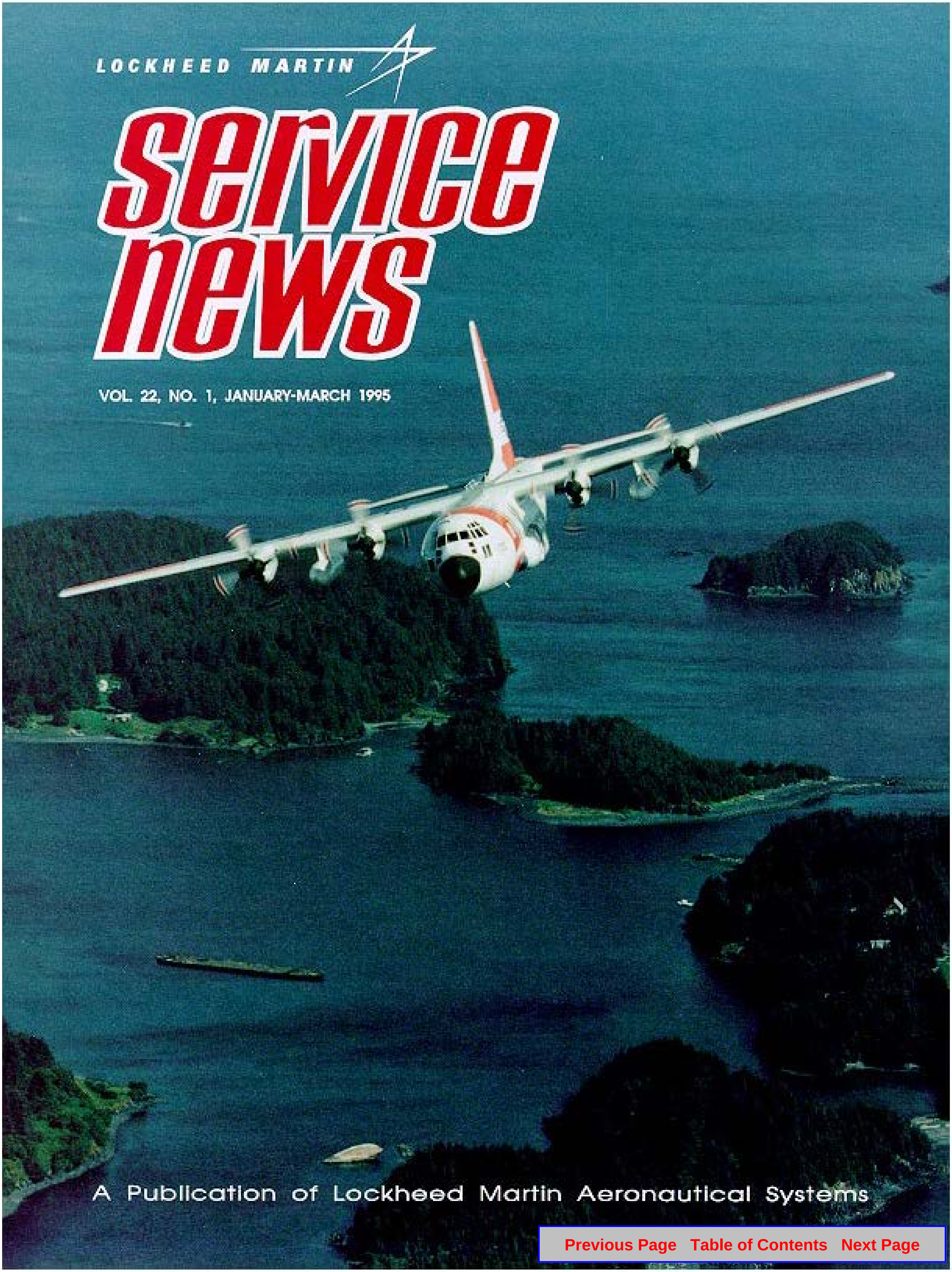
LOCKHEED MARTIN

service news

VOL. 22, NO. 1, JANUARY-MARCH 1995



A Publication of Lockheed Martin Aeronautical Systems

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LOCKHEED MARTIN

service news

A SERVICE PUBLICATION OF
LOCKHEED MARTIN
AERONAUTICAL SYSTEMS

Editor
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Art Direction
Anne G. Anderson

Vol 22, No.1 January-March 1995

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Front Cover: A U.S. Coast Guard HC-130H stationed in Kodiak, Alaska, patrols the islet-dotted waters along the shoreline of the Gulf of Alaska.

Back Cover: The setting sun backlights the C-l 30 flight line of the 167th Airlift Group at Martinsburg, West Virginia.

Cover photographs by John Rossino

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Focal Point

Field Support Looks to the Future

Jim Adams and Don Greene

These are exciting times for everyone who has any association with the Hercules airlifter. This spring saw the delivery of the 2100th C-l 30 to roll off the assembly line at Marietta, and the assembly line itself will soon mark 41 years of continuous, uninterrupted production. Records like these would in themselves be more than enough cause for celebration, but late 1995 will open yet another chapter in the Hercules success story. Before the year is out, the first C-130J is scheduled to take to the skies. It is no exaggeration to say that this is an event that will quite literally propel the Hercules program into the 2 1 st century.

A modern aircraft development effort such as the one that is creating the C-l 30J is typically a long and painstaking process. It incorporates input from all of the many and varied support elements that are part of the program-spares, manuals, training, and field support-right from the very outset. This is as it should and must be if the greatest value to the customer is to be realized. But there finally comes the day when the program evolves beyond being just another paper project, and becomes a real airplane with real operational and support requirements.

With so many exciting challenges ahead for our Field Support team, it was only appropriate that we review our capabilities and fine-tune our organizational structure to ensure that we are ideally prepared to meet whatever demands the future may hold. Thanks to recent promotions and reassignments, we in Field Support believe we have now made the world's best-qualified team of Hercules aircraft support specialists even better. In the following paragraphs, we would like to introduce a few of our key people to you. First, let's meet the leaders of the team.

Leading the Team

Jim Adams is Vice President of Lockheed Aeronautical Systems Support Company (LASSC), and Manager of Field Support for Lockheed Martin Aeronautical Systems (LMAS). Jim has responsibility for providing all field support services, including technical representatives as well as field modification activity for all LMAS aircraft. These include the C-130 Hercules, C-141 StarLifter, C-5 Galaxy, P-3 Orion, S-3 Viking, L-101 1 TriStar, and JetStar aircraft. Jim joined Lockheed in September of 1963 after five years in the U.S. Marine Corps as a KC-1 30 aircrew member. He was later assigned to Military Marketing and moved to his current position in 1989.

