

INVESTIGATE THE WORKING PRINCIPLE OF TRANSFORMER

Measurement practice II.

FOR VEHICLE ENGINEER STUDENTS



Version: 1.1

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1. Introduction

In this measurement exercise, the working principle of the transformer is investigated at a basic level.

1.1 Objectives

- Assembling the transformer;
- Number of turns voltage ratio study;
- Using an AC power supply;

1.2 Required instruments and components

- AC voltage supply (see Fig. 1.);
- transformer kit (with magnetic core and windings) (see Fig. 2.);
- digital oscilloscope (see Fig. 3.);
- BNC to banana plug adapter (see Fig. 4.);
- measuring cable.



Fig.1. AC voltage supply



Fig.2. Transformer

ROHDE&SCHWA	RZ HMO 1002 S IGSa/s / 1 MB MIXED SIG	Series NAL OSCILLOSCOPE		()	CURSOR/MENU	YPAD FFT	GENERAL
T8:50ns T:0s	XXX/HH98986H	0 500MSa R			VERTICAL POSITION CH UTL POSITION CH OR UTL POD	TRIGE	RECALL SET SETUP HELP DEFLAY FRANT HORIZONTAL HORIZONTAL POSITION SET OCA TIME/DIV
AUXOUT LOGIC CHANNEL POD AUXOUT LOGIC CHANNEL POD PATTERN GENERATOR POD COMP S0 S1 S2 S3 1 1 1 1 1 USE RECOMMENDED PROBE ONLY				RF IVE COP COP MENU BUS SORE FLTER COP ACOUNT EXT TRIG IN CH1 CH2 CH1 CH2 <			COM ACCURE CH2 CH2 F max. 200 Vp

Fig.3. Digital oscilloscope



Fig.4. BNC to banana plug adapter

2. Literature review

Transformer is described in "Electrical engineering-Students book_Form Three", chapter six. You should know the following terms/topics:

- construction of transformer (magnetic core, primary windig, secondary winding etc.);
- working principle of transformer;
- voltage ratio law;
- types of transformers.

3. Measurement exercise

3.1 Step-down transforming ECHENVI

In this measurement we investigate the step-down transforming. The steps of measurement:

- 1. Set the AC power supply to 6VAC. Check the output voltage using an oscilloscope. Record the measured value to the report and save to pendrive!
- 2. Build the transformer with the following coils:
 - Primer: 1200 turns;
 - Secunder 300 turms.
- 3. Connect the primer coil to the AC power supply and the secunder coil to the oscilloscope!
- 4. Turn on the AC power supply!
- 5. Measure the voltage of the primer and secunder coil using an oscilloscope. Record the measured value to the report and save it to pendrive as a picture!
- 6. Repeat the measurement with the following set-up:
 - Primer: 1200 turns;
 - Secunder 600 turms.

3.2 Step-up transforming

In this measurement we investigate the step-up transforming.

The steps of measurement:

- 7. Set the AC power supply to 4VAC. Check the output voltage using an oscilloscope. Record the measured value to the report and save to pendrive!
- 8. Build the transformer with the following coils:
 - Primer: 300 turns;
 - Secunder 1200 turms.
- 9. Connect the primer coil to the AC power supply and the secunder coil to the oscilloscope.
- 10. Turn on the AC power supply!
- 11. Measure the voltage of the primer and secunder coil using an oscilloscope. Record the measured value to the report and save it to pendrive as a picture!
- 12. Repeat the measurement with the following set-up:
 - Primer: 600 turns;
 - Secunder 1200 turms.

4. Measurement results

4.1 Step-down transforming

Measured voltage of AC power supply: Number of turns of primer coil:

Number of turs of secunder coil: Measured voltage of secunder coil:

4.2 Step-up transforming

Measured voltage of AC power supply: Number of turns of primer coil:

Number of turs of secunder coil: Measured voltage of secunder coil:

5. Conclusions

How does the ratio of turns depend on the ratio of voltage? The magnetic core in low frequency is laminated. Why? Is the power different on the primer side than on the secunder side?

6. Homework

Create a report using the template provided, with the required content and criteria.

7. References

[1] Electrical Engineering for Technical Secondary Schools, Student's book, Form Three.

