

The Research of Professional Teaching Method Based on “Two Diagrams and One Equipment”

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ABSTRACT: In the specialist higher-level vocational and technical education, the professional teaching method is important. The teaching method, which is based on “two diagrams and a equipment”, including the functional block diagram, electrical circuit diagram and actual equipment, is divided into three steps from the macro to the micro, from theory to practice. This teaching method explains profound theories step by step in simple language, problem teaching professional circuit principle of crack. Through the teaching examples (A/D conversion circuit principle teaching), improving students' ability of using the principle of theory to analyze and solve practical problems in the modern equipment maintenance support!

KEYWORD: Professional teaching method; Two diagrams and a equipment; Functional block diagram; Electrical schematic diagram; Actual equipment

1 INTRODUCTION

The occupation technology education curriculum contains two courses, aiming at professional equipment. One course is named "structure and principle", the other course is named "repair". Those courses are the professional posts required courses. The course of "structure and principle" key learning the use、function、the structure、basic working principle, to provide theoretical support for the knowledge and skills necessary for the subsequent course study. The course of "repair" focus on training students by using the principle of theory to analyze and solve problems, and lay a good foundation for the professional equipment operation, inspection and repair.

For the professional circuit theory knowledge learning, it is abstract, esoteric, and difficult to understanding, need of basic theory knowledge of electronic technology. This is to be the teaching occupation technology education focus and difficulty. In order to solve the problem, the author as one for many years engaged in the occupation technology education teachers, to explore a set of effective teaching method from the practice--"two diagrams and a equipment", carries on the discussion and the research.

2 THE WORKING PROCESS OF TEACHING METHOD

The teaching method, which is based on “two diagrams and a equipment”, including the functional block diagram, electrical circuit diagram and actual equipment, is divided into three steps from theory to practice.

The first step, combining the principle diagram of clear structure, analysis of signal process, form shallow understanding from the macro. The second step, combined with the electric principle diagram, run pass the electric circuit, and meantime should be flexibility in the use of computer software, form in-depth understanding from the micro. The third step, combined the actual equipment, apply the theory to practice, make knowledge point corresponding with the actual equipment. This teaching method is from the macro to the micro, from theory to practice. Finally students will develop an understanding of theory knowledge, and can be flexibly to analyze and solve practical problem, their ability will obtain very big promotion!

To explain the working process, we will use the teaching examples, which named A/D conversion circuit principle teaching. document by clicking Save As in the menu Files. Name your file as follows: First three letters of the file name should be the first three letters of the last name of the first author, the second three letters should be the first letter of the first three words of the title of the paper

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2.1 The functional block diagram teaching

Figure 1 is the functional block diagram of A/D

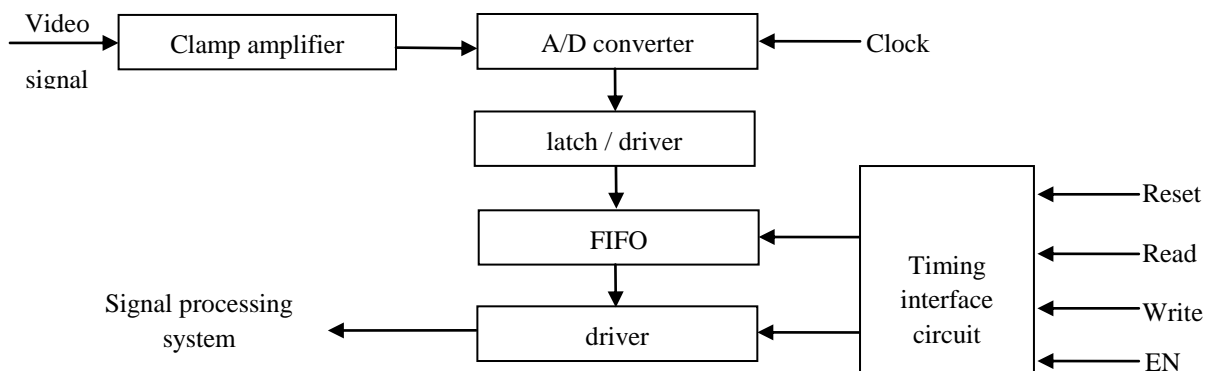


Figure 1 The Functional Block Diagram of A/D Conversion Circuit

conversion circuit principle, which comprises a clamp amplifier, high-speed A/D converter, high-speed latch / driver, FIFO memory, driver, and timing interface circuit.

Analysis of the signal flow: Analog baseband video signals into the A/D conversion circuit, first through the clamp amplifier. The magnification of clamp amplifier is 1, when the bipolar input signal's peak to peak value exceeds 2V, the output signal's peak to peak value is clamped to 2V, to protect the high speed A/D converter. Then signal enters the A/D converter, is converted into digital signal with binary features, the output of the digital signal through a latch / driver into the FIFO memory. The procession of memory reset, read, write and output sequence, is under control of the system timing and signal processing timing. Finally the data is outputted to the data bus of the signal processing system.

Through the analysis of the principle block diagram, students will have a superficial realization from the macro level, and then the first step is completed. But always feel or some abstract, not too specific, it requires second step.

2.2 The electrical circuit diagram teaching

Figure 2 is the electrical circuit diagram of A/D conversion circuit. Multimedia computer need to install Adobe. Acrobat. Professional software and Protel software. The Protel rendering with "AD.SCH" electrical circuit diagram, copy and paste into the Word document, and then convert it to a PDF document. Mainly using the powerful function of PDF, the diagram can be arbitrarily scaled and marked, easy to lead the students to run through the circuit diagram.

Electrical circuit diagram is too dense, like a spider's web, moreover is too small to see clearly. The map of local amplification as shown in

Figure3,4 shows the use of dynamic scaling function.

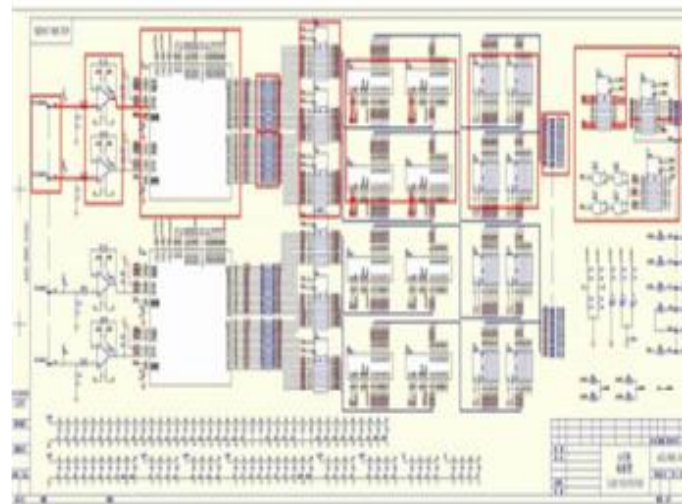


Figure 2 The electrical circuit Diagram of A/D Conversion Circuit

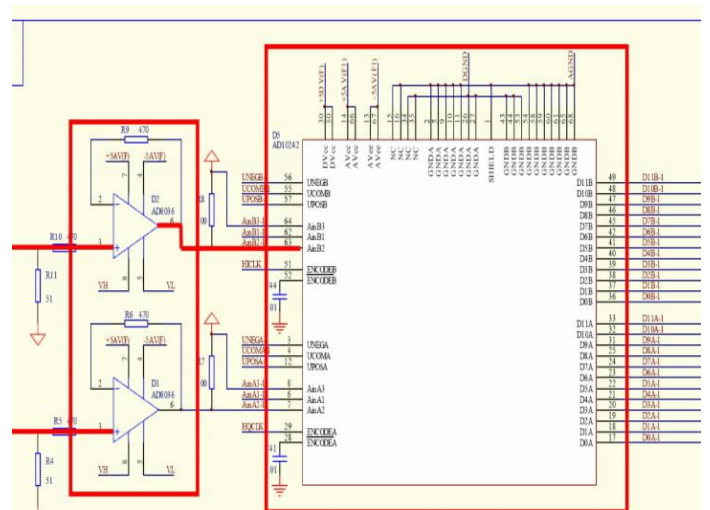


Figure 3 Electrical circuit diagram of local amplification and marking(a)

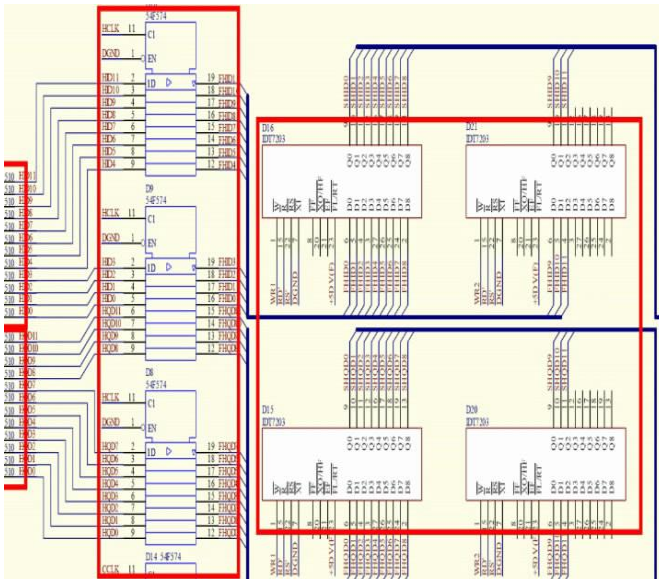


Figure 4 Electrical circuit diagram of local amplification and marking(b)

By local amplification and marking, the electrical circuit diagram is very clear, the signals from the left of the A 7/B7/C7 and the A9/B9/C9 input, to clamp amplifier (D1, D2), and then sent to the high-speed A/D converter (D5), after the latch / driver (D8, D9, D10), FIFO (D15, D16, D20, D21), driver (D24, D25, , D28, D29), output to A35~46 and C35~46, in addition to timing interface circuit (D7, D11, D17, D30). Using PDF rich mark tools, mark anywhere in need, like led us to walk, to enable students to master the signal sequence easily.

Through the analysis of electricity circuit diagram, students will learn in-depth analysis from the micro, and then the second step is completed. But it not enough, should also be timely to jump out of diagram to actual circuit board, which requires third step.

2.3 The actual equipment practical teaching

Combined with the real circuit board, students need to make each input and output of each module clearly. As showed in Figure 5, each component module circuit chip correspondingly marked on the front side of the actual circuit board. As showed in Figure 6, the input signal and output signal position correspondingly marked on the back side of the actual circuit board.

To see the input and output signal waveform, students need use oscilloscope to test on the actual equipment. The signal waveform performance testing is showed in Figure 7. Corresponding with the actual equipment, the use of theoretical knowledge in practice, and lay a solid foundation for equipment repair.

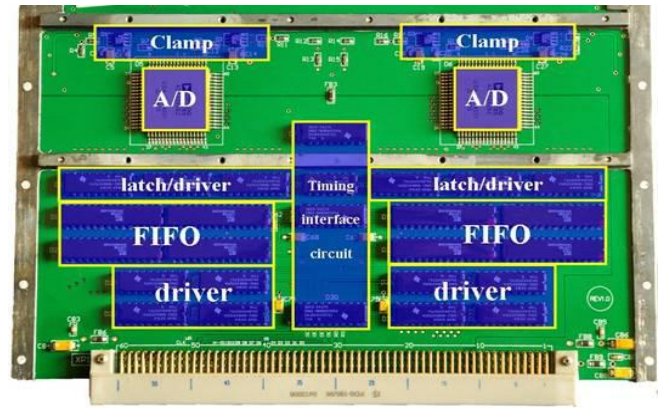


Figure 5 The front side of the board and marking

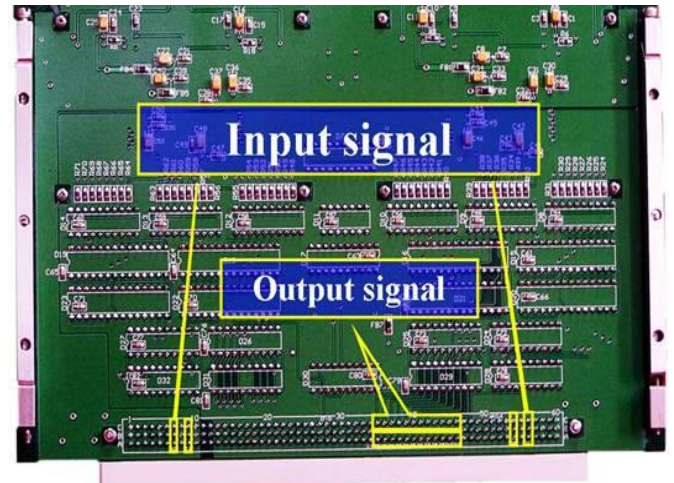


Figure 6 The back side of the board and marking



Figure 7 The signal waveform performance testing

3 CONCLUSIONS

The professional circuit principle is abstract, abstruse, difficult to understand, and is also the focus and difficulty of teaching occupation technology education major. To solve this difficult problem, the teaching method of "two diagrams and a equipment" is discussed as above. The first step is the functional

block diagram teaching; the second step is the electrical circuit diagram teaching; the third step is actual equipment practical teaching. To enable students to understand the working principle step by step, and can use the knowledge flexibly to analyze and solve practical problems. In this way, through the use of this teaching method, not only achieve good teaching effect, but also make students' ability greatly improved!

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