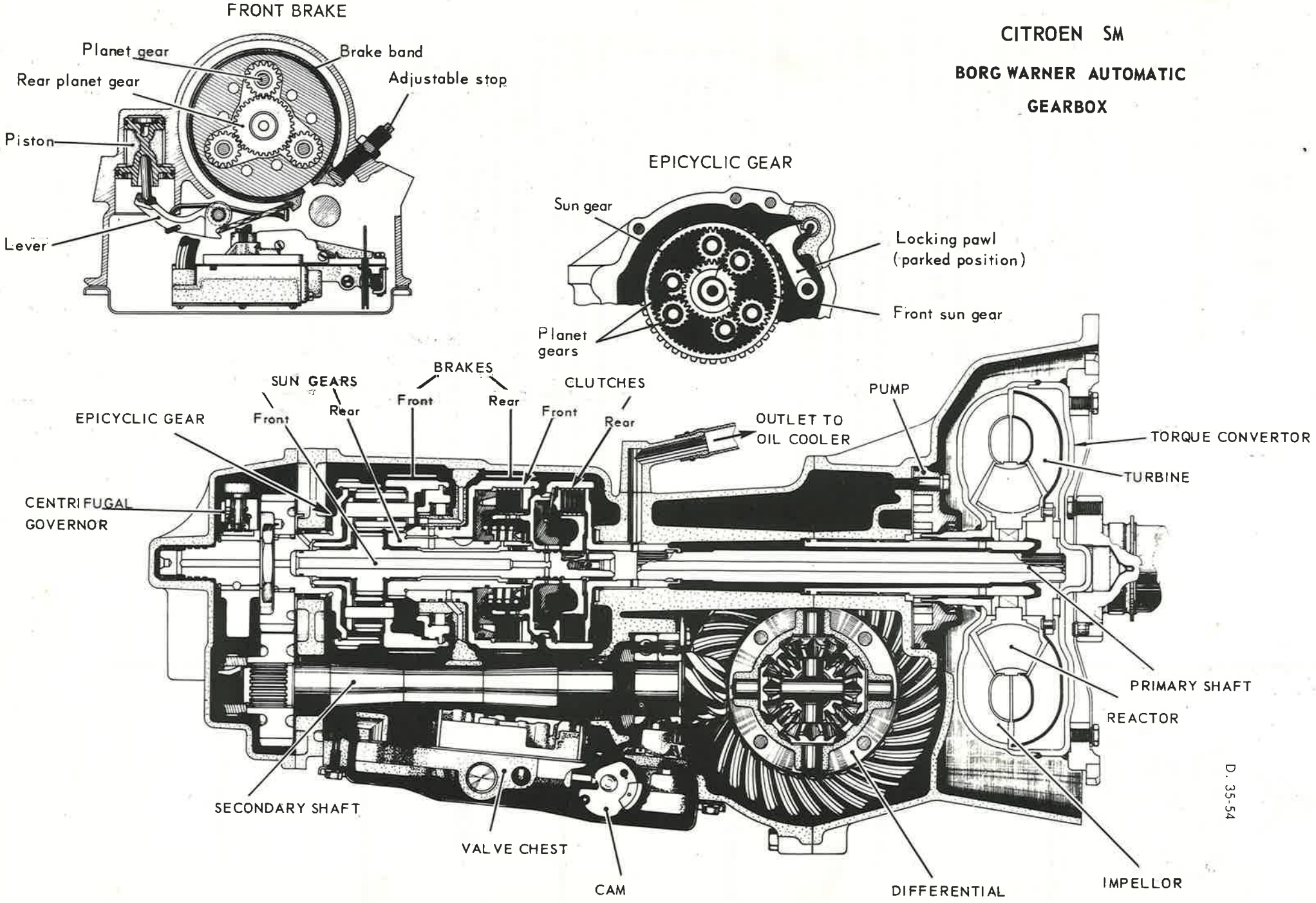
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