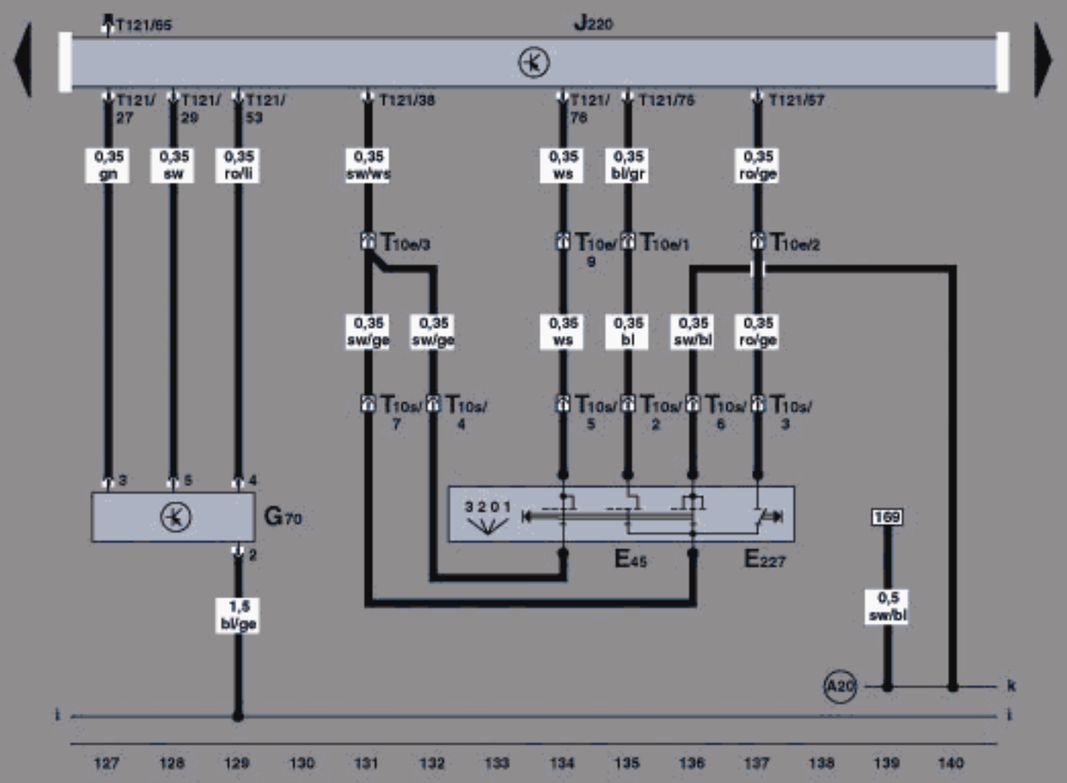
How to Read Wiring Diagrams

Symbols, Layout and Navigation



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Always check Technical Bulletins and the Volkswagen Worldwide Repair Information System for information that may supersede any information included in this booklet.

Table of Contents

Course goals

This course will enable you to:

- Follow current from its power source to the Ground point quickly and accurately.
- Understand the symbols of common components and circuit designations used in Volkswagen Wiring Diagrams.
- Practice Wiring Diagram navigation through practical exercises and hands on examples.

Introduction

As today's vehicles become increasingly complex, so does the job of the technician. Wiring diagram navigation skills are critical to diagnosing and repairing today's vehicle in a timely and accurate manner.

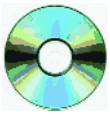
This Self Study Program is not intended to instruct the technician how the electrical system operates in a vehicle. Given an understanding of electrical operation, this Self Study Program will introduce you to the skills necessary to read Volkswagen wiring diagrams.

In this program you will be exposed to all aspects of wiring diagrams, including:

- Commonly used symbols and their meanings
- Current tracks, including how to follow circuits between pages or diagrams
- Component identification
- DIN standards for terminal designations
- Wiring color codes and gauge (size)
- Terminal identification on both connectors and components

This book will provide examples of various types of circuits. The Computer Based Training (CBT) CD included at the end of this self study will provide an opportunity to practice "hands-on" wiring diagram navigation.

Areas of text that give the technician an opportunity to practice the concepts in the CBT will be designated with an icon of a CD (below) at the beginning of that section.



Wiring Diagram Overview

Overview

Volkswagen wiring diagrams are a graphic representation of the actual vehicle wiring. They are developed from the engineering drawings that are used to produce the wiring harness. A consistent set of symbols are used to represent the actual components and conductors.

Volkswagen electrical systems and wiring diagrams follow the German DIN (Deutsche Industrie Norm/Deutsches Institut für Normung) standards. These standards are guidelines for manufacturing in Germany, similar to SAE (Society of Automotive Engineers) in the United States.

Layout

The layout of wiring diagrams is common to all Volkswagen vehicles. Called "Current Track" wiring diagrams, they show the power source at the top of the page and the Ground points at the bottom. Situated vertically between power and Ground are the current tracks, which contain electrical components and conductors.

This current track layout simplifies the wiring diagram. Conductor symbols crossing where they do not connect is kept to a minimum. Refer to the example on page 3 for the basic layout of the wiring diagram.

Central/relay panel

The central/relay panel is indicated in gray at the top of the wiring diagram page. The central/relay panel includes common power circuits, such as battery power (30), ignition switched power (15), load reduction (75/X), and Ground (31).

Ground Connections

Ground connections are represented as a line at the bottom of the wiring diagram page, directly above the current track numbers. All Ground connections, whether they occur as a splice in a harness, or the final Ground source, are numbered and identified in the wiring diagram.

Conductors and components

Between the central/relay panel and the vehicle ground at the bottom of the diagram are located the component symbols and conductors. Components are marked with a component code listed in the legend. Conductors are generally marked with wire color and size.

Current tracks

Individual current tracks are identified numerically along the base of the wiring diagram. These numbers are used to find the continuation of a conductor. Where the system or circuit layout is complex, this continuation may be on the same page, or on a different page.

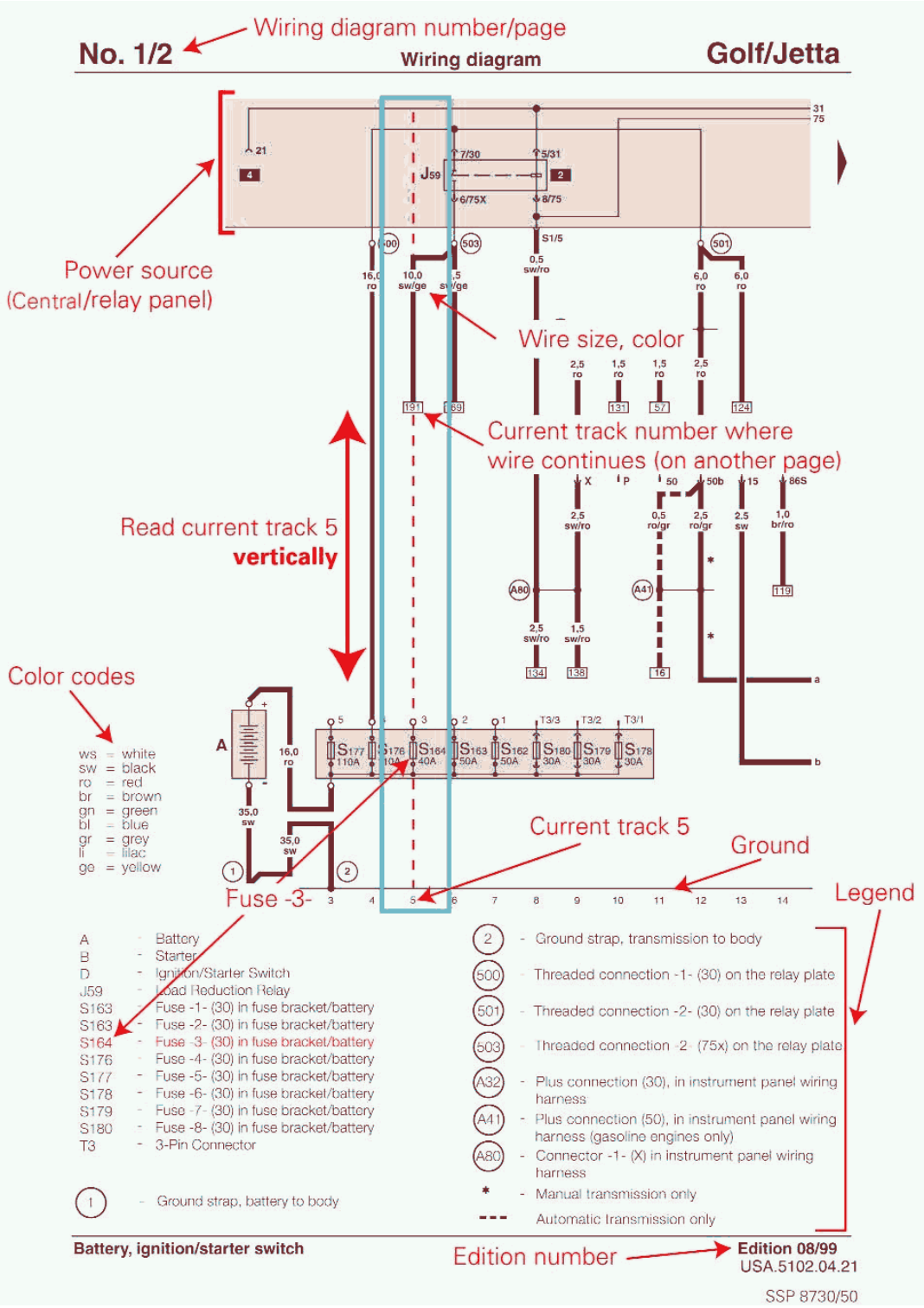
For example, the number 191 inside of the small box on page 3 indicates that the wire is continued on current track 191. Following straight down on the diagram, we see that this wire is on current track 5. If we were to navigate to current track 191, we would see the same color and size wire with a small box containing the number 5.

Legend

Below the current track numbers you'll find a legend of the components (by component code) found in the specific diagram. This will often detail the location of a given component or connection.

Navigation

Navigation in the wiring diagram is based around the use of the current track numbers. You will generally start with the affected component and then follow the associated circuit from there, tracing Power, Ground, and signals that affect the component's operation.



Elements of a Wiring Diagram

Elements of a wiring diagram

In this section, we will look at how various symbols are used in a wiring diagram to represent the actual components on the vehicle.

Every circuit needs a minimum of the following to operate:

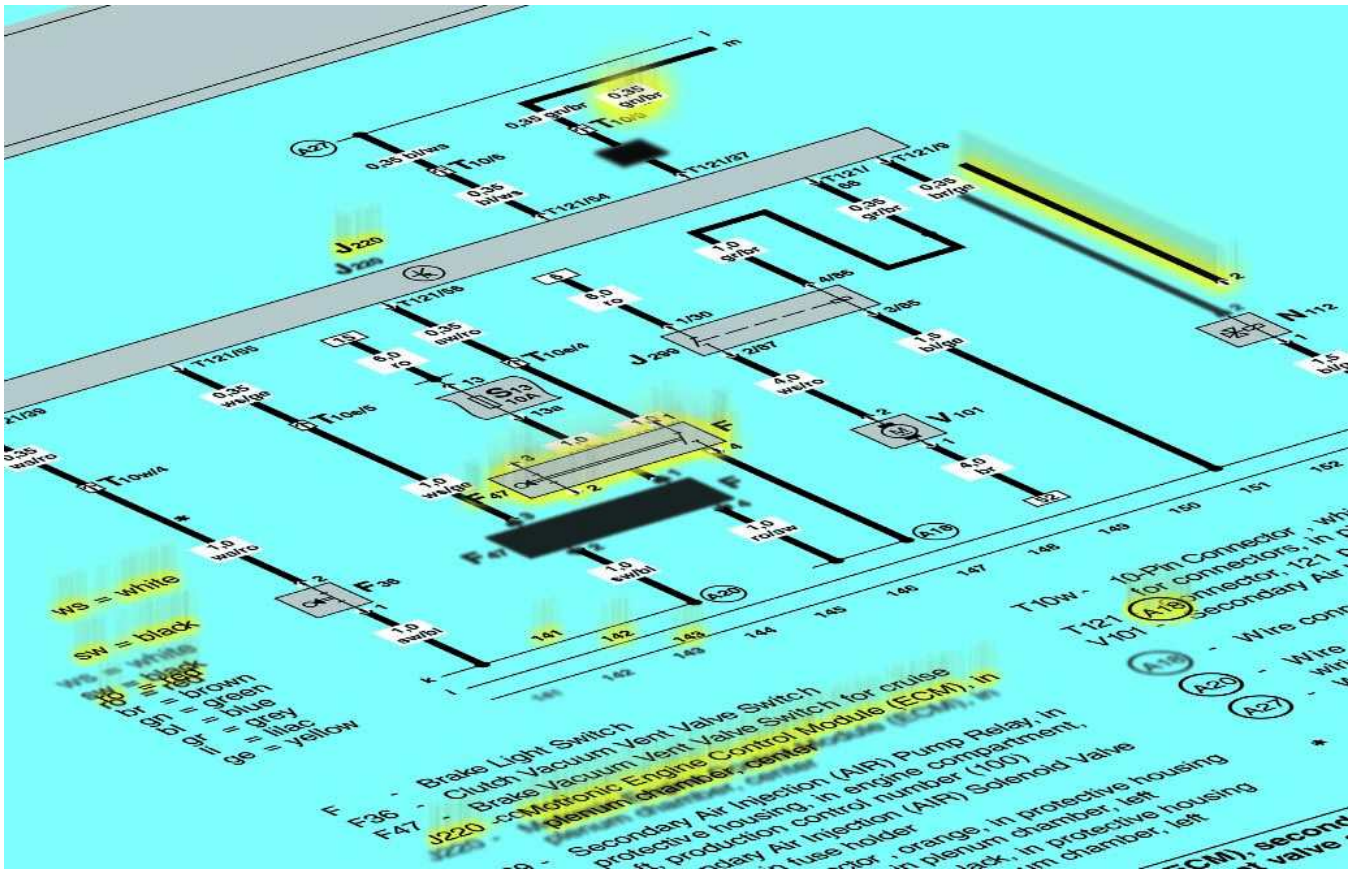
- Power supply
- Consumer (load)
- Ground
- Conductors (usually wire)

If any of these are missing, a complete circuit is broken and the consumer will not function. The ability to break down a circuit into its individual parts is the key to being able to diagnose failures in the circuit.

Wiring diagrams incorporate many symbols used to illustrate a complete circuit. These symbols can include:

- Current track numbers
- Components
- Terminal designations
- Conductors
- Connectors

Together these components make up a complete and accurate wiring diagram.



Symbols

Graphical representations called "symbols" are used to represent components and conductors in wiring diagrams. The key to reading wiring diagrams is understanding the symbols.

These symbols are standardized, allowing quick recognition of various components.

DIN Standard 72 552

This standard applies to the terminal designations for circuits. The purpose of the terminal designation system is to enable accurate connection identification from conductors (wires) to various components when diagnosis and repair is necessary. Examples of DIN standards for terminal designations are shown below:

1	Ignition coil primary
4	Ignition coil secondary
15	Ignition switched, on and start
30	Battery +
31	Ground
31b	Switched Ground
50	Starter control
75/X	Load Reduction/Ignition switched on only

The terminal designations do not identify the wires, but the type of circuit. For this reason, the designations are not placed on the wires in the diagram, but on the component. Refer to Appendix D on page 36 for a more complete list of terminal standards. Be aware that some abbreviations are used, and they may be abbreviations of German words. For example, "GRA" is the abbreviation for "cruise control", and VL is the abbreviation for "left front."

Elements of a Wiring Diagram

Introduction to Conductors

The wiring harness and related components may contain many different types of conductors, including wires, internal connections, threaded connections, welded connections, push-on connectors, multiple point connectors and Ground.

The complete list of wiring connections and symbols is shown in Appendix B.

Wires

Wires are conductors that carry current to components, and are usually indicated by a solid line. A wire shown as a dashed line in a wiring diagram indicates that the wire does not apply to all vehicles, and is noted in the wiring diagram legend.

Wire colors

Knowing the standards for wiring colors makes the job of reading and interpreting them easier. Some of the common standards include wiring color for specific circuits, as well as the terminal designation. For example:

Red . . . . . Battery +
Green. . . . . Ignition (1)
Brown . . . . . Ground (31)
Yellow . . . . . Headlights (58)

Once the technician has an understanding of the color guides, the job of isolating systems becomes easier.

Wire colors are shown as abbreviations of the German word for the color.

The following list shows the German abbreviations to the English text for the most common colors. Refer to appendix C for other color code definitions.

bl . . . . . Blue
br. . . . . Brown
ge . . . . . Yellow
gn . . . . . Green
ro. . . . . Red
sw . . . . . Black
li . . . . . Violet
ws . . . . . White

Wire sizes

Wiring diagrams also indicate the wire gauge used (shown in mm^2), designating the cross sectional area of the wire. Because standards exist for the maximum permissible voltage drop across a circuit, wire gauge is critical. If the voltage drop across the wire is too high, one or more of the following may occur:

- The circuit may overheat
- The consumer may not operate properly (due to low voltage condition)
- Components may be damaged

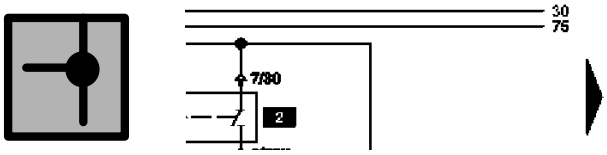
If a wiring repair needs to be made and metric sized wire is not available, the technician may need to use American Wire Gauge (AWG) sized wire.

Note:

- *If the exact size wire is not available for a repair, use the next larger size.*
- *For more information on wiring, refer to the* ***Wiring Harness Inspection and Repair*** *SSP (course number 871003).*

Other conductor descriptions

Internal conductors exist inside components, acting as bridges between the wiring harness and the final consumer. In some components these conductors are labeled in the component. An example would be the 30 circuit (Battery +) in the central/relay panel. In other components the conductor is not labeled. Internal conductors are shown as thin, black lines.



Physical contact

Some components, such as the starter or generator, may receive Ground where they are bolted to the engine or transmission. This is also shown as a thin black line.

Welded connections are used in wiring harnesses to join multiple, smaller gauge wires to a single larger wire which terminates at the fuse relay panel or chassis Ground.

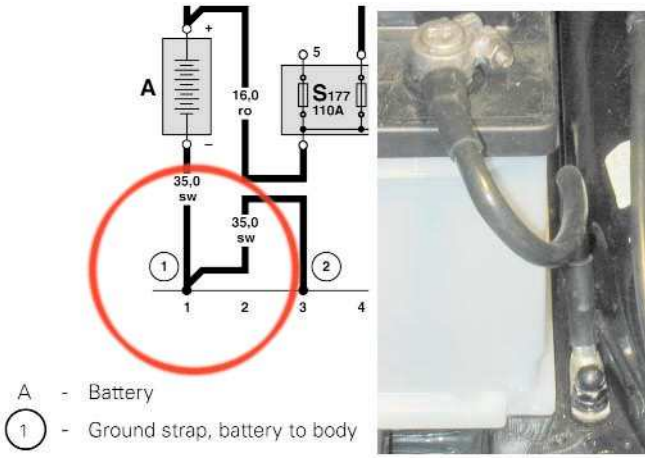
Sometimes a welded connection is shown with the thin line not terminating at another wire. This symbolizes that this welded connection is used in other diagrams for the car. The technician may need to reference other diagrams to locate components or Grounds related to this connection.

Threaded connectors are commonly used on the bottom of the fuse relay plate to distribute power and Ground to components. The common connectors include Battery power, Ground and load reduction (X).

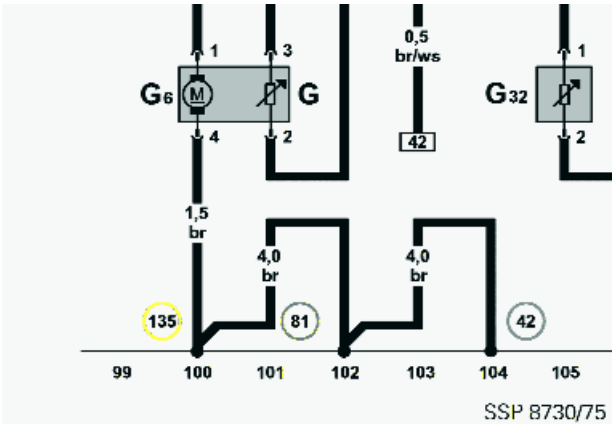
Elements of a Wiring Diagram

Ground

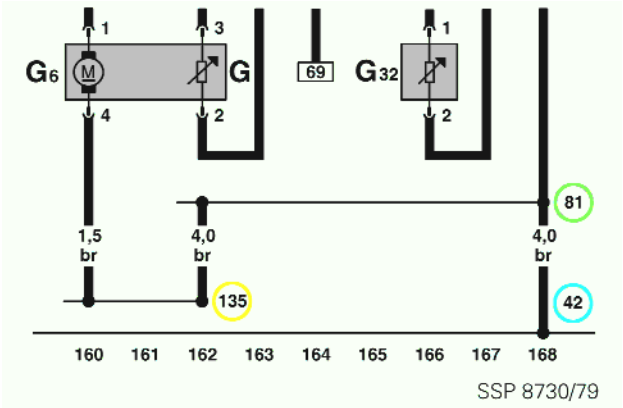
The vehicle chassis acts as a common Ground conductor throughout the vehicle, and is identified by the line at the bottom of the wiring diagram above the current track numbers.



Some wiring diagrams will show ground designations at the bottom of the wiring diagram that are actually welded ground connections in the harness (see illustration *SSP 8730/75)*. In practice, you may need to search through the legend to find where a welded ground connection finally attaches to the vehicle chassis.



Other wiring diagrams will show welded Ground connections in the wiring harness, as shown in illustration *SSP 8730/79*.



42 - Ground connection, beside steering column

81 - Ground connection -1-, in instrument panel wiring harness

135 - Ground connection -2-, in instrument panel wiring harness

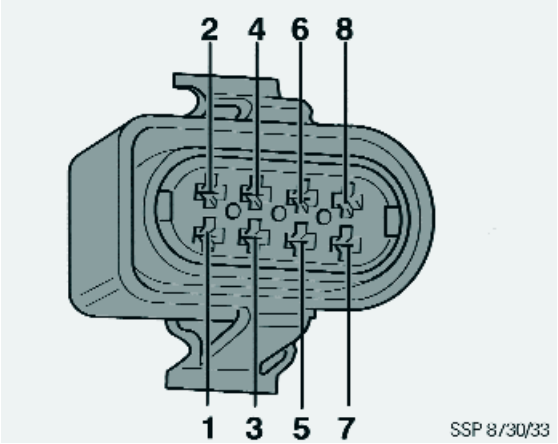
Connector pin assignments

Wiring diagrams tell the user at which pin numbers the wires terminate, simplifying diagnosis.

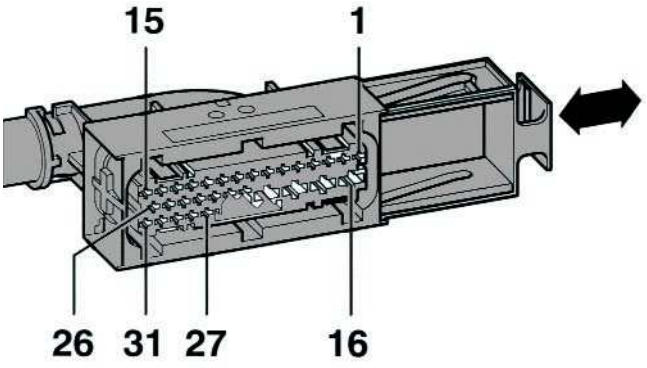
There are 4 main types of terminal designations:

- Push-on/multi-point connections
- Component/multi-point
- Central/relay panel
- Relay

Push-on/multi-pin connectors use the "T" designation, and are identified in the legend. For example, T8a/5 designates an 8-pin connector, with the specified wire located in terminal 5 of the connector housing. The legend will give additional information about this connector. For example: "8-Pin connector, brown, in engine compartment, in wiring duct, left" (see Wiring Diagram example 41 beginning on page 61 for specific examples).



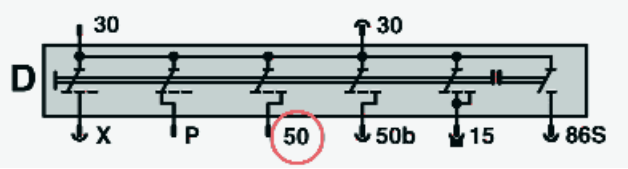
Generally, pin assignments are labeled on the plastic hard-shell connector housing and/or the corresponding component. On larger connectors, pin assignments are labeled at either end of a row. For example, the Engine Control Module (ECM) plug often has 2 or 3 rows of 12 or more terminals. Each row will be marked on each end to facilitate easier diagnosis.



SSP 8730/48

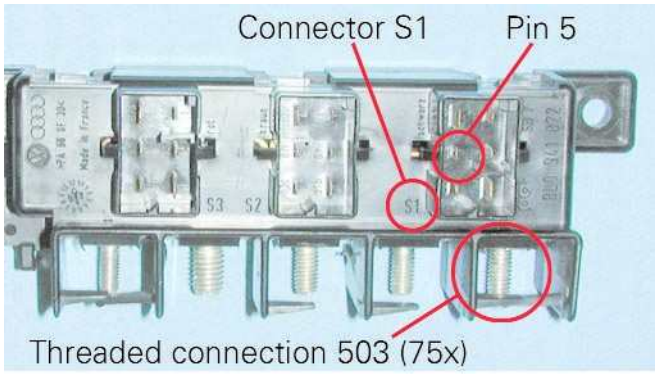
Elements of a Wiring Diagram

Component/multi-point pin assignments may or may not use the "T" designation. Some are numbered sequentially. Others may use DIN circuit designations, or a combination of these methods. See example at right, and find two examples in wiring diagram 29 (Appendix E).

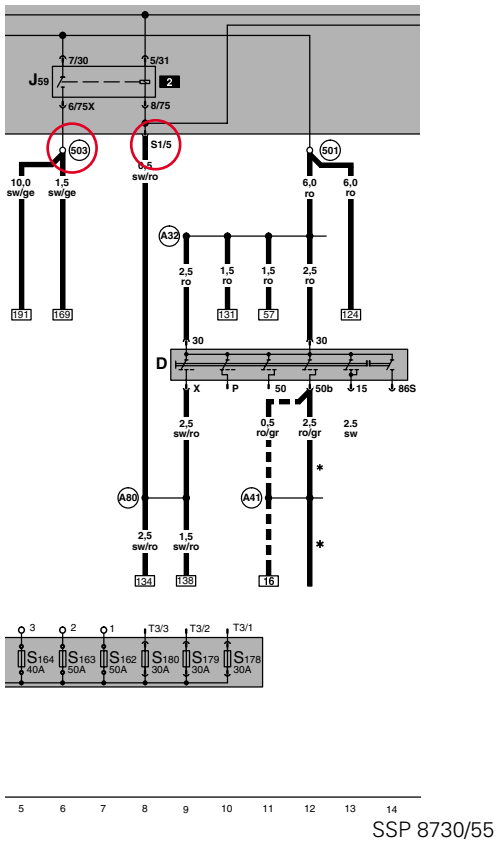


Central/relay panel connections enter or exit as either threaded connections, or multi-point connectors. Threaded connectors are identified in the legend, and may be identified on the component with the DIN circuit designation.

Multi-point connectors on the back of the panel are not identified in the legend. They will have a letter and possibly a number to identify location, followed by the pin number. For example S1/5 would be connector S1, pin 5.



SSP 8730/77

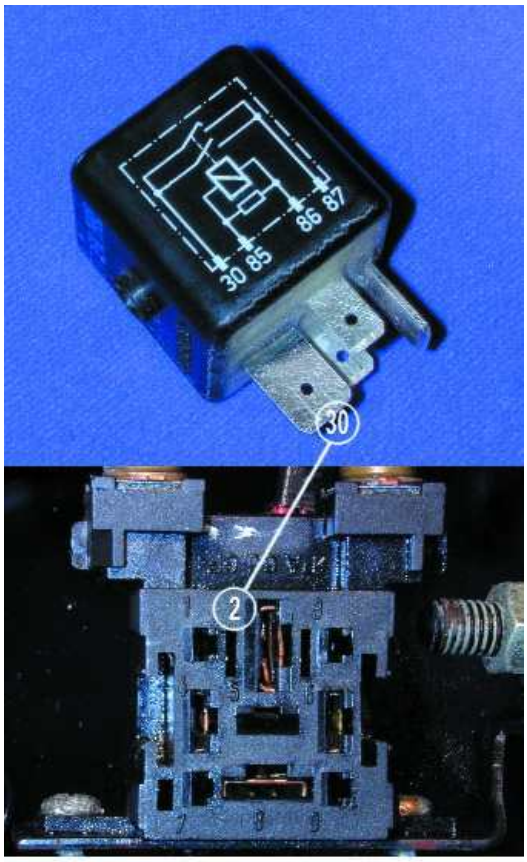


SSP 8730/55

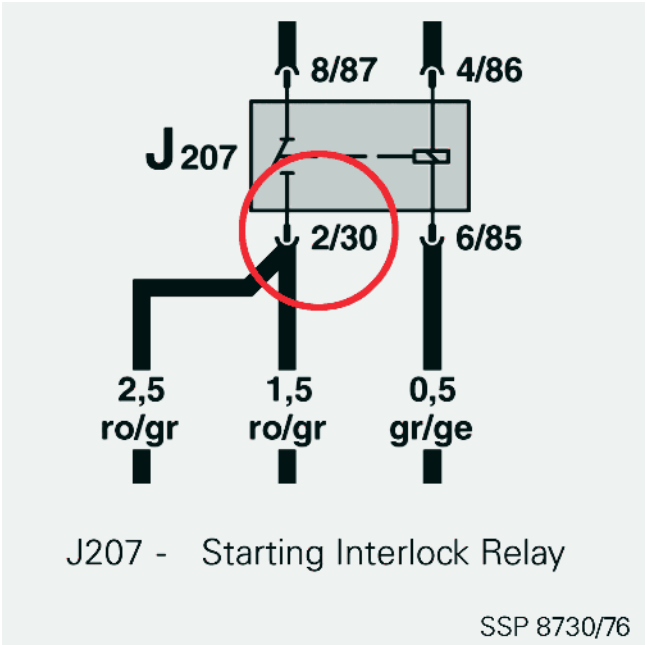
Relay connections list the terminal cavity number on the relay socket, followed by the pin identification on the relay. Illustration SSP 8730/65 shows that cavity 2 of the harness connector is associated with the DIN terminal 30 of the relay. Both may be used during diagnosis of the circuit.

