Eberspächer

HEATERS FOR VOLKSWAGEN VEHICULES

B-Heaters

1. Heaters supplied for certain vehicle types as optional extras

VW Passenger Cars

Code No.	Heater for	Remarks	Heater No.
01			
02			
03			
04			
05			
06	VW 1500 / VW Variant	6 V	20 1144 00 00 00
		12 V	20 1188 00 00 00
07			
08			
09			
10			
11			

VW Commercial Vehicles

21			
22	VW Transporter, Type BN 4	6 V	20 1104 00 00 00
		12 V	20 1147 00 00 00
23			
24			
25	VW Double Cab Pick-Up, Type BN 4	6 V	20 1127 00 00 00
		12 V	20 1176 00 00 00
26			
27	VW Ambulance, Type BN 4	6 V	20 1128 00 00 00
		12 V	20 1177 00 00 00
28			
29			
30			

Note: Fitting instructions are supplied with the heaters for service installation in all Volkswagen vehicles.

Summary of contents

Foreword

This service manual for the Eberspächer range of heating units has been made up to meet the requirements of the workshop.

The contents are divided into main sections and then sub-divided into the individual heater types. This makes the subject matter very clear and easy to understand and also facilitates the finding of any particular item.

The information given here is continually being amended and supplemented so that you always have the very latest and most complete data on the Eberspächer heaters to hand.

J. EBERSPÄCHER

Main Sections:

A	Operating instructions and maintenance
B	Fitting instructions
C	Trouble shooting and repair instructions
D	Spare parts
E	Additional parts
F	Workshop Bulletins
No letter	Service

A list of heaters with code numbers follows

Application example:

The heater for the VW 1500, heater number 20 1144 00 00 00 has the code number 06.

This means that you will find the operating instructions for this heater under A 06, the spare parts list under D 06 and the workshop bulletins under F 06.

Replacement of superseded pages

Every page has an index and heater code number and also an issue date and printing number. When an amendment has been made, you merely have to replace the old page (earlier issue date) by the new one and your book is complete and right up to date again.

P.O. BOX NO. 209 · TEL. [illegible] 55 · TELEX. 072 3584

Eberspächer HEATERS

Warranty Conditions for Vehicle Heaters

The following warranty conditions only apply to Eberspächer heaters which are sold direct to workshops in the VW Organization by Messrs. Eberspächer without bringing in the Volkswagenwerk AG.

Warranty work on Eberspächer heaters which are supplied by the Volkswagenwerk AG (e. g. as M-equipment) is carried out in accordance with the instructions from the Volkswagenwerk AG.

1 - We warrant the articles to be as assured and free from defects in accordance with the technical standards existing at time of manufacture. General alterations in the construction or design which we make on an article before executing an order do not constitute grounds for complaint.

2 - The warranty period begins on the date of installation of the heater or the initial registration of the vehicle and lasts for 6 months.

3 - Warranty claims will only be recognized if the warranty card which is supplied with every article is filled out properly by the workshop carrying out the installation and presented to us with the defective part. The control card must be filled out properly, signed and sent to us immediately after installation.

4 - a) The warranty covers, at our choice, either repair or replacement of the defective product, which is to be forwarded to us post or carriage paid. Only the defective parts will be replaced and the parts of the article supplied by us which are damaged by the defect despite proper care. Replaced parts become our property.

b) The warranty covers only parts of articles supplied by us.

5 - If we recognize a warranty claim, the cost of returning the articles by the cheapest method (in Germany) will be charged to our account.

There is no liability for consequential loss or damage of any nature.

6 - The purchase contract cannot be cancelled or the purchase price reduced unless we are not in a position to repair the defect.

7 - The warranty becomes void if the articles supplied are altered by unauthorized persons or by the installation of parts which have not been approved. The warranty also becomes void if the handling and fitting instructions have not been following and if the appliance has been used under other than normal operating conditions.

8 - a) Natural wear and damage due to careless treatment are also excluded from the warranty. We shall, in particular, not accept responsibility for alterations in the condition or operating performance of our products which are caused by improper storage and climatic or other influences.

b) Expendable parts such as heater plugs, etc. are not covered by this warranty.

9 - Warranty claims will only be accepted if submitted in writing without delay. Furthermore, free-of-charge repair must be demanded expressly and immediately. The warranty period will not be extended or renewed by repair or replacement.

See also our Workshop Bulletin F, Printing No. 2216, Instructions for Warranty Work in VW Workshops.

J. EBERSPÄCHER · 7300 ESSLINGEN/N., P.O. BOX NO. 289 · TEL. 35 65 55 · TELEX. 072 3584

SUBJECT TO ALTERATION
JULY 1963 ISSUE

Type BN 4
for VW Transporter
VW Double Cab Pick-up
VW Ambulance

Technical Description

The heater has a heat exchanger which consists of a cylindrical combustion chamber and a concentrically arranged annular chamber. These chambers are connected by two openings so that at one point the exhaust gases are flowing through the heat exchanger in a reverse direction. In front of the central part of the heat exchanger is the combustion chamber which is extended to carry the electric motor with fresh air and combustion air blowers.

Under the cover on the outer part of the housing are the diaphragm pressure regulator with the fuel solenoid valve, the fuel jet, the ignition coil, the heater plug, the thermo-switch, the safety switch and the overheating switch.

At the side of the cover is the spark plug. The electric fuel pump and the fuel filter are underneath the heater near the combustion air intake pipe and the exhaust pipe.

A bimetal spring flap and a regulator switch are installed in the warm air duct which is connected to the heat exchanger.

A push-pull switch and a knob which regulates the heating are fitted on the left-hand side of the seat base in the drivers cab. A warning lamp is installed in the push-pull switch.

Operation

The heater is switched on by means of the push-pull switch on the left-hand side of the seat base. When the switch is operated, current is supplied to the electric motor and the combustion air and fresh air blowers start to turn.

At the same time, the electric fuel pump delivers fuel to the combustion chamber via the diaphragm pressure regulator, solenoid valve and fuel jet. Here the fuel impinges on a toothed ring on the combustion air blower and is atomized.

The combustion air which is given a rotary movement by a guide blade housing now mixes with the atomized fuel and forms a combustible mixture.

The heater plug also receives current and heats up the mixture so that it will ignite readily.

The spark plug receives current via the ignition coil and ignites the fuel/air mixture. The resulting flame contacts the feeler tube at the end of the heat exchanger and the thermo-switch switches the heater plug off again. The spark plug continues to work as long as the heater is in operation.

The fresh air being drawn in is forced past the heat exchanger into the interior of the vehicle body. A bimetal spring flap in the outlet prevents the flow of cold air and does not open until the air temperature is about 35° C (95° F).

The warm air temperature can be set between 40° and 100° C by means of the knob located near the push-pull switch. When the desired temperature has been reached, the regulator switch cuts off the current supply to the solenoid fuel valve and thus stops the flow of fuel to the combustion chamber.

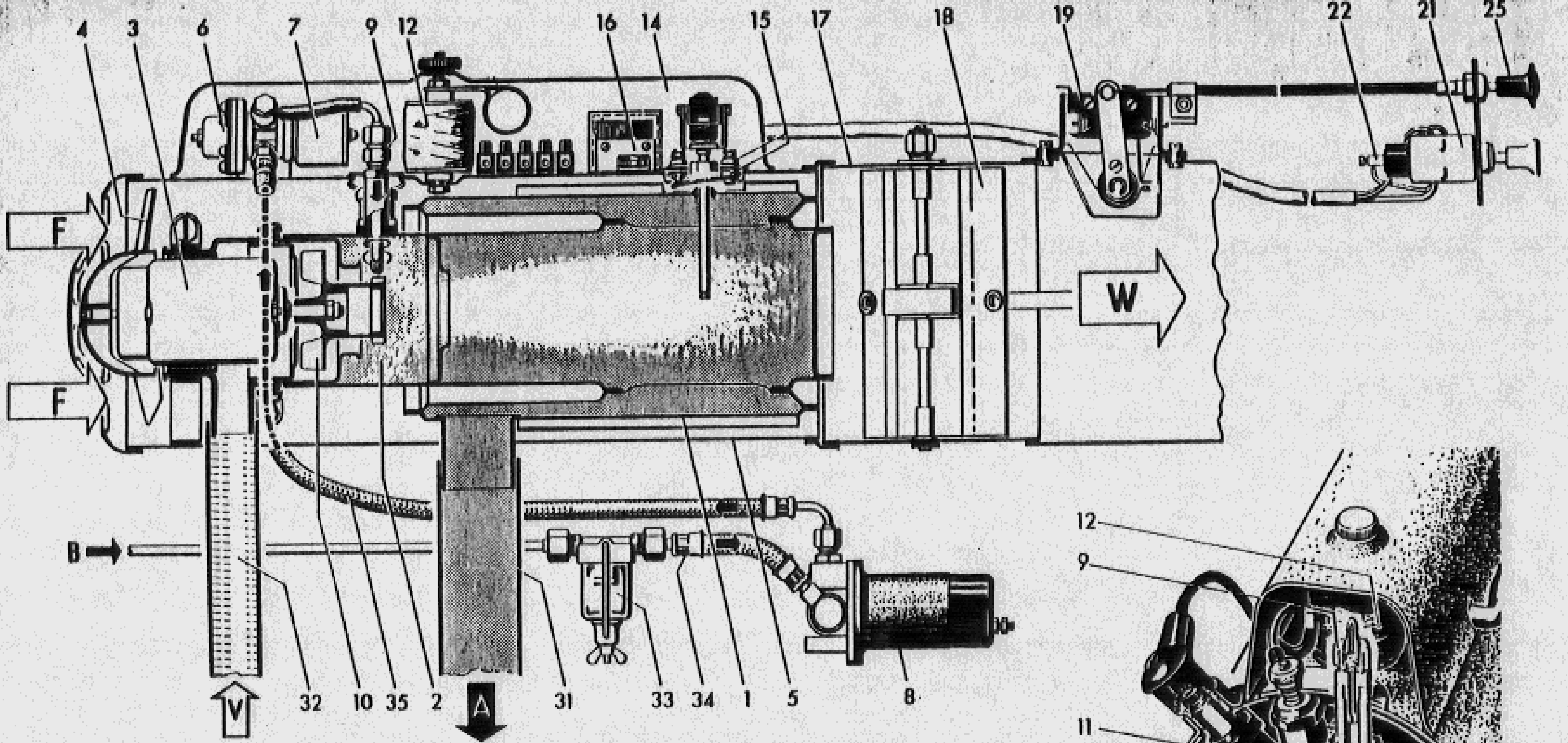
When the warm air cools down to below the set temperature, the regulator switch remakes the circuit to the solenoid valve which opens so that fuel can pass into the combustion chamber and start the burning operation again.

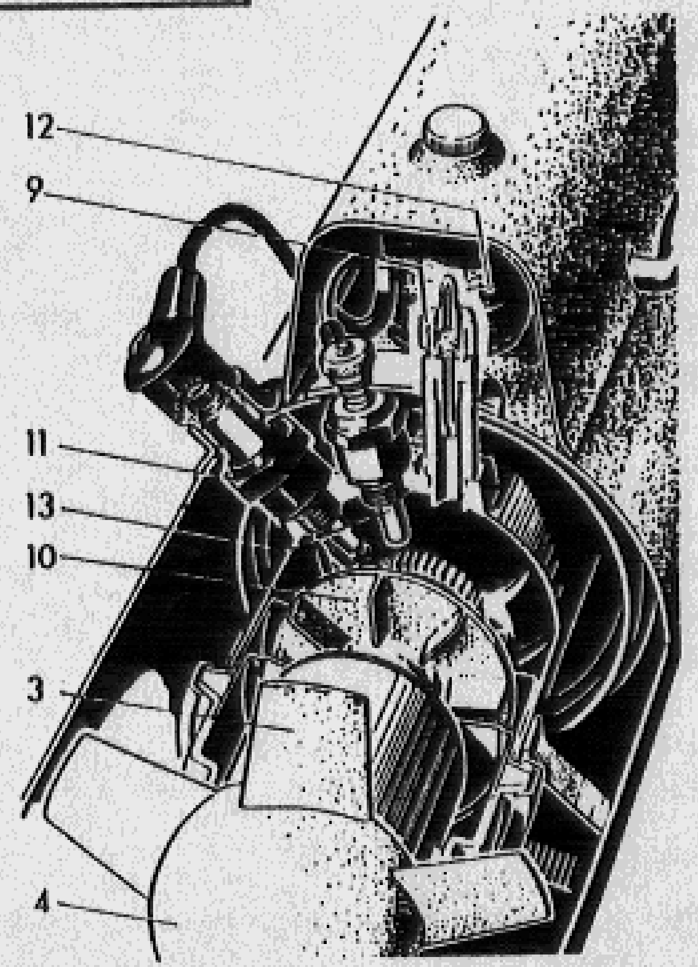
When the heater is switched off, the electric motor driving the fresh air and combustion air blowers continue to run for about a further 3 minutes. This cools the heat exchanger down and blows all traces of gas out of the combustion chamber. When the air temperature at the outlet drops to 30° C, the bimetal spring flap closes the air duct.

All current consumers are switched off when the warning lamp goes out.

SUBJECT TO ALTERATION
JULY 1963 ISSUE
PRINTING NO. 1840. 1. 64. HH

Cross sectional view of the Type [illegible] Heater





1 - Heat exchanger
2 - Combustion chamber
3 - Electric motor
4 - Fresh air blower
5 - Casing
6 - Diaphragm pressure regulator
7 - Solenoid fuel valve
8 - Electric fuel pump
9 - Fuel jet
10 - Combustion air blower
11 - Spark plug, 2 pole
12 - Ignition coil
13 - Heater plug
14 - Thermo-switch
15 - Overheating switch
16 - Safety switch
17 - Warm air outlet
18 - Bimetal spring flap
19 - Regulator switch
21 - Push-pull switch
22 - Warning lamp connection
25 - Knob for regulator switch
31 - Exhaust pipe
32 - Air intake pipe
33 - Fuel filter
34 - Fuel suction pipe
35 - Fuel pressure pipe

A - Exhaust gas · B - Fuel · F - Fresh air · V - Combustion air · W - Warm air

Warning and Safety Arrangements

Thermo-switch

When the heater is switched on, this switch controls the operation of the heater plug and the safety switch. When the heater is switched off, it permits the fresh air and combustion air motor to run-on for 3 minutes.

Safety switch

This switch cuts off the supply of current to the solenoid fuel valve if ignition does not take place when the heater is switched on or if the combustion process is interrupted for any other reason.

When fault has been rectified, press the red lever of the safety switch briefly to the right (it springs backs automatically) to restore the flow of current to the fuel pump.

Overheating switch

If the heater overheats, this switch cuts off the current to the solenoid fuel valve. This stops the flow of fuel to the fuel jet so that combustion ceases.

Warning lamp

The warning lamp in the push-pull switch lights up when the heater is switched on.

Operating instructions

To switch on

Pull out knob H. The warning lamp K lights up.

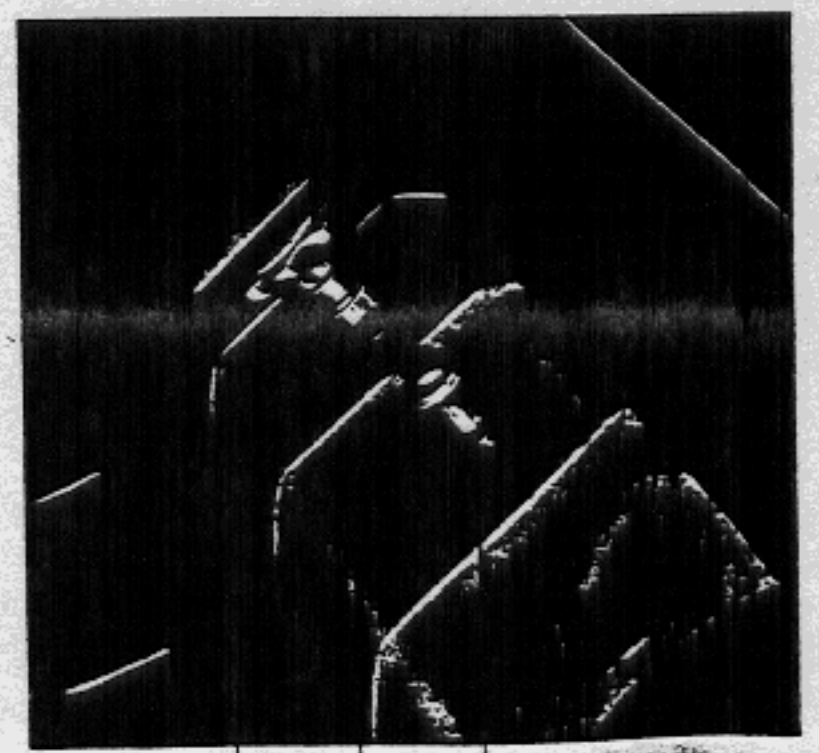
To regulate

Pull the second knob R to set the heating output between 1080 and 4000 kcal (40—100° C outlet air temperature).

The heat is increased by pulling the knob out.

To switch off

Push knob H in. After about 3 minutes the warning lamp goes out.



Maintenance

Every year before the heater is put into use:

Check heater plug.

Clean spark plug, check electrode gap (2.5 mm) and adjust if necessary.

Clean fuel jet and filter.

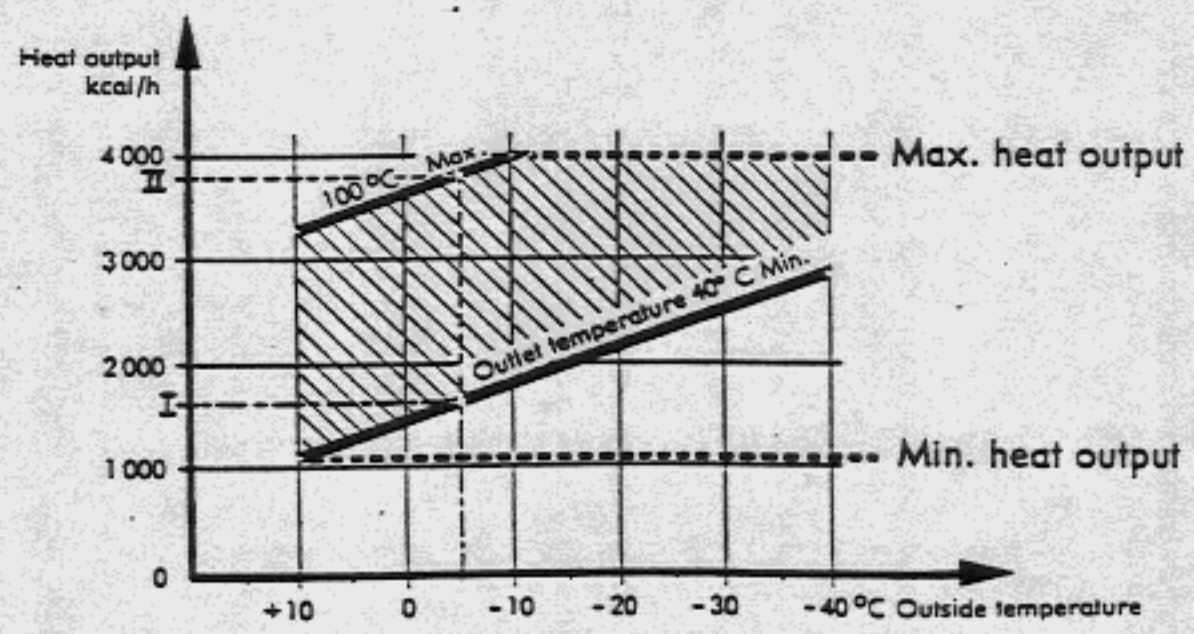
Check security of electrical connections.

When necessary: Check that intake and exhaust pipes are clear.

