

Report SAM-TR-75-31

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**C-141 THERAPEUTIC-OXYGEN MANIFOLD
DISTRIBUTION SYSTEM**

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USAF SCHOOL OF AEROSPACE MEDICINE
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NOTICES

This final report was submitted by personnel of the Biomedical Systems Branch, Clinical Sciences Division, USAF School of Aerospace Medicine, Aerospace Medical Division, AFSC, Brooks Air Force Base, Texas, under job order 7996-02-56.

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This report has been reviewed by the Information Office (OI) and is releasable to the National Technical Information Service (NTIS). At NTIS, it will be available to the general public, including foreign nations.

This technical report has been reviewed and is approved for publication.

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) → The C-141 Therapeutic Oxygen Manifold System was developed to overcome deficiencies of the integral C-141 therapeutic oxygen system. Three functional units, fabricated in-house to meet design specifications and performance requirements, successfully passed all phases of DT&E; no changes were made to the hardware. Two units were made available to Military Airlift Command for Operational Test and Evaluation (OT&E). OT&E results indicated that the units were acceptable for routine use aboard C-141 aeromedical airlift missions and were a definite improvement over the integral therapeutic oxygen system. ←		

C-141 THERAPEUTIC OXYGEN MANIFOLD DISTRIBUTION SYSTEM

INTRODUCTION

The present location of the C-141 aircraft therapeutic oxygen panel, right-forward bulkhead, requires 50 feet or more of low-pressure oxygen tubing to reach the litter patient positions. Reliability and control of flow are hampered by line pressure losses, flow splitting to accommodate more than one patient, and inadvertent crimping of the hose by aisle traffic and/or equipment. Oxygen therapy usually is restricted to litter patients located on the right-bulkhead or midcenter litter tiers. Although there are four outlets on the therapeutic oxygen panel, spacing prohibits using more than two pressure reduction valves (therefore only two oxygen lines) at one time.

APPROACH

An in-house study was conducted to identify the problem, determine possible solutions, define design parameters, prepare specifications, and establish performance requirements to develop hardware. A Development Test and Evaluation (DT&E) program was initiated. Three functional units were fabricated in-house and successfully completed DT&E. Two units were made available to Military Airlift Command (MAC) for Operational Test and Evaluation (OT&E).

RESULTS

Development Test and Evaluation was performed to determine the unit's suitability for use. Special emphasis was placed on operational performance, patient/user safety, and compatibility with the C-141 aircraft systems. Specific logistic and maintenance problems associated with medical materiel items used in aeromedical airlift were also considered. The unit successfully completed all phases of DT&E, and no changes were made to the hardware.

Two units underwent OT&E by MAC to determine the acceptability and number of systems that should be carried on a typical aeromedical evacuation mission. The OT&E results indicated that the unit (Fig. 1) was acceptable and that the number to be carried must be based on the patient load/mission density. The OT&E report further indicated that, if possible, the manifold outlets should be repositioned so as not to hinder litter placement in the upper space.

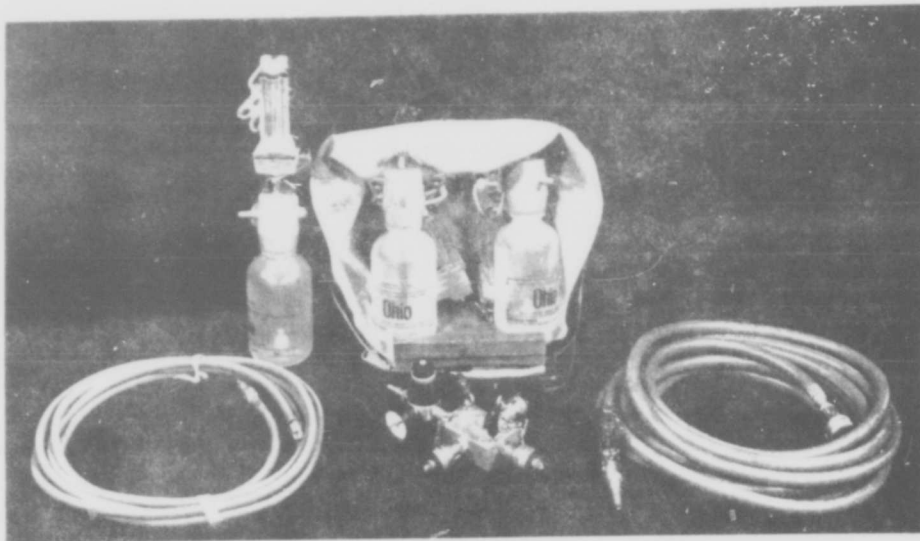


Figure 1. Components for one oxygen manifold distribution system.

