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# Workshop Manual

911

*Carrera 4*

## Structure of the Workshop Manual

This Workshop Manual describes all of the important operations for which special instructions are required to ensure proper completion. This manual is essential for shop foremen and mechanics who need this information to keep the vehicles in safe operating condition. The basic safety rules, of course, also apply to all repairs on vehicles, without exception.

## Breakdown of the Workshop Manual

1. Overview of repair groups
2. Record sheet for supplements
3. List of contents
4. Technical data
5. Repair groups

## Breakdown of the repair groups

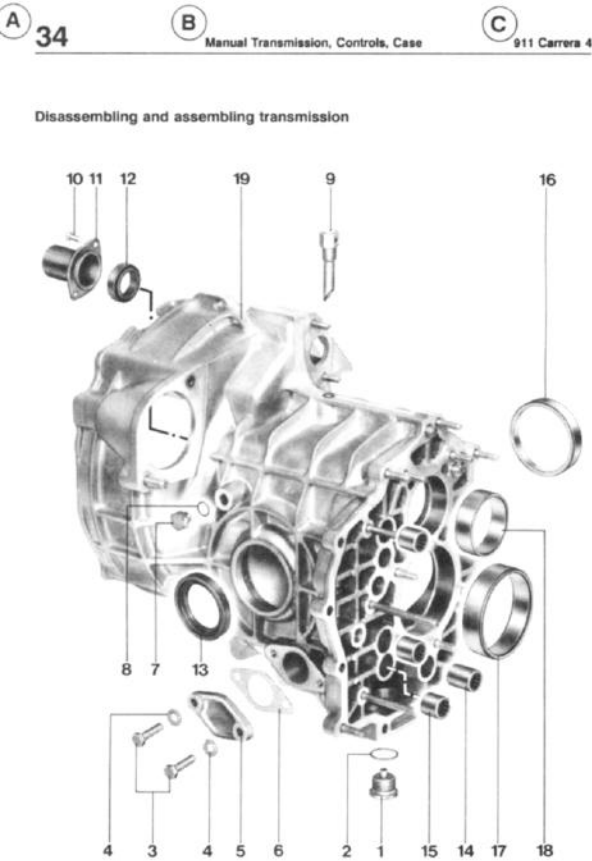
1. Table of tightening torques
2. Special tools required
3. Exploded diagrams
4. Legends for the exploded diagrams
5. Notes on assembly/application of special tools
6. Diagnosis for the repair groups

The Workshop Manual will be updated regularly by means of supplements which must be filed immediately to maintain the usefulness of the manual. Appropriate entries must be made in the record sheet to prove that the manual is complete.

The content of this Workshop Manual will be supplemented with Technical Information Bulletins, which will be integrated into the manual from time to time.

Descriptions of design and function can be found in the service training course reference material.

## Layout of the exploded diagram



**C** 911 Carrera 4 **B** Manual Transmission, Controls, Case **A** 34

| No | Description          | Qty. | Note when:                                                   |                                                                                                           |
|----|----------------------|------|--------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
|    |                      |      | Removing                                                     | Installing                                                                                                |
| 1  | Screw plug           | 1    |                                                              | Clean, tighten with 30 Nm                                                                                 |
| 2  | Sealing ring         | 1    |                                                              | Replace                                                                                                   |
| 3  | Hexagon head screw   | 2    |                                                              | Tighten with 23 Nm (17 ftlb)                                                                              |
| 4  | Washer               | 2    |                                                              |                                                                                                           |
| 5  | Flange               | 1    |                                                              |                                                                                                           |
| 6  | Seal                 | 1    |                                                              | Replace                                                                                                   |
| 7  | Screw plug           | 1    |                                                              | Tighten with 23 Nm (17 ftlb)                                                                              |
| 8  | Sealing ring         | 1    |                                                              | Replace                                                                                                   |
| 9  | Breather             | 1    |                                                              | Tighten with 35 Nm (26 ftlb). Observe installation position                                               |
| 10 | Fillister head screw | 2    |                                                              | Tighten with 10 Nm (7 ftlb)                                                                               |
| 11 | Guide tube           | 1    |                                                              |                                                                                                           |
| 12 | Rotary shaft seal    | 1    |                                                              | Only install after assembling the gear set (also refer to Page 34-113)                                    |
| 13 | Rotary shaft seal    | 1    |                                                              | Drive into position with Special Tool 9252. Pack space between sealing lips with Kübler Silubrin Grease S |
| 14 | Spherical sleeve     | 1    | Pull out with a suitable internal puller (e.g. Schrem 14-20) | Press in with Special Tool 9254                                                                           |

