

Service experience has shown that considerable difficulty is encountered by some Dealers in diagnosing faults which relate not only to the electrical circuits, but also those which are associated with purely mechanical items.

In order to assist dealers we are endeavouring to cover, in the following paragraphs, an alternative method of diagnosis, effecting a limited number of faults which are more commonly met with in the field. It should be stressed that this information does not replace the full diagnosis which is contained in both WSM 125 - Stage I Transmission and WSM 136 covering the Stage II, but approaches the subject differently, which may enable quicker decisions to be undertaken.

Only certain causes of failure are dealt with in the following text, and if after applying the recommended procedure the fault is not eliminated you should refer immediately to the appropriate WSM sections.

The following road test symptoms are dealt with:

- 1) Excessive Slip of Take Off.
- 2) Intermittent Failure to Change from Low to Intermediate.
- 3) Snatch in Transmission when changing from Low into Intermediate and occasionally from Direct to Intermediate, generally on over run.
- 4) Prolonged or Slow, change from Low to Intermediate.

### EXCESSIVE SLIP ON TAKE OFF

Under take off conditions and in Low Drive the Indirect Coupling is energised by current supplied from the generator via the current voltage regulator. It therefore follows that an excessive slip condition will occur if one or more of the following faults exist.

- (i) Incorrect tension of the generator driving belt.
- (ii) High resistance set up due to poor stator connections or harness.
- (iii) Low torque capacity of Indirect Coupling.
- (iv) Incorrect adjustment of current voltage regulator.
- (v) Generator output low or not conforming to the special output characteristics required for Easidrive application.
- (vi) Maladjustment of throttle and/or Governor linkage.

If the generator is still suspect after dealing with Items one, two and three, it should be removed and retested, etc., as shown in Figure 2, Section 13, WSM 125, or Figure 1A, Section 13, WSM 136. The test adjacent to these illustrations gives full particulars of the respective test procedures which are different for Stages I and II Transmissions.

When these tests cannot be made, it is obviously easier to try what improvement, if any, is obtained by fitting a generator which is known to give satisfactory performance.

It must be clearly understood that normal testing of the generator is not sufficient. A generator with a properly set regulator may maintain a properly charged battery and yet not be able to provide sufficient current output, at low speed, for the Intermediate Coupling to produce sufficient torque to give a satisfactory take off.

It is wrong to assume that because the generator output can balance auxiliary loading that the output is correct for Easidrive first gear operation. Such a conclusion shows that the generator operation under take off conditions is not properly understood.

For details of Governor and Linkage Checks, see Section 7, WSM 125 and 136.

#### INTERMITTENT FAILURE TO CHANGE FROM LOW TO INTERMEDIATE

This fault is frequently found to be associated with a defective dog switch, and it is important to ensure that contacts are kept free from contamination.

Of the Stage I Transmission a number of cases have been reported where the dog switch plate has been distorted and you are recommended to check this before undertaking deeper examination. On the Stage II it is important to make sure that the moving contact is free on its pivot.

In all cases where gearshift solenoid complaints are experienced it is imperative that the points are not fouled in any way.

Full particulars of adjustments of the dog switch and methods of obtaining the true and deep baulked conditions are contained in the respective Workshop Manuals, under Section 9.

#### SNATCH IN TRANSMISSION WHEN CHANGING FROM LOW TO INTERMEDIATE AND OCCASIONALLY FROM DIRECT TO INTERMEDIATE, GENERALLY ON OVER RUN

Should a condition of snatch become pronounced at the Intermediate change point this can be due to the sliding dog jumping out of mesh with the second speed wheel. A similar condition of gear noise is occasionally encountered when changing from Direct to Intermediate.

In order to determine whether gear disengagement is occurring you are recommended to place an 0-30 ammeter in circuit with the gear shift solenoid supply lead. If the gear disengages heavy discharge will be noted on the ammeter. A fluctuation of the reading occurring each time a gear is engaged and thrown out of mesh.

Prior to removing the gearbox you are recommended to check the baulk gap and if this is found to be excessive the cable should be removed for checking, replacement, and if necessary, readjustment followed by a road test.