(Please turn to page 15)

PRODUCT SUPPORT LOCKHEED MARTIN AERONAUTICAL SYSTEMS

J. L. GAFFNEY — DIRECTOR

FIELD SUPPORT	SUPPLY SUPPORT	TECHNICAL PUBLICATIONS	RM&S DESIGN	CUSTOMER TRAINING
J. D. Adams	J. L. Bailey	G. M. Lowe	H. D. Hall	S. S. Clark

by Ed Wright, ***Regional Service Manager***
Lockheed Aeronautical Systems Support Company

Historically, the Hercules airlifter has been required to operate in some of the most diverse weather conditions known to man, and has performed superbly from the frigid South Pole to the burning sands of the Sahara Desert. For an aircraft to be able to function under any and all climatic conditions requires special attention to system design. It must include the capability to meet the all of the demands that conducting airlift operations anywhere and anytime may impose.

As manufacturer of the C-130/L-100 Hercules, Lockheed Martin constantly pursues new ways of improving the efficiency, versatility, and utility of this prime transport aircraft. One result of this ongoing commitment is the new oil cooler augmentation system.

Each T56 power plant incorporates two separate lubrication systems, which are supplied by a common, nacelle-mounted oil tank. Each of these two systems, the engine power section and the reduction gearbox lubrication systems, has its own pressure pumps which feed the oil to the many internal surfaces of the engine that must be lubricated ***and cooled.*** Oil is recovered from the various lubrication points by scavenge components within both systems. It is then filtered, cooled by the engine oil cooler, and returned to the oil tank to be recirculated.

This all sounds fairly routine, but it isn't always quite so simple. The engine oil cooler requires sufficient air flow through it to properly cool the scavenge oil, and there are only two sources of air flow available. One is the airflow created by the positive blade angle of the propeller; the other is the aircraft's forward motion.

During flight, of course, cooling air is abundant. Unfortunately for the oil system, however, the aircraft must spend at least some time on the ground with the engines running. Such ground operations can pose a problem for the oil cooling system when the ambient temperature is above 20°C (68'F), and particularly on a true "hot day," when the temperature exceeds 29°C (84°F). Under such conditions, the air flow is both warmer and much less than it would be in flight.

An engine running in ground idle on a hot day often causes the engine oil temperature to rise above the 100°C (212°F) maximum limit, resulting indegradation of the oil, increased maintenance or, in the worst case, engine damage. Attempts to cool the oil by increasing throttle settings and propeller blade angle are often counterproductive because they can result in accelerated deterioration of other aircraft systems. In particular, the increased braking required to maintain the aircraft's position on the ground at higher power settings can lead to excessive wear on the braking system.

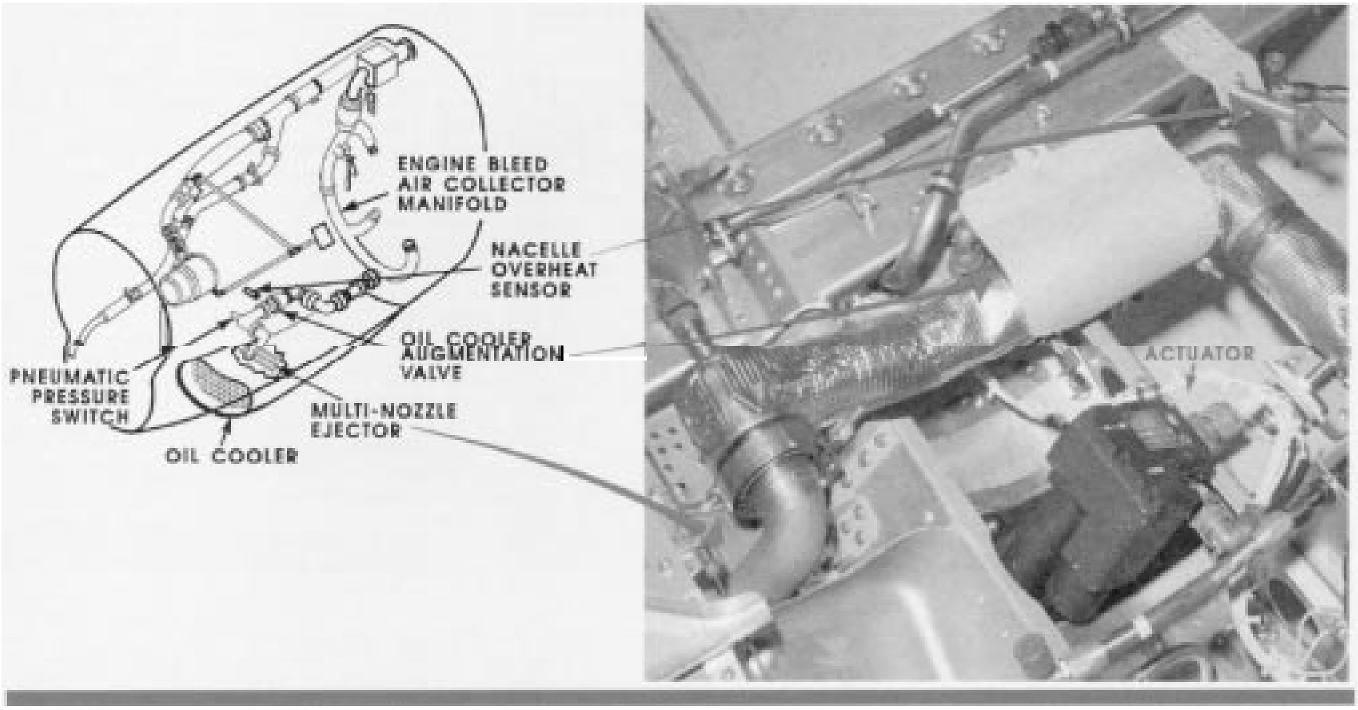


Figure 1. **Engine oil cooler augmentation system nacelle components.**

A much better approach is to devise a way of increasing the efficiency of the oil cooler while the aircraft is operating on the ground, and eliminate the need for high power settings. The engine oil cooling augmentation system does just exactly that, and so successfully that it has been incorporated as standard equipment on all new-production Hercules aircraft beginning with Lockheed serial number LAC 5070.

