

Hickok 580 and 580A Fact Sheet

I have included the specification sheets for both the 580 and the 580A at the end of this document. Included within this document I have described the characteristics of these two testers, their main features, and short comings.

Circuit design and operation method:

The 580 and 580A operate using the same Hickok bridge circuit design used in most all other Hickok testers. The key differences are that this model uses 3 power transformers, one for the filament (heater) supply, one for the plate voltage supply (and Gm measurement operation), and the third, for the screen voltage supply! This Hickok is the only model (other than the full laboratory units) that provided a range of plate/screen voltage supplies up to 300 volts DC! The TUT is operated with unfiltered and non-regulated voltages just as the other Hickok models and many other makes and models of service testers.

The only real difference between the factory stock 580 and 580A is that the 580A had the addition of a plate current measurement test, activated by a separate push button located directly below the main Gm meter. This test would only read to 50 mA of plate current. Other than the plate current measurement the technical specifications between the two were the same!

These two testers did have some inherent issues associated with their design. The issues were of small concern at the time for two reasons. First, at the time they were all new and parts deterioration from age, regular usage, and possible mis-use (abuse) was not a factor then, particularly age was not an issue. Second, they were primarily designed to determine if a tube was good or bad, and not for use as a Quality control tool, or for detailed tube analysis purposes. So in the application as a service testers the units did just fine back then. **So then what is wrong with them?** As service testers having been serviced and calibrated nothing! But there are still those design issues that inhibit them from providing a higher degree of accuracy in their Gm (mutual conductance) testing. This issues was present then, but to a much smaller degree. Now due to **parts deterioration from age**, then you **add** in the amount of use they have had (hours of operation), and any misuse, then the issue becomes a bigger problem now. In addition there are three inherent technical issues, one will lead to both testing errors and/or outright failure, one is also related to inaccurate test results, and an out of calibration condition, and/or total failure too, and yet one other will cause totally misleading test results in a wide range of higher gain amplifier tubes. This last issues was finally identified by Hickok and corrected in the last 580A units in production and corrected in both models that went in for service back in those days! However, there are a large number of units that were never fixed still out there.

The two inherent design issues that cause a less accurate test result and a calibration issues as well, are the plate/screen/heater power transformers, and the AC line set procedure. It is true that all, but one model series of Hickok had the same AC line set issue, this was also typical on 99% of all other make and models of service testers made by most companies! But the 580 and 580A were not low cost models as most of the other were. The normal power transformer issue is a problem for these testers just as much as it is for all the tube testers built back then. I have written another paper on transformers, titled **Transformer Issues In Tube Testers**.

What are all these issues:

- Power transformer issues,
- Power rectifier issue,
- Osillation during tube test issue,
- Correct tube test result & calibration issue,
- Tester failure issue,
- AC Line set issue,

Hickok identified a problem in the 580 and 580A late in the manufacturing of the 580A which caused the oscillation during the testing of higher gain tube, but also could occur with some medium mu tubes as well. They had to add a capacitor to the bridge circuit to suppress the tendency to cause some tubes to begin to oscillate. This oscillation caused the meter to measure the wrong Gm value!

The calibration and accuracy issue related to the plate/screen transformers are the following: First, the typical problem of leakage within the transformer, the carbon content of the transformer core material, wire insulation issues, the AC voltage regulation capabilities, and then internal temperature rise resulting from one, or more of these issues add to the other basic transformer design/manufacturing/materials issue of the past. When these issues are taken into account with the fact that the plate and screen voltages applied to the tube under test are taken from **dual sets of various secondary transformer windings, (often which have different winding resistance's between them)** which are actually switched in and out of circuit by the plate and screen voltage selector switches, thus causing you end up with voltage errors and an in-balance in the measurement bridge circuit. This in-balance will have a major additive or subtractive error on all Gm test results and the error will effect different tubes on the different plate/screen settings to different degrees! While this error was much smaller when the transformers were new it never the less was still present then as well but was considered to be acceptable. This problem is present even when the transformers were new, but it is much greater with the old transformers as they age and continue to be operated. In addition to this spicific issue other problems described in the first part of this paragraph are also found and are explained in my other document "**Transformer Issues In Tube Testers**" which also add to the degree of the problem from tester to tester. **I have designed a circuit upgrade that will correct this and greatly improve the accuracy of the testers Gm measurement on all ranges and for all tubes with old or new transformers. You may want to review my Hickok upgrade document for more details.**

The 580 and 580A were only two models of a total of five models that Hickok built using solid state rectifier diodes in the power supply. At the time, solid state diodes were in their early development and application usage phase, and many had material, and manufacturing process related issues. This issue in addition to the normal component aging, wear and operational stress will cause various problems up to including total tester failure to occur sooner or latter.

Having said all this when a 580 or 580A is in top condition and all the above issues are corrected this tester will provide a quite accurate test result and at plate voltages approaching those of up to 300 volts which are the typical values often stated in many tube specification sheets and manuals!

In any of these 580/580A testers which have marginal power transformers in them, you can still obtain acceptable test results usually within +/- 10% if most of the other issues have been addressed without replacing any of the transformers. However there are situations when one or more of the transformers may have to be replaced to obtain acceptable performance. However, this issues is no different than any other tube tester model except for the number of transformers used in most the other models are one and in only a few models two.

You may want to review some of my other related articles on:

- Transformer Issues In Tube Testers,
- Tube tester usefulness and accuracy,
- Service tube tester accuracy related issues,
- Testing tubes accurately on a service tester,

Hickok 580 & 580A specifications / features

Model 580

Physical Characteristics & Power requirements:

Size W =19 in. D= 15 ½ in. H= 7.0 in.