34 - 128 **D** Disassembling and assembling transmission **E** Printed in Germany - VII, 1988 **F**

Disassembling and assembling transmission **F** Printed in Germany - VII, 1988 **E** 34 - 128 **D**

- A - Repair group, numbers
- B - Repair groups, text
- C - Type of vehicle to be repaired
- D - Page number
- E - Operation
- F - Impressum, supplement number, year of printing
- G - Diagram item number in the order of disassembling
- H - Special notes to be observed when installing or removing

The notes on assembly/application of special tools which are given after the exploded diagram are always arranged in the order of text → diagram.

# List of Repair Groups Carrera 4

| General                                    | Technical Data                                  | Page 0.1 |
|--------------------------------------------|-------------------------------------------------|----------|
| Repair Groups                              |                                                 | Group    |
| <b>Volume I</b>                            | Maintenance, Self-diagnosis                     | 03       |
|                                            | Engine, Crankcase, Suspension                   | 10       |
| <b>Engine, Maintenance</b>                 | Engine, Crankshaft, Pistons                     | 13       |
|                                            | Engine, Cylinder Head and Valve Drive           | 15       |
|                                            | Engine, Lubrication                             | 17       |
|                                            | Engine, Cooling                                 | 19       |
|                                            | Fuel Supply                                     | 20       |
|                                            | Fuel System, Electronic Injection               | 24       |
|                                            | Exhaust System/Emission Controls                | 26       |
|                                            | Starter, Power Supply, Cruise Control           | 27       |
|                                            | Ignition System                                 | 28       |
|                                            | Diagnosis                                       |          |
| <b>Volume II</b>                           | Clutch, Controls                                | 30       |
|                                            | Clutch                                          | 32       |
| <b>Transmission (manual)</b>               | Manual Transmission, Controls, Case             | 34       |
|                                            | Manual Transmission, Gears, Shafts              | 35       |
|                                            | Differential, Transaxle System, All-Wheel Drive | 39       |
|                                            | Diagnosis                                       |          |
| <b>Volume III</b>                          | Clutch, Controls                                | 30       |
|                                            | Torque Converter                                | 32       |
|                                            | Automatic Transmission, Controls, Case          | 37       |
| <b>Transmission (automatic)</b>            | Automatic Transmission, Gears, Shafts           | 38       |
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| <b>Volume IV</b>                           | Front Wheel Suspension                          | 40       |
|                                            | Rear Wheel Suspension, Axle Shaft               | 42       |
| <b>Chassis</b>                             | Wheels, Tires, Alignment                        | 44       |
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|                                            | Ventilation                                     | 85       |
| <b>Heating, Ventilation, Air Condition</b> | Air Conditioner                                 | 87       |
| <b>Electrics</b>                           | Diagnosis                                       |          |
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| <b>Electrics</b>                           |                                                 |          |
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# Survey of Information Published in Technical Manual beginning in 1985

