

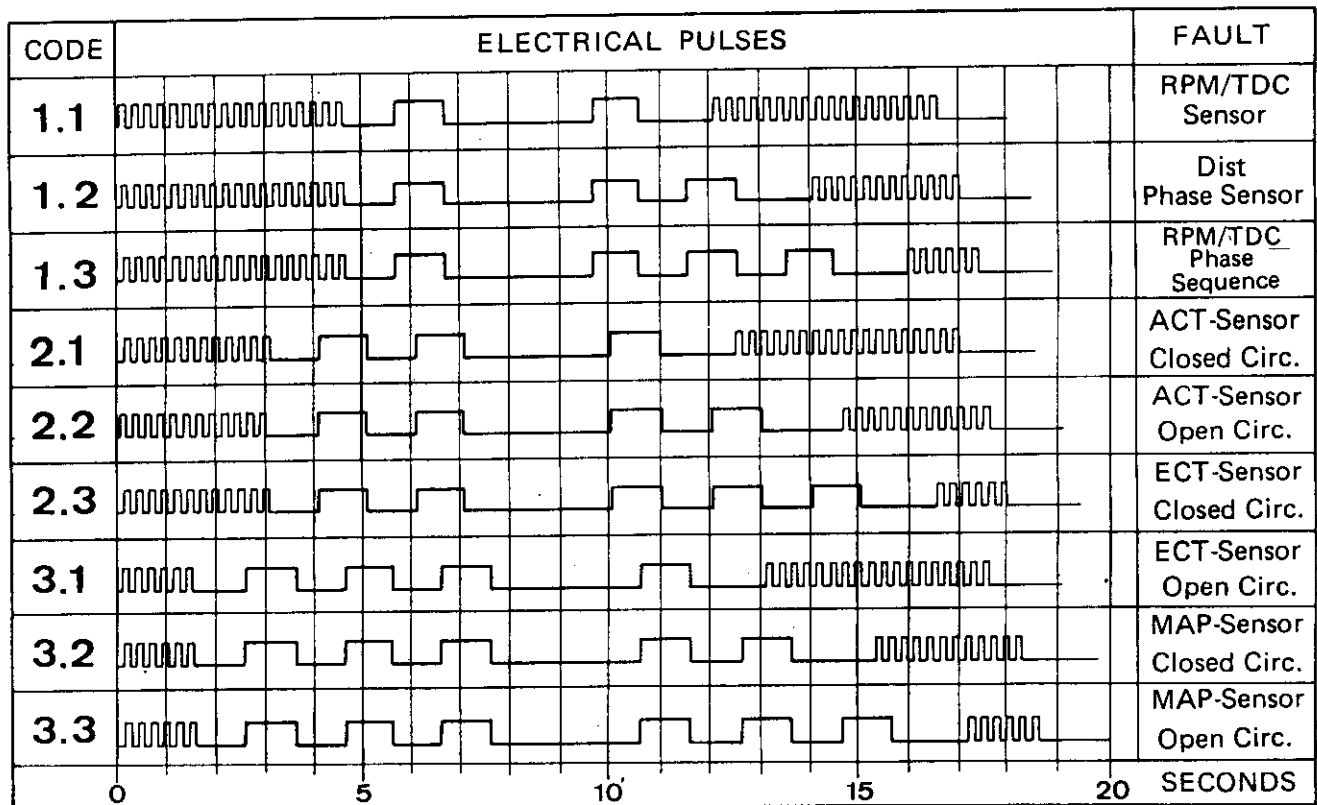
## PART A – Engine, Engine Management and Turbocharger

### 4. Maintenance, Service Adjustments and System Checks

#### 4.3 System Checks (cont'd.)

##### Quick Test (cont'd.)

- The coded signals are displayed as follows:
  - Start of test: Indicated by a series of short on – off pulses.
  - Pause
  - Codes: These are indicated by a series of on – off pulses each of them having a duration of one second. Each code is made up of two figures seperated by a pause. These two figures identify a defect in a sensor circuit.
  - End of test: Indicated by a series of short on – off pulses.
- During the quick test more than one defect code may be displayed.
- The quick test repeats itself until the ignition is switched off.



