LOCKHEED MARTIN

VOL. 25, NO. 4 October - December 1998

Service News

A SERVICE PUBLICATION OF LOCKHEED MARTIN AERONAUTICAL SYSTEMS SUPPORT COMPANY

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SYSTEMS SUPPORT COMPANY

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Front Cover: The 302nd AW takes part in the shortfield landing competition at the 1998 Air Mobility Rodeo at McChord AFB.

Focal Point

Airlift Field Service

Lockheed Martin's Airlift Field Service organization is a key element in the technical support of the Hercules aircraft. At Lockheed Martin Aeronautical Systems Support Company, we offer expert global support for all models and configurations of the Hercules from the C-130B to the latest C-130J. To date, we have contributed to the success of Hercules operators in more than sixty (60) countries worldwide. Our definition of service is simple and to the point: Field Service will provide anything of a technical, engineering, or logistical nature that the customer may require to ensure the success of his Hercules operations.

A key element of Field Service is the Field Service Representative (FSR). Each FSR is a highly experienced career professional, factory trained as an on-site expert in providing technical assistance on the airframe and all functional systems. Specialists are also available for assignment to such areas as avionics and supply. Each FSR is fully qualified to provide formal classroom and on-the-job training, as required. Effective airlift operations require effective teamwork. FSRs ensure the customer's access to the full resources of the factory from the very first day. FSRs are qualified to advise on all phases of maintenance, inspection, and operation of Hercules aircraft.

The FSRs work directly with the Hercules Support Center at the Field Service home office which is staffed by some of the most experienced Hercules personnel in the world. The average Hercules experience of the personnel in the home office is over thirty (30) years. The home office provides the crucial link to all Lockheed Martin in-plant organizations (engineering, manufacturing, quality assurance, supply, materiel, reliability, safety, research, etc.), vendors, and subcontractors. This link allows all of the Lockheed Martin resources to be brought into direct support of Hercules aircraft operations. Direct engineering liaison, expedited emergency spare parts delivery assistance, and rapid solution to complex technical problems are a few of the many services provided. If you do not have an FSR assigned to your operation, the Hercules Support Center can be reached directly at telephone: 770-431-6569, facsimile: 770-431-6556, and E-mail: hercules.support@lmco.com.

As the official support arm of the Hercules Original Equipment Manufacturer, