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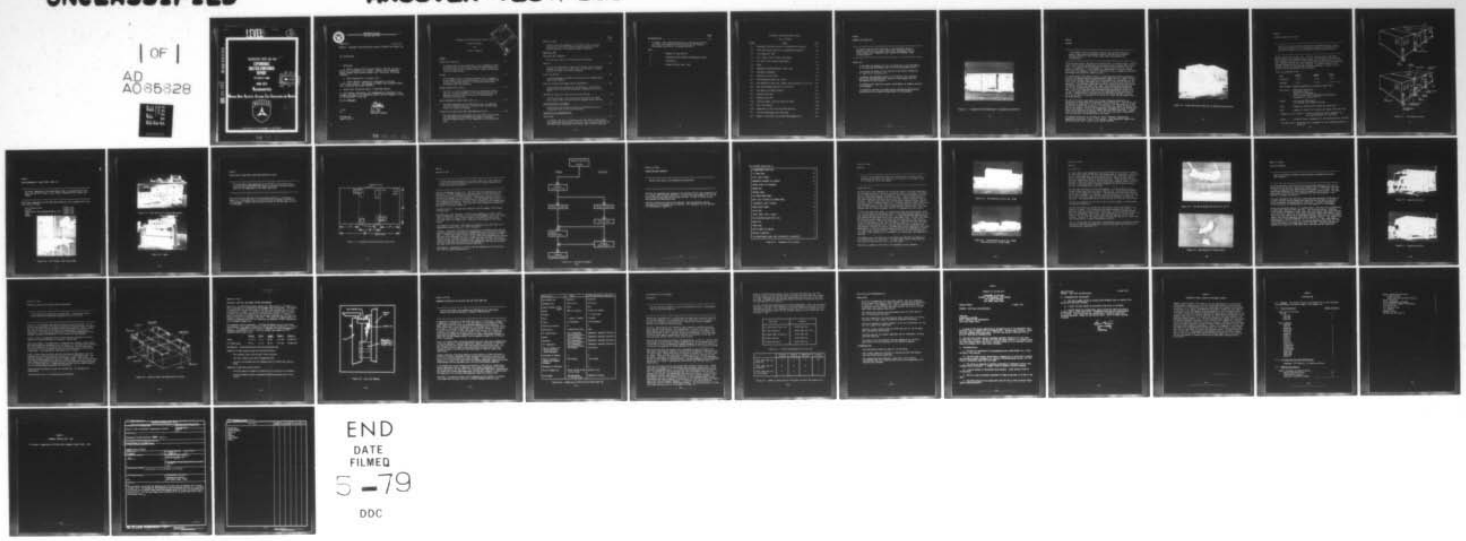

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MASSTER TEST No 136

EXPANDABLE SHELTER/CONTAINER REPORT

CPT RALPH P. DUNN

JUNE 1973

HEADQUARTERS

MODERN ARMY SELECTED SYSTEMS TEST EVALUATION AND REVIEW

MASSTER

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DEPARTMENT OF THE ARMY
HEADQUARTERS MODERN ARMY SELECTED SYSTEMS TEST EVALUATION AND REVIEW (MASSTER)
FORT HOOD, TEXAS 76544

ATMAS-MT-G

8 June 1973

SUBJECT: Expandable Shelter/Container Report, MASSTER Test Number 136

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1. References:

a. Letter, Office of The Adjutant General, AGDA (M) (19 Aug 71) FOR DC EXO, 2 September 1971, subject: Charter of the Commanding General, Modern Army Selected Systems Test, Evaluation, and Review (MASSTER).

b. STANO Program Plan, 16 January 1973.

c. Letter DAFD-DCT, Headquarters Department of the Army, 7 April 1972, subject: Test Program for Modern Army Selected Systems Test, Evaluation and Review (MASSTER).

2. Subject User Evaluation report is submitted herewith.

3. The findings, conclusions, and recommendations contained in this document are those of the Commanding General and not necessarily those of the Department of the Army.

FOR THE COMMANDER:

P. J. VOLK
Major, AGC
Assistant Adjutant

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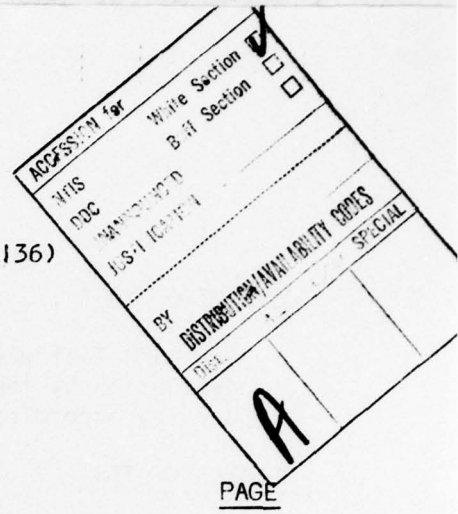

Expandable Shelter/Container Report (136)

Executive Summary

and

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General

PURPOSE AND OBJECTIVES

To evaluate the military usefulness of the Expandable Shelter/ Container (ES/C) as an aircraft sheet metal maintenance shop for direct support and integrated direct support maintenance (IDSM) of Army aircraft.

Objectives:

- To evaluate the adequacy of this size container in the performance of the required maintenance tasks at the DS maintenance levels.
- To evaluate the impact of this shelter on the overall ground and air mobility of the using unit.
- To compare the acceptability/utility of the ES/C with currently authorized shelters/containers used for direct support and IDS Maintenance of Army aircraft.
- To determine the logistical support requirements to properly maintain the equipment.
- To determine training, and human factors engineering deficiencies associated with the operation/employment of the equipment.

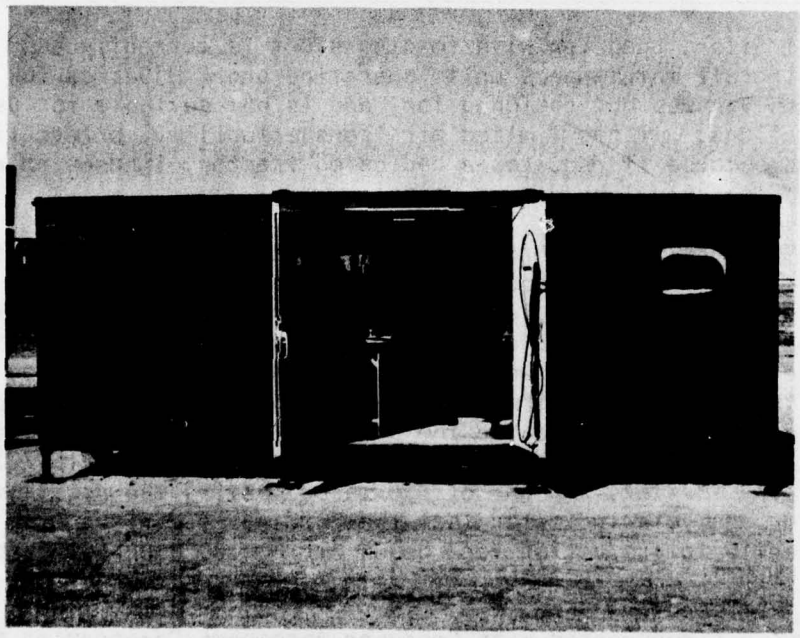

Figure 1-1. Expandable Shelter/Container in Expanded Configuration

General

HISTORY

In an attempt to find a suitable candidate for an airmobile direct support Army aircraft maintenance shelter, MASSTER was directed to evaluate the ES/C in the aircraft sheet metal maintenance shop configuration.

The M-447 Semitrailer, Shop Van with folding sides is currently used in direct support Army aircraft maintenance units operating under H Series TOE (figure 1-2). This shop van was not designed for, and is not suitable for use in airmobile operations. It has limited air transportability, offers limited work space, and because it requires a dedicated tractor, imposes an additional maintenance and logistical burden on units.