Test codes

## PART A – Engine, Engine Management and Turbocharger

### 4. Maintenance, Service Adjustments and System Checks

#### 4.3 System Checks (cont'd.)

##### Basic Checks

- A detailed Diagnosis can be performed using the diagnostic guide contained in the Sierra RS Cosworth Workshop Manual.
- The following test equipment is required:
  - FE 60 Breakout Box
  - Multimeter (Siemens, AVO or Keithly)
  - Test lead No. 2 (33-002)
  - New test lead No. 7 (29-005)
- The Test lead No. 2 allows an overall check to be performed on the engine management system like the resistance of the sensors and electronic actuators, the wiring loom and the plug connections.
- The new test lead No. 7 has to be connected to the ECU module, the multi-plug for the module and Test lead No. 2.

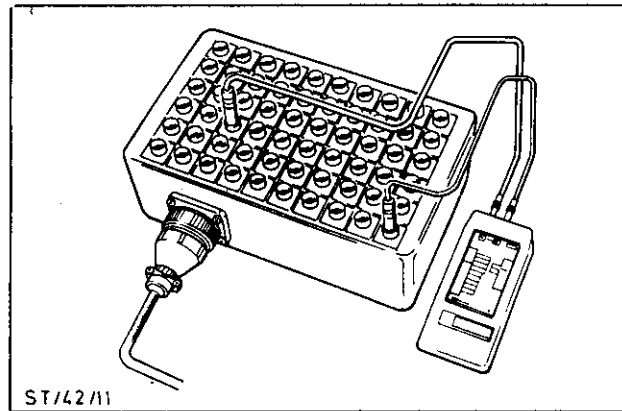
Connected in this way, the complete system can be tested i.e. the ECU module itself, and the voltages and current supplies for the various sensors and other electronic components.

##### Fuel System

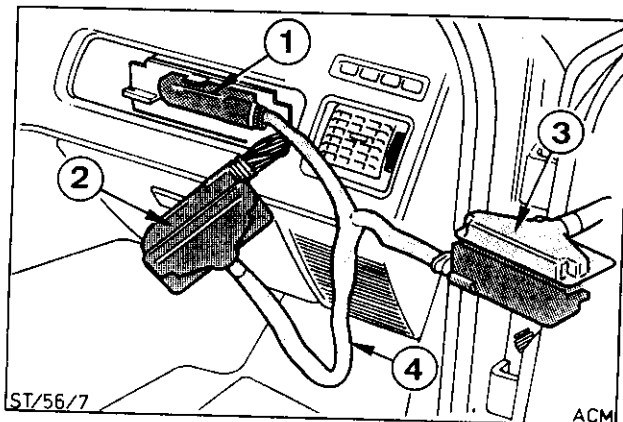
For pressure- and leak tests on the fuel system the available pressure tester 23-011 A/B should be used. Using suitable adaptors the pressure tester can be connected between the fuel rail and the pressure regulator. More detailed information is contained in the Sierra RS Cosworth Workshop Manual.

##### Turbocharger

Detailed instruction for checking and adjusting the boost pressure are included in the Sierra RS Cosworth Workshop Manual.



**FE 60 Breakout Box with Multimeter and Test lead No. 2**



**Test lead No. 7**

- 1 = Connection to ECU
- 2 = Connection to multiplug of ECU
- 3 = Connection to Test lead No. 2
- 4 = Test lead No. 7

## PART A – Engine, Engine Management and Turbocharger

### 5. Technical Data – Part A

#### Engine – General

Engine Code	N5A
Bore	90.82 mm
Stroke	77.00 mm
Cubic capacity	1995 cm <sup>3</sup> effective
Poweroutput	150 kW (DIN)
	at 6000 rpm
Torque	278 Nm (DIN)
	at 4500 rpm
Firing order	1 – 3 – 4 – 2
Compression ratio	8.0:1
Idle speed	850 rpm
Maximum engine speed	
– continued running	6500 rpm
– intermittent running	6800 rpm
Operation boost pressure	7.0 bars
Maximum boost pressure limited to	9.0 bars
Spark plugs	AGPR 901 C
Ignition timing	16° BTDC at idle
	(cannot be adjusted in service)

#### Engine Lubrication

Oil specification	API/SF-CC
Oil change intervall	10.000 km
Oil change capacity	3.0 litres without filter
	3.4 litres including oil filter
Minimum oil pressure	1.8 bars at 850 rpm
	(with SAE 20 W-50 oil at 80° C)
	2.4 bars at 2000 rpm

#### Tightening Torques – Cylinder Head

	Nm	Note
Cylinder head bolts – Stage 1	30–35	
– Stage 2	65–70	
– Stage 3	Rotate extra 80°–90°	
Camshaft bearing caps – 6 mm	8–10	
– 8 mm	19–23	
Valve cover to cylinder head	8–10	
Camshaft sprocket gear-fastening bolt	59–63	
Thermostat housing to cylinder head	18,5–21,5	
Inlet manifold to cylinder head	18,5–21,5	
Exhaust manifold to cylinder head	19–23	
Spark plug	28–33	
Plenum chamber to inlet manifold	8–10	
Elbow to plenum chamber	18,5–21,5	
Throttle body to elbow	8–10	
Air temperature sensor to plenum chamber	23–25	Loctite 242
Turbocharger to exhaust manifold	40–48	
Oil feed pipe adaptor to turbocharger	25–35	Loctite 242
Turbocharger oil feed pipe to adaptor	25	
Oil return pipe to turbocharger	18,5–21,5	
Coolant feed- and return pipes to turbocharger	19–23	

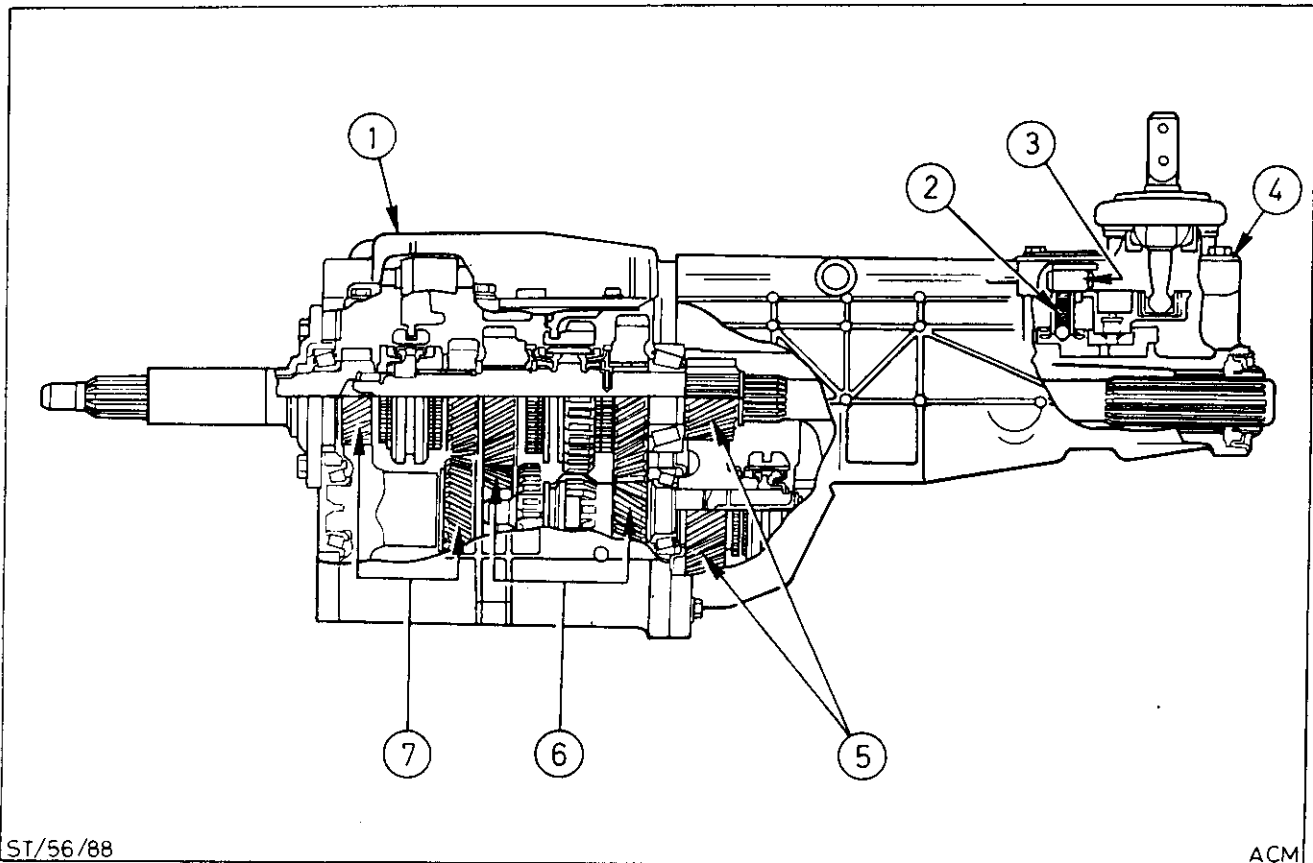
For detailed Technical Data and Tightening Torques see Sierra RS Cosworth Workshop Manual.

## PART B – Transmission and Rear Axle

### 1. Transmission

#### 1.1 General Description

- The transmission fitted to the Sierra RS Turbo is a five speed manual transmission with close ratios and with fifth gear as overdrive.
- The complete transmission housing is made from aluminium.
- First through fourth and reverse gears mesh within the transmission housing. The fifth speed gears and synchroniser are located on the back of the housing in the extension housing.
- The first-second and third-fourth shift forks are mounted in the shift cover. The shift cover with shift forks and the shift rail, which extends from the extension housing turret to the shift cover, are an assembly.



1 = Shift cover with 1st/2nd and 3rd/4th shift forks and shift rail

2 = Shift detent

3 = Shift rail

4 = Turret cover

5 = Fifth speed gears and synchroniser

6 = 1st/2nd speed gears and synchronisers (reverse gear)

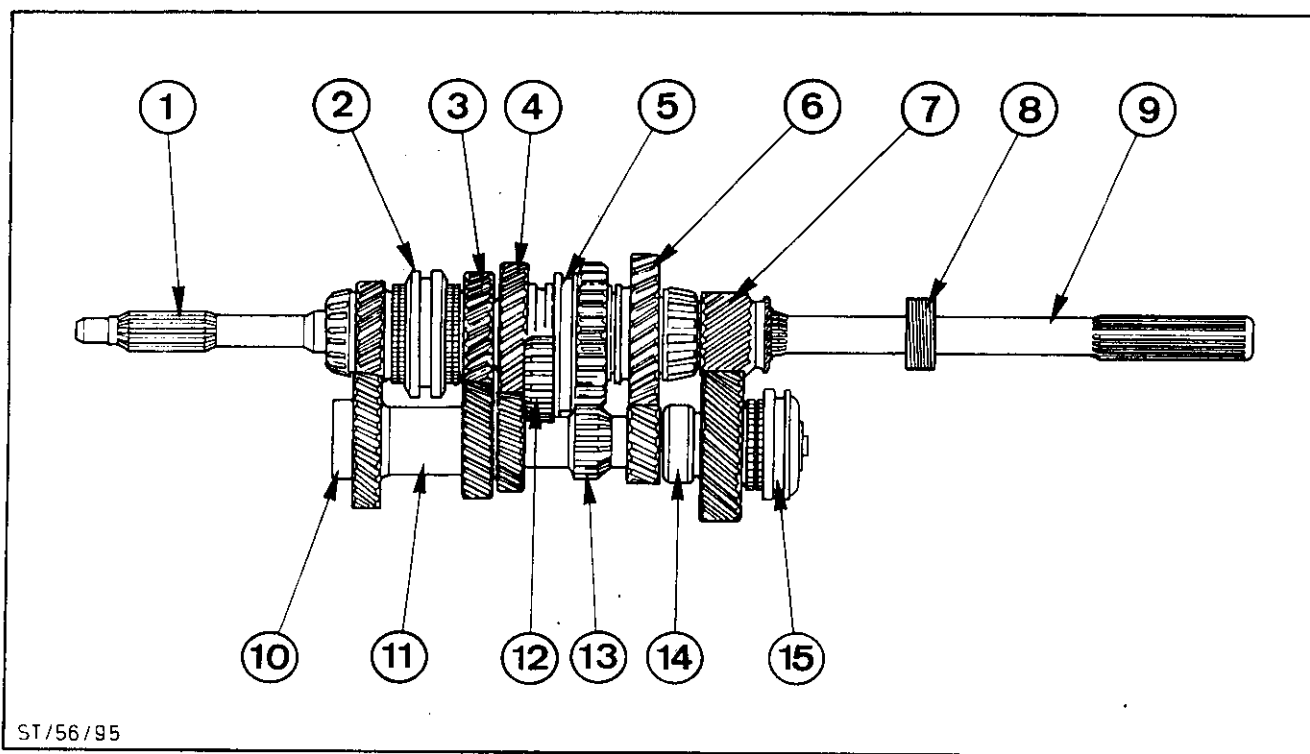
7 = 3rd/4th speed gears and synchronisers

## PART B – Transmission and Rear Axle

### 1. Transmission

#### 1.1 General Description (cont'd.)

- The fifth speed synchroniser and reverse idler gear are shifted by an intermediate lever mounted on a pivot pin in the transmission housing.
- The shift detent is located in the extension housing turret.