Note:
When diagnosing electrical concerns using the VAG 1598 pin-out box, the pin numbers on the control module and multi pin connector usually match the pin numbers on the tool.

*When using the VAG 1466 pin-out box, the numbers on the relay or control module and socket usually **do not** match those on the tool. These must be noted before beginning diagnosis.*



SSP 8730/65



J207 - Starting Interlock Relay

SSP 8730/76

Components

Components in wiring diagrams are given an alphanumeric designation for identification. The first portion of the code separates the component into basic groups. An *F* for example, designates a switch, while a *Z* would be used for a heating element. A complete list of these designations are shown in Appendix C on page 43. The second part (numeric) designates which component is covered inside of these main groups.

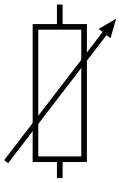
Example: Evaporative Emissions (EVAP) Canister Purge Regulator Valve N80. N designates a solenoid valve, 80 clarifies which solenoid is being dealt with.

Resistor

A commonly used symbol is the **resistor**, used to create a voltage drop in a circuit. Below are three types of resistors:

A **standard resistor** has a fixed resistance.

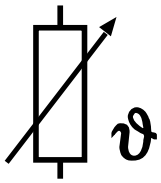
SSP 8730/57



Variable Resistor (Rheostat)

A **rheostat**, or **potentiometer**, varies its resistance based on mechanical input. An example of this is the Throttle Position Sensor (TPS) on a Motronic equipped car (SSP 8730/57).

SSP 8730/56



Temperature Dependant Resistor

A **temperature dependent resistor** varies its resistance based on temperature. This type of resistor is used as the Engine Coolant Temperature (ECT) sensor on an engine management system, or the Interior Temperature sensor on models with climate control (SSP 8730/56).

When a resistor is used as a sensor, it generally carries a component designator "G."

SSP 8730/21

Note:
Any time the temperature symbol (left) is attached to another symbol, it signifies that the operation of that component will vary with temperature.

The **switch** is another component used to control current flow. The basic symbols for an open and closed switch are shown in illustration SSP 8730/22. An example of this simple two-position switch would be a glove compartment light switch. A simple switch uses the component designation "F."

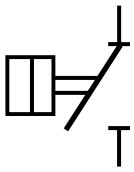
Normally open switch (NO)

Normally closed switch (NC)

SSP 8730/22

There are many types of designs, including mechanically actuated, pressure actuated, temperature actuated and momentary. Examples include:

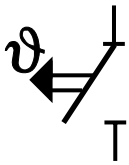
- Oil pressure switch (pressure actuated)



Pressure operated switch

SSP 8730/60

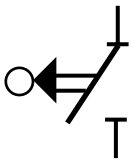
- Cooling fan thermo-switch (temperature actuated)



Thermally operated switch

SSP 8730/59a

- Brake Switch -F- (mechanically operated)

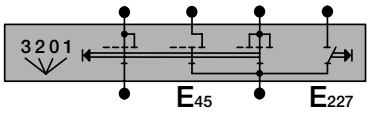


Mechanically operated switch

SSP 8730/58

More complex circuits may require a switch with multiple sets of contacts. An example of this would be the cruise control switch.

As you can see in illustration SSP 8730/25, there are multiple sets of contacts within the assembly. Depending on the position of the switch, various sets of contacts are open or closed. Careful study of the symbols allows the technician to follow the circuit through the switch under any condition.



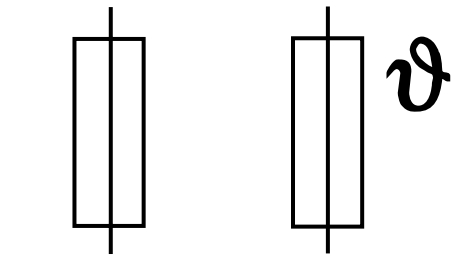
SSP 8730/25

A complex switch uses the component designation "E."

Note:
All switches and relays are shown in a non-operated state.

Elements of a Wiring Diagram

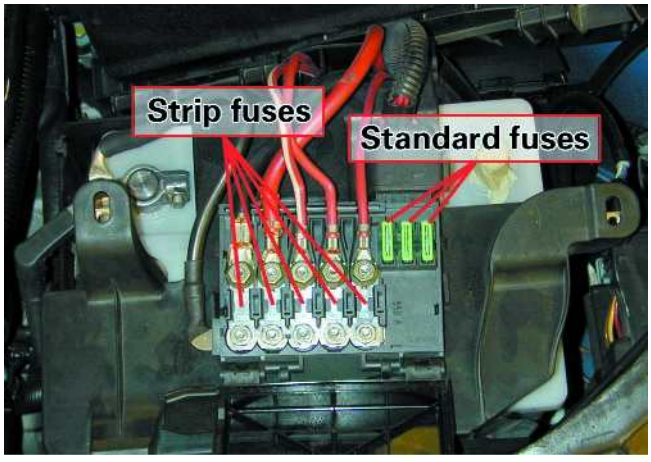
Fuses are used to prevent excessive current from damaging other components in a circuit. There are various types, including standard fuses, thermal fuses (circuit breakers), and strip fuses. Fuses use the component designation "S", their symbols are shown below:



Fuse/Strip fuse Thermal fuse

SSP 8730/23

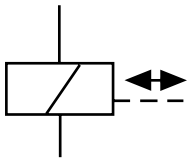
The example below shows strip fuses and standard fuses as seen in a current model vehicle.



SSP 8730/45

Solenoids are used to actuate many different components, including fuel injectors and relays.

A solenoid is a coil of wire wrapped around an iron core. When current is passed through the wire, a magnetic field is induced. This pulls a set of contacts in the relay closed, either opening or closing the circuit.



Solenoid
Arrow indicates direction of force

SSP 8730/24

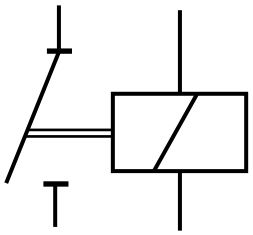
Complex Symbols

Often the internal schematic of the component is shown to allow the technician to follow current flow through the component.

These internal symbols are a combination of several basic symbols. This allows the technician to take a more complex symbol and break it down into its smaller components. Even the most complex components are nothing more than a combination of smaller basic symbols.

More complex components may contain complex control circuitry. This will be indicated with the symbol of a transistor in the component symbol (see control module).

A **relay** is an example of a combination of symbols in a single component.

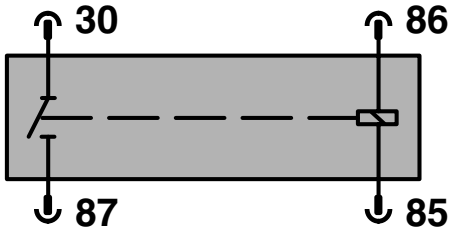


Relay

SSP 8730/26

Relays require a signal from an outside source to activate. Volkswagen vehicles use common Bosch®-type 4-pin relays on many circuits, to remove electrical load from the switch. Relays share the component designator "J" with control units.

The basic 4-pin relay (below) contains two separate components: a switch and a solenoid.



SSP 8730/49

The coil in the solenoid is energized with low current, creating a magnetic pull that closes or opens the switch.

Note:
All switches and relays are shown in a non-operated state.

The 4 pins of a standard relay are generally (but not always) numbered as follows:

30 Receives Battery power (switched to consumer)

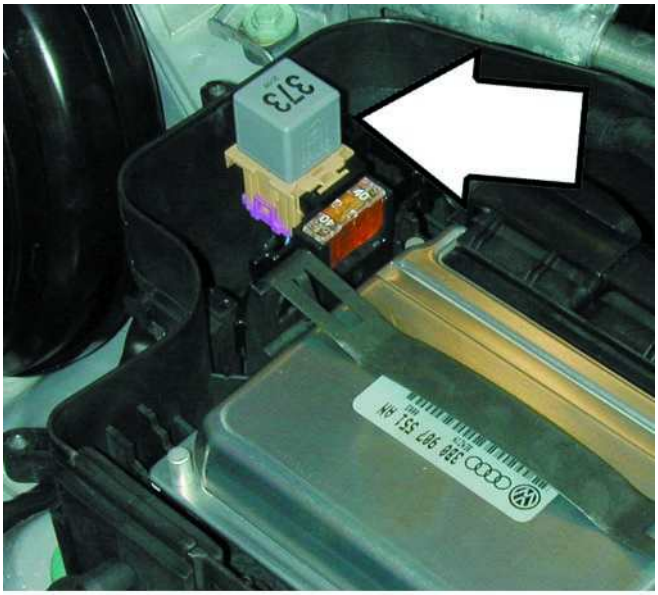
87 High load to the electrical consumer

86 Ignition switch, Battery+, load reduction (X)

85 Receives a switched ground to activate the solenoid winding in the relay

Note:
A production number may appear on top of the relay (see illustration SSP 8730/61). This number may be referred to in the wiring diagram for diagnostic purposes. See page 45 for examples.

However, do not rely solely on this information when diagnosing a circuit, as this number may change in production. Always refer to the parts information system for the current replacement part numbers.



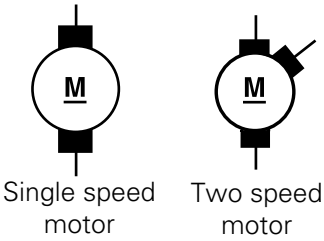
SSP 8730/61

The last of the more common symbols we will look at are the **Electric motor** and the **Electronic Control Module**.

Electric motors are used throughout the vehicle for numerous applications, including the Windshield Wiper Motor and the Fuel Pump.

SSP 8730/62

At the top and bottom of the motor symbol there are dark squares, representing the brushes in the electric motor.



SSP 8730/28

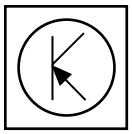
SSP 8730/66

If there are only two brushes, it is a single speed motor. The rear window wiper motor shown in illustration SSP 8730/62 is an example of a single speed motor.

If there are three brushes, the motor has two speeds. In the case of the two speed motor, the upper set of brushes are the low and high speed brushes.

The windshield wiper motor shown in illustration SSP 8730/66 is an example of a two speed motor.

Control Modules can make the task of reading and interpreting wiring diagrams more difficult because multiple signals enter and/or exit, but the internal schematic is not always shown.



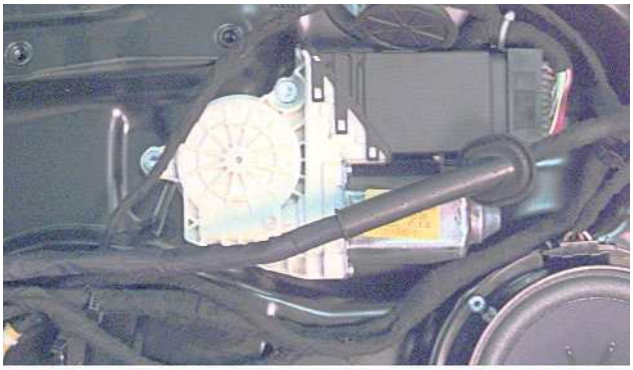
Control Module
SSP 8730/44

The Transmission Control Module (TCM) J217 seen in illustration SSP 8730/63 is an example of a common control module.

SSP 8730/63

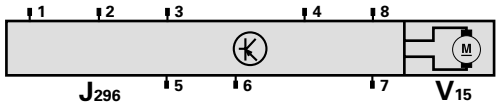
Some control modules may be integrated with other components.

Take, for example, the window motor with control module. Both the motor and the control module are combined to make a single component (SSP 8730/74).



SSP 8730/74

The symbol below represents the combined components.



Elements of a Wiring Diagram

Layout

1. **Relay location number**
   Indicates location on relay panel. See page 1 of individual wiring diagram for details.

2. **Arrow**
   Indicates wiring circuit is continued on the previous and/or next page.

3. **Connector designation - relay/control module on relay panel**
   Shows relay panel terminals with corresponding relay terminal.
   For example: 17/30 equals terminal 30 of relay connects to terminal 17 of central relay panel.

4. **Threaded pin on relay panel**
   White circle shows a threaded removable connection.

5. **Fuse designation**
   For example: S228 equals Fuse 28, 15 amps, in fuse holder.

6. **Reference of wire continuation (current track number)**
   Number in frame indicates current track where wire is continued (see page 3 for example).

7. **Wire connection designation in wiring harness**
   Location of wire connections are indicated in the legend.

8a. **Terminal designation on a multipoint connector**
8b. **Terminal designation on a component**
   Designation which appears on the actual component and/or terminal number of a multi-point connector.

9. **Ground connection designation in wire harness**
   Locations of ground connections are indicated in legend.

10. **Component designation**
    Use legend at bottom of page to identify the component code.

11. **Component symbols**
    A graphical representation of a component type. See Appendix A, page 35.

12. **Wire cross section size (in mm^2) and wire colors**
    Abbreviations are explained in the color chart beside the wiring diagram.

13. **Component symbol with open drawing side**
    Indicated component is continued on another wiring diagram. The number of the corresponding wiring diagram can be found in the table of contents.

14. **Internal connections (thin lines)**
    These connections are not wires. Internal connections are current carrying and are listed to allow tracing of current flow inside components and wiring harness.
a. **Internal Harness Splice (Welded Connection)**
b. **Physical Contact (Mounted to engine)**

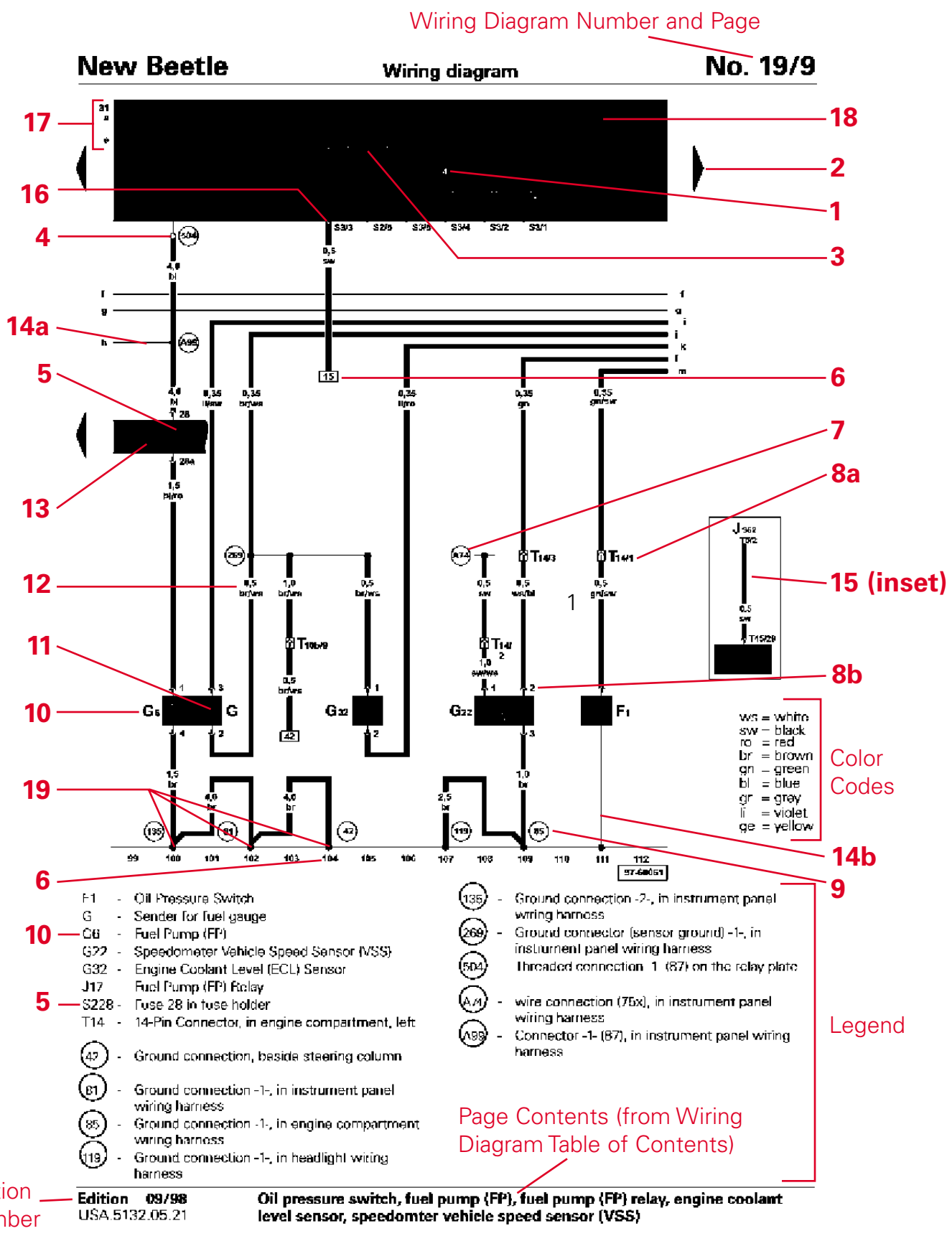
15. **Reference of continuation of wire to component (inset)**
    For example: Control module for anti-theft immobilizer J362 on 6-pin connector terminal 2.

16. **Central Relay panel connectors**
    Shows wiring of multi-point or single connectors on central relay panel.
    For example: S3/3 equals Multi-point connector S3, terminal 3.

17. **Reference of internal connection continuation**
    Letters indicate where connection continues on previous and/or next page.

18. **Central Relay Panel**

19. **Ground Path**
    ex.: from welded harness connection 135 to welded harness connection 81 to welded harness connection 42.


Wiring Diagram Number and Page
New Beetle
Wiring diagram
No. 19/9
17
18
16
2
1
4
3
14a
5
6
7
8a
13
12
15 (inset)
11
8b
10
19
14b
6
9
ws = white
sw = black
ro = red
br = brown
gn = green
bl = blue
gr = grey
li = violet
ge = yellow
Color Codes
F1 - Oil Pressure Switch
G - Sender for fuel gauge
10 G6 - Fuel Pump (FP)
G22 - Speedometer Vehicle Speed Sensor (VSS)
G32 - Engine Coolant Level (ECL) Sensor
J17 - Fuel Pump (FP) Relay
5 S228 - Fuse 28 in fuse holder
T14 - 14-Pin Connector, in engine compartment, left
42 - Ground connection, beside steering column
81 - Ground connection -1-, in instrument panel wiring harness
85 - Ground connection -1-, in engine compartment wiring harness
119 - Ground connection -1-, in headlight wiring harness
135 - Ground connection -2-, in instrument panel wiring harness
269 - Ground connector (sensor ground) -1-, in instrument panel wiring harness
504 - Threaded connection 1 (87) on the relay plate
A/1 - wire connection (75x), in instrument panel wiring harness
A95 - Connector -1- (87), in instrument panel wiring harness
Legend
Page Contents (from Wiring Diagram Table of Contents)
Edition number
Edition 09/98
USA.5132.05.21
Oil pressure switch, fuel pump (FP), fuel pump (FP) relay, engine coolant level sensor, speedomter vehicle speed sensor (VSS)

Working with wiring diagrams

When working to diagnose electrical concerns on vehicles, it is important that you have the correct wiring diagram. Not only are there different models and year, wiring harnesses will often change in the middle of a model year. There may be differences between models of the same type and year, but built in different factories.

Within models, there are also different levels of equipment. For example, the wiring for the fresh air blower of a vehicle with Climatronic will be different from one without Climatronic. Different engines, transmissions, even trim levels will mean differences. Always check that the wiring diagram is right for the vehicle in question.

It may be necessary to check more than one wiring diagram for the model you are servicing. A vehicle's wiring harness is often split into several different wiring diagrams. Engine, transmission and power accessory wiring diagrams will only show wiring for those specific systems.

When choosing a wiring diagram for diagnosis of an electrical concern, you should first confirm the vehicle model, model year, and production date, where applicable. Next, identify if the affected system is part of vehicle "standard equipment" or "additional equipment". Locate the appropriate wiring diagram by using the index.

A standard equipment diagram will show the vehicle with its base level wiring. Base level wiring is defined as the most basic possible rolling chassis, and this may be different than what is normally considered "standard equipment".

For example, all 2001 m.y. Golfs and Jettas sold in the US and Canada come with Daytime Running Lamps as "standard equipment". However, the Daytime Running Lamps are shown in a separate wiring diagram.

Wiring diagrams are automatically shipped to your dealer. Periodic updates can include both new wiring diagrams and updated pages for existing diagrams.

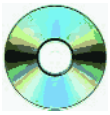
Wiring diagrams also exist as part of the Volkswagen Electronic Service Information System (VESIS). The advantages of electronic wiring diagrams include easy updating, pages that don't get dirty or lost, and search capabilities that can make searching for a component much easier.

Practical Examples

The preceding sections of this book gave examples of the symbols and layout of our current track wiring diagrams. In the following section we will examine current flow using navigation exercises. In these examples, we will look at:

- how battery power is provided to a component
- how consumers are actuated using relays
- how to split up a circuit to simplify diagnosis
- the importance of looking in multiple wiring diagrams

Appendix E, starting on page 39, contains the complete wiring diagrams number 29 and 41. Within the navigation exercises, magnified views of specific sections of these Wiring Diagrams may be shown. Note that, for clarification purposes, certain components found in the Wiring Diagrams may not be shown in these magnifications.



Navigation 1

In this example we will look at the circuit for the load reduction relay. The following page contains the complete diagram for this example.

The Load Reduction circuit supplies power to consumers such as the windshield wiper motor and fresh air blower motor when the ignition switch is in the "ON" position. With the ignition switch in the “START” position, the circuit is de-energized. This lowers the load on the electrical system when starting the vehicle.

Locate the Load Reduction Relay J59 on the wiring diagram on page 23. The relay consists of two separate circuits: the solenoid circuit, and the switch circuit. In order to supply power to the consumers in the load reduction circuit, the solenoid in the relay must be energized. To do this, terminal 8/75 must be supplied with power. The ground side of the solenoid receives an internal ground from the central relay panel at pin 5/31.

Starting at the Positive (+) terminal of the Battery (A), follow battery power (30) to the fuse box through a 16.0 ro wire.

Power then passes through S176, a 110A fuse, and exits the fuse box at terminal 4. From terminal 4, follow the 16.0 ro wire to threaded connection 500 on the central relay panel.

Power passes through the central relay panel and exits at threaded connection 501. From the relay plate, follow the 6.0 ro wire to welded connection A32 in the instrument panel wiring harness.

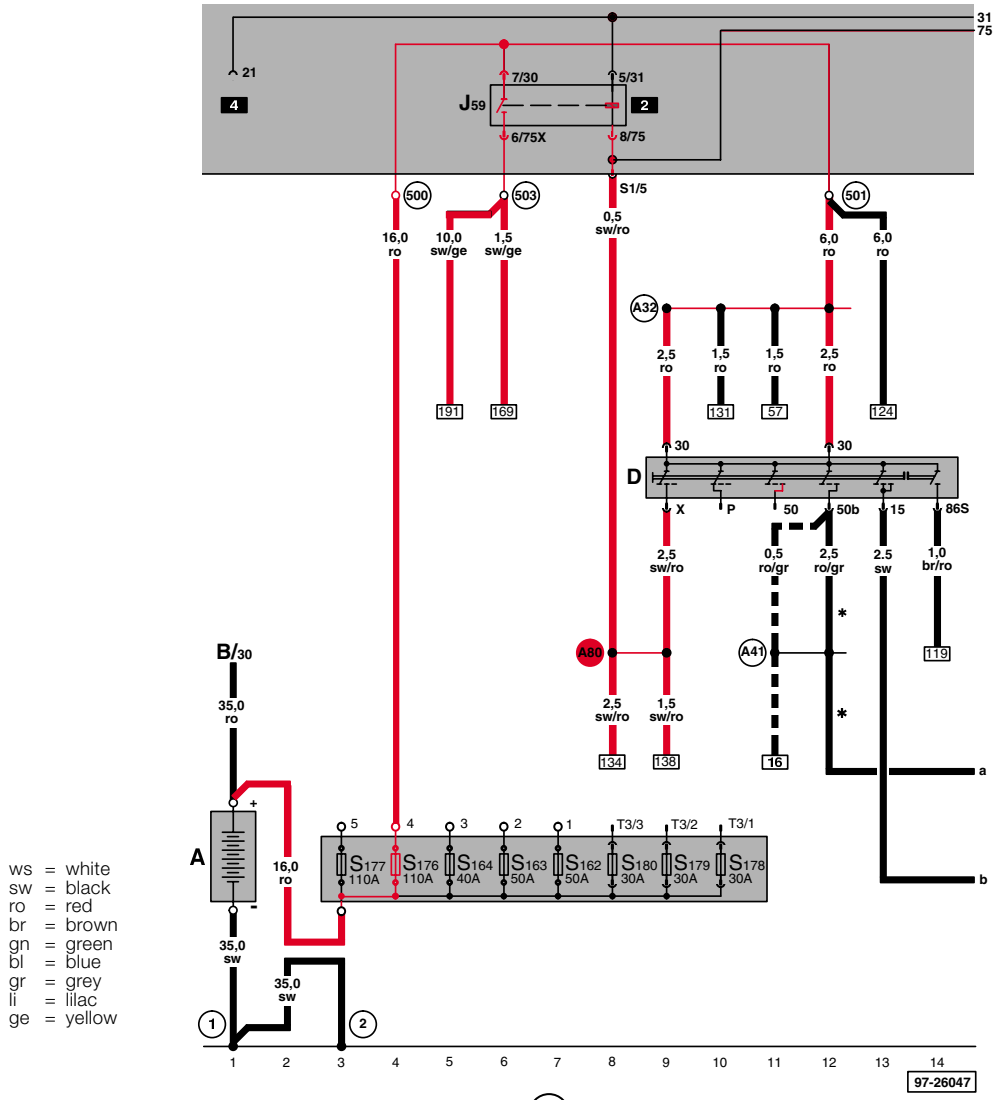
Note that the wire that supplies the power to the welded connection is larger than other wires that leave the connection. This fact can be useful in diagnosis. When tracing out a weld with many wire connections, the largest wire will usually be the one that goes directly to power or ground.

From the welded connection, a 2.5 ro wire goes to terminal 30 of the Ignition/Starter switch D. When the Ignition switch is moved to the "ON" position, power continues through the switch to the X contact. Power exits the Ignition switch through the 2.5 sw/ro wire on current track 9.

Follow the wire to welded connection A80. Another similar wire leaves this welded connection on current track 8, which connects to the central relay panel at terminal S1/5. Power flows from this terminal through the internal connection to terminal 8/75 of the relay.

Because relay terminal 5/31 is already grounded at the central relay panel, the solenoid is energized. This closes the switch and supplies power from terminal 500 (30), to terminal 503 (75/X) on the relay panel. From terminal 503, power can flow to the consumers on the circuit as needed.

No. 1/2 Wiring diagram Golf/Jetta



ws = white
sw = black
ro = red
br = brown
gn = green
bl = blue
gr = grey
li = lilac
ge = yellow

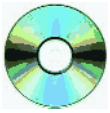
A - Battery
B - Starter
D - Ignition/Starter Switch
J59 - Load Reduction Relay
S163 - Fuse -1- (30) in fuse bracket/battery
S163 - Fuse -2- (30) in fuse bracket/battery
S164 - Fuse -3- (30) in fuse bracket/battery
S176 - Fuse -4- (30) in fuse bracket/battery
S177 - Fuse -5- (30) in fuse bracket/battery
S178 - Fuse -6- (30) in fuse bracket/battery
S179 - Fuse -7- (30) in fuse bracket/battery
S180 - Fuse -8- (30) in fuse bracket/battery
T3 - 3-Pin Connector

(1) - Ground strap, battery to body

(2) - Ground strap, transmission to body
(500) - Threaded connection -1- (30) on the relay plate
(501) - Threaded connection -2- (30) on the relay plate
(503) - Threaded connection -2- (75x) on the relay plate
(A32) - Plus connection (30), in instrument panel wiring harness
(A41) - Plus connection (50), in instrument panel wiring harness (gasoline engines only)
(A80) - Connector -1- (X) in instrument panel wiring harness
* - Manual transmission only
--- Automatic transmission only

Battery, ignition/starter switch

Edition 08/99
USA.5102.04.21



Navigation 2

This example will follow the flow of power from its source, through a switch, and to a consumer. This example will build on our understanding of the Load Reduction circuit as seen in Navigation example 1.

The example we will use is a typical horn circuit. The horn circuit on all Volkswagen vehicles is similar in design. The main components of the system are as follows.

- Mechanically operated switch (horn button)
- Relay
- Horns (high and low tone)
- Connecting wires

In order to follow these types of circuits, it is best to split the circuit into two sections. We will first look at the solenoid side of the relay circuit, then the switch side.

Note:
Refer to wiring diagram 29 in appendix E for this example.

From the table of contents for wiring diagram 29 (page 39), we see that the horn circuit is shown on page 29/15.