The USACDC/USAMC Joint Working Group, in investigating suitable maintenance shelters and formulating the proposed Materiel Need (MN) for a Shop, Portable, Aviation Maintenance (SPAM) studied the requirements of transportability and floor space, and also considered costs involved in procuring and testing the equipment. The candidate items were limited to those which could be obtained for testing within a six month time frame. Ten shelters were studied and the results indicated that three had the potential of meeting the materiel need. The US Air Force Bare Base Expandable Shelter/Container (ES/C) which is a multi-purpose shelter, was one of the three meeting the requirement of the MN. Further analysis indicated that the ES/C was a minimal risk item, as it was currently in production for the US Air Force, and was appropriate for Army testing.

The US Air Force has contracted with Goodyear Aerospace Corporation to manufacture a large number of Expandable Shelter/Containers. The Army version of the ES/C is identical to the Air Force version, with the exception of the addition of brackets which are used to attach mobilizer wheels for moving the ES/C on the ground. The ES/C has successfully undergone Air Force testing and operational evaluation during the CORONET BARE and HEAVY BARE tests. Corrections to the deficiencies detected in the Air Force tests were incorporated into the ES/C prior to being tested by the Army.

The MASSTER evaluation was directed by letter, DAFD-DCT, Headquarters, Department of the Army, 7 April 1972, subject: Test Program for Modern Army Selected Systems Test, Evaluation and Review (MASSTER).

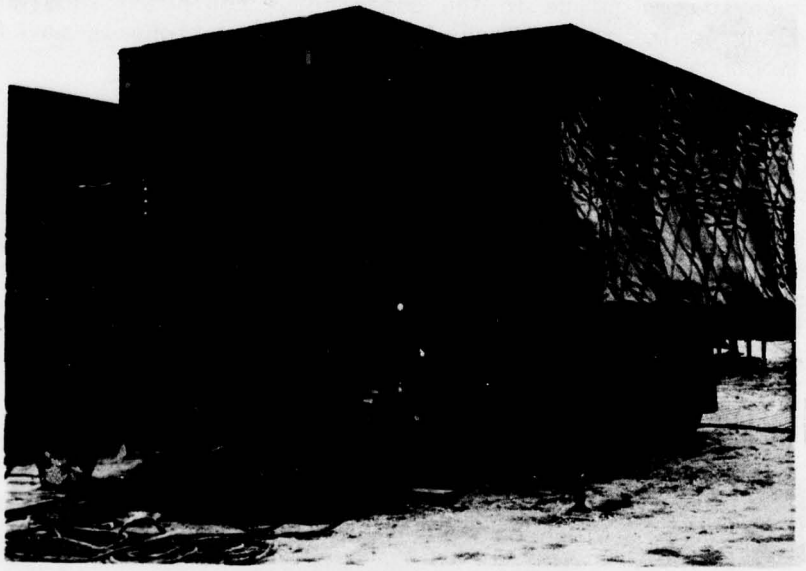

Figure I-2. M-447 Semitrailer Shop Van in Expanded Configuration

General

GENERAL DESCRIPTION OF ES/C

The ES/C is a multi-purpose horizontally expandable shelter used as a shipping container in its contracted position and expanded at the work site to provide an environmentally controlled working area.

General description (figure 1-3). The ES/C unfolds from a contracted configuration to an expanded shelter mode. The components that form the final expanded structure are hinged and folded into the center structure in such a manner that the unit may be expanded and contracted without removing whatever payload might be in the container. Equipment located in the expanded portion of the ES/C during normal operations is moved into the central portion when the ES/C is contracted.

Technical characteristics:

SIZE	HEIGHT	LENGTH	WIDTH
Contracted	8 ft	13 ft	8 ft
Expanded	8 ft	13 ft	21 ft, 5.2 in

Power Source - External commercial or generator power (5kw).

Facilities - Electrical outlets (10)
Ventilating Fans (2)
Lighting (6 fluorescent)
Built-in ducts for air conditioning and heating
Telephone wire receptical's (5)

Weight - Less payload 4000 pounds
With payload 12500 pounds, (maximum)

Floor - Capable of supporting 80 pounds per square foot

Roof - Capable of supporting 40 pounds per square foot snow load

Pneumatic Tool Air Supply - 5 CFM air compressor (Not a component of, and located external to, the ES/C)

Heater - 60,000 BTU (Not a component of, and located within, the ES/C)

Air Conditioner - 36,000 BTU (Not a component of, and located external to, the ES/C)

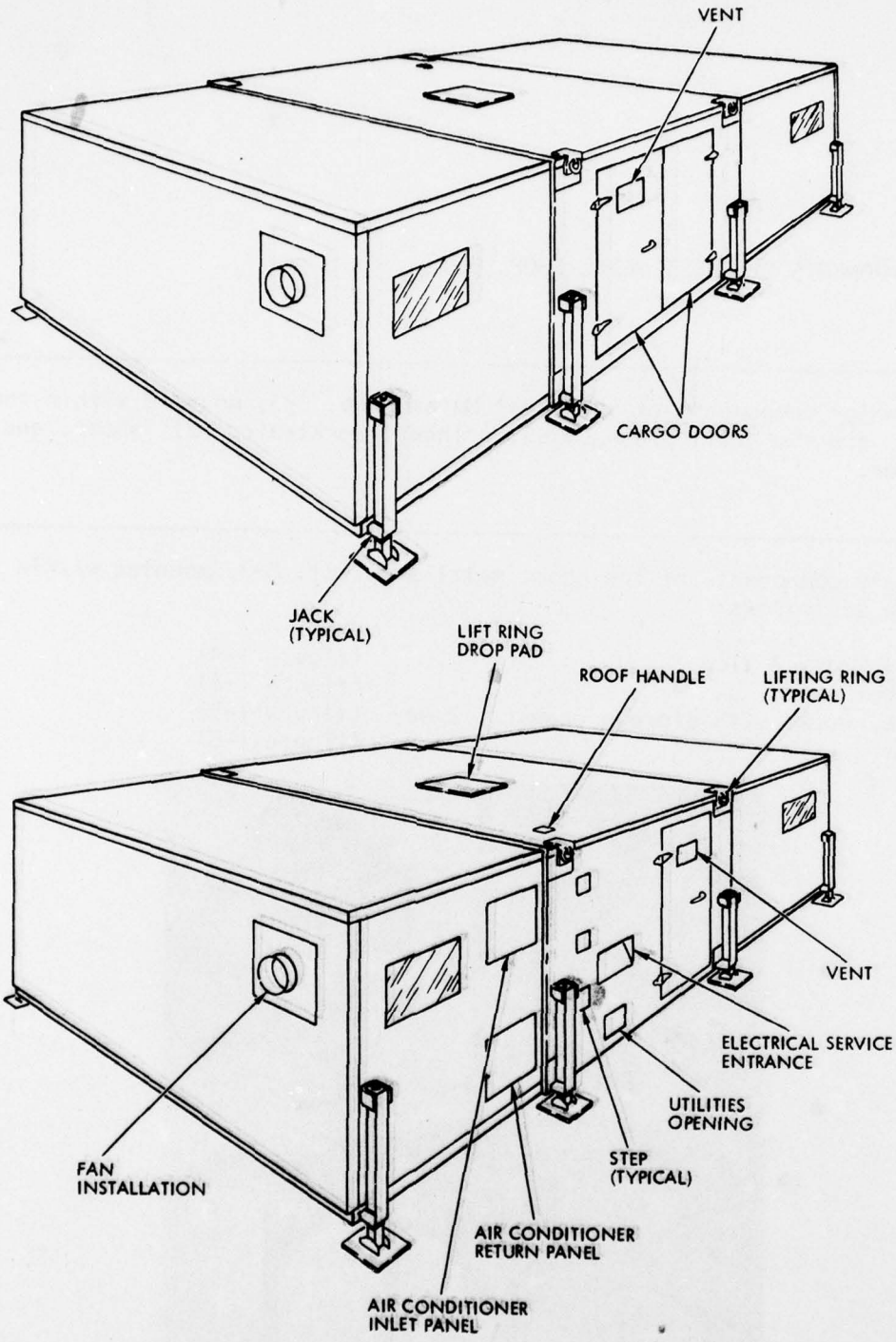

Figure 1-3. Line Drawing of ES/C

General

MAJOR COMPONENTS OF SHEET METAL SHOP, B-3

The major components of the Sheet Metal Shop, B-3, mounted within the ES/C, are the drill press, vise, grinder, worktables (2), shear, and bender.

