

AN EQUIPMENT TEMPERATURE TEST CABINET

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Received 2 February 1976

Reid, W.S. and D.J. Buckley. 1977. An equipment temperature test cabinet. *Can. Agric. Eng.* 19: 48.

A simple, inexpensive cabinet, designed to test temperatures of a wide range of instrumentation, is described.

INTRODUCTION

In an engineering research facility concerned with the development of instrumentation for agricultural research it is essential to have temperature testing facilities for the electronic components, subassemblies and circuits developed. The simple cabinet described was designed to fulfill these functions inexpensively.

THE EQUIPMENT

The cabinet comprises a domestic upright freezer, 0.34 m³ (12 ft³) capacity, which was modified as follows. The cabinet was raised 0.3 m on a subframe covered with open mesh, in which modified refrigeration controls and a 373 W (½ HP) condensing unit were installed. The original condensing unit had insufficient capacity for this application. An inspection window 0.25 X 0.35 m was cut in the cabinet door and the temperature controller (Yellow Springs Inc., Model 63RC) attached to the left hand side wall. A 115 V AC, 15 amp power strip was installed internally to the power equipment under test as well as a small air circulating fan (Rotron "Sprite" Model SP2A2 to minimize spatial temperature differences.

The refrigeration circuit (Fig. 1) was modified by the inclusion of the higher capacity condensing unit (B) with reversing valve (J) and the on-off type electronic controller. The condensing unit runs continuously, operating as a heat pump to alternately heat and cool the air in the cabinet.

A series of tests were carried out within the cabinet's operating range. Each test lasted 4 days. Data were analyzed to determine the range of variation of the recorded temperature from the selected control temperature for each test.

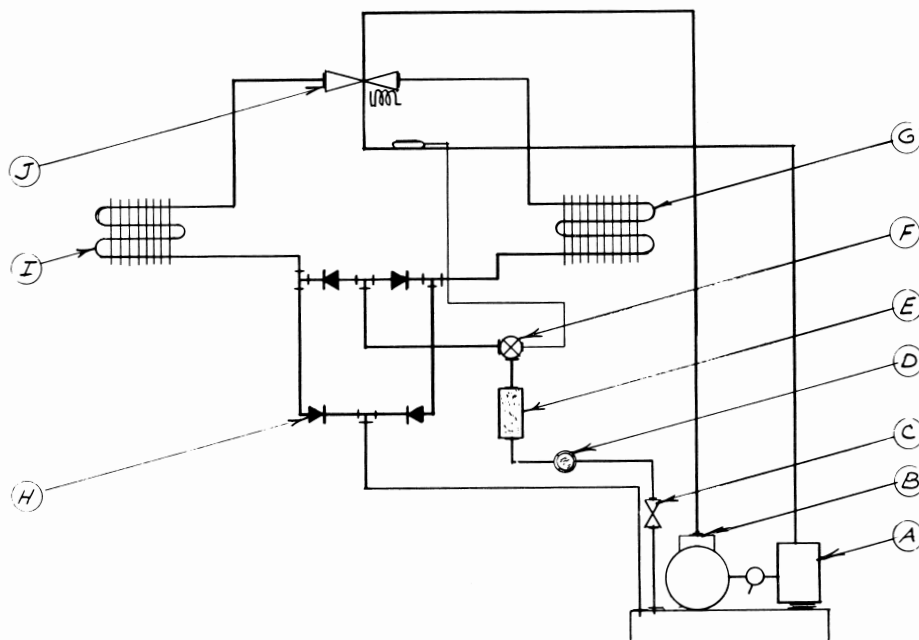


Figure 1. General schematic of the refrigeration circuit. A. Suction accumulator 3701, Refrigeration Research. B. Condensing unit AJ2425 AC R12 115V, Tecumseh. C. Liquid solenoid valve A3F1, Sporlan. D. Sight glass SA 12, Sporlan. E. Drier C-052, Sporlan. F. Thermal expansion valve TFZ, Danfoss. G. Condensing coil. H. Check valves 802A-G, Superior. I. Evaporator coil. J. Reversing valve V26, Ranco.

RESULTS

The maximum operating range of the cabinet was from -20.6 to +42.2 C. The cabinet air temperature was controlled within +1.5 C in the range 10 - 38 C and +2.5 C in the ranges -18 - 10 C and 38 - 42.2 C. These performance limits were maintained over a period of 4 days for the control temperatures selected. The cabinet has been in operation for 12 mo without failure. This equipment has proved to be inexpensive,

sufficiently accurate, reliable and useful to test a wide range of instrumentation.

Where commercial equipment is specified this does not imply official approval by Agriculture Canada.

ACKNOWLEDGMENTS

The author wishes to acknowledge the technical support and workshop staff of Engineering Research Service, who constructed and tested the equipment.