Lockheed

VOL. 14, NO. 4, OCTOBER—DECEMBER 1987

service news

A SERVICE PUBLICATION OF LOCKHEED AERONAUTICAL SYSTEMS COMPANY, GEORGIA DIVISION

SEALANTS

Previous Page Table of Contents Next Page

Lockheed
service news
A **SERVICE PUBLICATION OF LOCKHEED AERONAUTICAL SYSTEMS COMPANY**
GEORGIA DIVISION

Editor
Charles I. Gale

Associate Editors
James A. Loftin
Robert J.R. Rockwood

Art Director & Production
Darrel C. Benfield

Vol. 14, No. 4, October-December 1987

CONTENTS

Cover: A brand new C-130H belonging to the Sultanate of Oman tries out its wings near the Lockheed plant in Marietta, Georgia.

Focal Point

M.M. Hodnett

MAKING SURE IT REALLY FLIES

We at Lockheed often think of today's Hercules aircraft as the tangible result of a long series of good ideas. What is truly special is how well these ideas work in the real world. There probably has never been a better example of what can happen when inspired concepts and the right kind of technological know-how come together to create a product that really works. The Hercules is one idea that can literally get off the ground and fly.

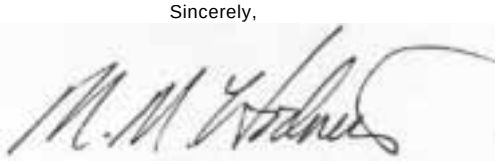
And how it can fly! Since the first production model Hercules rolled off the assembly line in 1955, over 1800 of these aircraft have been built, and they now serve the airlift needs **of more than 50** countries. Outwardly, the aircraft may not appear to have undergone any drastic changes in the past thirty-odd years, but on the inside, new technology is constantly replacing the old. Like every good idea, the Hercules is an evolving creation: an already smart aircraft that keeps getting smarter.

In our product support services, we are dedicated to being as dynamic and responsive as the Hercules aircraft itself. Our job to make sure that more than just ideas take flight. We help train our customers to fly the Hercules, and to maintain it. We supply spares, data systems, and equipment for ground support, and we provide repair services.

We have experts on duty around the clock at the Lockheed facility in Marietta and worldwide, ready to provide our customers with up-to-the-minute information and assistance. To document our products, we provide continually updated technical publications, as well as a wide range of other services.

At Lockheed, we want to be sure that our customers receive the best value in theindustry for every investment in our products and services. To achieve this, we make certain that the most inspired and best-built airlifter in the world is also the best supported.

Sincerely,



M.M. Hodnette
Director of Product Support

PRODUCT SUPPORT

LOCKHEED AERONAUTICAL SYSTEMS COMPANY
GEORGIA DIVISION, MARIETTA, GA. 30063

M.M. HODNETT DIRECTOR

CUSTOMER SERVICE	INTEGRATED LOGISTICS SUPPORT	CUSTOMER SUPPLY
A.H. MCCRUM	HT NISSLEY	H L BURNETTE
DIRECTOR	DIRECTOR	DIRECTOR

SEALING MATERIALS FOR HERCULES AIRCRAFT

by M. G. Billias, Staff Engineer
Materials and Processes Engineering

There are several different kinds and types of sealants used on the Hercules aircraft. The list includes silicones, fluorosiliconcs, polyurethanes, polyacrylates, and polysulfides. Each sealant is compounded to have certain desirable properties and is used on the aircraft where these properties are needed.

The great majority of the sealants used on the Hercules aircraft arc, however, of the polysulfide type. Polysulfide materials have long been in general use as sealants throughout the aircraft industry. They are dependable, easy to use, readily available, and relatively inexpensive.

Most of the sealants used during initial manufacture of the Hercules will last the life of the aircraft. They will never have to be repaired or replaced. Others, of course, are subjected to chemical or thermal degradation or weathering and may require repair or rework.

Work with sealants in the field usually involves (1) the fuel tanks and leak repair, (2) environmental sealing in connection with structural repairs, and (3) occasionally, repair of windshields.

Only the sealants designated in the T.0.s should be used in making these repairs. For example, MIL-S-8802 sealants should be used in making fuel tank repairs, while the MIL-S-81733 sealants should be used in faying surface sealing and wet-fastener installation in making structural repairs.

Most repairs on the aircraft can be made with the appropriate polysulfide sealing material. The following information concerns the polysulfide sealants, although other types of polymers respond in a similar manner with regard to heat curing.