Technical Data

Heat output	variable from 1080—4000 kcal/h
Warm air temperature	variable from 40— 100° C (104—212° F)
Fresh air capacity	approx. 120 000 liter/h (4240 cu. ft.)
Fuel	gasoline
Fuel consumption	from 0.2—0.65 liters per hour (.4—1.1 pints per hour)
Voltage	6 Volt 12 Volt
Current consumption	50 Watts
Weight	11 kg (22 lbs)

Heat output graph



Explanation of graph

Vertical line: Heat output in kcal/h (1 kcal = 3.968 BTU)

Horizontal line: Temperature of air to be heated (from +10° C to —40° C)

Diagonal lines: Constant outlet temperature

Shaded area: Range of heater control

Example: At an outside temperature of —5° C the
Min. heat output (I) is 1600 kcal/h
Max. heat output (II) is 3800 kcal/h

J. EBERSPÄCHER
7300 ESSLINGEN/N., P.O. BOX NO. 289
TEL. 35 65 55 · TELEX. 072 3584

Type BN 4
Heater No. 6 Volt 20 1104
12 Volt 20 1147
for VW Transporter

General

On the Transporter, the Eberspächer heater is installed in the engine compartment. The installation kit contains the following parts:

1 Heater
1 Exhaust pipe
1 Combustion air pipe
1 Air cleaner bracket, complete
1 T piece
1 Set of controls
1 Warm air hose (1220 mm long) for carburetor pre-heating
various screws, nuts and grommets
2 Templates

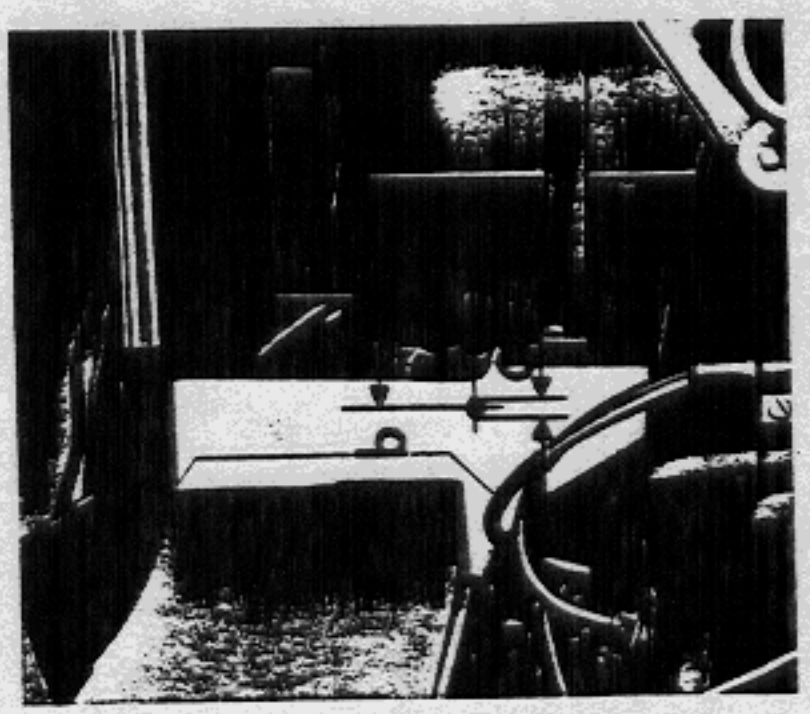


Fig. 2 a = 155 mm (6.1")
b = 42 mm (1.6")
c = 10 mm (.4")

Fitting sequence

1 - Disconnect battery and clamp fuel hose.

2 - Detach air cleaner from the bracket on the fan housing and swing it 180° to the right. The air cleaner is secured in the new position with the bracket supplied (Fig. 1).

Replace the carburetor pre-heater pipe with the longer version in the kit.

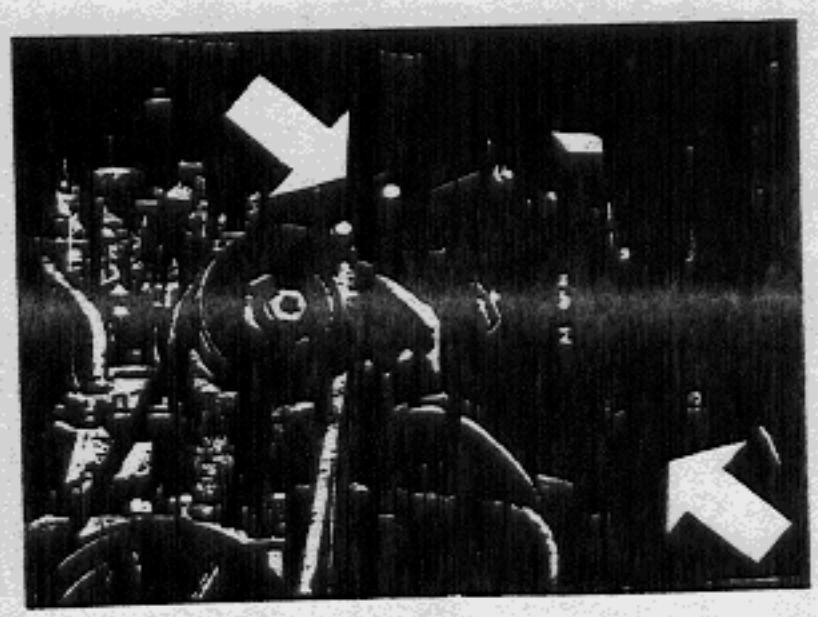


Fig. 1

3 - Mark off and drill a 10 mm hole in the partition below the tank support for the new fuel pipe (Fig. 2).

4 - With template I, mark off and drill the opening for the exhaust pipe and two holes for the bracket on the left-hand engine cover plate. Clean up hole edges (Fig. 3).

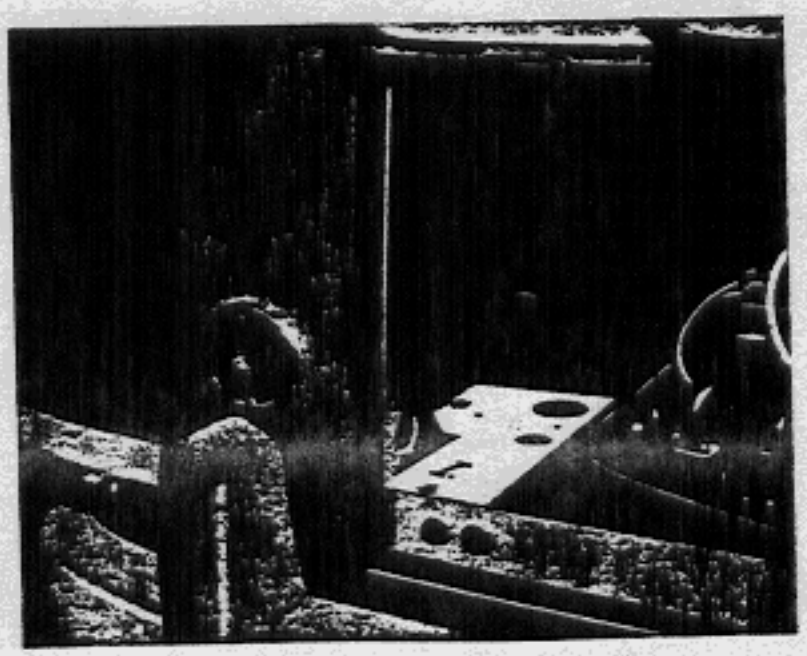


Fig. 3

5 - Lift rear of vehicle. With template II, mark off and drill the hole for the intake pipe and the holes for the pipe bracket from underneath. Clean up holes (Fig. 4).

SUBJECT TO ALTERATION
JULY 1963 ISSUE
PRINTING NO. 1831. 1. 64. HH

outlet in the rear partition to the measurements given here. Drill two holes for the Bowden cable and the switch cable near the opening. Fit grommets into the holes (Fig. 5).

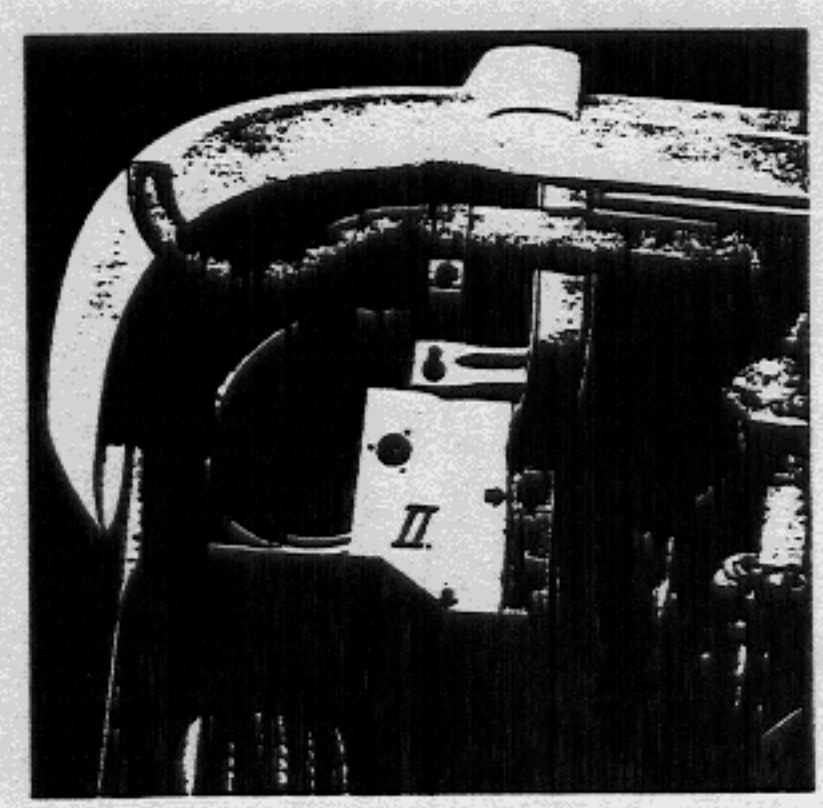


Fig. 4

Fig. 5 b = 25 mm (1")
c = 20 mm (.8")
d = 10 mm (.4")
e = 10 mm dia. (.4")
f = 166 mm (6.5")
g = 4 mm (.16")
h = 67 mm (2.6")
k = 14 mm dia. (.55")

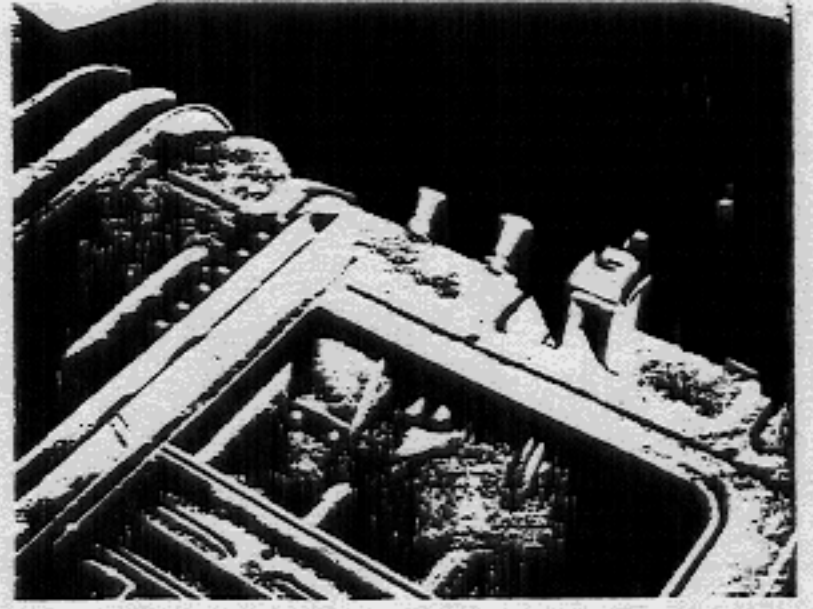


Fig. 6

7 - Mark off and drill two 10 mm holes in the cab between the center and left-hand ribs of the seat box, level with the rotary knob and 70 mm apart.

In line with the two holes in the bottom of the seat box, drill a 14 mm hole for the push-pull switch cable and a 10 mm hole for the Bowden cable (Fig. 6).

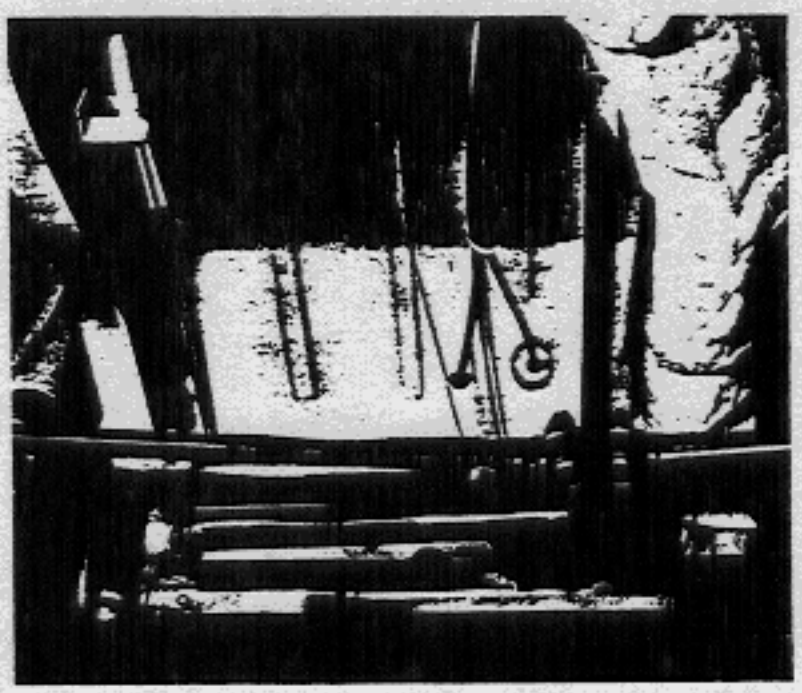


Fig. 6a

8 - Mark off and drill two holes (14 and 10 mm) in the load compartment, in line with the 12th rib in the floor plate (seen in driving direction) and as near to the floor as possible (Fig. 7).

Fit grommets into the holes.

Pull the Bowden cable and switch cable through the holes in the seat box and secure them to the accelerator cable guide tube (Fig. 6a).

Screw the switch and cap together and secure to the floor with two tapping screws.

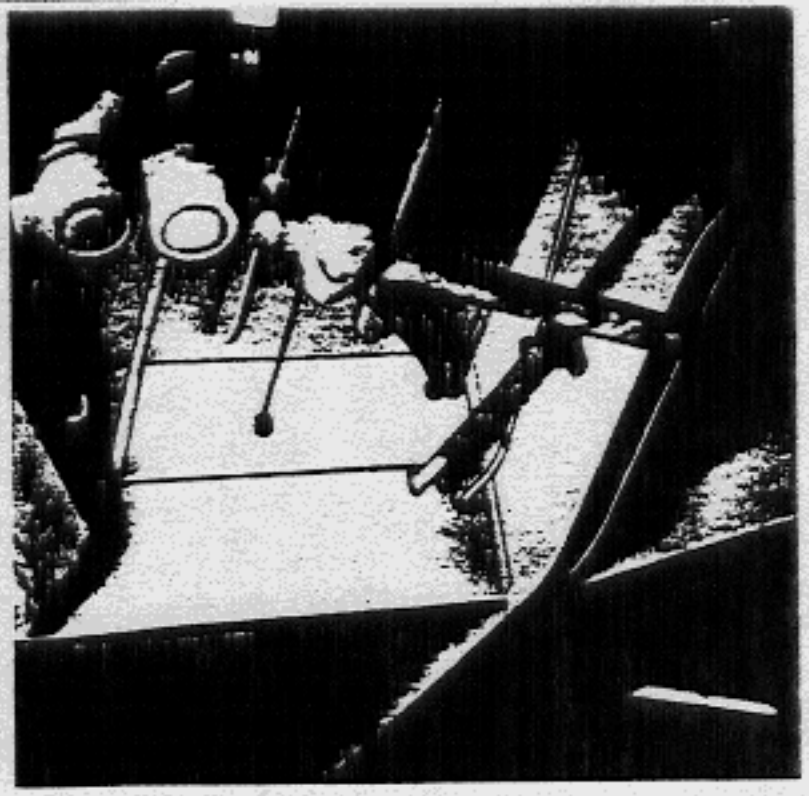


Fig. 7

9 - Fit a grommet into the large opening and insert the square warm air outlet into the opening from inside the vehicle. Mark off and drill 3.8 mm holes at top and sides and secure the outlet with 4.8 mm tapping screws (Fig. 8).

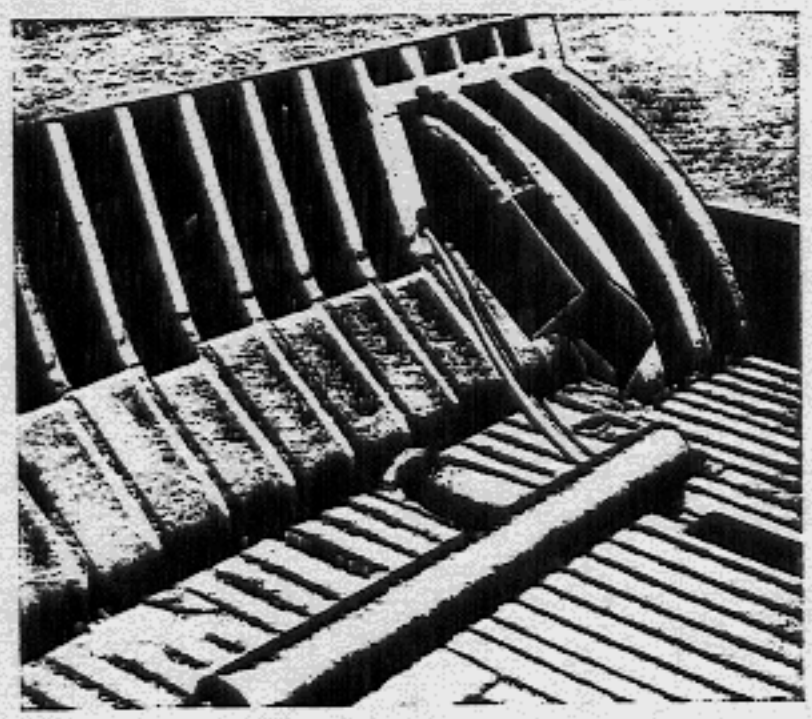


Fig. 8

10 - Install seal for exhaust pipe. Insert exhaust and intake pipes into the holes provisionally. Place heater in position and locate warm air flange into the outlet already installed. Bolt heater to base (Fig. 9).

11 - Secure intake and exhaust pipes. Slide exhaust elbow on to the exhaust pipe and secure with clamp screw. Drill a 6.5 mm hole in the left rear bumper bracket level with the exhaust pipe elbow support and secure support with a hexagon head M 6×15 screw, nut and spring washer (Fig. 10).

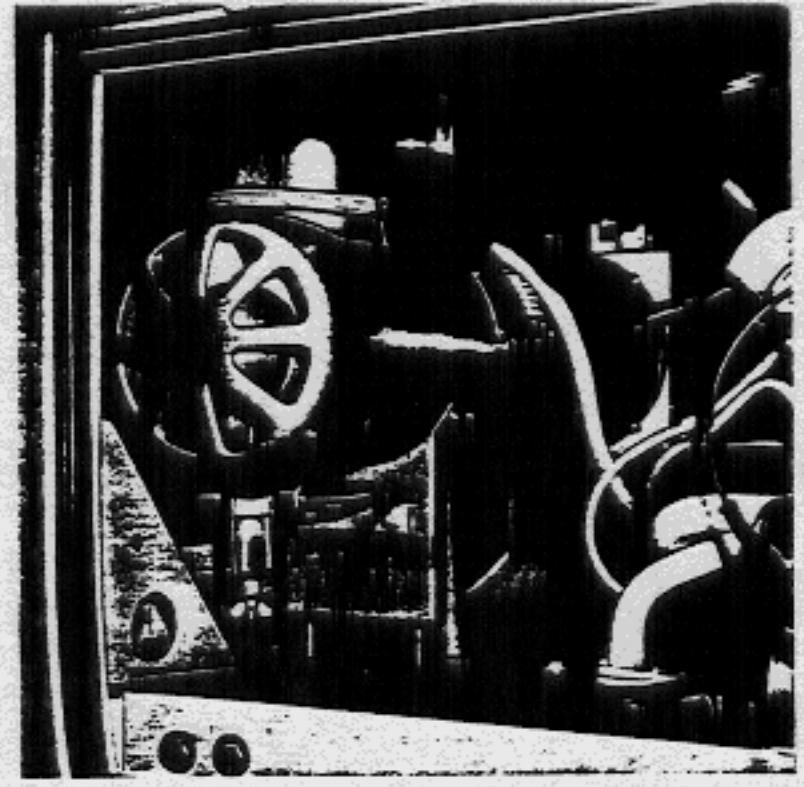


Fig. 9

12 - Cut a 6 cm long piece out of the fuel hose underneath the tank and install the "T" piece. Place the cut-out section of the hose on the free end of the "T" piece (Fig. 11). Push fuel line from engine compartment through the partition and into the hose on the "T" piece. Insert filter and connect it to the fuel lines with union nuts (Fig. 9).

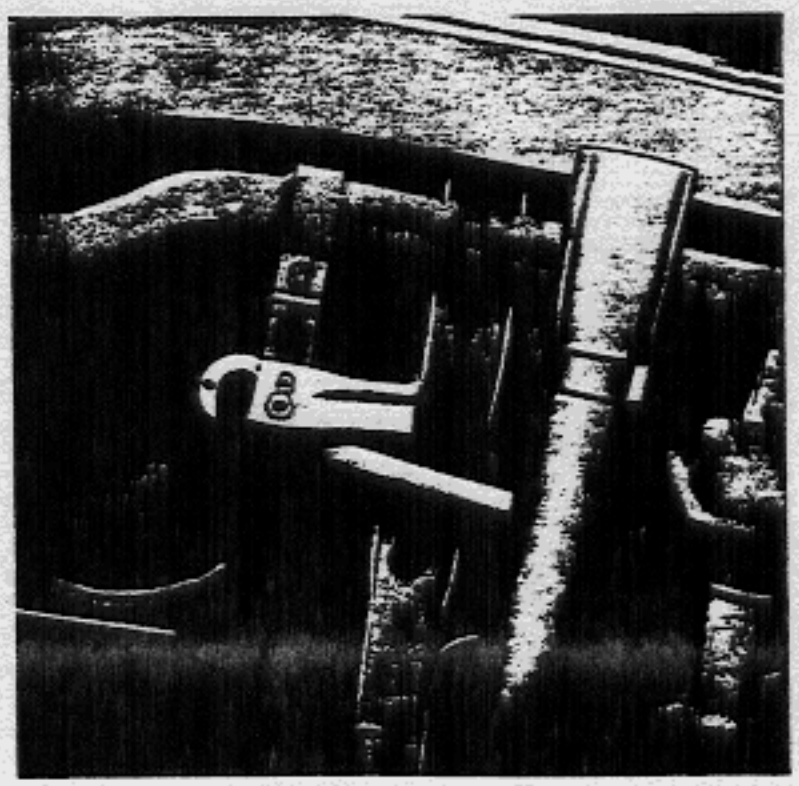


Fig. 10

13 - Attach Bowden cable to regulator switch.