**6  
Cyl.**

**1**

|                                                                                                        | TI/<br>QI | No.  | 911 C2/C4 | 911 | 911 Turbo | Remarks,<br>Model,<br>Also refer to...   | Date     |
|--------------------------------------------------------------------------------------------------------|-----------|------|-----------|-----|-----------|------------------------------------------|----------|
| <b>1985</b>                                                                                            |           |      |           |     |           |                                          |          |
| - Oil Pump with Intake Plate and Filter Screen                                                         | T         | 1/85 | ●         | ●   | ●         | New version                              | 29.04.85 |
| - Camshaft Sprocket Installation                                                                       | Q         | 1/85 | ●         | ●   | ●         | Threads not lubricated with oil          | 10.04.85 |
| - Engine Carrier/Engine Mounts                                                                         | Q         | 2/85 | ●         | ●   | ●         | Optimoly HT                              | 07.06.85 |
| - Scrapping Exhaust Valves                                                                             | Q         | 3/85 |           |     | ●         | Sodium filled valves                     | 13.08.85 |
| <b>1986</b>                                                                                            |           |      |           |     |           |                                          |          |
| - Thermo Valve Temperature Switch                                                                      | Q         | 1/86 | ●         | ●   | ●         | Hose routing                             | 18.04.86 |
| - Leakage Lower Valve Cover Gasket                                                                     | Q         | 2/86 | ●         | ●   | ●         | 1987 Models on                           | 20.06.86 |
| - Oil Pressure Switch Oil Pressure Warning Lamp Flickers                                               | Q         | 3/86 | ●         | ●   | ●         | 1984 Models on                           | 07.07.86 |
| - New Nuts and New Cylinder Head Tightening Specifications                                             | T         | 1/86 | ●         | ●   | ●         | Torque angle                             | 30.12.86 |
| - Modification on Bypass Valve                                                                         | T         | 2/86 | ●         | ●   | ●         | Noise                                    | 30.12.86 |
| <b>1987</b>                                                                                            |           |      |           |     |           |                                          |          |
| - Oil Pipes Chain Tensioner                                                                            | Q         | 1/87 | ●         | ●   | ●         | 1987 Model/leakage                       | 18.06.87 |
| <b>1988</b>                                                                                            |           |      |           |     |           |                                          |          |
| <b>1989</b>                                                                                            |           |      |           |     |           |                                          |          |
| - Additional Sealing on Crankcase                                                                      | T         | 1/89 | ●         | ●   | ●         | Silastic 732 RTV                         | 22.05.89 |
| - Protection and Conservation Agent for Engines / Type 959                                             | T         | 2/89 |           |     | ●         | Type 959: VW-Part No.: AKR 320 KD 604    | 31.05.89 |
| - Tightening Torque of Conrod Nuts                                                                     | T         | 3/89 | ●         | ●   | ●         | New grade 12.9: 15 Nm and 2 x 90°        | 20.12.89 |
| <b>1990</b>                                                                                            |           |      |           |     |           |                                          |          |
| - Camshaft housing cover                                                                               | T         | 1/90 | ●         |     |           | Additional washers: 6,2x20x4 (aluminium) | 28.02.90 |
| ◆ = Conversion instructions or workshop campaign<br>∇ = Brochure<br>⊕ = Supplement or change for TI/QI |           |      |           |     |           |                                          |          |



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|                                                                                                        | TI/<br>QI | No.    | 911 C2/C4 | 911 | 911 Turbo | Remarks,<br>Model,<br>Also refer to...     | Date     |
|--------------------------------------------------------------------------------------------------------|-----------|--------|-----------|-----|-----------|--------------------------------------------|----------|
| <b>1985</b>                                                                                            |           |        |           |     |           |                                            |          |
| - Misfiring Because of<br>Ground Strap Corrosion                                                       | Q         | 1/85   | ●         |     |           |                                            | 15.02.85 |
| - Fuel Injector Survey<br>L-Jetronic                                                                   | Q         | 2/85   | ●         |     |           |                                            | 15.02.85 |
| - Throttle Housing                                                                                     | Q         | 3/85   | ●         |     |           | Bypass air screw                           | 10.04.85 |
| - Corroded Spark Plug Connectors                                                                       | Q         | 4/85   | ●         |     | ●         |                                            | 10.04.85 |
| - Settings of DME Control Units                                                                        | T         | 1/85   | ●         |     |           |                                            | 18.07.85 |
| - List of Factory Tested an<br>Approved Spark Plugs                                                    | T         | 2/85   | ●         |     | ●         | Invalid/...TI-1/86                         | 08.07.85 |
| - Retrofitting - Catalysor                                                                             | T         | ◆ 3/85 | ●         |     |           |                                            | 20.12.85 |
| - Retrofitting - Catalysor                                                                             | T         | ◆ 4/85 | ●         |     |           |                                            | 20.12.85 |
| - Retrofitting - Catalysor                                                                             | T         | ◆ 5/85 | ●         |     |           | Invalid/...TI-1/87                         | 20.12.85 |
| <b>1986</b>                                                                                            |           |        |           |     |           |                                            |          |
| - Ignition Delay Relay                                                                                 | Q         | 1/86   |           |     | ●         | 1985-1986 Models/<br>Relay voltage 9 volts | 16.01.86 |
| - List of Factory Tested an Approved<br>Spark Plugs                                                    | T         | 1/86   | ●         |     | ●         | Invalid/...TI-1/88                         | 30.04.86 |
| - BatterieDischarging                                                                                  | Q         | 2/86   | ●         |     | ●         | Removing battery                           | 18.04.86 |
| - Mixture Preparation<br>Engine Stalls While Declutching                                               | Q         | 3/86   | ●         |     |           | 1986 Model/"mixture<br>too rich"           | 20.06.86 |
| - Catalytic Converter Cars<br>Poor Pickup                                                              | Q         | 4/86   | ●         |     |           |                                            | 20.06.86 |
| - Engine Damage<br>Engine Repairs                                                                      | Q         | 5/86   | ●         |     | ●         | Foreign particles in in-<br>take system    | 20.06.86 |
| - Information for Cars<br>with Catalytic Converter                                                     | T         | 2/86   | ●         |     |           |                                            | 26.06.86 |
| - Turbocharger<br>Compressor Wheel Damage                                                              | Q         | 6/86   |           |     | ●         | foreign particles                          | 10.10.86 |
| - Faulty Wire Bridge - Terminal 28<br>Lean Hesitation, CO Adjustment                                   | Q         | 7/86   | ●         |     |           | Terminal 28/resistance                     | 25.11.86 |
| <b>1987</b>                                                                                            |           |        |           |     |           |                                            |          |
| - Additional Air Pump<br>Maintenance                                                                   | Q         | 1/87   |           |     | ●         | Fuel return line                           | 20.02.87 |
| - Troubleshooting<br>Fuel System/Engine Electrical System                                              | Q         | 2/87   | ●         |     |           | Plug connections<br>(cleanliness)          | 20.02.87 |
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|--------------------------------------------------------------------------------------------------------|-----------|------|-----------|-----|-----------|----------------------------------------------|----------|
| - Engine Power<br>Fuel/Air Mixture                                                                     | Q         | 3/87 |           | ●   |           | 1986-1987 Models/<br>term. 28/oxygen sensor  | 31.03.87 |
| - Troubleshooting<br>Temperatur Sensor                                                                 | Q ♦       | 4/87 |           | ●   |           | NTC II                                       | 22.05.87 |
| - Service Installation -<br>Catalytic Converter                                                        | T ♦       | 1/87 |           | ●   |           |                                              | 25.10.87 |
| - Starting Motor<br>Transmission Cars                                                                  | Q         | 5/87 |           | ●   |           | 1987 Model/115 mm                            | 31.08.87 |
| - Battery<br>Discharging                                                                               | Q         | 6/87 |           | ●   | ●         | Only coupe/inside lights                     | 16.10.87 |
| - Battery Discharging<br>New Cars                                                                      | Q         | 7/87 |           | ●   | ●         | Checking battery con-<br>dition              | 24.11.87 |
| <b>1988</b>                                                                                            |           |      |           |     |           |                                              |          |
| - Fuel Grade<br>Exhaust System                                                                         | Q         | 1/88 |           | ●   | ●         | Exhaust tailpipe dis-<br>coloration/unleaded | 19.02.88 |
| - Survey of Factory Tested and<br>Approved Spark Plugs                                                 | T         | 1/88 |           | ●   | ●         |                                              | 06.07.88 |
| - Survey of Control Units                                                                              | T         | 2/88 |           | ●   | ●         |                                              | 06.07.88 |
| - Fuel/Air Mixture<br>Throttle Valve Housing                                                           | Q         | 2/88 |           | ●   |           | Hose to thermo valve<br>disconnected         | 19.09.88 |
| - Starter<br>Starter Gear Ring                                                                         | Q         | 3/88 |           | ●   |           | 911 Turbo starter gear-<br>ring/...QI-5/87   | 30.12.88 |
| <b>1989</b>                                                                                            |           |      |           |     |           |                                              |          |
| - Unleaded Gasoling<br>Regular RON 91 / Euro Premium RON<br>95 / Premium RON 98                        | T         | 1/89 | ●         | ●   | ●         | Fuel grade table.                            | 31.01.89 |
| - New Catalytic Converter Conversion Kit<br>930.113.911.03                                             | T         | 2/89 |           | ●   |           | ...with plastic filling tube.                | 12.06.89 |
| - Spark Plug connectors which are<br>hard to remove                                                    | T         | 3/89 | ●         |     |           | Engine Nos.: 62 K 00607<br>to 62 K 00788     | 02.05.89 |
| - DME Control Unit                                                                                     | T ♦       | 4/89 | ●         |     |           | ...with green dot.                           | 08.06.89 |
| - Lighting up of Warning Signs and<br>Faults in DME Fault Memory                                       | T         | 5/89 | ●         |     |           | Carrera 4                                    | 12.06.89 |
| - Service Installation of Catalytic<br>Converter                                                       | T ♦       | 6/89 | ●         |     |           | Carrera 4 M'89 (K)<br>964.113.911.00         | 05.10.89 |
| - Fuel Hose to Rear Fuel Pump                                                                          | T ♦       | 7/89 |           |     | ●         | Hose laid differently.                       | 13.11.89 |
| ♦ = Conversion instructions or workshop campaign<br>▽ = Brochure<br>⊕ = Supplement or change for TI/QI |           |      |           |     |           |                                              |          |



