# Radio-communication service tester
# PCT-430

## CHECK METHOD

ИТЦК468166.002СМ

2005

The present check method is for radio-communication service tester PCT-430 (hereafter referred to as “tester”). It prescribes procedures and instruments of primary and periodical checks according to ИТЦК468166.002ТУ.

The tester is checked for determination of its operational suitability:

- primary check, after manufacturing or repair;
- periodical check, during operation;
- exceptional check, in the case of loss of check documents; after long-term storage of tester.

The tester should be checked in accordance with the prescribed procedure.

Check interval is 1 year.

Metrological performances of the tester are given in appendix A.

## 1 CHECK STAGES

1.1 For the check, the operations given in Table 1 should be carried out:

Table 1

| Name of operation | Item number | Check | |
|---|---|---|---|
| | | Primary check | Periodical check |
| 1 External examination | 6.1 | Yes | Yes |
| 2 Testing | 6.2 | Yes | Yes |
| 3 Determination of metrological performances: | | | |
| 3.1 output signal frequency forming relative error estimation (high-frequency) | 6.3.1 | Yes | Yes |
| 3.2 output voltage setting absolute error estimation (high-frequency) | 6.3.2 | Yes | Yes |
| 3.3 signal frequency deviation setting relative error estimation (high-frequency) | 6.3.3 | Yes | Yes |
| 3.4 output signal frequency forming relative error estimation (low-frequency) | 6.3.4 | Yes | Yes |
| 3.5 output voltage setting absolute error estimation (low-frequency) | 6.3.5 | Yes | Yes |
| 3.6 signal frequency measuring relative error estimation (high-frequency) | 6.3.6 | Yes | Yes |
| 3.7 signal frequency deviation measuring relative error estimation (high-frequency) | 6.3.7 | Yes | Yes |
| 3.8 output signal power measuring relative error | 6.3.8 | Yes | Yes |

| | | | |
|---|---|---|---|
| estimation (high-frequency) | | | |
| 3.9 signal frequency measuring absolute error estimation (low-frequency) | 6.3.9 | Yes | Yes |
| 3.10 alternating voltage measuring relative error estimation | 6.3.10 | Yes | Yes |
| 3.11 alternating voltage distortion factor measuring relative error estimation | 6.3.11 | Yes | Yes |
| 3.12 direct voltage measuring relative error estimation | 6.3.12 | Yes | Yes |

1.2 If the result is negative during one of the operations, the check will be stopped.

## 2 CHECK INSTRUMENTS

2.1 For the check, the measuring instruments and auxiliary equipment indicated in the Table 2 must be used.

Table 2

| Item number of check method | Name, type, model of standard instrument or auxiliary equipment | Key specifications and/ or metrological performances |
|---|---|---|
| 1 | 2 | 3 |
| 6.3.1 | Spectrograph C4-74 | Frequency measurement in the range from 300 Hz to 300 MHz. $\Delta_{abs} = \pm(1 \cdot 10^{-7} \cdot f_c + 1/ t_{сч})$, Hz.<br>Voltage level measurement in the range from 300 nV to 3 V. $\delta_{rel} = \pm 10$ %. |
| 6.3.2 | Programmable high-frequency signal generator Г4-164<br><br>Spectrograph C4-74<br>Selective microvoltmeter SMV8.5 | Frequency range from 0.1 to 639.999 MHz. $\delta_{rel} = \pm 0{,}5 \cdot 10^{-5}$ %.<br>Output voltage range from $0.032 \cdot 10^{-6}$ to 2 V. $\Delta_{abs} = \pm 0.1$ dB. |
| 6.3.3 | Low-frequency signal generator Г3-112/1 | Output voltage: 0 ÷ 25 V.<br>Frequency range: from 10 Hz to 1 MHz. $\Delta_{rel} = \pm 6$ %.<br>Peak value measurement limits: |

| | | |
|---|---|---|
| | Computing modulation meter СК3-45 | 0.1 ÷ 1000 кHz.<br>$\Delta_{абс} = \pm (0.1\Delta f + 12 \cdot 10^{-8} f_c + 0.005)$, kHz.<br>Mean square value measurement limits: 0.005 ÷ 300 кHz.<br>$\Delta_{абс} = \pm (0.1\Delta f + 4 \cdot 10^{-8} f_c + 0.002)$, кHz. |
| | Selective microvoltmeter SMV8.5 | |
| 6.3.4 | cymometer Ч3-54 | Frequency measurement limits: from 0.1 to 120 MHz. $\Delta_{rel} = \pm\{5 \cdot 10^{-7} + 1/ (f_{chan} \cdot t_{сч})\}$ |
| 6.3.5 | Universal digital voltmeter В7-34 | Sinusoidal voltage measurement range up to 500 V in frequency range from 20 Hz to 100 кHz<br>$\Delta_{rel} = \pm\{0.15+0.05[(U_{кх}/U_x)-1]\}$,%<br>Distortion factor measurement range: 0.03 ÷ 100 %. |
| | Distortion meter С6-12 | $\Delta_{abs} = \pm (0.05\ K_г + 0.02)$, %, where $K_г$ – instrument reading. |
| 6.3.6 | Programmable high-frequency signal generator Г4-164 | |