Connect cables to heater as shown in wiring diagram.

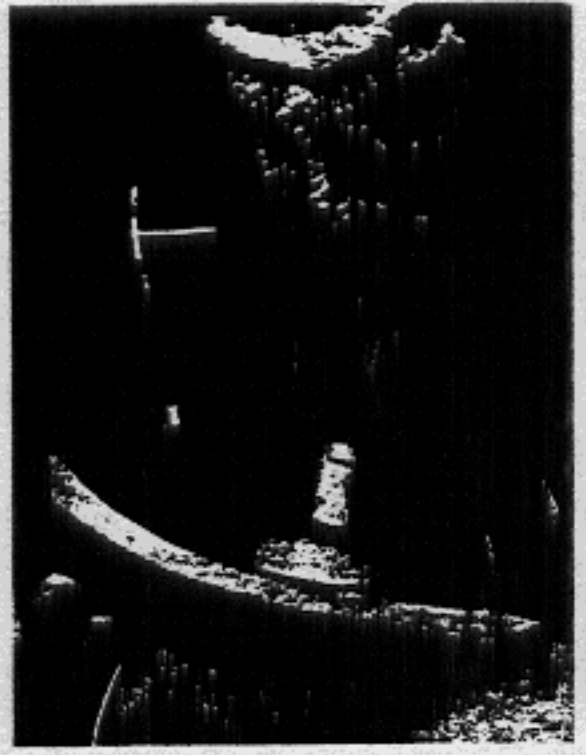


Fig. 11

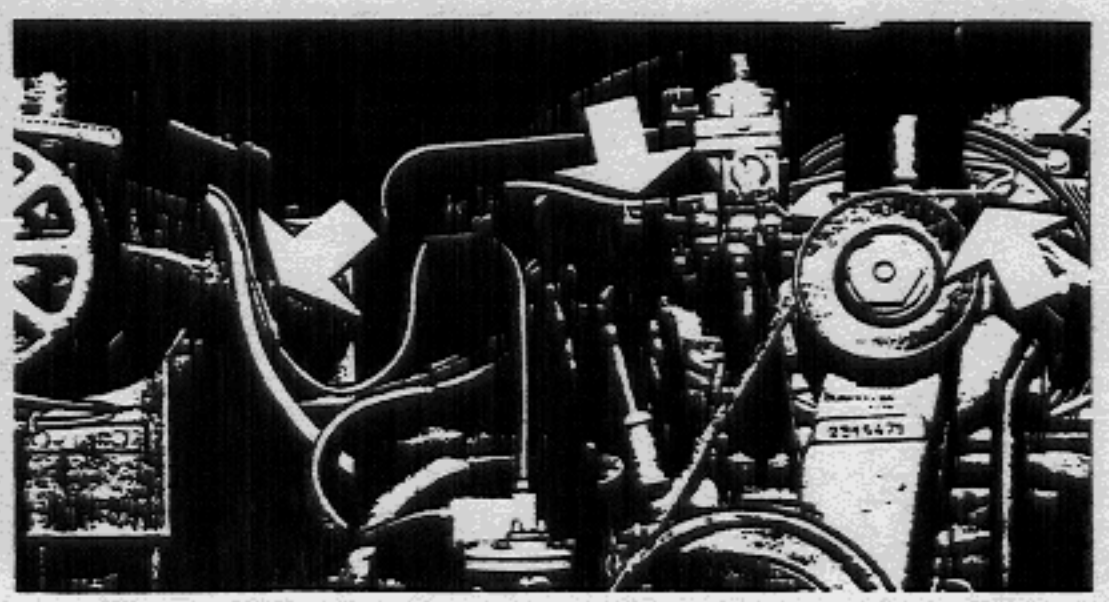


Fig. 12 Connection on generator

14 a - If the voltage regulator is on the generator, the positive cable is connected to Terminal 51 of the regulator.

The positive cable is connected to the cable adaptor together with the green cable and installed on terminal 2 on the heater.

The cable is then placed under the existing clip on the fan housing and connected to terminal 51 on the voltage regulator (Fig. 12).

14 b - If the voltage regulator is not in the engine compartment, the positive cable should be connected to terminal 30 on the starter.

The feed cable (700 mm long, 2.5 mm, black) must be replaced with a Part No. 20 9147 25 11 12 cable (1120 mm long, 2.5 mm, black).

The positive cable is connected to the cable adaptor together with the green cable and installed on terminal 2 on the heater.
The cable is then placed under the existing clip on the fan housing and routed behind the ignition coil to the generator cable harness.

The positive cable is laid along the harness, through the existing grommet to the starter where it is connected to terminal 30 (Fig. 13).

Ensure that the ground connections on the heater and all other electrical connections are making good contact.

15 - Open fuel hose and connect battery.

Lover vehicle.

16 - Check heater operation. If ignition has not taken place within 3—4 minutes after switching on for the first time (no fuel in line), the heater should be switched off and the red lever of the safety switch on the side of the cover moved forward briefly after about 5 minutes so that the heater can be switched on again.

17 - On the Micro Bus, the opening in the panel under the rear seat must be extended by 315 mm on the warm air outlet side (Fig. 14).

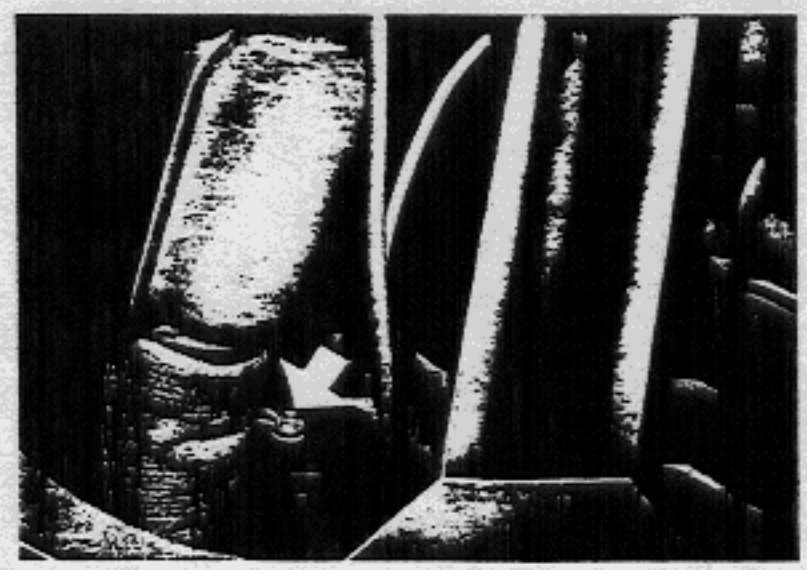


Fig. 13 Connection on starter

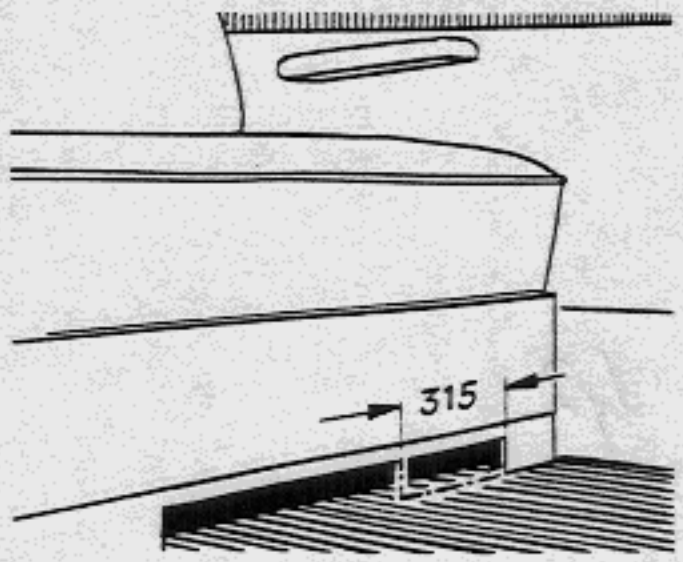
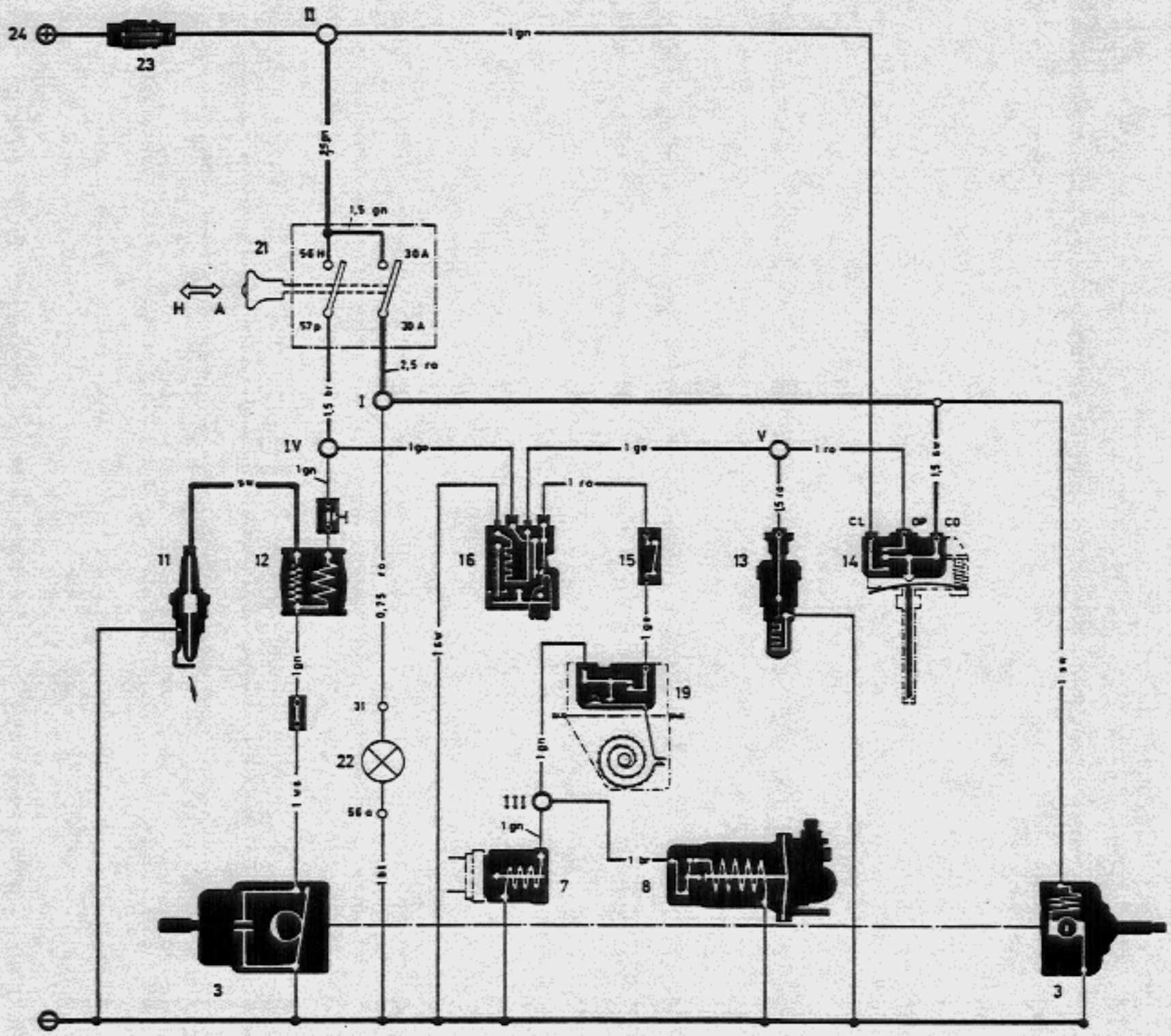


Fig. 14

Wiring diagram



H - On A - Off

3 - Electric motor with contacts
7 - Solenoid fuel valve
8 - Electric fuel pump
11 - Spark plug
12 - Ignition coil
13 - Heater plug
14 - Thermo-switch
cold: CO—OP
warm: CO—CL
15 - Overheating switch opening at 180° C
16 - Safety switch

19 - Regulating switch
20 - Terminal plate
21 - Push-pull switch
22 - Warning lamp
23 - Fuse holder and 25 A fuse
24 - To vehicle starter (Terminal 30)
○ Terminal on terminal plate

Color key

bl - blue	ro - red
br - brown	sw - black
ge - yellow	ws - white
gn - green	

J. EBERSPÄCHER
7300 ESSLINGEN/N., P.O. BOX NO. 289
TEL. 35 65 55 · TELEX. 072 3584

Type BN 4
for VW Transporter
VW Double Cab Pick-up
VW Ambulance

Trouble — Cause	Remedy
Heater does not ignite	
Battery voltage too low. Normal voltage 5.8.	Start engine to get full generator voltage.
No current.	Clean contact surfaces of ground strap between vehicle — battery and heater — vehicle. Tighten all electrical connections.
Fuse blown.	Check heater, rectify fault, install new 25 Amp. fuse.
Spark plug defective.	Clean plug, check electrode gap. With single pole plug: Check length of spark to ground. Smallest gap electrode/ground, 4 mm. With two pole plug: Check gap (2.5 mm). Fit new plug if defective.
Heater plug as ground electrode for spark plug is dirty (only with single pole plug).	Clean (with wire brush).
Coil defective or cable to plug faulty.	Check if ignition cable connector is making good contact.
Spark too weak.	Replace coil.
Spark too weak at a result of damaged or worn contact breaker.	Replace complete combustion air blower as dismantling is not permitted and contact breaker cannot be adjusted.
Heater plug not working because thermo-switch set incorrectly.	Adjust thermo-switch. Check heater plug electrically.

SUBJECT TO ALTERATION
JULY 1963 ISSUE
PRINTING NO. 1818. 1. 64. HH

Heater does not ignite	
Mixture too rich or too weak because pressure regulator set incorrectly.	Adjust pressure regulator.
Fuel not being injected on to the toothed part of radial wheel. (Watch through hole for heater plug or spark plug.)	Clean or replace jet. Align jet carrier.
No fuel	
Safety switch has operated after $3^1/_2$ minutes and cut off fuel supply because combustion did not commence.	Press the red safety switch lever to the right briefly to make the fuel pump circuit again.
Loose contacts in overheating switch.	Tighten all connections, if contacts are damaged, replace complete part.
Loose or sticking connections in regulator switch.	Tighten both connections or replace micro-switch.
Solenoid valve on pressure regulator not opening because of short circuit in coil windings.	Detach cover on valve housing and replace coil.
Fuel pump stopped because of dirty points.	Clean and set points. Oil springs and bearings lightly.
Fuel pipes or filter leaking. Pump sucking in air (clicks rapidly).	Check fuel pipe connections and filter glass for leakage.
Dirt or water in filter.	Clean. If filter is inserted so that the arrow does not correspond with the direction of flow, the dirt in the filter will be washed into the pipes and pressure regulator.
Pump not delivering fuel (clicks). Non-return valve on pressure side is dry and sticking.	Take pressure line off pump and put a few drops of fuel into the adaptor.
Fine filter on pressure regulator blocked.	Remove pressure line on regulator and clean filter with compressed air.
Pressure regulator and solenoid valve not working.	Clean and adjust pressure regulator.

No fuel	
Solenoid valve does not open because of rust.	Remove pressure regulator with solenoid valve. Dismantle solenoid valve and clean. Replace valve if necessary.
Fuel jet blocked.	Remove pipe and clean jet with compressed air.
Fuel jet damaged.	Fit new jet.
No air	
Combustion air blower connections damaged or loose.	Tighten connections at terminal 1.
Combustion air blower motor bearings or windings damaged.	Replace complete blower. Dismantling not permitted because of balancing.
Fresh air blower rubbing on casing.	Remove casing and tighten combustion air blower clip. Shortening of blades not permitted.
Radial wheel is damaged and is jammed in guide blade housing.	Replace complete combustion air blower.
Motor defective	Replace complete combustion air blower.
Shortage of combustion air	
Voltage too low, must be at least 5.8 Volts.	Check battery and charge if necessary. Check ground cable.
Combustion air blower not reaching the specified speed of approx. 5000 rpm at correct voltage.	Replace complete combustion air blower.
Fresh air blower rubbing on casing.	Shape casing so that axial wheel has running clearance.
Exhaust back pressure too high because exhaust pipe blocked or extended incorrectly.	Clean, remove extension and use standard parts.
Combustion air intake pipe blocked by road dirt.	If not installed properly (see fitting instructions) the opening of the intake pipe can become blocked. Remove and clean.

Bimetal spring flap not opening.	Remove heater and free off flap bearings through warm air duct. If dismantled the flap must be reset. (Should close with snap action when temperature drops below 35 ± 2°).
Poor heat transfer due to combustion deposits in heat exchanger.	Clean heat exchanger.
Heat output insufficient	
Insufficient fuel due to incorrectly set regulator switch.	Adjust screw for minimum and maximum heat output on regulator switch so that combustion starts again at 42—52° C and stops at 105° C (Correct the setting at room temperature).
Heater smokes and soots up	
Excess of fuel due to damaged jet.	Replace jet.
Combustion air shortage.	See under "Shortage of combustion air".
Pressure regulator incorrectly set.	Adjust pressure regulator.
Heater does not switch off	
Fuel supply defective. Solenoid valve does not close because of electrical fault.	Winding connection must be on terminal 3 together with fuel pump and regulator switch. The positive connection from generator terminal 51 goes to terminal 2 on heater.
Solenoid valve sticks.	Remove solenoid valve, clean and if rusty, replace. After re-assembling, check adjustment of pressure regulator.
Combustion blower runs continuously. If the thermo-switch is set incorrectly, the blower will run on continuously when heater is switched off.	Adjust thermo-switch. Loosen securing screw slightly. Quarz rod in thermo-switch broken. Remove thermo-switch, fit new quarz rod.

J. EBERSPÄCHER
7300 ESSLINGEN/N., P.O. BOX NO. 289
TEL. 35 65 55 · TELEX. 072 3584

Type BN 4
for VW Transporter
VW Double Cab Pick-up
VW Ambulance

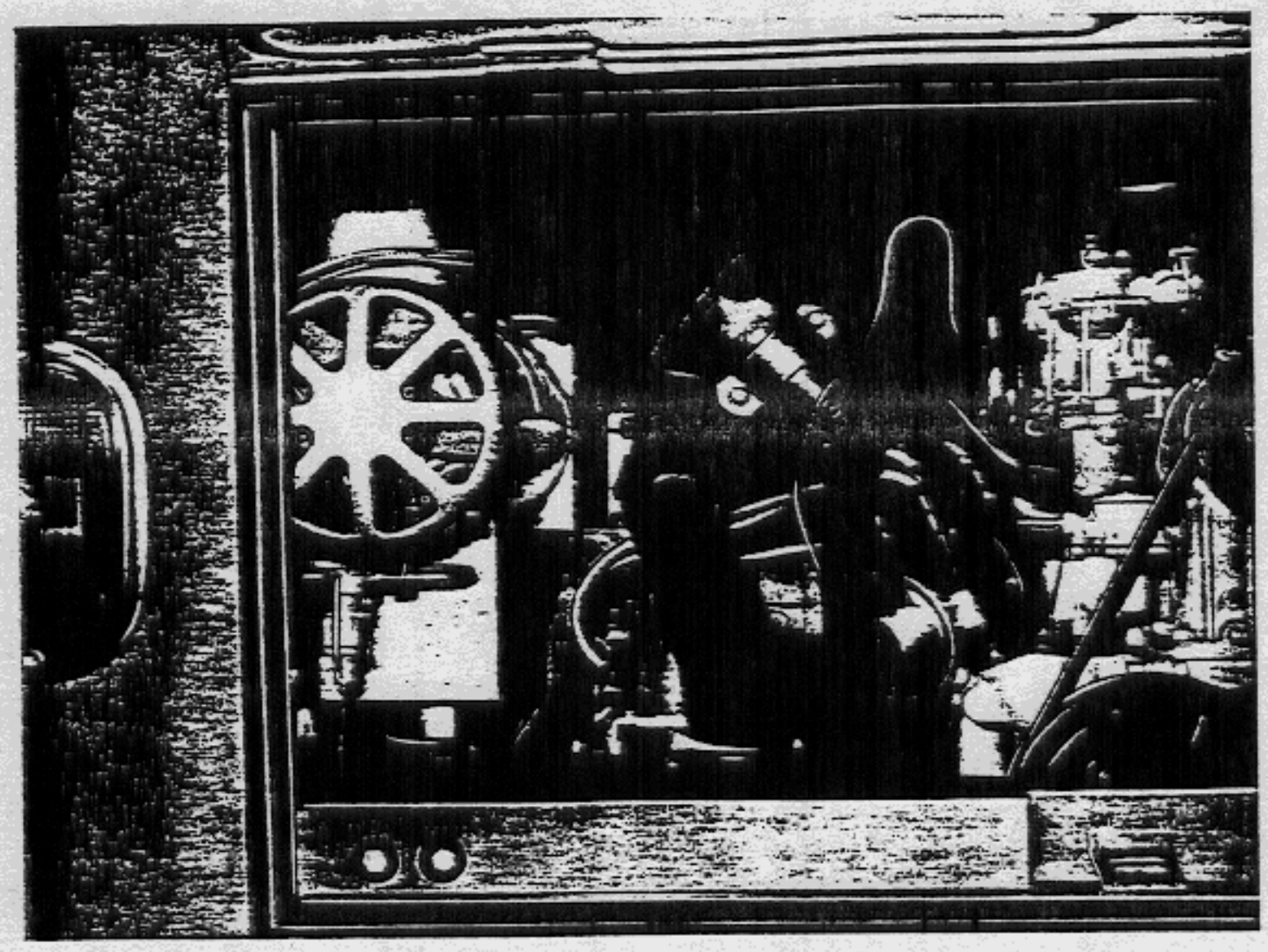


Fig. 1

Contents

SUBJECT TO ALTERATION
JULY 1963 ISSUE
PRINTING NO. 2223. 1. 64. HH

I. Work with heater installed

1 - Replacing push-pull switch and cables

Take 25 Amp. fuse out of holder in engine compartment or (if fitted) out of push-pull switch in sea box.