Oil **Cooler Operation – No Augmentation**

The engine oil cooler is mounted in the lower portion of each engine nacelle, as shown in Figure 1. The oil cooler radiator is a shell assembly with a core consisting of a system of tubes or a series of hollow, horizontal plates separated by an air space and cooling fins. Heat is transmitted from the oil flowing through the passages in the plates to the fins and the air flowing through the unit.

The cooling capacity of the oil cooler is governed by the rate of air flow through the cooler. The air flow is also governed by the position of the oil cooler flap, which is controlled by a switch on the oil cooler flap control panel. Indicators on the engine instrument panel indicate the oil cooler flap position.

An oil cooler regulator valve thermostatically regulates the temperature of the oil leaving the cooler. The valve senses the temperature of the incoming scavenged oil and directs the oil to the cooler core or bypasses the cooler altogether as necessary to maintain the proper oil temperature.

Oil Cooler Operation – Augmented System

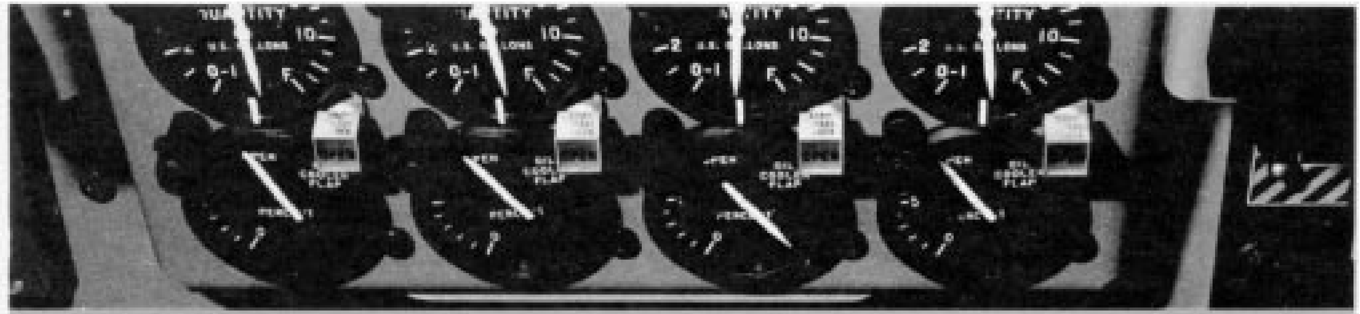
The oil cooler in the augmented system is mounted in the same location as that of the unaugmented system and generally operates according to the same principles. In the augmented system, however, high-velocity bleed air is injected into the oil cooler duct aft of the cooling radiator. This creates a low-pressure area which induces a greater flow of air through the cooler core.

The major engine nacelle components of the T56 engine oil cooler augmentation system include a multi-nozzle ejector, an electrically controlled pneumatic shutoff valve, a pneumatic pressure switch, and a specially designed engine bleed air manifold. System components located in the flight station are four control valve switches, four throttle beta switches, and four indicator lights.

System Operation

Operation of the system requires that engines be operating and that essential 28VDC bus power is available to energize the augmentation valve. To complete the circuit, the following conditions must be satisfied.

- Ground start interlock relay energized.
- Ground start switch off.
- Augmentation control switch on.
- Throttle position below flight idle.
- Oil cooler flap position open 90% or greater.



When the shutoff valve solenoid is energized, it allows pressure from the engine bleed air manifold to open the shutoff valve. Bleed airflow is directed through the valve to the ejector assembly located in the aft section of the oil cooler duct. The bleed air is injected into the duct at a high velocity to create a low-pressure area behind the oil cooler assembly. This action causes an increase in the volume of air that passes through the oil cooler, thereby allowing more heat to be transferred to the air flow.

Placing the control switch to the off position deenergizes the augmentation valve, stopping the flow of bleed air to the ejector assembly. Advancing the throttle to flight idle or above opens the beta switch, also deenergizing the valve. The same thing occurs when the oil cooler flap is closed to the less than 90% open position.

An amber indicator light for each engine is installed on the engine instrument panel above and to the right of the oil cooler flap position indicator (see Figure 2). Illumination of the light is controlled by a pressure switch in the line upstream from the ejector assembly. When the pressure in the line increases above 20 psi, the switch closes to illuminate the light, indicating that the system is on. When pressure decreases to less than 12 psi, the switch opens and extinguishes the light, indicating that the system is off.

The oil cooler augmentation control panel, located beneath the interphone control panel on the flight station overhead panel, contains four two-position (on-off) toggle switches, as shown in Figure 3. These switches, one for each engine, are used to operate the augmentation valves which control the flow of bleed air to the ejector.

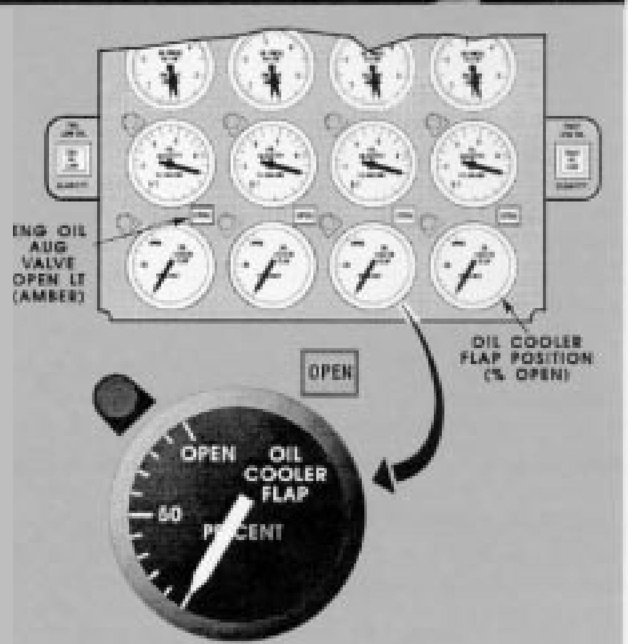
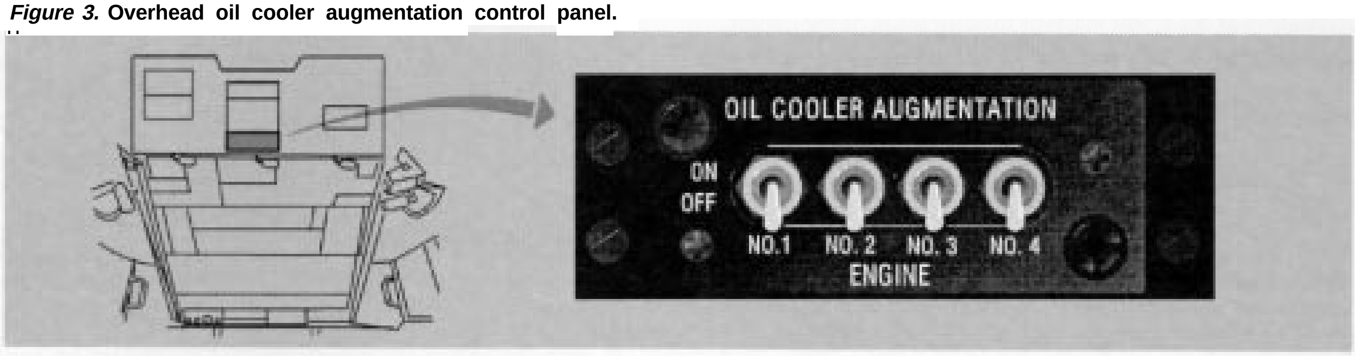