Locate the horn relay (J4) on page 29/15. Starting at the solenoid side of the symbol, follow the internal connection from terminal 4/75 across the central relay panel until it terminates at an internal connection that runs between terminal S1/5 on the back of the central relay panel, and terminal 8/75 of relay J59 on wiring diagram page 29/2. Looking at the legend, we see that J59 is the Load reduction relay.

Looking at the wiring for J59 we see that the internal connection we are concerned with here is the power that activates the load reduction relay. Follow the 0.5 sw/ro wire down current track 8 to plus connection A80, across to current track 9 and up to terminal X of component D.

We can see that power will flow from the battery, through fuse S176, and through the ignition switch to the horn relay when the ignition switch is in the on position. Now, back on page 29/15, let's take a look at the ground side of the Horn relay solenoid.

From J4, follow the ground side of the circuit from terminal 1/71 of the relay to S1/6. A 0.35 br/bl wire runs from the central relay panel to T5b/3. The legend identifies T5b as a 5 pin connector on the airbag spiral spring (F138).

From the spiral spring, the circuit continues through another 5 pin connector, T5j, through manually operated push button switch H (the horn contact), and then back though the spiral spring to T5b/2. From this terminal a 0.35 br wire runs to welded ground connection 135, in the instrument panel wiring harness.

Looking at 135, we see no less than 9 wires in the weld! In practice, you may need to trace out every wire in the weld to find a problem. Let's use the trick we discussed in the last example to narrow down the field. Looking at the left side of connection 135, we see a 4.0 br wire connecting to another internal connection, marked with the continuation "o."

Follow "o" in both directions. It is identified as welded ground connection 81, in the instrument wiring harness. It is connected to ground at two points; ground 49 at current track 182, and ground 42 at current track 201. We now have the complete circuit for the solenoid side of the relay.

Let's look at the horns and the switch circuit of the relay. Follow the internal connection "m" from terminal 3/30 at the relay to the fuse box at current track 153. Continue to follow the source of the power through the fuse and the current track continuation back to page two of the wiring diagram.

As seen in Navigation example 1, the power comes from the battery, through fuse S176, to threaded connection 500. From there it runs though the central relay panel to threaded connection 501, to the fuse box at fuse 40 (S240), and to the relay though the central relay panel. When the relay is activated by pushing the horn contact, power will flow to the horns through S2/2, though welded connection A90, to terminal 2 on each horn.

Tracing the ground side of the horns, we see that they jump to current tracks 74 and 75 from tracks 183 and 185, respectively. Going to current tracks 74 and 75, follow the brown wires to internal connection marked "d". We follow that along to find that it is welded connection 179, which goes to Ground though a 4.0 br wire at ground connection 12, in engine compartment left, shown on current track 61. We now have the complete circuit for the horns.

Navigation 3

In this exercise, we will again examine the activation of an electrical consumer through a simple 4-pin relay. Let's look at the navigation from the point of view of diagnosing an inoperative motor. In this circuit we will look at the Secondary Air Injection (AIR) pump motor V101.

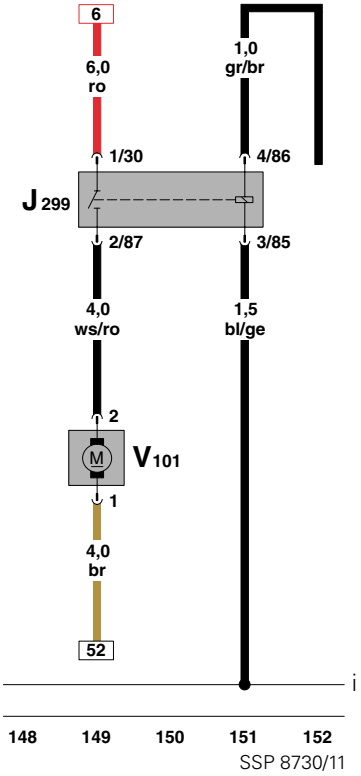
To diagnose this circuit, we need to understand that the secondary air system is activated by the Motronic ECM at certain times when the engine is running, and that we can trigger this function using the VAS 5051 scan tool. Assume that we have already attempted this, and the pump does not run. Also assume that the only DTC in the systems memory is the Secondary Air DTC.

Note:
Refer to the illustrations on pages 26-28 and wiring diagram 41 in appendix E for this example.

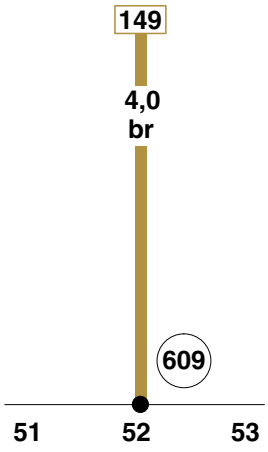
From the table of contents for wiring diagram 41 (page 40), we see that the Secondary Air circuit is shown on page 41/12.

Locate the Secondary Air Injection (AIR) pump relay J299 on wiring diagram page 41/12. We will once again split the circuit into two parts to simplify diagnosis. Let's start with the switch side of the relay.

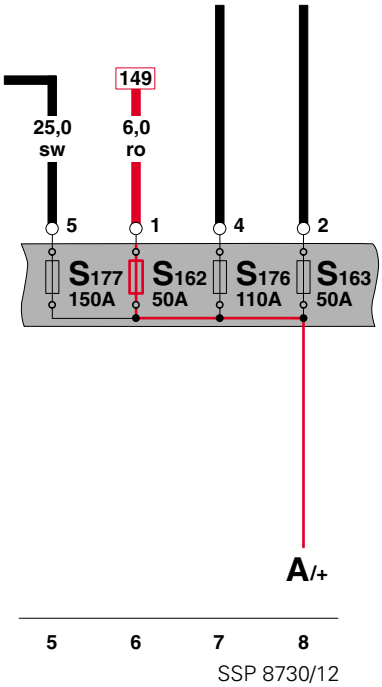
From motor V101, follow the 4.0 br wire down to the current track continuation (illustration SSP8730/11), and over to page 41/5. The wire goes directly to Ground 609 in the right side of the plenum chamber. Now let's trace the power side.



SSP 8730/11



SSP 8730/17



SSP 8730/12

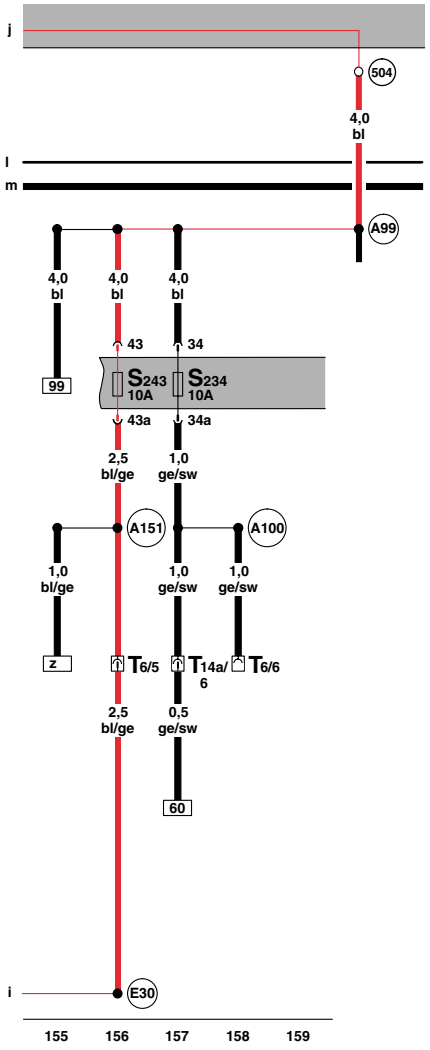
Returning to current track 149, we see that the 4.0 ws/ro wire runs to the switch portion of the relay (illustration SSP8730/11). Following the 6.0 ro wire from where it leaves terminal 1/30 on the relay, through its current track continuation, we see that the motor receives direct battery power (30) from fuse S162. Checking the fuse on the vehicle shows it to be good.

Locate relay J299, and pull it from its socket. Using a wire from the VAS 1978 wiring repair kit of the proper size, and with the proper size terminals, we can jump the relay socket from terminal 1/30 to 2/87. The Secondary Air Injection (AIR) pump motor V101 runs, verifying that this section of the circuit is functioning correctly.

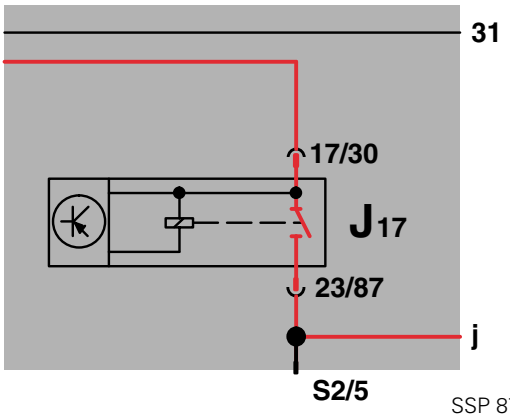
Let's trace out the power side of the solenoid in the relay. Terminal 85 on a standard 4-pin relay is usually the power side. Following the 1.5 bl/ge wire down, we see that it leads to welded connection continuation "i".

In both directions along "i", we see that this is welded connection E30 in the engine wiring harness. It supplies power to many of the actuators in the engine management system. Since there are no other faults in the Engine Management System, we can assume that fuse 43 (S243) on current track 156 is good. To test this circuit correctly, let's trace that power back to its source.

Following the circuit from Fuse S243 up to the central relay panel and over internal connection "j", we see that this power comes from the switch side of J17, the fuel pump relay. This is important for testing. We know that we will only have power at terminal 3/85 of the Secondary Air Injection (AIR) pump relay J299 when the fuel pump relay is energized.



SSP 8730/13

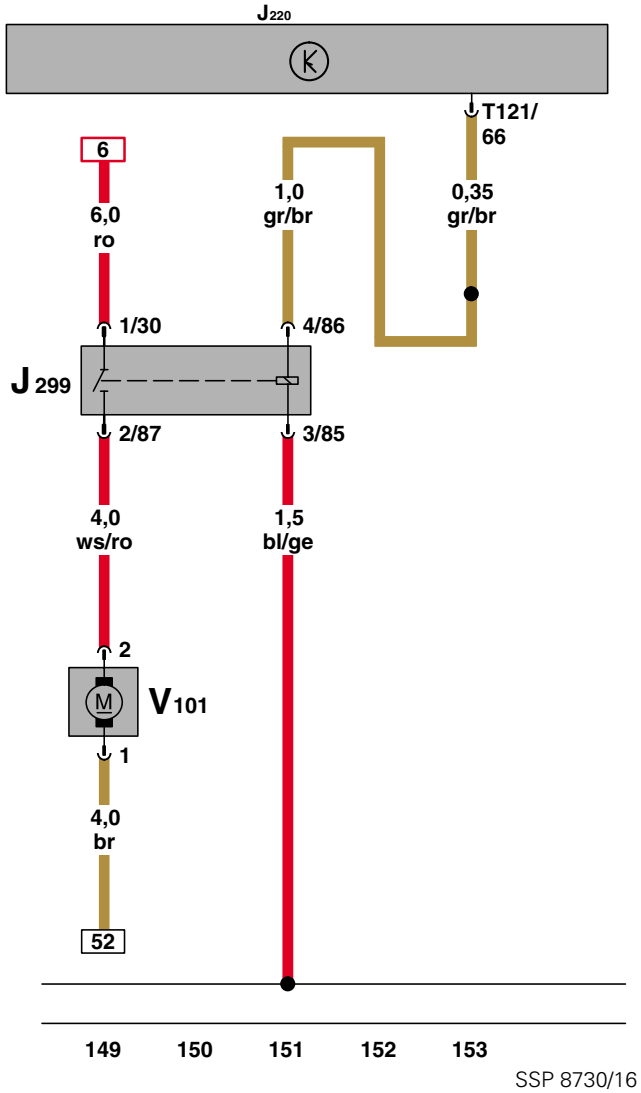


SSP 8730/14

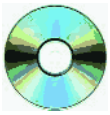
Go to the Secondary Air pump relay J299 on page 41/12 (or see below). Follow the 1.0 gr/br wire from terminal 4/86 to terminal T121/66 on the Motronic ECM J220. Note that somewhere in the harness it appears that the wire enters an unidentified connection, and changes size. This wire carries the ground signal that energizes the relay.

Now let's test the solenoid side of the circuit. Connect the appropriate test equipment, such as an LED test light, multimeter, or the Digital Storage Oscilloscope of the VAS 5051, between terminals 4/86 and 3/85 of the relay socket. We then activate the circuit (using the VAS 5051) and see that the proper signal is going to the relay socket.

Since the circuit appears to be complete, the next step would be to replace the relay and retest. Doing this, we find that the circuit operates correctly. We can now check, and if necessary, erase any DTCs, quality check the vehicle, and return it to the customer.



SSP 8730/16



Navigation 4

Often, when we are diagnosing an electrical problem on a vehicle, we will need to look at more than one wiring diagram. In this final example, we will look at a simple problem that shows the importance of considering all of the applicable wiring diagrams for the vehicle that we are diagnosing.

Let's consider a customer concern of an inoperative speedometer. The vehicle is a 2000 Jetta GLS, equipped with a 1.8T engine and manual transmission.

A road test verifies that neither the speedometer nor the odometer is operating. There is also a DTC stored in the engine ECM memory, showing no signal from the vehicle speed sensor (VSS).

Note:
Refer to wiring diagrams 29 and 41 in appendix E for this example.

From the table of contents for wiring diagram 41 (page 40), we see that the vehicle speed sensor circuit is shown on page 41/14.

Looking at wiring diagram page 41/14, we locate the VSS (G22), and trace the power back to fuse 7 (S7). We find that the fuse is blown. After locating the 14 pin connector in the engine compartment wiring duct (T14a), and some testing with a multimeter, we find there is a short to ground between terminal 7a on the fuse box, and terminal T14a/2.

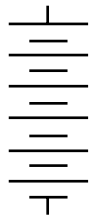
Looking at welded connection B163 shows it to be open ended. This often indicates that the weld is continued on another wiring diagram. Since we located the VSS in the I.8T engine wiring diagram, one place to look would be the Standard Equipment wiring diagram for this vehicle, number 29.

Looking through the legend at the bottom of each page in wiring diagram 29, we find weld connection B163 on page 29/3.

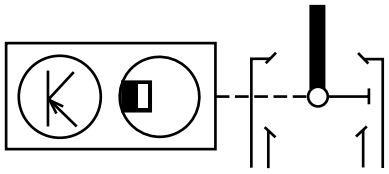
Following the current track continuation from B163 to current track 122, we find that the 1.0 sw/gn wire runs to the backup light switch. In the engine compartment, we find that this wire has been pinched in the engine compartment wiring harness near the starter. We repair the wire using the VAS 1978 wiring repair kit, replace the fuse. Check, and if necessary, erase any DTCs, quality check the vehicle, and return it to the customer.

One thing to note: in vehicles equipped with an automatic transmission, the circuit for fuse S7 would be different. We would need to look in the wiring diagram for that system as well.

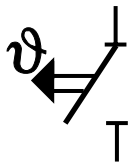
Notes



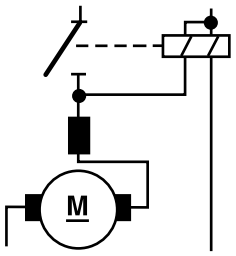
Battery



Distributor
(electrical)

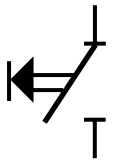


Thermally
operated
switch

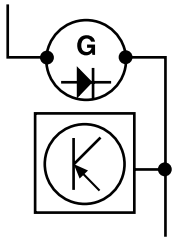


Starter

Spark plug
connector
and plug

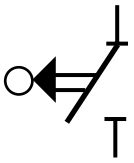


Push-button switch
(manually operated)

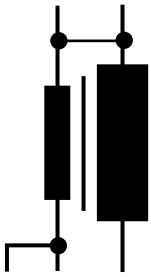


Generator

Glow plug
heater element

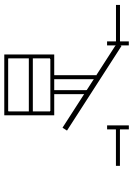


Mechanically
operated
switch

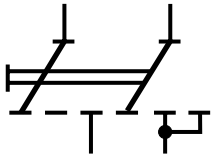


Ignition coil

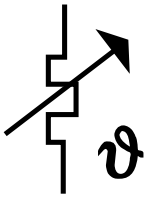
Manually
operated
switch



Pressure
operated
switch



Multiple switch
(manually operated)



Heater element
(temperature dependent)

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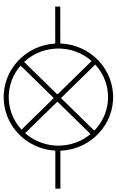
Appendix A: Component Symbols

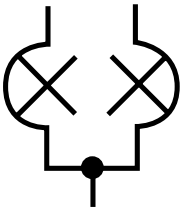
Diode

Zener diode

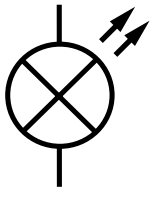
Diode
(light sensitive)



Light bulb

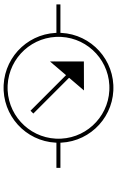


Light bulb
(dual filament)

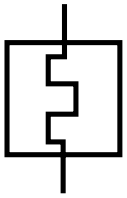


LED

Interior light

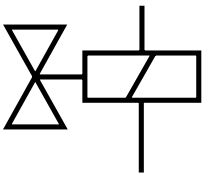


Instrument
(gauge)

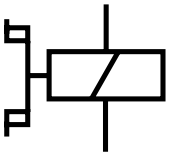


Rear window defogger
heat element

Cigarette
lighter



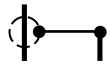
Solenoid valve



Magnetic clutch

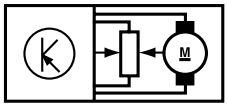
Wire connection
in wiring harness

Resistance wire

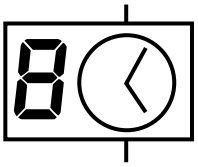


Shield wire

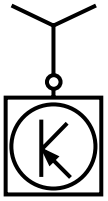
SSP 8730/03



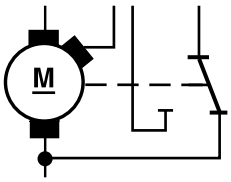
Control motor, headlight range adjustment



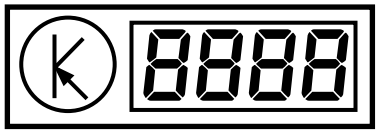
Digital clock



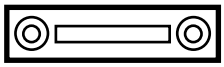
Antenna with electronic antenna amplifier



Wiper motor (2-speed)

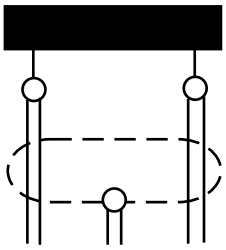


Multifunction indicator

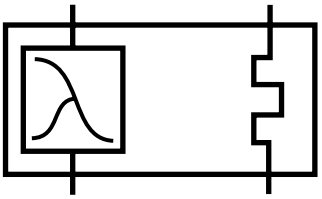


Radio

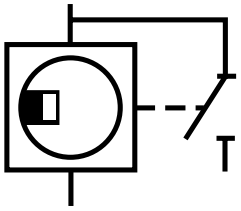
Airbag spiral spring



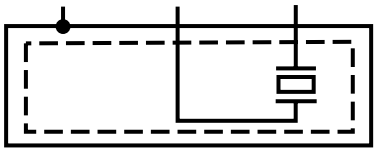
Crankshaft position sensor



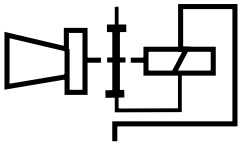
Heated oxygen sensor



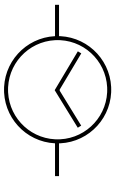
Speed sensor



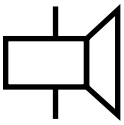
Camshaft position sensor



Horn



Analog clock



Speaker

SSP 8730/04

Wiring junction

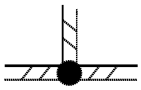
Internal connection in a component

Disconnected wire terminal

Slip contact

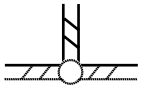
Multipoint connector or component

Push-on connector

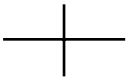


Wires connected

Connected wire terminal



Wires connected (detachable junction)



Wires not connected

SSP 8730/30

Component Code Prefixes

- **A** Battery
- **B** Starter
- **C** Alternator/Generator
- **D** Ignition/Starter switch
- **E** Switches - these are usually more complex switches: A/C control head, sunroof regulator
- **F** Switches - door, hood, brake, clutch, trunk, multifunction, etc.
- **G** Gauges and sensors
- **H** Horn
- **J** Control modules, Relays, Electronic Relays
- **K** Indicator/Warning lights
- **L** Lights
- **M** Lights
- **N** Solenoids/Inductors/Ignition - Fuel injectors, Purge, Ignition coil, Ignition module, etc.
- **P** Spark plug connector
- **Q** Spark Plugs
- **R** Radio, CD, Telephone, Navigation
- **S** Fuse, circuit breaker, protection device
- **T** Wire connector
- **V** Motor - Window motors, vacuum pumps, etc.
- **W** Lights - Interior, Trunk
- **Z** Heating elements - O_2 sensor heater, heated seats, heated mirrors, etc.

Color Codes

German Abbreviation to English

bl	Blue
br	Brown
ge	Yellow
gn	Green
ro	Red
sw	Black
li	Violet
ws	White

Occasionally in a complex circuit, other colors may be used. These are listed below.

el	Cream
nf	Neutral
og	Orange
rs	Pink
hbl	Light Blue
hgn	Light Green
rbr	Maroon
x	Braided cable
y	High tension
z	Non-cable

American Wire Gauge (AWG) Conversion to Metric

The conversion from AWG to Metric (mm^2) is shown below.

AWG	**mm^2**
22	0.35
20	0.50
18	0.75
16	1.00
14	1.50
12	2.50
10	4.00
8	6.00
4	16.0
2	25.0
2	35.0

Appendix D: DIN Standards

DIN standards for terminal designations

The following are examples of the common Volkswagen DIN list for terminal designations:

1 Ignition coil, ignition distributor - Low voltage

1a To contact breaker I (Ignition distributor with two separate circuits)

1b To contact breaker II (Ignition distributor with two separate circuits)

4 Ignition coil, ignition distributor - high voltage

4a From ignition coil I (Ignition distributor with two separate circuits)

4b From ignition coil II (Ignition distributor with two separate circuits)

15 Switched (+) downstream of battery (output of ignition/driving switch)

15a Output at ballast resistor to ignition coil and starter

17 Glow plug and starter switch - Start

19 Glow plug and starter switch - Preheat

30 Input from battery (+) term., direct 12/24 V series-parallel battery switch

30a Input from (+) terminal of battery II

31 Battery negative terminal, or ground, direct

31b Return line to battery negative terminal, or ground via switch or relay (switched negative)

31a Return line to battery II, negative (12/24 V series-parallel battery switch)

31c Return line to battery I, negative (12/24 V series-parallel battery switch)

Electric motors

32 Return line

33 Main terminal connection

33a Self-parking switch-off

33b Shunt field

33f For second lower-speed range

33g For third lower-speed range

33h For fourth lower-speed range

33L Counterclockwise rotation

33R Clockwise rotation

Starters

45 Separate starter relay, output; starter, input (main current)

Two-starter parallel operation - Starting relay for engagement current

45a Output, starter I, Input, starters I and II

45b Output, starter II

48 Terminal on starter & on start-repeating relay for monitoring starting

Turn-signal flashers (pulse generators)

49 Input

49a Output

49b Output, second circuit

49c Output, third circuit

Starter control

50 Starter control (direct)

50a Series-parallel battery switch - Output for starter control

50b with parallel operation of two starters with sequential control

Starting relay for sequential control of the engagement current during parallel operation of two starters

50c Input at starting relay for starter I

50d Input at starting relay for starter II

50e Start-locking relay Input

50f Start-locking relay Output

50g Start-repeating relay Input

50h Start-repeating relay Output

Wiper motors

53 Wiper motor, input (+)

53a Wiper (+), self-parking switch-off

53b Wiper (shunt winding)

53c Electric windshield-washer pump

53e Wiper (brake winding)

53I Wiper motor with permanent magnet and third brush (for higher speed)

Lighting

55 Fog lamp

56 Headlamp

56a High beam, high-beam indicator lamp

56b Low beam

56d Headlamp-flasher contact

57a Parking lamp

57L Parking lamp, left

57R Parking lamp, right

58 Side-marker, tail, license plate, and instrument panel lamps

58b Dimmer

58d Dimmer

58L License-plate lamp, left

58R License-plate lamp, right

Alternators and voltage regulators

61 Alternator charge-indicator lamp

B+ Battery positive

B- Battery negative

D+ Dynamo positive

D- Dynamo negative

DF Dynamo field

DF1 Dynamo field 1

DF2 Dynamo field 2

U,V,W Alternator terminals

75 Radio, cigarette lighter

76 Speakers

Switches

Break contact (NC) and changeover switches

81 Input

81a Output 1, NC side

81b Output 2, NC side

Make contact (NO) switches

82 Input

82a Output 1

82b Output 2

82z Input 1

82y Input 2

Multiple-position switches

83 Input

83a Output, position 1

83b Output, position 2

83L Output, left-hand position

83R Output, right-hand position

Appendix D: DIN Standards

Relays/Current relays

84 Input, actuator and relay contact

84a Output, actuator

84a Output, relay contact

Switching relays

85 Output, actuator (end of winding to ground or negative)

86 Input, actuator (start of winding)

86a Start of winding or 1st winding

86b Winding tap or 2nd winding

Relay contact for break (NC) and changeover contacts

87 Input

87a Output 1 (NC side)

87b Output 2

87c Output 3

87z Input 1

87y Input 2

87x Input 3

Relay contact for make (NO) contact and changeover contacts

88 Input

88a Output 1

88b Output 2

88c Output 3

88z Input 1

88y Input 2

88x Input 3

Directional signals (turn signal flashers)

C Indicator lamp 1

C2 Indicator lamp 2

C0 Main terminal connection for separate indicator circuits actuated by the turn signal switch

C3 Indicator lamp 3 (e.g., when towing two trailers)

L Turn-signal lamps, left

R Turn-signal lamps, right

Golf/Jetta - Standard Equipment, from May 1999

No./Page

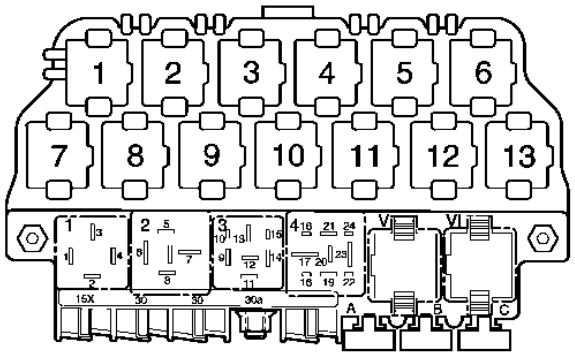
1.8L - Engine - Motronic Multiport Fuel Injection (MFI)/110kW, code AWD, from November 1999

No./Page

Golf /Jetta - Standard Equipment,

from May1999

Deviate relay location and fuseplacements as well as the locations of multiple connectors see section "component locations".



97–14163

Relay location on the thirteenfold auxiliary relay panel, above relay panel:

3 Starting Interlock Relay (53)

Relay panel:

1 Dual Horn Relay (53)

2 Load Reduction Relay (18)

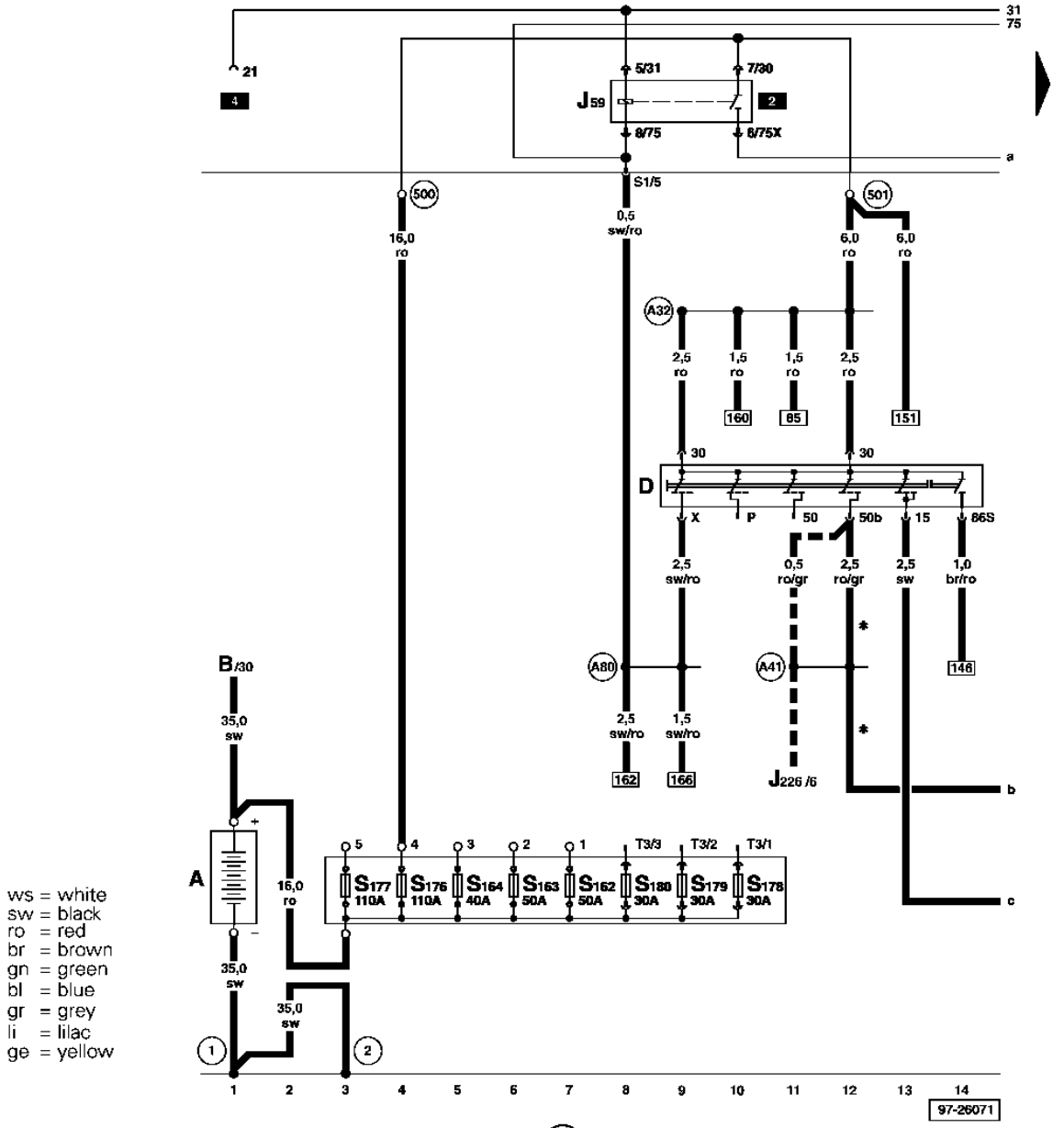
V
VI Wiper/Washer Intermittent Relay (377)

Note: Number in parentheses indicates production control number stamped on relay housing.

