

## TEACHING AND LEARNING STIMULATOR FOR PRESSURE AND TEMPERATURE BASED SYSTEM

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### **ABSTRACT**

This paper describes an improved teaching and learning stimulator for the learning of the refrigeration and air conditioning system. The present stimulator featured some important components that need to be included to improve learning. It is user friendly, capable of illustrating the real air conditioning system to the learner and thus provides easier understanding of the concept to the learners. The lecturer too found that the teaching is conducted more easily and efficiently.

### **INTRODUCTION**

The present stimulator relates to the design of the teaching and learning apparatus that help to enhance learning. More specifically, the present stimulator attempts to improve the teaching of refrigeration and the air conditioning system. The course is part of the teaching and learning module in technical schools, polytechnics, community college, universities or other technical institution. Such a stimulator overcomes the difficulties of teaching and learning in the field of refrigeration and air-conditioning and at the same time improves the student knowledge and skills.

Each individual has different learning style. This becomes the main purpose for this research which is to find the new strategic ways to overcome the problem in the delivery of instruction to learners with different learning style. At the same time the result of the research can produce a group of highly skillful and knowledgeable student. The process of teaching and learning in this new era need the utilization of media and technology. It can help up in transferring the data and give information to achieve of the study objectives. Further more this study kit can teach the students to become more independence and being able to solve the problem (Baron & Orwing, 1997). The purpose of this research is to develop an instructional system using study kit as a main media of delivery in the process of teaching and learning in a classroom. By using this study kit the students can understand the content of study more easily compare to the class-room based teaching. This is because this study kit is a module that was developed specifically to upgrade the skill of the engineering students especially in the higher education.

The idea of air conditioning started before a machine was created to produce the cooling effect desired. The first attempt at building an air conditioner system was made Gorrie (1803-1855), an American physician, in Apalachicola, Florida. In the 1830s, Dr. Gorrie created an ice-making machine that essentially blew air over a bucket of ice for cooling hospital rooms of patients suffering from malaria and yellow fever. In 1881, when President James Garfield was dying, naval engineers constructed a box-like structure containing cloths saturated with melted ice water, where a fan blew hot air overhead. This contraption was able to lower a room by 20 degrees Fahrenheit but consumed half a million pounds of ice in the period of two months.

The modern air conditioner units were first made in 1902 by an American engineer by the name of Willis Carrier. The machine at that time called "Apparatus for Treating Air" and was build for the Sackett-Wilhelms Lithographing and Publishing Co. in Brooklyn, New York. Chilled coils were used in the machine to cool air and lower humidity to 55%, although the apparatus was made with enough precision that the humidity level desired was adjustable. After the invention by Carrier, air conditioners began to bloom. They first hit the industrial building such as printing plants, textile mills, pharmaceutical manufacturers, and a few hospitals. The first air-conditioned home was that of Charles Gates, son of gambler John "Bet a Million" gates, in Minneapolis in 1914. However, during the first wave their installation, Carrier's air conditioner unit was large, expensive, and dangerous due to the toxic ammonia that was used as coolant.

Today, air conditioners an invention that is hard to live without. The increasing demand of air conditioners has also created many job opportunities. In fact, refrigeration and air conditioning is now one of the important subject offered in schools, colleges, polytechnics and even universities.

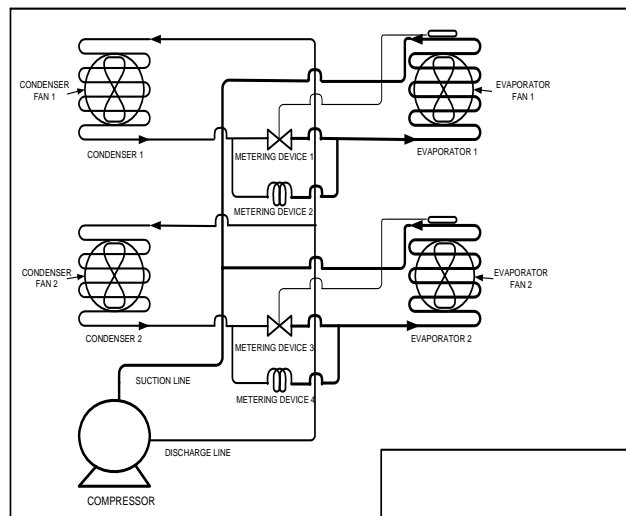
In terms of teaching and learning, the refrigeration and air conditioning simulator and the troubleshooting training system are designed for student and service technicians. The simulator is an invaluable tool since it teaches the basics of air conditioner troubleshooting and operation, as well as improving the service skills of experienced technicians. However, the existing simulator being used is too simple and is not fully equipped with the important parts such as pressure reading meter. The incompleteness of the stimulator makes the teaching and learning of refrigeration and air conditioning subject not very effective.