The primary components of the sheet metal shop set, B-3, mounted within the ES/C, are as follows:

Drill Press & Vice	(figure 1-4)
Grinder	(figure 1-4)
Table, work, with storage drawers, 2 ea	(figure 1-5)
Shear	(figure 1-6)
Bender	

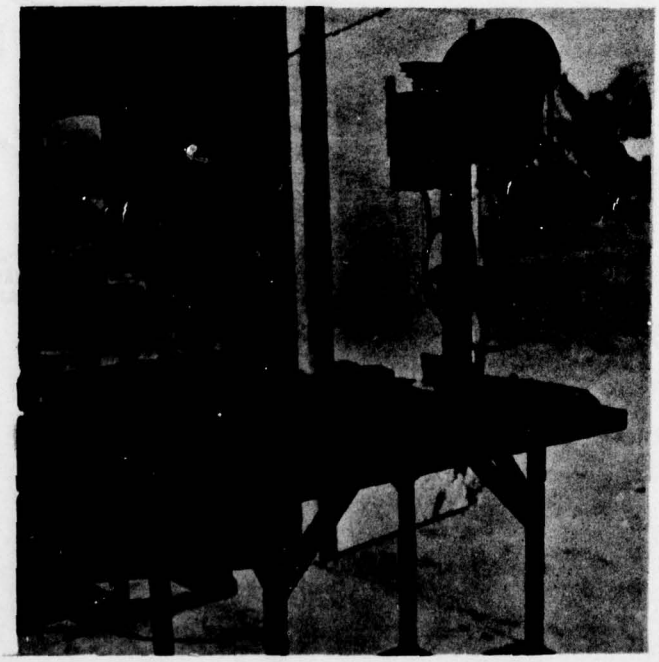

Figure 1-4. Drill Press, Vise, and Grinder

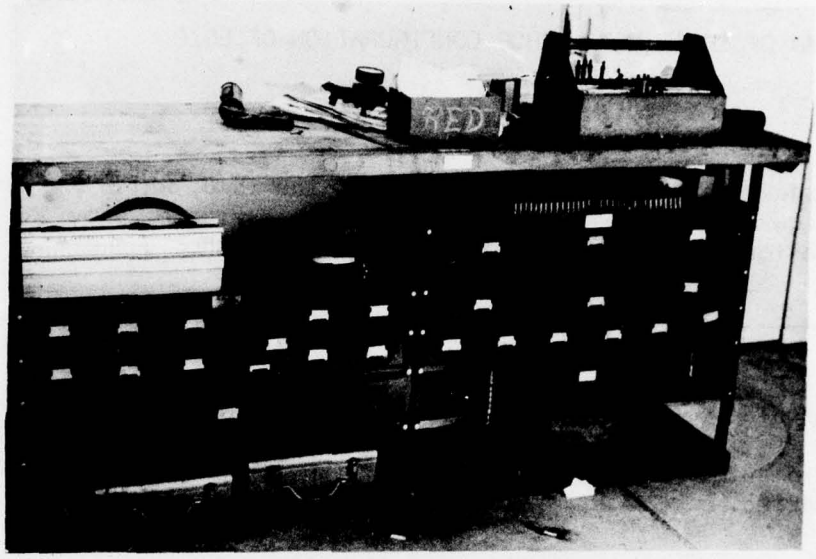

Figure 1-5. Work Table with Storage Compartments

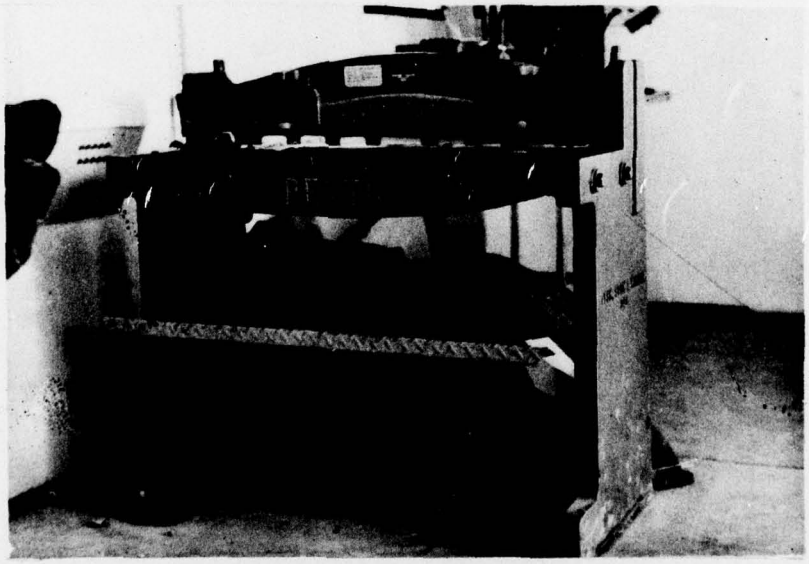

Figure 1-6. Shear

General

FLOOR PLAN OF SHEET METAL SHOP CONFIGURATION OF ES/C

The sheet metal shop configuration of the ES/C, which was the only configuration that MASSTER was tasked to evaluate, provides adequate space for the components of the sheet metal shop.

The floor plan for the ES/C in the expanded condition is illustrated in figure I-7. The dotted lines for the work table and bender indicate how this equipment is moved into the central portion of the ES/C when the unit is contracted.

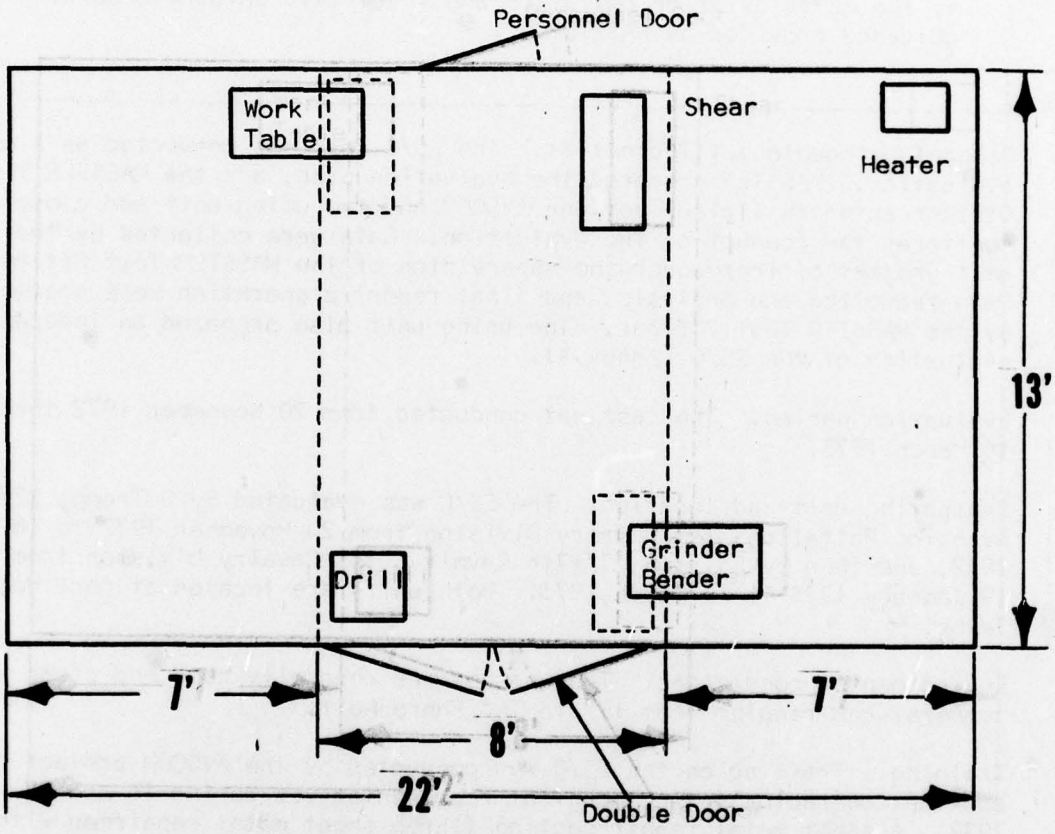

Figure 1-7. Expandable Shelter/Container Floor Plan

General

CONCEPT OF TEST

The ES/C Test was conducted at Fort Hood, Texas, as a user evaluation by the 227th Aviation Battalion and the 7/17th Cavalry according to guidance provided by MASSTER.