Fuse colors

30 A - green
25 A - white
20 A - yellow
15 A - blue
10 A - red
7,5 A - brown
5 A - beige
3 A - violet

Edition 08/99
USA.5102.04.21



ws = white
sw = black
ro = red
br = brown
gn = green
bl = blue
gr = grey
li = lilac
ge = yellow

A - Battery
B - Starter
D - Ignition/Starter Switch
J59 - Load Reduction Relay
J226 - Park/Neutral Position (PNP) Relay
S162 - Fuse -1- (30) in fuse bracket/battery
S163 - Fuse -2- (30) in fuse bracket/battery
S164 - Fuse -3- (30) in fuse bracket/battery
S176 - Fuse -4- (30) in fuse bracket/battery
S177 - Fuse -5- (30) in fuse bracket/battery
S178 - Fuse -6- (30) in fuse bracket/battery
S179 - Fuse -7- (30) in fuse bracket/battery
S180 - Fuse -8- (30) in fuse bracket/battery
T3 - 3-Pin Connector

(1) - Ground strap, battery to body
(2) - Ground strap, transmission to body
(500) - Threaded connection -1- (30) on the relay plate
(501) - Threaded connection -2- (30) on the relay plate
(A32) - Plus connection (30), in instrument panel wiring harness
(A41) - Plus connection (50), in instrument panel wiring harness (gasoline engine only)
(A80) - Connector -1- (X) in instrument panel wiring harness

* - Manual transmission only
--- Automatic transmission only

Battery, ignition/starter switch

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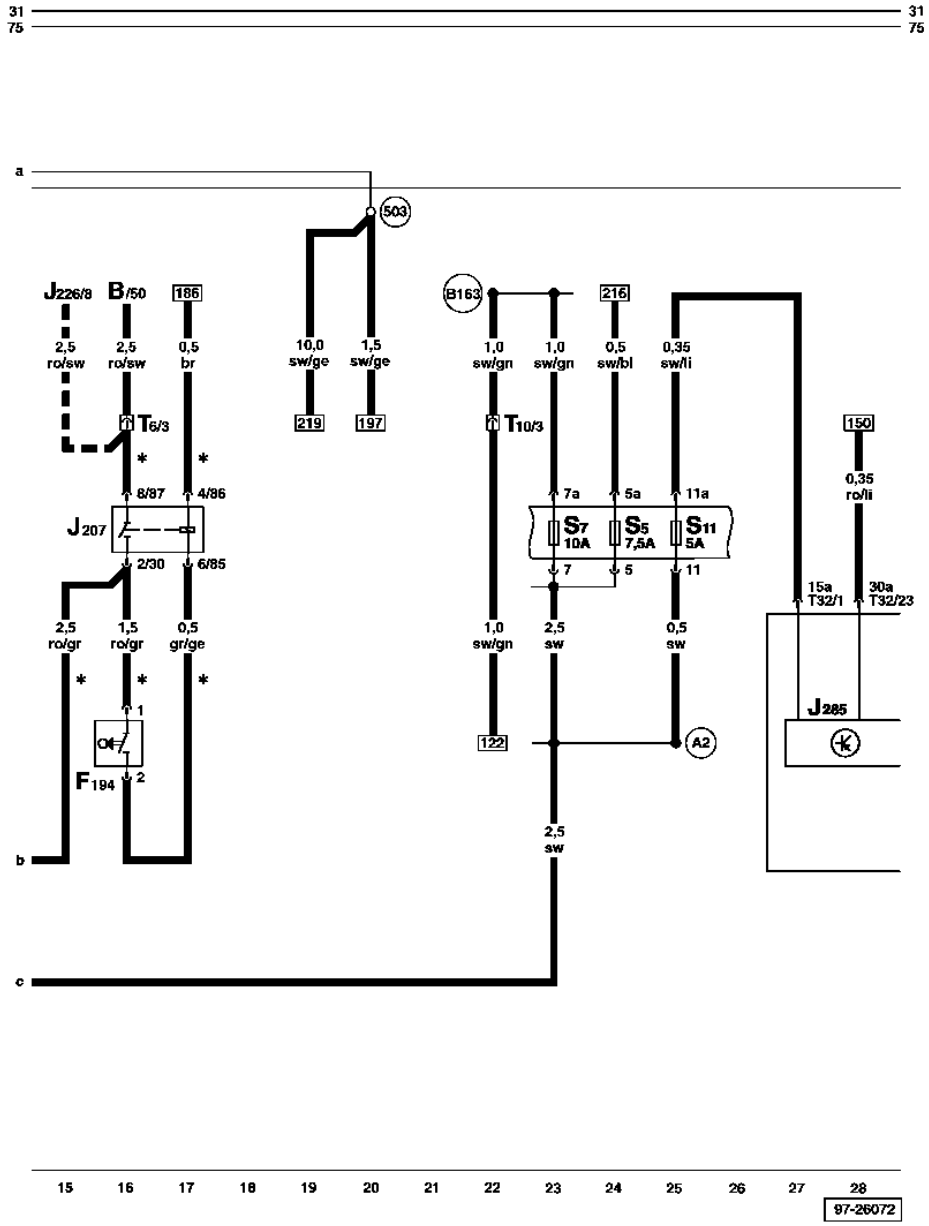
USA.5102.04.21

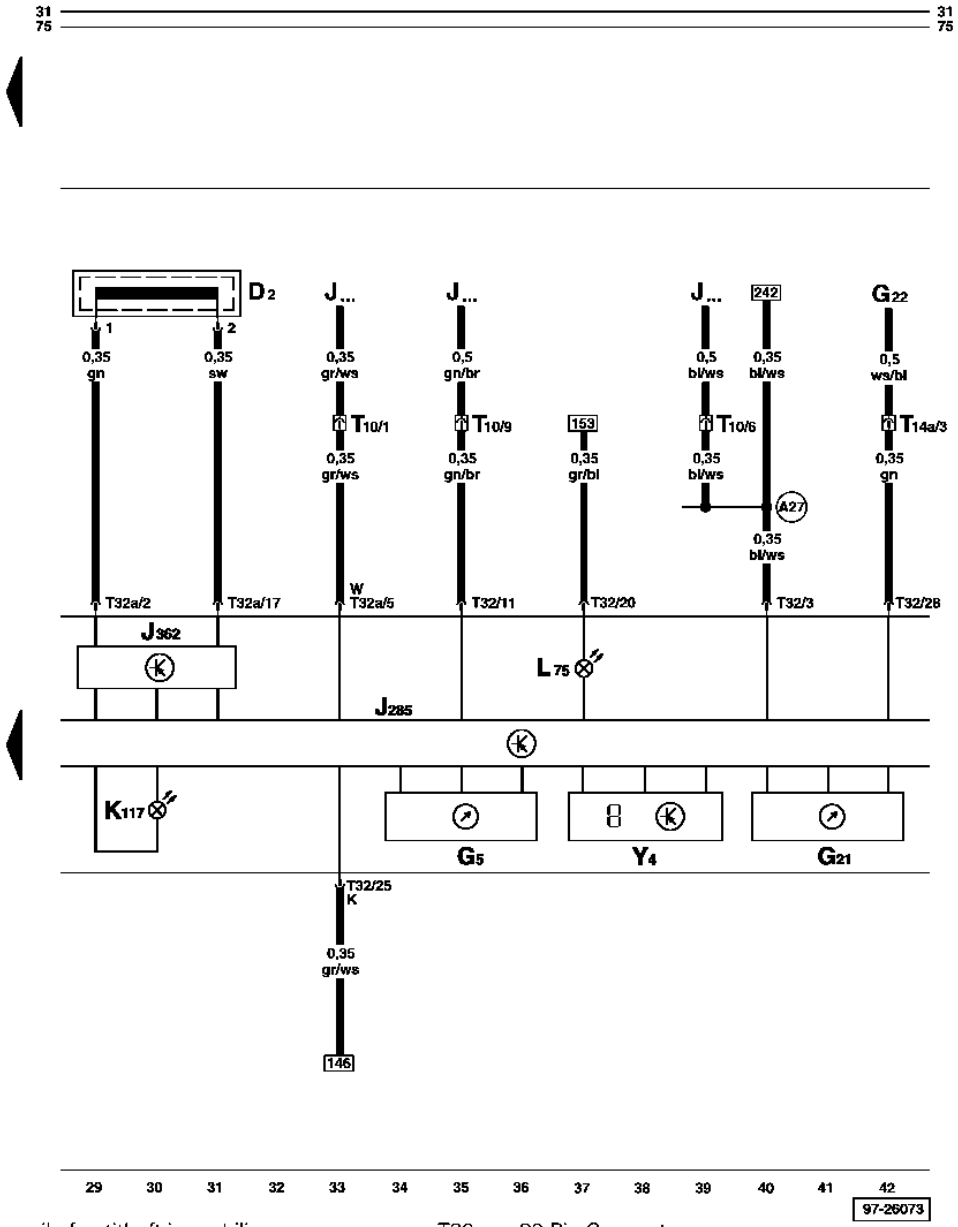


ws = white
sw = black
ro = red
br = brown
gn = green
bl = blue
gr = grey
li = lilac
ge = yellow

B - Starter
F194 - Clutch Pedal Position (CPP) Switch*
J207 - Starting Interlock Relay*
J226 - Park/Neutral Position (PNP) Relay
J285 - Control module with indicator unit in instrument panel insert
S5 - Fuse 5 in fuse holder
S7 - Fuse 7 in fuse holder
S11 - Fuse 11 in fuse holder
T6 - 6-Pin Connector, brown, in protective housing for connectors, in plenum chamber, left
T10 - 10-Pin Connector, orange, in protective housing for connectors, in plenum chamber, left
T32 - 32-Pin Connector, blue

(A2) - Plus connection (15), in instrument panel wiring harness
(B163) - Plus connector -1- (15) in wiring harness interior
(503) - Threaded connection -2- (75x) on the relay plate

* - Manual transmission only
--- Automatic transmission only

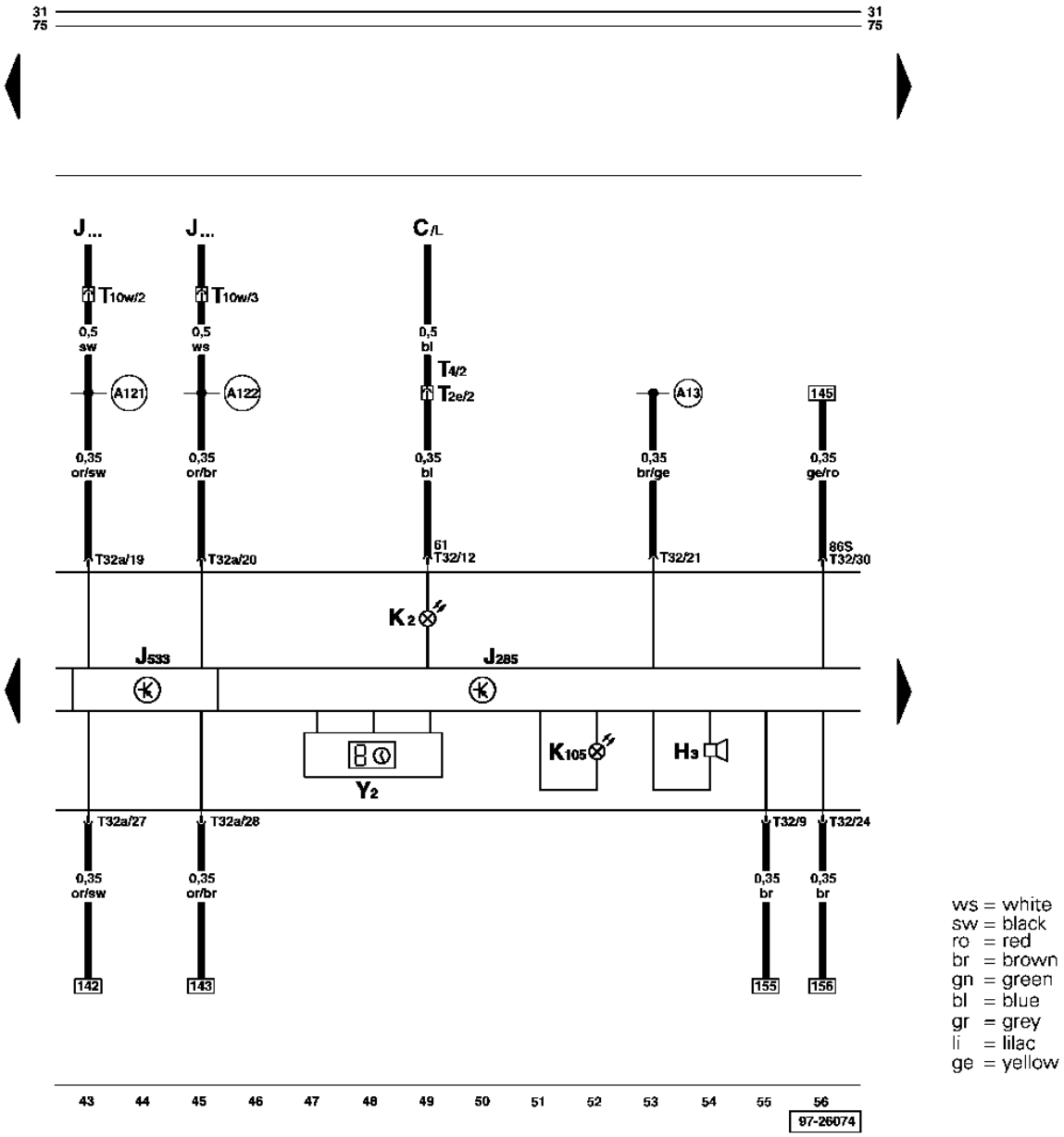


ws = white
sw = black
ro = red
br = brown
gn = green
bl = blue
gr = grey
li = lilac
ge = yellow

D2 - Induction coil of antitheft immobilizer
G5 - Tachometer
G21 - Speedometer
G22 - Speedometer Vehicle Speed Sensor
J285 - Control module with indicator unit in instrument panel insertControl module for anti-theft immobilizer
J362 - Control module for anti-theft immobilizer
J... - Engine Control Module (ECM)
K117 - Warning light for anti-theft imobilizer sensor
L75 - Digital Display Light
T10 - 10-Pin Connector, orange, in protective housing for connectors, in plenum chamber, left
T14a - 14-Pin Connector, in engine compartment, in wiring duct, left
T32 - 32-Pin Connector, blue
T32a - 32-Pin Connector, green
Y4 - Odometer Display
(A27) - Wire connection (vehicle speed signal), in instrument panel wiring harness

Instrument cluster, tachometer, speedometer, odometer display antitheft immobilizer, warning light for anti-theft imobilizer sensor

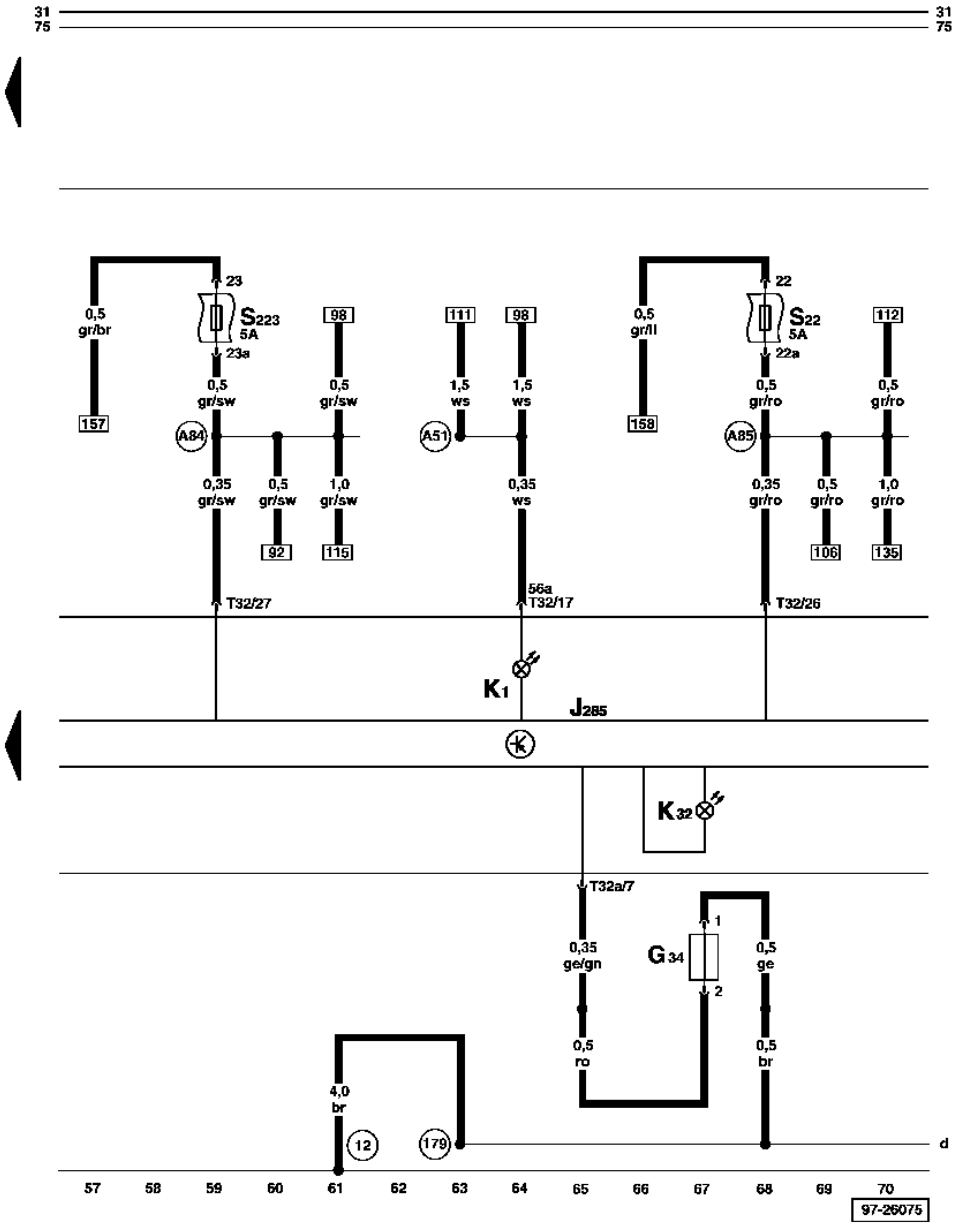
Edition 08/99
USA.5102.04.21



ws = white
sw = black
ro = red
br = brown
gn = green
bl = blue
gr = grey
li = lilac
ge = yellow

C - Generator (GEN)
H3 - Warning buzzer
J285 - Control module with indicator unit in instrument panel insert
J533 - Data Bus On Board Diagnostic Interface
J... - Engine Control Module (ECM)
K2 - Generator (GEN) Warning Light
K105 - Low Fuel Level Warning Light
T2e - Double Connector, near starter (in vehicles without air conditioning)
T4 - 4-Pin Connector, near starter (in vehicles with air conditioning)
T10w - 10-Pin Connector, white, in protective housing for connectors, in plenum chamber, left
T32 - 32-Pin Connector, blue
T32a - 32-Pin Connector, green
Y2 - Digital Clock

(A13) - Wire connection (door contact switch) in instrument panel wiring harness
(A121) - Connection (high bus), in instrument panel wiring harness
(A122) - Connection (low bus), in instrument panel wiring harness



ws = white
sw = black
ro = red
br = brown
gn = green
bl = blue
gr = grey
li = lilac
ge = yellow

G34 - Left Front Brake Pad Wear Sensor
J285 - Control module with indicator unit in instrument panel insert
K1 - Headlight High Beam Indicator Light
K32 - Brake Pad Wear Indicator Light
S22 - Fuse 22 in fuse holder
S223 - Fuse 23 in fuse holder
T32 - 32-Pin Connector, blue
T32a - 32-Pin Connector, green

(12) - Ground connection, in engine compartment, left
(179) - Ground connection, in left headlight wiring harness
(A51) - Wire connection (56), in instrument panel wiring harness
(A84) - Connector (58L) in instrument panel wiring harness
(A85) - Connector (58R) in instrument panel wiring harness

Instrument cluster, left front brake pad wear sensor, brake pad wear indicator light, headlight high beam indicator light

Edition 08/99
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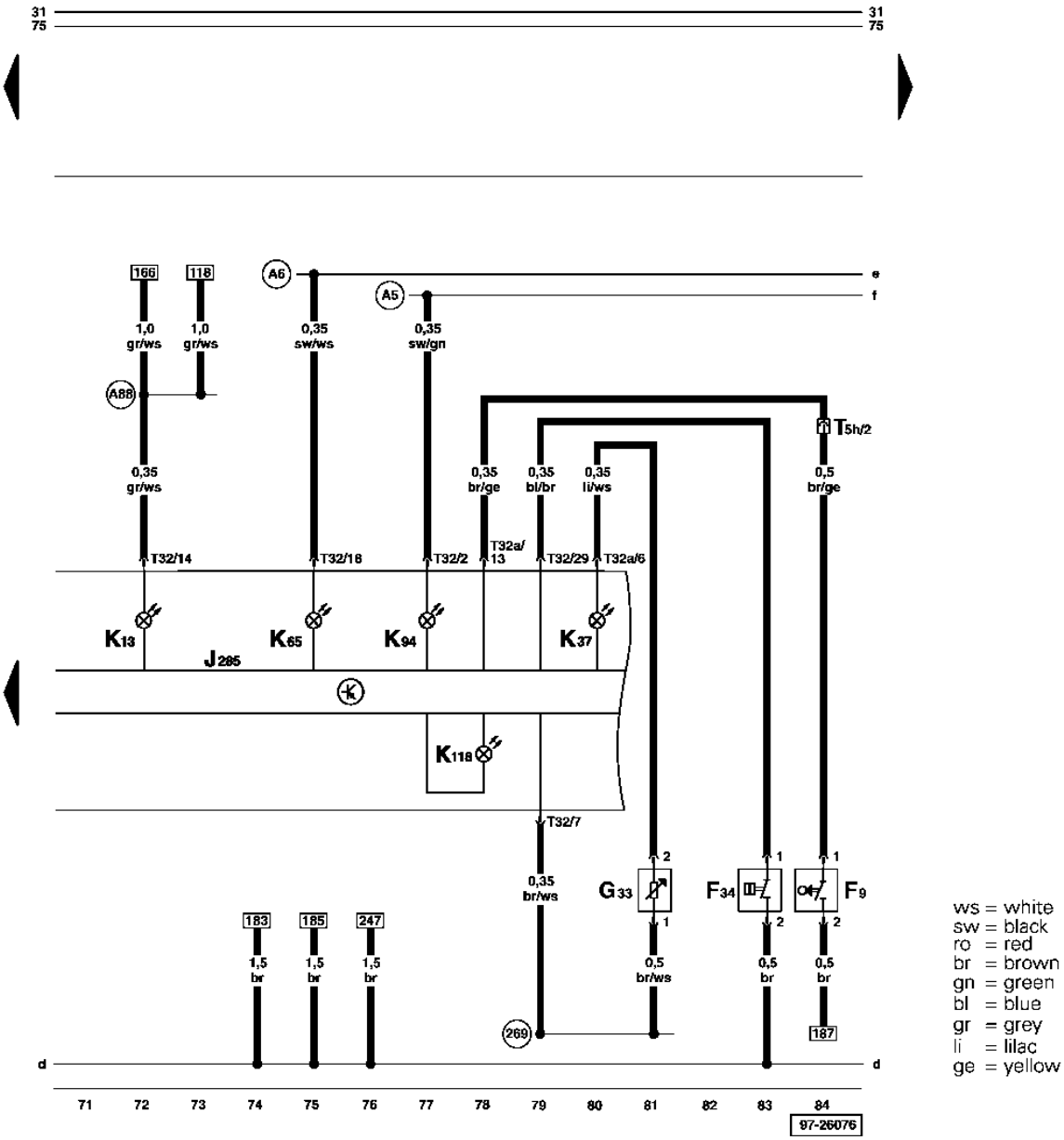
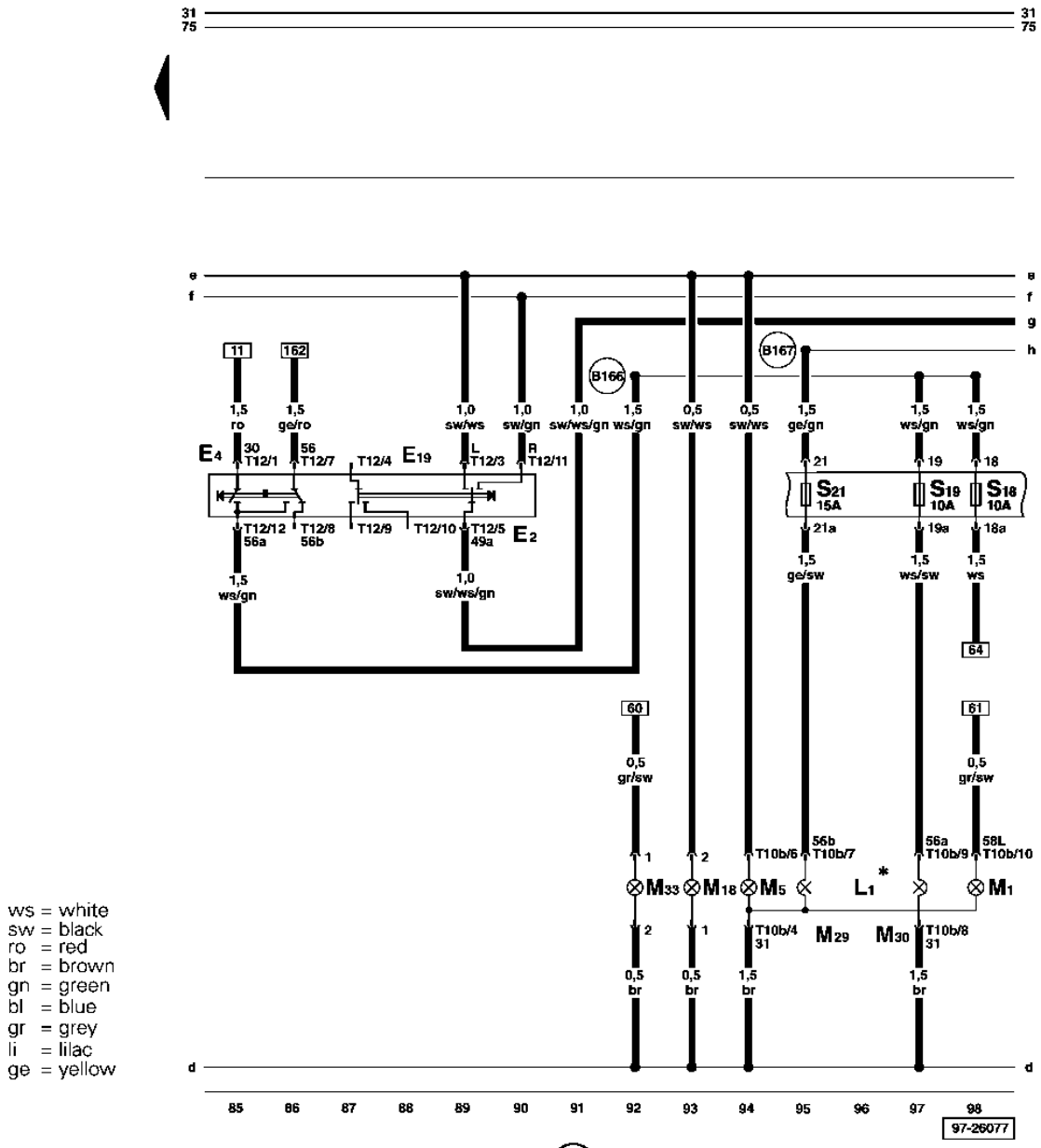


F9 - Parking Brake Warning Light Switch
F34 - Brake Fluid Level Warning Switch
G33 - Windshield Washer Fluid Level Sensor
J285 - Control module with indicator unit in instrument panel insert
K13 - Rear Fog Light Indicator Light
K37 - Low Windshield Washer Fluid Level Indicator Light
K65 - Left Turn Signal Indicator Light
K94 - Right Turn Signal Indicator Light
K118 - Warning light for brake system
T5h - 5-Pin Connector, near left A-pillar, lower part, in harness
T32 - 32-Pin Connector, blue
T32a - 32-Pin Connector, green

