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SERVICE NEWS



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Cover. This month's cover is a montage of two photographs one showing a Hercules HC-130H making a pick-up via the Fulton Recovery System and the other of a subject awaiting pickup. Photos courtesy of the USAF.

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Focal Point

Operators and maintenance crews of the Hercules need a reliable source of supplies which is available for quick and efficient delivery. Lockheed-Georgia recognizes this need, and is ready to tackle any supply problem our customers may have.

The responsibilities of the Customer Supply Division include providing spare parts, ground support equipment, technical data (including the illustrated parts catalog), kits, and associated administrative functions. These assure the customer of getting the right part at the right time.

A 24-hour telephone service is available to all Hercules customers to answer supply questions and insure that the requested item will be sent with the least possible delay.

Another service of Lockheed is a computer system which can determine the status of a customer's part on a particular order. Real-time data systems are used to track a part from the time it is placed on order until it is shipped to the customer.

In addition to the use of this sophisticated equipment, we provide each customer with his own supply administrator (a one-to-one relationship) to provide personal service and quick responses.

Another important phase of Customer Supply is our component repair capability. The overhaul, repair and calibration of aircraft components is an exacting business requiring highly trained and experienced personnel, specialized test equipment, and rigorous control procedures. We provide Hercules operators with repair service for a variety of avionic, hydraulic and mechanical items. The level of repair service ranges from minor component replacement to major overhaul. For more information on our component repair service, contact your individual supply administrator.

The inside back cover of this issue of Service News provides information on our emergency and "drop-in" repair services. If I or anyone in this division can help you with a supply problem, please do not hesitate to ask.

Support of our products is of tremendous importance to us at Lockheed. Even though Customer Supply is only one area of support given the customer, the same dedication applies throughout the Lockheed organization.

Sincerely,

M. M. Hodnett, Manager
Customer Supply Division

PRODUCT SUPPORT

LOCKHEED GEORGIA COMPANY,
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KEEP A TIGHT SHIP!

by: D. J. Lipscomb, *Senior Material
& Processes Engineer*

R. W. Nazarowski, *Senior Structures
Design Engineer*

Air leaks around aircraft doors, hatches, and clear vision windshields are fairly common due to the repeated use of these structures. The air leaks are usually considered to be nuisances, but not necessarily problems unless the leakage affects cabin pressurization. But recently much of this has changed. Energy shortages and escalating fuel costs have added a new urgency to the effort to minimize drag and conserve fuel. And air pressure leakage is an important source of drag.

Leaking seals and/or misrigged doors which permit cabin air to escape into the airstream increase aircraft drag significantly. Many commercial cargo carriers estimate that each one percent of drag increases fuel consumption by one percent.

Flight Hours per Year	800	1100	563
Gallons of Fuel per Flight Hour	600	2000	3384
Fuel Cost per Gallon	40¢	40¢	40¢
Annual Savings on Fuel Costs (with 1% reduction in fuel usage)	\$1,440.00	\$8,800.00	\$7,821.00

Figure 1 Estimated annual fuel savings resulting from a 1% reduction in drag.

The cumulative effect of such seal inefficiency and resulting drag can be surprising when viewed in terms of annual fuel usage (Figure 1). The savings reflected by Figure 1 are really quite conservative. Commercial cargo carriers report that extremely “dirty” airplanes, such as those with gross air leaks or misfaired structure, can suffer drag increases of up to six percent over baseline configurations.

The areas of an aircraft most sensitive to drag are the nacelles, the forward fuselage, and the leading edge sections of wings and tail. While the causes of drag are numerous and elusive, one of the most common is air leakage, and this can be corrected by proper sealing.

SERVICE LIFE

Hercules seals have proven to be very rugged and reliable in service under world-wide climatic conditions.

They must of course be maintained with periodic cleanings, and removal of debris that could cause FOD (Foreign Object Damage). Routine checks of door rigging are also required to assure proper operation and long life. Too little compression of the rubber seal will usually result in excessive air leakage around the opening, while too much compression of the seal significantly reduces seal life.

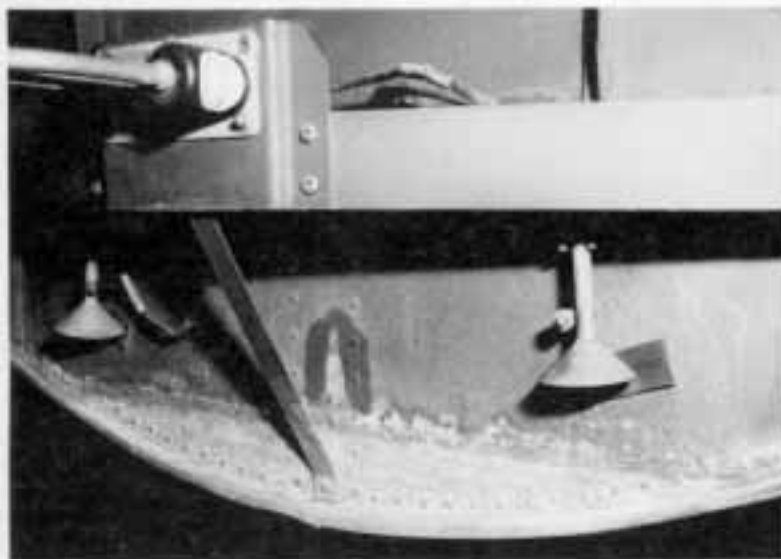
CLEANING

The first rule to remember in repairing seals and sealants is cleanliness. Sealants and adhesives will not adhere to a dirty surface. Also, if door seals are allowed to remain in prolonged contact with a contaminant such as hydraulic fluid, the seal will become soft and swollen. In this condition, seals are most easily damaged and can blow out under pressure. Fortunately, most C-130 seals are not permanently degraded by brief contact with hydraulic oil. They can be restored to their original condition if fluid spills are properly cleaned from the surface and dirt and foreign matter are removed.

In order to maintain rubber seals in their best condition, the “two rag” system of cleaning is recommended. Use clean, dry, cotton wiping rags (Figure 2, Item 1) and either aliphatic naphtha solvent (Item 2) or trichloroethane (Item 3) as the cleaning fluid. Moisten one rag with the solvent and wipe the seal clean, then wipe the seal dry immediately with a second rag. Repeat the operation as many times as necessary. Do not allow the solvent to evaporate on the seal. The structural surfaces which mate with the seals (seal strikers) must also be cleaned at the same time as the seals, using the same technique.

Apply talc, soapstone or fluorocarbon powder (Item 12) to the seal in the areas that have been cleaned.

Window left: Corrosion in the radome area due to improper sealing. *Right:* BL 0.0 flapper valves should be checked and cleaned whenever the floor panel is removed.



ITEM NO.	DESCRIPTION		VENDOR	SPECIFICATIONS AND NATIONAL STOCK NUMBER	RECOMMENDED USE
	Maternal	Commercial			
1	Cotton Rags	—	Various Vendors	DDD-R-30. Grade A	Cleaning
2	Solvent	Naptha	Various Vendors	TT-N-95, Type II	Cleaning Seals
3	Solvent	Trichloroethane	Various Vendors	0 T-620. Type I	Cleaning Seals
4	Solvent	Dry Cleaning	Various Vendors	P-D 680, Type I	Cleaning Windshields
5	Dacron Fabric	D-2000	Mohawk Mills Amsterdam, NY	Commercial	Reinforcement
6	Dacron Fabric	D 117	Mohawk Mills Amsterdam, NY	Commercial	Reinforcement
7	Rubber Coated Nylon Cloth		Reeves. Vulcan New York, NY	MIL-C-20696, Type I, Class 3	Reinforcement
8	Silicone Adheswe 1 Part RTV	No. RTV 157 Alternate No. RTV 154	General Electric Waterford, MA	Commercial Alternate Commercial or NSN 8040-00-181-8380	Repair/Splicing of Silicone Rubber
9	Silicone Adheswe 2 Part RTV	No. 93 076 1/2	Dow Corning Midland, MI	Commercial NSN 8030-00-043-1726	Repair/Splicing of Silicone Rubber
10	Chloroprene Adhesive	No A-68-6	B. F. Goodrich Akron, OH	Commercial NSN 8040-01-016-5354	Repair/Splicing of Chloroprene Rubber
11	Silicone sponge Core	LS33763-1	Purosil Corporation Hadbar Division Alhambra, CA	Commercial	Internal support
12	Fluorocarbon Powder	—	Various Vendors	MI L L 60326	Anti-Stick Coating
13	Polysulfide Sealant	—	Various Vendors	MIL S 8802. Class B-1/2 NSN 8030-753 5004	Sealing Windshields
14	Petrolatum	Vaseline	Various Vendors	VV-P-236 NSN 9150-00-250-0926	Release Agent
15	Silicone Compound	DC 4	Dow Corning Midland, MI	MIL-S 8660 NSN 6850-00-880 7616	Release Agent