General methodology (figure I-8). The ES/C Test was conducted as a user evaluation. MASSTER prepared the evaluation plan, and the MASSTER Test Officer acted as liaison between AVSCOM and the using unit and closely monitored the conduct of the evaluation. Data were collected by the using unit project officer under the supervision of the MASSTER Test Officer. Data reduction and analysis, and final report preparation were accomplished by the MASSTER Test Officer. The using unit also prepared an independent evaluation of the ES/C (Annex A).

Evaluation period. The test was conducted from 20 November 1972 through 16 March 1973.

Evaluating unit and location. The ES/C was evaluated by D Troop, 227th Aviation Battalion, 1st Cavalry Division from 20 November 1972 to 18 January 1972, and then by E Troop, 7/17th Cavalry, 1st Cavalry Division from 19 January 1973 to 16 March 1973. Both units are located at Fort Hood, Texas.

Environmental conditions. The weather was generally cold and clear with temperatures ranging from 17° to 76° Fahrenheit.

Training. Training on the ES/C was conducted by the AVSCOM project officer and the contractor's two technical representatives during 16 and 17 November 1972. A sheet metal repair section (three sheet metal repairmen with MOS 68G and a staff sergeant E-6) from D Troop, 227th Aviation Battalion received instruction on the proper method to expand and level the ES/C, and install inserts, safety, and the evaluation plan. Personnel from the 7/17th Cavalry, also with a 68G MOS, were trained by the MASSTER Test Officer and received the same training as the 227th Aviation Battalion.

Maintenance. Maintenance of the ES/C was the responsibility of the using unit and the AVSCOM representative.

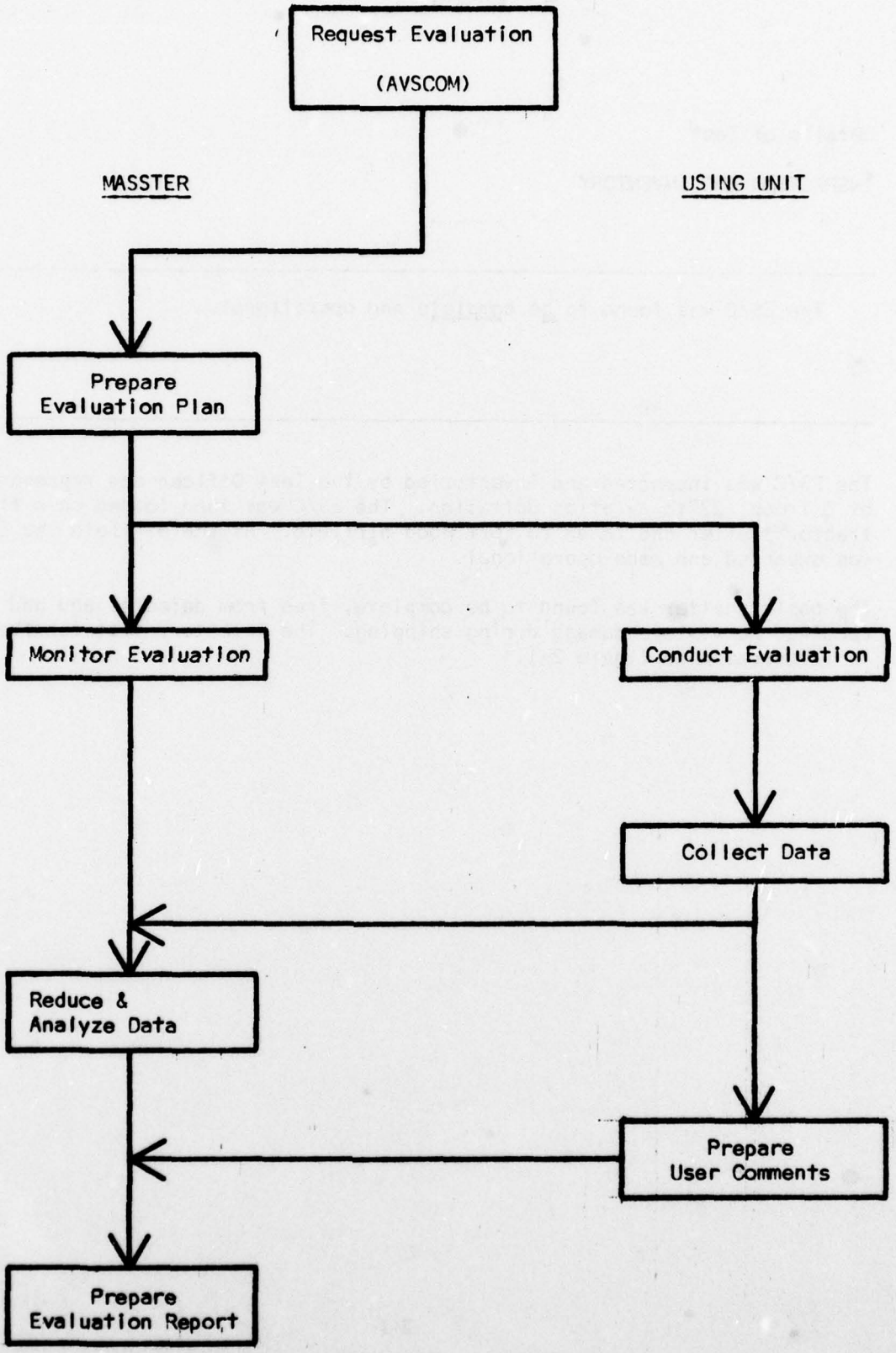

Figure 1-8. Evaluation Sequence

Details of Test

INSPECTION AND INVENTORY

The ES/C was found to be complete and operational.

The ES/C was inspected and inventoried by the Test Officer and representatives of D Troop, 227th Aviation Battalion. The ES/C was then loaded on a five ton tractor trailer and taken to Fort Hood airfield. At the airfield the ES/C was expanded and made operational.

The basic shelter was found to be complete, free from defects, and had received no visible damage during shipping. The inventory list for the ES/C is illustrated in figure 2-1.

ES/C SN 0508 consisting of:

4 COMPARTMENT PARTS BOX	1
TIE DOWN RINGS	15
3/16" CABLE CLAMPS	12
ARROWPOINT ANCHORS with CABLES	12
CORNER JACKS with WRENCHES	8
GROUND ROD	1
CONTROL PANEL	1
AIR CONDITIONER PANEL	2
AREA LIGHT FIXTURE with POWER CABLE	1
FLUORESCENT LIGHT FIXTURES	6
POWER OUTLET BOXES	12
SWITCH BOX	2
TABLE, WORK, TYPE I CLASS 2	2
FOOT SQUARING SHEAR PEXTO 137-L	1
BENCH TOP	1
TABLE BASE	1
METAL FRAME with WHEELS	2
HEATER, 60,000 BTU	1
AIR CONDITIONER, 208V, 3HP, 60-CYCLE AC, 36,000 BTU	1

Figure 2-1. Inventory List for ES/C

Details of Test

MOBILITY

The ES/C was successfully towed over various types of terrain while attached to the Dolly Set, M-829, and airlifted to an indicated speed of 70 knots by a CH-47 helicopter.

Ground Mobility.

The sheet metal shop components to include the heater with mount were moved to the center portion of the ES/C and secured (the air compressor, generator, and air conditioner were not transported); the ES/C was contracted; and the leveling jacks were removed (3 men-130 minutes). The dolly set brackets were then bolted onto the ES/C and the Dolly Set, M-829, attached (3 men-40 minutes). The dolly set wheels were hydraulically lowered, thereby raising the ES/C (2 men-5 minutes) (figure 2-2). The ES/C with Dolly Set, M-829, was then attached to a 2 1/2 ton truck by lowering the tongue of the dolly set onto the pintle hook of the truck (3 men-5 minutes) (figure 2-3). The total elapsed time for 3 men to prepare the ES/C for movement was 180 minutes.