The system that was developed in this study has figured out a plurality of important aspects that need to be included onto the existing simulator. The present system is the improved teaching and learning apparatus for refrigerating and air conditioning which can overcome the above problems. It is a specific object of the present system to provide an additional teaching and learning apparatus to assist the teaching and learning refrigeration and air conditioning subject so that the teaching time will be reduced and hence more effective. It is also a specific object of the present system to provide a practical method of teaching and learning the air conditioner subject as the teaching and learning apparatus of the present system can always be a reference materials and it is convenient to use for revision.

### THE STIMULATOR

The stimulator developed is shown Figure 1 in which the elements are numbered identically through out a description of the preferred embodiment of the present system will now be provided. The system developed introduces an improved teaching and learning apparatus for refrigerating and air conditioning system to provide the conveniences of teaching and learning in the subject of air conditioner. Figure 1 shows the front view of the teaching and learning apparatus of the present system, the teaching apparatus for refrigerating and air conditioning. The present system has figure out some important components that need to be included into the existing air conditioner simulator system to make the teaching of air conditioner subject more effective. The new components and their functions will be explained below:

**Figure 1:** The full circuit model of the present system of refrigeration and air conditioning apparatus for pressure and temperature based system



The first component that is added in the present system is the high and low pressure meter (6). See Figure 2. The teaching kit apparatus for refrigerating and conditioning comprising four main components of air conditioner in the present system namely a compressor (2), a condenser (3), plurality of devices (4) and an evaporator (5) are installed with the high and low pressure meter (6) at their respective inlet and outlet means as shown in figure 2, 3, 4 and 5. The purpose of installing the high and low pressure meter (6) is to obtain the reading of pressure of the cooling material there through which includes the high and low pressure at each of the four main components as mentioned above. Through calculation, the capability of the air conditioner system can be detected.

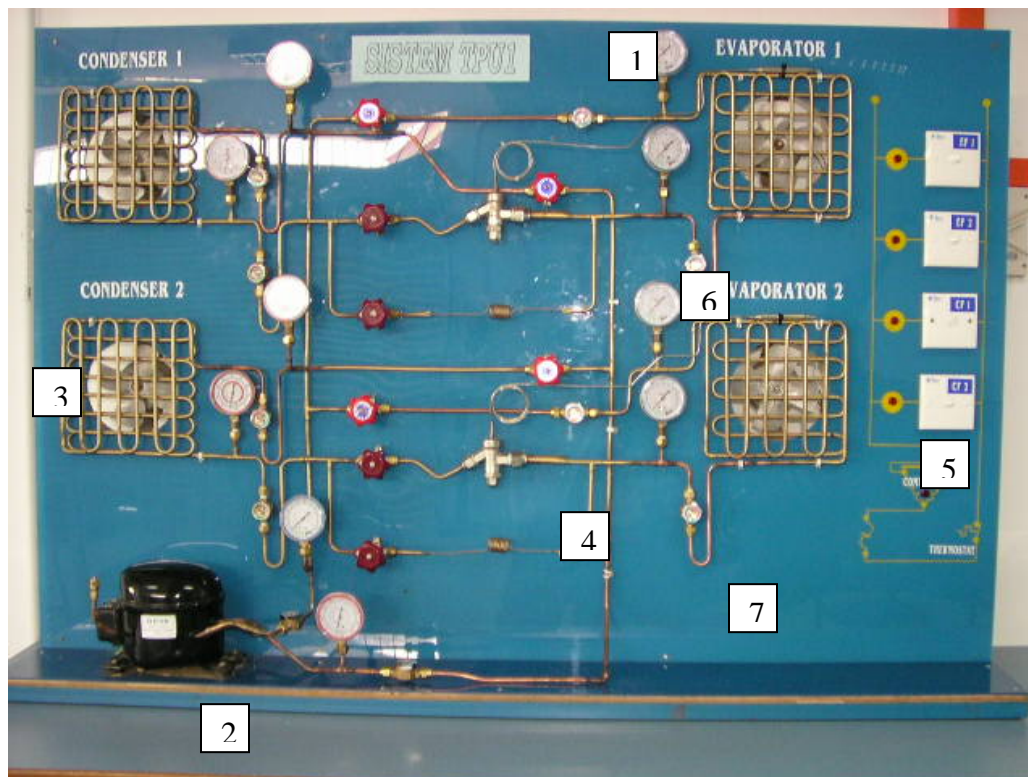
Next is the need of observation glass (7) to observe the transformation stage of the cooling material (not shown) during the sudden negative action on the air conditioning system. By referring now to figure 2, 3, 4 and 5, observation glass (7) is installed at the inlet and outlet means of each of these four components