Figure 2

CLEANING AND REPAIR MATERIALS FOR SEALS

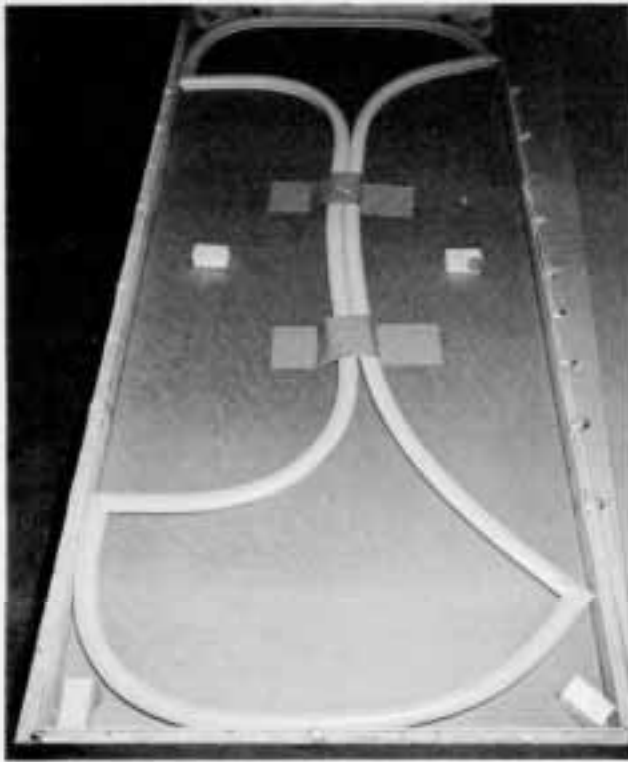
Cleaning the rubber flapper seals over the drain openings in the lower pressure skin at or near butt line (BL) 0.0 should be accomplished any time the center cargo floor panels are removed for access. Damaged or deteriorated flappers should be replaced in accordance with the procedures described in the applicable manuals.

CARE AND HANDLING OF DOOR SEALS

Despite their rugged appearance, uninstalled door seals are easily damaged. They must be given proper care and handling during storage, removal, and installation if they are to perform satisfactorily. The following are a few helpful hints for proper storage and handling of seals:

- . Seals can become deformed as a result of poor storage. Be sure to provide proper support for those assemblies on the bottom of the stack. Without proper support, those on bottom could be crushed.
- . Permanent deformation can easily result from hanging seals over nails or pegs.
- . Keep seals in their original closed containers until installation. Proper packaging will prevent contamination of the seals which is caused by leaking fluids, dirt, etc.





Notice the stand-off blocks which prevent deformation of the seal if other material is stacked on top.

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- Although pressure door seal assemblies are not controlled by limited calendar life requirements, they should nevertheless be stocked and issued on a first-in, first-out basis.
- Use correct tools for removing and installing door seals. Tools can be made from any plastic or wood that is soft enough and suitably shaped so as to not puncture or damage the seal. Wooden tongue depressors work well for installing bulb seals into retainers, as do flat wooden ice cream spoons.

ADHESIVES

Limitations and Selection

The type adhesive used is just as important as how it is used. It is imperative that silicone rubber seals be repaired or spliced with silicone adhesive; likewise chloroprene adhesives should be used with chloroprene seals.

Silicone adhesive (Item 8) is used when your schedule permits a 48-hour cure cycle. Water-moistened cloths may be placed on the silicone adhesive (Item 8) to further reduce the cure cycle. For faster or emergency repairs of silicone seals only, the two-part silicone adhesive (Item 9) may be used instead of the one-part silicone adhesive (Item 8). Chloroprene seals require the use of chloroprene

adhesive (Item 10) only. The application of heat on chloroprene adhesive (Item 10) with appropriate vulcanizing tools will greatly reduce the cure time.

Application of Adhesive

Here is some useful information concerning the applications of adhesives. Take special note of the cautions and warnings; safety should always be your first consideration.

Silicone adhesive (Item 8) is a one-component material which is ready for application as received. Do not thin the adhesive with water or any other solvent.

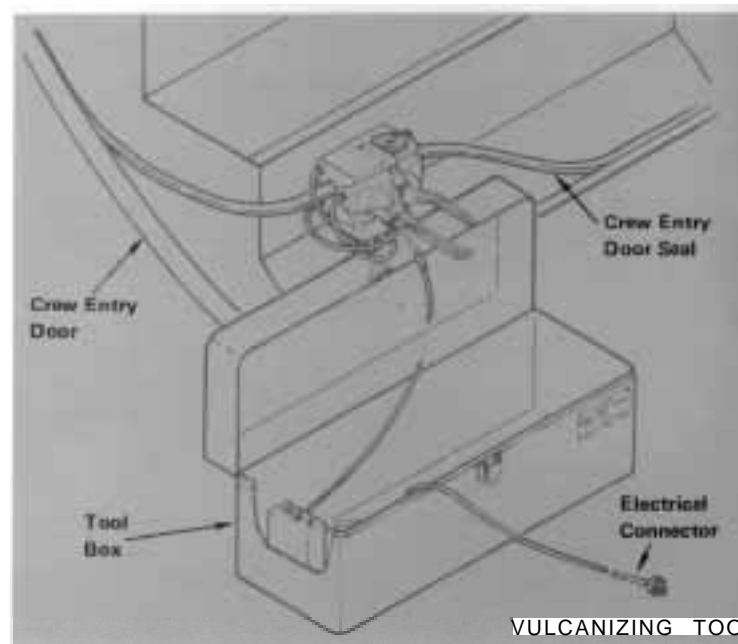
CAUTION: Do not apply heat to this adhesive. It will only slow the cure time.

Another silicone adhesive (Item 9) is a two-part system which consists of a base and a catalyst. Thoroughly mix the adhesive with one part catalyst to 10 parts base by weight. Do not allow air bubbles to form while hand mixing the base and catalyst.

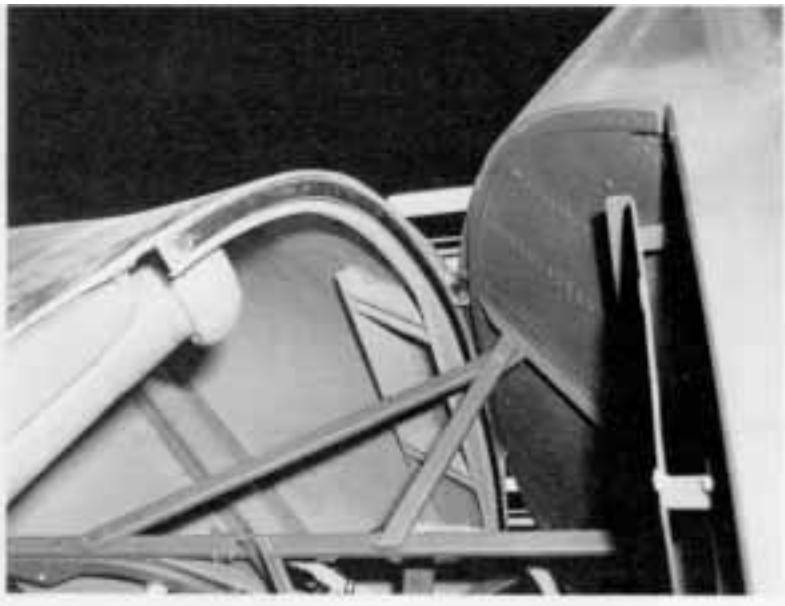
WARNING

The catalyst for this adhesive (Item 9) is dibutyl tin dilaurate. Avoid contact of the catalyst with skin and eyes.

Chloroprene adhesive (Item 10) is a two-part adhesive system, consisting of a base and an accelerator. The adhesive should be thoroughly mixed by adding one part accelerator to 40 parts base by volume. The adhesive can be cured at room temperature or with elevated temperatures and suitable vulcanizing tools.



VULCANIZING TOOL



Good seals are vital in keeping water and debris from entering the radome.

SEAL IDENTIFICATION

Figure 6 (page 11) shows cross-sectional dimensions of Lockheed Standard seals used on C-130 aircraft. Figure 7 (page 12) lists the seal assemblies used for sealing pressure and access openings on Hercules series aircraft by name, part number, material, Lockheed Standard number (if applicable) and aircraft serialization. Refer to this chart to identify those seals which can be repaired by vulcanization.

SEAL REPAIR

There are two main types of pressure seals, flapper and bulb types (Figure 3), and both types are affected by three principal categories of damage.

The method used for seal damage repair depends on the category of seal damage. The following describes the proper method for each.