Figure 2. **Oil cooling augmentation system indicator light locations.**

In USAF C-130 aircraft of recent manufacture equipped with night-vision imaging systems (NVIS), the oil cooler augmentation control panel and the oil cooler flap control panel have been deleted. A single oil cooling control panel is provided instead. Located on the flight station overhead panel, this new panel combines most of the functions of the other two panels, except that

***Figure 3.* Overhead oil cooler augmentation control panel.**



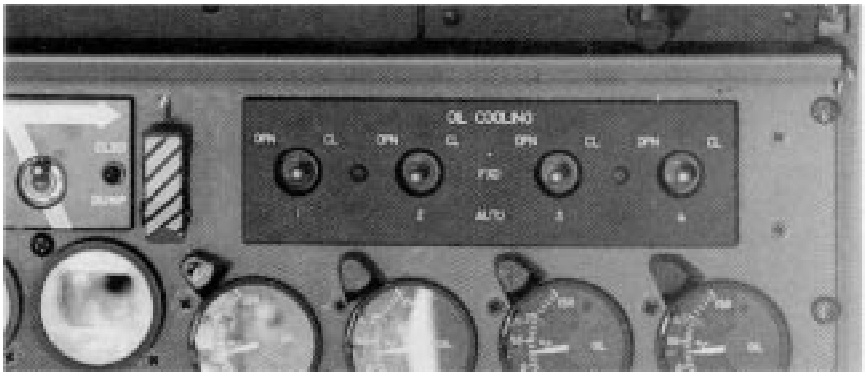


Figure 4. Oil cooling augmentation control **panel--recent NVIS-equipped USAF: C-130H aircraft.**

no separate OFF position for the oil cooler augmentation valves is available (Figure 4). The cooler augmentation system operates automatically in the "on" mode whenever the oil cooler flap control switches are set for automatic operation. Also in these aircraft, the indicator lights are included in the main caution/advisory panel located in the center instrument panel.

There are four throttle-actuated beta switches located inside the center pedestal. With the throttle set at the ground idle position, the beta switch will allow activation of the augmentation system for that engine. Movement of the throttle out of the beta range will deactivate the system for that engine. Also, a switch on the oil cooler flap prevents opening of the shutoff control valve if the flap is not extended at least 90 percent.

Engine Oil Cooling Augmentation Kit

As we noted above, the oil cooling augmentation system has been incorporated into production version of the aircraft beginning with Lockheed serial number 5070. Lockheed Martin Aeronautical Systems offers the augmentation system in kit form for retrofit installation on those Hercules aircraft (except A-models) manufactured prior to the production line incorporation. The kit is applicable to aircraft prior to Lockheed serial number 5070.

Modifications include installation of cooling and support structure in the existing QEC nacelle, modification of wire harnesses, installation of an additional nacelle overheat detector, an oil cooler flap actuator containing a 90% switch, addition of controls and indicators at the flight station, modification of the center pedestal, and revision to the aircraft wiring.

Summary

The oil cooler augmentation system is a proven modification which has been adapted for retrofit on in-service C-130 aircraft, as well as for production line installation. The integration of a cooling augmentation system into an existing C-130 QEC provides more efficient engine oil cooling during hot-day ground operation, thereby eliminating the need for higher throttle settings and reducing the stress placed on various aircraft systems.

This modification is one of many aircraft enhancements resulting from Lockheed Martin's continuing effort to improve the utility and versatility of its transport products. Please contact the following for further information about the C-130 Oil Cooling Augmentation Kit:

Technical/Engineering Information:

Lockheed Martin Aeronautical Systems
Airlift Derivative Programs
Department 93-20
Marietta, GA 30063-0492 USA
Telephone l-404-494-2793
Fax 404-494-7784

Proposal/Procurement Information:

(U.S. Government)
Lockheed Martin Aeronautical Systems
Customer Supply Business Management
Department 65-11
Marietta, GA 30063-0577
Telephone: 404-494-7529
Fax: 404-494-7657

(International and Commercial)
Lockheed Aeronautical Systems Support Co.
P.O. Box 121
Marietta, GA 30061-0121
Telephone 404-43 l-6664
Fax 404-43 l-6666

The author and *Service News* wish to extend special thanks to Jeff Osterlund for his generous assistance in the preparation of this article.

Ed Wright can be reached at 404-431-6544 (voice) or 404-431-6556 (fax).

SERVICE NEWS

Corrosive Materials Cleanup

by **Everett Smith,** *Specialist Engineer*
Producibility, Materials, and Processes Engineering

This article concerns a subject which historically has been a major problem within the airplane maintenance community; namely, the timely cleanup of corrosive contaminants. Being the workhorse that it is, the Hercules aircraft comes into contact with many corrosive materials, ranging from spilled cargo such as battery acid and cement, to waste from live animals and fluids leaking from packaged fish, meat, etc.

The Hercules is also subjected to other contaminants which can be just as destructive to the airplane as any of the corrosive materials listed above; namely, firefighting agents, sand and volcanic ash, and soot. Several incidents over the past few years have shown that there is a significant amount of confusion about the corrosivity of these contaminants and the need for prompt cleanup when they come in contact with the airplane.