(269) - Ground connector (sensor ground) -1-, in instrument panel wiring harness
(A5) - Plus connection (right turn signal), in instrument panel wiring harness
(A6) - Plus connection (left turn signal), in instrument panel wiring harness
(A88) - Connector fog light, in instrument panel wiring harness



ws = white
sw = black
ro = red
br = brown
gn = green
bl = blue
gr = grey
li = lilac
ge = yellow

E2 - Turn signal switch
E4 - Headlight Dimmer/Flasher Switch
E19 - Park Light Switch
L1 - Left Headlight*
M1 - Left Parking Light
M5 - Left Front Turn Signal Light
M18 - Left, Side Turn Signal Light
M29 - Left Low Beam Headlight (Golf only)
M30 - Left High Beam Headlight (Golf only)
M33 - Light for side marker front left
S18 - Fuse 18 in fuse holder
S19 - Fuse 19 in fuse holder
S21 - Fuse 21 in fuse holder
T10b - 10-Pin Connector
T12 - 12-Pin Connector

B166 - Connection (56a) in passenger compartment wiring harness
B167 - Connection (56b) in passenger compartment wiring harness

* - Jetta only

Turn signal switch, headlight dimmer/flasher switch, left front turn signal light, light for side marker front left, left headlight

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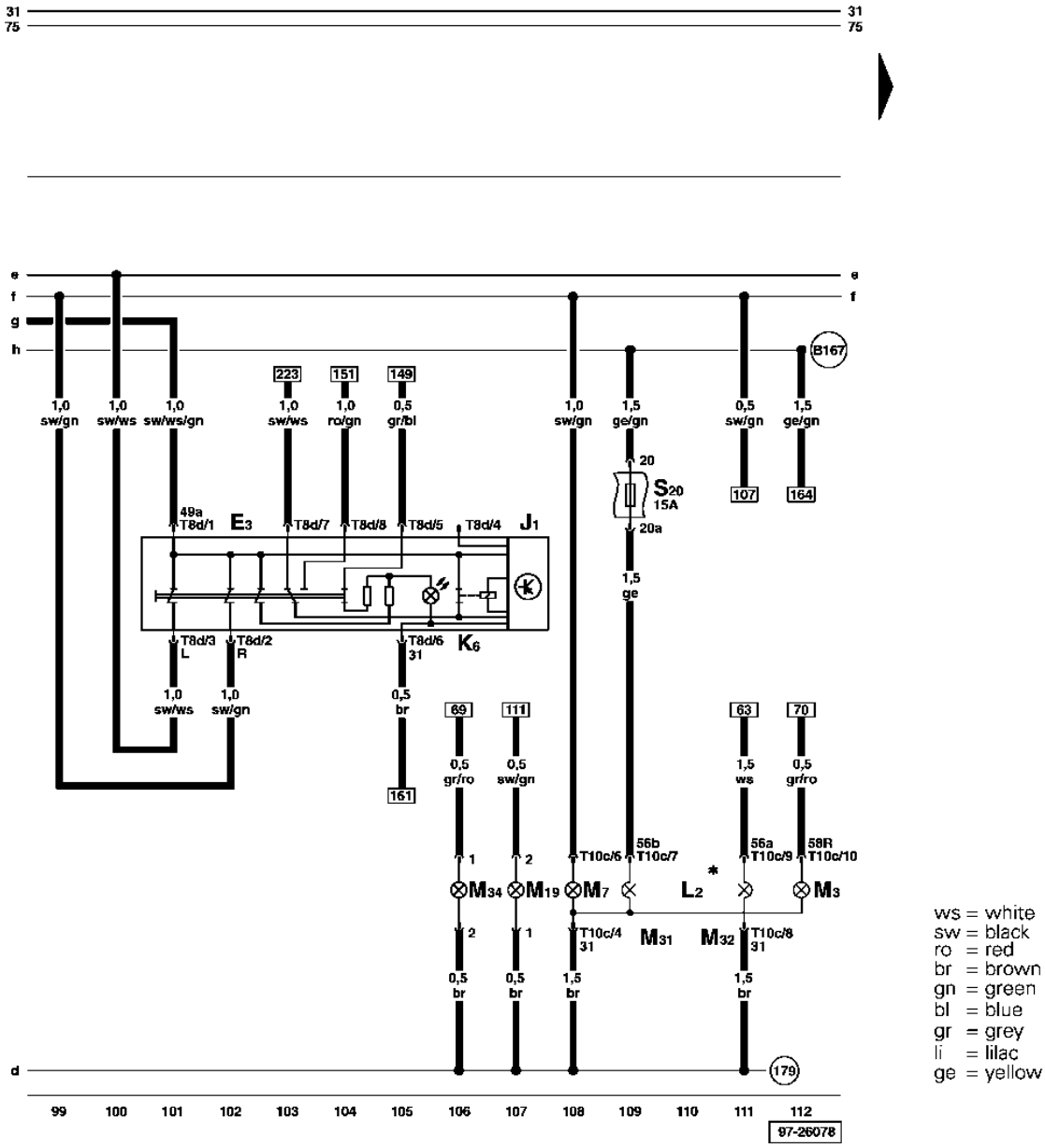

ws = white
sw = black
ro = red
br = brown
gn = green
bl = blue
gr = grey
li = lilac
ge = yellow

E3 - Emergency Flasher Switch
J1 - Turn Signal Relay
K6 - Indicator light for emergency flasher system
L2 - Right Headlight*
M3 - Right Parking Light
M7 - Right Front Turn Signal Light
M19 - Right, Side Turn Signal Light
M31 - Right Low Beam Headlight (Golf only)
M32 - Right High Beam Headlight (Golf only)
M34 - Light for side marker front right
S20 - Fuse 20 in fuse holder
T8d - 8-Pin Connector
T10c - 10-Pin Connector

(179) - Ground connection, in left headlight wiring harness

(B167) - Connection (56b), in passenger compartment wiring harness

* - Jetta only

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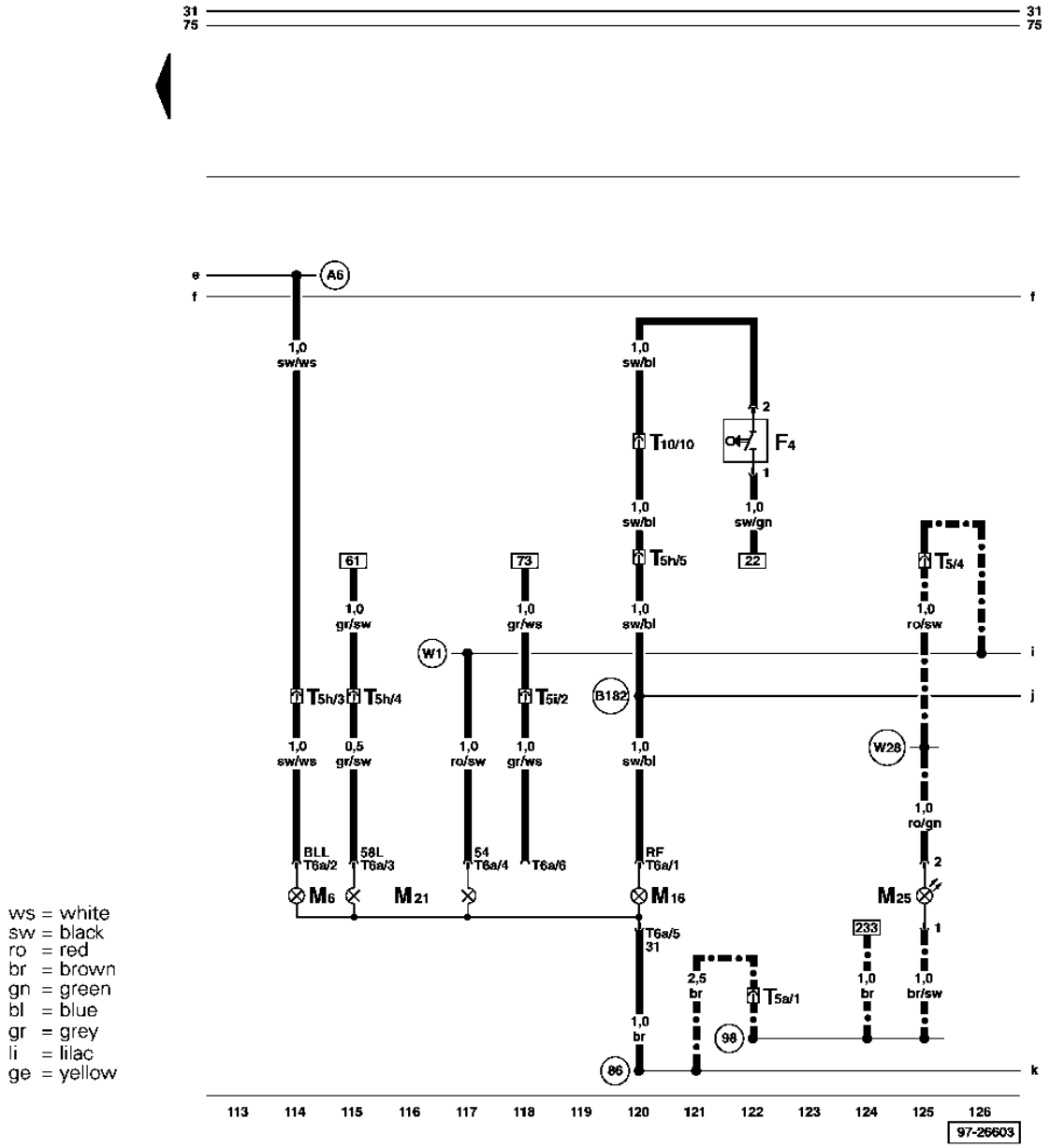
Emergency flasher switch, turn signal relay, right front turn signal light, light for side marker front right, right headlight



ws = white
sw = black
ro = red
br = brown
gn = green
bl = blue
gr = grey
li = lilac
ge = yellow

F4 - Back-Up Light Switch
M6 - Left Rear Turn Signal Light
M16 - Left Back-Up Light
M21 - Left Brake/Tail Light
M25 - High-mount Brake Light (32 light emitting diodes)
T5 - 5-Pin Connector, black, connector station C-pillar, left
T5a - 5-Pin Connector, pink, connector station C-pillar, left (Golf only)
T5h - 5-Pin Connector, near left A-pillar, lower part, in harness
T5i - 5-Pin Connector, near left A-pillar, lower part, in harness
T6a - 6-Pin Connector
T10 - 10-Pin Connector, orange, in protective housing for connectors, in plenum chamber, left

(86) - Ground connection -1-, in rear wiring harness
(98) - Ground connection, in rear lid wiring harness
(A6) - Plus connection (left turn signal), in instrument panel wiring harness
(B182) - Connection (RF), in passenger compartment wiring harness
(W1) - Plus connection (54), in rear wiring harness
(W28) - Plus connector -2- (54), in wiring harness taillight assembly
-•-•- Golf only

Back-up light switch, left rear turn signal light, left back-up light, left brake/ tail light, high-mount brake light (Golf only)

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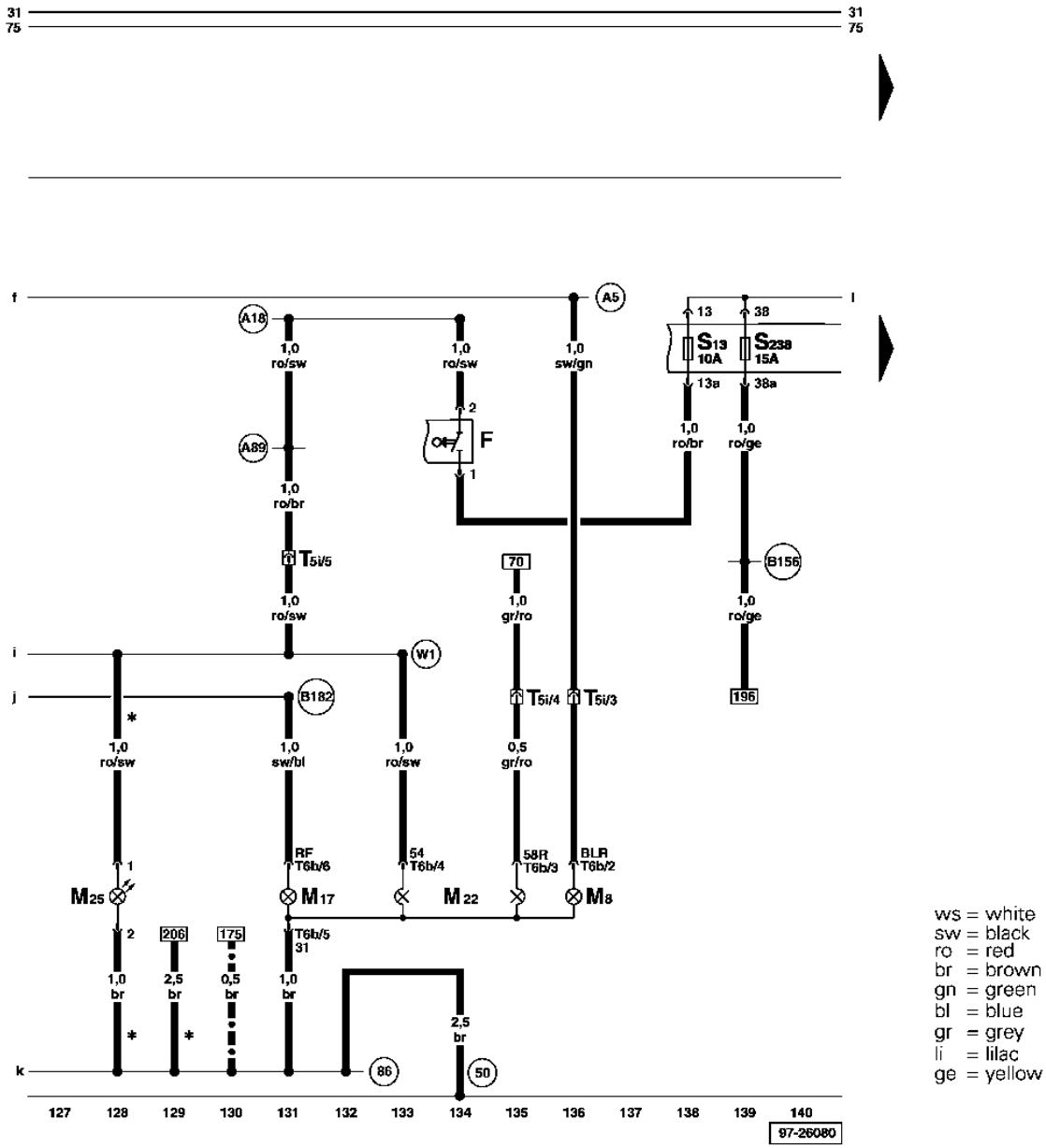

ws = white
sw = black
ro = red
br = brown
gn = green
bl = blue
gr = grey
li = lilac
ge = yellow

F - Brake Light Switch
M8 - Right Rear Turn Signal Light
M17 - Right Back-Up Light
M22 - Right Brake/Tail Light
M25 - High-mount Brake Light (18 light emitting diodes)*
S13 - Fuse 13 in fuse holder
S238 - Fuse 38 in fuse holder
T5i - 5-Pin Connector, near left A-pillar, lower part, in harness
T6b - 6-Pin Connector

(50) - Ground connection, in luggage compartment, left
(86) - Ground connection -1-, in rear wiring harness

(A5) - Plus connection (right turn signal), in instrument panel wiring harness
(A18) - Wire connection (54), in instrument panel wiring harness
(A89) - Connector (54), in instrument panel wiring harness
(B156) - Plus connector (30a), in wiring harness interior
(B182) - Connection (RF), in passenger compartment wiring harness
(W1) - Plus connection (54), in rear wiring harness

* - Jetta only
-•-•- Golf only

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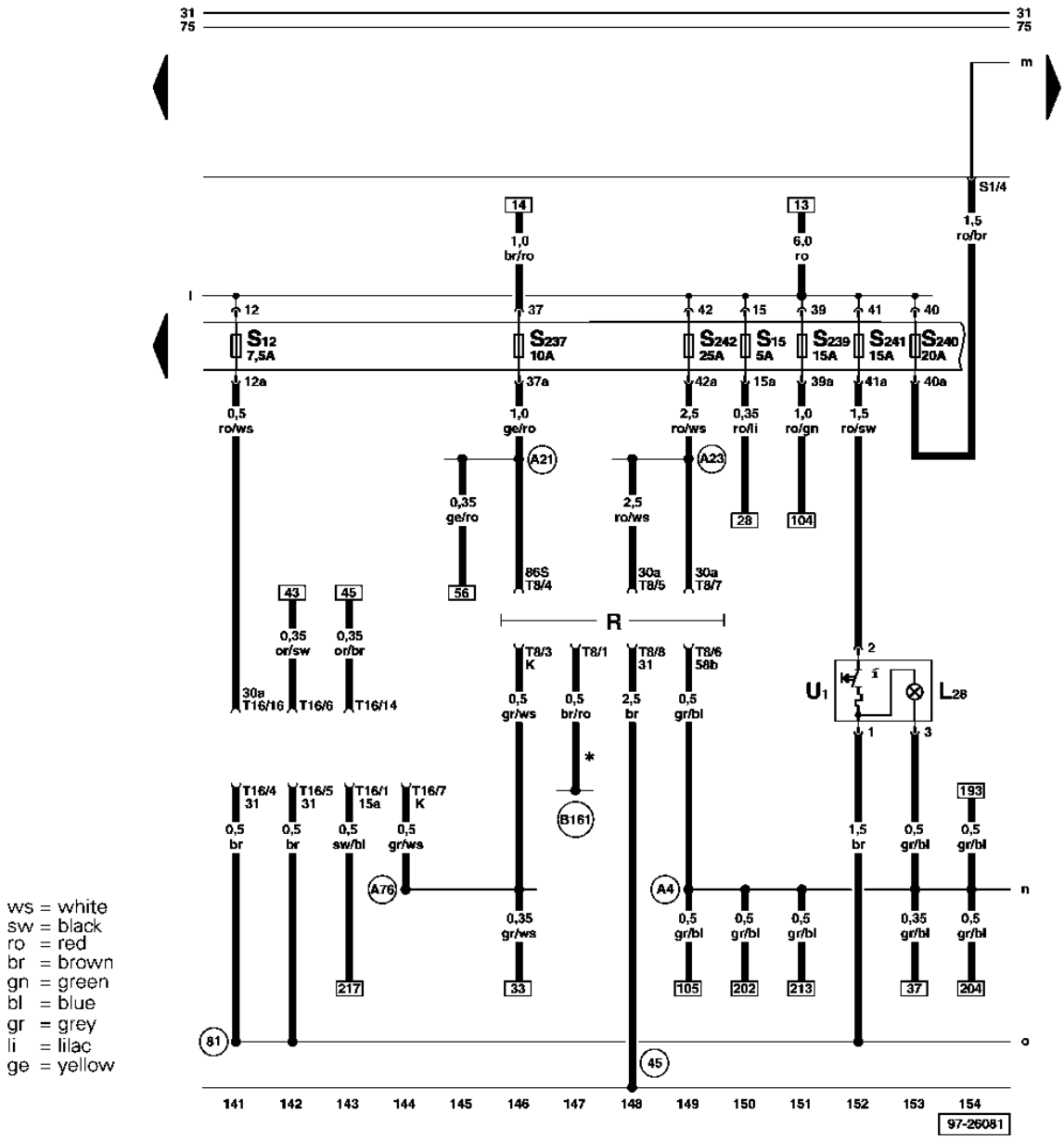
Brake light switch, right rear turn signal light, right back-up light, right brake/ tail light, high-mount brake light (Jetta only)



ws = white
sw = black
ro = red
br = brown
gn = green
bl = blue
gr = grey
li = lilac
ge = yellow

L28 - Cigarette Lighter Light
R - Radio
S12 - Fuse 12 in fuse holder
S15 - Fuse 15 in fuse holder
S237 - Fuse 37 in fuse holder
S239 - Fuse 39 in fuse holder
S240 - Fuse 40 in fuse holder
S241 - Fuse 41 in fuse holder
S242 - Fuse 42 in fuse holder
T8 - 8-Pin Connector
T16 - Data Link Connector (DLC), below instrument panel, left
U1 - Cigarette Lighter

(45) - Ground connection, behind instrument panel, center
(81) - Ground connection -1-, in instrument panel wiring harness
(A4) - Plus connection (58b), in instrument panel wiring harness
(A21) - Wire connection (86s), in instrument panel wiring harness
(A23) - Wire connection (30a), in instrument panel wiring harness
(A76) - Connector (K-diagnosis wire) in instrument panel wiring harness
(B161) - Connector (anti-theft warning system), in wiring harness interior*

* - Vehicles with anti-theft warning system only (see wiring diagram comfort system/ central locking)

Data Link Connector (DLC) radio connection, cigarette lighter

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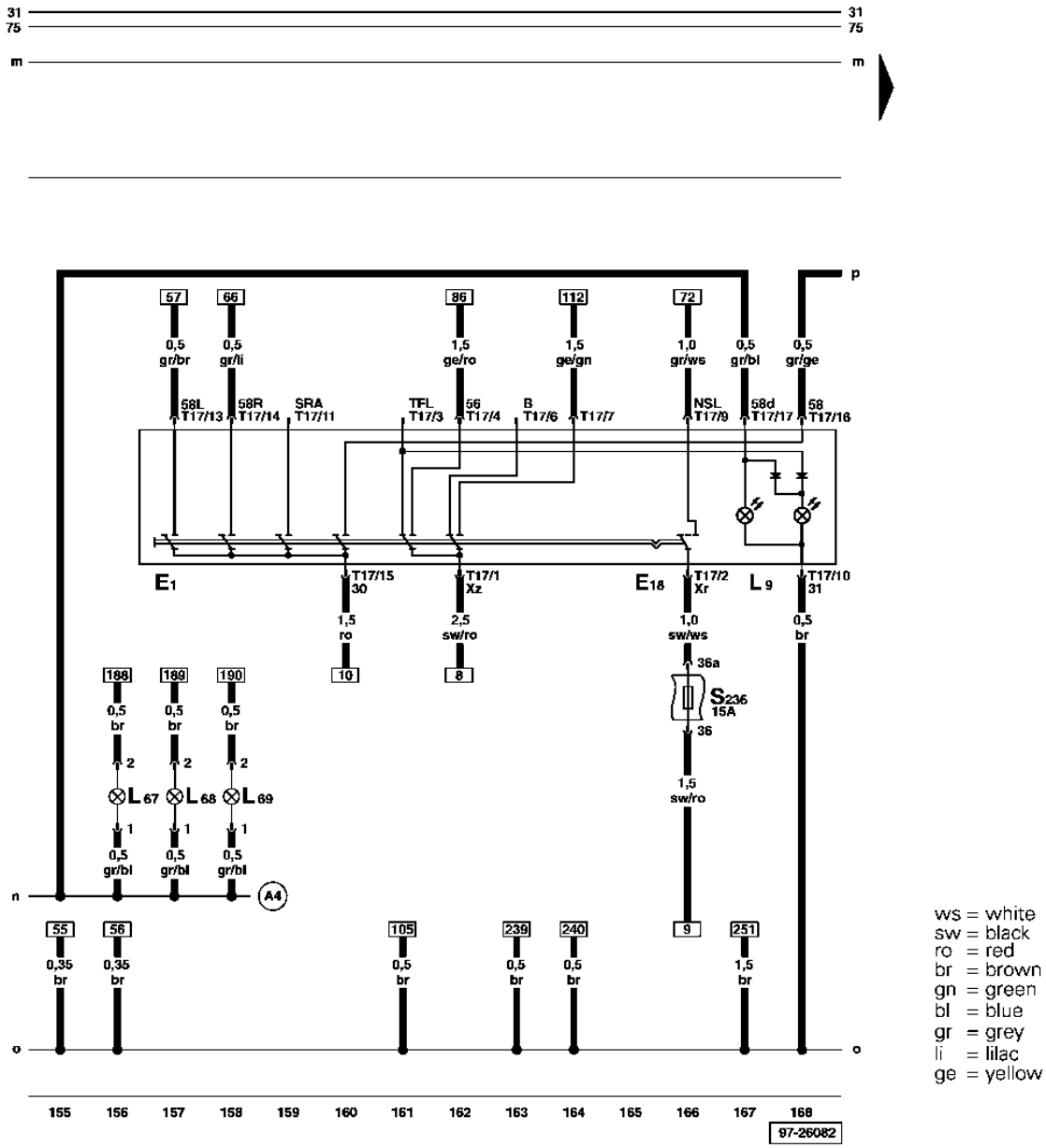
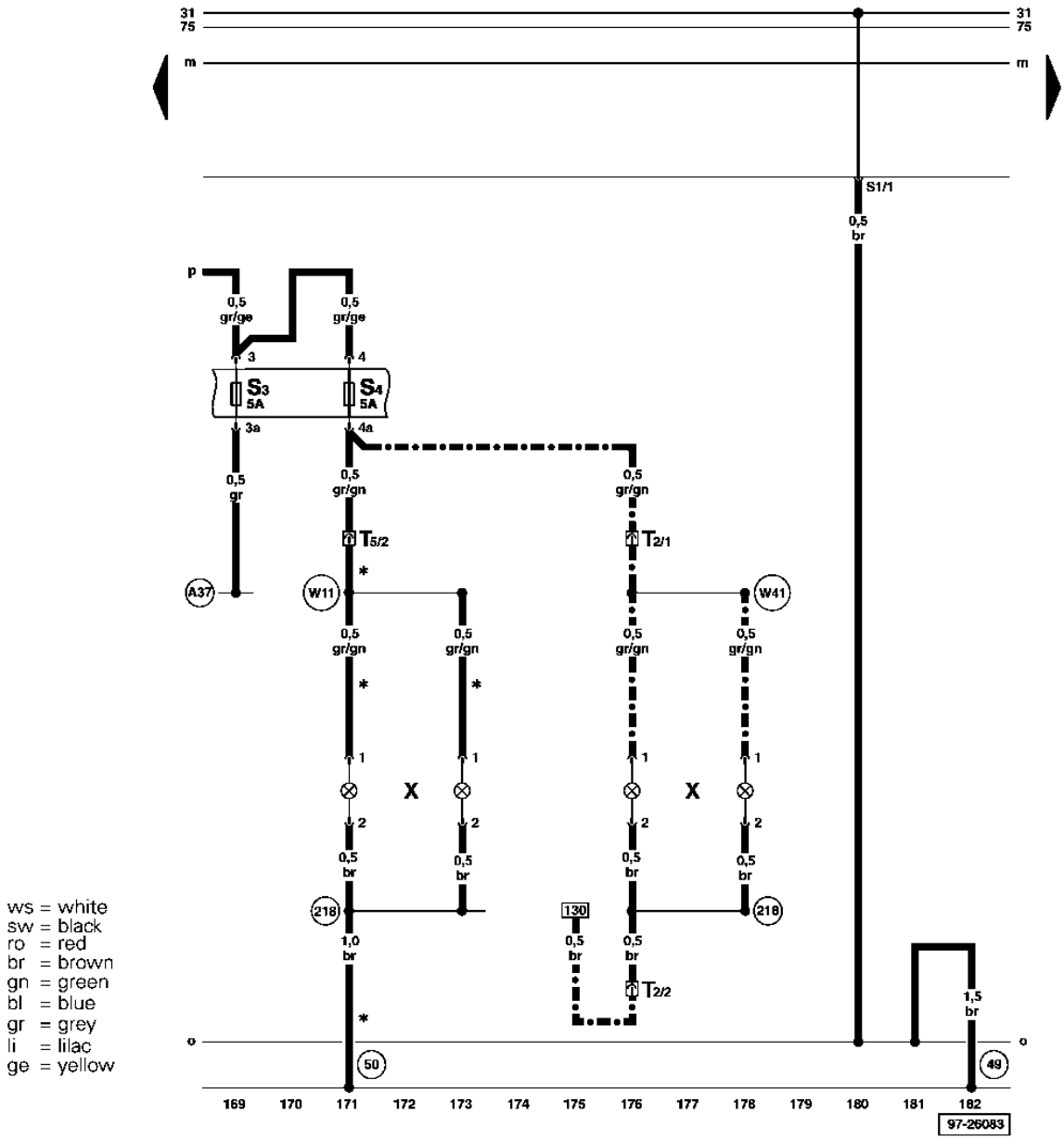


ws = white
sw = black
ro = red
br = brown
gn = green
bl = blue
gr = grey
li = lilac
ge = yellow

E1 - Light switch
E18 - Rear Fog Light Switch
L9 - Headlight Switch Light
L67 - Left Instrument Panel Vent Illumination
L68 - Center Instrument Panel Vent Illumination
L69 - Right Instrument Panel Vent Illumination
S236 - Fuse 36 in fuse holder
T17 - 17-Pin Connector

(A4) - Plus connection (58b), in instrument panel wiring harness



ws = white
sw = black
ro = red
br = brown
gn = green
bl = blue
gr = grey
li = lilac
ge = yellow

S3 - Fuse 3 in fuse holder
S4 - Fuse 4 in fuse holder
T2 - Double Connector, in luggage compartment, left (Golf only)
T5 - 5-Pin Connector, black, connector station C-pillar, left
X - License Plate Light

(49) - Ground connection, on steering column
(50) - Ground connection, in luggage compartment, left
(218) - Ground connection -1-, in rear lid wiring harness
(A37) - Wire connection (58a), in instrument panel wiring harness
(W11) - Wire connection (58), in rear lid wiring harness
(W41) - Plus connection (58), in wiring harness

* - Jetta only
-•-•- Golf only

License plate light

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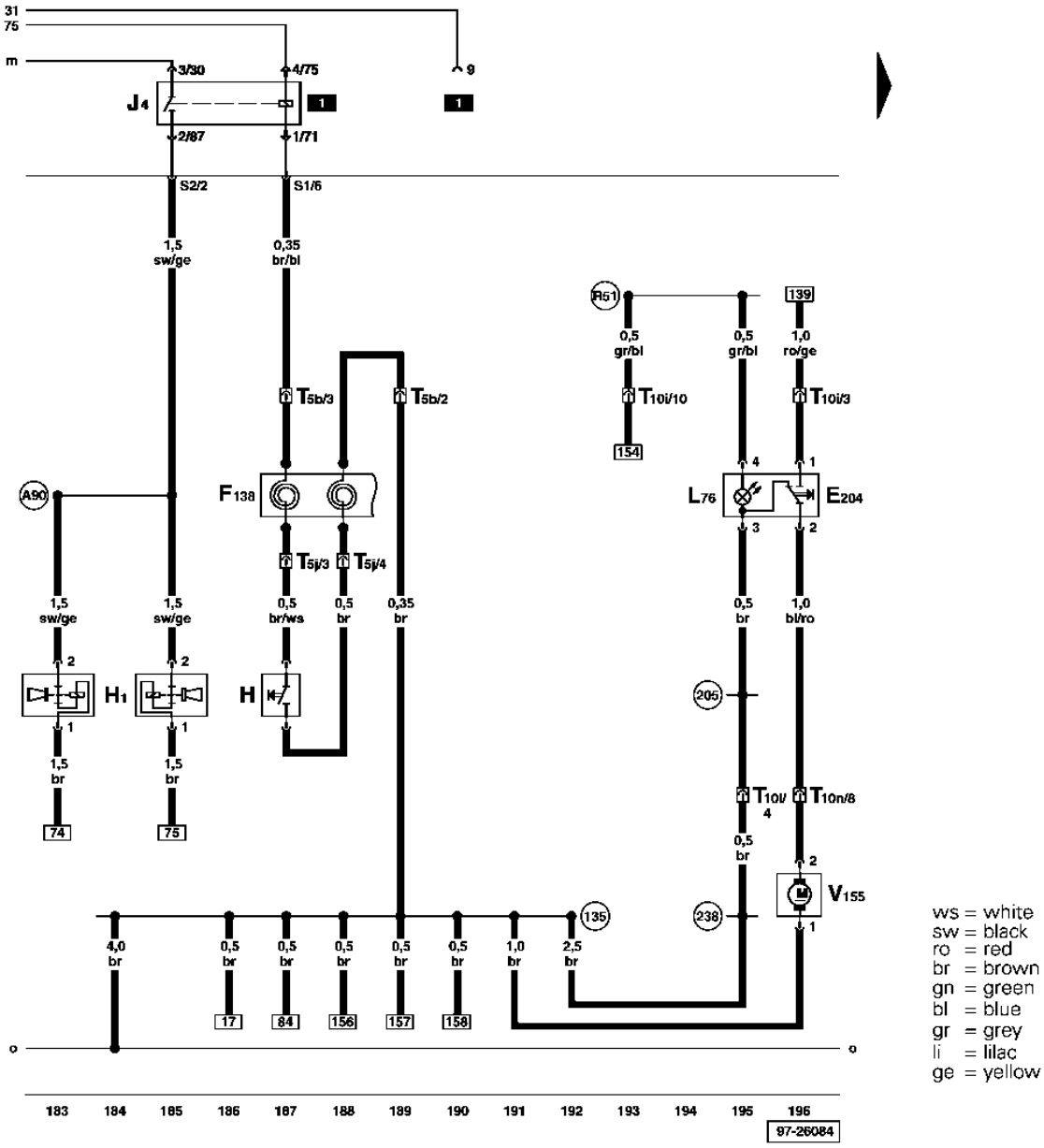
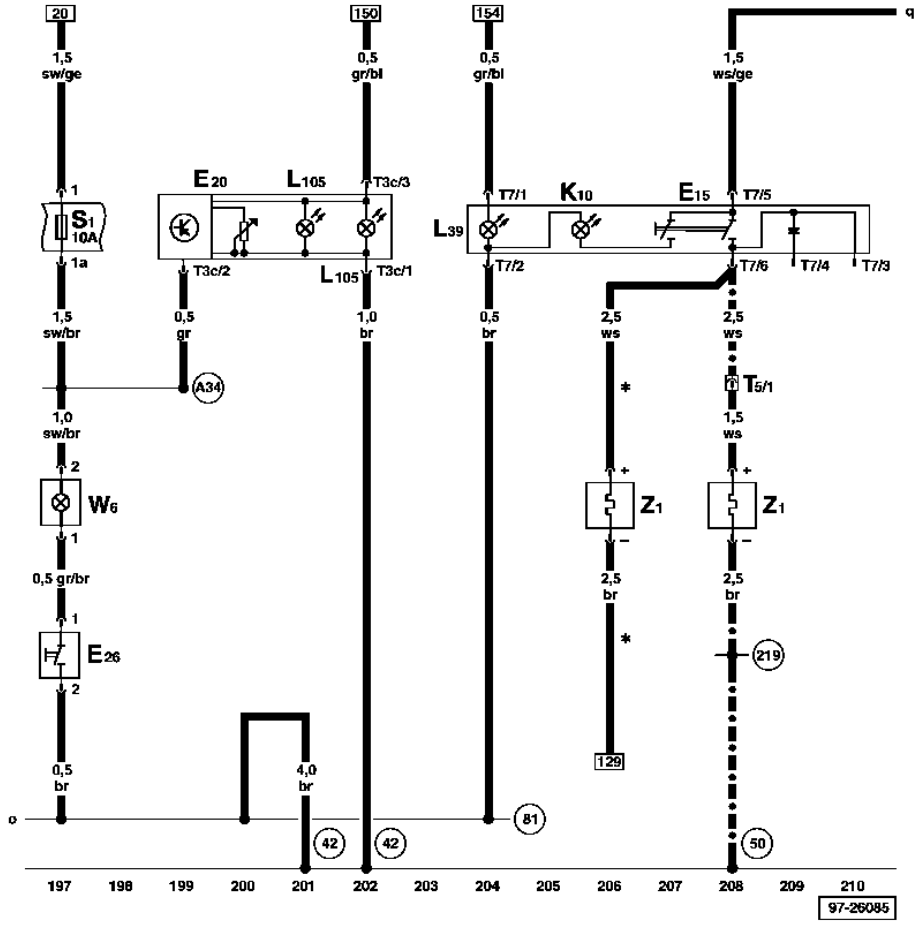


ws = white
sw = black
ro = red
br = brown
gn = green
bl = blue
gr = grey
li = lilac
ge = yellow

E204 - Switch for remote/fuel tank door (also see Comfort System with power windows wiring diagram)
F138 - Airbag Spiral Spring/Return Spring with Slip Ring
H - Signal horn activation
H1 - Dual tone horn
J4 - Dual Horn Relay
L76 - Push Button Light
T5b - 5-Pin Connector, on airbag spiral spring
T5j - 5-Pin Connector, behind driver's airbag
T10i - 10-Pin Connector, black, connector station A-pillar, left
T10n - 10-Pin Connector, brown, connector station A-pillar, left
V155 - Motor for fuel tank lid unlock

(135) - Ground connection -2-, in instrument panel wiring harness
(205) - Ground connection, in driver's door wiring harness
(238) - Ground connection -1-, in wiring harness interior
(A90) - Connector (dual tone horn), in instrument panel wiring harness
(R51) - Connection (58b) in door wiring harness, driver side



ws = white
sw = black
ro = red
br = brown
gn = green
bl = blue
gr = grey
li = lilac
ge = yellow

E15 - Rear window defogger switch
E20 - Instrument Panel Light Dimmer Switch
E26 - Glove compartment light switch
K10 - Indicator light for heated rear windshield
L39 - Rear Window Defogger Switch Light
L105 - Illumination for lighting controller
S1 - Fuse 1 in fuse holder
T3c - 3-Pin Connector
T5 - 5-Pin Connector, black, connector station C-pillar, left (Golf only)
T7 - 7-Pin Connector
W6 - Glove Compartment Light
Z1 - Heated rear window

(42) - Ground connection, beside steering column
(50) - Ground connection, in luggage compartment, left
(81) - Ground connection -1-, in instrument panel wiring harness
(219) - Ground connection -2-, in rear lid wiring harness
(A34) - Wire connection (75x), in instrument panel wiring harness

* - Jetta only
-•-•- Golf only

Instrument panel light dimmer switch, glove compartment light, rear window defogger switch, heated rear window

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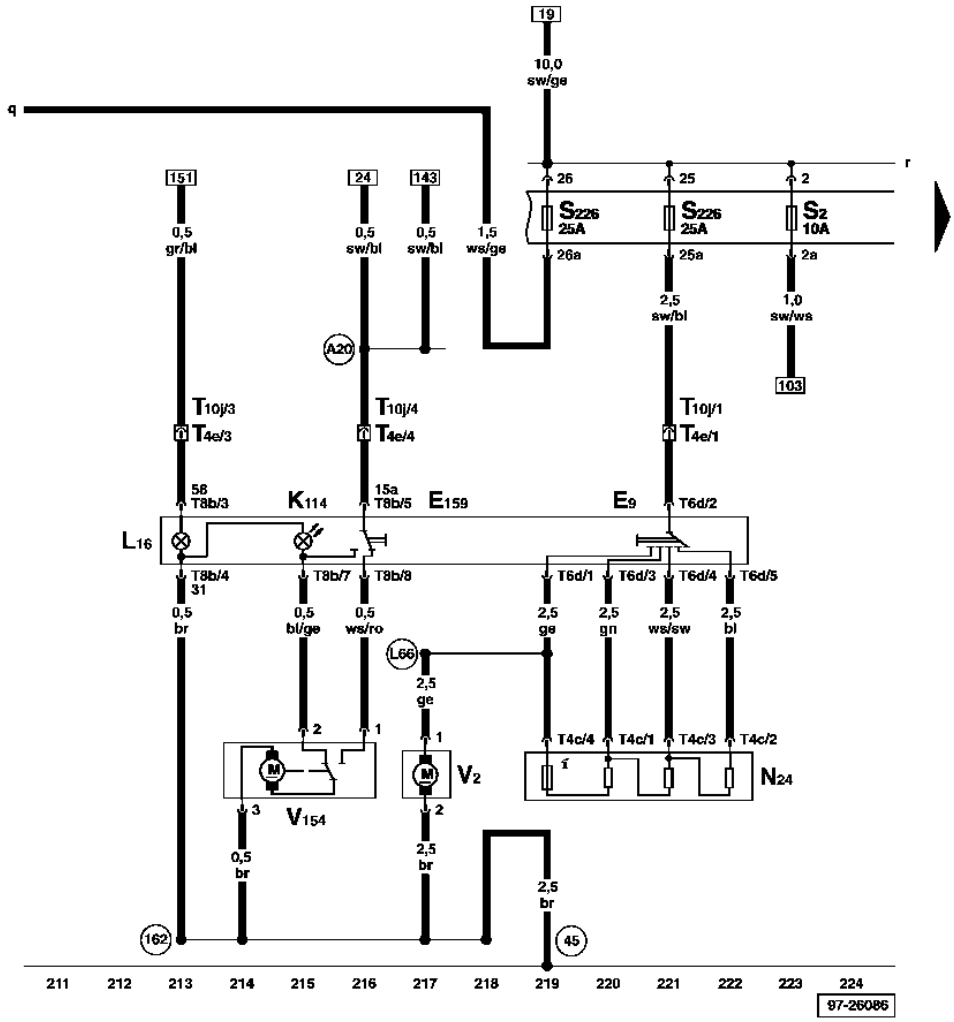
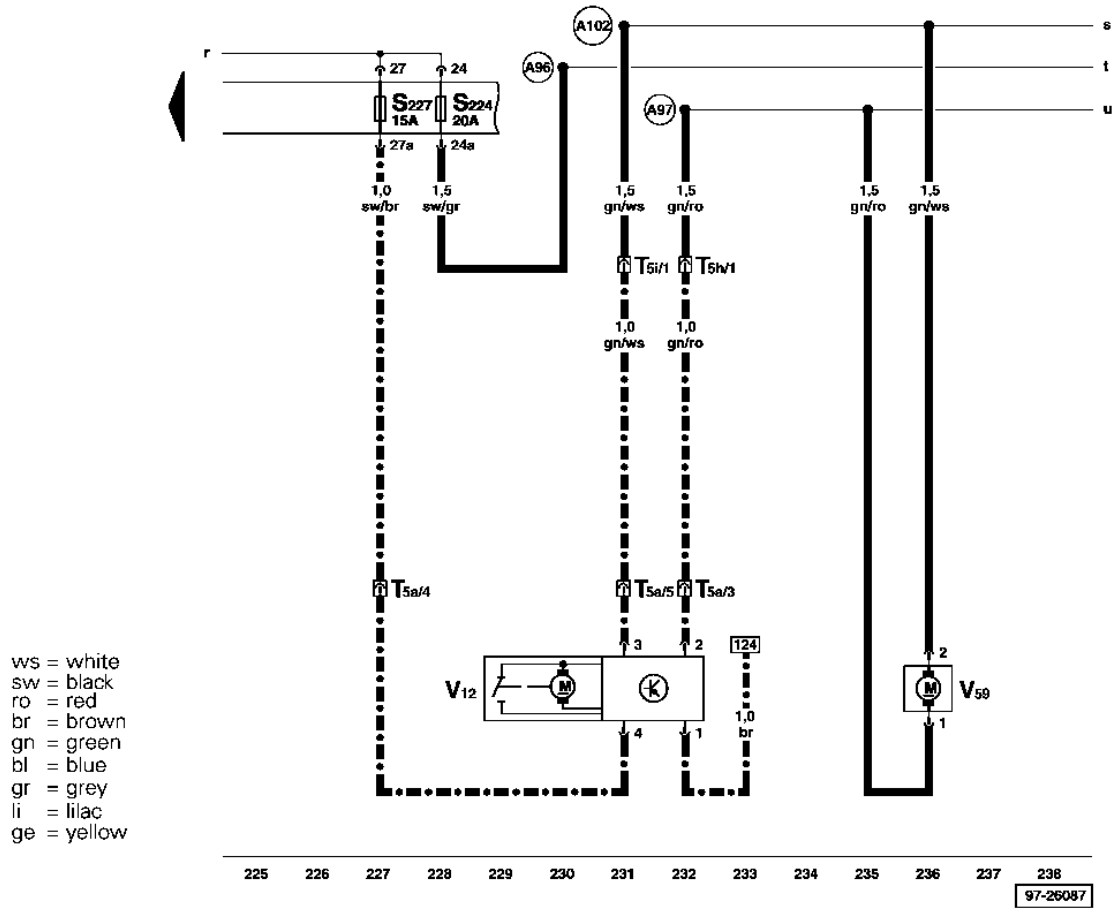
USA.5102.04.21



ws = white
sw = black
ro = red
br = brown
gn = green
bl = blue
gr = grey
li = lilac
ge = yellow

E9 - Fresh Air Blower Switch
E159 - Fresh Air/Recirculating Flap Switch
K114 - Fresh Air and Recirculating Air Mode Indicator Light
L16 - Fresh Air Control Lever Light
N24 - Fresh Air Blower Series Resistance With Fuse
S2 - Fuse 2 in fuse holder
S225 - Fuse 25 in fuse holder
S226 - Fuse 26 in fuse holder
T4c - 4-Pin Connector
T4e - 4-Pin Connector (in vehicles without air conditioning)
T6d - 6-Pin Connector
T8b - 8-Pin Connector
T10j - 10-Pin Connector, behind instrument panel, center (in vehicles with air conditioning)
V2 - Fresh Air Blower
V154 - Servo motor for fresh-/recirculating air door

(45) - Ground connection, behind instrument panel, center
(162) - Ground connection, in blower motor wiring harness
(A20) - Wire connection (15a), in instrument panel wiring harness
(L66) - Connector, in wiring harness heater blower



ws = white
sw = black
ro = red
br = brown
gn = green
bl = blue
gr = grey
li = lilac
ge = yellow

S224 - Fuse 24 in fuse holder
S227 - Fuse 27 in fuse holder
T5a - 5-Pin Connector, pink, connector station C-pillar, left (Golf only)
T5h - 5-Pin Connector, near left A-pillar, lower part, in harness
T5i - 5-Pin Connector, near left A-pillar, lower part, in harness
V12 - Motor for rear windshield wiper
V59 - Windshield and Rear Window Washer Pump

(A96) - Connector (53a), in instrument panel wiring harness
(A97) - Connector (53), in instrument panel wiring harness
(A102) - Connector (windshield wiper), in instrument panel wiring harness

---- Golf only

Motor for rear windshield wiper, windshield and rear window washer pump

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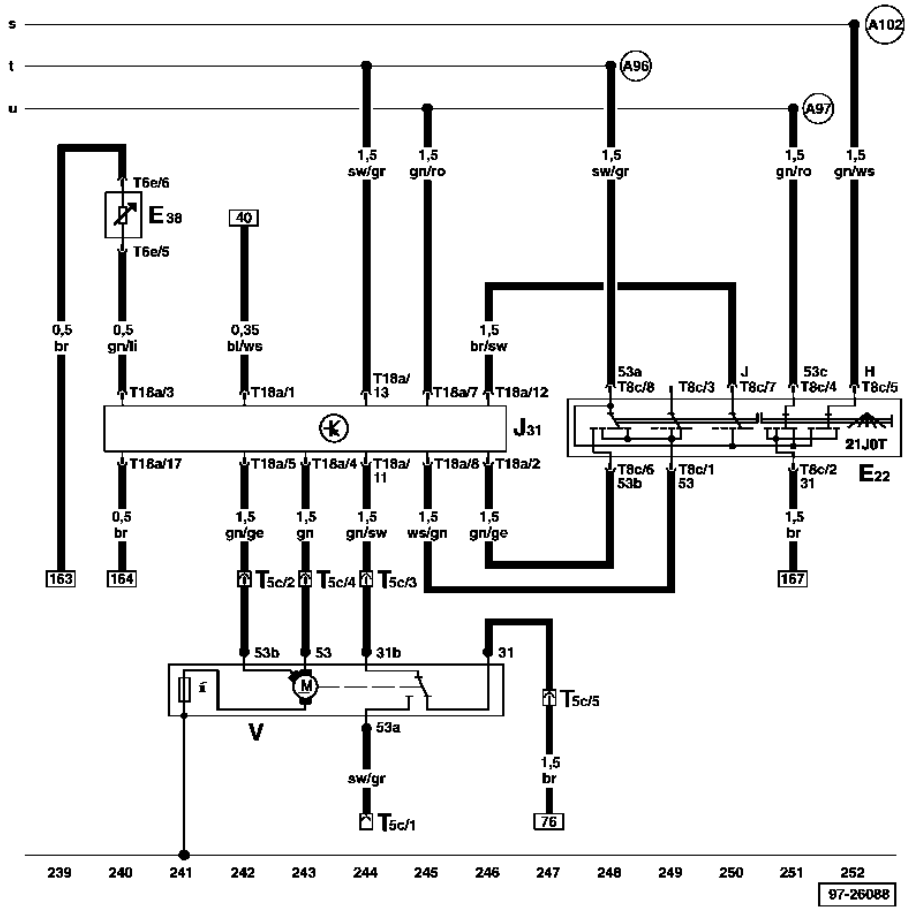


ws = white
sw = black
ro = red
br = brown
gn = green
bl = blue
gr = grey
li = lilac
ge = yellow

E22 - Windshield Wiper/Washer Switch
E38 - Windshield Wiper Intermittent Regulator
J31 - Wiper/Washer Intermittent Relay, on relais panel
T5c - 5-Pin Connector, on windshield wiper motor
T6e - 6-Pin Connector
T8c - 8-Pin Connector
T18a - 18-Pin Connector
V - Windshield Wiper Motor

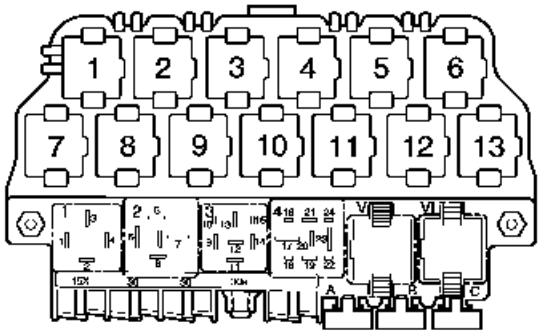
A96 - Connector (53a), in instrument panel wiring harness
A97 - Connector (53), in instrument panel wiring harness
A102 - Connector (windshield wiper), in instrument panel wiring harness

Notes

1.8L - Engine - Motronic Multiport Fuel Injection (MFI)/110 kW, code AWD,

from November 1999

Deviate relay location and fuseplacements as well as the locations of multiple connectors see section "component locations".



97-14163

Relay location on the thirteenfold auxiliary relay panel, above relay panel:

Relay panel:

2 Load Reduction Relay (100)

4 Fuel Pump (FP) Relay (109)

Note: Number in parentheses indicates production control number stamped on relay housing.

Fuse colors

30 A - green
25 A - white
20 A yellow
15 A blue
10 A - red
7,5 A - brown
5 A - beige
3 A violet

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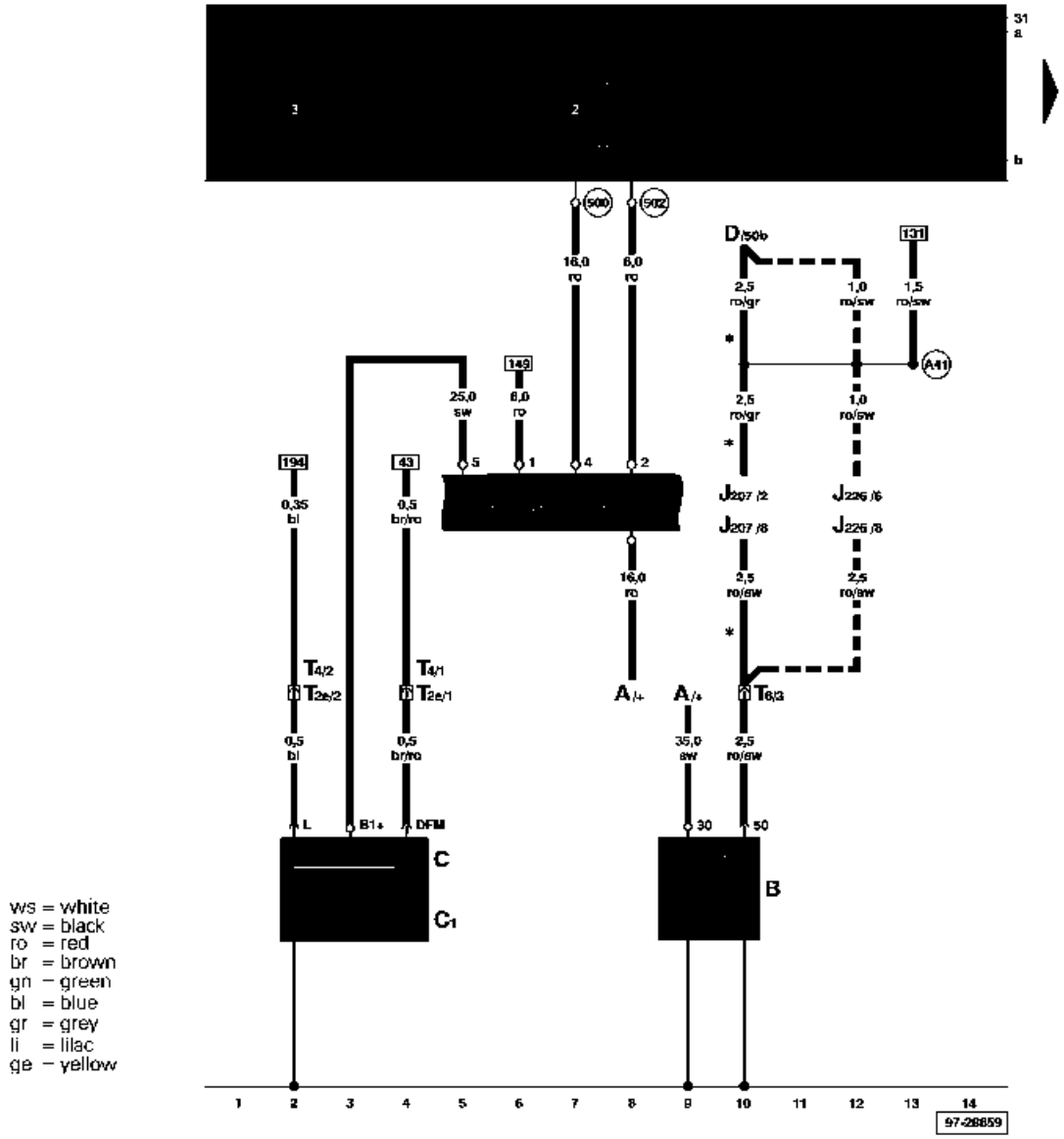
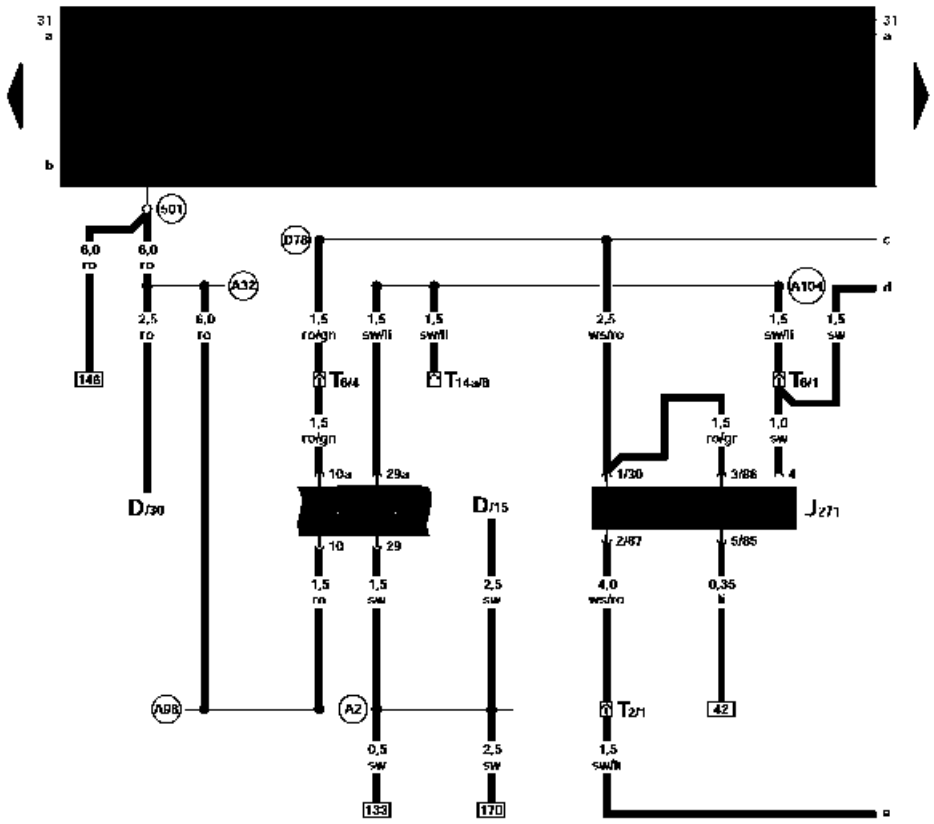


A Battery
B - Starter
C - Generator (GEN)
C1 - Voltage Regulator (VR)
D - Ignition/Starter Switch
J59 - Load Reduction Relay
J207 - Starting Interlock Relay
J226 Park/Neutral Position (PNP) Relay
S162 - Fuse -1- (30) in fuse bracket/battery
S163 - Fuse -2- (30) in fuse bracket/battery
S176 - Fuse -4- (30) in fuse bracket/battery
S177 - Fuse -6- (30) in fuse bracket/battery
T2e - Double Connector, near starter (vehicles without air conditioning)
T4 - 4-Pin Connector, near starter (vehicles with air conditioning only)
T6 6 Pin Connector, brown, in protective housing for connectors, in plenum chamber, left
(500) - Threaded connection -1- (30) on the relay plate
(502) - Threaded connection -1- (30a) on the relay plate
(A41) - Plus connection (50), in instrument panel wiring harness
* - Manual transmission only
--- Automatic transmission only

