

**D. (Luft) T. 4211**

# **Tube tester RPG 2**

## **Device Manual**

### **Description and mode of operation as well as use and maintenance**

**The Reich Minister of Aviation and commander-in-chief of the Luftwaffe**

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**This publication: "D. (Luft) T. 4211 Tube Tester RPG 2, Device Manual – Description and operation, and use and maintenance, September 1941 is tested and is considered a service instruction.**

**It comes into immediate effect from the date of issue.**

**I.A Udet**

**September 1941**

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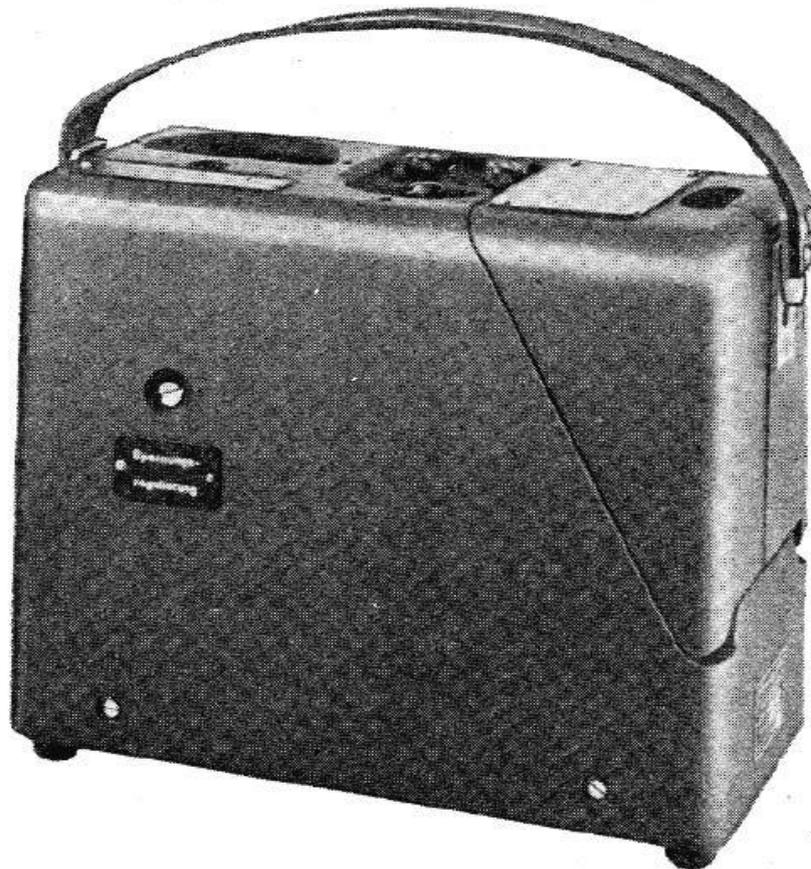
## **I. General**

### **A. Intended use**

The tube tester RPG 2 is used to test the 35 watt transmitter pentode RL 12 P 35.

### **B. Construction**

Die Cast housing with protected built-in indicator and control knob. Leather hand carrying strap.



*Figure 1  
Tube Tester RPG2*

### **C. Technical features and operation**

#### **1. Execution**

The housing is of a light metal cast type construction.