A two-part polysulfide sealant cures by mixing the catalyst (or curing agent) with base material. Thecuring mechanism is tailored by the manufacturer to provide a cure time and related pot life or application time that ranges widely from product to product. This can be from a short pot life of 15 minutes and a tack-free cure of six hours to a long pot life for a material that remains mastic (fluid) for 168 hours and requires 21 days for a tack-free cure.

The curing process is a chemical reaction and, like most chemical reactions, is affected by heat. Elevated temperatures speed up the reaction, while lower temperatures slow it down. Cure rates arc also affected by humidity; the higher the humidity, the faster the reaction.

A manufacturing and field repair sealant should, ideally, have unlimited pot life, remain mastic until all assembly or repair operations are completed, and then cure immediately. Since the ideal sealant does not exist, it is necessary to use the chemical "facts of life" to enhance the capabilities of the sealants that are available.

Freeze-mixed sealants can be stored up to 30days with no significant loss of application time. All that is required is to quick-thaw the material and it is ready for normal use.

A good rule of thumb is that for every l5-degree F rise in temperature above the standard test condition temperature of 77 degrees F, the application and cure time is reduced by one half. For example, a sealant that has a tack-free time of 48 hours at 75 degrees F would cure tack-free in three hours if cured at 135 degrees F. These calculations are made assuming that the humidity is approximately 50 percent.

A sealant used during assembly operations must have a long pot life and consequently a long cure time. Because of the manufacturing or shop environment, the excess or "squeeze-out" of wet sealant can become contaminated with dirt or metal chips. Various techniques have been tried in an effort to reduce this problem, but none have been satisfactory.

Recently a new material, called a tack-free accelerator, has been developed. It reduces the tack-free time up to 85 percent. This material forms a cured surface on the sealant that prevents dirt and metal chips from sticking to the sealant. The material is very effective in accomplishing this purpose.

SEALANTS USED IN MANUFACTURE AND REPAIR

MATERIAL TYPE	GENERAL PURPOSE	SPECIFICATION	VENDOR/PRODUCT
Fluorosilicone	Fuel and oil resistant High temp. resistant	—	Dow Corning RTV 730
Silicone	High temp. aerodynamic smooth-windshield sealant	—	Dow Corning 93-006-6 93-006-1
	Firewall sealant	AMS3374	General Electric RTV 133
Polysulfides	Fuel and oil resistant	MIL-S-8802	Q.P.L.
	Corrosion inhibiting	MIL-S-81733	Q.P.L.
	Hole filling compounds	—	Products Research Co. ProSeal 567 PR205 Goal Chemical Co. GC4106
	Low density-pressure sealing	—	Goal Chemical Co. GC401 Products Research Co. PR1223
	Electrically conductive	—	Goal Chemical Co. GC4109
	Corrosion inhibiting/ electrically conductive		Products Research Co. ProSeal 872
	Potting compounds	MIL-S-8516	Q.P.L.
	Aerodynamic smoother	MIL-S-38226	Products Research Co. ProSeal 895
	Low adhesion sealant	MIL-S-8784	Q.P.L.
	Low adhesion/ corrosion inhibiting	—	Products Research Co. PR1403G
	Honeycomb sandwich sealant (epoxy-polysulfide)	MIL-S-834232	Goal Chemical Co. GC91
Polyacrylates	Heat resistant sealant	—	Products Research Co. PR810
	Firewall sea ant	MIL-S-38249	Products Research Co. Proseal 700 Goal Chemical Co. GC1900
Polyurethane	Smoothing and fairing	MIL-C-83982	B.F. Goodrich Co. PL 410

The name of this product is Proseal 815, manufactured by Products Research Corporation. It is effective on polysulfide sealants only. Proseal 815 should be very useful in field repairs. It is supplied in an aerosol container and only a light spray over the "wet" sealant is necessary. If the structure or sealant is to be subsequently painted, or if the repairs are inside a fuel tank, the overspray should be solvent-cleaned prior to application of the paint or top coat.