Remove knob and knurled nut from switch under drivers seat (Fig. 2).

Remove 2 tapping screws from cap in seat box (Fig. 3).

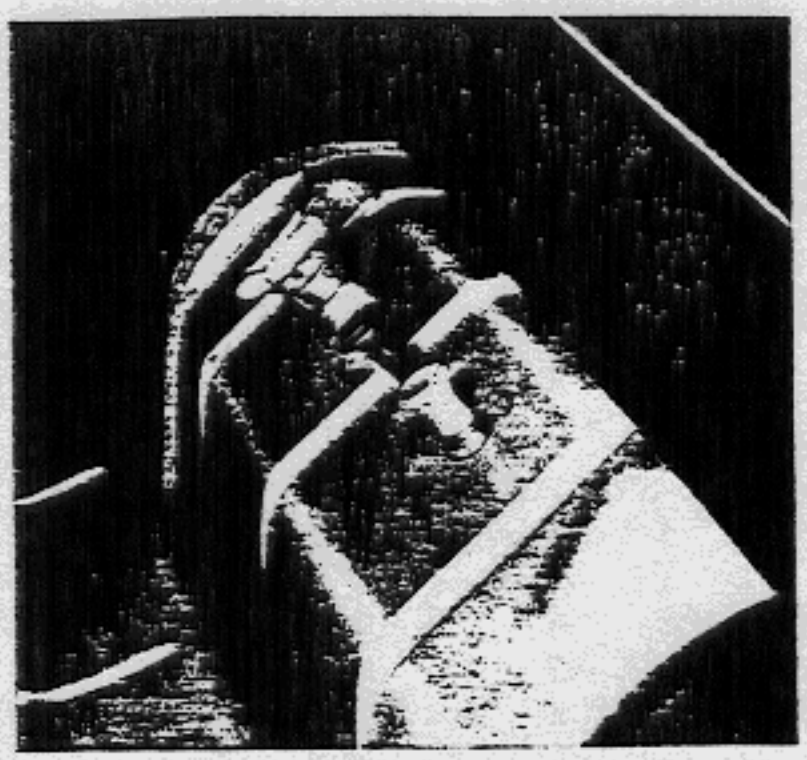


Fig. 2

Take switch and cap out of the hole in seat box and pull rubber sleeve off.

Disconnect cables and check switch.

At "Off" position (switch pushed in): No circuit from + to KL 30 A and from KL 56 H to KL 57 P.

At the "On" position (switch pulled out): there should be a circuit from + to KL 30 A and from KL 56 H to KL 57 P (see wiring diagram in fitting instructions).

Replacing cables: Remove push-on connections at KL 1, 2 and 4 on heater.

Remove protective cover over cable and Bowden cable on load compartment floor, if fitted.

Pull cable out of grommets.

When installing cable ensure that all the grommets are in good condition to avoid the risk of chafing, short circuit and fire.

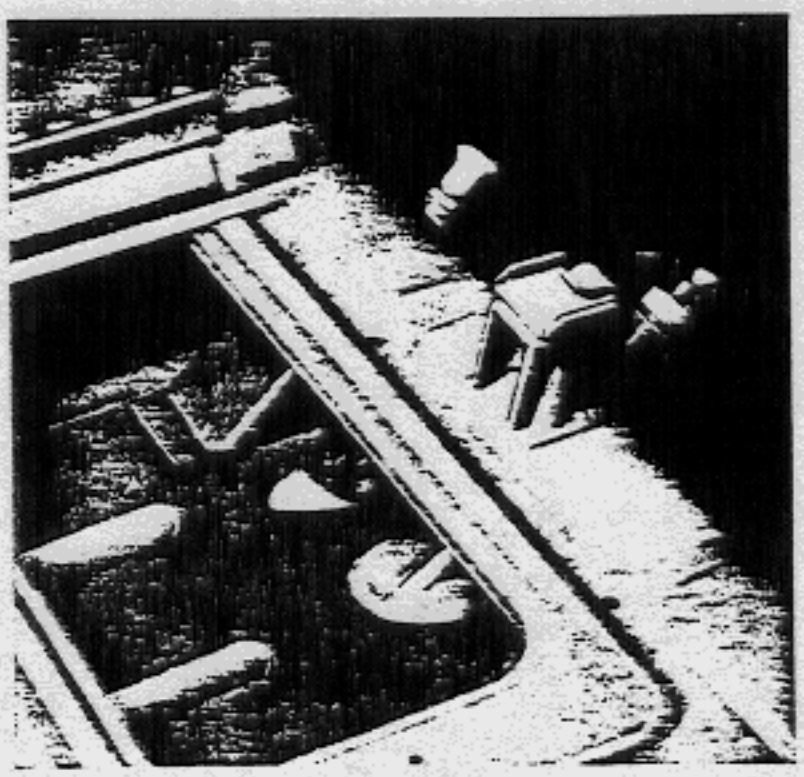


Fig. 3

2 - Replacing Bowden Cable

Detach Bowden cable at regulator switch, using wrenches SW 7 and SW 10 (Fig. 4).

Remove protective cover in vehicle interior, where fitted.

Loosen nut in seat box under driving seat.

Pull Bowden cable out.

When installing, check grommets in holes. Avoid kinks and large curves, rout as straight as possible, shorten if necessary.

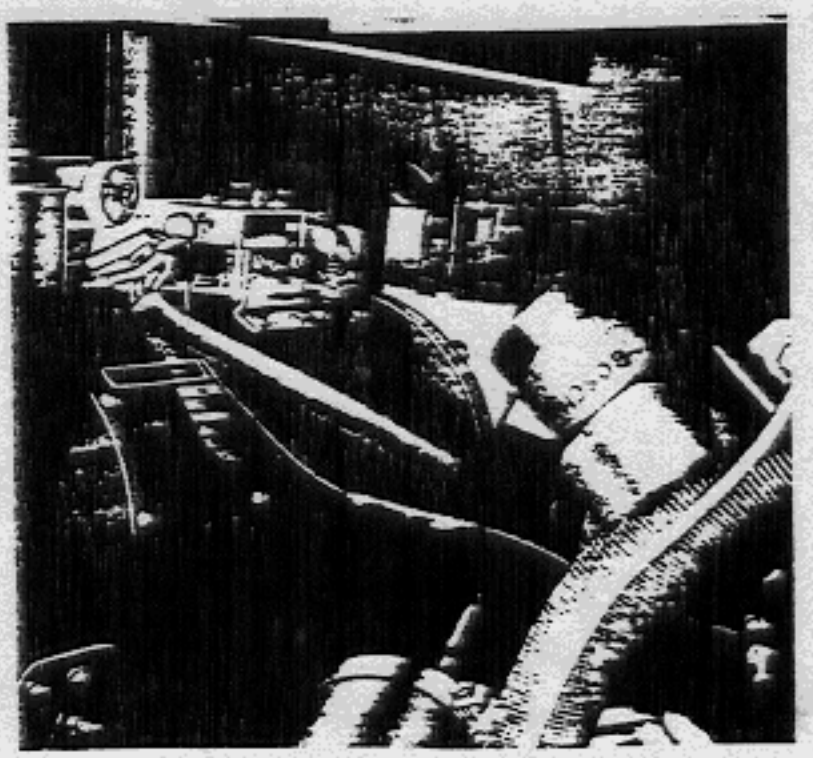


Fig. 4

3 - Removing and cleaning filter

Loosen union nuts at connections.

Take filter off.

Loosen wing nut on bracket.

Bend bracket to side, and take glass bowl off (**not screwed on**).

Unscrew filter element.

Clean element with compressed air. When installing, note that flow direction corresponds to arrows.

Replace glass bowl even if only slightly damaged.

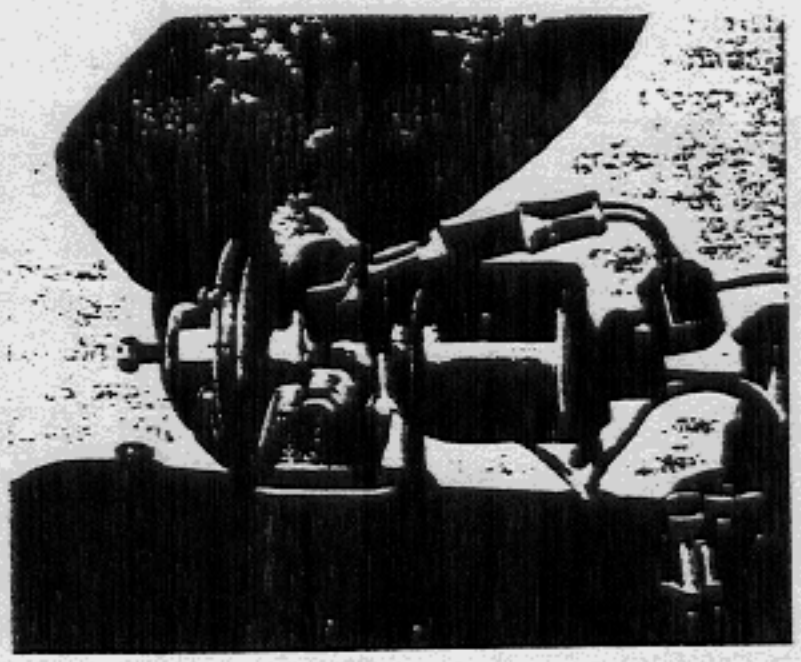


Fig. 5

4 - Removing and disassembling pressure regulator and solenoid valve

Remove pump pressure line from pressure regulator.

Loosen fuel hose at jet, holding jet with SW 14 wrench.

Disconnect solenoid cable at KL 3 on the terminal plate.

Remove 4 screws at bottom of regulator and take regulator off with solenoid (Fig. 5).

Take gland screw out of housing and remove fuel hose. Remove threaded portion, take filter out and clean it (Fig. 7).

Remove 3 screws in cap and take cap off (Fig. 6). Take out adjusting spring and spring plate.

Remove 3 screws in flange, take off flange and diaphragm. Screw valve out of housing. Check valve and clean fine filter.

Clean housing and blow out with compressed air.

Assembly takes place in the reverse order.

Note that the adjusting spring is located properly in the spring plate and that the adjusting screw engages the depression in the upper part.

The small hole in the cap must be downwards.

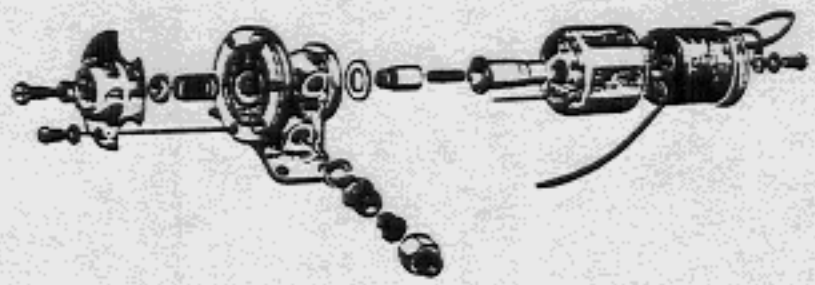


Fig. 6

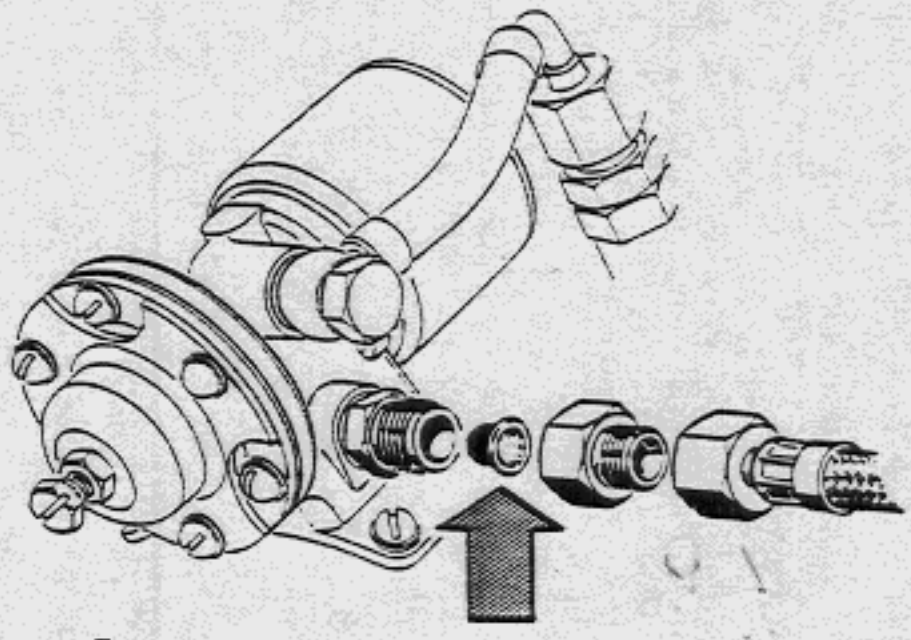


Fig. 7

The pressure regulator controls the fuel flow quantity. It can only be set properly on the heater by means of a **consumption test:**

a - Checking on a test stand in accordance with the test instructions for the heater.

b - On the heater when installed ready for operation, the fuel hose is taken off the jet and the jet screwed out. The jet is then screwed into the fuel hose and held at the same height as it would be when installed. The fuel being pumped out is then caught in a measuring glass for 2 minutes, after which time the quantity should be 20—21 cc. If less than this, the adjusting screw in the cap must be screwed into the right and if the amount is excessive the screw must be screwed out to the left. Note that the safety switch will cut the current to the pump and the solenoid valve after $3^1/_2$ minutes.

5 - Removing fuel pump

Remove pressure and suction lines at the pump.

Disconnect electrical cable.

Loosen two screws in pump bracket and take pump off.

Remove nut on terminal and take cover off (Fig. 8).

a - Check the contact breaker points, oil bearings and springs **lightly** as necessary.

b - The contact breaker gap to the gap (lower contact spring pressed against housing) should be 1 mm. Gap is set with the adjusting spring.

c - The pump must be fitted so that the pressure union is vertical as shown by arrow.

d - It may be necessary to bleed the air from the fuel lines and moisten the pressure valve with a few drops of gasoline after installing the pump.

Note:
On heaters with the pump on the left (newest version) the left rear light assembly should be taken out to facilitate work.

Removing solenoid valve from pressure regulator and disassembling it

Remove screw in solenoid valve cover and take cover off. Take windings out.

Remove 4 screws at bottom of housing and take housing off.

Take out guide tube with valve and spring.

Remove sealing ring in seat and fit new.

Clean valve seat.

Assemble in reverse order.

If the diaphragm valve is working properly, the valve should open with a definite click when current is applied. Otherwise check and replace the windings. If valve is corroded it must be replaced.

Always fit a new seal in the valve seat.

The dimensions of the spring **must not** be altered.

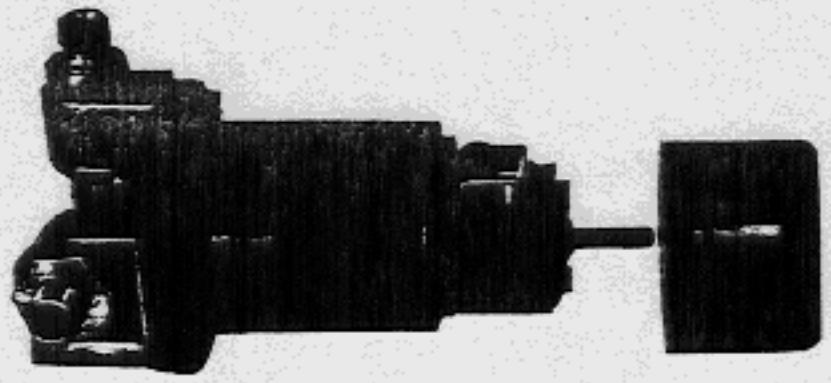


Fig. 8

6 - Removing fuel jet

Take fuel hose off at jet, holding the jet with a SW 14 wrench.

Screw jet out holding jet carrier with SW 14 wrench. The jet carrier is soldered in. Clean filter element and jet with compressed air.

Do not use wire or other objects to clean jets (Fig. 9 and 10).

Install in reverse order. Do not forget the gasket between jet carrier and jet and the filter between jet and fuel hose which also acts as a gasket. When the jet has been removed a few times, fit a new gasket and filter.

Check the fuel spray through the holes for the spark plug and heater plug. The jet of fuel should strike the atomizer wheel about 1 mm off center towards the motor (Fig. 11).

If necessary, align the jet carrier carefully with a brass drift or a 14 mm box wrench.

7 - Removing and checking spark plug

Take plug connector off and screw plug out.

Check electrode gap (Figs. 12 and 13).

If a single pole plug is fitted, the union nut must be undone and the plug pulled out of the adaptor.

When installing the plug, ensure that the guide pin in the adaptor engages in the groove in the insulation on the plug. On the single pole plug the heater plug serves as a ground electrode.

Fig. 9

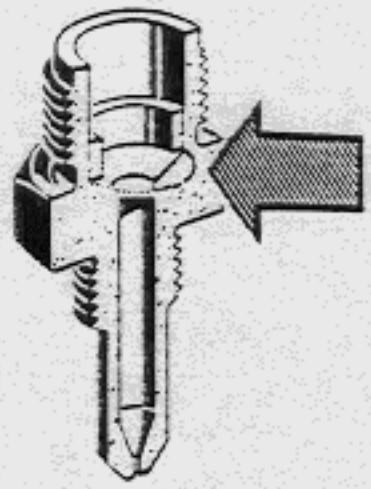


Fig. 10

Conversion to two pole spark plug

Our new type BN 4 heaters are fitted with a two pole spark plug which helps to improve the ignition of the mixture. The electrode gap of the two-pole plug is 2.5 mm (.090").

If a customer with an old type heater with a single pole plug wishes to have it converted to the two pole system, proceed as follows:

a - Remove single pole plug.

b - Remove the lock pin for the single pole plug.

c - Bore the plug hole out to 12.5 mm.

d - Tap an M 14×1.25 thread in the hole.

e - Screw in the two pole plug (Order No. 20 1105 10 00 11).

We wish to point out however that this conversion is not covered by our warranty conditions and must be paid for by the customer.

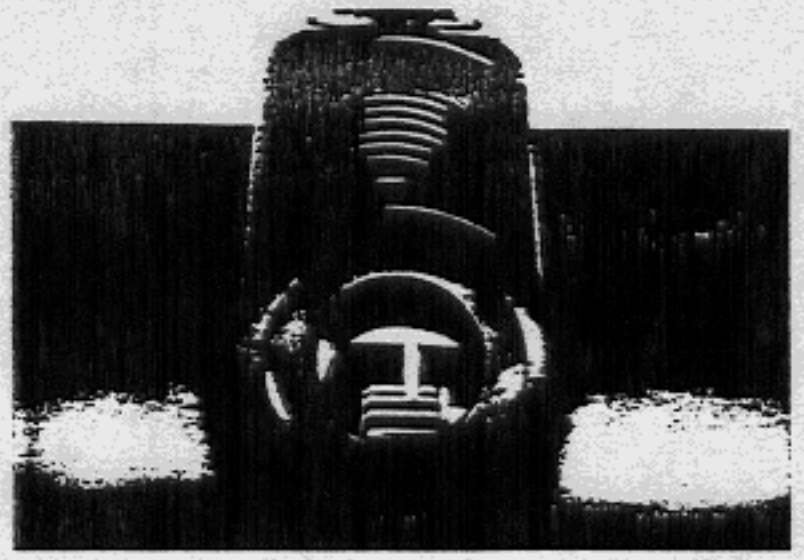


Fig. 11

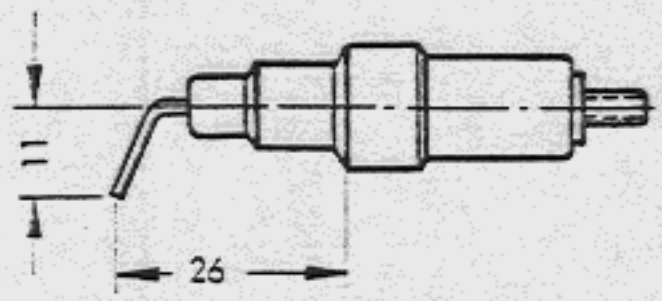


Fig. 12

8 - Removing and checking heater plug

Remove M 5 nut, take cable off and unscrew plug with SW 21 socket.

Check condition of plug and clean with a brass wire brush or a sand blaster if necessary.