## 2. Power sources and energy requirements

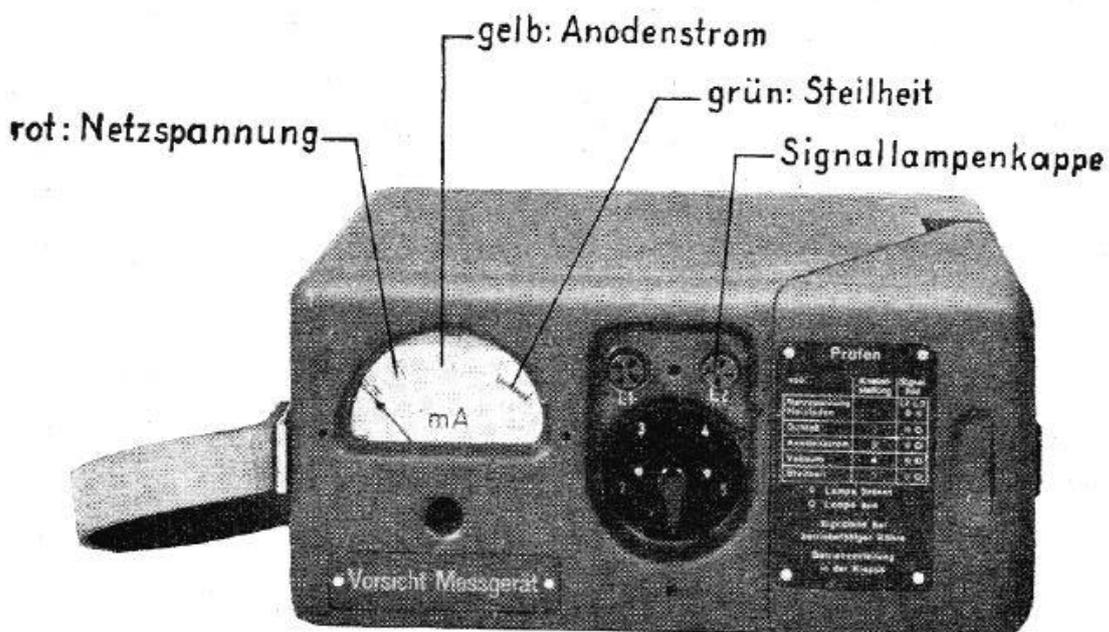
The RPG 2 can be powered from any AC 220 V source.

**For all other types of current and voltages sources, the tester should not be used.**

The testing of the tube with AC voltage has the advantage that the tube receives considerably higher anode voltages than DC with the same anode load at the peak of the anode AC voltage. At a mean current of circa 50 mA, the peak current is 2.8 times, so 140 mA. The tube to be tested operates under conditions similar to those in transmission mode.

## 3. Operation

The device is suitable for five different tests thanks to a five position selector switch.

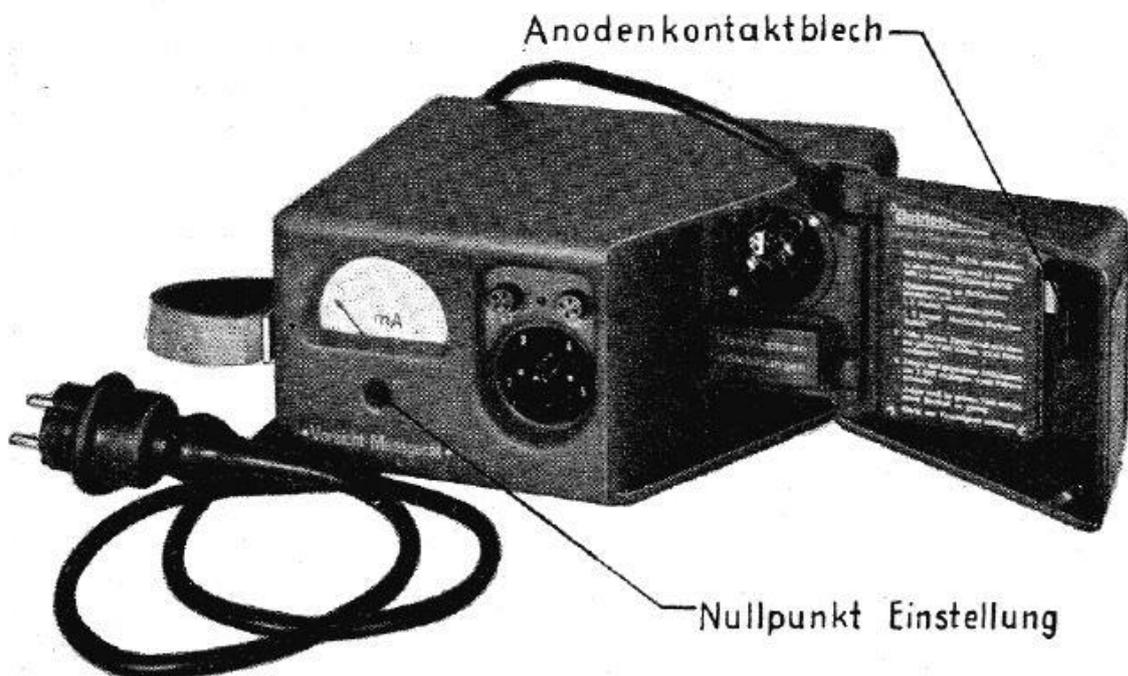


*Figure 2*  
*Tube Tester Top View*

The following measurements are carried out on the tube:

- a) Heater continuity test.  
At the same time, the mains is checked for correct voltage and adjusted accordingly with a mains regulator (see Fig. 4);
- b) Electrode circuit;
- c) Anode current;
- d) Quality of the vacuum;
- e) Slope test.

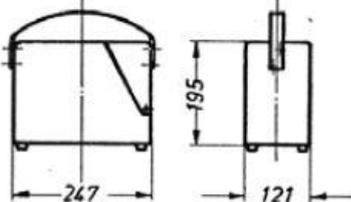
Tests can only be carried with the tube housing flap closed, because when closed the power switch is operated and the anode of the tube receives voltage (see Fig. 4).



*Figure 3*  
*Tube tester with open flap*

A moving coil meter J and the control lamps L 1 and L 2 are used to monitor the measurements (see Appendix: Circuit diagram RPG 2).

## D. Dimensions, weight and designation

Benennung	Bau- must.	Anf.-Z	Gew.- kg	Abmessungen
Röhren- prüfgerät	RPG 2	Ln 26 814	6,200	

## II. Description

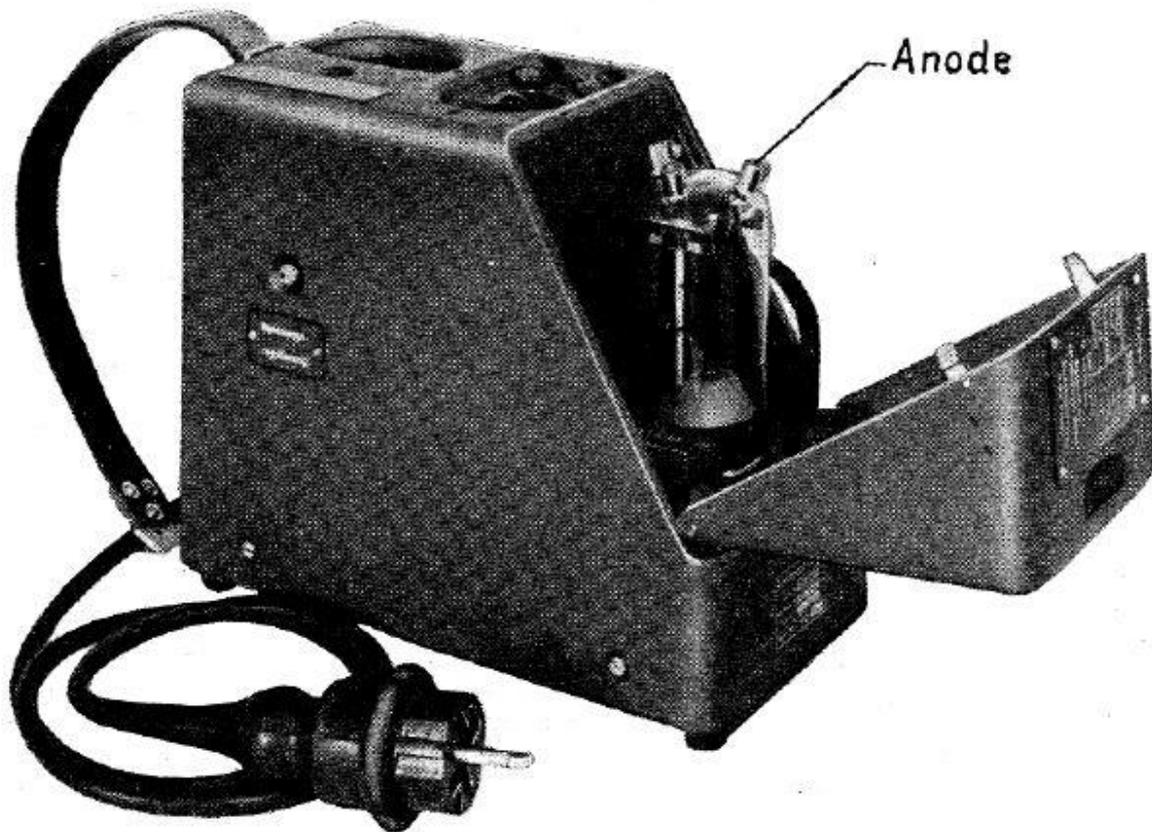
### A. External Construction

The housing surrounding the internal components is closed off by a base plate provided with feet. A carrying strap is provided for transport.



Figure 4  
Tube Tester with mains lead coiled inside

After removal of the carrying strap, the flap located to the side can be opened, the coiled mains lead can be removed and the tube to be tested can be inserted in the tube socket.



*Figure 5*  
*Tube tester with inserted tube*

## **B. Circuit and mode of action**

1. For power supply and heater test set switch to position 1.

In switch position 1, F1, F3 and F5 are closed. L 1 indicates that the device is powered and ready for use.

If the heater is OK, L 2 lights up as the heater is in line with L 2 and has very little resistance relative to L 2. Indicator J is used as a mains voltmeter. The pointer must adjust to the red mark of the scale; if not, set the correct voltage with the mains regulator (Netzregler) with about 1% accuracy. The adjustment

must be done slowly, otherwise the resulting current surges can cause the fuse to blow. If the tube has an short circuit connection between the suppressor grid and the anode, the transformer is loaded via W 8 and W 4, which almost means a short circuit, and the fuse blows. Since F 1 is closed and W 1 acts as a protective resistor, the display device J is protected against overloading.

2. For electrode short circuit tests, move switch to position 2.

In switch position 2, F 1, F 2 and F 3 are closed. L 1 illuminates. If the tube has a cathode to heater short, then L 2 lights up, because L 2 lies across the heater supply via W4.

3. For anode current test move switch to position 3.

In switch position 3, F2, F4 and F5 are closed. L 1 is lit, but L2 is bridged, so that the full heating voltage is at the heater and the cathode is heated. The indicator J is connected in this switch position as an ammeter for testing the anode current. If the tube is perfect, the pointer will swing within the yellow field. If this is not the case the issue may be:

- a) Control grid - cathode short
- b) Control grid - screen grid short

In both cases, the grid bias is zero.

The control grid resistor W 2, is provided to prevent high-frequency oscillation, thereby limiting the current, this protects the transformer from overloading.

If the pointer of the display unit is exceptionally high this indicates high anode current, the selector switch should be switched back immediately to position 2, in order to avoid rupturing the fuse.

In the case of a suppressor grid - screen grid short circuit, W 4 and W 5 also flow via W 8, generating a grid bias in W 4 and W 5 and now blocking the tube. Consequently, the pointer of the display device does not move, since no anode current can flow.

In contrast, in test switch position 5 a small anode current flows even when the screen grid is shorted, namely because W5 is short-circuited via F3 and thus part of the grid bias voltage.

Also with a completely dead cathode in position 5, no current will flow and the display will show no indication. This makes it possible to distinguish a screen grid suppressor grid short from a dead cathode. In the presence of a heater short circuit L1 would go out when switching from test 2 to 3. In this case immediately return the test switch to 2 to protect the fuse and the transformer.

4. For vacuum test, move the test selection switch to position 4.

After switching the test switch from position 3 to 4, F2 opens, the resistor W3 is released and the tube to be tested is checked for vacuum and insulation defects as well as grid emission. If the tube is in perfect condition, the pointer of the measuring instrument may not indicate more than two scale divisions - compared to the displayed value for switch position 3 (anode current test). At higher indications, the tube is useless. Normally, the vacuum of the tube is so good that a higher value than the anode current will not be displayed.