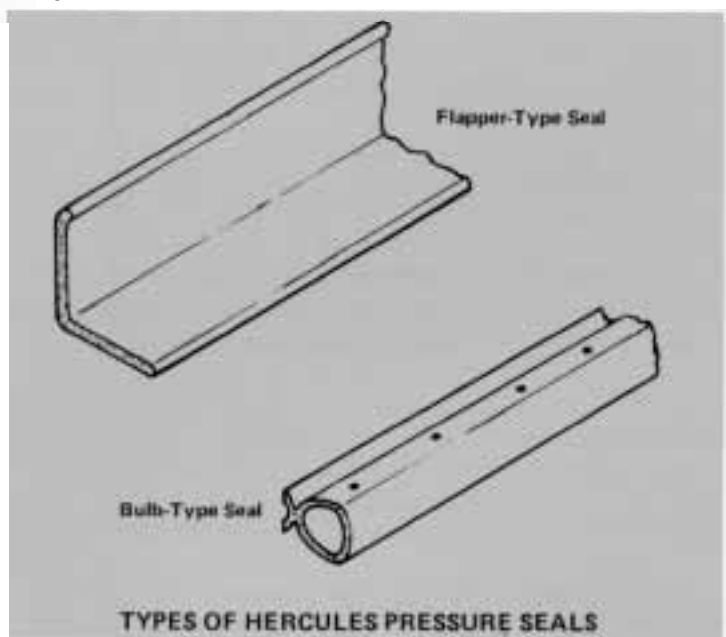
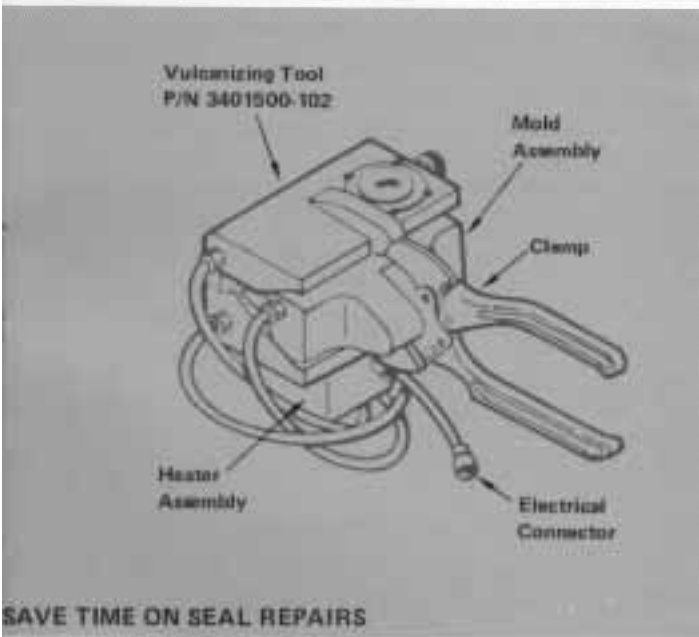
Category I

Category I damage is described as cuts or abrasions which are less than two inches in length, less than 0.125 inch wide, and do not extend through the seal wall.

- a. To repair Category I damage, first remove the injured portion of the seal, leaving some extra length on each side of the damaged area to provide working space. Do not remove the entire seal unless it is necessary for access.

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Figure 3



The seal (1) above the ramp actuator is an example of a flapper-type seal, and the pressure door seal (2) is an example of a bulb-type seal.



- b. Clean the cut or abraded area of the seal with solvent, as previously instructed.
- c. Apply sufficient adhesive, catalyzed when required, to completely fill the cut or abrasion.
- d. Fair the adhesive smoothly over the damaged and adjacent area. Overlap the adjacent areas by 0.50 inch with a thickness of approximately 0.010 to 0.016 inch.
- e. Allow the repair to cure for the minimum time before compressing or deflecting the seal.
- f. Reinstall the repaired seal. Pressurize the aircraft in accordance with applicable manuals and examine the seal for leaks.

- h. Reinstall repaired seal as required. Pressurize the aircraft in accordance with applicable manuals and examine the seal for leaks.

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Category II

Category II damage refers to cuts or abrasions that are less than two inches in length and less than 0.125 inch in width, but do penetrate the seal wall. For Category II seal damage, steps a-c are the same as for Category I.

- d. Apply a continuous coat of the appropriate adhesive to the area around the seal periphery. The adhesive coating should be approximately 0.010 inch thick, and extend one inch on either side of the damaged area.
- e. Place one wrap of Dacron fabric (Item 6 or 7) around the seal extending one inch on either side of the damaged area. Overlap the fabric on itself, approximately 0.25 inch on the base or attaching leg of the seal. Dacron fabric (Item 6) may be used for wrapping both silicone and chloroprene seals. A rubber-coated nylon cloth (Item 7) is used for wrapping chloroprene seals only.
- f. Coat the fabric with one coat of the correct adhesive approximately 0.005 inch thick. Fair the adhesive smoothly over the fabric wrap and the adjacent area, then overlap onto the adjacent areas by 0.50 inch with a thickness of approximately 0.010 to 0.016 inch.
- g. Allow the repair to cure for the minimum time applicable before compressing or deflecting the seal.

Category III

Category III procedures are a little different than Categories I and II. Category III includes any damage greater than that listed under Categories I and II. This classification is also applied in cases where part of the seal shows so many small defects that complete removal and replacement of the damaged section is required in order to restore sealing integrity.

SPLICING

Using a sharp knife, remove the damaged segment of the seal by making a smooth butt cut on each side of the damaged area. Then cut a replacement segment from a seal of the same type, cutting carefully so that the butted ends fit evenly.

Clean the ends of the cut and replacement segment thoroughly with solvent. Be sure that the cleaned area extends at least three inches back from the ends. The segment is now ready for splicing.

Napper-Type Seals -For proper splicing, apply the correct adhesive in a continuous coating approximately 0.010 of an inch thick to each seal butt joint, and to the area extending one inch on either side of the butt joint.

NOTE: Do not allow the adhesive to remain on any surfaces or to cause the seal to adhere to the surface on which it is mounted.

At this time, fit the ends together. Ordinary staples may be used to hold the mating ends together, as shown in Figure 4. It is not necessary to remove the staples, since they will not affect the seal's performance.

Next, place one wrap of Dacron fabric (Item 6) around the outside of the seal over the spliced joint, extending it one inch on either side of the joint. Overlap the fabric on itself approximately 0.25 inch on the base or attaching leg of the seal.

After you have completed this step, rub the fabric into the adhesive using a paddle. Smooth the fabric out on the seal so that no wrinkles are present, especially in the seal area. When the fabric is completely rubbed into the adhesive, smooth the excess adhesive which has squeezed through the fabric. Apply small amounts of additional adhesive as required to eliminate any dry spots in the fabric.

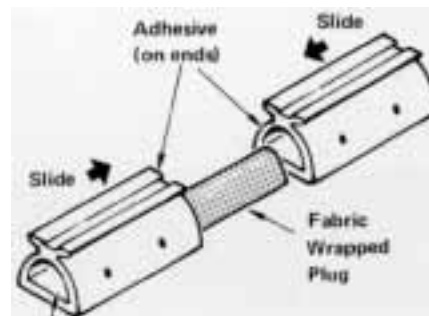
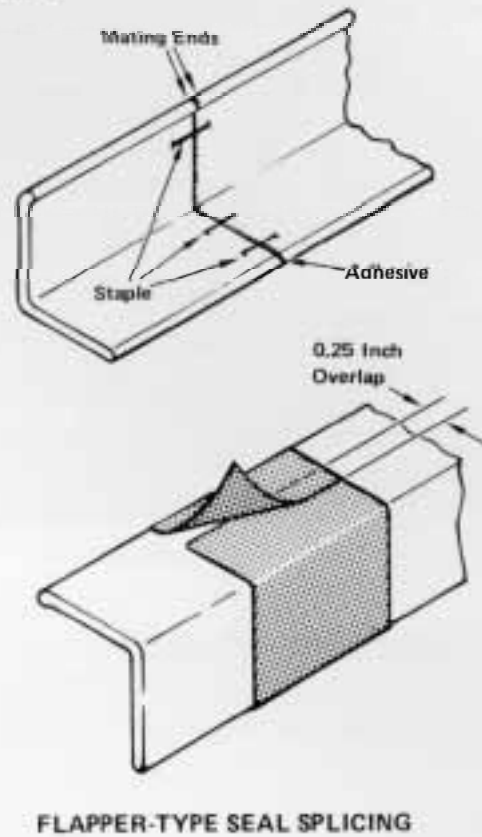
Now, allow the seal repair to cure for the minimum time specified for the adhesive used, Reinstall the repaired seal as required. Pressurize the aircraft in accordance with applicable manuals and examine for leaks.

Bulb-Type Seals-Bulb-type seal splicing is a different procedure requiring the use of different materials than the flapper-type seal. Begin by cutting a three-inch length of silicone sponge plug (Item 11) to fit one and one half inches inside the seal. The adhesive coating needs to be approximately 0.010 to 0.016 of an inch thick.

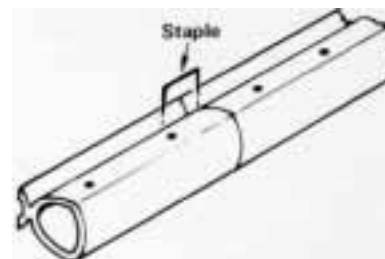
NOTE: Poor adhesion between chloroprene adhesive (Item 10) and the silicone sponge plug has no effect on final joint strength of chloroprene fabric (Item 5 or 7) around the sponge plug. Overlap the fabric on itself approximately 0.25 inch. Insert the fabric-wrapped plug into the butting seal ends and slide the ends together. Center the plug and fit the ends together carefully. Here also, staples may be used to keep the seal in place. (See Figure 4 for proper location).