The ES/C was towed over paved, dirt and gravel roads and cross-country using a 2 1/2 ton truck with no adverse effects. The maximum speed obtained driving over paved roads was 50 miles per hour. This was the maximum speed obtained only because of the posted 50 miles per hour speed limit. The ES/C was towed 28 miles over paved roads, four miles over dirt and gravel roads, and two miles cross-country. During the cross-country phase the ES/C was towed over 2 foot ruts at angles of 20°, 45°, and 90° at a speed of 0-5 miles per hour. The ES/C tipped a maximum of 10° from the vertical, and no problems were encountered. Analysis of results indicates that the ES/C mounted on the M-829 and towed by a 2 1/2 ton truck possesses ground mobility comparable to other 2 1/2 ton trucks towing trailers. The bed of the 2 1/2 ton truck must be utilized to haul personnel, air compressor, air conditioner, and generator as required.

For movement over long hauls or hilly terrain the ES/C must be towed by a 2 1/2 ton truck or a 5 ton truck. For short hauls within a work area the ES/C could be moved by a 1/4 or a 1 1/4 ton truck.

There was no damage to the ES/C or its components during movement.

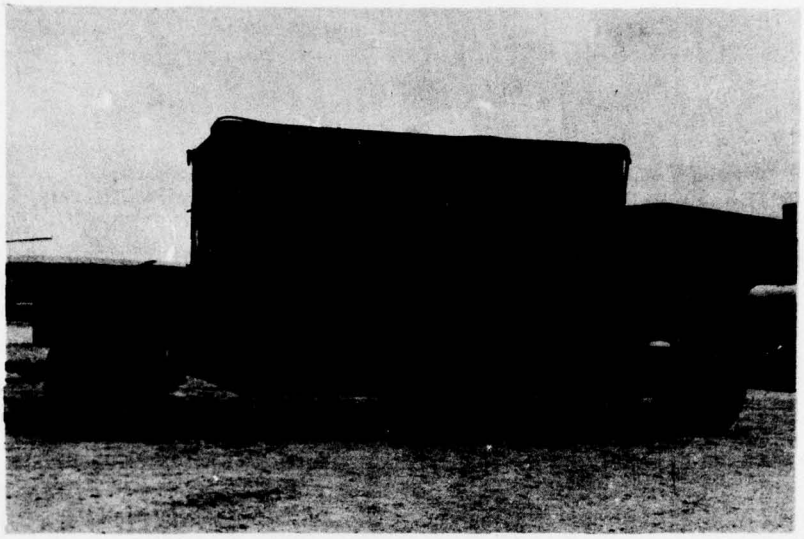

Figure 2-2. ES/C Mounted on Dolly Set, M-829

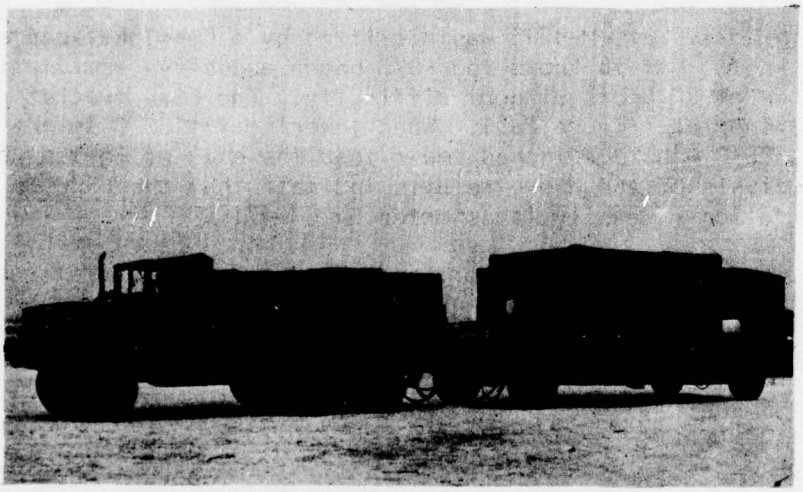

Figure 2-3. ES/C Mounted on Dolly Set, M-829
Being Pulled by 2 1/2 Ton Truck

Details of Test

MOBILITY

Air Mobility

The sheet metal shop components to include the heater with mount were moved to the center portion of the ES/C and secured (the air compressor, generator, and air conditioner were not airlifted); the ES/C was contracted; and the leveling jacks were removed (3 men-130 minutes). The dolly set brackets were then bolted onto the ES/C and the Dolly Set, M-829, attached (3 men-40 minutes). The dolly set wheels were hydraulically lowered, thereby raising the ES/C (2 men-5 minutes). The total elapsed time for 3 men to prepare the ES/C for movement was 175 minutes.

The ES/C was airlifted by a CH-47 helicopter. A multi-leg chain sling, twisted every three feet, was used in the airlift. The sling was attached to the lifting shackles of the ES/C. The ES/C was airlifted with the Dolly Set, M-829, attached. All pneumatic lines from the dolly set were tied down to the ES/C, and the tongue for the dolly set was secured in a vertical position. The approximate weight of the ES/C as airlifted was 9,000 pounds.

The ES/C was prepared for airlift by two qualified riggers in approximately 15 minutes (figure 2-4).

The ES/C with Dolly Set, M-829, was airlifted by a CH-47 helicopter to a speed of 75 knots. At 75 knots the ES/C began excessive oscillation. The ES/C was flown at 70 knots without difficulty. The ES/C tracked sideways when air transported (figure 2-5). When lowering the ES/C to the ground, the front of the ES/C was four inches lower than the back at initial ground contact. Analysis of the above results indicate that the ES/C in sheet metal shop configuration is easily transported by CH-47.

The air conditioner, air compressor, and generator are not internally mounted, therefore, they must be moved as an internal load aboard the helicopter or transported as a separate lift.

Figure 2-4. ES/C Being Hooked Onto CH-47 for Airlift

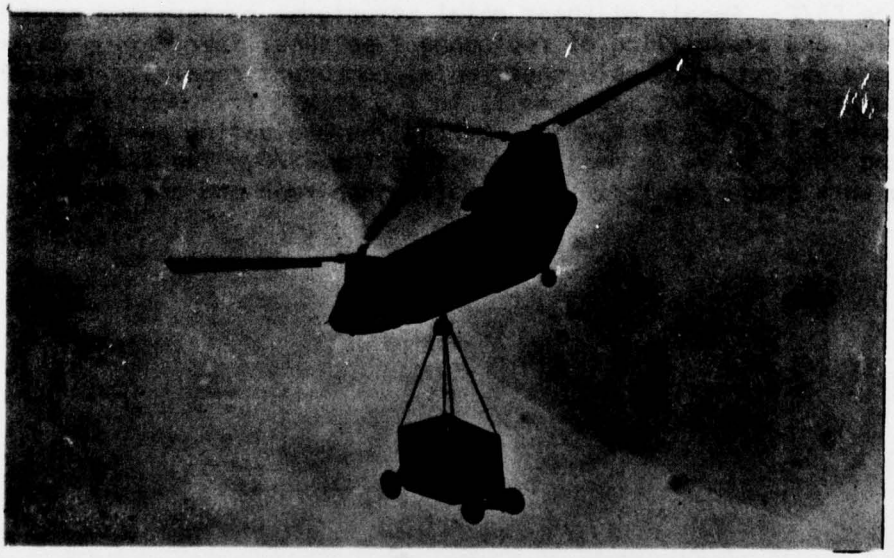

Figure 2-5. ES/C Being Airlifted by CH-47

Details of Test

FIELD UTILIZATION

The ES/C provided an effective working area for accomplishing sheet metal repairs.

The time required by the using unit using available personnel (four men) to expand and level the ES/C, attach the generator and air compressor, and make it ready for operation was approximately 80 minutes. It is likely that with experienced personnel this time could be reduced to 45-60 minutes. Personnel experienced little difficulty in expanding the ES/C and placing it into operation (figures 2-6 and 2-7).

The time required by the using unit using available personnel (three men) to contract the ES/C from an operational condition and tie down the equipment to be transported was approximately 135 minutes. Personnel experienced little difficulty in contracting the ES/C and preparing it for movement.