Table 2

| 1 | 2 | 3 |
|---|---|---|
| 6.3.7 | Programmable high-frequency signal generator Г4-164 | |
| 6.3.8 | Accepted power wattmeter М3-56 | Power measurement range 0÷20 W in the range up to 17.85 GHz. $\delta_{rel} = \pm\{6 + 0.1[(P_к / P_x) - 1]\}$, %. |
| | Power amplifier УМ100-400 | |
| | Programmable high-frequency signal generator Г4-164 | |
| 6.3.9 | Low-frequency signal generator Г3-112/1 | |
| | cymometer Ч3-54 | |
| 6.3.10 | Low-frequency signal generator Г3-112/1 | |
| | Universal digital voltmeter В7-34 | |
| 6.3.11 | Distortion meter С6-12 | Distortion factor measurement range: 0.03÷100 %. $\Delta_{abs} = \pm (0.05 K_г + 0.02)$, %, where $K_г$ – instrument reading, % |
| | Low-frequency signal generator Г3-112/1 (2 pieces) | |
| 6.3.12 | Voltmeter checking instrument В1-13 | Power measurement limits from 100 μV to 100 В. $\Delta_{abs} = \pm (5 \cdot 10^{-5} \cdot U_f + 500)$, μV. |

2.2 The use of other check instruments and methods not mentioned in this document may also be admitted if they are approved for use in Russian Federation in accordance with established procedure. Their accuracy rating and characteristics must be no worse than those of the above-mentioned ones.

2.3 All measuring instruments mentioned in the table 2 must be checked in accordance with established procedure and have valid check certificates.

## 3 SAFETY REQUIREMENTS

3.1 Tester checking is allowed only by persons who have passed the safety briefing.

3.2 Before switching on the tester, the compliance of output voltage from power supply unit with tester operating voltage must be checked.

3.3 Safety requirements stated in the in-line documentation for measuring instruments must be satisfied during the check.

3.4 DO NOT do cable overcommutation while instruments are switched on.

## 4 CHECK CONDITIONS

4.1 The following conditions should be observed during the check:

- ambient temperature, °C …… 20 ± 5;
- relative air humidity, % …….. 50 ÷ 80;
- atmospheric pressure, kPa (mm hg) ……..86.6 ÷ 106.7 (650 ÷ 795);
- supply voltage, V ……. 220 ± 22;
- supply voltage frequency, Hz ……..…….. 50 ± 1.

Supply line voltage should be stable and step-free.

## 5 CHECK PREPARATION

5.1 The following cleanup activities should be carried out before checking the testers:

1) checkable testers and check instruments must be kept indoors under the conditions specified in 4.1 for 2 hours.

2) check instruments must be prepared in accordance with in-line documentation.

3) checkable testers must be prepared in accordance with operations manual.

## 6 CHECKING

### 6.1 External examination

6.1.1 Make sure the completeness of the tester PCT-430 in accordance with the tester certificate.

6.1.2 Make sure the conformity of identification mark according to the in-line documentation.

6.1.3 Make sure that tester has no visible damages and contaminations, which can affect its operational capability.

6.1.4 Examine operation and tuning controls for operability (buttons, toggle switches, etc.).

6.1.5 Check for sharp QCD and verification officer stamp impression or state verification certificate (while periodic check).

6.1.6 Checking is not allowed if damages of the tester are revealed.

### 6.2 Testing

6.2.1 Testing must be carried out in order to check tester's operability. The following operations should be carried out for testing:

1) Make sure that power supply button is in switch-off position.

2) Connect tester to EPU БПС15-2.

3) Connect tester to testable radio station as shown in figure 1.

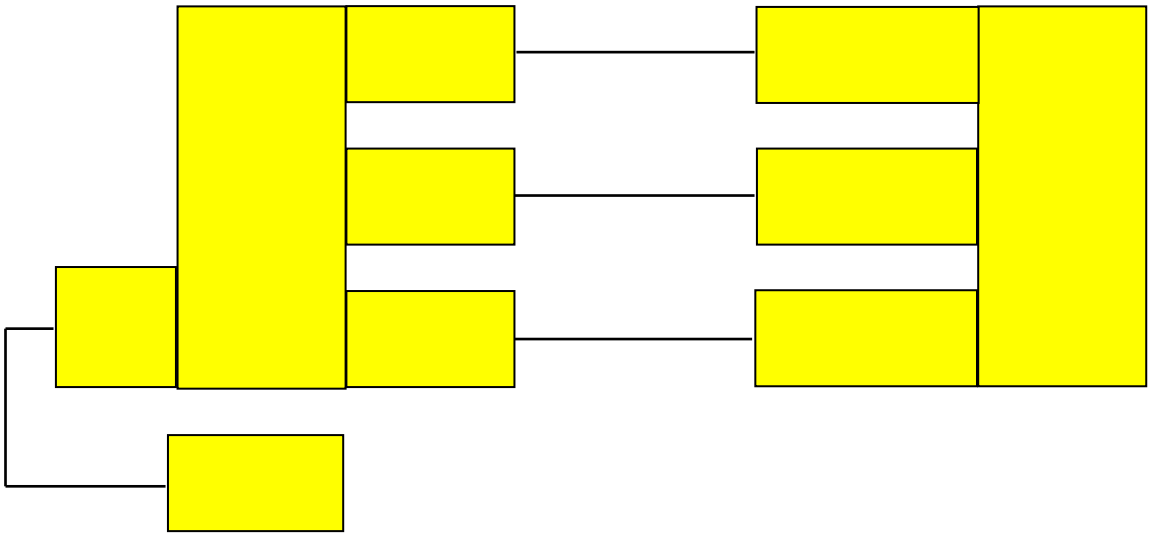

Figure 1

4) Press the power-on button. The following static picture will appear on the screen.