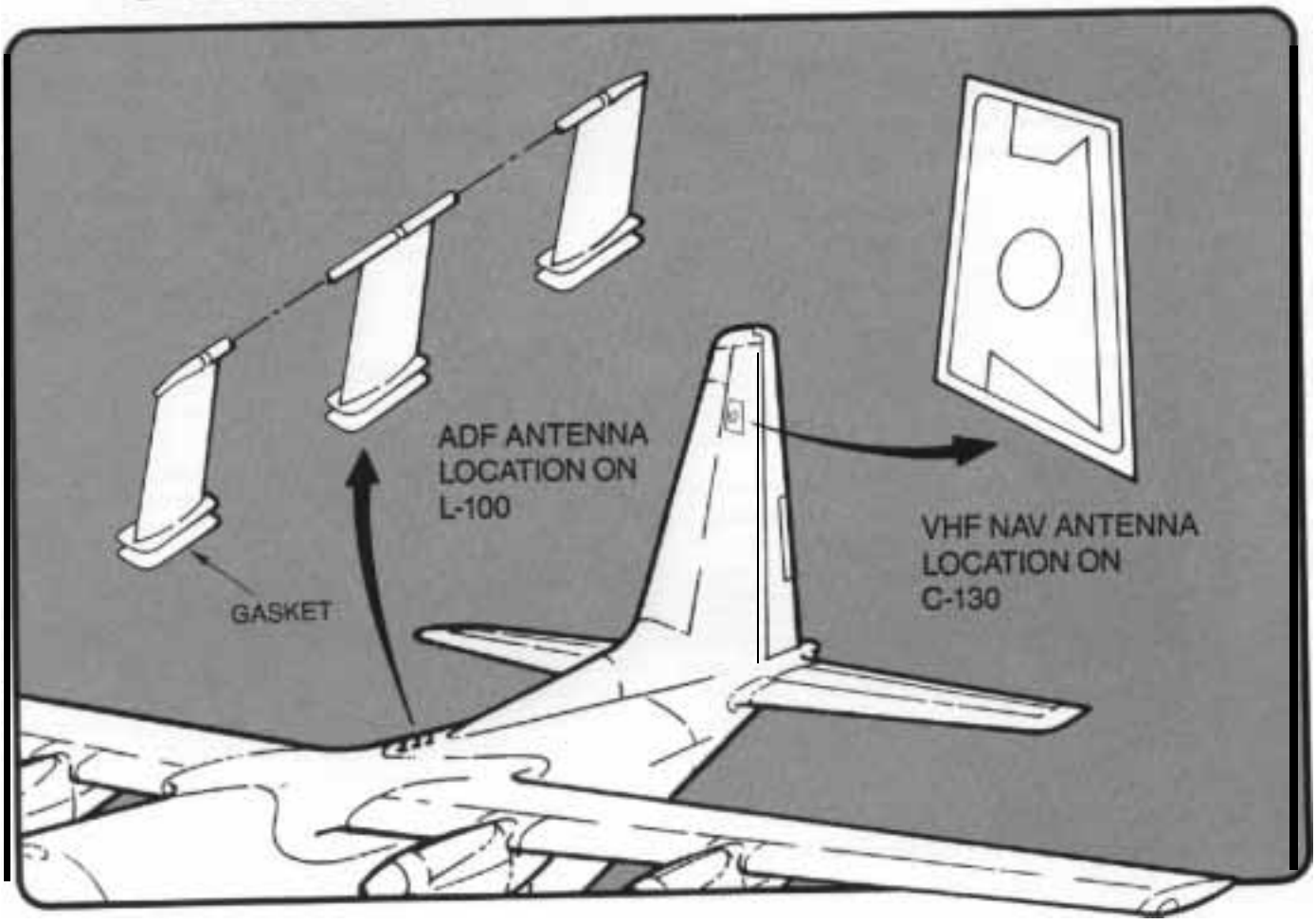
It is important that the function of the tack-free time accelerator not be misunderstood. The accelerator cures only the surface of the sealant. Only elevated temperature and humidity are effective in accelerating the cure of the applied sealant throughout.

The table above lists the various types of sealants used on the Hercules, the suppliers, and the product identity. If your work on the Hercules brings you into contact with sealants and sealing materials, this information should be useful to you.

service news

Previous Page Table of Contents Next Page

Fighting Antenna CORROSION



by **E. J. Smith,** Materials and Processes Engineer, Senior
D. G. Wetzel, Field Service Representative

Antennas on the Hercules aircraft should be inspected periodically for corrosion. These inspections require that the antennas be removed and then reinstalled. Because of the location of some of the antennas-such as the two VHF NAV antennas on the C-130-and the number of fasteners holding them in place, the removal procedure can be tedious and time-consuming.