Invitations to Corrosion

Some firefighting agents used to extinguish airplane fires pose little risk to aluminum airframe structure. A good many others, however, are very active chemically and can quickly produce severe corrosion. Foam products and bromochloromethane (CB) and, to a slightly lesser degree, dibromodifluoromethane (DB) agents are the most notable offenders in this regard.

Many of the more commonly used dry-powder agents, such as potassium bicarbonate (PKP) are in themselves only mildly corrosive, but after exposure to heat the residue may convert to potassium hydroxide, a product which is very corrosive to aluminum. To make a bad matter worse, both of these salts are hygroscopic; that is, they will absorb moisture from the atmosphere, creating a corrosive poultice on airplane surfaces.

Sand and volcanic ash particles can be trouble anywhere, but they are particularly destructive in connection with aircraft operations. One of the major problems during the recent Desert Storm war was blowing sand, which impeded the function of oil and air filters, caused erosion to leading edges, and settled into every accessible area of the airplane.

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The abrasive and obstructive nature of sand particles is only part of the problem, however. Even though the dryness of the climate might appear to offer an acceptable environment for aluminum structure, most deserts are the sites of ancient sea beds and the sand often contains a significant amount of salt.

Volcanic ash provides an even more exotic mix of abrasive and corrosive elements. In recent years, there has been a spate of volcanic eruptions which spewed ash into the air for great heights. Samples of volcanic ash taken from the Mt. St. Helens and Mt. Pinatubo eruptions were analyzed and found to contain significant quantities of corrosive materials such as sulfuric acid and chloride salts.

Last, but not least, there is the problem of soot. The soot generated by an airplane fire is carbon that is contaminated by a variety of combustion products, depending on what has been burned. Soot is both corrosive and hygroscopic, no matter whether the soot is generated by a fire or from normal engine operation.

A problem with all of these corrosive agents is that determining just when the airplane may be subjected to them normally cannot be predicted. What is important, however, is that the cleanup begin as soon as possible after contact, and knowing the correct cleanup procedures to prevent further damage. With a few variations, cleanup of firefighting agents, sand, and volcanic ash is accomplished in the same manner.

Firefighting Agents

On the Hercules, CB or DB extinguishing agents are used in the engine and APU areas. CB is also used in some fuselage hand-held fire extinguishers. Both of these materials are in themselves corrosive, and their corrosive action is increased if moisture is present. When enough heat (900°F) is added to the mix they will turn acidic, making them even more likely to cause corrosion damage. In addition to the corrosive effect on metal surfaces, both products will also damage paint, sealant, and adhesives within the contaminated area.

The critical importance of a prompt cleanup after a fire cannot be overemphasized. Besides water, fire trucks generally use aqueous film-forming foam (AFFF) or a dry powder (PKP) extinguishing agents. In a recent incident, protein foam, Aero-Foam 3%, was used to extinguish an engine fire. An unfortunate fact about protein foam from the standpoint of metallic surfaces is that it is usually made from animal blood, which contains salt and is extremely corrosive. In this case, the post-fire cleanup was not done for over a week, and as a consequence the engine and surrounding structure were severely corroded.

To clean up CB and DB, follow this procedure:

- Ventilate the area
- Remove the residue with dry rags or sponges

From firefighting agents to animal waste: prompt cleanup is the kev to preventing corrosive materials damage.

- Clean with Stoddard solvent, PD-680, type II, or equivalent

- Apply a 10% solution of sodium bicarbonate or a three parts alkaline cleaning compound to 1 part water (3:l) to the contaminated areas until the bubbling stops.

- Rinse with clean water and dry the surface.

This procedure can also be used to clean up the protein foam by omitting the Stoddard solvent and removing the residue left by the foam with the 3: 1 solution of alkaline cleaning compound.

Sand, PKP, and Volcanic Ash

For removal of sand, PKP, and volcanic ash, apply the following procedure:

- Gain access to areas of the airplane where the material may be trapped.

- Vacuum up all of the residue. A soft bristle brush may be required to dislodge some debris while vacuuming.

- Clean with a 3: 1 solution of alkaline cleaning compound; rinse with clean water and dry the surface.

Note in particular that volcanic ash is usually quite acidic; therefore, watch for bubbling during the cleaning process. If necessary, reapply the cleaning compound until the bubbling stops.

Soot

As we have previously noted, soot is carbon, which by itself is extremely corrosive to aluminum surfaces. However, soot also contains byproducts of the burned material that produced it, which significantly increases the corrosivity.

Of all the materials we have discussed, soot is without a doubt the most difficult to clean up. Not surprisingly, cleaning crews do not always do a thorough job removing it, which results in future corrosion. In cleaning up soot, there are two options. Option one is to use stiff bristle brushes and a 3: 1 solution of alkaline or solvent-type cleaning compound, followed by rinsing with clean water and drying the area.

Option two involves some initial equipment costs, but the efficiency and ease of cleaning will make up the difference in labor cost savings. This option is to remove the soot by the abrasive blast method, using a Vat-U-Blast or similar type of machine and either crushed walnut shells or 30/40-grit plastic media. The use of walnut shells is not recommended where entrapment may occur since walnut shells will absorb water and rot. The decay process releases acids, which will result in corrosion of adjacent surfaces.

On the other hand, plastic media are inert and will not cause corrosion if trapped. When using this method to remove soot, keep the blast pressure at the lowest level which will do the job so as not to damage the airplane. It is best to start at 30 psi, and if it is necessary to increase the pressure, do it slowly until an optimum pressure not exceeding 50 psi is reached.

Media blasting should only be done on metallic structure, and should be used with caution. This process may be used prior to repainting since it will remove paint degraded by the soot. Be especially careful on thin sheets (0.032" and thinner) and clad parts: there is a possibility of oil-canning of thin sheets and roughening the surface of the clad.

After the blasting process is complete, vacuum up any stray media and clean, prime, and paint the affected surface to match the surrounding structure. The inorganic finish (chemical conversion coating, sulfuric acid anodize, etc.) may be removed by aggressive blasting. If this occurs, apply a chemical conversion coating prior to applying the primer and paint topcoat.

Some exterior areas of the airplane that may be contaminated by impingement of engine soot can be protected with the use of a soil barrier. After the wash, and before the airplane dries, apply a thin coat of Cee-Bee A-6 or Eldorado PC 1020 (or equivalent) soil barrier. If the area was just repainted, wait until the paint has cured and spray the surface with water before application of the soil barrier.