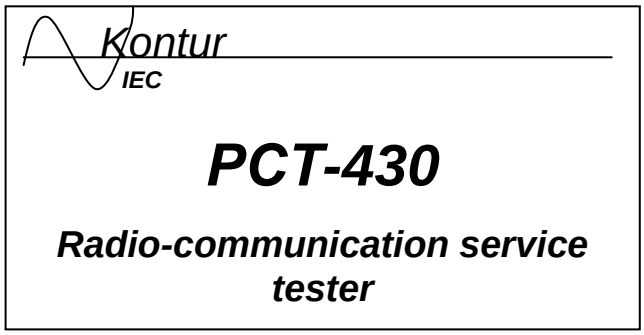


Figure 2

5) Tester will be ready to work in 10 seconds (self-test time).

**6.3 Metrological examination**

6.3.1 Output signal frequency forming relative error estimation (high-frequency).

6.3.1.1 Use spectrograph C4-74 for signal frequency measuring (high-frequency) in the range from 90 to 210 MHz.

6.3.1.2 Connect tester ("RFl" connector) to spectrograph C4-74 ( “Input” connector) using interface cable.

6.3.1.3 Adjust the following parameters of the spectrograph:

- swath = 5 кHz;
- bandwidth = 300 Hz;

Adjust the following parameters of the tester:

- “Receiver” mode
- maximum level (high-frequency)
- turn off modulation
- frequency $F_{hf}$ = 150 MHz..

6.3.1.4 Measure signal frequency (high-frequency) using spectrograph C4-74 in accordance with its in-line documentation.

6.3.1.5 Relative error of signal frequency forming (high-frequency) is calculated as:

$$\delta_{rel} = [(F_{уст} – F_{изм}) / F_{уст} ] \cdot 100, \%$$

where $F_{уст}$ is setpoint value of output signal frequency (high-frequency) on the tester, $F_{изм}$ is measured value of output signal frequency (high-frequency).

6.3.1.6 Repeat the measurements as described in sections 6.3.1.2 ÷ 6.3.1.5 for frequencies of 90 and 210 MHz.

6.3.1.9 Follow the instructions given in section 6.3.1.5.

The measurement results are satisfactory if the relative error of frequency measurement in the range from 90 to 210 МГц is no more than $\pm 3 \cdot 10^{-4}$ %.

6.3.2 Error of output voltage setting (high-frequency) is estimated following the scheme presented in figure 3.

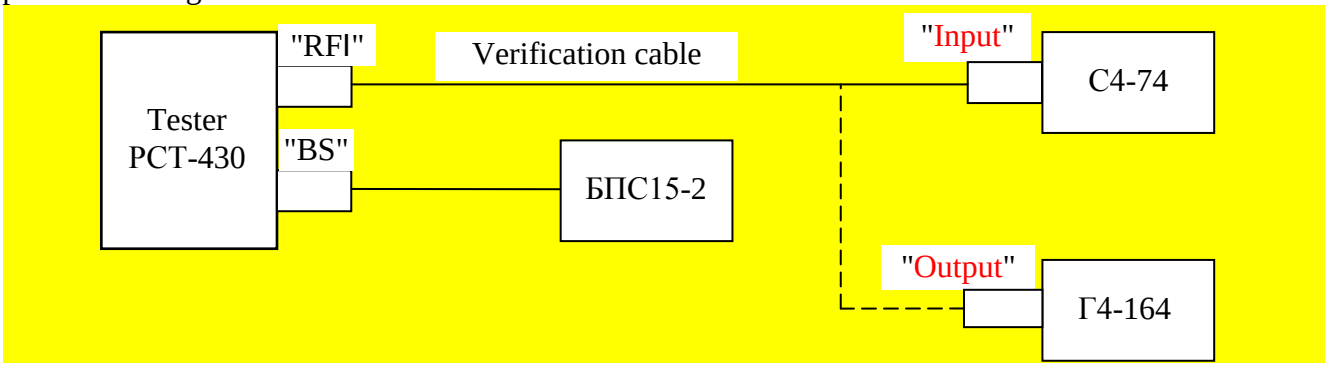


Figure 3

6.3.2.1 Wire up as shown in Figure 3.

6.3.2.2 Measurement of output voltage level (high-frequency) should be performed using spectrograph С4-74 for alternating voltage with frequency = 90…210 MHz.

6.3.2.3 Adjust the following parameters of the generator Г4-164 in accordance with its in-line documentation:

- voltage level = -110 dB;
- frequency = -150 MHz;
- continuous frequency generation.

6.3.2.4 Energize spectrograph С4-74 by generator Г4-164.

6.3.2.5 Standardize spectrograph С4-74 through input sign with voltage = -120 dB in accordance with its in-line documentation

6.3.2.6 Adjust the following parameters of the tester:

- "Receiver" mode
- voltage level $U_{hf}$ = - 60 dB;
- deviation = 0 кHz;
- frequency $F_{hf}$ = 150 MHz..

6.3.2.7 Measure output voltage (high-frequency) using spectrograph С4-74 in accordance with its in-line documentation.

6.3.2.8 Absolute error of measurement of output voltage signal level (high-frequency) can be defined by the formula:

$$\Delta_{abs} = (U_{hf\ agr} - U_{hf\ m}),\ dB,$$

where $U_{hf\ agr}$ is setpoint value of output voltage level (high-frequency) on the tester, dB;

$U_{hf\ m}$ is measured value of output voltage level on the spectrograph С4-74.

6.3.2.9 Repeat the measurements as described in sections 6.3.2.3 ÷ 6.3.2.8, gradually installing frequency = 90 and 210 MHz on the generator Г4-164 and tester.

3.2.10 Repeat the measurements as described in sections 6.3.2.3 ÷ 6.3.2.9, gradually installing voltage level = -80 dB and - 60 dB on the generator Г4-164 and tester.

Measurement results are considered to be satisfactory if the absolute error of measured output voltage level (high-frequency) is no more than value defined by the formula: $\Delta_{abs} = \pm [3 + (U_{hf\ agr} / 40)]$, dB.

6.3.3 Relative error of signal frequency deviation setting (high-frequency) is estimated following the scheme presented in figure 4.

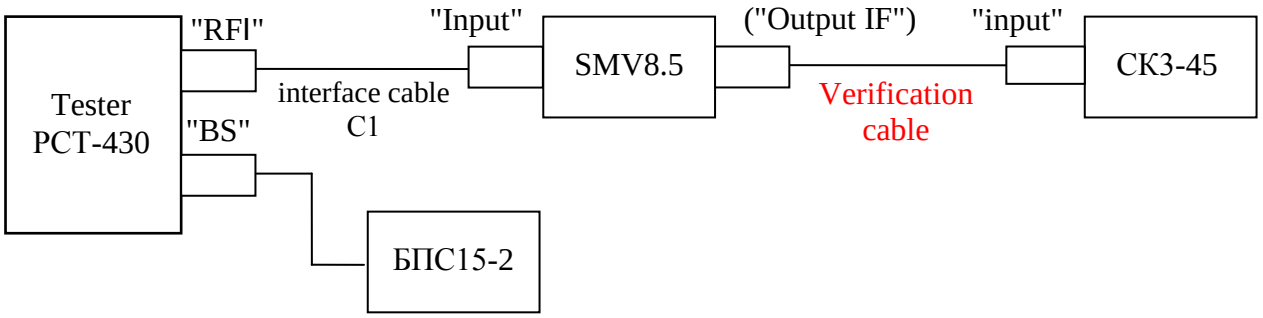


Figure 4

6.3.3.1 Wire up as shown in Figure 4.

6.3.3.2 Adjust the frequency of 150 MHz on the microvoltmeter SMV8.5 under its in-line documentation and tune a maximum of diclinations

6.3.3.3 Adjust the following parameters of the measuring instrument СК3-45 in accordance with its in-line documentation:

- "FM", "+" mode
- bandwidth 0,2 ÷ 200 кHz.

6.3.3.4 Adjust the following parameters of the tester:

- “Receiver” mode
- frequency $F_{вч}$ = 150 MHz
- modulation frequency = 1 кHz
- deviation = 3 кHz.

6.3.3.5 Measure signal frequency deviation (high-frequency) by the measuring instrument СК3-45.

6.3.3.6 Relative error of frequency deviation can be defined by the formula:

$$\delta_{отн} = \pm [(D_{agr} - D_м) / D_{agr}] \cdot 100, \%,$$

where $D_{agr}$ is setpoint value of frequency deviation on the tester, кHz;

$D_м$ is frequency deviation value measured using the measuring instrument СК3-45, кHz.

6.3.3. Repeat the measurements as described in sections 6.3.3.2 ÷ 6.3.3.6 for frequency deviation = 10 and 20 кHz.

Measurement results are considered to be satisfactory if the relative error of signal frequency deviation (high-frequency) is not more than the value defined by the formula:

$$\delta_{rel} = \pm [5 + 5 (D_f / D_{agr})], \%,$$

where $D_f$ = 20 кHz is upper value of frequency deviation setting range;

$D_{agr}$ is setpoint value of frequency deviation, кHz.

6.3.4 Determination of relative error of output signal frequency forming (low-frequency):

6.3.4.1 Connect tester ("AF OUT" connector) to cymometer Ч3-54 (“Input” connector) using interface cable.

6.3.4.2 Adjust the following parameters of the tester:

- “Transmission“ mode;
- output voltage $U_{нч}$ = 1 V;
- frequency $F_{нч}$ = 1 кHz.

6.3.4.3 Measure output signal frequency (low-frequency) using cymometer in accordance with its in-line documentation.

6.3.4.4 Relative measurement error of frequency $F_{lf}$ can be calculated as:

$$\delta_{rel} = \pm [(F_{lf\ agr} - F_{lf\ м}) / F_{lf\ agr}] \cdot 100, \%$$

where $F_{lf\ agr}$ is setpoint value of output signal frequency (low-frequency) on the tester, кHz;
$F_{lf\ m}$ is output signal frequency (low-frequency) measured using the cymometer Ч3-54, кHz.

6.3.4.5 Repeat the measurements as described in sections 6.3.4.2 ÷ 6.3.4.4 for tester frequencies = 5 кHz; 20 кHz.

Results are satisfactory if signal frequency error (low-frequency) is not more than ± 1 Hz.

6.3.5 Absolute error estimation of output voltage setting (low-frequency):
6.3.5.1 Connect tester ("AF OUT" connector) and voltmeter В7-34 using interface cable.
6.3.5.2 Adjust the following parameters of the tester:
- "Transmission" mode;
- output voltage $U_{lf}$ = 0,25V;
- frequency $F_{lf}$ = 1 кHz.
6.3.5.3 Measure output voltage $U_{нч}$ using voltmeter В7-34 in accordance with its in-line documentation.
6.3.5.4 Absolute error of output voltage measuring can be defined by the formula:

$$\Delta_{abs} = (U_{lf\ agr} - U_{lf\ м}),\ V,$$

where $U_{lf\ agr}$ is setpoint value of output voltage on tester, V;
$U_{lf\ м}$ is measured value of output voltage using the voltmeter В7-34, V.

6.3.5.5 Repeat the measurements as described in sections 6.3.5.2 ÷ 6.3.5.4 for output voltage values on the tester = 1 V; 2,0 V.
6.3.5.6 Repeat the measurements as described in sections 6.3.5.2 ÷ 6.3.5.5 for tester frequency $F_{lf}$ = 5 кHz; 20 кHz.
Results are satisfactory if absolute error of measured output voltage (low-frequency) does not exceed the value defined by formula:

$$\Delta_{abs} = \pm\ (0.02 + 0.05 \cdot U_{lf\ agr}),\ V,$$

where $U_{lf\ agr}$ is setpoint value of output voltage (low-frequency), V.

6.3.6 Relative error of signal frequency (high-frequency) is estimated following the scheme on figure 5.
6.3.6.2 Adjust the following parameters of generator Г4-164 according to its in-line documentation:
- voltage = 1 V;
- frequency $F_{hf}$ = 150 MHz..
6.3.6.3 Adjust “Transmission/ Frequency” mode on the tester.
6.3.6.4 Take the tester reading.
6.3.6.5 Relative error of signal frequency $F_{hf}$ (high-frequency) is calculated by the formula:

$$\delta_{rel} = \pm\ [(F_{hf\ agr} - F_{hf\ m}) / F_{hf\ agr}] \cdot 100,\ \%$$

6.3.6.6 Repeat the measurements as described in sections 3.6.2 ÷ 6.3.6.5 for frequency = 90 MHz; 210 MHz on the generator Г4-164.
Measurement results are satisfactory if relative error of the measured signal frequency (high-frequency) does not exceed $\pm 3 \cdot 10^{-4}$ %.
6.3.7 Relative error of signal frequency deviation measuring (high-frequency) is estimated following the scheme in figure 5.
6.3.7.2 Adjust the following parameters of the generator Г4-164 according to its in-line documentation:
- voltage level = 1V
- frequency $F_{вч}$ = 150 MHz.
- frequency modulation: internal
- deviation = 1 кHz.
6.3.7.3 Adjust “Transmission/ Deviation” mode on the tester.

6.3.7.4 Take the tester reading.

6.3.7.5 Relative error of signal frequency deviation (high-frequency) is defined by the formula:

$$\delta_{rel} = \pm [(D_{agr} - D_м) / D_{agr}] \cdot 100, \%$$

6.3.7.6 Repeat the measurements as described in sections.6.3.7.2 ÷ 6.3.7.5 for frequency = 90 MHz; 210 MHz on the generator Г4-164.

6.3.7.7 Repeat the measurements as described in sections 6.3.7.2 ÷ 6.3.7.6 for deviation = 5.0 кHz; 20 кHz on the generator Г4-164.

Measurement results are satisfactory if relative error of measured signal frequency deviation (high-frequency) does not exceed the value defined by the formula:

$$\delta_{rel} = \pm [5 + 5 (D_f / D_м)], \%,$$

where $D_f$ = 20 кHz is upper value of frequency deviation setting range;

$D_м$ is measured value of frequency deviation, кHz.

6.3.8 Relative error of output signal power measuring (high-frequency) is estimated following the scheme in figure 5.

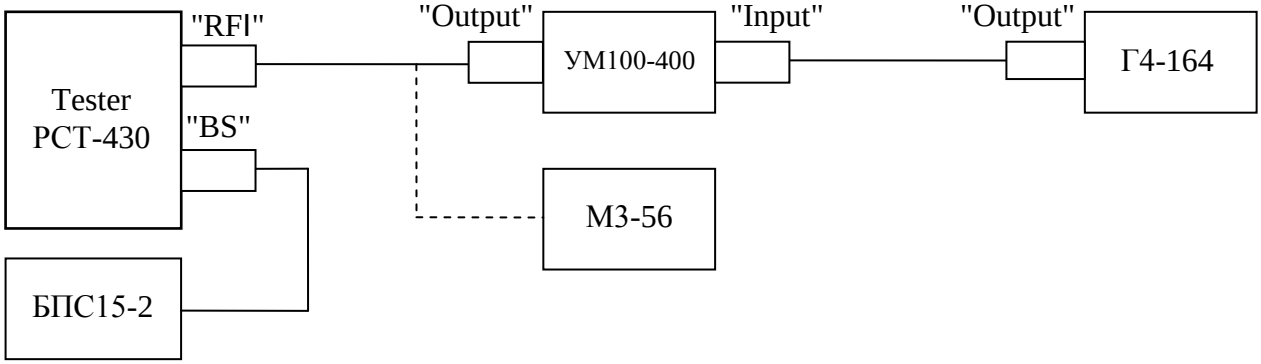


Figure 5

6.3.8.1 Wire up as shown in Figure 5.

6.3.8.2 Adjust signal level of the generator Г4-164 satisfying УМ100-400 amplifier input power:

- frequency $F_{hf}$ = 150 MHz
- power = 20 W.

6.3.8.3 Connect wattmeter М3-56 to power amplifier УМ100-400 in accordance with its in-line documentation and measure power amplifier output parameters.

6.3.8.4 Connect tester instead of wattmeter М3-56.

6.3.8.5 Take the tester reading.

6.3.8.6 Relative error of power measuring is defined by the formula:

$$\delta_{rel} = \pm [(P_{agr} - P_м) / P_{agr}] \cdot 100, \%$$

6.3.8.7 Repeat the measurements as described in sections 6.3.8.2 ÷ 6.3.8.6 for power values 0.2 W and 10 W.

6.3.8.8 Repeat the measurements as described in sections 6.3.8.2 ÷ 6.3.8.7 for frequency = 90 MHz and 210 MHz..

Measurement results are satisfactory if relative error of power measuring does not exceed the value defined by the formula:

$$\delta_{rel} = \pm [5 + 0.1 \cdot (P_f / P_м)], \%,$$

where $P_f$ = 20 W is upper value of output signal power measuring range (high-frequency);

$P_м$ is setpoint value of output signal power (high-frequency), W.

6.3.9 Absolute error of signal frequency (low-frequency) is estimated following the scheme in the figure 6.

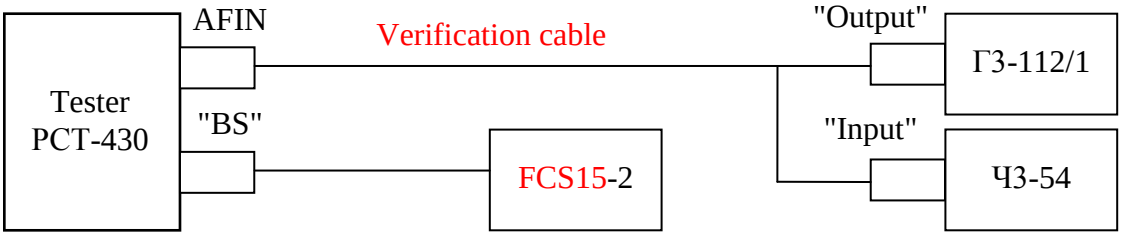


Figure 6

6.3.9.1 Wire up as shown in Figure 6.

6.3.9.2 Adjust the following parameters of the generator Г3-112/1 in accordance with its in-line documentation:

- output voltage $U_{lf}$ = 1 V;
- frequency $F_{lf}$ = 1 кHz.

6.3.9.3 Check generator frequency using cymometer Ч3-54 in accordance with its in-line documentation.

6.3.9.4 Adjust "Frequency, Vetka" mode on the tester.

6.3.9.5 Take the tester reading.

6.3.9.6 Absolute error of signal frequency $F_{lf}$ (low-frequency) is estimated by the formula:

$$\Delta_{abs} = F_{lf\ agr} - F_{lf\ м},\ кHz,$$

where $F_{lf\ agr}$ is setpoint value of frequency, кHz;

$F_{lf\ м}$ is measured value of frequency, кHz.

6.3.9.7 Repeat the measurements as described in sections 6.3.9.2 ÷ 6.3.9.6 for frequency = 10 кHz and 100 кHz on the generator Г3-112/1.

Measurement results are satisfactory if absolute error of signal frequency measuring (low-frequency) does not exceed the value defined by the formula:

$$\Delta_{abs} = \pm 1\ Hz.$$

6.3.10 Relative error of alternating voltage measuring is estimated following the scheme shown in figure 7.

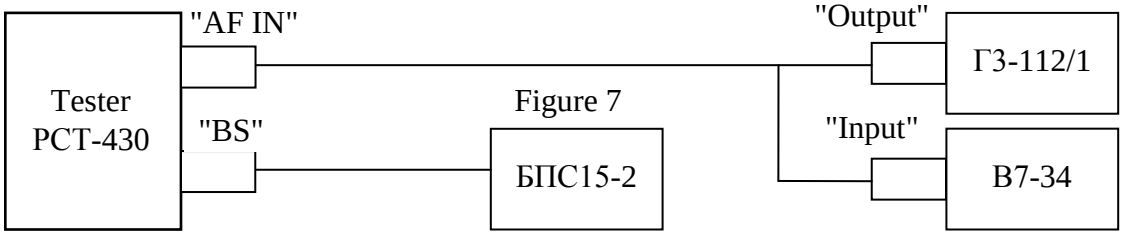


Figure 7

6.3.10.1 Wire up as shown in Figure 7.

6.3.10.2 Adjust "Receiver/ Voltage" mode on the tester.

6.3.10.3 Adjust the following parameters of the generator Г3-112/1:

- frequency $F_{lf}$ = 20 Hz;
- output voltage $U_{lf}$ = 0.2 V.