Should the condition still be evident the gearbox should be removed and an examination carried out of the 2nd speed wheel and sliding dog, especially in regard to damage to dog teeth, but in addition a close examination should be carried out of the mainshaft and end floats of the second speed wheel to ensure that they comply with the readings contained in Section 9 of WSM 125 and 136.

#### PROLONGED OR SLOW CHANGE FROM LOW TO INTERMEDIATE

There are a number of causes which can bring about this road test symptom, and these will be dealt with individually under the following headings.

- (a) R15 and R16 Resistances in TS4 Circuit (Control Unit).
- (b) Maladjustment of throttle and/or Governor Linkage.
- (c) Coupling Trimming Resistances.
- (d) High Resistance set up in Circuit Connections.
- (e) Rotor Inefficiency.

#### (a) R15 and R16 Resistances in TS4 Circuit (Control Unit).

Examine and ensure that the fly lead is placed on the bottom position in the Control Unit TS4 Circuit.

If resistances have not been removed, as already recommended, by placing the fly lead on to the bottom Lucar connection, slip can result at low throttle openings.

NB Instructions for repositioning jumper lead has already been circulated in Bulletin E.12. It is of the utmost importance that these instructions are carried out, otherwise the overall life of the Rotor may be impaired.

#### (b) Maladjustment of Throttle and/or Governor Linkage.

It is important to ensure that the governor and throttle linkage is correctly adjusted as otherwise the whole performance of the car, including the change characteristics, can be adversely affected.

(c) Coupling Trimming Resistances.

Coupling trimming resistances were initially introduced to vary the overall torque capacity of the coupling and fitted in cases where the coupling was above the top limit specification.

Experience has shown that due to 'bedding in' of the couplings during the early life of the transmission this resistance is not required, and you are recommended to remove these where they are fitted to either the Direct or Indirect stator connections.

(d) High Resistance Set Up in Circuit Connections.

It is of greatest importance to ensure that good electrical connections are maintained throughout the transmission circuit.

It should be appreciated that if a high resistance is set up in the circuit to the control unit or from the control unit to the couplings including Lucar and snap connectors, coupling slip will be promoted with a resultant slow change.

You are recommended to carry out a current consumption check at the couplings so as to ensure correct consumption is being obtained during change from Low to Intermediate. If the consumption does not conform to the following figures the cause must be established.

CONSUMPTION IN AMPERES DURING LOW TO INTERMEDIATE

Indirect Coupling

3 amperes

Direct Coupling

6 amperes

NB It must be understood that the consumption of the coupling will vary, due to temperature and resistance tolerances, consequently these figures are approximate only.

When it is necessary to remove plug and socket connections for the purpose of carrying out harness resistance checks, the connections which have been disturbed should be carefully checked, as these may well be the cause of the fault.

(e) Rotor Inefficiency.

If when preceding factors have been taken into account and no fault can be detected, it is possible that the rotor is the cause of the prolonged change, but prior to the changing of the unit you are recommended to check the following points:

- (a) Drive in neutral.
- (b) Stall test indirect coupling to obtain efficiency.
- (c) Stall test direct coupling to obtain efficiency.
- (d) Shuddering to a halt.

- (a) Remove both harness connections from the coupling stator and check for drive in neutral.
- (b) Carry out stall test procedure as indicated in appropriate WSM Section.
- (c) Place indirect coupling lead to direct stator connection and carry out stall test as in (b) above. The figures for stall test on Direct Coupling should be similar to that on the Indirect.

If one or more of the conditions above prove to be faulty, replace rotor unit.

Cases have been met with in Service where a complaint has arisen of the car juddering or shuddering to a halt; this indicates that the inner coupling has not completely freed. This condition illustrates that contamination of the inner rotor has occurred or a bearing has picked up.

Whilst writing to you we feel that we should draw to your attention that a number of Smiths control units have been returned to the Factory which have been subject to damage, brought about by an external short circuit.

In the event of a harness short circuit arising, it is imperative that the cause of the fault is established prior to replacing any unit.