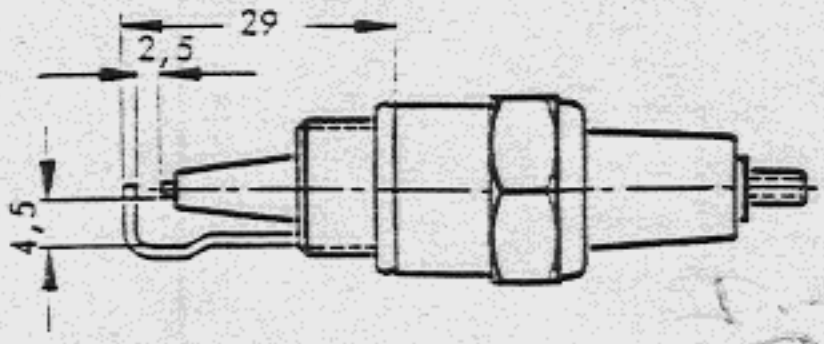


Fig. 13

Remove plug cable.

Detach cable from contact breaker to coil at the terminal plate.

Detach cable from condenser.

Remove brass screw from stud and take coil off (Fig. 14).

To remove condenser, detach green cable at KL 4 on the terminal plate.

To test the coil use the full voltage. The spark must jump a 6 mm gap and show no signs of misfiring.

When removing the ignition cable plug, loosen the brass stud and pull the high-tension cable out. When installing the cable in the plug, ensure that a good contact is made.

When installing the ignition coil, ensure that the condenser clip is parallel to the longitudinal axis of the heater to avoid the danger of a short circuit on the cover.

The terminal for the connection between coil and contact breaker must be routed so firmly that it cannot get too near to the soldered joint of the high-tension cable on the coil.

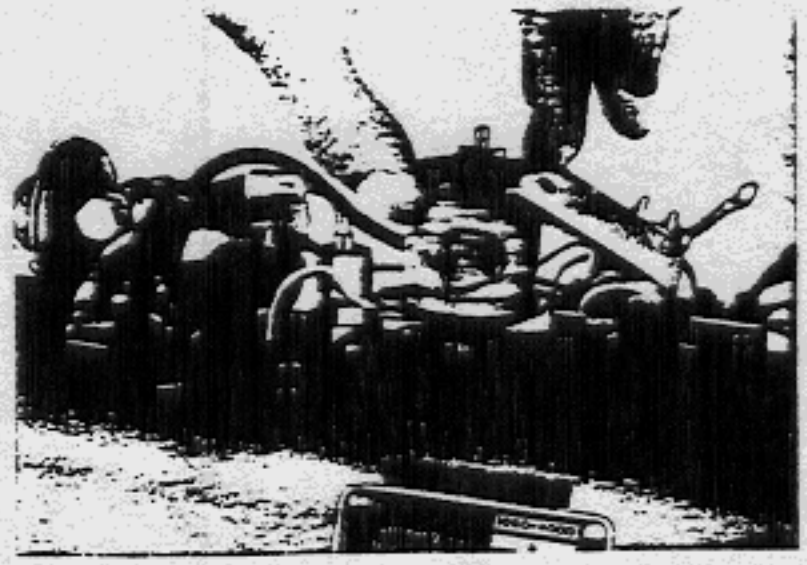


Fig. 14

10 - Removing thermo-switch

Disconnect the 3 switch cables at the terminals CL, OP and CO.

Loosen union nut under switch.

Using a turning movement, lift switch out of flange vertically without bending the feeler tube. If tight, use a suitable solvent.

Take adjusting screw out of nut in switch mounting.

Take out pressure spring and leaf spring.

Fold adjustment mounting and micro-switch over.

Slide quarz rod out of tube.

When assembling the switch, ensure that the tube is not bent and that the quarz rod slides easily in the feeler tube.

The adjustment mounting must turn freely in the switch mounting.

Basic adjustment of thermo-switch outside the heater:

Turn the adjusting screw in until the switch operates (audible click), turn back to the switching point, then tighten 120° ($^1/_3$ of a turn) past the switching point (Fig. 16).

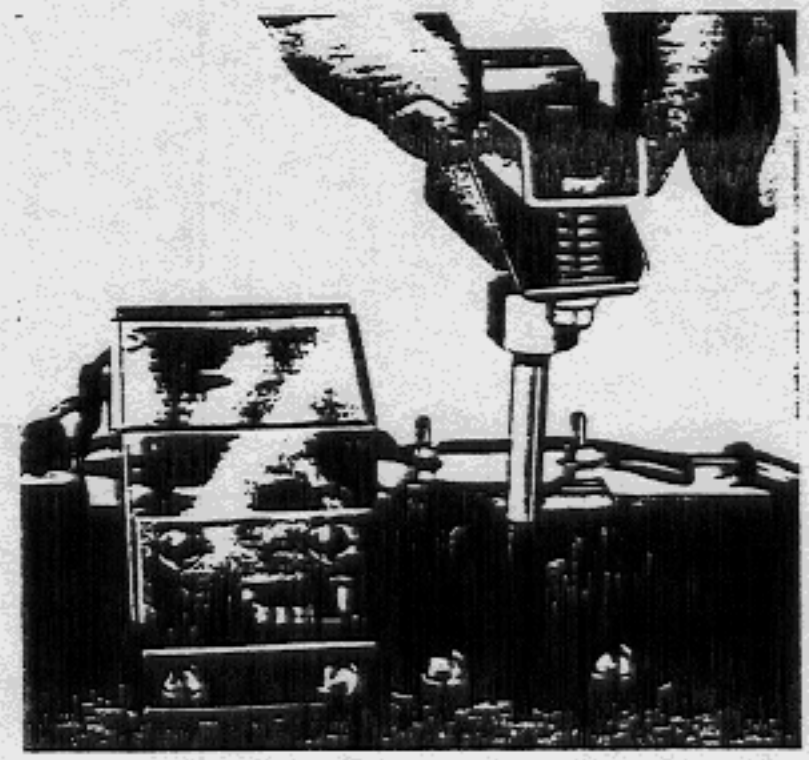


Fig. 15

Fig. 16

When installing the switch in the heater, ensure that the nut in the switch mounting does not touch the casing as otherwise the switch will not work properly.

The final adjustment should be made when heater is warm.

The run-on time should be 150—210 seconds. If too long, turn adjusting screw to the right and if too short, turn to the left.

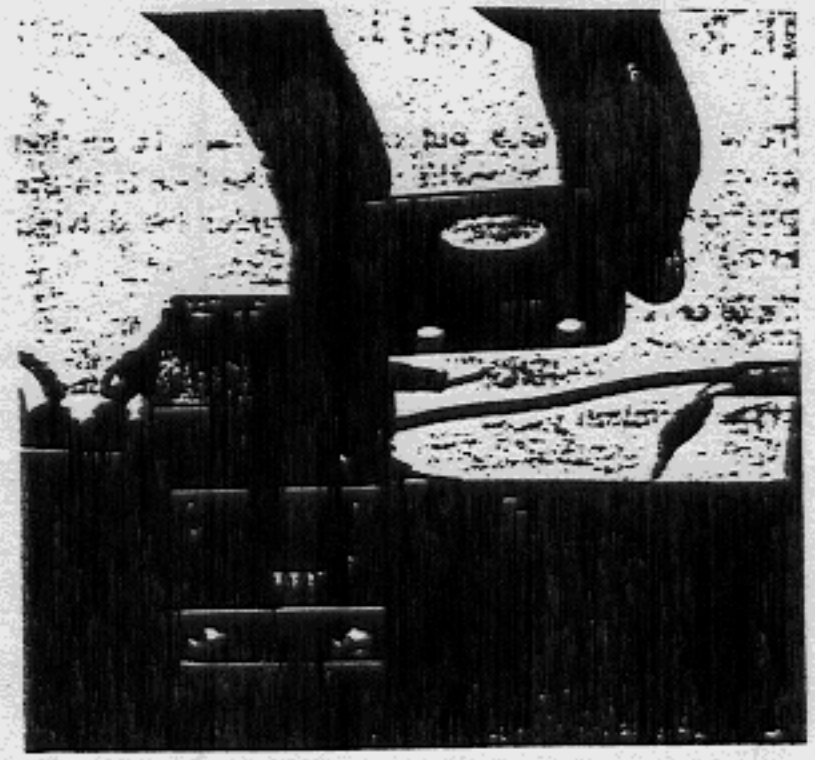


Fig. 17

11 - Removal of overheating switch

At a temperature of 150—200°, this switch breaks the circuit to the fuel pump and solenoid valve and stops combustion. The switch is adjusted at the factory. If it does not operate properly it should be replaced and no attempt made to repair it.

Remove thermo-switch (see point 10).

Detach cables from safety switch and to regulator switch.

Remove four tapping screws and disconnect cables from safety switch.

Take overheating switch out and fit a new part (Fig. 17).

12 - Removal of regulator switch

Detach Bowden cable at switch by loosening with SW 7 wrench and holding with SW 10 wrench.

Pull push-on connections off.

Remove screws from outlet.

Lift regulator switch out of warm air outlet (Fig. 18).

A bimetal spring which is influenced by the temperature of the warm air controls the flow of current to the fuel pump and solenoid switch by means of a micro-switch. The operating temperature should be 42—52° C at the minimum heat output and 90—105° C at the maximum heat output.

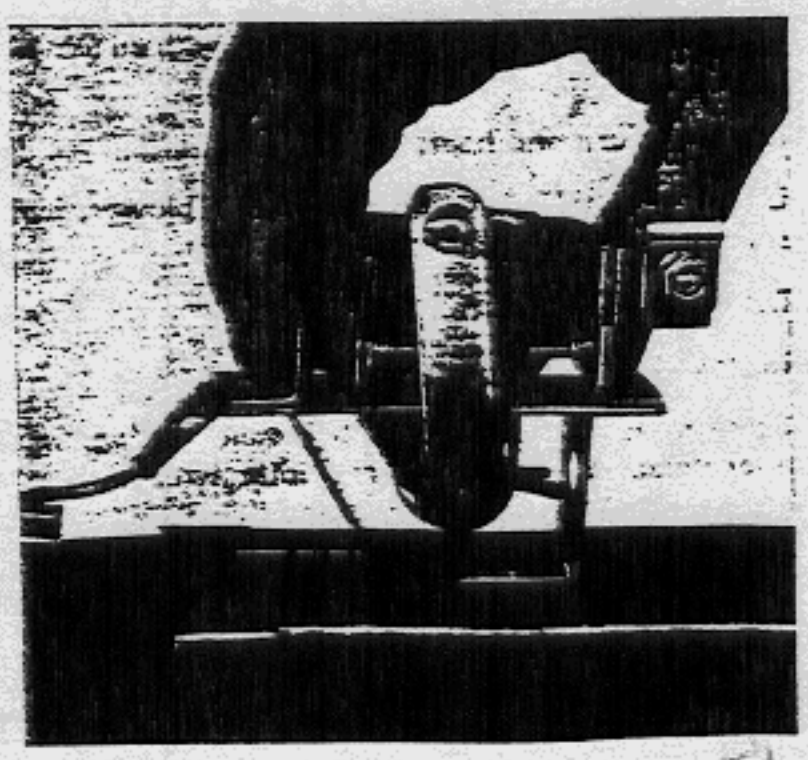


Fig. 18

Checking heater when working

If the specified temperatures are not reached, a correction can be made by altering the stop screw for the operating lever.

II. Removal and installation of heater (Fig. 19)

Take 25 Amp. fuse out of fuse holder in engine compartment. (On earlier models the fuse is in the push-pull switch in the tool box under the driving seat.)

Take cover off heater

Pull three connections off terminals KL 1, 2 and 4 at the terminal plate.

Unscrew fuel pipe at feed to filter and fit a plug.

Detach Bowden cable at regulator switch with SW 7 wrench, holding with SW 10 wrench.

Pull combustion air hose off heater.

Remove securing screw from exhaust pipe.

Remove two M 6 heater securing nuts under the vehicle.

Lift heater slightly so that the exhaust flange on the heater comes out of the exhaust pipe. Lift heater carefully and withdraw the outlet flange from the warm air duct.

Installation takes place in the reverse order.

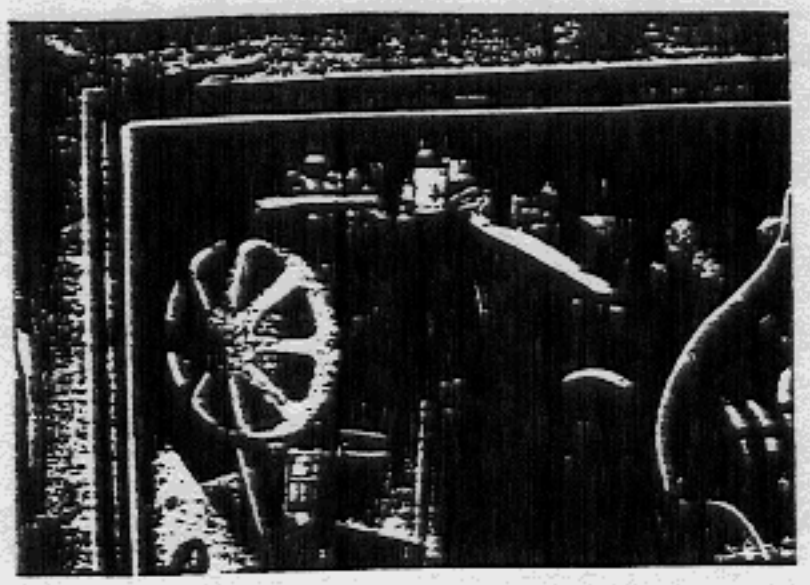


Fig. 19

III. Work with heater removed from vehicle

1 - Dismantling heater and removing combustion air blower with heat exchanger (Fig. 20 and 21)

Detach fuel pump pressure pipe at pressure regulator.

Detach the fuel hose from the pressure regulator, holding the jet with an SW 14 wrench.

Screw fuel jet out, holding jet carrier with an SW 14 wrench.

Remove spark and heater plugs.

Disconnect cables from combustion air blower, fuel solenoid valve and fuel pump.

Remove thermo-switch.

Remove intake cap.

Remove warm air outlet with bimetal spring flap after detaching cable from regulator switch.

Detach cable from fuel pump.

Remove pump and support bracket.

Remove the four screws in the casing and pull casing apart. Pull cables from combustion air blower and fuel pump through the casing. Take rubber plug out of large opening in casing.

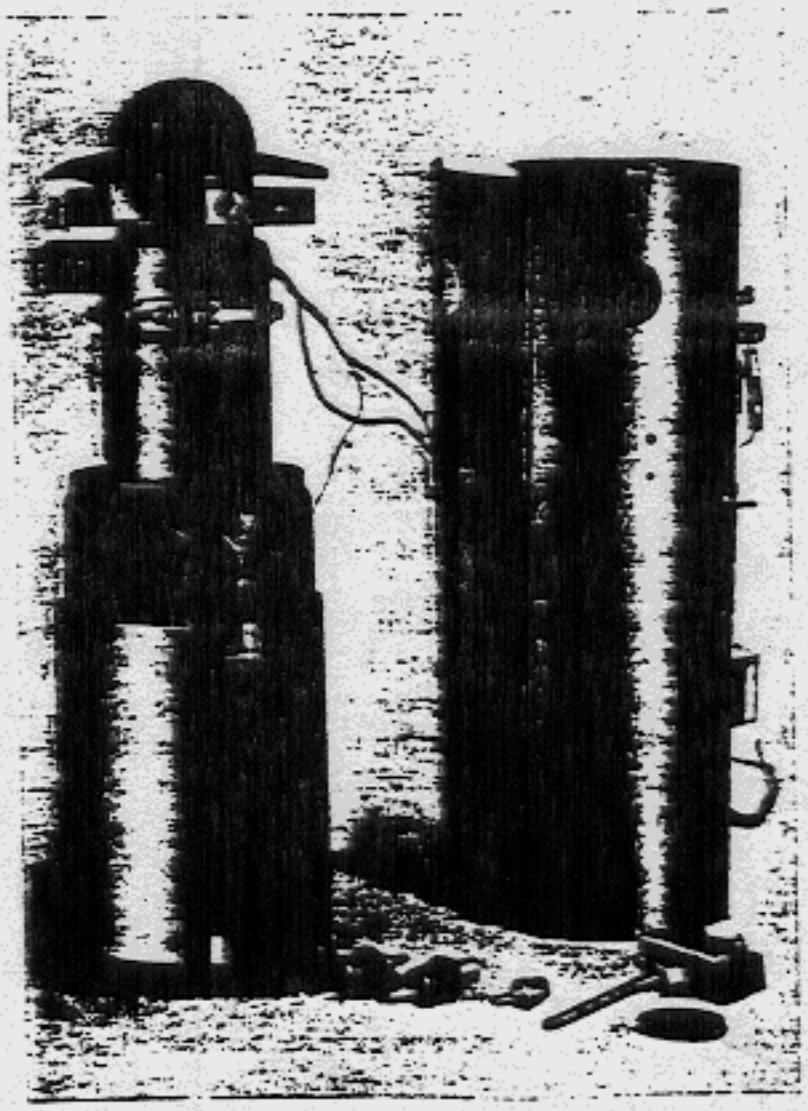


Fig. 20

out of the casing, taking care not to damage the threaded adaptors for thermo-switch and jet carrier.

Loosen the clip which connects blower and heat exchanger and pull blower out of heat exchanger carefully.

The combustion air blower should **not** be dismantled further as it is fully balanced and the breaker contacts cannot be adjusted. The gap between radial wheel and motor housing should be 1.4 to 2 mm.

Note: The guide blades in the combustion chamber of the heat exchanger should not be bent or damaged. The three holes in the combustion chamber must be free of combustion deposits.

Assembly takes place in the reverse order.

When installing the combustion air blower, ensure that the ends of the clip are in line with the exhaust pipe adaptor and the slot of the clamp screw in the clip is on the opposite side to the combustion air intake adaptor. After installing the blower and heat exchanger in the casing, center the combustion air adaptor in the opening in the casing and then tighten the clip through the opening and close the opening with the rubber plug.

Note: After installation, check that the blades of the axial blower do not touch the casing. If necessary bend the casing to rectify. The blades must not be shortened.

Fig. 21

2 - Removing combustion air blower

Detach fuel pump pressure pipe at pressure regulator.

Detach the fuel hose from the pressure regulator at the jet.

Disconnect fuel pump cable.

Disconnect combustion air blower cable.

Take off push-on connectors at regulator switch.

Remove intake cap.

Remove outlet with thermo spring flap.

Remove pump and bracket.

Remove four screws in casing.

Pull casing apart and insert a piece of wood about $1^1/_2$" wide.

Loosen blower and heat exchanger clip.

Pull blower cable out of grommet in casing.

Pull blower out of heat exchanger and casing to the front (Fig. 22).

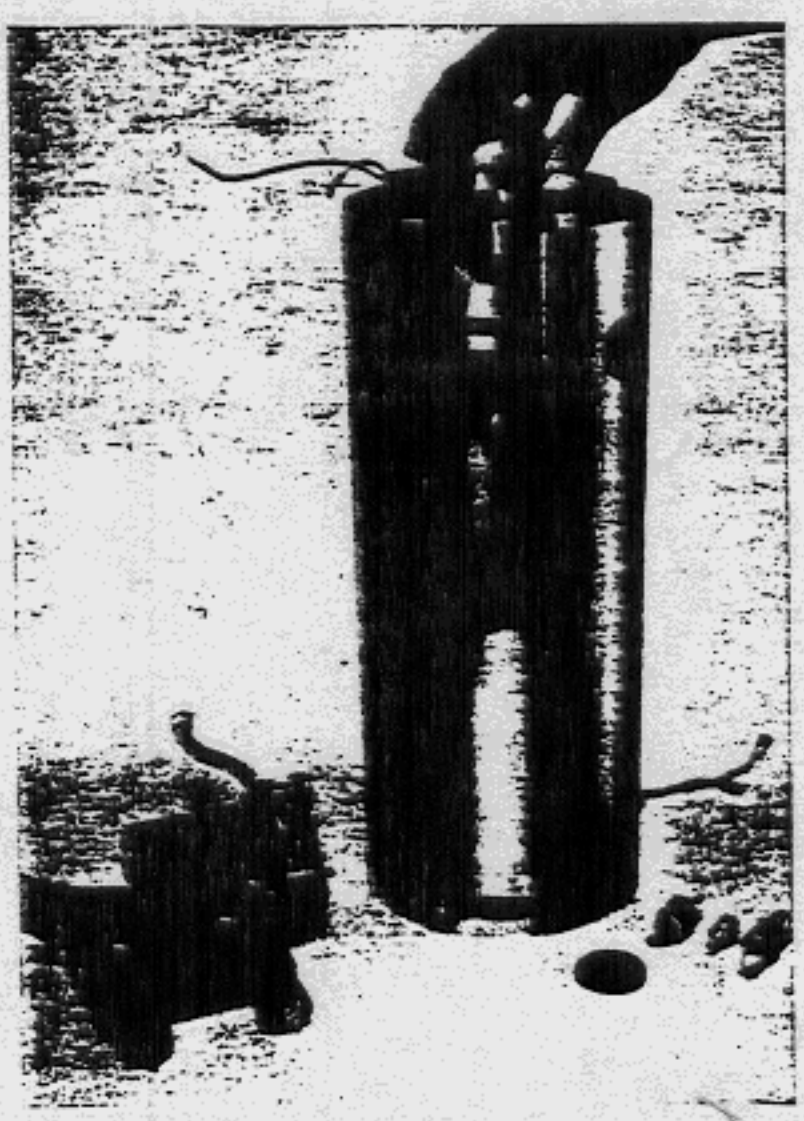


Fig. 22

The remarks on the combustion air blower in para. 1 are to be noted.