During the evaluation period (117 calendar days), the using units accomplished 23 sheet metal repairs within the ES/C. The following typical Integrated Direct Support Maintenance (IDSM) sheet metal maintenance tasks were performed within the ES/C: Repair of sheet metal structural members and sandwich panels, fabrication and predrilling of replacement patches, fabrication of replacement panels, and various removable sheet metal component repairs. The largest item repaired within the ES/C measured 12 in X 8 ft X 4 ft. Most items measured approximately 4 ft X 3 ft X 2 ft. During the evaluation period the unit had no job too large to be accomplished within the ES/C. The ES/C provided an adequate work space for three sheet metal repairmen and one supervisor.

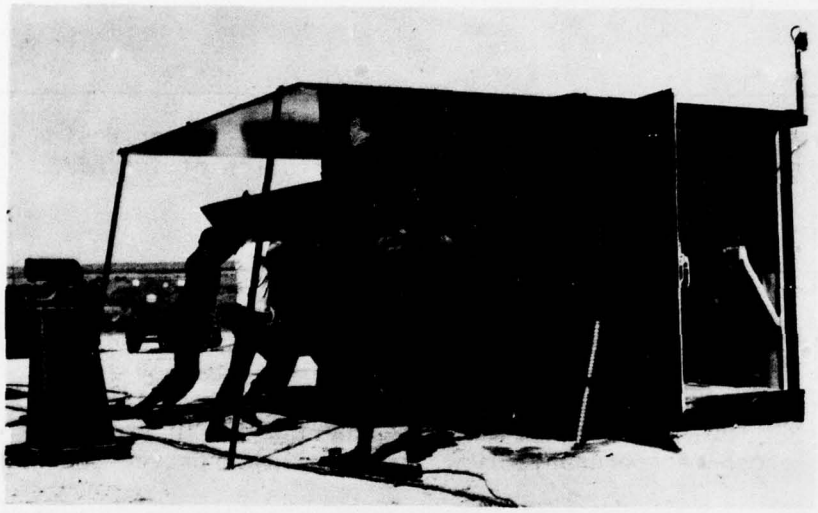

Figure 2-6. Expanding the ES/C

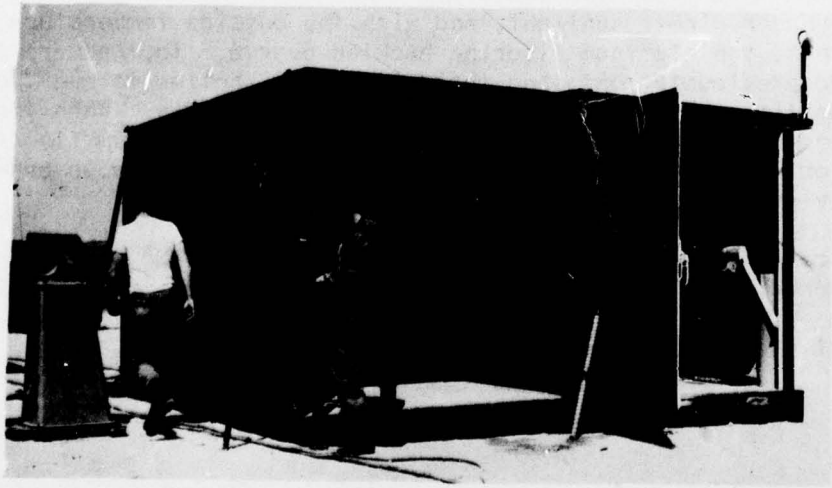

Figure 2-7. Expanding the ES/C

Details of Test

TRAINING, LOGISTICS AND HUMAN FACTORS ENGINEERING

Little training is required to use the ES/C. Minor design changes would improve the operational characteristics of the ES/C.

Training. All personnel received a 60 minute class on the ES/C. The 60 minute class consisted of 30 minutes devoted to the proper method to expand and level the ES/C, and 30 minutes on the proper method to install inserts into the wall and floor of the ES/C for the mounting of the shop set components. The training was conducted by the AVSCOM representative and a Goodyear Aerospace representative. This training proved adequate.

Lights. The six fluorescent ceiling lights and the one exterior 150 watt floodlight provided excellent illumination (figure 2-8).

Doors and windows. The doors were of adequate size, however, some trouble was experienced with condensation on the interior of the double pane windows. As a field expedient to alleviate this problem, two 1/4 inch holes were drilled, one in the top center and one in the bottom center of the inside window pane. The condensation evaporated within 3 hours.

Floor. Under direct sunlight, and with the outside temperature over 70° Fahrenheit, the aluminum flooring buckled over a 3 foot square area. The area had previously contained the drill press, bolted to the floor. The aluminum flooring buckled to a height of three inches. When the double doors were closed eliminating the direct sunlight, the aluminum flooring returned to its original position. Excessive wear and tear was also experienced on the vinyl-polyurethane laminated floor covering.

Communication and exterior electrical connections. No problems were encountered.

Blackout facilities. No problems were encountered.

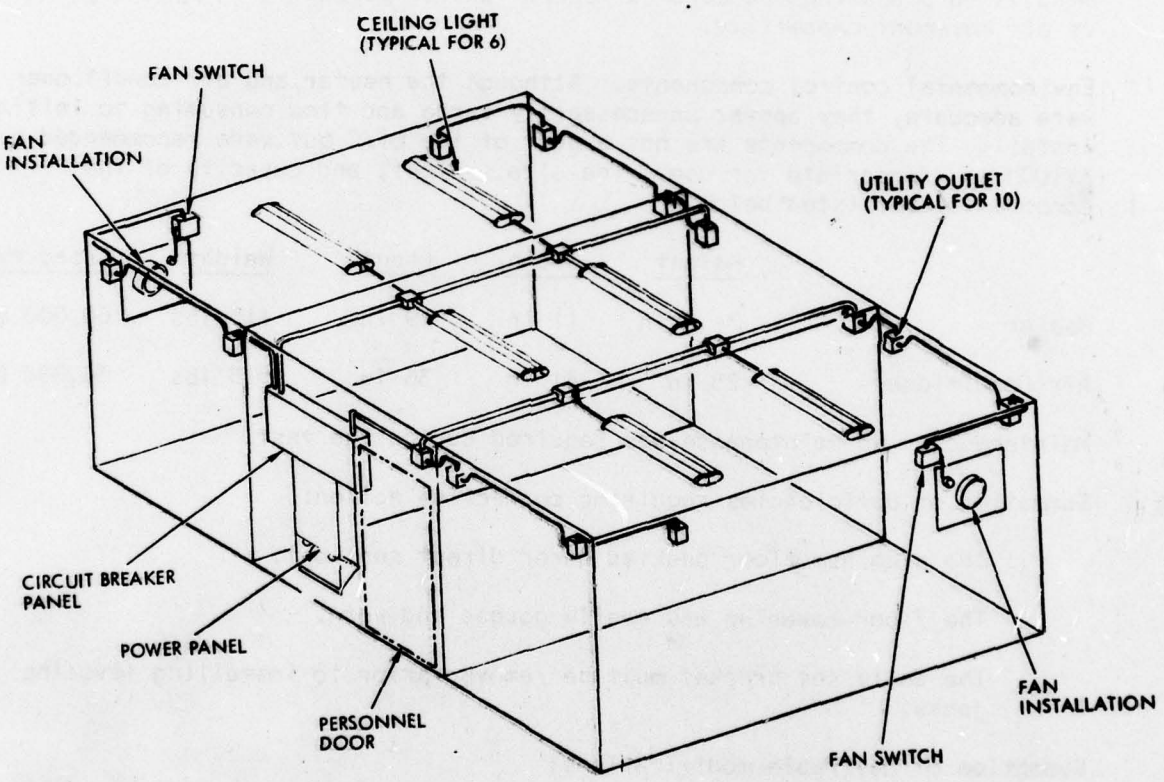

Figure 2-8. Lighting, Power, and Ventilation for ES/C

Details of Test

TRAINING, LOGISTICS AND HUMAN FACTORS ENGINEERING

Dolly set. The ES/C would better support the IDSM concept if the amount of time to prepare it for operations and movement could be reduced. Ten minutes of preparation time could be saved if the dolly set brackets could be left installed at all times. As currently designed the brackets must be removed to attach the leveling jacks which raise and level the ES/C. Further, it would be desirable if the ES/C could be leveled, expanded, and utilized with the entire dolly set attached to the ES/C. This would save approximately 40 minutes in preparing the ES/C for operations or movement, without degradation of air movement capability.