5. When checking the slope, turn the test switch to position 5.

As a final examination of the tube, the slope test is provided by lowering the grid bias due a short circuit of part of the cathode resistor taking place.

Test 5 closes F 2, F 3, F 4, and F 5. The pointer of the display device then moves, with a useful tube in the green area.

### III. Service

1. Connect mains cable to 220V AC mains.
2. Check zero point of meter and adjust with screwdriver if necessary.
3. Turn the test switch to position 1.
4. Insert the tube to be tested.
5. Close the flap.
6. Check mains voltage and, if necessary, readjust with a screwdriver on the mains regulator.

The tubes are tested according to the following scheme:

Prüfung	Knebel	Bereich	L 1	L2	Bemerkung
Heizfaden	1	▼rot	⊗	⊗	
Elektroden-schluss	2	▼rot	⊗		
Anodenstrom	3	gelb	⊗		*)
Vakuum	4	gelb	⊗		**)
Steilheit	5	grün	⊗		

\*) If the pointer of the display device fully deflects, move the test switch back to position 2 immediately.

\*\*\*) Pointer may not increase more than two divisions from the pointer setting at 3 (anode current test, yellow area).

If the tube does not meet the intended test conditions, it is faulty. If the tube is faulty, the tester must be de-energized immediately by opening the flap. If there are major problems, the fuse may blow, which must then be replaced.

## **IV. Operating instructions and maintenance**

### **1. Signal lamp change**

By pulling out the signal lamp cap, the lamp is exposed, by lightly pressing the lamp and simultaneously turning it to the left, the lamp can be removed or replaced.

The insertion takes place in reverse order.

### **2. Fuse replacement**

The fuse can be replaced by removing the fuse cap with the flap open. Only the fuse specified in the parts list may be used.

### **3. Anode connection**

By opening the flap slightly it can be checked if the anode connection is ok. Press the contact plate onto the anode of the tube.

### **4. Other**

The device must be treated as a measuring device, protected from impact and fall, and stored in a dry place.

The display meter unit is matched with the resistor W 7 together to exactly 120 ohms at 18 ° room temperature.

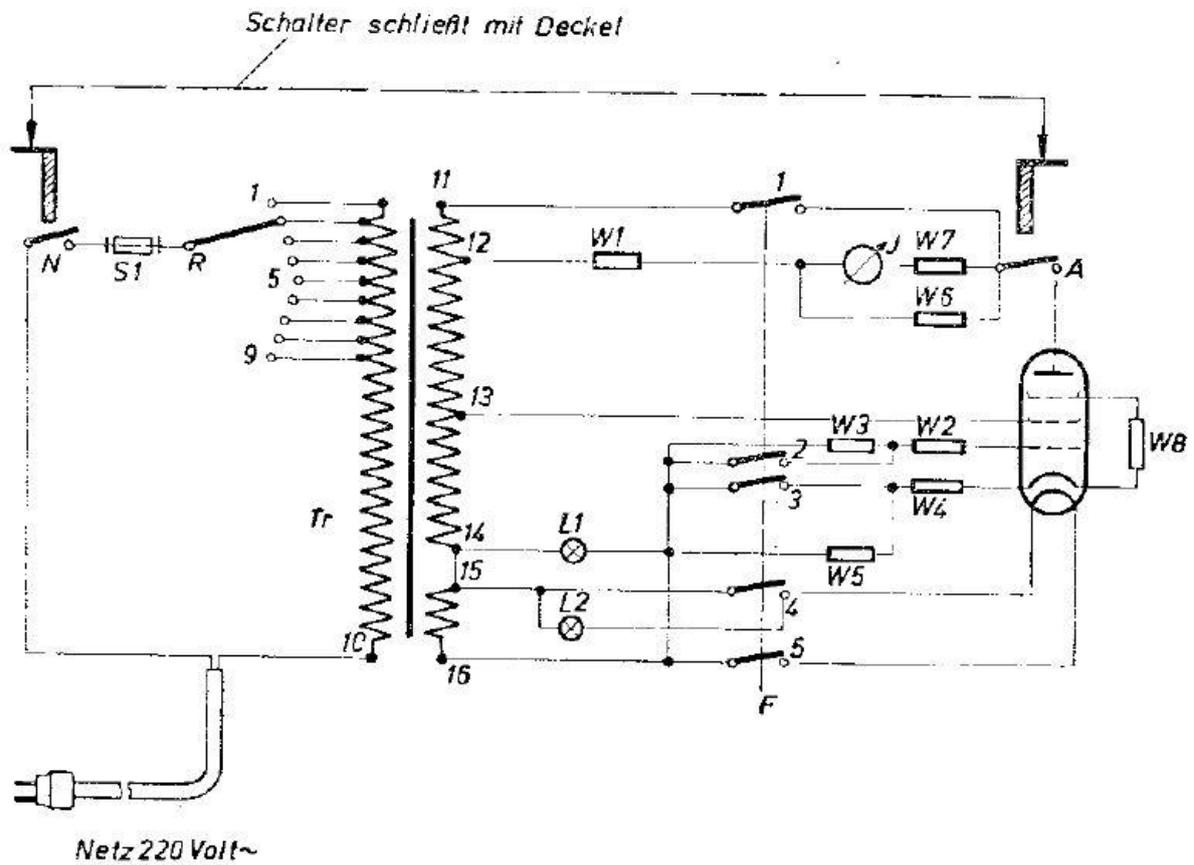
Any damage or replacement of the display unit necessitates re-calibration.