It is important to understand what causes corrosion at the antenna and adjacent surfaces in the first place. Whenever surface panels or antennas are removed from the aircraft, it is not uncommon to find corrosion at the mating surfaces.

Antennas and surrounding areas, such as the Omega mounting assembly, are always highly corrosion-prone. The frame that attaches an antenna to the structure of the aircraft is normally aluminum. The bonding strips on the antenna panel itself may be of brass or copper or a similar conductive material. When moisture is trapped between mating surfaces of galvanically incompatible materials such as copper and aluminum, the corrosion process begins.

An antenna such as the ADF sense antenna usually has a rubber gasket installed between the antenna and the aircraft fuselage skin panel. However, unless the antenna is properly sealed, water and washrack chemicals can get between the gasket and panel and cause corrosion of the panel.

An improved procedure for installing and rcsealing antennas could help exclude moisture and thus inhibit the corrosion processes. In this article we will examine such a procedure.

Engineering drawings and specifications normally require that antenna mating surfaces and fasteners be free of insulating finishes to provide for electrical conductivity. To prevent moisture intrusion and the inevitable corrosion that follows, while at the same time maintaining electrical continuity, Lockheed Engineering recommends that antennas be removed and installed as follows:

1. Remove the antennas. Using a cloth wet with a solutionofonepart Turco AIR-TEC21 (MIL-C-87936, Type I) or B&B-2020 Plus (MIL-C-43616, Class I) or equivalent aircraft surface cleaning compound and 10 parts tap water, clean the aircraft and antenna mating surfaces. Wet another cloth with clean tap water and wipe the surface free of soil and soap solution. Dry the surface with yet another cloth.

2. Visually inspect the aircraft and antenna mating surfaces for corrosion products, pitting, exfoliation, and other discontinuities.

3. Remove corrosion per procedures in the applicable maintenance manuals. Blend out all pits and roughness to conform with the requirements of prescribed corrosion control guidelines.

4. Using a depth gage, determine if the allowable removal limits have been cxcccdcd. If the metal removed exceeds the allowable limits, repair in accordance with applicable procedures in the structural repair manual.

5. Using fresh cloths and O-T-620 trichloroethane or TT-N-95 aliphatic naptha, clean the mating surfaces of the aircraft and antenna.

6. Apply Ram Chemicals Plastilease 843 parting agent (or equivalent) to the antenna mating surface and allow to dry. Apply to antenna only.

7. Apply Goal Chemical CC-4109 or Coast Pro-Seal 872 (or equivalent) electrically conductive sealant to the mating surfaces of the aircraft and antenna. Use an adequate amount of sealant to ensure complete coverage leaving no voids.

8. Dip attaching screws in Ram Chemicals Plastilease 843 (or equivalent) parting agent and allow screws to dry.

9. Install screws wet with CC-4109 or Pro-Seal 872.

10. Within the pot life of the sealant, clean off excess sealant from around the antenna edge and from around fasteners with cloths and O-T-620 trichloroethane or TT-N-95 aliphatic naptha. Allow the sealant to cure tack-free before proceeding.

11. Prime all gaps and voids around the antenna with PL 106 primer and then fill with B. F. Goodrich Industrial Products PL 410 B2 (MIL-S-83982) fluid-resistant sealant. (Note that this is a two-part system which requires that primer beapplied before the sealant.)

12. When the sealant is tack-free, apply the appropriate finish system over the sealant, screw heads, and exposed metal adjacent to the antenna.

When the above instructions are followed, the major cause of corrosion-moisture-will be eliminated. Less work will be required when replacing or inspecting the antennas.

Lockheed Engineering is recommending this procedure for incorporation in the appropriate technical manuals. We believe that the new procedure will help prolong the life of the antennas and the attaching structure of the aircraft, as well as make possible an increased interval between inspections.