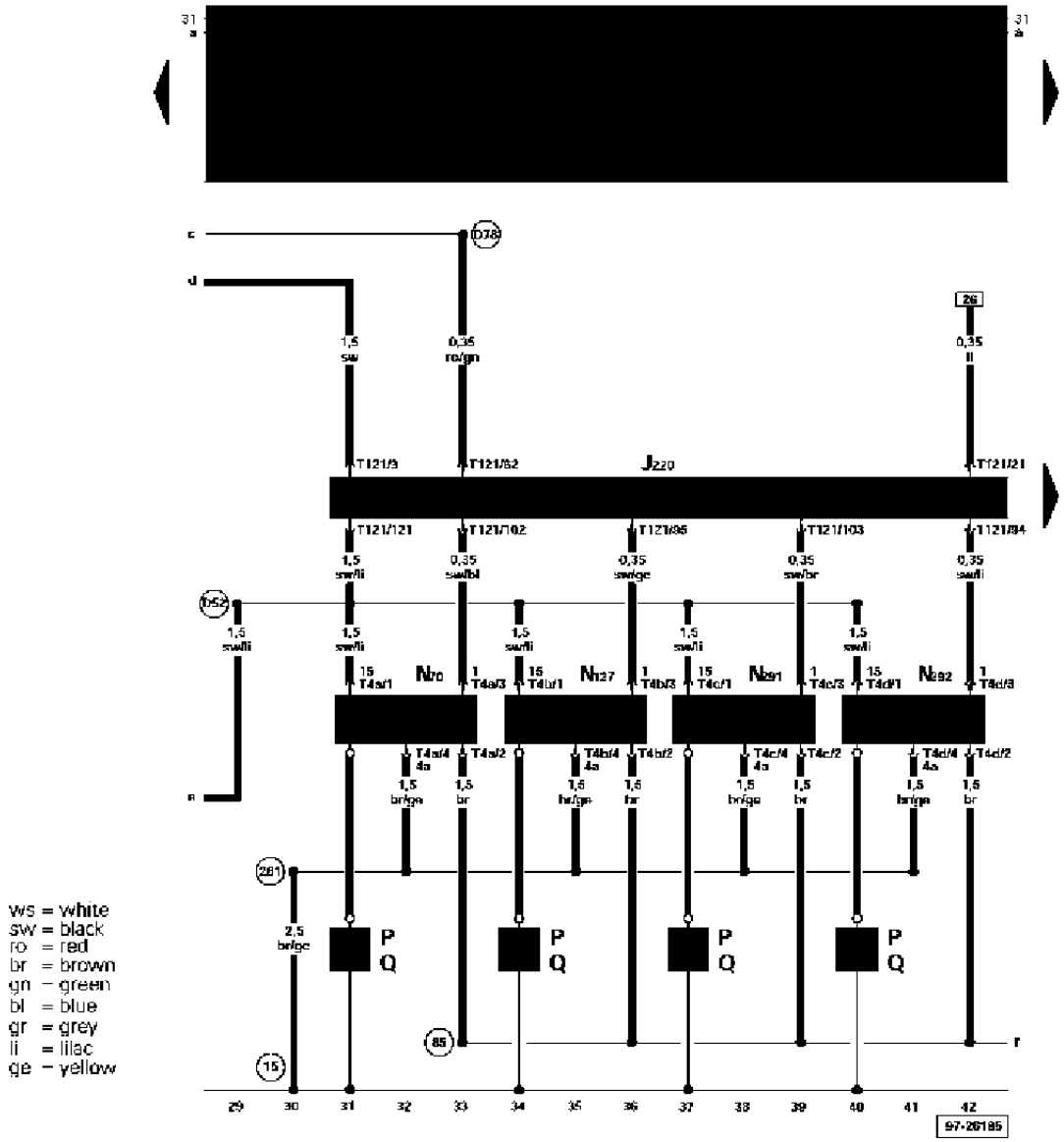


ws = white
sw = black
ro = red
br = brown
gn = green
bl = blue
gr = grey
li = lilac
ge = yellow

D - Ignition/Starter Switch
J271 - Motronic engine control module (ECM) power supply relay, in protective housing, in engine compartment, left, production control number (428)
S10 - Fuse 10 in fuse holder
S29 Fuse 29 in fuse holder
T2 - 2-Pin Connector, in engine compartment, left
T6 - 6-Pin Connector, brown, in protective housing for connectors, in plenum chamber, left
T14a - 14-Pin Connector, in engine compartment, in wiring duct, left

(501) - Threaded connection -2- (30) on the relay plate

(A2) - Plus connection (15), in instrument panel wiring harness
(A32) - Plus connection (30), in instrument panel wiring harness
(A98) - Plus connector -4- (30), in instrument panel wiring harness
(A104) - Plus connector -2- (15), in instrument panel wiring harness
(D78) - Plus connector -1- (30a), in engine compartment wiring harness



ws = white
sw = black
ro = red
br = brown
gn = green
bl = blue
gr = grey
li = lilac
ge = yellow

J220 - Motronic Engine Control Module (ECM), in plenum chamber, center
N70 - Ignition Coil 1 with Power Output Stage
N127 - Ignition Coil 2 with Power Output Stage
N291 - Ignition Coil 3 with Power Output Stage
N292 - Ignition Coil 4 with Power Output Stage
P - Spark Plug Connectors
Q - Spark Plugs
T4a - 4-Pin Connector
T4b - 4-Pin Connector
T4c - 4-Pin Connector
T4d - 4-Pin Connector
T121 - Connector, 121 point

(15) - Ground connection, on cylinder head
(85) - Ground connection -1-, in engine compartment wiring harness
(281) - Ground connector -1-, in wiring harness engine pre-wiring
(D52) - Plus connector (15a), in engine compartment wiring harness
(D78) - Plus connector -1- (30a), in engine compartment wiring harness

Motronic engine control module (ECM), ignition system

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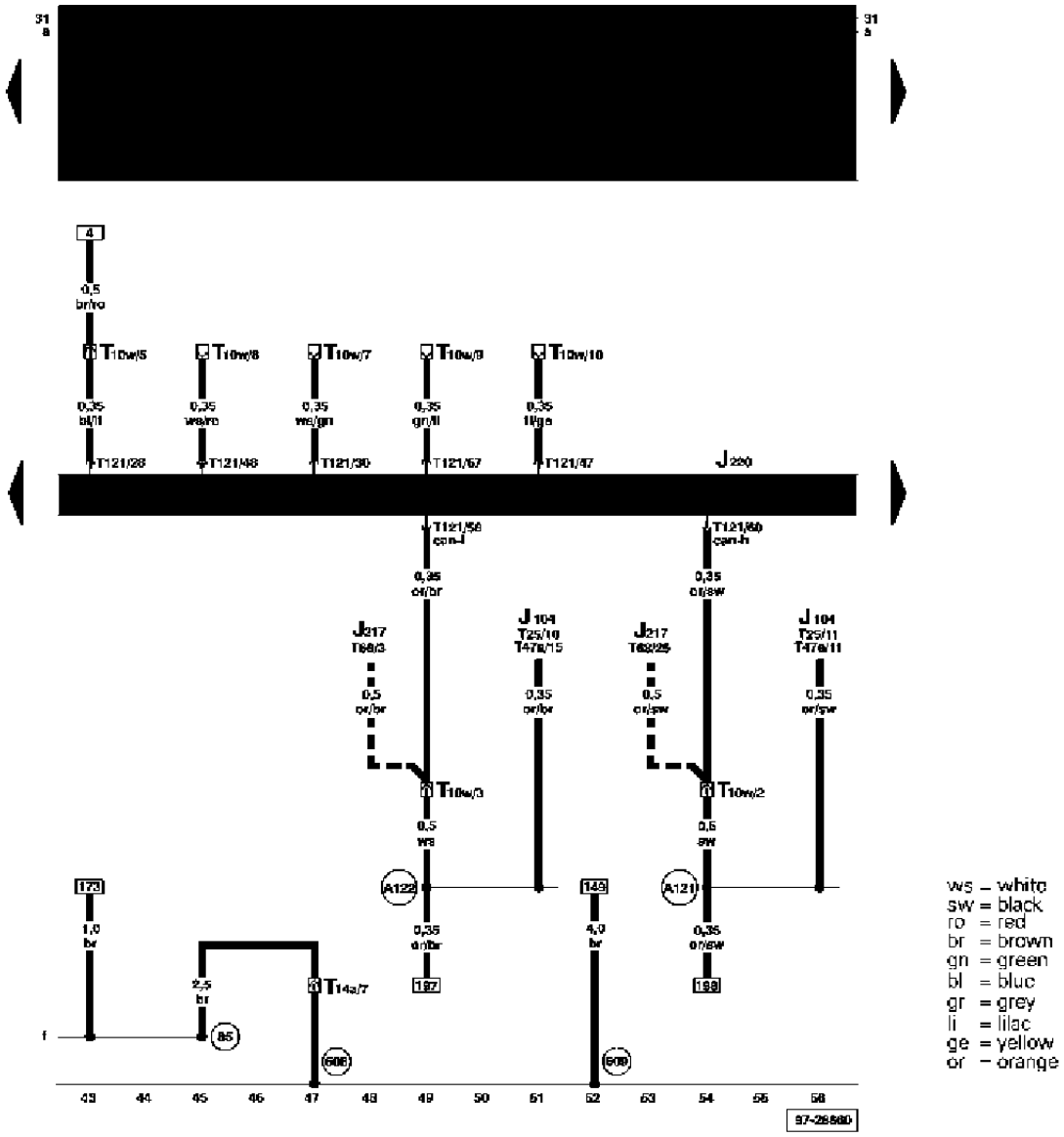


J104 - ABS Control Module (w/EDL), in engine compartment, left

J217 Transmission Control Module (TCM), in plenum chamber, center

J220 - Motronic Engine Control Module (ECM), in plenum chamber, center

T10w- 10-Pin Connector, white, in protective housing for connectors, in plenum chamber, left

T14a - 14-Pin Connector, in engine compartment, in wiring duct, left

T25 - 25-Pin Connector, on ABS Control Module (through July 2000)

T47a 47 Pin Connector, on ABS Control Module (beginning August 2000)

T68 - 68-Pin Connector, on Transmission Control Module (TCM)

T121 Connector, 121 point

(85) - Ground connection -1-, in engine compartment wiring harness

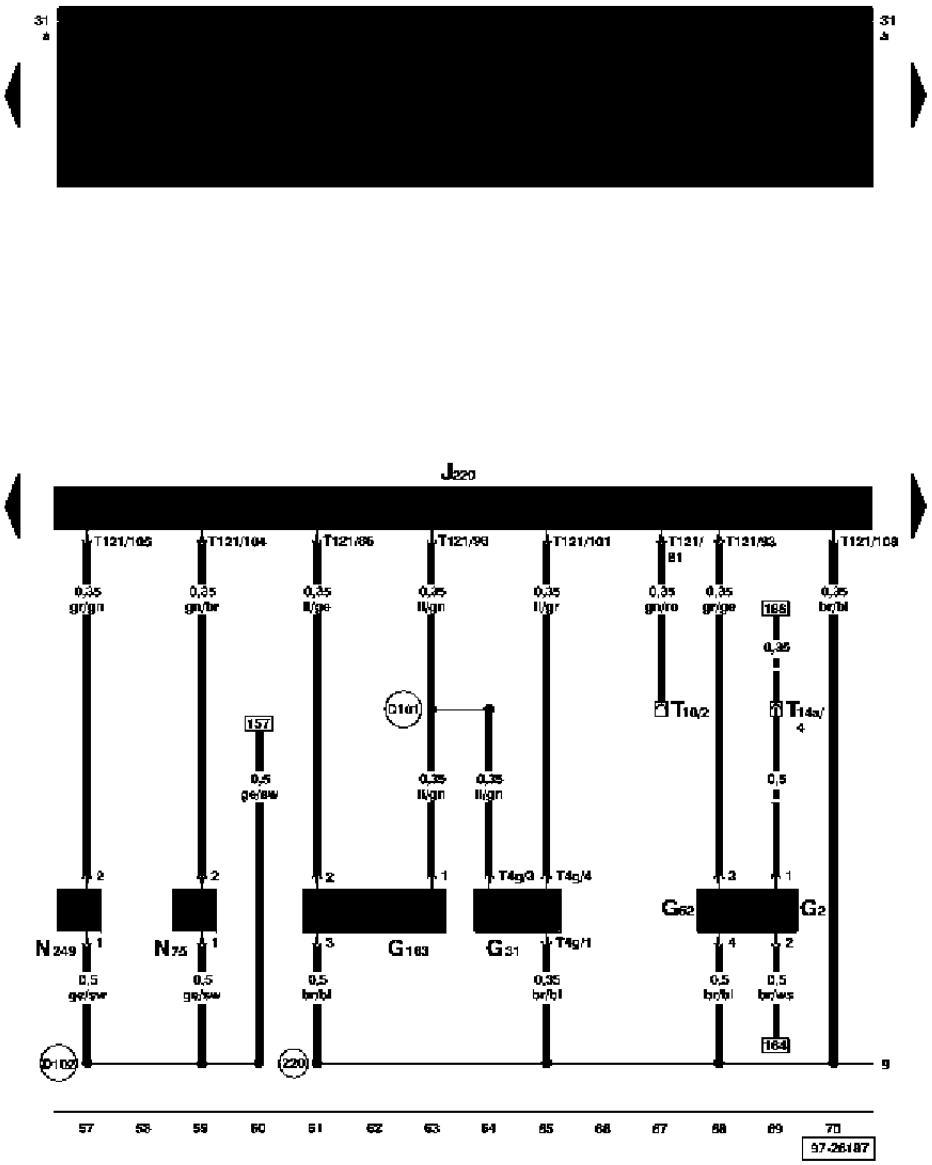
(608) - Ground Connection (in center plenum chamber)

(609) Ground Connection (in right plenum chamber)

(A121) - Connection (high bus), in instrument panel wiring harness

(A122) - Connection (low bus), in instrument panel wiring harness

--- Automatic transmission only

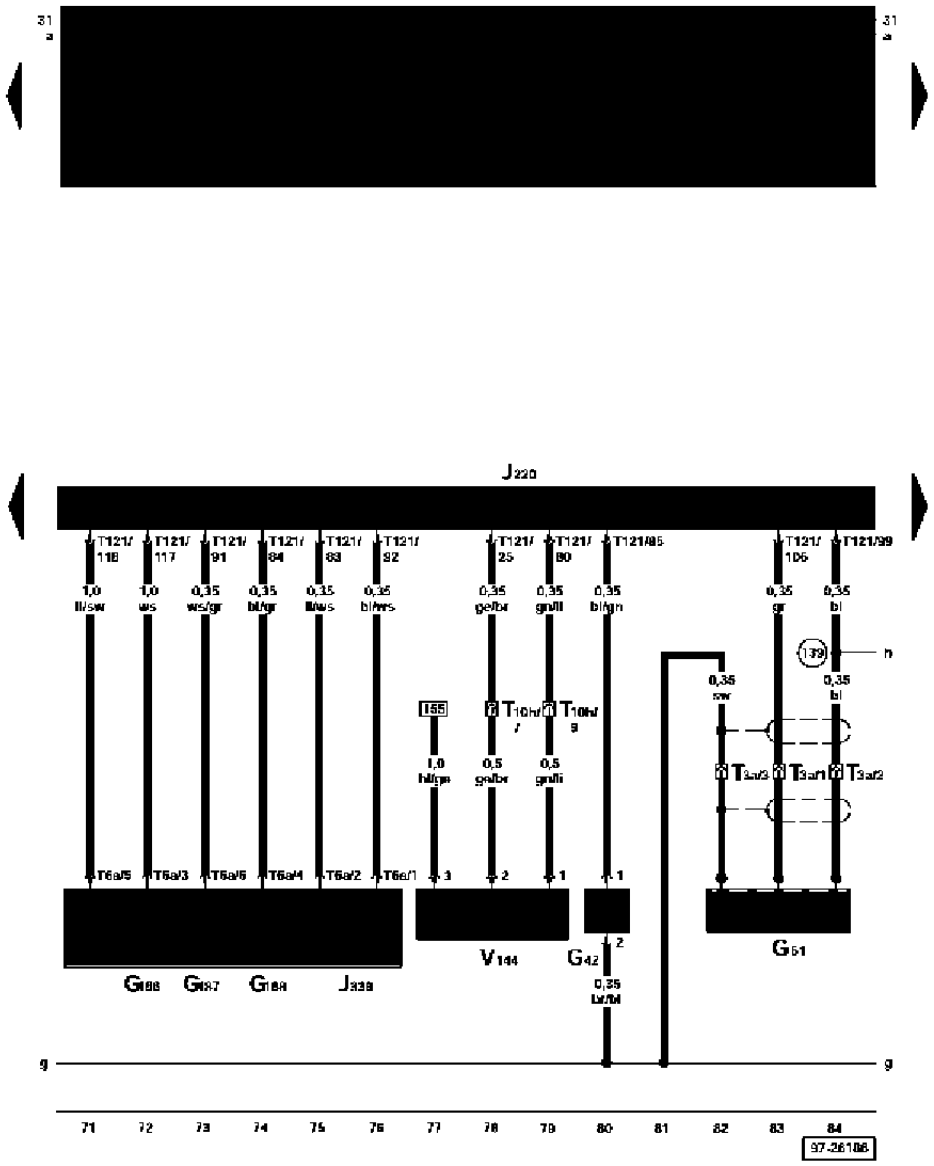


ws = white
sw = black
ro = red
br = brown
gn = green
bl = blue
gr = grey
li = lilac
ge = yellow

G2 - Engine Coolant Temperature (ECT) Sensor
G31 - Charge Air Pressure Sensor
G62 - Engine Coolant Temperature (ECT) Sensor
G163 - Camshaft Position (CMP) Sensor 2
J220 - Motronic Engine Control Module (ECM), in plenum chamber, center
N75 - Wastegate Bypass Regulator Valve
N249 - Recirculating valve for turbocharger
T4g - 4-Pin Connector
T10 - 10-Pin Connector, orange, in protective housing for connectors, in plenum chamber, left
T14a - 14-Pin Connector, in engine compartment, in wiring duct, left
T121 - Connector, 121 point

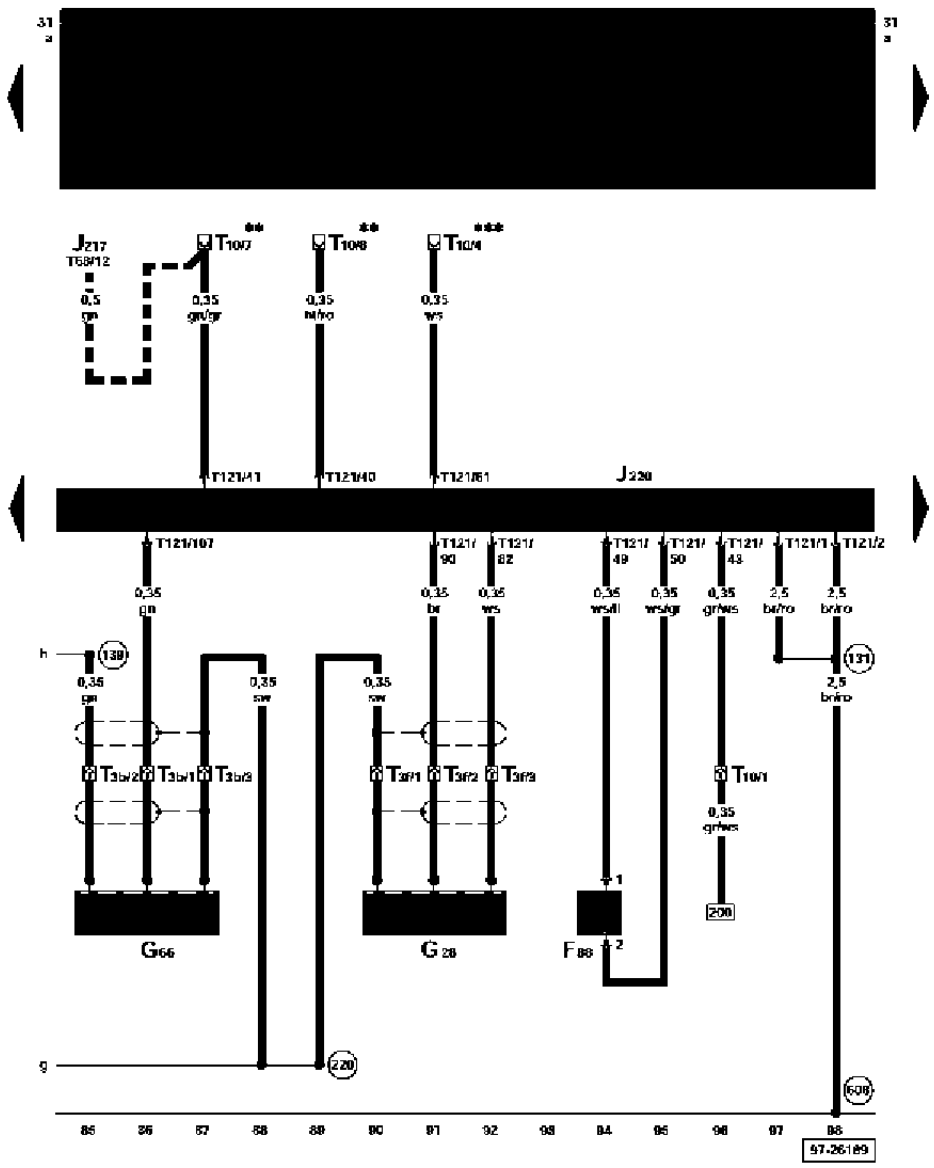
220 - Ground connection (sensor ground), in engine compartment wiring harness
D101 - Wire connection -1-, in engine compartment wiring harness
D102 - Wire connection -2-, in engine compartment wiring harness

Motronic engine control module (ECM), (ECT) sensor, charge air pressure sensor, camshaft position (CMP) sensor 2, wastegate bypass regulator valve, recirculating valve for turbocharger **Edition 12/00** USA.5102.09.21



G42 - Intake Air Temperature (IAT) Sensor
G61 Knock Sensor (KS) 1
G186 - Throttle drive (power accelerator actuation)
G187 - Angle sensor -1- for throttle drive (power accelerator actuation)
G188 - Angle sensor -2- for throttle drive (power accelerator actuation)
J220 Motronic Engine Control Module (ECM), in plenum chamber, center
J338 - Throttle Valve Control Module
T3a - 3-Pin Connector, in engine compartment, front
T6a - 6-Pin Connector
T10h 10 Pin Connector, blue, in protective housing for connectors, in plenum chamber, left
T121 - Connector, 121 point
V144 - Leak detection pump (LDP)
(139) - Ground connection (sensor Ground), in Motronic Multiport Fuel Injection (MFI) wiring harness

Edition 11/99 **Motronic engine control module (ECM), angle sensor for throttle drive (power accelerator actuation), intake air temperature (IAT) sensor, knock sensor (KS) 1, leak detection pump (LDP)**
USA.5102.05.21



ws = white
sw = black
ro = red
br = brown
gn = green
bl = blue
gr = grey
li = lilac
ge = yellow

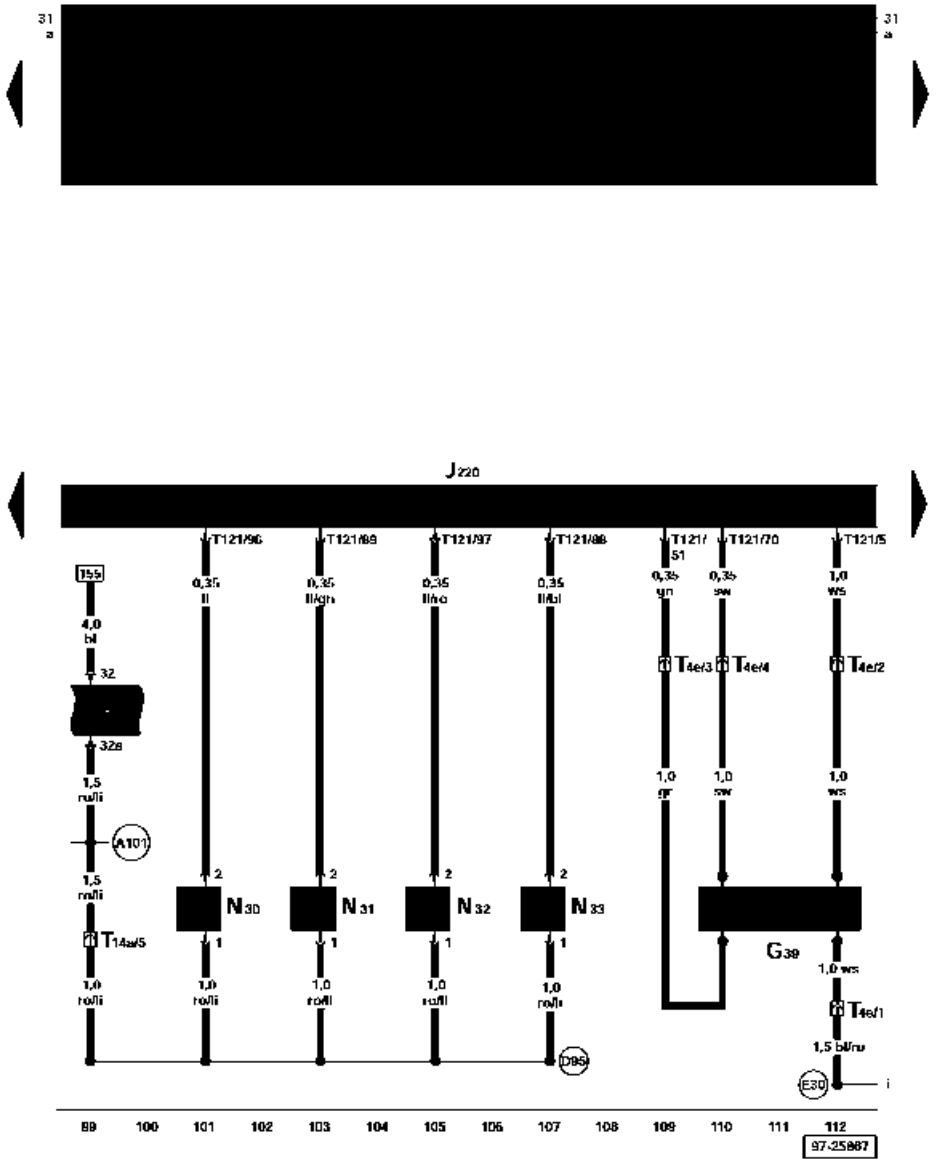
F88 - Pressure switch/power steering
G28 - Engine Speed (RPM) Sensor
G66 - Knock Sensor (KS) 2
J217 - Transmission Control Module (TCM), in plenum chamber, center
J220 - Motronic Engine Control Module (ECM), in plenum chamber, center
T3b - 3-Pin Connector, in engine compartment, front
T3f - 3-Pin Connector, in engine compartment, front
T10 - 10-Pin Connector, orange, in protective housing for connectors, in plenum chamber, left
T68 - Connector, 68 point
T121 - Connector, 121 point

(131) - Ground connection -2-, in engine compartment wiring harness
(139) - Ground connection (sensor Ground), in Motronic Multiport Fuel Injection (MFI) wiring harness
(220) - Ground connection (sensor ground), in engine compartment wiring harness
(608) Ground Connection (in center plenum chamber)

** - A/C connection
*** - Coolant Fan Control Module connection
--- - Automatic transmission only

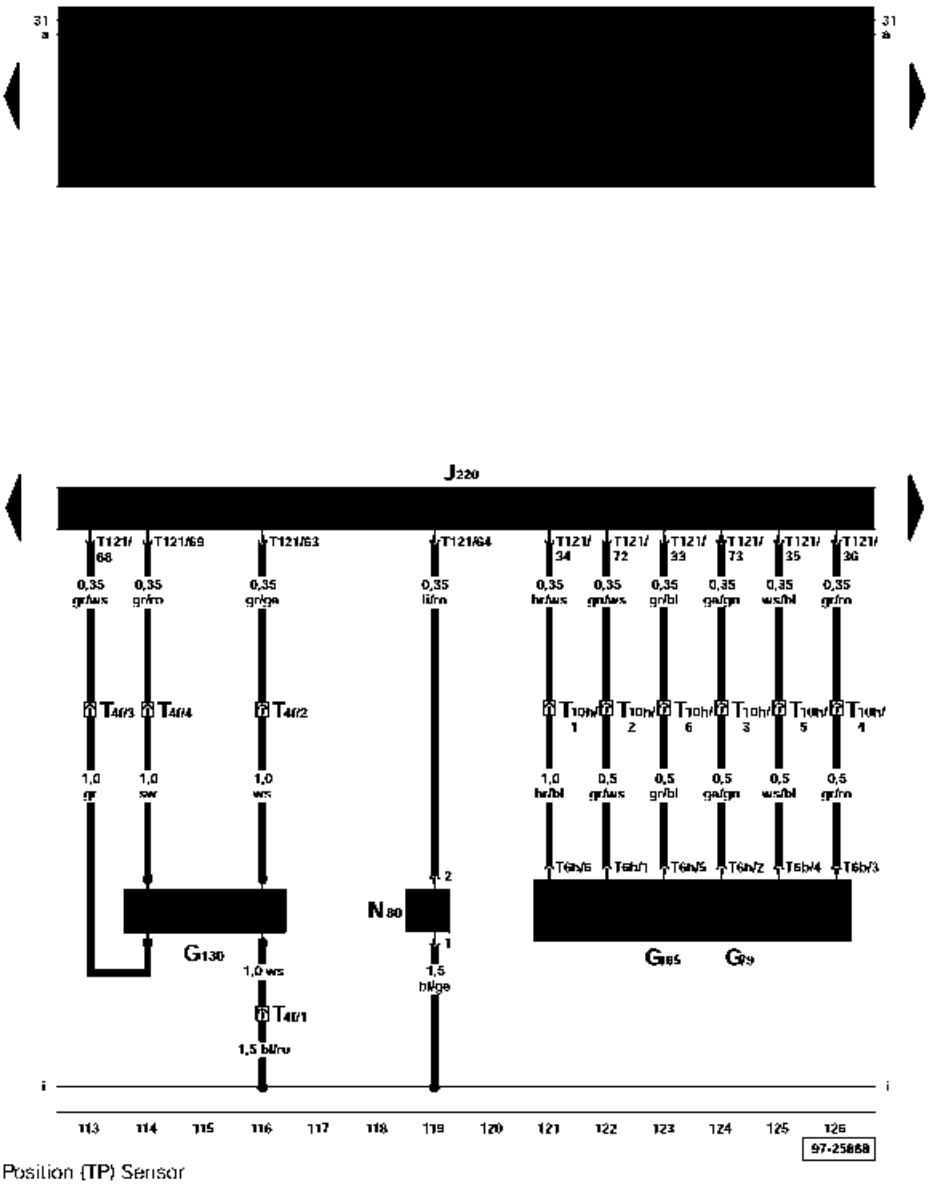
Motronic engine control module (ECM), pressure switch/power steering, engine speed (RPM) sensor, knock sensor (KS) 2