3 - Removing safety switch

Remove two screws in switch bracket.

Take plastic cover off housing.

Pull switch out of housing.

Disconnect cables at terminal plate, at casing and at overheating switch.

Fit new switch if necessary.

Do not bend the spring or the contacts.

The switch must only be checked and adjusted when the plastic housing is closed. At the nominal voltage, the time taken to operate should be 3—4 minutes. If rectification is required, the red sealed adjusting screw on the right side of the base plate must be turned through the slot in the switch lever. If the switch-off time is shorter turn screw to the right, if longer, turn to the left (Fig. 23).

The marking of the safety switch under the base plate, indicates the voltage:

FC = 6 Volt
FR = 12 Volt
GG = 24 Volt

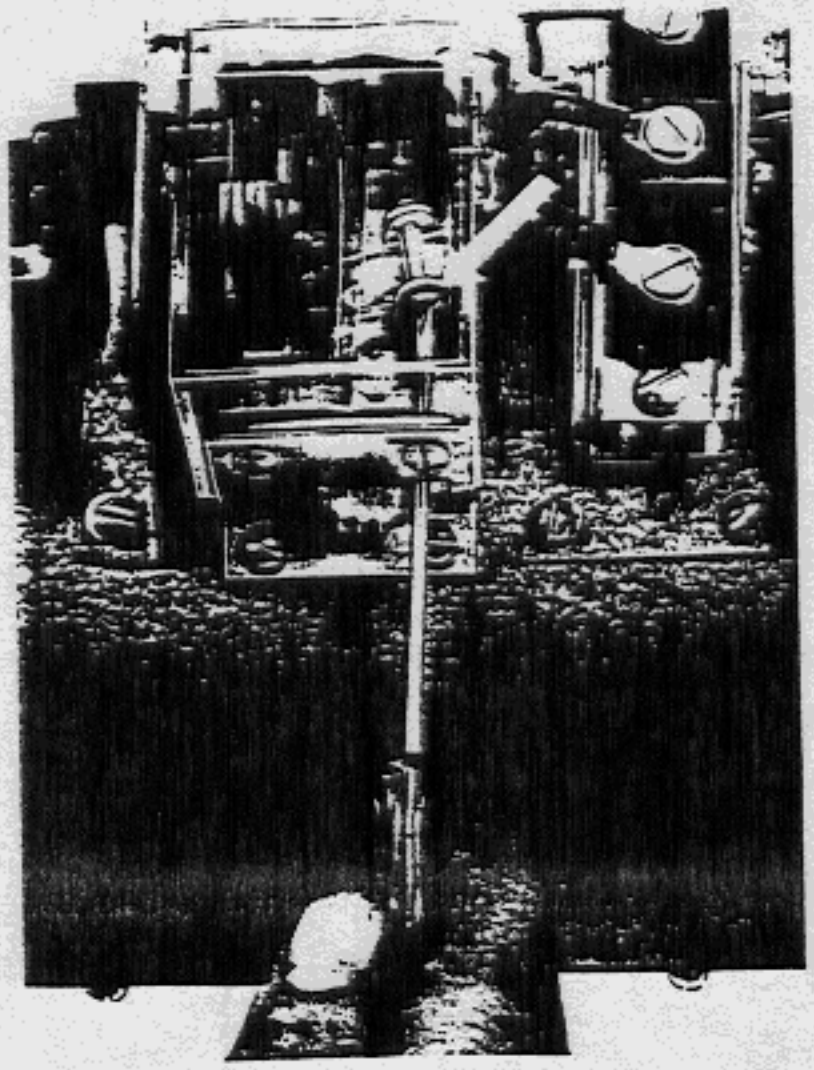


Fig. 23

4 - Outlet with bimetal spring flap

Remove two feed cables at regulator switch.

Loosen four screws and take outlet off casing (Fig. 24).

Remove regulator switch (see l. 12).

If faulty, replace complete.

Adjustment is made with heater working. When switching off, the flap must close with a snap at an outlet air temperature of 33—37° C.

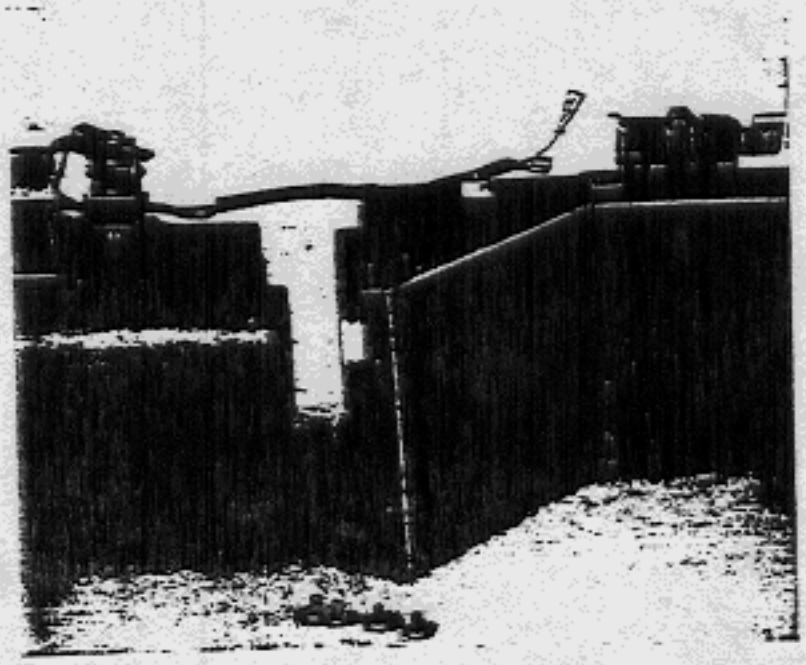


Fig. 24

IV. Checking the heater

When the heater has been dismantled or when parts have been replaced, it must be given a working test and all the adjustments which the manufacturer stipulates for the operation and safety of heater and vehicle, checked. This is the only way to ensure that the heater will continue to work properly.

1 - Checking with heater removed

Note: The following parts may be required for the test:

1 Exhaust pipe
1 Exhaust elbow
1 Fresh air hose
1 Intake pipe
1 Electric cable with push-pull switch

The heater must be set up horizontally. It must only be clamped in a vice at the base and not at the casing.

Place the exhaust pipe on the flange. If the exhaust gas is to be taken farther away, use the exhaust elbow as well. Install the fresh air pipe and hose on the combustion air intake flange. Connect the fuel supply to the filter and ensure that the fuel container is in the same relative position as in the vehicle. Do not exceed the maximum pump delivery head of 1 m under any circumstances.

Connect positive cable to terminals KL 1, 2 and 4, (it is best to use the push-pull switch with operating cable).

Connect the negative cable to heater ground, preferably to the ground strap on the support. (Battery and mains transformer).

Use the correct voltage as shown on the identification plate.

Connect the test lamp to the fuel pump connection and heater ground in order to check the pump, safety switch, overheating switch and regulating switch.

Test voltage 5.8 Volt or 11 Volt: measure at feed KL 2 or KL. CL on thermo-switch.

Remove spark and heater plugs and check fuel jet direction. The jet of fuel should strike the atomizer wheel about 1 mm offset towards the motor.

Align jet carrier as necessary.

Start heater up and check that it ignites properly.

Set **regulator switch** to minimum position.

After one regulating cycle, that is after the heater switches on the second time, check the warm air temperature at the outlet and adjust as necessary until the specified value is attained.

Specified value:
Regulator maximum setting = Switch-off temperature 90—105° C.

Pull the soot check rod out and check if it is covered with soot.

Check fuel consumption and blower speed at 6 Volts.

a) Fuel consumption

Bridge the cable at regulator switch. Start the measurement as soon as the heater is fully in operation. The time for the consumption of 25 cc is measured. The time should be 141—153 sec./25 cc which equals .64—.59 liters per hour. If a second check is required, switch heater off and let the run-on cycle cool the heater down.

b) Blower speed

Measured at 6 Volts.
Nominal speed 4875—5375 rpm.

Measure the run-on time as follows.

Set the heat output to "Max." and then stop the combustion process within a regulating cycle by moving the switch to "Off" and operate the stop watch at the same time.

Measure the time which elapes before the blower switches off.

The time should be 150—210 seconds.

Adjust the bimetal spring flap during the heater run-on period.

The flap should close with a snap action at 35° ± 2° C.

(Not valid for heater 20 1127, VW Double Cab Pick-up.)

Overheating switch

1. Block the air intake with the proper cover cap.
2. Measure the switch-off temperature.

Should be 150°—200° C.

Check security of all nuts and screws on the heater.

2 - Checking with heater installed

If the heater is to work properly when installed even though it has been checked thoroughly beforehand, it must be installed in accordance with the maker's instructions.

Do not alter the exhaust pipe layout.

The position of the intake pipe for the combustion air must be noted particularly (common fault).

Seen in the direction of travel it be at a right angle to the right and end between exhaust elbow and vehicle floor.

Avoid a poor ground connection (voltage drop) by removing paint or rust from ground strap contact surface.

Check electrical connections with wiring diagram.

Check that Bowden cable works easily, correct routing if necessary.

Check vehicle battery and charge if necessary. At a voltage of less than 5.6, the heater will no longer function properly.

Switch heater on and check ignition and controls.

Ensure that the safety switch is switched on. As the red switch lever does not show the position of the switch, it should be moved back and forth.

If the battery is discharged and the voltage low, start vehicle engine and switch heater on again after the red charging lamp has gone out.

Check and correct heater run-out if necessary.

3 - Technical data for the Type BN 4 heater

Test voltage	5.8 Volts; 11 Volts
Safety switch cut-out time	100—180 seconds
Regulator switch operating temperature — Min. position	42—52° C
Max. position	90—105° C
at a voltage of	6 V; 12 V
Fuel consumption	25 cc in 141—153 secs.
or	.64—.59 liters/hour
Blower speed	4875—5375 rpm
Heater run-on time	150—210 seconds
Bimetal spring flap closes	35 ± 2° C
Overheating switch operating temperature	150—200° C

V. Repair times for the BN 4 heater

for VW Transporter
VW Double Cab Pick-up
VW Ambulance

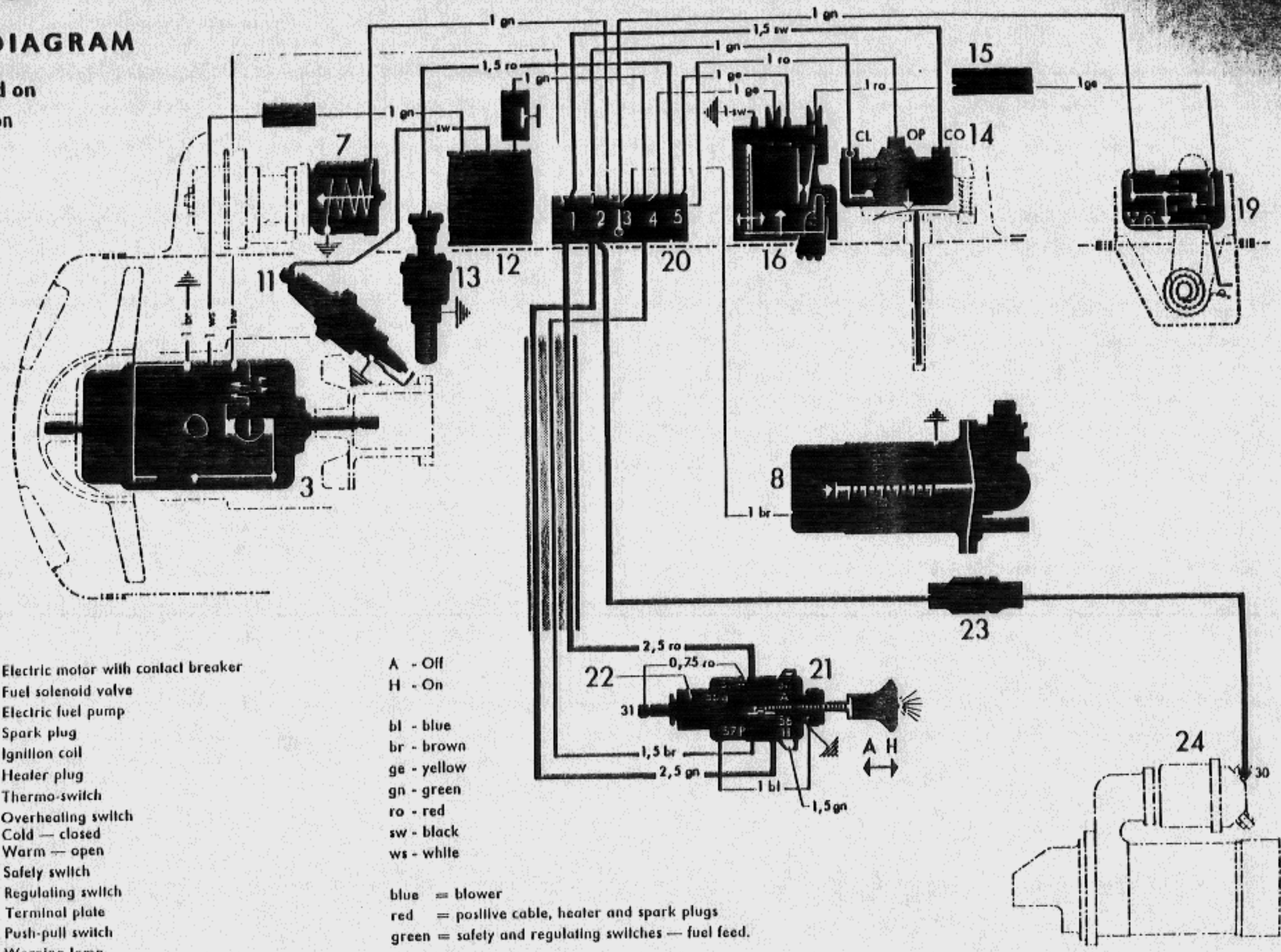
L	1 - Replace push-pull switch	10 min.
	a) Replace warning lamp	10 min.
	b) Replace cable harness	30 min.
	2 - Replace Bowden cable	30 min.
	3 - Replace fuel filter	10 min.
	4 - Replace pressure regulator complete	20 min.
	a) Adjust pressure regulator	10 min.
	b) Replace coil for solenoid valve	15 min.

5 -	a) Replace fuel pump (old type)	15 min.
	b) Replace fuel pump (new type)	25 min.
	c) Adjust contacts	10 min. + operation 5a or b
6 -	a) Replace fuel jet	10 min.
	b) Align jet carrier	40 min. + operation II
7 -	Replace or clean spark plug	10 min.
8 -	Replace or clean heater plug	10 min.
9 -	Replace coil	10 min.
10 -	a) Replace or adjust thermo-switch	25 min.
	b) Adjust thermo-switch	10 min.
11 -	Replace overheating switch	10 min. + operation 10a
12 -	Regulator switch	30 min.
13 -	Replace intake pipe	15 min.
14 -	Replace exhaust	15 min.
II.	Remove and install	60 min.
III.	a) Dismantle heater and remove combustion air blower with heat exchanger	45 min. + operation II
	b) Replace combustion air blower	30 min. + operation II
	Replace casing	100 min. + operation II
	c) Replace safety switch	10 min. + operation II
	d) Replace outlet with bimetal switch flap	10 min. + operation II
IV.	Check heater	20 min.

J. EBERSPÄCHER
7300 ESSLINGEN/N., P.O. BOX NO. 289
TEL. 35 65 55 · TELEX. 072 3584

WIRING DIAGRAM

Heater switched on
Start of combustion



3 Electric motor with contact breaker
7 Fuel solenoid valve
8 Electric fuel pump
11 Spark plug
12 Ignition coil
13 Heater plug
14 Thermo-switch
15 Overheating switch
Cold — closed
Warm — open
16 Safety switch
19 Regulating switch
20 Terminal plate
21 Push-pull switch
22 Warning lamp
23 Fuse holder
24 Starter (Terminal 30)

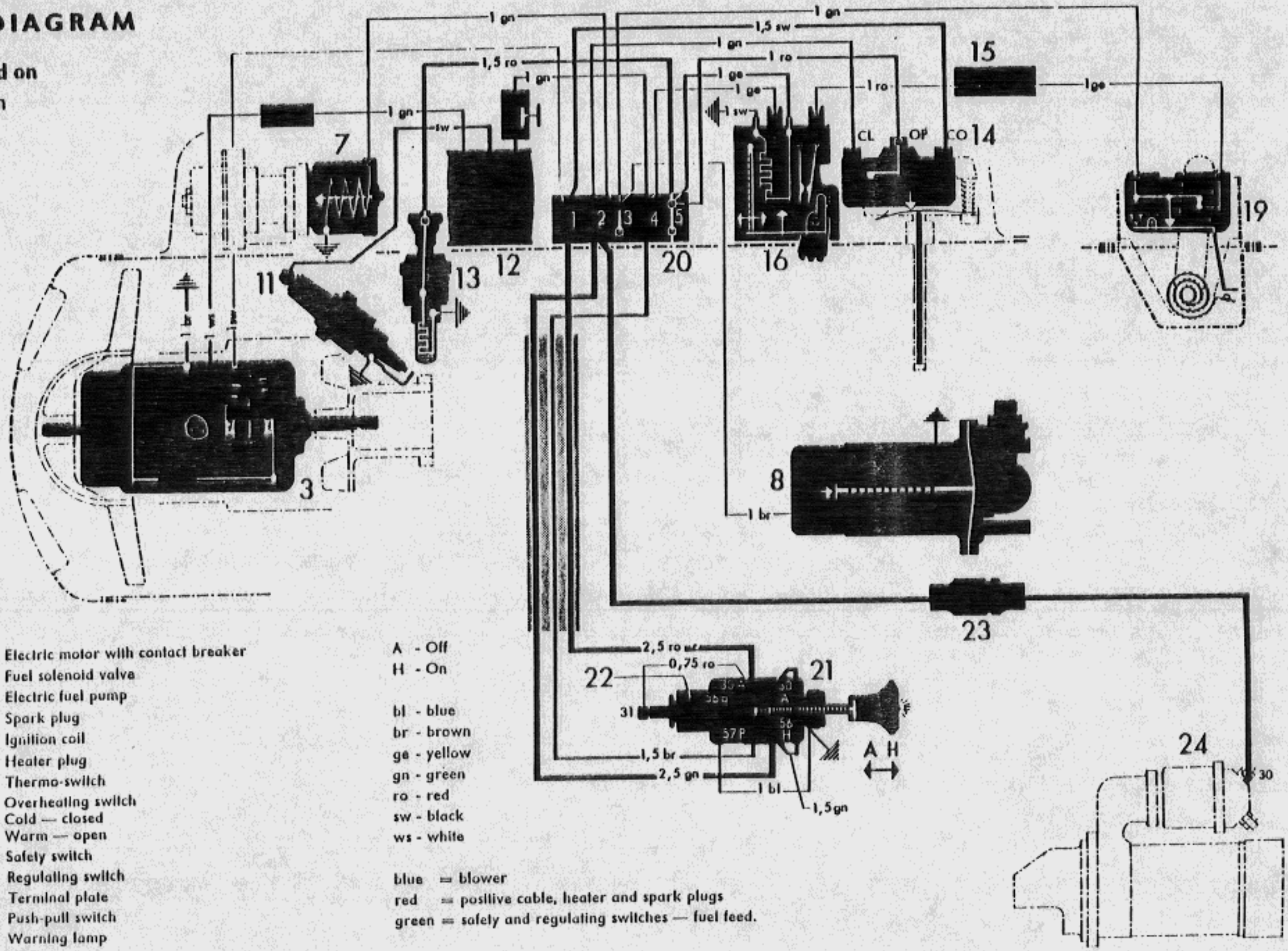
A - Off
H - On

bl - blue
br - brown
ge - yellow
gn - green
ro - red
sw - black
ws - white

blue = blower
red = positive cable, heater and spark plugs
green = safety and regulating switches — fuel feed.