Weight: 30 pounds

Power Line voltages: 105 to 125 VAC

Power line Frequency: 50 to 60 Hz

Tube Socket Complement:

9 pin Novar,
12 pin Compactron,
9 pin and 10 pin Miniature,
7 pin miniature,
8 pin Loctal,
5 pin Nuvistor,
7 pin Nuvistor,
8 pin Octal,
8 pin sub-miniature round,
7 pin sub-miniature in -line,
5-7 pin Acorn,
7 pin Combination,
4, 5, & 6 pin Combination

Mutual Conductance Ranges (Gm):

3,000 micro mho's,
10,000 micro mho's,
30,000 micro mho's,
60,000 micro mho's,
Three rectifier/diode test ranges,
One voltage regulator range.

AC Test Signal: = 0.28 vac RMS

Leakage test:

Sensitivity to 50 megohms.
Read directly from meter.

Test Voltages:

Filament/heater: 0 to 117 vac in 19 steps:
0.6, 1.1, 1.4, 2.0, 2.5, 3.0, 4.3, 5.0, 6.3, 7.5, 10.0,
12.6, 17.0, 20.0, 25.0, 35.0, 50.0, 75.0, 117.0

Plate and Screen DC voltages:

Individually Selectable in 12 steps.
6.3, 12.6, 22.5, 45, 80, 100, 120, 150,
180, 200, 250, 300

Bias voltage:

Fixed Bias voltage: 0 to 50 vdc.
Self Bias: available through applying a fixed resistor to a standard phone jack on top panel by Gm meter.

Life test: -10% Push button

Gas Test: to 50 milli-microamps of grid current

NO Plate Current Measurement Available!

Model 580A

Physical Characteristics & Power requirements:

Size W =19 in. D= 15 ½ in. H= 7.0 in.

Weight: 30 pounds

Power Line voltages: 105 to 125 VAC

Power line Frequency: 50 to 60 Hz

Tube Socket Complement:

9 pin Novar,
12 pin Compactron,
9 pin and 10 pin Miniature,
7 pin miniature,
8 pin Loctal,
5 pin Nuvistor,
7 pin Nuvistor,
8 pin Octal,
8 pin sub-miniature round,
7 pin sub-miniature in -line,
5-7 pin Acorn,
7 pin Combination,
4, 5, & 6 pin Combination

Mutual Conductance Ranges (Gm):

3,000 micro mho's,
10,000 micro mho's,
30,000 micro mho's,
60,000 micro mho's,
Three rectifier/diode test ranges,
One voltage regulator range.

AC Test Signal: = 0.28 vac RMS

Leakage test:

Sensitivity to 50 megohms.
Read directly from meter.

Test Voltages:

Filament/heater: 0 to 117 vac in 19 steps:
0.6, 1.1, 1.4, 2.0, 2.5, 3.0, 4.3, 5.0, 6.3, 7.5, 10.0,
12.6, 17.0, 20.0, 25.0, 35.0, 50.0, 75.0, 117.0

Plate and Screen DC voltages:

Individually Selectable in 12 steps.
6.3, 12.6, 22.5, 45, 80, 100, 120, 150,
180, 200, 250, 300

Bias voltage:

Fixed Bias voltage: 0 to 50 vdc.
Self Bias: available through applying a fixed resistor to a standard phone jack on top panel by Gm meter.

Life test: -10% Push button

Gas Test: to 50 milli-microamps of grid current

Plate Current measurement: up to 50 mA

By push button switch . Measured on main meter.

Description of common features between the 580 and 580A models:

The Hickok Model 580 and 580A Tube Tester combines some of the characteristics desired for exacting laboratory tube testing with the portability and simplicity required by the technician for the maintenance of modern electronic equipment. The design specifications include, all accepted standard tests and in addition have the facility to test tubes with individually variable potentials as **required to comply with tube manufacturers' tube manuals.**

Operating test voltages for Filament, plate, and screen supplies can be preset to provide the voltages specified by most of the receiving tubes as stated in most Tube Manuals. Three separate power supply transformers with solid state rectifiers supply stable, long-lasting, trouble-free operation (no vacuum tubes are used in the Model 580 or 580A Tube Tester).

Filament voltages are variable from 0.8 to 117 volts AC, in 19 steps. Plate voltages and screen voltages are each separately variable in 11 steps. These variable voltage values provide the combinations most specified in manufacturers tube manuals.

The d. c. bias voltage is continuously variable from 0 to 50 volts and can be set by means of a calibrated dial or it can be read on the meter mounted on the panel. For accuracy in setting the bias voltage a two position switch is provided which permits readings of 0 to 5 or 0 to 50 volts full scale. A cathode resistor may be inserted into the SELF-BIAS jack on the front panel by means of a phone plug for making self-bias tests, This jack' is internally shunted by a 1000 mfd capacitor making an external cathode bypass capacitor unnecessary.

A potentiometer concentrically mounted on the FILAMENT VOLTS switch provides a means of electrically centering the tube filament to prevent 60 hz modulation of the grid-filament circuit during Gm testing.

Dual diodes and triodes with electrically identical sections can be tested with one setting of the selector switches. Each section of the tube can be tested in-dependently for inter-element leakage, gas, and mutual conductance by transferring the tube test conditions (the selector switch settings) from one section of the tube under test to the other section by pressing one push button switch.

Both models provides a gas test circuit that permits detection of as little as 50 milli-microamperes of grid current in the tube under test.

Plate, grid, and cathode jacks are provided on the front panel for easy connection to plate, grid, and cathode tube caps.

Life-test of a tube is provided for by means of a push button switch that reduces heater voltage. This permits evaluation of the cathode reserve and an approximation of the life expectancy of a tube.

The standard Hickok unique safety-interlock of the selector switches prevents possible damage to the tube under test or to the testes circuits. END OF DOCUMENT:

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