Next, be sure that all seal inflation holes are facing the same way before the splice is completed. The adhesive squeezed out between the butted seal ends should be smoothed so that the seal joints are as flat and smooth as possible. Allow the repair to cure the minimum time. Reinstall the repaired seal as required. Pressurize the aircraft in accordance with applicable manuals and examine for leaks.

Figure 4



Adhesive (inside bulb for length of plug)



BULB-TYPE SEAL SPLICING



The clear vision window uses a cast-in-place seal.

CLEAR VISION WINDSHIELD PANELS

Clear vision windshield panels are also examples of frequently used openings which may require special attention to the seals.

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For detailed instructions about removing, replacing and repairing the seals on the clear vision windshields, commercial users can refer to procedures of SMP 581, temporary revision 564 dated 28 September 1977. Military users will find further information in T. O. IC-130A-3.

The clear vision windshields on both the military and commercial versions of the Hercules utilize formed-in-place seals which are applied on the interior side of the structure where they mate with the clear vision windshield. This formed-in-place seal acts as a pressure and moisture seal on commercial Hercules, and a moisture seal on military C-130s. Pressure sealing on clear vision windshields for military C-130s is accomplished with a chloroprene seal, P/N 339359.

Formed-in-Place Seal Repair

Minor repairs to the formed-in-place seal for the clear vision windshields on any Hercules can be accomplished with the following procedure:

1. Remove the damaged portion of the formed-in-place seal using a sharpened phenolic scraper. Clean the area thoroughly using clean rags (Figure 2, Item 1) and solvent (Item 4) or the equivalent. Wipe surfaces dry using additional clean, dry rags.
2. Apply a thin film of petrolatum (Item 14) or silicone grease (Item 15) to the contacting surface on the clear vision windshield to serve as a parting agent.

3. Mix sealant (Item 14) according to manufacturer's instructions (SEMKITS preferred).
4. Apply sufficient sealant to the damaged area of the formed-in-place seal to completely fill all voids and form a continuous flat surface when the clear vision windshield is closed.

5. Close the clear vision windshield and remove excess sealant that squeezes out. Please note that a uniform brush coat of sealant applied over the formed-in-place seal is usually sufficient to correct any water leakage occurring through the seal when no-damage is apparent.

NOTE : Steps 3, 4, and 5 must be completed within one half hour.

6. Set aside a small amount of the unused sealant to facilitate determining when the tack-free condition occurs.

7. Leave the clear vision windshield closed until a tack-free condition of the sealant is achieved. Usually, ten hours at a minimum of 77 (+/-2) degrees F and 50 (+/-15) percent relative humidity is required. The presence of tack-free condition is best determined by applying a piece of polyethylene film to the surface of the sealant sample set aside in Step 6.

The sealant is considered tack-free when sealant will no longer adhere to the film.

NOTE : The ten-hour tack-free cure time is based on a temperature of 77 (+/-2) degrees F. Cure time is approximately doubled for each 15 degrees F reduction in temperature from these conditions. Conversely, cure time is reduced by half for each 15 degrees F increase in temperature. Do not exceed 140 degrees F when using additional heat to accelerate sealant curing. For other adhesive cure cycles please refer to Figure 5.

Figure 5 ADHESIVE CURE CYCLES

ADHESIVE Item Number from Figure 21	APPLICATION TIME	TACK.FREE TIME	CURE TIME A
8	25 Minutes	1 Hour	48 Hours 8 Hours
9	30 Minutes	1 Hour	24 Hours 2 Hours
10	1 Hour	8 Hours	168 Hours 45 Minutes

At standard conditions of 77 (+/-2)°F and 50 (+/-15) percent relative humidity unless otherwise noted.

Application of water-moistened cloths over applied adhesive will reduce cure time of thicknesses up to 1/8-inch to 8 hours.

Application of 300°F heat to applied adhesive will reduce cure time to 2 hours.

Application of 300°F heat with vulcanizing molds reduces cure time to 45 minutes.

8. Open the windshield and remove the parting agent from all contacting surfaces.
9. Trim away all sealant flash not previously removed.
10. Check the formed-in-place seal for smoothness and continuity. Repairs that are not smooth and flat should be reworked by repeating Steps 1 through 9 above.

DOOR RIGGING

As we mentioned earlier, fuselage pressurization losses may also be attributed to improper rigging of one or more of the numerous doors and openings on the Hercules.

Most doors on this aircraft are fitted with bulb-type seals and seal strikers. Although these seals are configured with small holes on the pressure side of the seal to facilitate seal inflation by cabin air pressure, misrigging of the doors

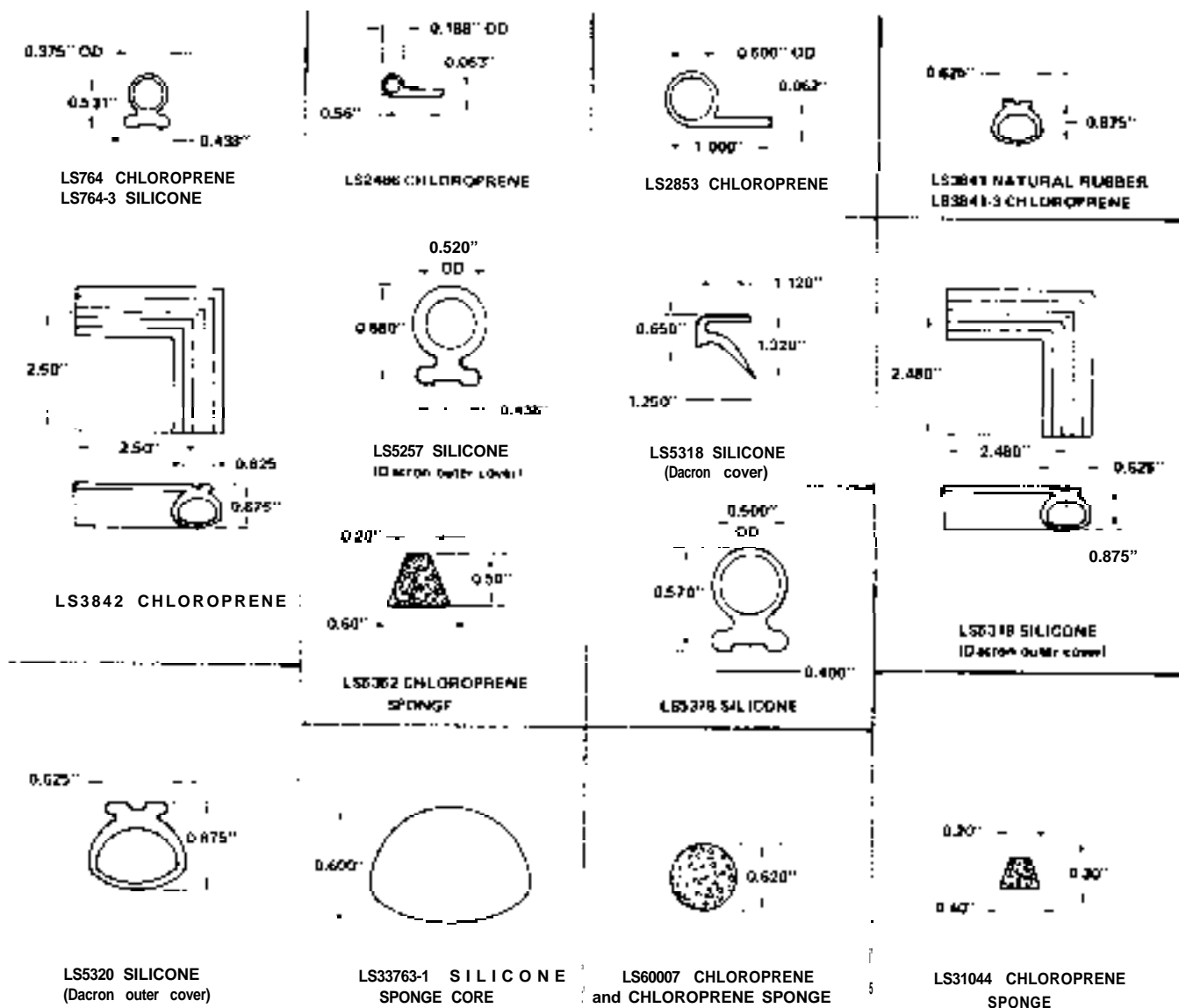
could prevent the initial contact of the seal and its striker. This contact is imperative for proper seal inflation.

All doors and openings are fitted with adjustable serrated plates, adjustable links, and/or shims to allow for a proper fit between the doors and their openings. Bulb seals should be depressed in a minimum 0.10 inch by the seal striker to provide proper seal contact. For further information on rigging, the January-March 1977 (V4N1) issue of the *ServiceNews* contains a comprehensive article on cargo ramp rigging.