INDEX by SUBJECT-
VOL. 1, NO. 1 through VOL. 14, NO. 4
1974-1987

AIRFRAME

AIRFRAME (cont)

AIRFRAME (cont)

AIRFRAME (cont)

ELECTRICAL AND AVIONICS

Previous Page Table of Contents Next Page

ELECTRICAL AND AVIONICS (cont)

ENGINES AND PROPELLERS

ENGINES AND PROPELLERS (cont)

ENGINES AND PROPELLERS (cont)

FUEL SYSTEM

FUEL SYSTEM (cont)

HYDRAULICS

Previous Page Table of Contents Next Page

HYDRAULICS (cont)

HYDRAULICS (cont)

LANDING GEAR

LANDING GEAR (cont)

LANDING GEAR (cont)

OPERATIONS

Previous Page Table of Contents Next Page

OPERATIONS (cont)

PNEUMATICS AND ENVIRONMENTAL

PNEUMATICS AND ENVIRONMENTAL (cont)

TOOLS AND GROUND SUPPORT EQUIPMENT

TOOLS AND GROUND SUPPORT EQUIPMENT (cont)

TOOLS AND GROUND SUPPORT EQUIPMENT (cont)

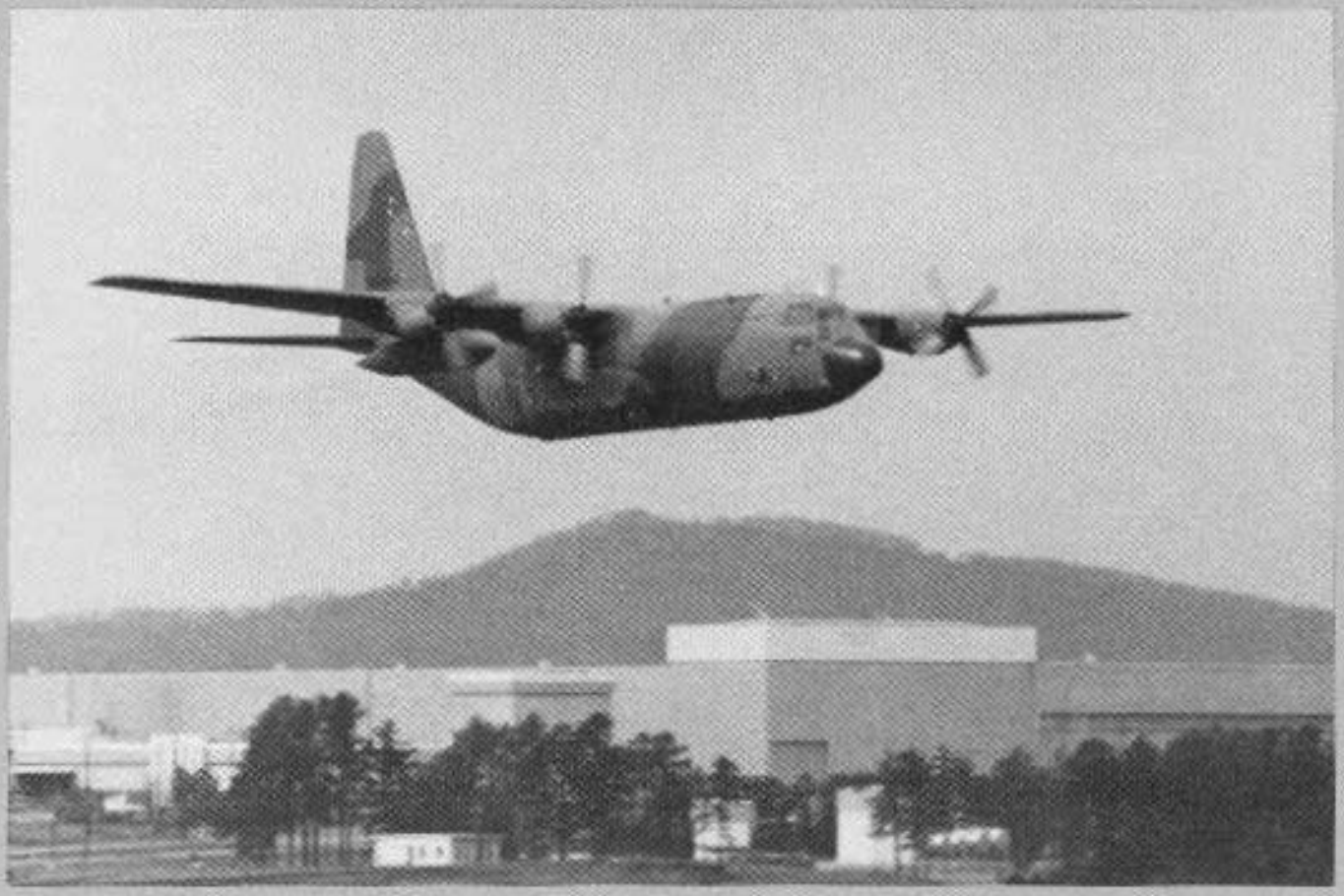
MISCELLANEOUS

Previous Page Table of Contents Next Page

MISCELLANEOUS (cont)