WIRING DIAGRAM

Heater switched on
Normal operation



3 Electric motor with contact breaker
7 Fuel solenoid valve
8 Electric fuel pump
11 Spark plug
12 Ignition coil
13 Heater plug
14 Thermo-switch
15 Overheating switch
Cold — closed
Warm — open
16 Safety switch
19 Regulating switch
20 Terminal plate
21 Push-pull switch
22 Warning lamp
23 Fuse holder
24 Starter (Terminal 30)

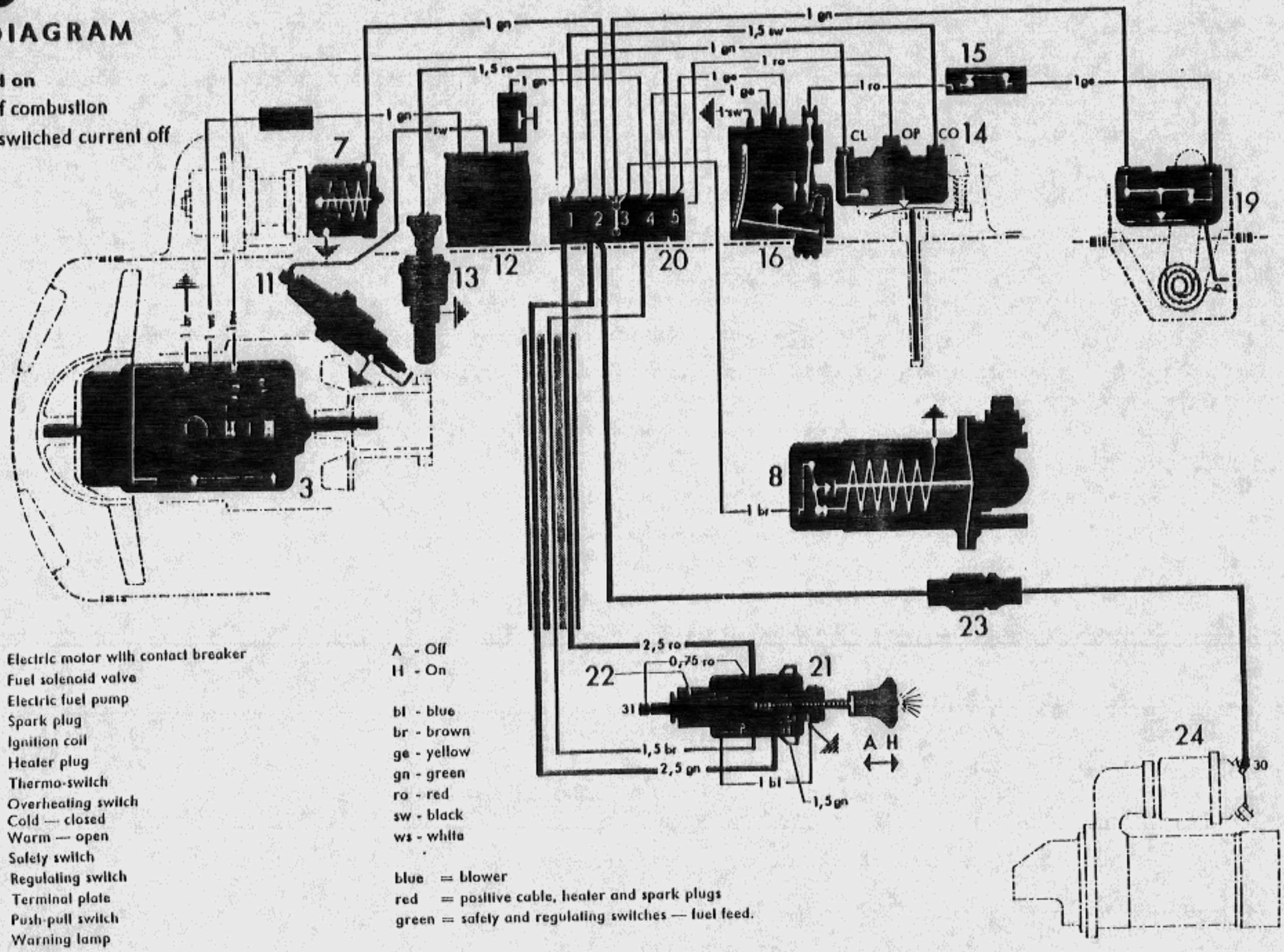
A - Off
H - On

bl - blue
br - brown
ge - yellow
gn - green
ro - red
sw - black
ws - white

blue = blower
red = positive cable, heater and spark plugs
green = safety and regulating switches — fuel feed.

WIRING DIAGRAM

Heater switched on
Trouble at start of combustion
Safety switch has switched current off



3 Electric motor with contact breaker
7 Fuel solenoid valve
8 Electric fuel pump
11 Spark plug
12 Ignition coil
13 Heater plug
14 Thermo-switch
15 Overheating switch
Cold — closed
Warm — open
16 Safety switch
19 Regulating switch
20 Terminal plate
21 Push-pull switch
22 Warning lamp
23 Fuse holder
24 Starter (Terminal 30)

A - Off
H - On

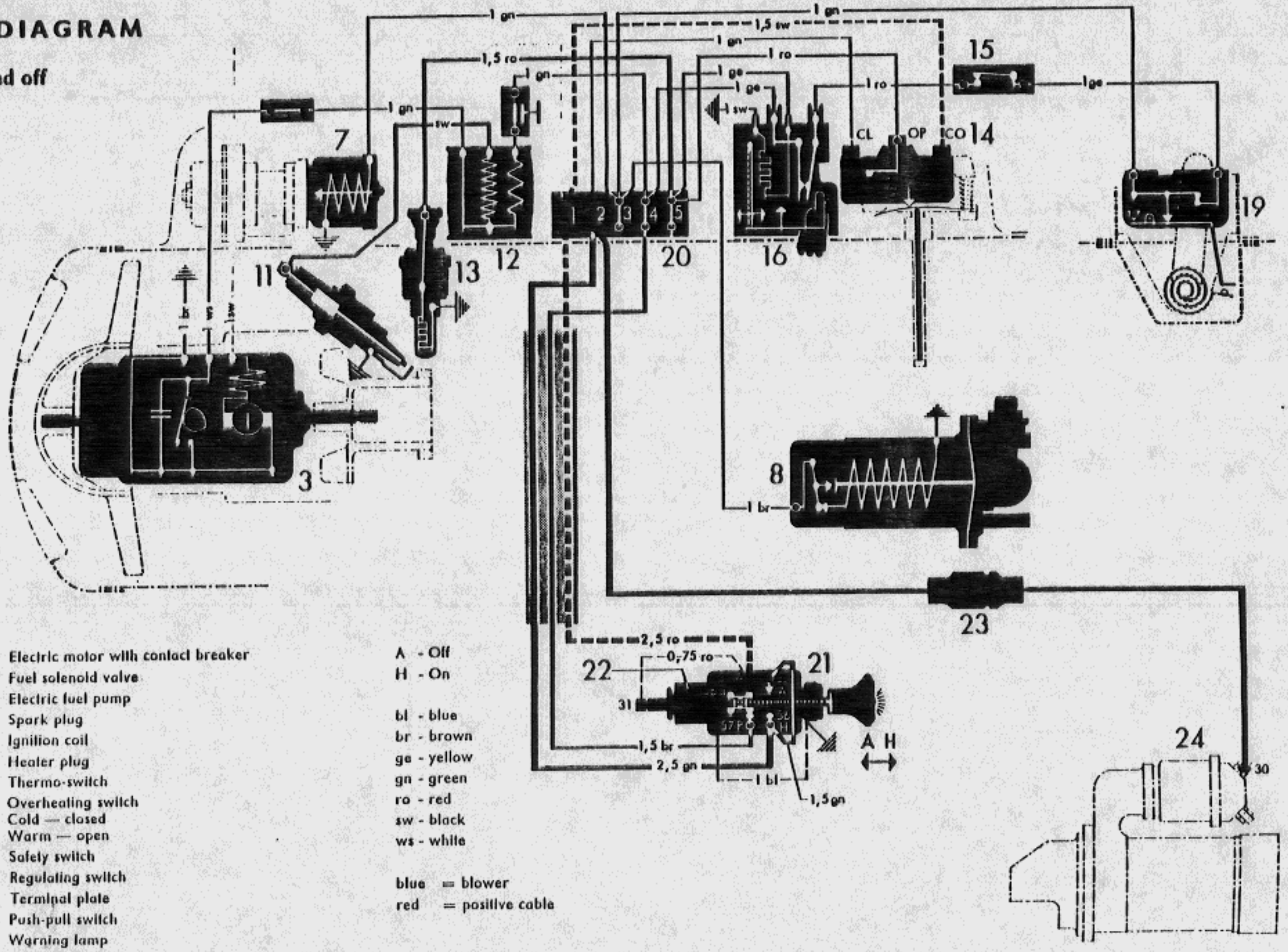
bl - blue
br - brown
ge - yellow
gn - green
ro - red
sw - black
ws - white

blue = blower
red = positive cable, heater and spark plugs
green = safety and regulating switches — fuel feed.

WIRING DIAGRAM

Heater switched off

Run-on



3 Electric motor with contact breaker
7 Fuel solenoid valve
8 Electric fuel pump
11 Spark plug
12 Ignition coil
13 Heater plug
14 Thermo-switch
15 Overheating switch
Cold — closed
Warm — open
16 Safety switch
19 Regulating switch
20 Terminal plate
21 Push-pull switch
22 Warning lamp
23 Fuse holder
24 Starter (Terminal 30)

A - Off
H - On

bl - blue
br - brown
ge - yellow
gn - green
ro - red
sw - black
ws - white

blue = blower
red = positive cable

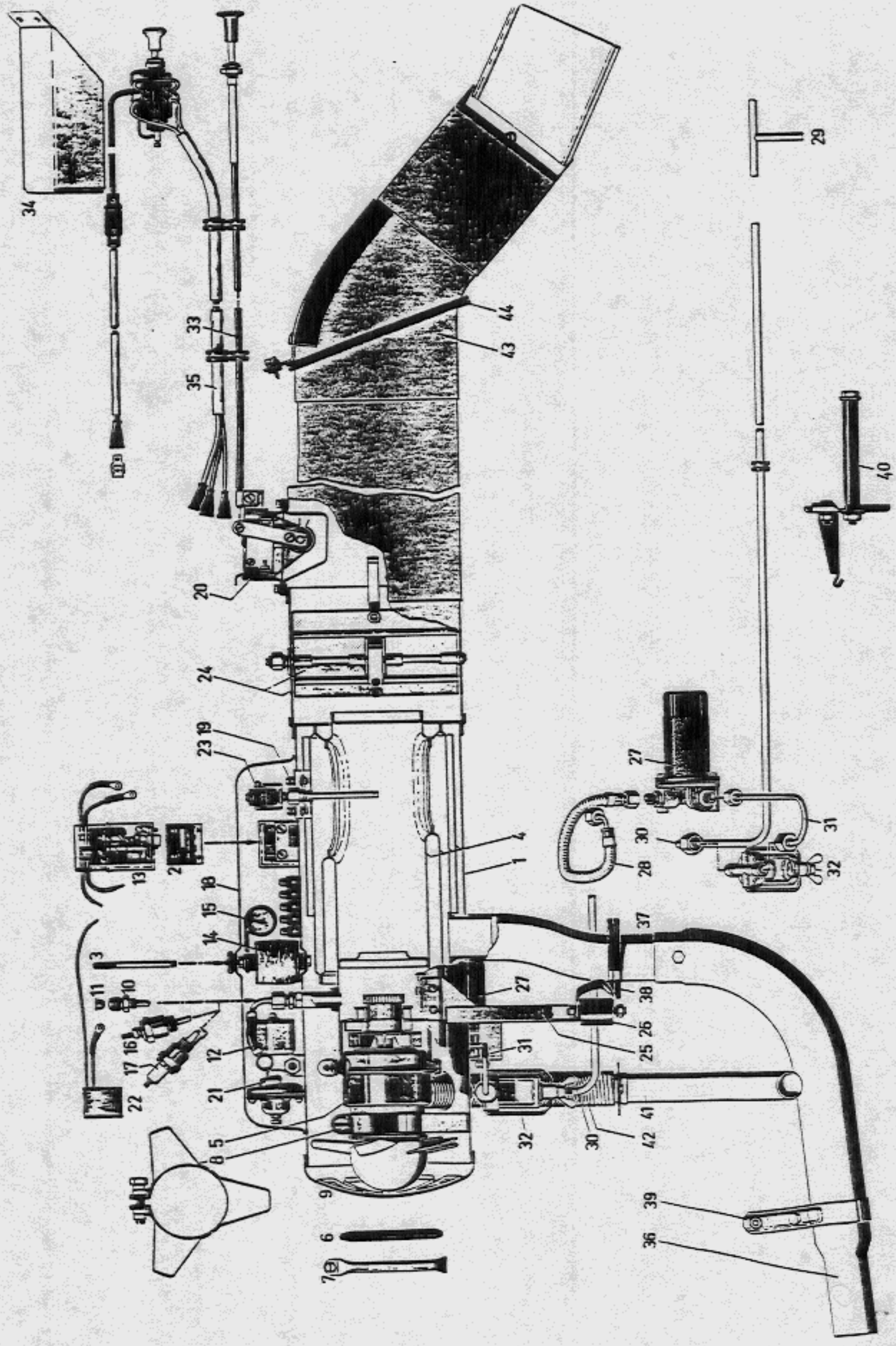
No.	Qty.	Designation Remarks	Order No.	No.
		Electrical parts (6 Volt) **(12 Volt)**		
		consisting of:		
13	1	Safety switch, complete (6 Volt)	20 1101 30 01 00	7951
		(12 Volt)	20 1102 30 01 00	8252
		consisting of:		
	1	Cap, front	20 1101 10 01 06	7986
	1	Cap, rear	20 1101 10 01 07	7984
14	1	Coil (6 Volt)	20 1101 10 00 02	8207
		(12 Volt)	20 1102 10 00 02	8208
	1	Ignition cable connector	20 1101 10 00 18	8032
	1	Terminal plate, 5 pole	20 1101 30 03 00	7993
	1	Terminal plate, 1 pole	20 1101 10 00 04	8026
	3	Connecting tabs	20 1101 10 00 05	8027
	1	Clip	20 1101 10 00 06	8028
15	1	Condenser	20 1101 10 00 08	8029
16	1	Heater plug (6 Volt)	20 1101 10 00 10	8030
		(12 Volt)	20 1102 10 00 10	8140
17	1	Spark plug (2 pole)	20 1105 10 00 11	8130
	1	Rubber cap	20 1101 10 00 19	8033
	2	Cheese head tapping screw	BZ 2,9 x 13 DIN 7971	8222
	1	Hexagon nut	M 5 DIN 934	2032
	3	Lock washer	J 5,3 DIN 6797	3011
	2	Lock washer	J 4,3 DIN 6797	3014
18	1	**Cap**	20 1101 22 00 00	8253
	1	Knurled nut	M 5 DIN 467	8008
	1	Washer	5,3 DIN 9021	8009
19	1	**Overheating switch**	20 1101 33 00 00	8225
		including:		
	4	Round head screw	AM 4 x 6 DIN 86	3086
	4	Lock washer	J 4,3 DIN 6797	3014
20	1	**Regulator switch**	20 1101 14 00 00	8045
		including:		
	2	Cheese head screw	M 4 x 6 DIN 84	8052
	2	Spring washer	A 4 DIN 137	8228
21	1	**Pressure regulator with solenoid valve**	20 1101 35 00 00	8254
		consisting of:		
22	1	Coil, complete (6 Volt)	20 1101 06 03 00	8059
		(12 Volt)	20 1102 06 03 00	8111
	1	Union	20 8515 05 00 29	3061 A
	1	Adaptor	20 8542 04 00 02	2038

No.	Qty.	Designation Remarks	Order No.	No.
	1	Strainer	20 0128 00 00 00	2195
	1	Hollow screw	A 2/3 DIN 7623	8005
	3	Sealing ring	A 8 x 12 DIN 7603	2045
	4	Round head screw	4 x 8 DIN 86	2003
	4	Lock washer	J 4,3 DIN 6797	3014
	1	Housing	20 1101 35 05 01	8241
	1	Cap, complete	20 1101 15 04 00	8242
	1	Adjusting screw	20 1101 15 00 04	8243
	1	Adjusting spring	20 1101 15 00 02	7963
	1	Spring cover	20 1101 15 00 03	8244
	1	Flange	20 1101 15 00 01	8245
	1	Diaphragm, complete	20 1101 25 03 00	8246
	1	Valve, complete	20 1101 25 02 00	8247
	1	Housing	25 1101 04 00 01	8248
	1	Guide sleeve	25 1101 04 01 00	7961
	1	Valve, complete	20 1101 06 01 00	7964
	1	Spring	20 1101 06 00 04	8249
	1		25 1101 04 00 03	8250
	1	Gasket	25 1101 04 00 02	8251
	6	Round head screw	AM 4 x 8 DIN 86	2003
	6	Lock washer	J 4,3 DIN 6797	3014
23	1	**Thermo-switch** consisting of:	20 8470 21 00 00	2094
	1	Switch mounting, complete	20 8470 20 01 00	2095
	1	Micro-switch	20 8470 21 00 02	2096
	1	Adjusting mounting	20 8470 20 00 07	2097
	1	Leaf spring	20 8470 20 00 08	2098
	1	Spring	20 8470 16 00 12	2099
	1	Quarz rod	20 8456 09 00 25	2100
	1	Seal	20 8450 09 00 10	2043
	1	Locating pin	20 8470 21 00 28	8195
	1	Union nut	2/3 M 10 x 1 DIN 7606	4041
	2	Lock washer	2,3 DIN 6799	8196
	1	Screw	CM 3,5 x 25 DIN 85	2102
	2	Washer	3,7 DIN 433	2103
	4	Lock washer	J 3,7 DIN 6797	2104
	1	Hexagon	M 3,5 DIN 934	2105
	1	Screw	CM 4 x 22 DIN 85	2106
	1	Washer	4,3 DIN 433	2107

NO.				No.
24	1	**Outlet with bimetal spring flap** including:	20 1104 01 00 00	8006
	4	Screw	AM 5 x 8 DIN 85	8017
	4	Lock washer	J 5,3 DIN 6797	3011
25	1	**Heater mounting** consisting of:	20 1104 22 00 00	7954
	1	Support, complete	20 1104 22 01 00	7952
26	2	Bonded rubber mounting with thread	20 8460 01 00 15	3027
	1	Copper ground strap	20 8460 01 00 24	3028
	4	Hexagon nut	M 6 DIN 934	2015
	4	Spring washer	B 6 DIN 127	2016
	4	Round head screw	M 4 x 8 DIN 86	2003
	4	Lock washer	J 4,3 DIN 6797	3014
		Fuel pump with suction pipe consisting of:		
27	1	Electric pump (6 Volt)	20 8541 16 02 00	4047
		(12 Volt)	20 1122 04 01 00	8237
	1	Bakelite cap for normal pump	20 8541 16 02 04	5651
28	1	Pressure line	20 1104 24 00 06	8239
	2	Hexagon head screw	M 6 x 15 DIN 931	3053
	2	Spring washer	B 6 DIN 127	2016
	1	Ground cable	20 0012 10 01 10	7997
29	1	T piece	20 8478 07 02 00	3047
30	1	Pipe, long	20 1104 24 02 00	7957
31	1	Pipe, short	20 1104 24 01 00	7958
32	1	**Fuel filter** consisting of:	20 8478 07 07 00	2092
	1	Housing with clip	20 8478 07 07 01	2153
	1	Gasket	20 8478 07 07 02	2154
	1	Strainer	20 8478 07 07 03	2155
	1	Glass bowl	20 8478 07 07 04	2156
	1	Clamp sleeve	20 8478 07 07 05	2157
	1	Wing nut	M 5 DIN 315 g	2158
	1	**Controls** consisting of:	20 1104 15 00 00	8240
33	1	Bowden cable	20 1104 26 00 01	7960

Fig. No.	Qty.	Designation · Remarks	Order No.	EB-No.
34	1	Cover plate	20 1104 05 00 06	7992
	2	Grommet	20 8362 02 00 34	2072
35	1	**Cable for control**	20 1104 15 02 00	8255
	1	Push-pull switch (6 Volt)	20 8529 17 04 00	4038
		(12 Volt)	20 8530 17 04 00	8256
	1	Fuse holder with 25 Amp. fuse	20 8542 12 03 00	8158
	1	Fuse, 25 Amp.	25 DIN 72 581	4056
	1	Cable adaptor	20 0023 00 00 00	8073
	2	Grommet	20 8593 17 00 51	8074
	1	Bulb (6 Volt)	20 8515 17 04 02	8257
		(12 Volt)	20 8516 17 04 01	2202
	1	**Exhaust system** consisting of:	20 1104 06 00 00	8075
36	1	Elbow	20 8478 09 00 01	3125
37	1	Exhaust pipe	20 1104 06 00 03	8076
38	1	Sealing ring for exhaust pipe	20 8542 11 00 02	2087
39	1	Bracket	20 8478 09 00 04	3116
	2	Hexagon head screw	M 5 x 50 DIN 931	2088
	2	Hexagon nut	M 5 DIN 934	2032
	2	Spring washer	B 5 DIN 127	2033
	2	Hexagon head screw	M 6 x 18 DIN 931	8178
	2	Hexagon nut	M 6 DIN 934	2015
	2	Spring washer	B 6 DIN 127	2016
40	1	**Filter bracket, complete**	20 1104 21 00 00	7990
	1	Warm air hose	20 1104 11 00 01	8079
	1	**Intake system** consisting of:	20 1104 07 00 00	8081
41	1	Intake pipe, complete	20 1104 07 01 00	8082
42	1	Fresh air hose	20 1104 07 01 01	8083
	3	Hexagon head screw	M 4 x 10 DIN 933	1136
	3	Washer	B 4,3 DIN 125	2012
	3	Spring washer	B 4 DIN 127	2004
	1	**Air outlet, complete** consisting of:	20 1104 08 00 00	8084
43	1	Air outlet	20 1104 08 03 00	8085
44	1	Seal	20 1104 08 00 04	8086
	2	Grommet	20 8515 12 00 33	3074
	2	Cheese head tapping screw	BZ 4,8 x 13 DIN 7971	4052
	2	Washer	5,3 DIN 125	3042

The following parts are also available on an **Exchange** basis:	Order No.	EB-No.
1 - Electric pump (6 Volt)	20 8541 16 02 00	4047
Electric pump (12 Volt)	20 1122 04 01 00	8237
2 - Combustion air blower (6 Volt)	20 1101 03 00 00	8012
Combustion air blower (12 Volt)	20 1102 03 00 00	8097
3 - Thermo-switch	20 8470 21 00 00	2094
Expendable parts which are not covered by the warranty:		
1 - Heater plug (6 Volt)	20 1101 10 00 10	8030
Heater plug (12 Volt)	20 1102 10 00 10	8140
2 - Spark plug	20 1105 10 00 11	8130
3 - Glass bowl for filter	20 8478 07 07 04	2156
4 - Fuse 25 Amp.	25 DIN 72 581	4056
5 - Bulb (6 Volt)	20 8515 17 04 02	8257
Bulb (12 Volt)	20 8516 17 04 01	2202
6 - Gaskets and seals		
7 - Grommets		



J. EBERSPÄCHER
7300 ESSLINGEN/N., P.O. BOX NO. 289
TEL. 35 65 55 · TELEX. 072 3584

Type BN 4
for VW Transporter
VW Double Cab Pick-up
VW Ambulance

Supplement to Part List for older BN 4 heaters

for heaters with single pole spark plug:

Qty.	Designation	Order No.	EB-No.
1	Spark plug, single pole	20 1101 10 00 11	8031
1	Union nut	20 1101 10 00 21	8034
1	Gasket	20 1101 10 00 13	8258

for heaters with horizontal fuel pump in front of mounting

Qty.	Designation	Order No.	EB-No.
1	Heater mounting, complete consisting of:	20 1104 02 00 00	8065
1	Mounting	20 1104 02 01 00	8066
1	Fuel hose (pressure line from fuel pump)	20 1104 04 00 06	8039
1	Fuel pipe, long	20 8478 07 04 00	3048
1	Fuel pipe, short	20 8478 07 06 00	3050 A

Up to Vehicle Chassis No. 970 650

1	Filter bracket	20 1104 11 00 00	8077

from Vehicle Chassis No. 970 651

1	Filter bracket	20 1104 21 00 00	7990

J. EBERSPÄCHER · 7300 ESSLINGEN/N., P. O. BOX NO. 289 · TEL. 35 65 55 · TELEX. 072 3584

SUBJECT TO ALTERATION
JULY 1963 ISSUE
PRINTING NO. 2220. 1. 64. HH

22
D 25
27

Type BN 4
for VW Double Cab Pick-up
VW Ambulance

in conjunction with
Parts List D 22

General

The above versions of the BN 4 Eberspächer heater differ from the heater for the VW Transporter in the following parts.