6.3.10.4 Check generator output voltage by voltmeter В7-34 in accordance with its in-line documentation.

6.3.10.5 Take the tester reading.

6.3.10.6 Relative measurement error of alternating voltage $U_{lf}$ is defined by the formula:

$$\delta_{rel} = \pm [(U_{lf\ agr} - U_{lf\ м}) / U_{lf\ agr}] \cdot 100, \%$$

where $U_{lf\ agr}$ is setpoint value of generator alternating voltage, V,
$U_{lf\ м}$ is alternating voltage value measured by the tester, V.

6.3.10.7 Repeat the measurements as described in sections 6.3.10.2 ÷ 6.3.10.6 for generator frequencies = 1.0 кHz and 20 кHz.

6.3.10.8 Repeat the measurements as described in sections 6.3.10.2 ÷ 6.3.10.7 for generator output voltage = 1.0 V and 15 V.

Measurement results are satisfactory if relative error estimation of input voltage (low-frequency) does not exceed the value defined by the formula:

$$\delta_{rel} = \pm [3 + 3 (U_f / U_m)], \%,$$

where $U_f$ = 20 V is upper value of alternating voltage measuring range,
$U_м$ is measured value of alternating voltage, V.

6.3.11 Relative error of alternating voltage distortion factor is estimated following the scheme shown in figure 8.

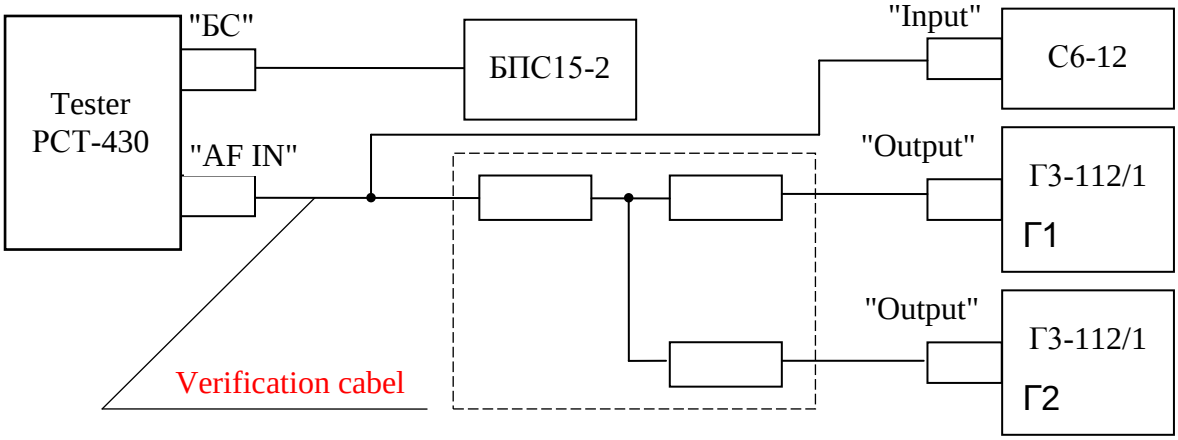


Figure 8

6.3.11.1 Wire up as shown in Figure 8.

6.3.11.2 Adjust “Receiver/ distortion factor” mode on the tester.

6.3.11.3 Adjust the following parameters of the generator Г3-112/1 (Г1):

- frequency $F_{lf}$ = 1 кHz;
- output voltage $U_{lf}$ = 1 V.

6.3.11.4 Adjust the value of distortion factor of 5% on the instrument С6-12 changing output voltage of the generator Г3-112/1 (Г2).

6.3.11.5 Take the tester reading.

6.3.11.6 Relative error estimation of distortion factor is defined by the formula:

$$\delta_{rel} = \pm [(DF_{agr} - DF_м) / DF_{agr}] \cdot 100, \%$$

where $DF_{agr}$ is setpoint value of distortion factor on the instrument С6-12, %,
$DF_м$ is distortion factor measured by the tester, %.

6.3.11.7 Repeat the measurements as described in sections 6.3.11.2 ÷ 6.3.11.6 for distortion factor of 20 % and 50 % on the instrument С6-12 .

6.3.11.8 Repeat the measurements as described in sections 6.3.11.2 ÷ 6.3.11.6 for Г3-112/1 (Г1) generator frequency of 3 кHz.

Measurement results are satisfactory if relative error of distortion factor in the range from1 to 50 % does not exceed the value defined by the formula:

$$\delta_{rel} = \pm [5 + 0.1 \cdot (DF_f / DF_м)], \%,$$

where $DF_f$ = 50 % is upper value of distortion factor measuring range, %;

$DF_м$ is measured value of distortion factor, %.

Note: Measurement error of distortion factor in the range from 50 to 100 % is not standardized.

6.3.11 Relative measurement error of direct voltage is estimated as described below:

6.3.11.1 Connect the tester ("AF IN" connector) to voltmeter B1-12 ("Output" connector) using interface cable.

6.3.11.3 Adjust voltage of 0.1 V on the voltmeter B1-13 in accordance with its in-line documentation.

6.3.11.3 Adjust “Receiver” mode on the tester.

6.3.11.4 Take the tester reading.

6.3.11.5 Relative error estimation of direst voltage is defined by the formula:

$$\delta_{отн} = \pm [(U_{agr} – U_м) / U_{agr} ] \cdot 100, \%$$

where $U_{agr}$ is voltmeter value of direct voltage, V;

$U_м$ is direct voltage value measured by the tester, V.