Edition 11/99
USA.6102.05.21

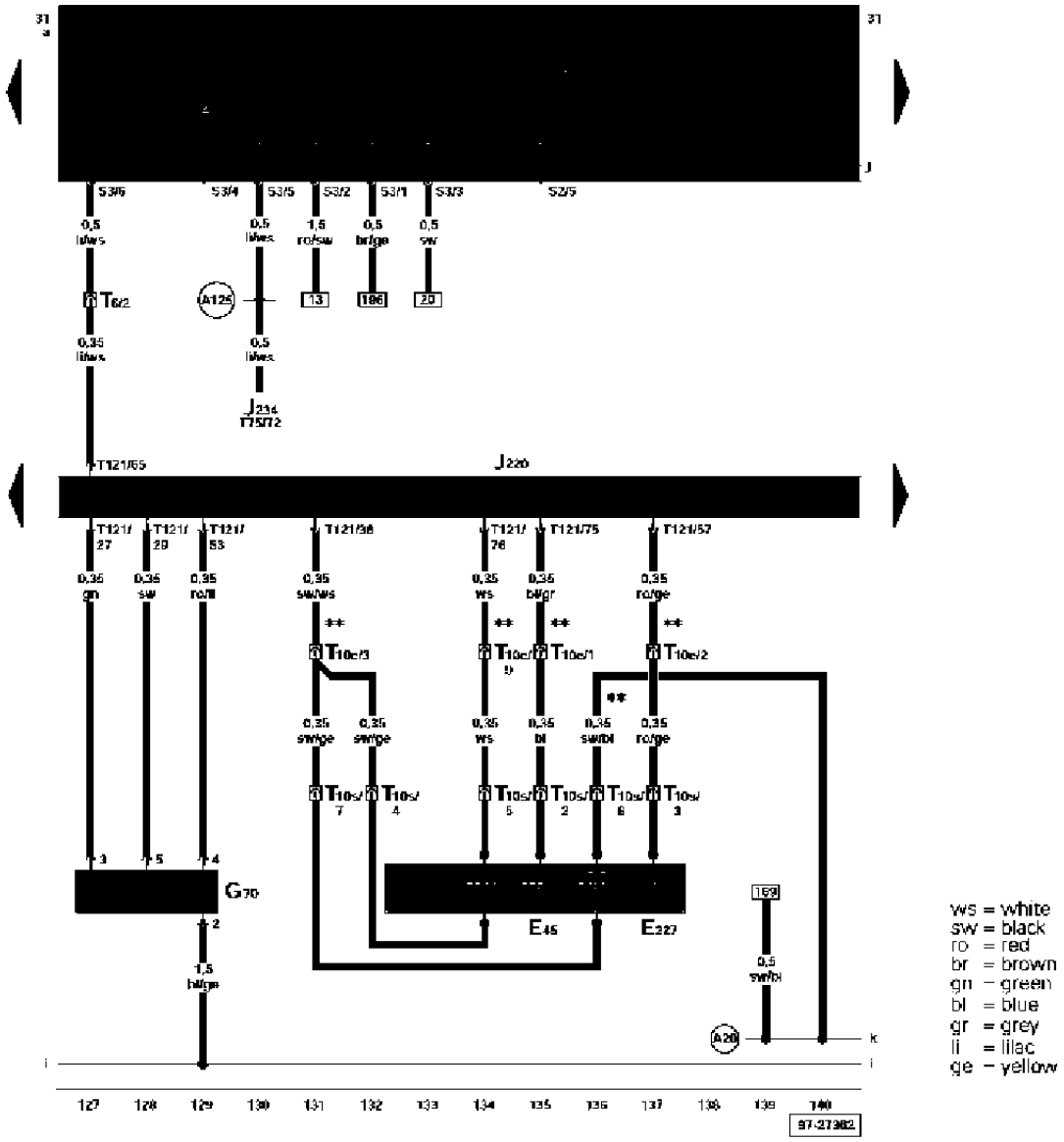


G39 - Heated Oxygen Sensor (HO2S)
J220 Motronic Engine Control Module (FCM), in plenum chamber, center
N30 - Cylinder 1 Fuel Injector
N31 - Cylinder 2 Fuel Injector
N32 - Cylinder 3 Fuel Injector
N33 Cylinder 4 Fuel Injector
S232 - Fuse 32 in fuse holder
T4e - 4-Pin Connector, in protective housing for connectors under right floor
T14a - 14-Pin Connector, in engine compartment, in wiring duct, left
T121 Connector, 121 point

(A101) - Connector -3- (87a), in instrument panel wiring harness
(D95) - Wire connection (injectors), in engine compartment wiring harness
(E30) - Connector (87a), in wiring harness engine



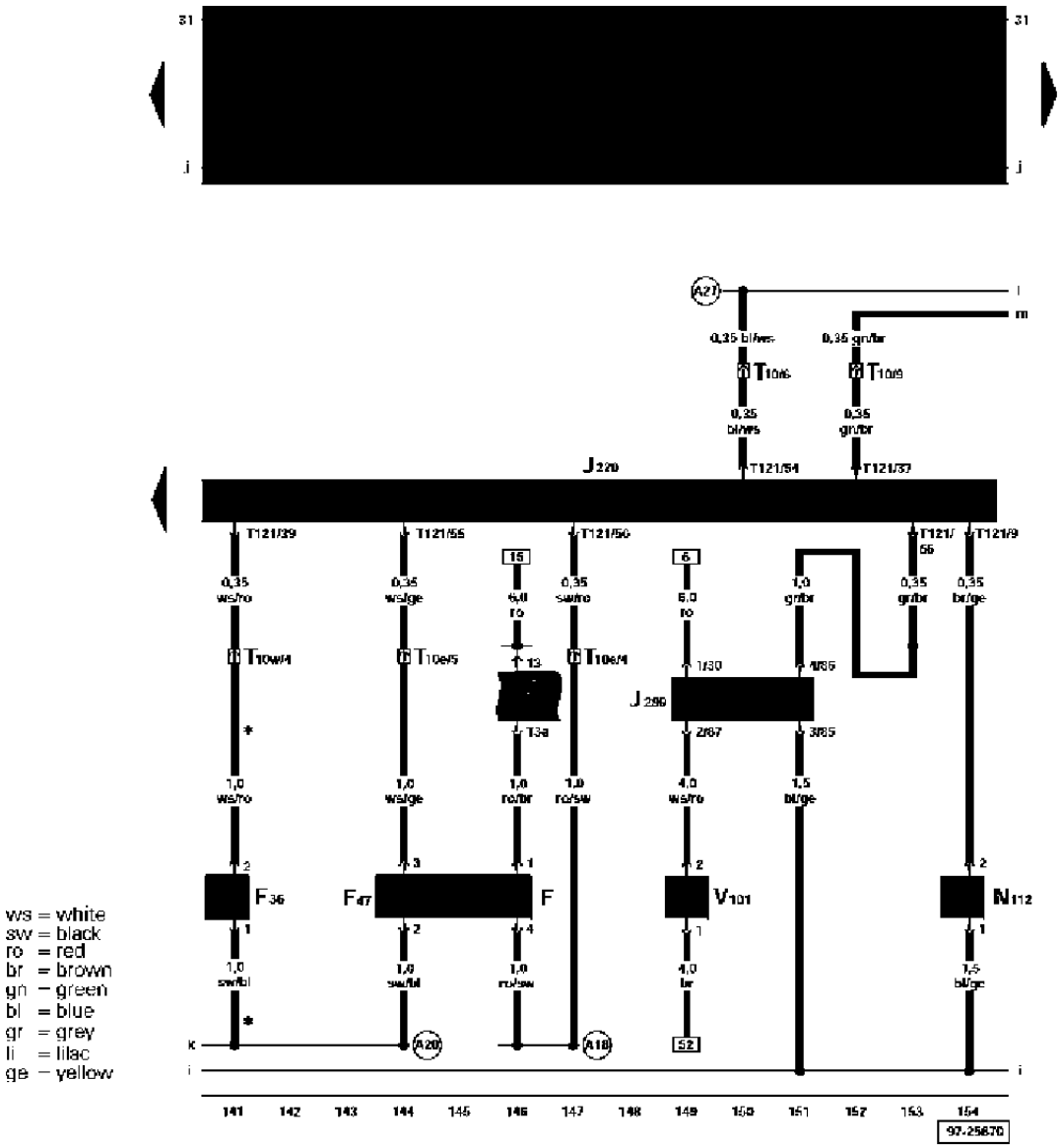
G79 - Throttle Position (TP) Sensor
G130 Oxygen Sensor (O2S) behind Three Way Catalytic Converter (TWC)
G185 - Sender -2- for accelerator pedal position
J220 - Motronic Engine Control Module (ECM), in plenum chamber, center
N80 - Evaporative Emission (EVAP) Canister Purge Regulator Valve
T4f 4 Pin Connector, in protective housing for connectors under right floor
T6b - 6-Pin Connector
10h - 10-Pin Connector, blue, in protective housing for connectors, in plenum chamber, left
T121 - Connector, 121 point



E45 - Cruise Control Switch**
E227 - Cruise Control Push Button (SET)**
G70 - Mass Air Flow (MAF) Sensor
J17 - Fuel Pump (FP) Relay
J220 - Motronic Engine Control Module (ECM), in plenum chamber, center
J234 - Airbag Control Module
T6 6 Pin Connector, brown, in protective housing for connectors, in plenum chamber, left
T10e - 10-Pin Connector, black, in protective housing for connectors, in plenum chamber, left
T10s - 10-Pin Connector, near steering column
T75 - 75-Pin Connector
T121 Connector, 121 point

(A20) - Wire connection (15a), in instrument panel wiring harness
(A125) - Connection (crash signal) in instrument panel wiring harness

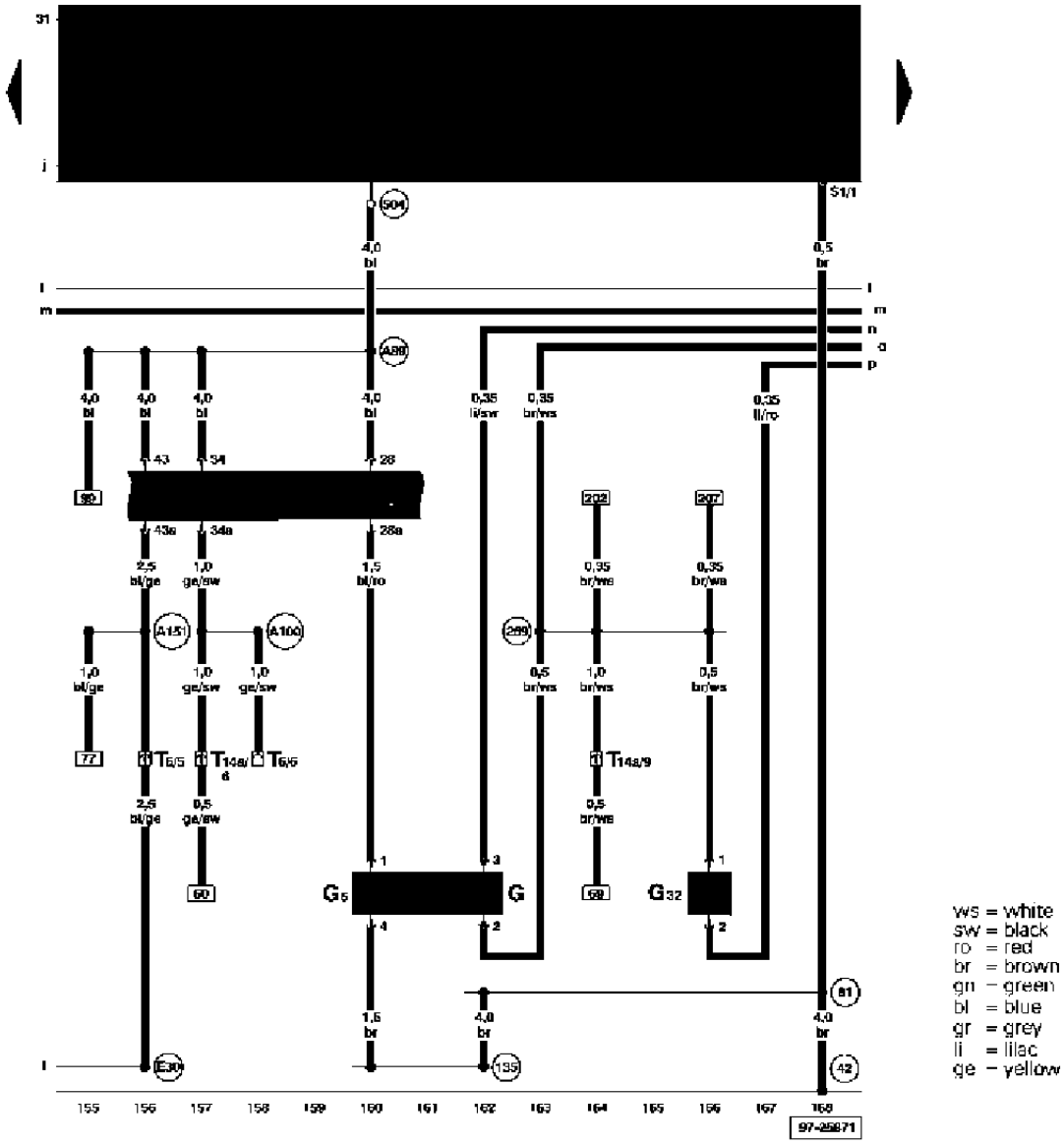
** Vehicles with cruise control only



ws = white
sw = black
ro = red
br = brown
gn = green
bl = blue
gr = grey
li = lilac
ge = yellow

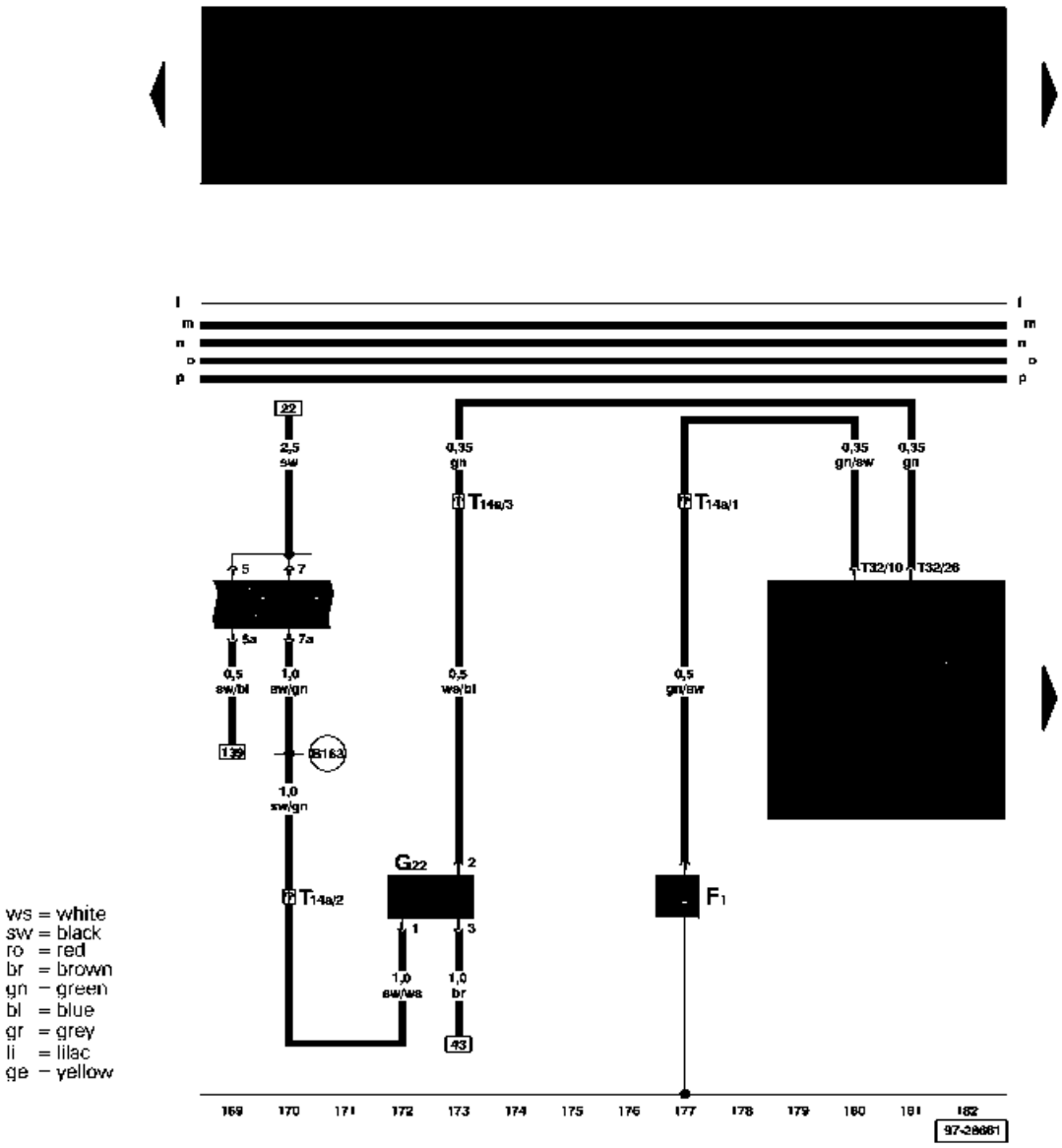
I - Brake Light Switch
F36 - Clutch Vacuum Vent Valve Switch
F47 Brake Vacuum Vent Valve Switch for cruise control
J220 - Motronic Engine Control Module (ECM), in plenum chamber, centor
J299 - Secondary Air Injection (AIR) Pump Relay, in protective housing, in engine compartment, left, production control number (100)
N112 - Secondary Air Injection (AIR) Solenoid Valve
S13 - Fuse 13 in fuse holder
T10 - 10-Pin Connector, orange, in protective housing for connectors, in plenum chamber, left
T10e - 10-Pin Connector, black, in protective housing for connectors, in plenum chamber, left
T10w- 10-Pin Connector, white, in protective housing for connectors, in plenum chamber, left
T121 - Connector, 121 point
V101 - Secondary Air Injection (AIR) Pump Motor
(A18) - Wire connection (54), in instrument panel
(A20) - Wire connection (15a), in instrument panel wiring harness
(A27) - Wire Connection (vehicle speed signal), in instrument panel wiring harness
* - Manual transmission only

Motronic engine control module (ECM), secondary air injection (AIR) pump system, brake light switch, clutch vacuum vent valve switch, brake vacuum vent valve switch **Edition 06/00** USA.5102.06.21



G - Fuel Level Sensor
G6 - Fuel Pump (FP)
G32 - Engine Coolant Level (ECL) Sensor
S228 - Fuse 28 in fuse holder
S234 - Fuse 34 in fuse holder
S243 - Fuse 43 in fuse holder
T6 - 6-Pin Connector, brown, in protective housing for connectors, in plenum chamber, left
T14a - 14-Pin Connector, in engine compartment, in wiring duct, left

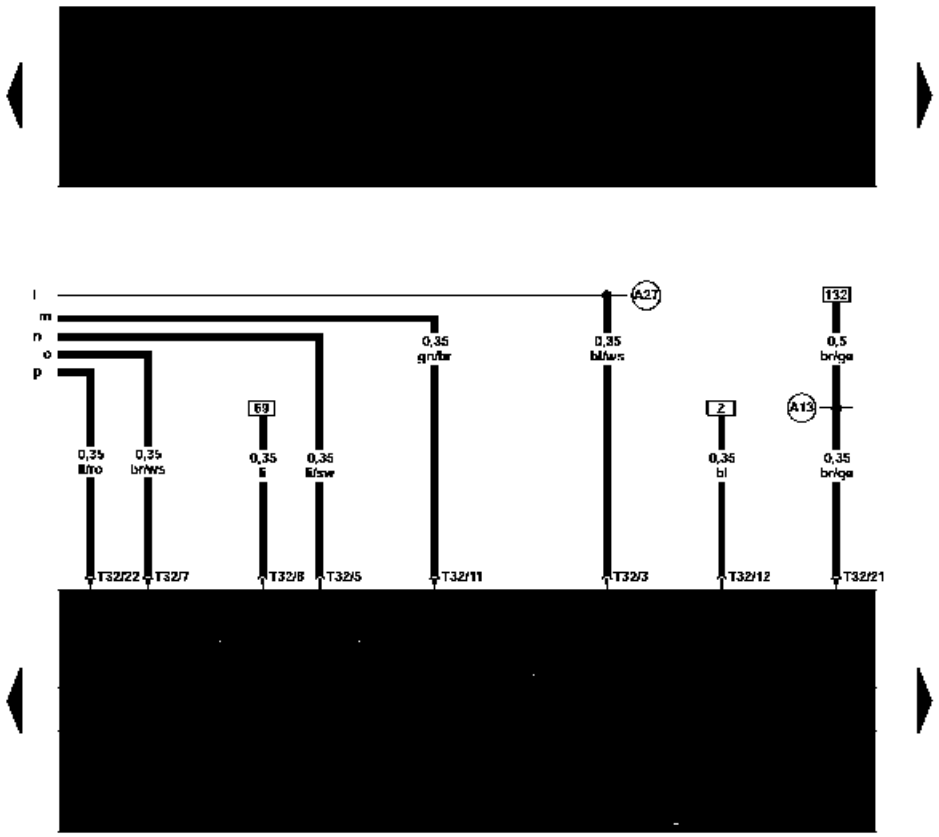
(42) - Ground connection, beside steering column
(81) - Ground connection 1, in instrument panel wiring harness
(135) - Ground connection 2, in instrument panel wiring harness
(269) - Ground connection (sensor ground) -1-, in instrument panel wiring harness
(504) - Threaded connection -1- (87) on the relay plate
(A99) - Connector -1- (87), in instrument panel wiring harness
(A100) - Connector -2- (87), in instrument panel wiring harness
(A151) - Connector 4 (87), in instrument panel wiring harness
(E30) - Connector (87a), in wiring harness engine



ws = white
sw = black
ro = red
br = brown
gn = green
bl = blue
gr = grey
li = lilac
ge = yellow

F1 - Oil Pressure Switch
G22 - Speedometer Vehicle Speed Sensor (VSS)
J285 - Control module with indicator unit in instrument panel insert
K3 - Oil Pressure Warning Light
K38 - Engine Oil Level Indicator Light
S5 - Fuse 5 in fuse holder
S7 - Fuse 7 in fuse holder
T14a - 14-Pin Connector, in engine compartment, in wiring duct, left
T32 - 32-Pin Connector, blue

B163 Plus connector 1 (15) in wiring harness interior



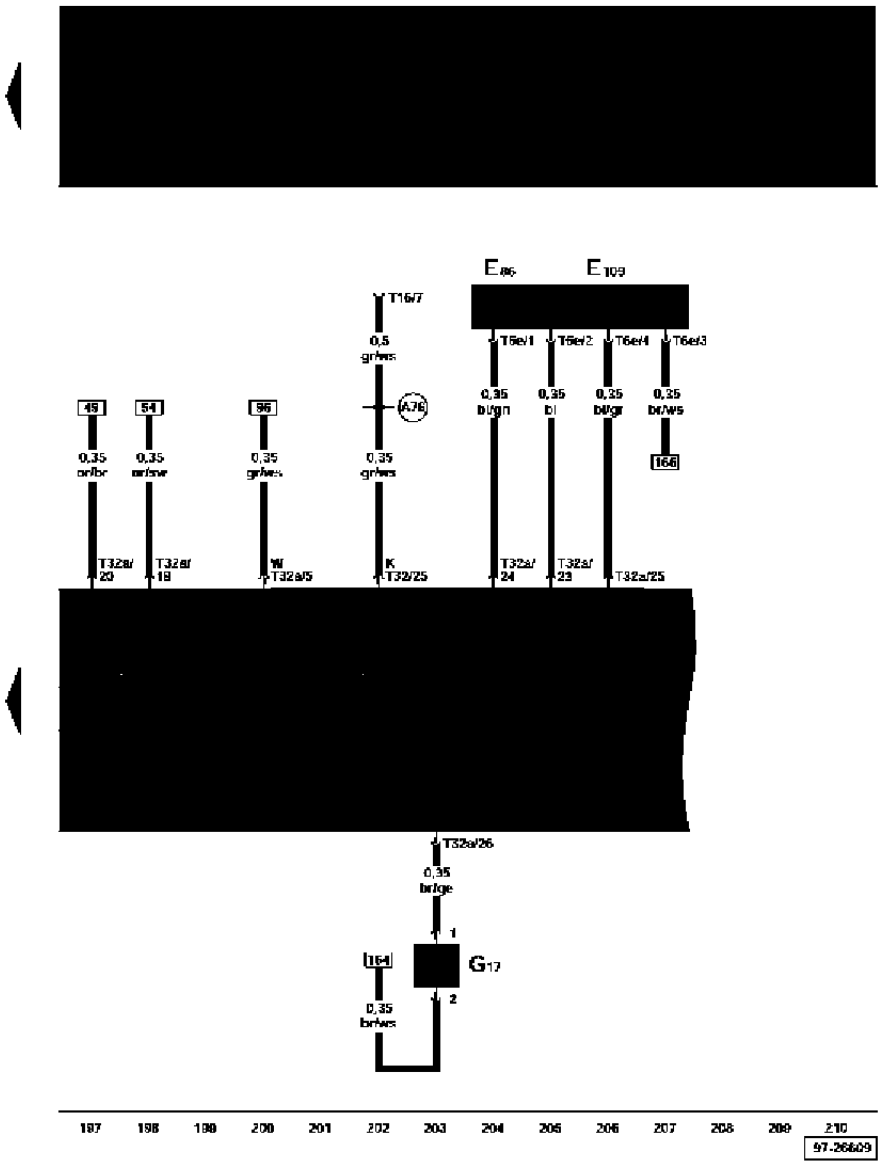
ws = white
sw = black
ro = red
br = brown
gn = green
bl = blue
gr = grey
li = lilac
ge = yellow

183 184 185 186 187 188 189 190 191 192 193 194 195 196

97-26192

G1 - Fuel gauge
G3 - Engine Coolant Temperature (ECT) Gauge
G5 Tachometer
G21 - Speedometer
H3 - Warning Buzzer
J285 - Control module with indicator unit in instrument panel insert
K2 Generator (GEN) Warning Light
K28 - Engine Coolant Level/Temperature (ECL/ECT) Warning Light
K105 - Low Fuel Level Warning Light
T32 - 32-Pin Connector, blue

(A13) - Wire connection (door contact switch), in instrument panel wiring harness
(A27) - Wire Connection (vehicle speed signal), in instrument panel wiring harness



ws = white
sw = black
ro = red
br = brown
gn = green
bl = blue
gr = grey
li = lilac
ge = yellow
or = orange

F86 - Multi Function Indicator Mode Select Switch
E109 - Multi-Function Indicator Memory Switch
G17 - Outside Air Temperature Sensor
J119 - Multi-function Indicator (MFI)
J285 - Control module with indicator unit in instrument panel insert
J533 - Data Bus On Board Diagnostic Interface
K83 - Malfunction Indicator Lamp (MIL)
K132 - Electronic Power Control (EPC) Warning Lamp
T6e - 6-Pin Connector
T16 - Data Link Connector (DLC), below instrument panel, center
T32 - 32-Pin Connector, blue
T32a - 32 Pin Connector, green

(A76) Connector (K diagnosis wire), in instrument panel wiring harness

Instrument cluster, multi-function indicator (MFI), outside air temperature sensor, electronic power control (EPC) warning lamp

Glossary

American Wire Gauge (AWG): The American standard for wire size, expressed in units from 2 gauge to 22 gauge.

Central relay panel: A centralized location for relays and circuits in an automobile. Includes common circuits used to provide battery power, ignition "ON", and Ground to vehicle systems.

Control Module: A transistorized, rather than analog, switching circuit that relies on one or inputs to control the switching of a logic circuit.

Current track number: A method of following circuits within Volkswagen wiring diagrams. The wiring diagram is numbered along the bottom of the page to aid in navigating between disconnected pages.

DIN (Deutsche Institut fur Normung) standards: German institute for standards that establishes guidelines for manufacturing and nomenclature.

Electric motor: A motor driven by electromotive force.

Fuse: A component installed in series with a circuit, designed to disrupt the circuit when carrying more than its specified amperage. Fuses are placed in circuits to protect other components in the circuit from damage.

Ground: A wire connected to the vehicle's chassis (and therefore the Ground). This allows power to be supplied by one insulated wire, while the chassis acts as the return path.

Internal conductors: Connections inside of a component, often not designated in the wiring diagrams.

Load reduction circuit: A circuit designed to switch off high current electrical consumers during starting to insure optimal available voltage supply to the starter. The term comes from removing the load of the consumers from the Ignition switch.

Metric wire sizes: The metric system for wire size, expressed in mm^2. This designates the cross-sectional area of the wire. The wiring used in Volkswagen vehicles ranges from .35 to 35 mm^2.

Multi-point connectors: A connector installed in a wiring harness that allows the wiring harness to be detached from the component.

Potentiometer: see Rheostat

Relay: Component that uses a low current to switch a high current circuit.

Resistor: A component that creates a voltage drop in a circuit. Resistors can be used for measurement of current flow, as well as to drop the applied voltage for certain consumers.

Rheostat: A resistor that varies its resistance based on a mechanical input.

Push-on connectors: See Multi-point connector.

Solenoid: Used to actuate other components, a solenoid consists of a coil of wire wrapped around an iron core. When a current is passed through a wire, a magnetic field is induced. This magnetic "pull" is used to operate other components.

Switch: A component used to disrupt or redirect current flow.

Symbols: Graphical representations of electrical components in Volkswagen wiring diagrams

Temperature dependent resistor: A resistor that varies its resistance with temperature.

Threaded Connectors: A connector consisting of a threaded stud to which other wires attach. Often used in high Amperage circuits.

Vehicle Chassis: See Ground.

Welded Connectors: A connection inside of a component created by compressing several wires together under high heat, partially melting the separate wires together.

X circuit: See Load reduction circuit.

How to Read Wiring Diagrams Teletest

The test accompanying this course, #873003, has been prepared and shipped as a separate document. Please refer to your copy of that document and follow the testing instructions to complete the Teletest.

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