ST/56/95

- |  |                               |
|--|-------------------------------|
| 1 = Input shaft                                  | 9 = Output shaft (main shaft) |
| 2 = 3rd / 4th synchroniser                       | 10 = Bearing assembly         |
| 3 = Third gear unit                              | 11 = Countershaft             |
| 4 = Second gear unit                             | 12 = Reverse idler gear       |
| 5 = 1st / 2nd synchroniser (reverse driven gear) | 13 = Reverse gear             |
| 6 = First gear unit                              | 14 = Bearing assembly         |
| 7 = Fifth gear unit                              | 15 = Fifth gear synchroniser  |
| 8 = Speedometer gear                             |                               |

## PART B – Transmission and Rear Axle

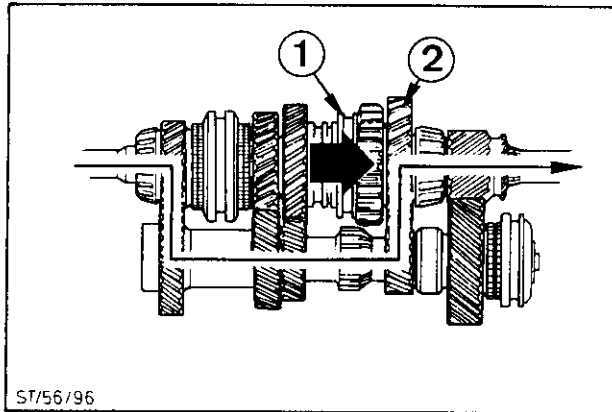
### 1. Transmission

#### 1.2 Power flow

##### First Gear

Ratio: 2.96:1

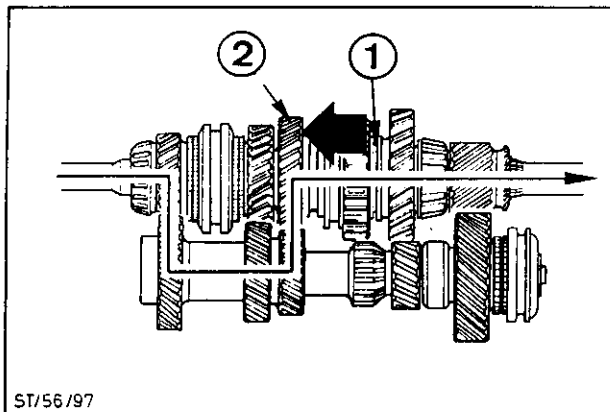
- 1 = 1st/2nd synchroniser
- 2 = First gear unit



##### Second Gear

Ratio: 1.94:1

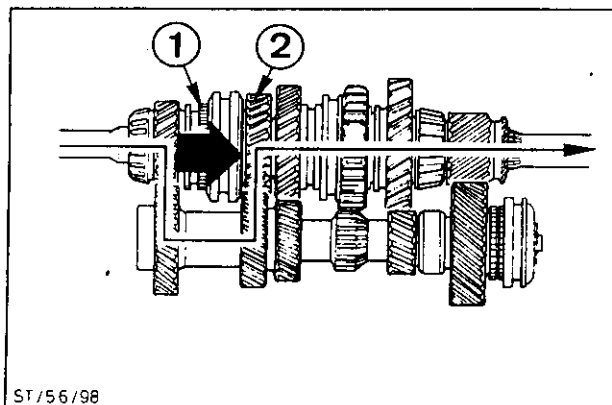
- 1 = 1st/2nd synchroniser
- 2 = Second gear unit