I. Heater Type BN 4

Heater No. 20 1127 (6 Volt)
20 1176 (12 Volt)
for Double Cab Pick-up

Fig. No.	Qty.	Designation Remarks	Order No.	EB-No.
1	1	**Outlet with bimetal spring flap** consisting of:	20 1127 01 00 00	8168
	4	Screw	AM 5 x 8 DIN 85	8017
	4	Lock washer	J 5,3 DIN 6797	3011
(25)*	1	**Heater mounting** consisting of:	20 1127 22 00 00	8236
	1	Support, complete	20 1104 22 01 00	7952
(26)	2	Bonded rubber mounting with thread	20 8680 01 00 32	2402
	1	Copper ground strap	20 8460 01 00 24	3028
	4	Hexagon nut	M 6 DIN 934	2015
	4	Spring washer	B 6 DIN 127	2016
	4	Round head screw	M 4 x 8 DIN 86	2003
	4	Lock washer	J 4,3 DIN 6797	3014

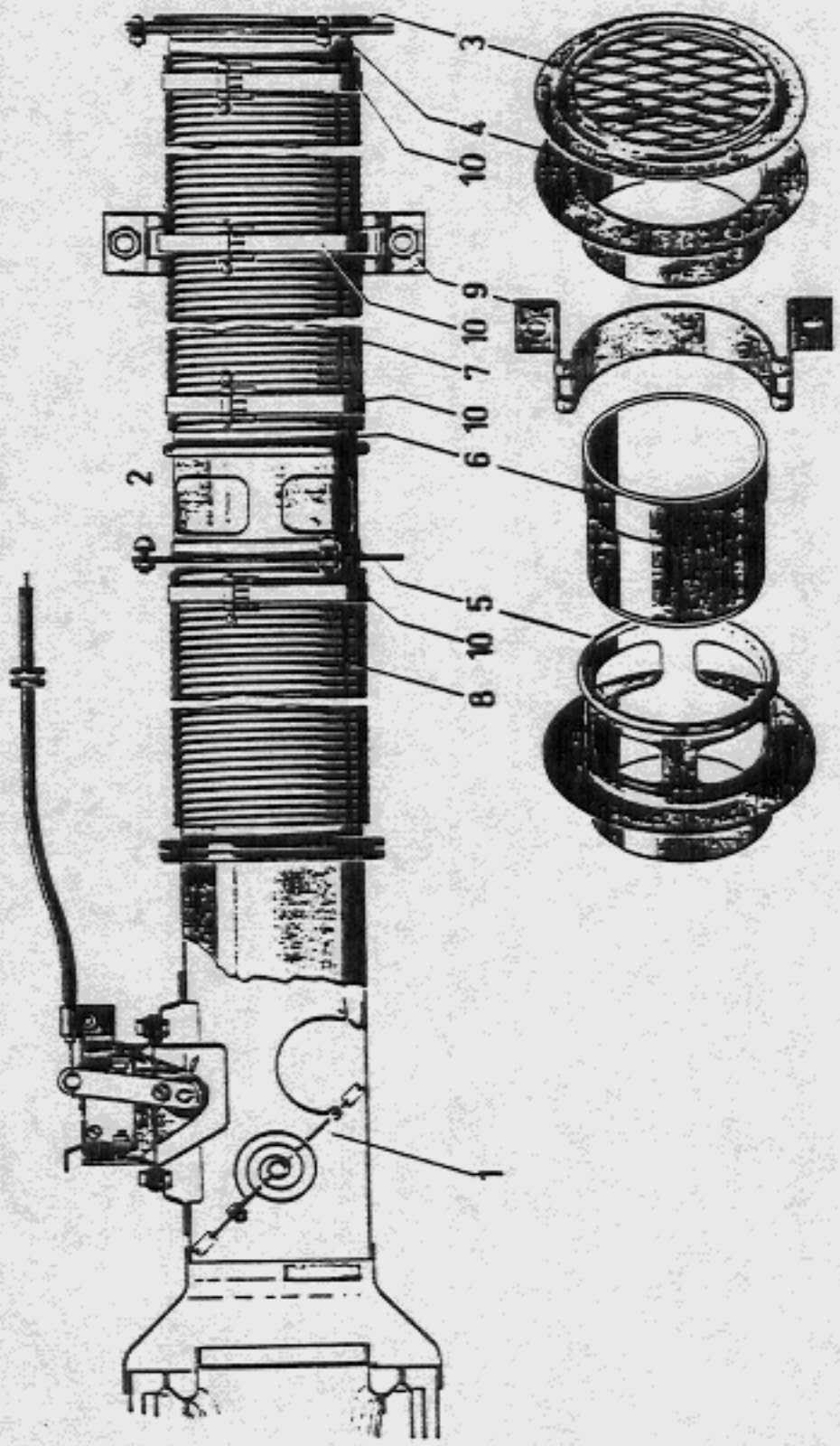
* See Parts illustration D 22 for Fig. Nos. in brackets.

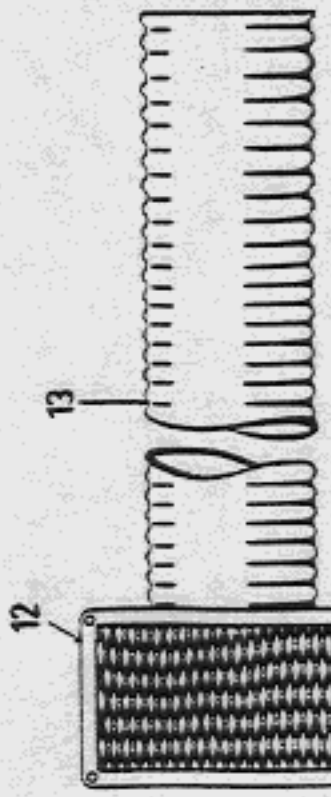
SUBJECT TO ALTERATION
JULY 1963 ISSUE
PRINTING NO. 1833. 1. 64. HH

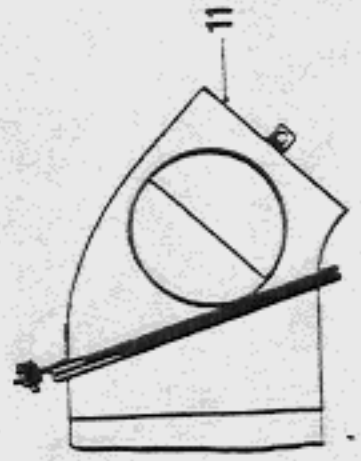
Fig. No.	Qty.	Designation Remarks	Order No.	EB-No.
	1	**Exhaust system** consisting of:	20 1127 06 00 00	8175
(36)	1	Elbow	20 8478 09 00 01	3125
(37)	1	Exhaust pipe	20 1127 06 00 03	8176
(38)	1	Sealing ring for exhaust pipe	20 8542 11 00 02	2087
(39)	1	Bracket	20 8478 09 00 04	3116
	2	Screw	M 5 x 50 DIN 931	2088
	2	Nut	M 5 DIN 934	2032
	2	Spring washer	B 5 DIN 127	2033
	2	Screw	M 6 x 18 DIN 931	8178
	2	Nut	M 6 DIN 934	2015
	2	Spring washer	B 6 DIN 127	2016
2	1	**Outlet, complete** consisting of:	20 8617 11 00 00	4103
3	1	Outlet	20 8617 11 01 00	4104
4	1	Hose support	20 8617 11 02 00	4105
5	1	Sleeve	20 8617 11 03 00	4106
6	1	Tube, complete	20 8617 11 04 00	4126
7	1	Warm air hose, long	20 8617 11 00 02	4127
8	1	Warm air hose, short	20 8617 11 00 03	4128
9	1	Bracket	20 8617 11 00 05	4129
	2	Screw	M 8 x 15 DIN 933	8179
	2	Nut	M 8 DIN 934	3114
	2	Washer	8,4 DIN 126	8180
	2	Spring washer	B 8 DIN 127	3124
10	4	Beru strip hose clip	20 8617 11 00 04	4130
	4	Tensioner	20 8617 11 00 07	5017
	3	Screw	AM 4 x 12 DIN 86	4112
	3	Nut	M 4 DIN 934	3013
	3	Spring washer	B 4 DIN 127	2004
	3	Screw	AM 5 x 12 DIN 86	8181
	3	Spring washer	B 5 DIN 127	2033

Heater No. 20 1128 (6 Volt)
20 1177 (12 Volt)
for VW Ambulance

Fig. No.	Qty.	Designation Remarks	Order No.	EB-No.
	1	**Outlet**	20 1128 11 00 00	8090
		consisting of:		
11	1	Outlet elbow, complete	20 1128 11 01 00	8091
	1	Seal	20 1104 08 00 04	8086
12	1	Outlet	20 8514 11 04 00	6006
13	1	Warm air hose	20 8514 11 00 29	6008
	1	Outlet grille	20 8514 11 05 00	6007
	2	Grommet	20 8515 12 00 33	3074
	2	Tapping screw	BZ 4,8×13 DIN 7971	4052
	2	Washer	5,3 DIN 125	3042







J. EBERSPÄCHER
7300 ESSLINGEN/N., P.O. BOX NO. 289
TEL. 35 65 55 · TELEX. 072 3584

Instructions for warranty work in VW Workshops

The following instructions only apply to Eberspächer heaters which are sold direct to workshops in the VW Organization by Messrs. Eberspächer without bringing in the Volkswagenwerk AG.

Warranty work on Eberspächer heaters which are supplied by the Volkswagenwerk AG (e. g. as M-equipment) is carried out in accordance with the instructions from the Volkswagenwerk AG.

1 - In accordance with our Warranty Conditions for Vehicle Heaters which are included with every "Eberspächer Stationary Heater for Volkswagen" leaflet, our warranty covers all heaters which are installed in an **authorized workshop** (VW Workshop with mechanics who have had a heater course) as laid down in our fitting instructions.

If **incorrectly installed,** we do not accept warranty claims for the heater when removed.

2 - The warranty period for all heaters fitted as **"M" equipment** begins on the date when the vehicle is registered.
For all heaters **installed subsequently,** the warranty period begins on the date of installation.*

3 - The **warranty claims** must bear the Type designation and the **Factory No.,** give **exact** information on the type of defect which has occurred and also describe the work carried out in the workshop. The claims must be submitted not later than 4 weeks after workshop process.

The **spare parts** used must be listed separately. The defective parts should be sent in or kept until the warranty claim has been checked. The parts used when carrying out warranty repairs will be credited at net price or we shall supply free-of-charge replacement parts.

4 - If **badly** damaged heaters cannot be repaired in the VW Workshop, the matter must be referred to the nearest JE Service Station or to the manufacturer. When necessary, an exchange appliance can be made available from there. Heaters which still do not function properly after having been examined twice in the workshop must also be returned for exchange.

Overseas such appliances should be sent to the Importers central workshop.

5 - Damage caused by **negligence** in the workshop will be charged to the workshop and is excluded from warranty procedure. Our repair times are valid for repair work and also for removal and installation costs.

6 - Cleaning, adjusting and checking operations which are connected with **normal** maintenance and cannot be attributed to malfunctioning of our heater cannot be claimed under warranty.

7 - **Expendable parts** such as spark plugs, heater plugs, glass filter bowls, etc. are not covered by the warranty. Mechanical **damage,** excessive **dirt** or heavy **corrosion** are not covered by the warranty, nor can costs incured when it is necessary to send a heater away for warranty repairs be accepted.

8 - On the question of **"Consequential Damage"**, see our Warranty Conditions, point 5.

* **This is covered by point 3 in our Warranty Conditions, Printing No. 2217.**

J. EBERSPÄCHER · 7300 ESSLINGEN/N., P.O. BOX NO. 289 · TEL. 35 65 55 · TELEX. 072 3584

SUBJECT TO ALTERATION
JULY 1963 ISSUE
PRINTING NO. 2216. 1. 64. HH

F

Type BN 4
for VW Transporter
VW Double Cab Pick-up
VW Ambulance

Instructions for trouble shooting on the BN 4 heater.

During the last winter we received numerous complaints about the BN 4 heater which revealed a lack of knowledge of the basic principles. The following instructions supplement the trouble shooting chart for the BN 4:

1 - Ensure that voltage at terminal 2 is at **least** 5.6 Volts when **the heater is working** without the vehicle engine running.

If the voltage is below this **minimum,** the result will be shooting up, ignition difficulty and even an occasional banging.

2 - Note the **wiring diagram** when installing. After installation, check that there is current at terminal 2 — even when the heater is switched off.

3 - Check that the **thermo-switch** is working properly:

a) during the starting procedure, there must be current at all 3 terminals.

b) about 15 seconds after combustion has commenced, the thermo-switch must switch the heater plug off. There should not be current at the OP terminal (center connection).

c) The run-on period should be 150—180 seconds. If too long the red-marked adjusting screw must be turned to the right. If too short, turn to the left.

d) When the heater is switched off and the run-on finished there should only be current at terminal CL.

4 - If **ignition** does not take place, the fault may lie in:

a) The ignition system or

b) Shortage of fuel.

To a) There should be current a terminal 4; and at the contact screw in the spark plug connector. Loosen this screw and check that the conical part is really making good contact with the cable. With the single pole spark plug, ensure that the plug and the heater plug which acts as the ground electrode are clean in order to prevent tracking. With the two pole plug, ensure that the gap is correct (2.5 mm) and that the condenser is not shorting on the cover.

Consider conversion to 2 pole plug: see Repair Instructions BN 4.

SUBJECT TO ALTERATION
JULY 1963 ISSUE
PRINTING NO. 1917. 1. 64. HH

b) There should be current at terminal 3. If not, operate the red lever on the safety switch (item 15 in wiring diagram) and check the terminal 3 again. If there is still no current here, check the circuit from terminal 4 via. the safety switch — overheating switch (item 15) to the regulator switch (item 19) with the aid of the wiring diagram and find out where the break is.

Take the jet out of the adaptor (holding with the second SW 14 wrench) after removing the union nut. Clean the jet by blowing with compressed air in direction of flow. Then connect the fuel hose to the jet and switch the heater on. The fuel should flow in a steady stream.

If the jet of fuel is being diverted by dirt between fine filter and jet hole, remove the filter with a small hook and clean the jet.

If no fuel is delivered, check if there is current at the pump. If there is, check the suction pipes and filter gasket for leakage.

Finally check if the fuel solenoid valve is clear and not sticking. The solenoid valve should give an audible click if current is applied to terminal 3 (current can be taken from terminal 2) when the heater is switched off. This is subject to the pressure regulator setting being roughly right.

5 - We have also frequently noted the following **fitting errors:**

a) Deficient or incorrectly installed combustion air pipes. The bent **combustion air pipe** (snow protection pipe) must be at a right angle to the right when seen in direction of motion and end between exhaust pipe and vehicle floor.

b) Flexible combustion air hoses not fitted on the heater flange.

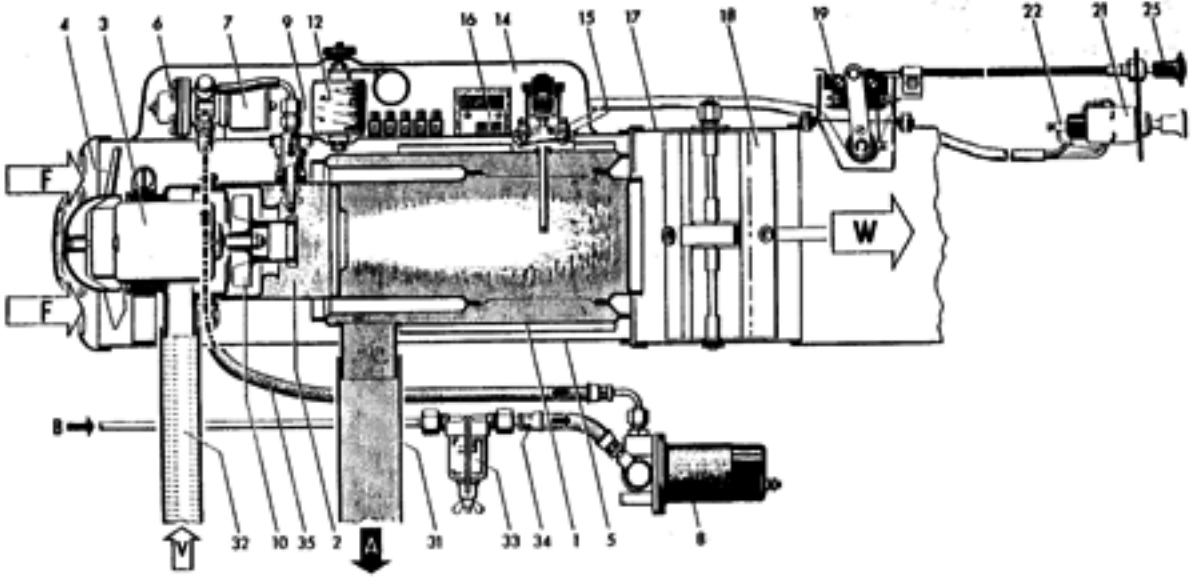
c) Poor ground connections due to paint left on ground strap contact surfaces.

J. EBERSPÄCHER
7300 ESSLINGEN/N., P.O. BOX NO. 289
TEL. 35 65 55 · TELEX. 072 3584

Type BN 4
Heater No. 20 1104 (6 Volt)
20 1147 (12 Volt)
for VW Transporter

Fig. No.	Qty.	Designation Remarks	Order No.	EB-No.
1	1	**Casing with component parts** consisting of:		
	1	Casing complete	20 1101 01 01 00	8001
2	1	Bracket	20 1101 01 00 01	8002
3	1	Stud	20 1101 01 00 02	8003
	1	Grommet	20 1101 01 00 05	8004
	1	Grommet	20 8456 01 00 26	2011
	1	Grommet	20 8362 02 00 34	2072
	7	Half round head screw	M 4 x 8 DIN 86	2003
	2	Countersunk screw	AM 4 x 6 DIN 91	7995
	7	Lock washer	J 4,3 DIN 6797	3014
4	1	**Heat exchanger**	20 1101 32 00 00	8214
5	1	**Combustion air blower 6 Volt** **12 Volt** consisting of:	20 1101 03 00 00 20 1102 03 00 00	8012 8097
6	1	Sealing ring	20 1101 03 00 04	8013
7	1	Clip	20 1101 03 00 07	8014
8	1	Support clip	20 1101 03 00 08	8159
9	1	**Intake cap, complete** consisting of:	20 1101 04 00 00	8015
	1	Intake cap	20 1101 04 00 01	8016
	4	Screw	AM 5 x 8 DIN 85	8017
	4	Lock washer	J 5,3 DIN 6797	3011
		Connecting parts consisting of:		
10	1	Fuel jet	20 1101 07 02 00	8019
11	1	Strainer	20 0128 00 00 00	2195
12	1	Fuel hose	20 1101 07 00 05	8021
	1	Sealing ring	A 8 x 12 DIN 7603	2045

SUBJECT TO ALTERATION
JULY 1963 ISSUE
PRINTING NO. 1839. 1. 64. HH


4
3
6
7
9
12
16
14
15
17
18
19
22
21
25
F
F
W
B
V
A
32
10
35
2
31
33
34
1
5
8