of the compressor (2), condenser (3), devices (4) and evaporator (5). The observation glasses (7) are connected adjacent the high and low pressure reading meter (6).

In the teaching or training process, it is important to demonstrate the function of pressure based safety system to the students or trainees. Therefore, the air conditioning teaching and learning apparatus system of the present system has introduced another component, the safety switch (not shown) into the existing simulator. The safety switches are installed at the inlet and outlet of the compressor (2) to help to demonstrate the function of pressure based safety system. For experimenting purpose during the practical session, the present system has also designed a pipe (not shown) for attaching at the outwardly curved portions of evaporator (5) at its inlet, center portion and outlet.

These 3 curved portions at inlet, center positions and outlet are used for other experimental applications by attaching an indicator (not shown) at each portion to indicate if there are any effects. This is to observe the changing process especially in the aspect of pressure and temperature at all these four main components of compressor (2), condenser (3), devices (4) and evaporator (5) and hence determine the capability of the air conditioner system. The present system has also provided a few flexibilities in the present air conditioning teaching and learning apparatus system considering the importance of experimenting among the students and technicians in the teaching process.

The present air conditioning teaching apparatus system allows the change of compressor (2) in different sizes, the change of cooling gas, and also the change of other experimental applications. By using the pipe size built in system, components like compressor (2) and cooling gas can be experimented to detect the system's failure and system's capability. Lastly is the installation of half cover. In the present teaching and learning apparatus system (1), the half cover is installed on the condenser (3) and evaporator (5). Such installation has the purpose of observing the differences in capability of the system and also the transformation of shapes. In the practicing point of view, by having the installation of half cover, it is possible to obtain the capability of the system when a negative action is performed on the system.



**Figure 2:** Actual model

The teaching and learning apparatus system (1) of the present system provides more benefits to the learner as compared to existing air conditioner simulator. It is very user friendly. It provides easier understanding to the learner in the conceptual aspect of air conditioner. The lecturer can teach the course more easily and the teaching time will be shortened. Hence, the teaching of air conditioner

subject becomes more effective. It is to be understood that the present system may be embodied in other specific forms and is not limited to the sole embodiment described above. However modification and equivalent of the disclosed concepts such as those which readily occur to one skilled in the art are intended to be included within the scope of the claims which are appended thereto.

### **SUMMARY**

The present system describes an improved of refrigeration and air conditioning simulator apparatus for a purpose of teaching and learning module as a subject in schools, polytechnics, community colleges, universities and other institutions, to overcome the difficulties of teaching and learning as well as to improve the student knowledge and skills. The existing refrigeration and air conditioning simulator being used is too simple and is no fully equipped with the important parts such as pressure reading meter, before and after the components like compressor, condenser, evaporator and etc. The present system has figured out a plurality of important aspects that need to be included in the system, Hopfully the present system can always be a reference materials to fasilitators and also students.

### **REFERENCES**

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