##### Third Gear

Ratio: 1.34:1

- 1 = 3rd/4th synchroniser
- 2 = Third gear unit



## PART B – Transmission and Rear Axle

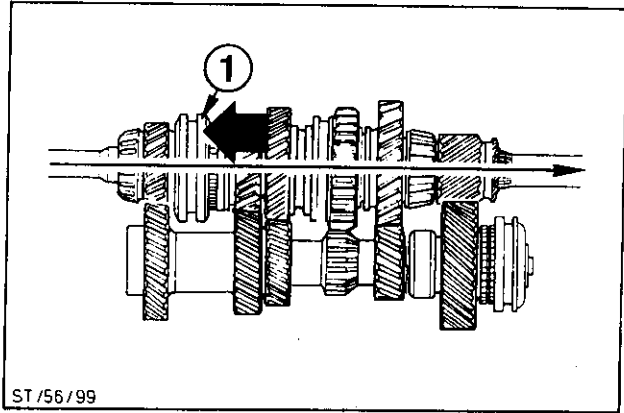
### 1. Transmission

#### 1.2 Power flow (cont'd.)

#### Fourth Gear

Ratio: 1:1

1 = 3rd/4th synchroniser

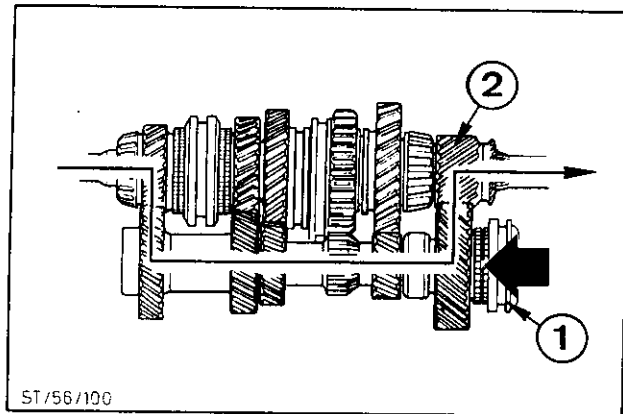


#### Fifth Gear

Ratio: 0.8:1

1 = Fifth gear synchroniser

2 = Fifth gear unit

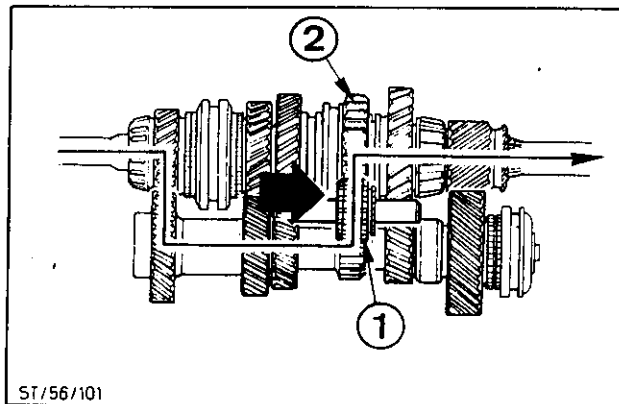


#### Reverse Gear

Ratio: 2.76:1

1 = Reverse idler gear

2 = Reverse gear unit



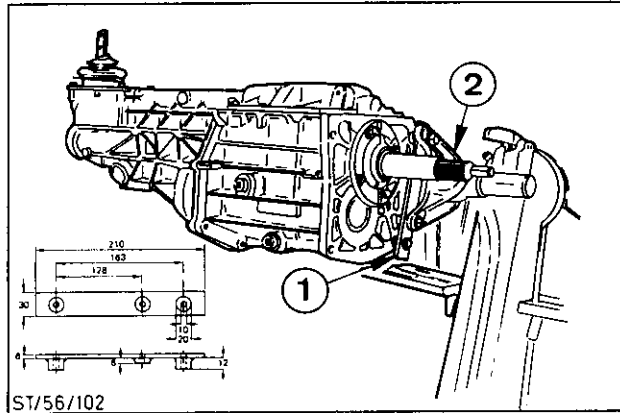
## PART B – Transmission and Rear Axle

### 1. Transmission

#### 1.3 Important Notes on Disassembly and Assembly

Transmission disassembly and assembly operations are explained in detail in the Sierra RS Cosworth Workshop Manual. This part of the brochure covers some important points only.

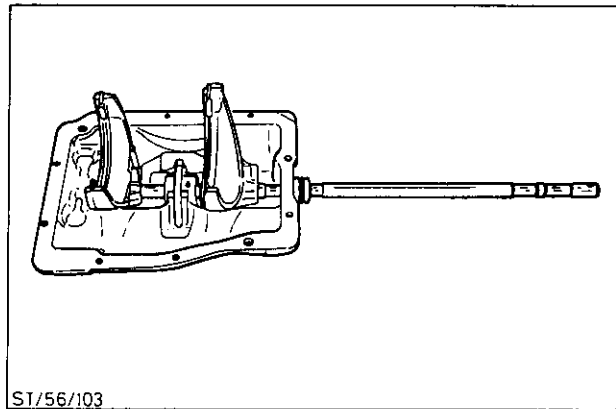
- No new special tools are required.
- The transmission has to be mounted in a repair stand using a dealer manufactured adaptor bracket.
- The extension housing and the selector crank of the shift detend should be removed from the transmission housing as an assembly.  
The selector crank can not be removed with the extension housing in position, because this is prevented by a lug, located on the bottom of the selector crank which meshes with the detend plate.



**Transmission on stand**

- 1 = Adaptor bracket (dimensions in mm)
- 2 = Mounting bracket 16-009

- The shift cover, the 1st/2nd and 3rd/4th shift forks and the shift rail have to be removed from the housing as an assembly.