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|                                                     | Ti/<br>Qi | No.  | 911 C2-C4 | 911 | 911 turbo | Remarks,<br>Model,<br>Also refer to...         | Date     |
|-----------------------------------------------------|-----------|------|-----------|-----|-----------|------------------------------------------------|----------|
| <b>1990</b>                                         |           |      |           |     |           |                                                |          |
| - Cable harness connector at the<br>air-flow sensor | T ♦       | 1/90 | ●         |     |           | Cable cluster mounted<br>in tight loop.        | 21.02.90 |
| - Securing heat shield to exhaust system            | T         | 2/90 | ●         |     |           | ...coat with Optimoly HT                       | 31.08.90 |
| - Engine Temperature Sensor (NTC) II                | T         | 3/90 |           | ●   |           | M'84 (E)-'89 (K) spare<br>part: 930.606.915.00 | 16.11.90 |

♦ = Conversion instructions or workshop campaign  
 ▽ = Brochure  
 ⊕ = Supplement or change for Ti/Qi



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|----------|----------|
| Date     |          |
| 30.04.90 | 31.12.90 |
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The workshop manual of the Carrera 4 also includes that for the Carrera 2.  
The Carrera 4 acts as the basis for description of the repairs in the manual.  
"Carrera 4" also appears on every page in the header line.

Deviating descriptions for repairs on the Carrera 2 follow those of the Carrera 4. These repair descriptions for both models are separated by a yellow sheet.

"Carrera 2" appears on all pages in the header line after the separating sheet. The page number starts with 100 as an additional distinction.

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