MISCELLANEOUS (cont)

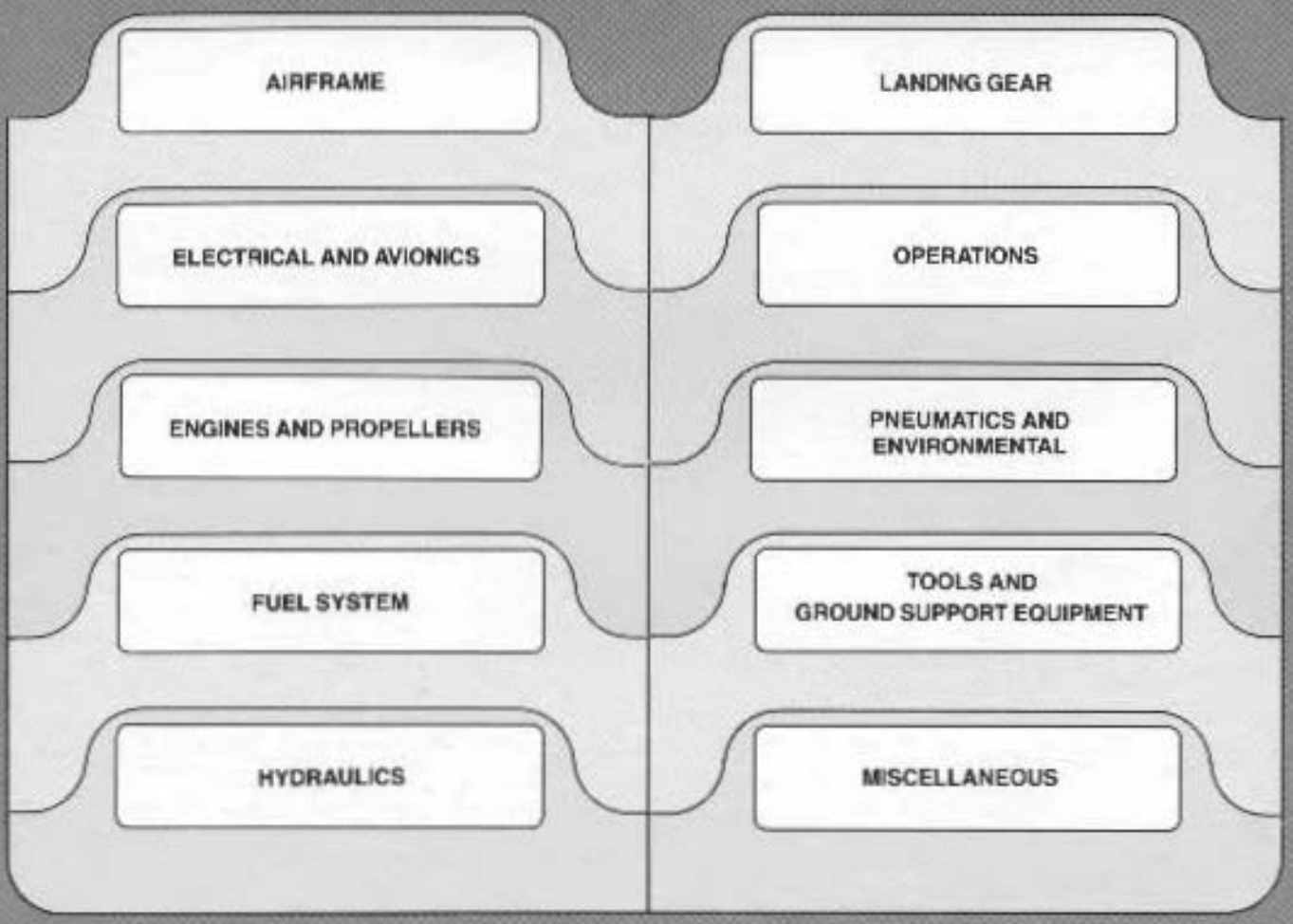
Service News



Lockheed
Aeronautical Systems Company

A SERVICE PUBLICATION OF
LOCKHEED AERONAUTICAL
SYSTEMS COMPANY
GEORGIA DIVISION

INDEX
1974–1987



Previous Page Table of Contents Next Page