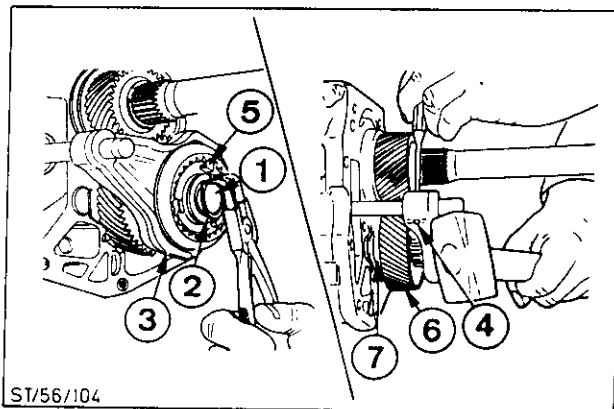


**Shift cover**

- The 5th gear, 5th gear synchroniser and shift fork have to be removed from the countershaft as an assembly.

- 1 = Snap ring
- 2 = Spacer
- 3 = Shift fork
- 4 = Roll pin
- 5 = Synchroniser
- 6 = 5th gear
- 7 = Countershaft retainer

**Note:** Selective washers are located between the countershaft retainer and the rear countershaft bearing race to adjust the end float of the countershaft to specification.



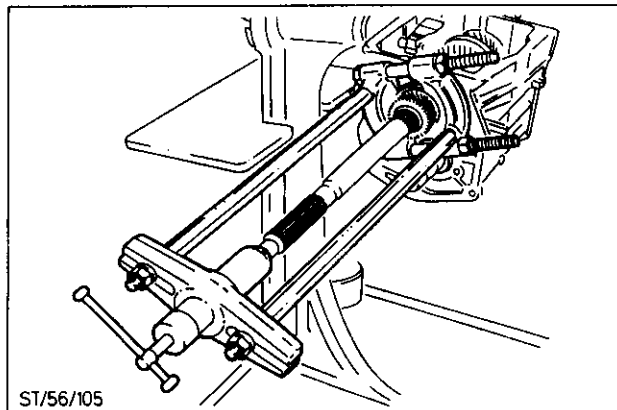
## PART B – Transmission and Rear Axle

### 1. Transmission

#### 1.3 Important Notes on Disassembly and Assembly (cont'd.)

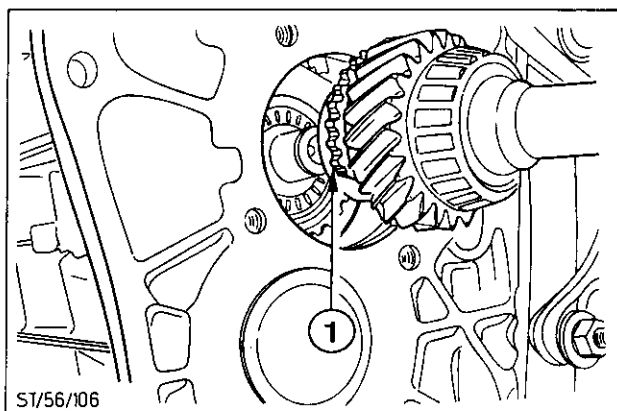
- After removing the snap ring the fifth gear can be pulled off from the main shaft using a proprietary puller.

**Note:** The 5th gear cannot be reused.



**Remove 5th gear from main shaft**

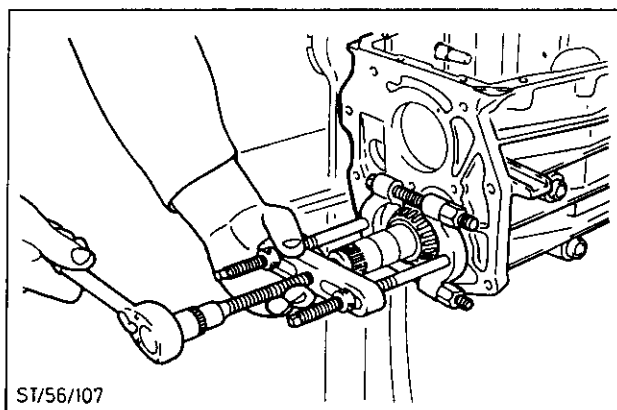
- The transmission shafts have to be removed in the following order
  - Input shaft
  - Main shaft
  - Countershaft
- To remove the input shaft, the flat section of the synchroniser tooth ring must first be positioned above the countershaft gear.
- To remove the main shaft, first remove the rear bearing cup. To do this pull the main shaft to the rear until the first gear stops against the transmission housing. Removal of the main shaft is from the top of the housing.