The typical Hercules airlifter is subjected to many corrosive influences in the course of completing its everyday tasks. Preventing potential corrosion from turning into real corrosion is one of the most important and worthwhile maintenance activities that any aircraft operator can perform.

Any time spent in protecting your aircraft from the destructive effects of strong chemicals, sand, ash, and soot will pay big dividends in terms of cost savings and safety. Looked at another way, removing corrosive materials in a timely manner helps extend the working life of the Hercules aircraft. Conscientious application of the techniques described in this article will assist you, the operator, in your efforts to fly a well-maintained airplane in the most economical way.

Everett Smith has recently retired. Questions concerning this article may be directed to Scott Jones at 404-494-3849 (voice) or 404-494-9610 (fax).

HERCULES OPERATORS UPDATE

Conducted by **Dave Holcomb,**
Service Analyst
Lockheed Aeronautical Systems Support Company

1995 HERCULES OPERATORS CONFERENCE (HOC 1995)

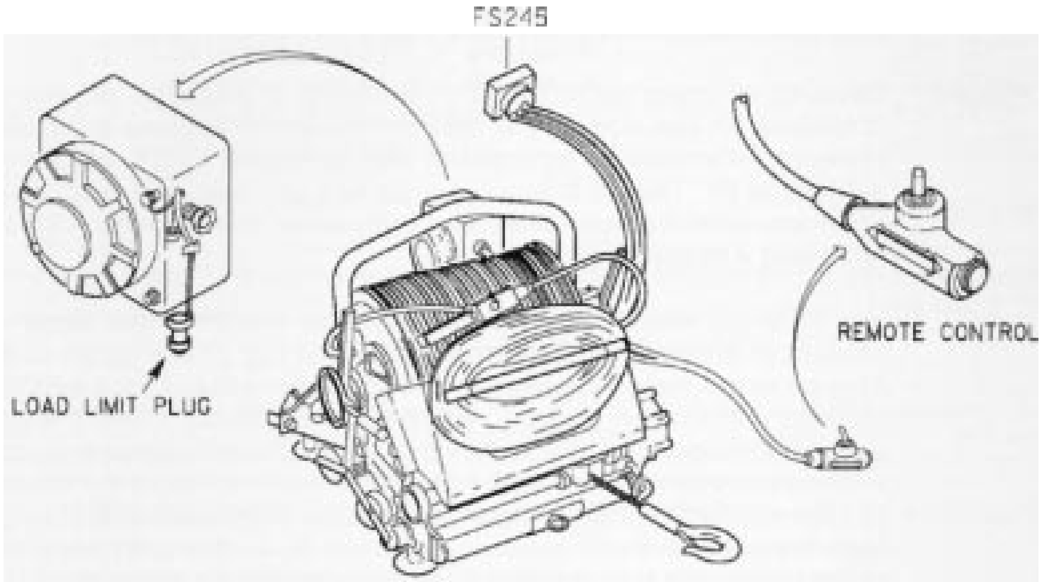
During the week of 16 October, 1995, representatives of Hercules owners and operators, Hercules Service Centers, major Hercules vendors, and Lockheed Martin will assemble at the Atlanta Marriott Northwest to discuss matters of common interest relative to the operation of world's most famous airlifter. This important conference was established in 1982 to provide a forum wherein Hercules owners and operators could exchange ideas with each other and Lockheed personnel. Attendance has grown from just fifteen in 1982 to more than 250 in 1994. The attendees at HOC 1994 represented 82 owners and operators from every corner of the globe. Lockheed expects another productive and record-setting meeting during HOC 95. Don't miss it!

AN IMPROVED CARGO WINCH

Problems with the procurement of the PN 41750-3041 BG cargo winch have made it necessary to establish a new source for this important piece of accessory equipment. The PN 9440-I 1 cargo winch, manufactured by the Teleflex Corporation, meets all the requirements for use in Hercules aircraft and now has been approved as an alternate.

A number of important improvements have been included in the new winch. Among these are increased reliability, a level-cable mechanism, and remote control capability. Other features offered by the new unit are the following:

- Single-cable pull limit of 6500 pounds, and up to 13,OOO pounds capacity (with some restrictions) when utilizing a snatch block.
- A control pendant equipped with a three-position toggle switch attached to the end of a 105-foot cable.
- A powerful 115/200 VAC, 400 Hz, 3-phase motor.
- Essentially one-man operation.
- A level-wind mechanism capable of directing the cable onto the drum evenly.
- A load-limit device.



CARGO WINCH

The 41750-304BG Cargo Winch

The new winch is now the preferred spare. Customers who are interested in procuring this improved unit should use their normal supply channels, or contact the following:

(U.S. Government)
Lockheed Martin Aeronautical Systems
Customer Supply Business Management
Dept. 65-l 1
Marietta, GA 30063-0577
Telephone: 404-494-7529
Fax: 404-494-7657

(International and Commercial)
Lockheed Aeronautical Systems Support Co.
P.O. Box 121
Marietta, GA 30061-0121
Telephone 404-431-6664
Fax: 404-431-6666

THE HERCULES OPERATORS UPDATE (HOU) HOTLINE – Answers to Your Hercules Maintenance Questions.

1. Question: Is there a replacement fastener for the fuel tank upper access panels? The NAS585 screws are becoming increasingly difficult to obtain.

   Answer: We at Lockheed Martin have been utilizing NAS1580A5T- * (* = length in 1 /1 6-inch increments) fasteners as replacements for NAS585 screws. Note that the "T" denotes Torq-Set. We are currently installing these fasteners on production aircraft. They are close-tolerance tension screws that have a Torq-Set head design and should provide longer life than the coin-slot design. A Torq-Set adapter and bit are required for installation.

2. Question: We have noticed rust and corrosion on our flap tracks. How can we deal with this?

   Answer: First, clean the tracks with PD-680 or equivalent safety solvent and wipe them dry. Then remove all corrosion and rust completely, using 400-grit sandpaper, Briteboy, or a 3M-type abrasive wheel, depending on the severity of the problem. Then apply dry-film lubricant MIL-L-46147 to the installed track and air-cure. The lubricant should be reapplied periodically.

3. Question: How can we compensate for the removed weight when engines or propellers are removed from one side of the aircraft only?

Answer: Because of main strut friction, removing a propeller or even both propellers on one side may or may not cause the airplane to tilt slightly. However, it should be anticipated that removing a QEC ***will*** cause the airplane to tilt. Thus all personnel must be kept clear, and work stands or other equipment should be moved from under the opposite wing before removing a propeller or QEC.