6.3.11.6 Repeat the measurements as described in sections 6.3.11.2 ÷ 6.3.11.5 for direct voltage of 0.3 V, 3 B and 20 V on the voltmeter.

Measurement results are satisfied if direct voltage does not exceed the value defined by the formula:

$$\delta_{rel} = \pm [2 + 0.05 \cdot (U_f / U_м)], \%,$$

where $U_f$ = 30 V is upper value of direct voltage measuring range,

$U_{изм}$ is measured value of direct voltage, V.

## 7 CHECK RESULT PRESENTATION

7.1 Check results of testers should be protocoled on form of mandatory appendix B.

7.2 Check certificate is given out if check results are satisfactory.

7.3 Issue and use of testers is not allowed if they do not pass primary check. In this case trouble report is given out.

7.4 Testers must be removed from use and repaired if they do not pass periodical check.

## APPENDIX A
(for reference)

### Metrological performance of tester PCT-430

| Name of characteristic, unit | Parameter | Error limits |
|---|---|---|
| 1 Output signal frequency range (high-frequency), MHz | 90…210 | $\delta_{rel} = \pm 3 \cdot 10^{-4}$ % for the range |
| 2 Output level range (high-frequency), dB. (0 dB = 1 mW ) | From - 60 to - 130 | $\Delta_{abs} = \pm [3 + (U_{hf\ agr} / 40)]$, dB. |
| 3 Signal frequency deviation range (high-frequency), кHz. | 0.2 ÷ 20 | $\delta_{rel} = \pm [5 + 5 (D_f / D_{agr})]$, %, where $D_f$ = 20 кHz is upper value of deviation frequency setting range; $D_{agr}$ is setpoint value of deviation frequency, кHz. |
| 4 Output signal range (low-frequency), кHz. | 0.02 ÷ 20 | ± 1 Hz |
| 5 Output voltage range (low-frequency), V. | 0.02 ÷ 2 | $\Delta_{абс} = \pm (0.02 + 0.05 \cdot U_{lf\ agr})$, V, where $U_{lf\ agr}$ is setpoint value of output voltage, V. |
| 6 Output voltage distortion factor (low-frequency), %. | No more than 1 | – |
| 7 Output signal frequency range (high-frequency), MHz. | 90…210 | $\delta_{rel} = \pm 3 \cdot 10^{-4}$, %. |
| 8 signal frequency deviation measuring range (high-frequency), кHz. | 0.2 ÷ 20 | $\delta_{rel} = \pm [5 + 5 (D_f / D_{agr})]$, %, where $D_f$ = 20 кHz is upper value of deviation frequency setting range; $D_{agr}$ is measured value of deviation frequency, кHz. |
| 9 Output signal power measuring range (high-frequency), W. | 0.2 ÷ 20 | $\delta_{rel} = \pm [5 + 0{,}1 \cdot (P_f / P_м)]$, %, where $P_f$ = 20 W is upper value of output signal power measuring |

| | | |
|---|---|---|
| | | range (high-frequency); $P_м$ is measured value of output signal power (high-frequency), W. |
| 10 Signal frequency measuring range (low-frequency), Hz. | $20 \div 1 \cdot 10^5$ | ± 1 Hz. |
| 11 Sinusoidal alternating voltage measuring range in the frequency range from 0.02 to 20 кHz, V. | 0.02 ÷ 15 | $\delta_{rel} = \pm [3 + 2 (U_f / U_м)]$, %, where $U_f$ = 20 V is upper value of alternating voltage measuring range; $U_м$ is measured value of alternating voltage, V. |

**APPENDIX A**

| Name of characteristic, unit | Parameter | Error limits |
|---|---|---|
| 12 Measuring range of alternating voltage distortion factor, %. | 1 ÷ 100 | In the range from 1 to 50 %: $\delta_{rel} = \pm [5 + 0{,}1 \cdot (DF_f / DF_м)]$, %, where $DF_f$ = 50 % is upper value of distortion factor measuring range, %; $DF_м$ is DF measured value, %. In the range from 50 to 100 % DF is not standartized. |
| 13 Direct voltage measuring range, V. | 0.02 ÷ 20 | $\delta_{rel} = \pm [2 + 2 (U_f / U_м)]$, %, where $U_f$ = 30 V is upper value of direct voltage measuring range; $U_м$ is direct voltage measured value, V. |

## APPENDIX B
(mandatory)

## PCT-430 TEST LOG

_____
*(works number)*
owned by _____
(company name)
checked by _____
(company name)
“_____” _____

### Check conditions

Ambient temperature, °C _____
Relative humidity, % _____
Atmospheric pressure, kPa (mm hg) _____
Supply voltage, V _____

### Check instruments

_____
_____
_____

***1 External examination, completeness checking*** _____
_____
Conclusion: _____

***2 Testing*** _____
_____
Conclusion:_____

***3 Measurement of tester parameters, errors***

Table A.1

| Item number | Measurable parameter | Error limits |
|---|---|---|
| | | |

Conclusion:_____

**Overall conclusion:** _____
(certificate, number or cause of unserviceability)

Chief of State Supervision Laboratory _____ _____
(signature) (surname)
State verification officer _____ _____
(signature) (surname)

Stamp here Date _____