There are obviously many places on an airplane where air leaks can occur. We have discussed only a few of the most frequently used seals which are apt to allow air leakage. Air leaks are also not the only cause of drag, but reducing the air leaks by proper sealing has been shown to be a proven, worthwhile energy saver. *











Figure 6

CROSS SECTIONS OF HERCULES SEALS



SEALS FOR THE HERCULES

Figure 7

NAME/LOCATION	FUNCTION	PART NUMBER	LOCKHEED STANDARD PART NO.		TYPE	MATERIAL	USED ON LOCKHEED SHIP SERIAL	RECOMMENDED VULCANIZING TOOL 
			Extrusion	Corner or Filler				
Nose Radome (Upper)	Environmental	354008-21	-	-	Flat	0.12 Chloroprene Sponge	3028-3169	-
Nose Radome (Upper)	Environmental	354008-30	-	-	Flat	0.25 Chloroprene Sponge	3170-3500	-
Nose Radome (Upper)	Environmental	354009-41	-	-	Flat	0.15 Chloroprene Sponge	3028-3169	-
Nose Radome (Upper)	Environmental	354009-48	LS31044-1	-	Square	Chloroprene Sponge	3170-3500	-
Nose Radome (Upper)	Environmental	375514-4/7	LS3841-3	LS60007-1	Sponge Filled Bulb	Chloroprene and Chloroprene Sponge	3501 and Up	3401500-102 (3841-3 only)
Nose Radome (Upper)	Environmental	375514-6	LS5352	-	Square	Chloroprene Sponge	3501 and Up	-
Fwd NLG Door (Side)	Environmental	338766-7	LS764-3	-	Bulb	Silicone	3001 and Up	-
Fwd NLG Door (Aft)	Environmental	338766-9	LS764-3	-	Bulb	Silicone	3001-3016	-
Fwd NLG Door (Aft)	Environmental	338766-11	LS764	-	Bulb	Chloroprene	3016 and Up	-
Fwd NLG Door (Fwd)	Environmental	338978-24	LS764-3	-	Bulb	Silicone	3001-3027	-
Fwd NLG Door (Fwd)	Environmental	354009-24	LS764-3	-	Bulb	Silicone	3028 and Up	-
Aft NLG Door (Side)	Environmental	337659-21 337659-22	LS764-3	-	Bulb	Silicone	3001 and Up	-
Aft NLG Door (Aft)	Environmental	337668-57	LS764-3	-	Bulb	Silicone	3001-3015	-
Aft NLG Door (Center)	Environmental	339262-3	LS764-3	-	Bulb	Silicone	3001-3015	-
Aft NLG Door (Fwd)	Environmental	339262-16	LS764-3	-	Bulb	Silicone	3001-3015	-
NLG Inspection Door	Environmental and Pressure	350972	-	-	Tubular	Chloroprene	3001 and Up	-
NLG Inspection Window	Environmental and Pressure	388098-33	-	-	Flat	Chloroprene	3831 and Up	-
NLG Access Panel	Environmental and Pressure	388098-59	-	-	Flat	Chloroprene	4223 and Up	-
Pressure Diaphragm Access	Environmental and Pressure	389280	-	-	Tubular	Chloroprene	3001 and Up	-
Oxygen Filler Box	Environmental	388429-5	-	-	Tubular	Chloroprene Tubing	3609 and Up	-
Clear Vision Windshield	Environmental and Pressure	339359	-	-	Flat	Chloroprene	3001 and Up 	-
Crew Door	Environmental and Pressure	355656-1	LS3841-3	LS3842-3	Bulb	Chloroprene	3001-3500	3401500-102
Crew Door	Environmental and Pressure	373972-1	LS5320	LS5319	Bulb 	Silicone 	3501 and Up	3501500-102
Side Cargo Door	Environmental and Pressure	355658-1	LS3841-3	LS3842-3	Bulb	Chloroprene	3001-3521	3401500-102
Side Cargo Door	Environmental and Pressure	404933-1	LS5320	LS5319	Bulb 	Silicone	3522-3729 	-
Overhead Emergency Exit (Fwd)	Environmental	342279-15 	LS2853	-	Bulb	Chloroprene	3001-3504	-
Overhead Emergency Exit (Fwd)	Pressure	355657-1	LS3841-3	-	Bulb	Chloroprene	3001 and Up	3401500-102
Overhead Emergency Exit (Fwd)	Environmental	375940-1	LS2853	-	Bulb	Chloroprene	3505 and Up	-
Overhead Emergency Exit (Center)	Environmental	352280-12 	LS2853	-	Bulb	Chloroprene	3001-3159	-
Overhead Emergency Exit (Center)	Pressure	355657-1	LS3841-3	-	Bulb	Chloroprene	3001 and Up	3401500-102
Overhead Emergency Exit (Center)	Environmental	361937-22 	LS2853	-	Bulb	Chloroprene	3160-3504	-
Overhead Emergency Exit (Center)	Environmental	375940-1	LS2853	-	Bulb	Chloroprene	3505 and Up	-
Overhead Emergency Exit (Aft)	Environmental	342281-12 	LS2853	-	Bulb	Chloroprene	3001-3504	-
Overhead Emergency Exit	Pressure	355657-1	LS3841-3	-	Bulb	Chloroprene	3001 and Up	3401500-102

Overhead Emergency Exit (Aft)	Environmental	375940-1	LS2853		Bulb	Chloroprene	3500 and Up	--
Emergency Depressurization Door	Environmental	361933-7	--	--	Flat	0.125 Chloroprene	3160 and Up	--
Emergency Depressurization Door	Pressure	361946-1 ¹	LS3841	--	Bulb	Natural Rubber	3160-4190	3401500-102
Emergency Depressurization Door	Pressure	361946-3	LS5320	--	Bulb	Silicone ³	4191 and Up	3401500-102
Side Emergency Exit	Environmental and Pressure	355655-1	LS3841-3	LS3842-3	Bulb	Chloroprene	3001 and Up	3401500-102
MLG Access Door (Upper)	Environmental and Pressure	342105-4	--	--	Flat	0.093 Chloroprene Sponge	3001-3500	--
MLG Access Door (Upper)	Environmental and Pressure	373010-3	--	--	Flat	0.093 Chloroprene Sponge	3501-3609	--
MLG Access Door (Upper)	Environmental and Pressure	380083-3	--	--	Flat	0.187 Chloroprene Sponge	3609 and Up	--
MLG Inspection Window	Environmental and Pressure	355088-3	--	--	Flat	0.093 Chloroprene	3001-3500	--
MLG Inspection Window	Environmental and Pressure	372340-1	--	--	Tubular	Chloroprene	3501 and Up	--
MLG Door (Outbd-Fwd)	Environmental	338742-14L/R	LS764-3	--	Bulb	Silicone	3001 and Up	--
MLG Door (Outbd-Lower)	Environmental	338736-19	LS764-3	--	Bulb	Silicone ³	3001-3149	--
MLG Door (Outbd-Lower)	Environmental	338736-64	LS5257	--	Bulb	Silicone ³	3150-3500	--
MLG Door (Outbd-Lower)	Environmental	372522-19	LS5378	--	Bulb	Silicone ³	3501 and Up	--
MLG Door (Outbd-Aft)	Environmental	340194-40	LS764-3	--	Bulb	Silicone	3001 and Up	--
MLG Door (Inbd-Fwd)	Environmental	338742-14L/R	LS764-3	--	Bulb	Silicone	3001 and Up	--
MLG Door (Inbd-Aft)	Environmental	340194-41 340194-42 340194-43	LS764-3	--	Bulb	Silicone	3001 and Up	--
Air Deflector Door (Lower)	Environmental	338738-10	LS764	--	Bulb	Chloroprene	3001 and Up	--
Air Deflector Door (Aft)	Environmental	338738-17	LS764	--	Bulb	Chloroprene	3001 and Up	--
Air Deflector Door (Upper)	Environmental	338782-30	LS2466	--	Bulb	Chloroprene	3001 and Up	--
Air Deflector Door (Fwd)	Environmental	340194-41 340194-42 340194-43	LS764-3	--	Bulb	Silicone	3001 and Up	--
Aft Side Entry Door	Environmental and Pressure	355654-1	LS3841-3	--	Bulb	Chloroprene	3001-3537	3401500-102
Aft Side Entry Door	Environmental and Pressure	404934-1	LS5320	--	Bulb	Silicone ³	3538 and Up	3401500-102
Aft Cargo Door	Environmental and Pressure	355653-1	LS3841-3	LS3842	Bulb	Chloroprene	3001-3500	3401500-102
Aft Cargo Door	Environmental and Pressure	404937-1	LS5320	LS5319	Bulb	Silicone ³	3501 and Up	3401500-102
Cargo Ramp	Environmental and Pressure	355652-1	LS5320	LS5319	Bulb	Silicone ³	3001-3500	3401500-102
Cargo Ramp	Environmental and Pressure	375232-7	LS5318	--	Flapper	Silicone ³	3501 and Up	3401500-103
Under Floor Drain Valve	Pressure	358252-1	--	--	Flat	0.063 Chloroprene	3001-4374	--
Under Floor Drain Valve	Pressure	358252-1	--	--	Flat	0.063 Fluorosilicone	4375 and Up	--

- ¹ Thermostatically controlled vulcanizing tools suitable for either 110 or 220 volt operation are available from Lockheed as AGE equipment under the part number noted.
- ² Except commercial aircraft, which use a cast-in-place type seal.
- ³ Fabric-covered.