Environmental control components. Although the heater and air conditioner were adequate, they appear unnecessarily large and time consuming to initially install. The components are not a part of the ES/C but were recommended by AVSCOM as appropriate for use. The size, weight, and capacity of the components are listed below.

	Height	Width	Length	Weight	Capacity
Heater	21.2 in	11 in	29 in	115 lbs	60,000 BTU
Air Conditioner	28 in	41 in	36 in	515 lbs	36,000 BTU

Maintenance. No maintenance was required during the test.

Summation of deficiencies requiring corrective action:

- The aluminum floor buckled under direct sunlight.
- The floor covering was easily gouged and worn.
- The dolly set bracket must be removed prior to installing leveling jacks.

Summation of desirable modifications:

- The ES/C should be capable of operation with the dolly set attached.
- The environmental control components should be smaller and of less weight.

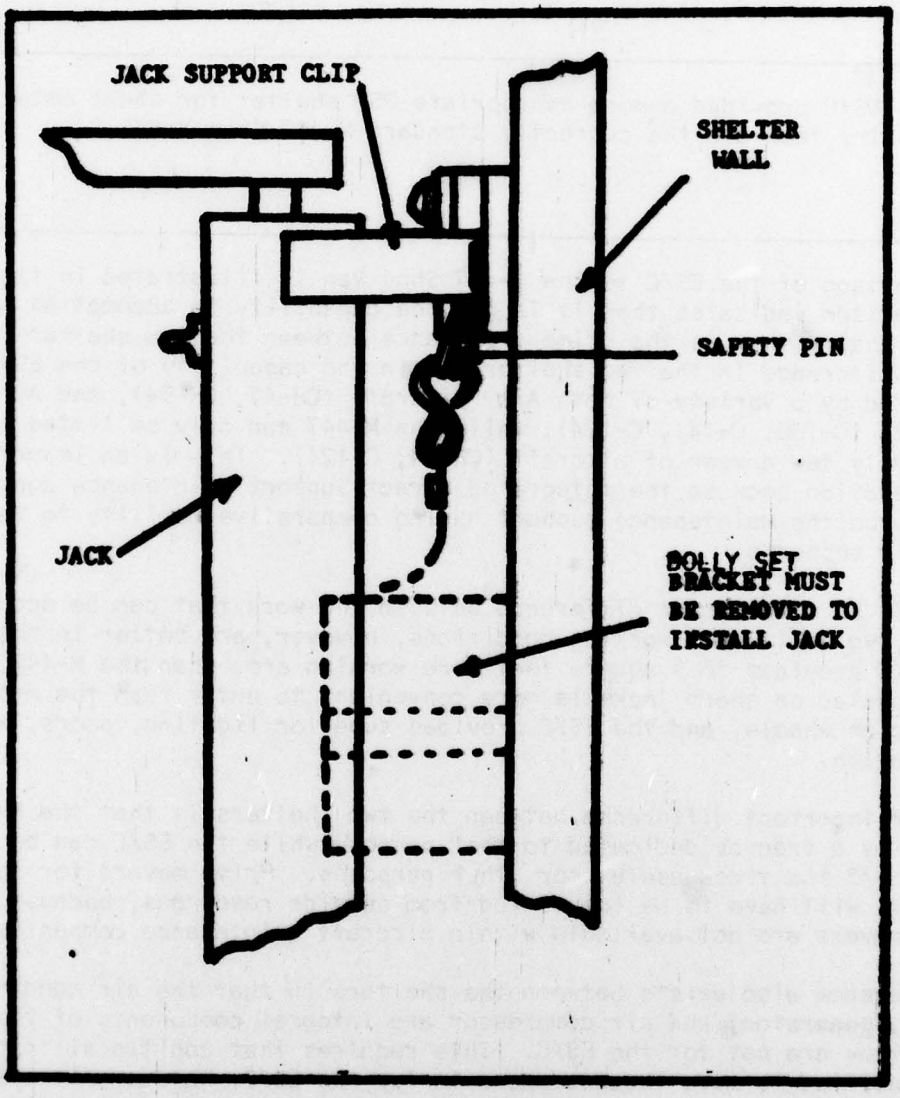

Figure 2-9. Dolly Set Bracket

Details of Test

COMPARATIVE ANALYSIS OF THE ES/C AND THE M-447 SHOP VAN

The ES/C provided a more appropriate DSM shelter for sheet metal repairs than did the currently standard M-447 Shop Van.

A comparison of the ES/C to the M-447 Shop Van is illustrated in figure 2-10. A comparison indicates that it is not the capability to accomplish sheet metal repairs that is the prime difference between the two shelters. The prime difference in the two shelters is in the capability of the ES/C to be airlifted by a variety of both Army aircraft (CH-47, CH-54), and Air Force aircraft (C-130, C-141, C-124), while the M-447 can only be lifted by a relatively few number of aircraft (CH-54, C-124). This is an important consideration because the integrated Direct Support Maintenance concept is based upon the maintenance support having comparative mobility to the unit which it supports.

There is no significant difference between the work that can be accomplished in the two shelters. Working conditions, however, are better in the ES/C. The ES/C provides 56.5 square feet more working area than the M-447. The ES/C located on short jacks is more convenient to enter than the M-447 located on wheels, and the ES/C provides superior lighting, doors, and ventilation.

Another important difference between the two shelters is that the M-447 is pulled by a tractor dedicated to that purpose while the ES/C can be pulled by a 2 1/2 ton truck useful for other purposes. Prime movers for the ES/C, however, will have to be identified from outside resources, because sufficient prime movers are not available within aircraft maintenance companies.

A difference also exists between the shelters in that the air conditioner, heater, generator, and air compressor are integral components of the M-447 while they are not for the ES/C. This requires that additional transportation be identified to move these components for the ES/C; however, it also allows the possibility of a centralized component supporting several ES/C.

The M-447, it should be noted, can be expanded and contracted in a shorter time frame than the ES/C, giving it a faster movement reaction time.

Description	ES/C	M-447 Semitrailer, Van Shop
Contracted Size	8'x8'x13'	8'x8'x16'
Expanded Size	8'x21.5'x13'	8'x14'x16'
Square Footage (Floor space)	279.5	224
Weight	4000 lbs (empty)	14,090 lbs (empty)
Windows	4	1 in rear door
Doors	1 single, 1 double	1 double
Lights	6 Fluorescent	10 Fluorescent
Electrical Outlets	10	6
Ventilation	2 Ventilating Fans	none
Air Conditioner	Not a component, mounted externally	Component, mounted internally
Heater	Not a component, mounted internally	Component, mounted internally
Generator	Not a component, mounted externally	Component, mounted externally
Air Compressor	Not a component, mounted externally	Component, mounted internally
Time to Prepare for Operations after Ground Movement	106 minutes	45 minutes
Personnel to Expand	4	4
Time to Contract & Prepare for Ground Movement	180 minutes	150 minutes
Personnel to Contract	3	4
Airlift Capability	CH-47, CH-54, C-130, C-141, C-124	CH-54, C-124
Prime Mover	Non-dedicated 2 1/2 ton truck	Dedicated tractor

Figure 2-10. Comparison of ES/C with the M-447 Shop Van

Considerations of Employment

DISCUSSION

The ES/C would be issued to aviation maintenance units as a replacement item for the M-447 Shop Van

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MASSTER was requested only to investigate the sheet metal shop configuration of the ES/C; however, it is apparent that all shop sets in a unit could, if desired, be mounted in similar shelters. Hence, the following comments pertain to all shop set configurations.

The DS or IDSM aviation unit (Annex B) has a need for a shelter/container which can easily be ground or air transported. The weight and size of the M-447 greatly curtails the aircraft which can by used to air transport the shop sets (CH-54, C-124). The ES/C can be air transported from a rear area, to the division area of operations by the use of a variety of Army and Air Force aircraft (CH-47, CH-54, C-130, C-141, C-124).