The tilt angle which results depends on the weight of the airplane, the amount of fuel on board, and the weight and c.g. of any cargo on board. Thanks to the main strut load-stroke characteristics, a light airplane will tilt more that a heavy airplane with the same fuel load. When the airplane does tilt in response to the removal of engines and/or propellers, the fuel within each internal wing tank will shift in the direction of the lower wing tip, thereby further increasing the unbalance and thus the tilt. If cargo has been loaded with an off-center c.g. (not on BL 0), this unbalance will add to the unbalance that resulted from the removal of a propeller or QEC on the opposite side.

When lateral unbalance is created by the removal of one or both propellers and/or engines from one side, a possible solution to the problem is to transfer fuel to the lighter side of the aircraft. Several factors must be considered in determining if it is necessary to transfer fuel to restore lateral balance.

1. If the airplane is parked outside, what winds are anticipated? Lateral unbalance reduces the wind speed the aircraft can withstand without tipping sideways. If a storm that may have wind speeds of 48 knots and above is approaching, fuel should be transferred to restore lateral balance, or wing mooring cables should be installed, making sure that there is no slack in the cable attached to the light wing.

2. The ground handling and servicing manual defines the reduction in allowable weight for jacking if the airplane is not laterally balanced.

3. Tilting of the airplane will not cause excessive stresses on the airframe. However, it is not recommended that a condition of large unbalance be allowed to exist for periods of several days.

The following moments may be used to determine the amount of fuel which needs to be transferred to restore lateral balance if this is judged to be necessary. Bear in mind that the fuel unbalance limits given in the flight manual-which specifies a limit of 1000 pounds difference between symmetrical tanks-apply while the airplane is being flown or taxied, but not during maintenance activities, including towing. Be sure to keep personnel, workstands, etc. away from the wings when transferring fuel, and remember to transfer the fuel back when the engines and/or propellers are reinstalled.

ITEM	MOMENT(inch-pounds)
No. 1 or No. 4 propeller	426,400
No. 2 or No. 3 propeller	208,940
No. 1 or No. 4 QEC (including propeller)	1,620,OOO
No. 2 or No. 3 QEC (including propeller)	793,800

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Fuel asymmetry - for each 1000 lbs difference:

Between tanks No. 1 and No. 4	534,000”
Between tanks No. 2 and No. 3	284,000”
Between auxiliary tanks	120,000”
Between external tanks	302,000

[redacted]

Example: Determine the weight of fuel which must be transferred from tank No. 3 to tank No. 2 to restore lateral balance after removal of the No. 2 QEC.

$$\textit{Fuel weight difference} = \frac{793800}{284000} \times 1000 = 2795 \textit{ pounds}$$

The fuel which must be transferred is 1/2 of 2795; i.e. about 1400 pounds.

4. Question: **Can you give us an update on windshields?**

Answer: **Yes. We are pleased to advise that new windshields are available for the pilot, copilot, and center positions. The new design replaces the integral PVB bumper around the perimeter with cast-in-place polysulfide sealant. This design reduces the stresses that act on the glass edge, thereby reducing the number of incidents of cracking. The new PN 337279-I 1 and PN 338124-I I/I 2 panel assemblies should be the preferred spares for the PN 337279-9 and PN 338124-9/I 0 panels, although all are interchangeable. The organizations shown in the address blocks in the middle of page 11 can provide price and availability information about the new panels if desired.**

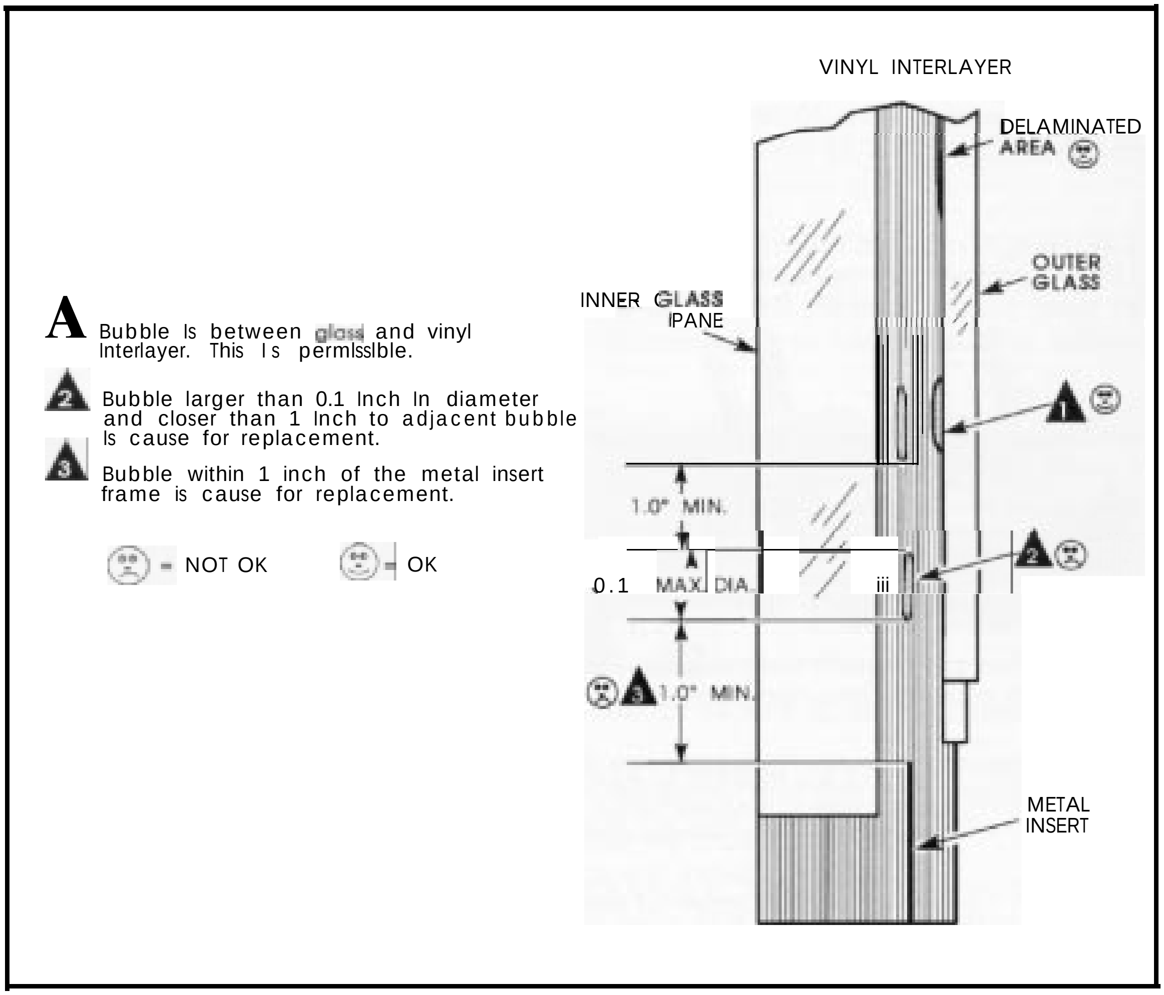
5. Question: **Can we install forward fuselage windows and windshields with the aircraft on jacks?**