- ⁴ Mitered vulcanized corners may be used in lieu of corner sections.
- ⁵ Aircraft prior to 3729 had side cargo doors. Most have now been sealed closed in compliance with T.O. 1C-130-702.
- ⁶ Seal P/N 375940-1 may be used to replace this seal.
- ⁷ Seal P/N 361946-3 may be used to replace this seal.

ARRS

Often one hears of a mountain climber being rescued or survivors of an air crash being found and saved. One fact that usually is not mentioned is who is responsible for the rescue. One group particularly well known in the rescue field is the Aerospace Rescue and Recovery Service (ARRS), which is an organization within the United States Air Force. They have been responsible for saving 17,500 lives, both military and civilian, since their formation on 13 March 1946, then known as the Air Recovery Service (ARS). The name was changed to Aerospace Rescue and Recovery Service in January of 1966.

The primary equipment used by the ARRS for rescue and recovery operations are helicopters and Lockheed Hercules aircraft. The Air Recovery Service received their first Hercules in 1965.



This particular Hercules is one of the first HC-130Hs delivered to the USAF for rescue purposes.





Above: Flight history was made on December 14, 1966 when the first inflight refueling of a helicopter was made from a fixed-wing aircraft. Left: The refueling capabilities of the Hercules helped open the way for new rescue possibilities.

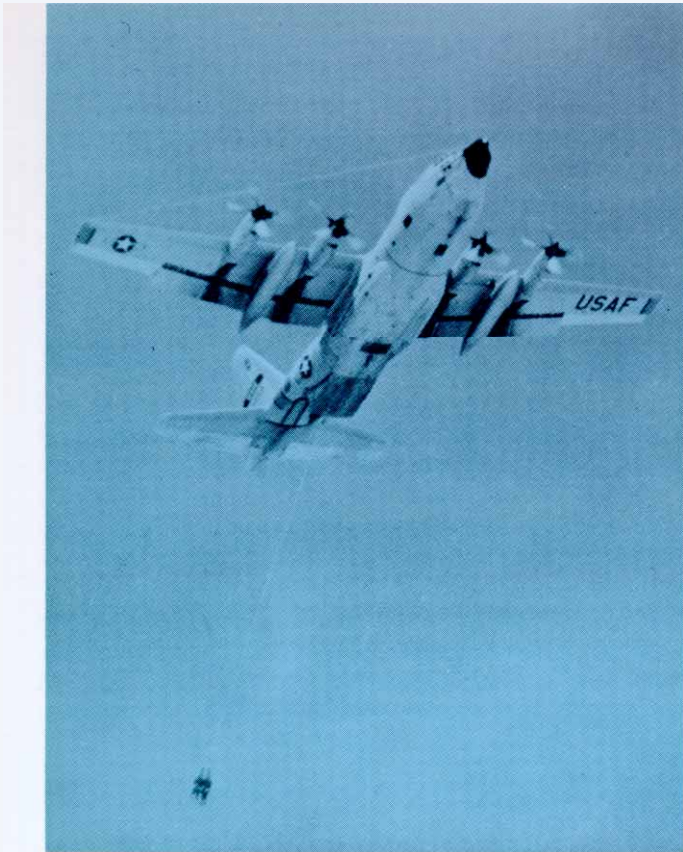
The HC-130s used by the ARRS are especially modified for the purpose of search and recovery missions. The HC-130P and HC-130N are tanker versions of the Hercules. These tankers are capable of carrying 5000 pounds of transferable fuel for 1800 nautical miles, refueling a helicopter, and then returning to the original departure point. On 14 December 1966 aviation history was made when an ARRS HC-130 became the first aircraft to refuel a helicopter in flight. This was a major step in increasing the capabilities of the ARRS.

The efforts and successes of the ARRS are almost limitless. Their missions have included combat rescue and recovery, humanitarian efforts, search and rescue, hurricane evacuation, space program support, missile site support, weather reconnaissance, and atmospheric sampling.

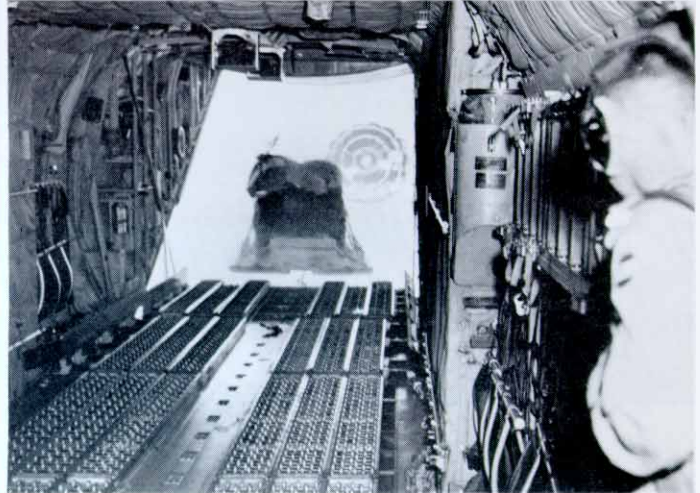
The ARRS consists of approximately 3,600 men and women who operate from 46 bases located around the world. Facilities for search and rescue, and weather reconnaissance operations are strategically located to meet any

The Hercules dropping supplies and recovery equipment.





Left: One of the unique aspects of the Hercules is its ability to rescue personnel, by the use of the Fulton Recovery System, without landing. Below: Supplies being extracted by parachute from the cargo compartment of a Hercules.



civil or military requirement. These operations are directed from ARRS headquarters at Scott Air Force Base (AFB), Illinois, through two wings: the 39th Aerospace Rescue and Recovery Wing, Eglin AFB, Florida, and the 41st Rescue and Weather Reconnaissance Wing (RWRW), McClellan AFB, California. The ARRS also operates several overseas search and rescue coordination centers: one at Ramstein Air Base, Germany, another at Albrook AFS, Canal Zone, and still another is located at Hickam AFB, Hawaii. Additionally the ARRS serves as intermediate command for four Air Force Reserve Squadrons and two Air National Guard Aerospace Rescue and Recovery Groups.

EMERGENCY RESCUES

Combat Rescue and Recovery The primary mission of ARRS is combat rescue. The command was credited with saving 996 lives during the Korean War and 2,759 during the war in Southeast Asia.

Humanitarians A corollary mission of the Aerospace Rescue and Recovery Service is to provide assistance to civilians in distress. This support comes in a variety of forms including search and rescue missions, and transporting food, clothing, and medical supplies to flood or earthquake victims.

Search and Rescue – Lost hunters, critically ill seamen, civilian pilots, wandering children, and injured mountain climbers are frequent subjects of search and rescue missions within the continental United States.

Hurricane Evacuation Rapid and orderly evacuation of military aircraft in the path of a hurricane is another ARRS responsibility. The ARRS prepares and administers the Joint Military Aircraft Hurricane Evacuation Plan for the continental United States

SPACE PROGRAM SUPPORT

The ARRS has provided recovery support for the National Aeronautics and Space Administration since the Discoverer launches, and for all manned flights beginning with the Mercury series and continuing through the Apollo and Skylab series and the joint USA-USSR Apollo-Soyuz mission

Weather reconnaissance support requirements are fulfilled by WC-130s which provide last minute weather data for the launch site as well as the primary and secondary recovery areas.



Above left: It takes a lot of planning and teamwork to coordinate weather reconnaissance missions into the eye of a hurricane. **Right:** Weather reconnaissance missions take the Hercules over some of the most turbulent weather in the world.

WEATHER RECONNAISSANCE

The first duty of ARRS's weather reconnaissance force is tropical cyclone reconnaissance. The Hercules routinely locate and penetrate hurricanes and typhoons and then relay vital weather data to the National Hurricane Center at Miami or the Joint Typhoon Warning Center on Guam. Information passed to these centers regarding storm location, intensity, and movement is used to formulate storm advisories that are passed to both the military and public sectors. Storm warning reconnaissance activities have resulted in considerable savings in terms of reduced property damage and loss of human lives. In addition to tropical storm reconnaissance, ARRS units provide specific mission-tailored weather services in support of various Federal and Department of Defense operations. Reconnaissance is flown along the east coast of the United States during severe winter storms. This enables the National Weather Service to issue accurate advisories on snow accumulation. Weather aircraft precede transoceanic tactical fighter movements and relay critical weather information about air refueling areas. ARRS crews per-

form reconnaissance in remote areas to fill important meteorological data voids. ARRS units are also involved with weather modification through cold fog dispersal operations in Europe and Alaska.