Once the ES/C has been airlifted to its destination, a 1/4, or 1 1/4 ton truck can be used to haul the ES/C a short distance to its future operational site. If the ES/C is to be transported a greater distance, or over hilly terrain, a vehicle with an external air brake connection (2 1/2 T, 5 T) must be utilized.

When moving the ES/C by ground or air, consideration must be given to the additional tranportation problem of moving the air compressor, generator, and air conditioner. These items could be placed in the bed of a 1 1/4 ton truck or larger. When airlifting the ES/C, a second airlift is required for the personnel, generator, air compressor, and air conditioner, or the components can be carried inside of the helicopters. The environmental control components should only be issued in geographical areas which have extreme ranges of temperature.

There are five shop sets in the aircraft DSM inventory (figure 3-1). These shop sets are located in the M-447 Shop Vans currently authorized by TOE to aircraft maintenance units. All division TOE's researched were the H series TOE. The DISCOM aircraft maintenance unit for the Infantry (TOE 29-15H), Armored (TOE 29-21H), and Mechanized (TOE 29-11H) Divisions, is the Aircraft Maintenance Company, Maintenance Battalion, Division Support Command. The maintenance unit for the Airmobile Division is the Transportation Aircraft Maintenance and Supply Company, Transportation Aircraft Maintenance and Supply Battalion, Division Support Command. In addition, divisional aviation battalions have an Aircraft Maintenance Company. The TOE distribution of shop sets among various units is illustrated in figure 3-2.

Based on the ES/C being slightly larger than the M-447 Shop Van, the ES/C could be issued on a one-for-one basis to replace the M-447 Shop Van; however, a limited investigation into the shop space currently available in the M-447 Shop Vans indicates that consideration should be given to providing two ES/C for shop sets B-2, B-3, and B-4.

The test officer had discussions with various commanders, staff, and maintenance personnel of aviation units located at Fort Hood concerning portable aircraft maintenance shelters. The consensus was that the ES/C was an appropriate type aircraft maintenance shelter and was probably superior to the M-447 Shop Van currently in use.

Shop Sets	Shelter
B-1 Flaw Detect Tool Crib	M-447 Shop Van
B-2 Elec Hydraulic	M-447 Shop Van & TLR
B-3 Sheet Metal & Welding	M-447 Shop Van
B-4 Mach and Eng	M-447 Shop Van
B-5 Prop and Rotor	M-447 Shop Van

Figure 3-1. Aircraft Maintenance Unit Shop Sets

	Infantry Division	Armored Division	Mechanized Division	Airmobile Division
Total Shop Sets for Maint Bn	5	5	5	20
Total Shop Sets for AVN Bn/GP	10	10	10	0
Total Shop Sets for Air Cav Sqdn	0	0	0	5

Figure 3-2. Number of Shop Sets per Divisional Aircraft Maintenance Unit

Conclusions and Recommendations

CONCLUSIONS

- The ES/C is compatible with the Direct Support (DS) and Integrated Direct Support Maintenance (IDSM) concept, has appropriate ground and air mobility, is of adequate size, and is therefore appropriate for integration into the division and nondivisional units as an aircraft sheet metal maintenance shop shelter.

- The tested ES/C required less maintenance than the M-447 Shop Van with its dedicated prime mover.

- With the exception of the deficiencies noted, there were no training, logistics, or human factors engineering problems encountered.

- To provide responsive ground movement, an on call prime mover for the ES/C will need to be identified.

- The ES/C is more suitable than the M-447 Shop Van for the DS sheet metal maintenance shop shelter.

- The ES/C requires an integral generator and air compressor, as does the M-447 Shop Van.

- The issue of the environmental control components for the ES/C should be left to the discretion of the theater commander.

RECOMMENDATIONS

- That deficiencies noted on page 2-11 be corrected.

- That further testing of the ES/C in various aircraft maintenance shop configurations be conducted.

- That appropriate modifications to the ES/C or Dolly Set be investigated that will allow the ES/C to be fully operational with the dolly set attached.

ANNEX A

COMMENTS OF TESTING UNIT

DEPARTMENT OF THE ARMY
E TROOP, 7TH SQUADRON, 17TH CAVALRY
1ST CAVALRY DIVISION
Fort Hood, Texas 76545

ALBAC-7/17CV-E 9 April 1973

SUBJECT: ES/C Test and Evaluation

Commander
Headquarters MASSTER
ATTN: MATERIAL TEST DIRECTORATE
Fort Hood, Texas 76545

1. E Troop 7/17th Cavalry performed an evaluation test of the Expandable Shop Container from 15 January 1973 to 30 March 1973. The ES/C gave E Troop a larger more well lighted sheet metal shop. The ES/C can easily be deployed with an Aircraft Maintenance Company/Troop.

2. The ES/C with allied support equipment provides capability for all types of sheet metal repairs. The ES/C was used for small repairs i.e. stinger covers and large repairs panels and doors. The ES/C proved to be an extremely valuable piece of equipment for a sheet metal workshop.

3. Recommendations:

a. The ES/C be considered for incorporation into TO&E 55-389T for E Troop 7th Sqdn, 17th Cavalry.

b. The ES/C when issued, should have a complete set of sheet metal supplies and necessary support equipment i.e. dollies, airconditioning, heater, air compressor, sheetmetal shear and rivet guns.

c. The floor be reworked to prevent separation of fiberglass surface from aluminum frame underneath. A tougher floor is needed to prevent gouging.

d. A better method of installing floor inserts. Screw inserts would be satisfactory.

e. ES/C be towed up moderate inclines @ 19 mph in 3rd gear or 27 mph in 4th gear.

f. The ES/C should not be backed more than 20 feet as the swiveling tongue makes backing difficult.

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3. Recommendations (Continued):

g. The floor hinges should be covered with flexible tape to prevent fouling by dirt and metal scrapes.

h. A built in level should be provided in the floor of the ES/C.

i. Airlift should be accomplished using a multi-leg chain leg sling 3 notches high on right hand corner. Recommended airspeed for sling-loading is 70 knots. Some oscillation was experienced at 75 knots along with a floating sensation. Winds for the airlift were: 360° @ 14 knots gusting 20 knots.

BRUCE R GARDNER
CPT TC
Commanding

ANNEX B

INTEGRATED DIRECT SUPPORT MAINTENANCE CONCEPT

Company sized aviation units normally will be organized with an integrated direct support capability and will be staffed and equipped to permit accomplishment of all maintenance functions associated with preventive maintenance inspections (i.e., daily, intermediate) and special inspection requirements. In addition to the maintenance tasks performed by aviation elements organic to brigade, group, and battalion headquarters which can be accomplished by the aircraft crew chief or aircraft repairman at organizational maintenance level, company sized units will be provided with the skills and tool capability to accomplish major modules (i.e., engines/transmissions) removal and replacement. Airframe maintenance functions will be limited to the inspection, cleaning, preserving, painting, adjusting, replacing, welding, riveting, and strengthening of airframe structural and new structural sheet metal parts, formers, and bulkheads where extensive disassembly, jigging, or alighment is not required. The capability to manufacture airframe parts will be limited to those items which can be fabricated with tools and equipment found in current airmobile tool or shop sets. (Assignment of maintenance tasks to divisional company sized units will consider the overall maintenance capability of the division and the requirement to conserve personnel and equipment resources where practicable.)

ANNEX C

DISTRIBUTION

C-1. Purpose. This annex contains the distribution for the Expandable Shelter/Container Evaluation Report, Test Number 136.

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ANNEX D

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Fort Hood, Texas 76544

13. ABSTRACT

The evaluation of the ES/C was conducted at Fort Hood from 20 November 1972 through 16 March 1973. The purpose of the evaluation was to evaluate the military usefulness of the ES/C as an aircraft sheet metal maintenance shop for DS and IDS maintenance of Army aircraft. The ES/C was found to be suitable for an aircraft sheet metal repair maintenance shop.

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14. KEY WORDS	LINK A		LINK B		LINK C	
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Aircraft						
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