**Remove the input shaft**

1 = Flat section of tooth ring

- Before removing the taper roller bearing from the countershaft, remove the oil collector for the fifth gear from the end of the shaft.
- To remove the countershaft, pull out the rear bearing cup and then pull off the taper roller bearing using a suitable puller. The countershaft can then be removed from above.



**Remove bearing from countershaft**

## PART B – Transmission and Rear Axle

### 1. Transmission

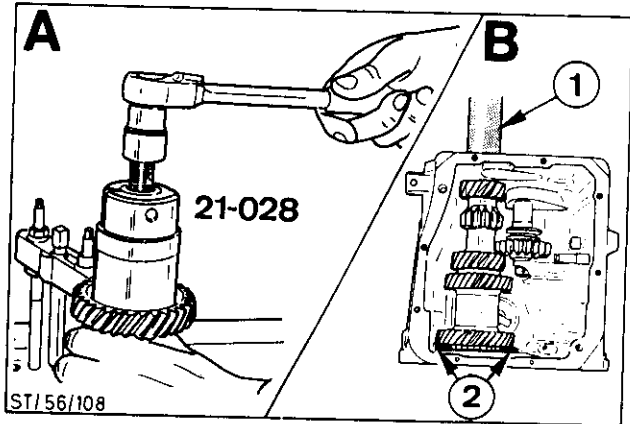
#### 1.3 Important Notes on Disassembly and Assembly (cont'd.)

- Using special tool 21-028 pull off the input shaft bearing.

Press new bearing onto shaft and bearing cup into housing.

- With the countershaft in situ, install rear bearing using a press and a suitable piece of tubing.

**Note:** Support countershaft using two suitable steel bars (thickness 6–8 mm) to prevent damage to the transmission housing.



A = Removal of the front bearing from the countershaft

B = Installing the rear bearing

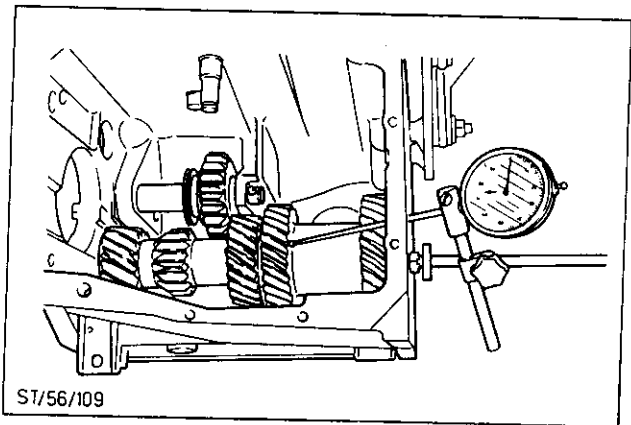
1 = Tubing

2 = Steel bars

- End play of the countershaft is adjusted by shims between the bearing outer ring and the bearing retainer.

Specified end float 0.025 – 0.127 mm

Measure end float using a thin shim. If necessary remove bearing retainer and add shims as required. (Shim sizes – see Technical Data).

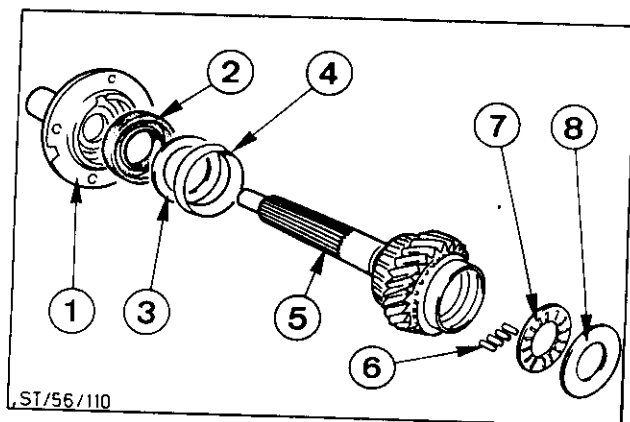


Measuring countershaft end float

- Install main shaft
- End play of the main shaft is controlled by shims between the bearing outer ring and the retainer of the input shaft bearing.

This end play is measured after the transmission has been completely assembled.

For this reason, no shims should be fitted when installing the input shaft and the bearing retainer.



1 = Bearing retainer

2 = Oil seal

3 = Shim

4 = Bearing outer ring

5 = Input shaft

6 = 15 needle rollers

7 = Thrust bearing

8 = Bearing race