## V. Parts list (electrical components)

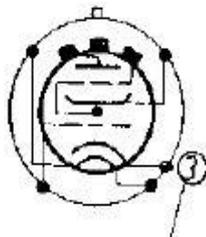
Teil	Benennung	Zeichnungs-Nr.	Elektr. Werte	Stück
Tr	Transformator	Görler	220/12,6/190/590/600	1
W 1	Drahtwiderstand	Monette	300 Ohm 5 W $\pm$ 1 %	1
W 2	Drahtwiderstand	Monette	5 KOhm 5 W $\pm$ 10%	1
W 3	Massewiderstand	Dralowid	0,1 MOhm 1 W $\pm$ 5%	1
W 4	Drahtwiderstand	Monette	150 Ohm 5 W $\pm$ 1	1
W 5	Drahtwiderstand	Monette	300 Ohm 5 W $\pm$ 1	1
W 6	Drahtwiderstand	Monette	300 Ohm 5 W $\pm$ 1	1
W 8	Drahtwiderstand	Monette	1 KOhm 25 W $\pm$ 10%	1
L 1	Glühlampe	FI 32777	24V 2W	1
L 2	Glühlampe	FI 32777	24V 2W	1
S 1	Sicherung	Wickmann FT3	0,5 A	1
W 7	Widerstand	gehört zu J	Mit J auf 120 Ohm abgleichen	1
J	Anzeigegerät	AEG303511	50 MA	1

# Appendix

## Circuit Diagram



RL12P35



Anschluß am Sockelmantel;  
 Sockel von unten in Richtung  
 gegen die Röhre gesehen.

Netzspannung  
 I Heizfaden

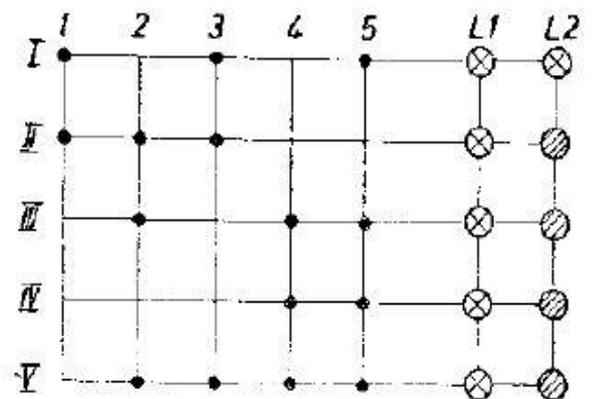
II Schluß

III Anodenstrom

IV Vakuum

V Steilheit

Schalter F



Signallampe leuchtet ⊗

Signallampe aus ⊗