DESCRIPTION

The C-141 Oxygen Manifold Distribution System is a simple, three-outlet manifold, with a reduction valve set at 50 psi, which can be easily connected by hose to one of the aft recharger hoses on the therapeutic LOX system. The manifold can be attached to any of the center litter-tier-support stanchions by two quick-release pins inserted through the manifold into the "Evans Seat" connection holes (Fig. 2). Each manifold enables aeromedical crews to administer metered quantities of oxygen, with proper individual patient control and humidification, to as many as three patients simultaneously at any location in the litter section. Three flow meter and humidifier sets are included with each manifold. The capability to recharge portable walk-around oxygen bottles has been retained by including a recharger outlet in the system where it connects to the aircraft recharger system.

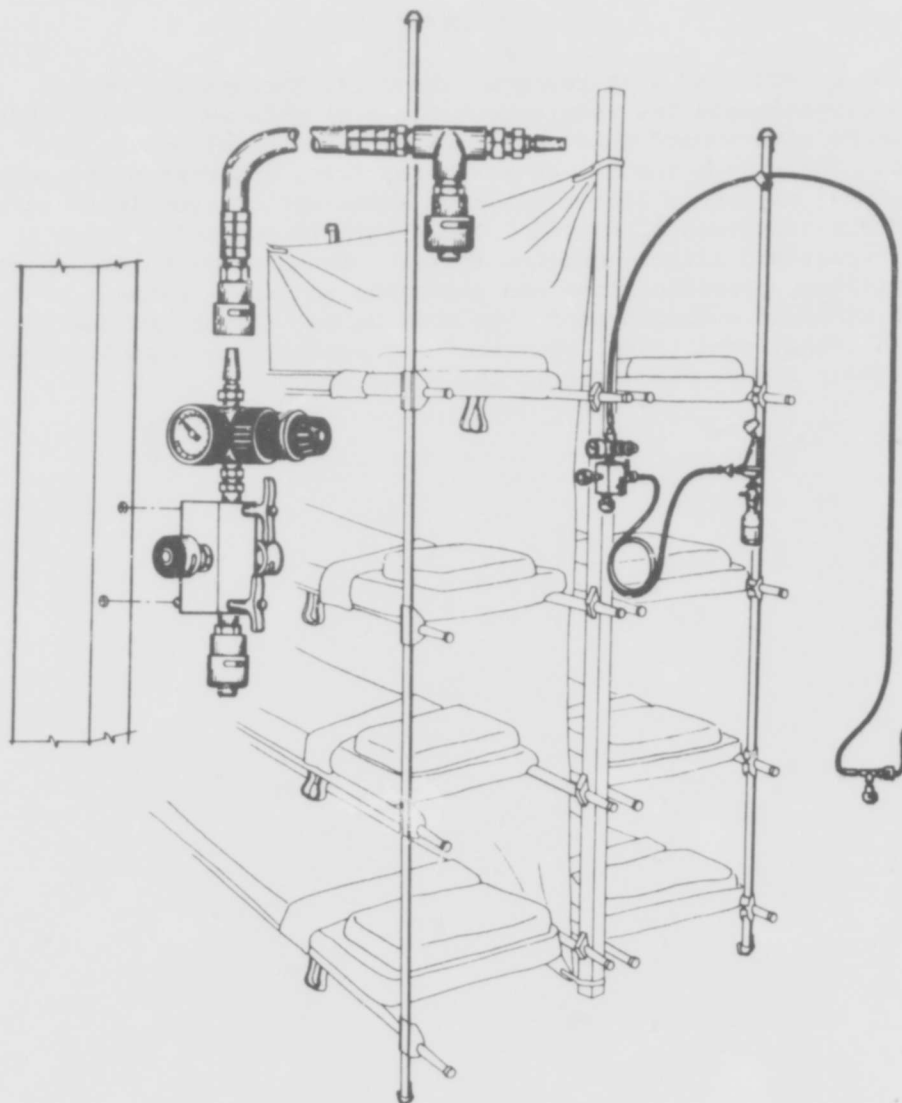


Figure 2. Therapeutic-Oxygen Manifold Distribution System (enlargement seen on left side) with one flow meter and humidifier set connected.

CONCLUSION

Based on DT&E and OT&E reports, the C-141 Therapeutic Oxygen Manifold System meets the requirement for a plug-in oxygen distribution system to be used aboard C-141 aircraft on aeromedical evacuation missions. The system insures an adequate, safe, and controlled method for supplying oxygen to litter patients whose medical condition warrants the need for supplemental oxygen. The system is compatible with the C-141 aircraft and litter-securing system. It conforms to the appropriate military specifications and standards to insure patient protection with the airborne environment during both normal flight and emergency landing/ditching conditions. The manifold outlets are positioned so as not to hinder litter placement in the upper space.