ATMOSPHERIC SAMPLING

Global atmospheric sampling is another responsibility of ARRS. Crews and aircraft collect samples of the atmosphere at low and medium altitudes throughout the world to detect and identify various impurities.

The ARRS has proven its capability of handling civilian emergencies as well as military. The small group that made up the first rescue and recovery unit in 1946 has grown into a large network of people located around the world. The ARRS is still growing, and constantly finding new and better ways to save lives. We at Lockheed are proud to have the Hercules serve as a part of this organization.

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An important mission of the ARRS is the recovery of manned space capsules.

SERVICE NEWS



Special thanks to personnel of the Aerospace Rescue and Recovery Service and the Military Airlift Command for their assistance in the preparation of this article.



Cargo Floor SHORING

The Hercules gets to do some of the roughest, toughest airlifting jobs in the world, and it's not surprising to find that the floor of the cargo compartment often takes quite a beating. It will stand up to a lot of punishment, but sometimes we see aircraft with floor damage that probably could have been avoided by the use of proper shoring **techniques**.

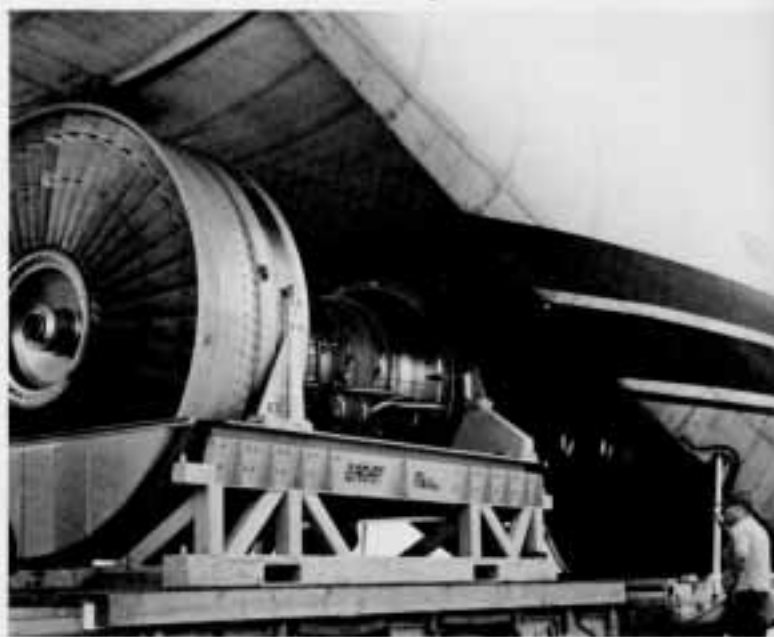
Shoring will protect the floor in two ways: First, shoring helps prevent unsightly "cosmetic" damage the gouges, cuts, and scratches that may result when vehicle cleats, packing box studs, and similar sharp objects come in contact with the floor. Some operators who frequently haul rough cargoes keep large sheets of 3/4-inch plywood on the floor at all times to guard against such damage.

The second, and most crucial, use **of shoring** is to spread the stresses applied by heavy loads over a greater area in order to ensure that the load limits for the floor are not exceeded. The limit for concentrated loading of small

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Loading of large machinery and equipment requires special planning for the selection and placement of shoring



local areas is SO PSI anywhere on the floor, but the limits for distributed loads are lower, and depend upon the compartment in which the load is to be carried and whether or not it can be placed over the treadways.

The loading instructions in the technical manuals contain charts and tables which give the loading limits that are applicable to each area of the cargo floor.

Remember that the primary factor which determines the effectiveness of any suitable shoring material in distributing loads is its thickness. Load pressures will be transmitted outward through the shoring material at an angle of 45° from the base of the load to the floor. What this amounts to in practical terms is that for every inch a load is raised by shoring, in effect an inch will be added to each side of the load as “seen” by the floor. Obviously the shoring must always extend beyond the footprint of the load in all directions by an amount at least equal to the thickness of the shoring material (in this case, one inch) or the advantage of increased bearing area will not be obtained. The added inch may not sound very impressive, but the increase in total area can make the difference between a safe load and a damaged floor.

Let’s look at a specific example. Suppose a crate containing industrial machinery is to be transported in compartment H between the treadways. The box weighs 725 pounds and is supported under the corners by four wooden blocks, each of which measures 6 x 6 inches.

Some quick calculations will reveal that the blocks – the only parts of the crate actually in contact with the floor – have a total area of 144 square inches. Dividing this figure into 725, we find that over 5 pounds is pressing down on each square inch of the floor surface beneath the blocks. Since the safe limit for a distributed load off the

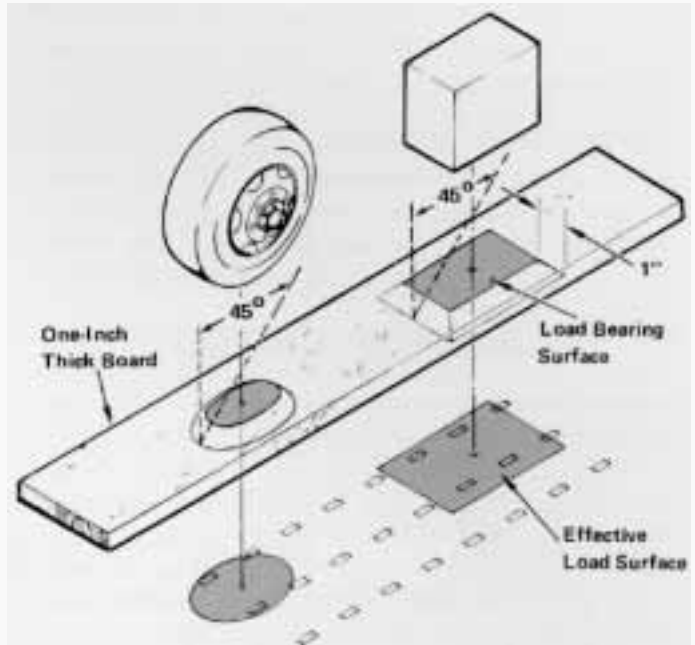


Figure 1 45° LOAD FACTOR

treadways in compartment H is 3.1 PSI, placing this box in the aircraft without suitable preparation could risk a damaged floor.

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The correct way to protect the floor is with shoring, and an inch of it will more than do the job. With the crate’s corner blocks shored up one inch, the area transmitting the load to the floor is increased a total of one inch per side for each of the blocks. The load-bearing area is thus increased from 144 to 256 square inches, and the resulting

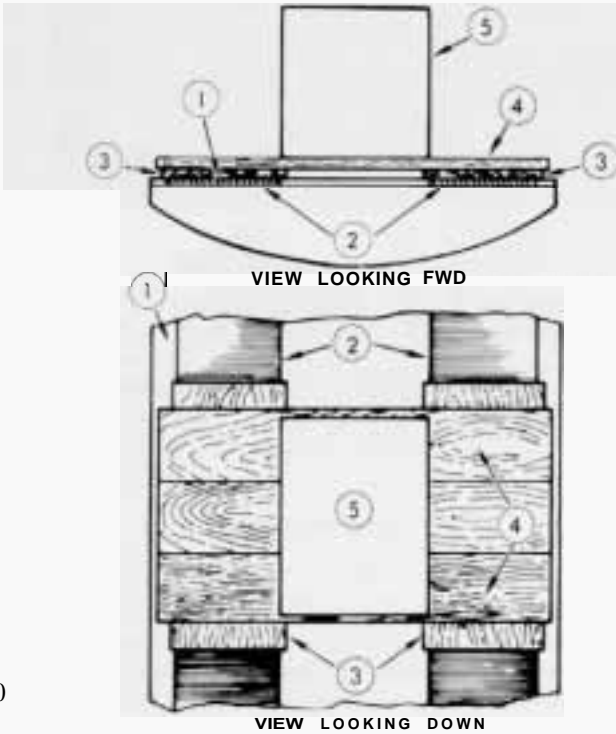
The use of blocks and plywood under certain loads can prevent cargo floor damage.



Barrels and drums can cause floor damage if not properly shored.



Figure 2 BRIDGE SHORING



1. CARGO FLOOR
2. TREADWAY AREA
3. LOAD-DISTRIBUTING SHORING
4. PLANKS FORMING BRIDGE
5. CARGO LOAD

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There are special computations for determining the amount of stress placed on the cargo floor by loaded vehicles.

pressure on the floor drops to less than 2.8 pounds per square inch, well within safe limits for this area of the floor.

Shoring plays a vital role in saving cargo compartment floors whatever the size and shape of the load. Here are a few special points to consider.