Answer: **Windshields and windows should not, repeat, not be installed while the aircraft is supported on jacks. Jacking can strain-load the panels and result in premature failure. However, the windshields may be installed while the aircraft is supported on contoured cradles in accordance with the applicable maintenance manual. In this situation, the nose jacks**

should be snugged up only (no upload applied), with the weight of the fuselage on the cradles.

6. Question: Speaking of windows and windshields, how can one differentiate between bubbles and delamination when inspecting the panels? We feel we are changing too many windows.

Answer: Bubbles are identified as air pockets trapped between the glass panel and vinyl interlayer. Bubbles may also occur in the vinyl interlayer, which may be cause for rejection. Delamination is usually a larger separation and extends to the edge of the windshield. Acceptable delamination is separation between the outer glass and vinyl interlayer (see drawing below). Be sure to refer to the maintenance manual when inspecting windshields and windows.



■ Questions on Hercules aircraft maintenance topics should be addressed to: HOU Hotline, Airlift Field Service, Lockheed Aeronautical Systems Support Company, P.O. Box 121, Marietta, GA, 30061-0121. Faxes are also welcome, and may be sent to 404-431-6556. All inquiries will receive responses. The questions and answers considered to be of the broadest interest to Hercules operators worldwide will be published in this section of ***Service News*** magazine.

service news

(Continued from page 2)
He has held numerous field assignments and supervisory and management positions in Field Support.

Don Greene is our new manager of Airlift Field Service. Don joined Lockheed in 1978 upon his retirement from the U.S. Navy, where he accumulated over 5000 hours as a flight engineer. Before signing on with Field Service, he held various supervisory and management positions with Lockheed in Greece, Saudi Arabia, and the Yemen Arab Republic. Since joining Field Service, Don has assisted Hercules operators in Africa and the Far East, in addition to the U.S. Navy, U.S. Coast Guard, and the Air National Guard. Prior to his promotion to manager of Airlift Field Support, Don was Regional Service Manager for South America.

The Regional Service Managers

Many Hercules operators make certain that their aircraft receive the very best in product support by contracting to have their own dedicated Field Service Representatives, or “Tech Reps” on-site. Not all operators feel that they need such regular, professional assistance, however. Our Regional Service Managers provide worldwide technical support services to these customers, as well as to our other customers through their Tech Reps. They also supply the factory with important feedback on aircraft maintenance and support issues. In addition, these uniquely qualified service specialists help advise other Lockheed personnel assigned within their areas. They are truly special people, and we would like you to meet them.


Chuck Foster

Chuck Foster is based in Marietta, but operates from England. He assists Hercules operators throughout Europe and Morocco. Chuck, a native of Tennessee, joined Lockheed in 1953 as a flight line electrician and has held several production, supervisory, and management positions. In 1971, he joined Field Service and was assigned to the Hercules program in Libya. Chuck’s extensive Hercules aircraft maintenance expertise have proven invaluable in his many important field assignments throughout the world.

Fred Kasell covers the Pacific region from his base in Australia, maintaining close contact with Lockheed’s many customers throughout the region. Fred’s service with Lockheed began in 1955, after his discharge from the U.S. Air Force. During his career in C-130 maintenance, Fred has worked with the U.S. Air Force and Navy, in addition to various assignments in Australia, New Zealand, Africa, the Middle East, and the Far East.

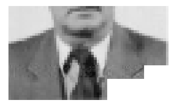

Fred Kasell


Dan Miller

Dan Miller, Regional Service Manager for North America, operates from our Marietta office in support of domestic U.S. Government and commercial Hercules operators. A native of North Carolina, Dan has an extensive background in aircraft maintenance. He joined Lockheed in September of 1980, following a 21-year career in the U. S. Marine Corps. Prior to his present assignment, Dan served as Field Service Representative in Gabon, Kuwait, Sudan, and then as the Regional Service Manager for Europe.

L. R. Webb is based in Marietta, Ga. and covers Africa, the Middle East, and selected countries in the Far East. L.R. became a valued member of Lockheed Field Service after retiring from the U.S. Marine Corps. His extensive Hercules experience has been utilized in many and varied important Field Service assignments since he joined Lockheed in 1981.


L. R. Webb


Ed Wright

Ed Wright provides support to Latin American Hercules owners and operators, traveling as required from his base in Marietta. Ed is a Georgia native, and joined Lockheed in 1979 after completion of 27 years of service in the U.S. Marine Corps. Following completion of Lockheed’s Field Service Representative School, he was assigned to Airlift Field Service, and has provided support for Hercules aircraft in Venezuela, Zaire, Chad, Italy, and Canada, as well as to Navy and Marine units in various locations in the U.S.

We are particularly proud of our Regional Service Managers for the contribution they make to the success of our on-site Field Service Representatives, as well as to all Hercules operators in every corner of the globe. Now that you have been introduced, please feel free to call on the Service Manager covering your area. You will find his telephone and fax numbers listed below. Remember that each of these professionals is there to support you!

Airlift Field Service
Regional Hercules Service Managers

Telephone and Fax Numbers

Chuck Foster (Europe)

Tel. 44-l -763-208-282
Fax 44-l-733-208-040

Fred Kasell (Pacific/Far East)

Tel. 61-2-976-2401
Fax 61-2-976-2401

Dan Miller (North America)

Tel. 404-431-6547
Fax 404-431-6556

L. R. Webb (Africa/Middle East/Far East)

Tel. 404-431-6559
Fax 404-431-6556

Ed Wright (Latin America)

Tel. 404-431-6554
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