Barrels and drums present special problems because they often have narrow rims on the ends that are the only part of the load to actually come in contact with the floor. Consequently, the area loading on these rims is likely to be high, and unless the barrels are empty, it's a pretty sure bet that shoring will be needed. To calculate the area of a barrel rim, measure the outside diameter of the drum, square the number, and multiply the result by 0.785. Now measure the inside diameter (i.e., minus the rim), square it, and multiply by 0.785. Subtracting the second result from the first will give you the area of the rim. Since you will be dealing with decimals and fractions, a pocket electronic calculator will help ensure accuracy in working these problems.

When calculating floor pressures for vehicles equipped with pneumatic tires (tire pressure less than 100 PSI), remember that the shape of the tire's footprint is elliptical, and simply multiplying the length of the footprint times its width will yield too large a figure for the area. Multiply the length times the width, but then multiply this result by 0.785. This will allow for the "missing corners" of the rectangle.

The treadways of the cargo compartment are specially reinforced, and will tolerate significantly higher floor loading in most areas. You can take advantage of the higher strength of the treadways by the use of bridge shoring. Two-inch thick wooden boards are normally used for this purpose. Avoid using materials which may sag to the cargo floor between the treadways when loaded.



El Caballito de los Andes

Having recently completed the first ten years of service with the FAC (Colombian Air Force), the Hercules has lived up to the nickname the Colombians have given it -- "El Caballito de los Andes" (the little horse of the Andes). This name comes from the victory of the Hercules over the difficulty of transportation in that part of South America.

A third of Colombia has mountainous terrain formed by three ranges of the Andes Mountains. Most of the remainder of the country is located on a plain of the Amazon Basin which contains large tracts of jungles and swamps. Surface transportation from Bogota, the capital, to the outlying districts is very slow. It is also rough on the cargo being transported. Using "El Caballito," the FAC is making air transportation a practical alternative to surface transportation.

Using the Hercules as a military transport, the FAC has taken advantage of the aircraft's long range capability to pick up and deliver military logistics in other parts of the American continents and in Europe. It has used it to transport jet fighters from France and helicopters from the United States. This is in addition to the many plane loads of parts and smaller items of equipment the FAC has hauled for the military as well as other branches of government.

Within Colombia, the FAC has used its Herky Birds to support itself, the army and the navy in a variety of operations. They include routine missions such as personnel and equipment movements, and resupply of outlying bases as well as special operations such as airport building and humanitarian missions.

There are numerous examples of the FAC's use of the Hercules in its role as a humanitarian airlifter. One of these examples occurred in 1972 when the Putumayo River flooded and inundated Puerto Asis, a regional capital. An FAC Hercules evacuated more than 1500 flood victims. In another instance, the people of the city of Pasto found themselves in a frustrating crisis situation when they lost their electric power because of the failure

of an electric generating plant. The FAC brought them immediate assistance by flying two electric generating plants from Miami. And the list goes on. "El Caballito" has been used to deliver drinking water, drugs, food, clothing and medical personnel in many emergencies such as the tire in Tumaco that destroyed nearly 80% of the town. It has carried prefabricated housing to earthquake victims in Nicaragua, equipment and players to major sporting events, instruments and musicians to national events and even special radio equipment to assist Pope Paul VI when he visited Colombia.

The FAC does not limit the Hercules to military and humanitarian missions. It also uses it to assist government agencies as well as private companies in their country-building projects. The Hercules' large payload capacity, its easy loading of unusual and outsized cargoes and its capability to land on and take off from short airstrips make it perfect for the country-building missions. The FAC has used "El Caballito" to deliver equipment for road building, oil exploration, mining, rural electric projects and airport enlargement and improvement projects to otherwise inaccessible locations all over Colombia.

It also hauls shipments such as dressed beef, live cattle, bananas, Brazil nuts and coffee. It hauls these commodities to destinations within the country and into or out of it. These are not commercial missions for profit but assistance missions to support the economy. The FAC can take "El Caballito" into places airlines can't get into and do it for a price and with a speed that makes air transportation the best way to go.

The Lockheed-Georgia Company takes great pride in the fact that its products can assist in the development of many nations. We salute the time record of Colombia's air force and look forward to many more years of Hercules service to the people of Colombia.

SERVICIO NOTAS





Real time data systems are used to track a part from the time it is placed on order until it is shipped to the customer.

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Emergency Services

***full service product support,
twenty-four hours a day -***

The Lockheed Hercules is a versatile airplane and serves in many remote areas of the world. On occasion, an airplane may be down in an area far from a source of parts. This can present a real problem, especially if there is an urgent need to get the aircraft operational as soon as possible.

The Customer Supply Division at Lockheed-Georgia operates a system to provide support for such emergency demands. Spare parts, kits, and technical assistance are available on an around-the-clock, seven-days-a-week basis, providing coverage of all Lockheed-Georgia products. If an emergency situation occurs during regular working hours, contact your individual supply administrator; if the emergency is after hours, you should call 404-424-3281.

In addition to the Supply Division, other Lockheed Divisions, such as Customer Service, Manufacturing, Engineering, Purchasing, Shipping, and Transportation are ready to provide full-service support to help with these situations, even after regular working hours.

To help us respond to our customers' needs we maintain a multi-million dollar inventory of spare parts.





Above left: The overall repair and calibration of aircraft components are precise and exacting processes which require highly trained and experienced personnel, specialized test equipment, and rigorous control procedures. Right: An all-hours expedite service is available to any Hercules customer. A telephone call sets into motion a specialized group of people who are dedicated to getting the requested item shipped with the least possible delay.

Emergency requests for 7500 line items were received from our customers during 1978, of which 98.5% were satisfied within a 24-hour period from the time of receipt.

The Supply Division also handles the parts requirements for "drop-in" type maintenance, in which airplanes actually come to the plant for repair. Preparing custom kits for repair of crash-damaged aircraft is still another capability of this Division.

The primary objective of our emergency support system is to provide a rapid response to the customer's request. Our product support inventory consists of approximately

8,000 line items and in emergency situations we have access to over 66,000 items of production stock.

If flight and maintenance crew members find themselves in an emergency, they should know about the services offered them by Lockheed. Please contact your individual supply administrator if you have further questions regarding any of our services or if we can help you in any way.



Lockheed Supply Support offers:

- ✓ Around-the-Clock Emergency Support
- ✓ Single Point of Contact
- ✓ Individual Customer Order Administration
- ✓ Warranty Assistance
- ✓ Functional Test
- ✓ Centralized Overhaul and Repair
- ✓ New Parts

- ✓ No Minimum Buys
- ✓ Latest Design Parts
- ✓ Configuration Control
- ✓ Latest Packaging Techniques
- ✓ Delivery and Shipping Documentation
- ✓ Direct Routings
- ✓ Economical Shipments
- ✓ Delivery Information and Notification



TATTOO



"DOESN'T LOOK LIKE IT'S GOING TO FIT"

Trying to fit this huge trophy into your display case would be one of those delightful dilemmas that nobody would really mind. This fine prize, the award for the Concours d'Elegance Competition, will be given for the best turned-out aircraft at the Hercules Meet, a commemoration of the 25th anniversary of the first flight of the Hercules. The meet is an integral part of the 1979 International Air Tattoo which will be held at RAF Greenham Common, Newbury, England on June 20-25. In fact, this versatile airlifter will be the featured aircraft of this year's Tattoo. Any organization that operates a Hercules is eligible to attend the meet. It doesn't matter whether your organization is civilian or military.

The International Air Tattoo (IAT) is billed as the world's largest military air show. However, it is not limited to military might alone. IAT 79 will include displays by aviation manufacturers and organizations, exhibitions by aviation enthusiasts, a general trade display, motorized vehicle displays, an arts and crafts fair and exhibitions by armed forces and public service organizations. In a special arena, there will be performances by bands, drill teams, majorettes and motorcycle teams.

Above the runways, well-drilled aviators will execute difficult precision aerial acrobatics. A large number of balloons and airships are expected to attend the show. They will perform less acute maneuvers. In addition, there will be a static display of over 100 various kinds of aircraft from the air arms of several different nations. A special area has been set aside for the static display of the Hercules attending the meet. All these events and displays will be on the public days, June 23 and 24.

The activities of the three days before the public days will be centered around the Hercules crews. The focal point of this period will be a technical symposium on Hercules operation. As a complement to it, participants of the meet will have the unique opportunity to compare notes with other veteran Hercules operators from around the world. The many meals and social gatherings and even the afternoon excursion to London planned for the Hercules teams will provide optimum conditions for the exchange of concepts, methods and experiences.

The winner of the Concours d'Elegance Competition will be selected by a group of independent judges. They will check each Hercules on static display for cleanliness and the condition of maintenance based on the age of the aircraft and the number of operational hours it has logged. Regardless who wins the trophy, each Hercules crewmember will be awarded a special shoulder patch as one of several mementos of his or her participation in IAT 79. An illustration of the patch is shown at the top of the page.

The Tattoo will be well covered by news media of many nations. This will be an ideal opportunity to show the people of your country as well as those of many others just what your organization is doing.

Invitations are being issued by the Tattoo staff. Prospective entrants should respond as soon as possible since the number of Hercules attending may be limited by the amount of space allotted. For additional information and an invitation, write or call:

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Tel: (0635) 49019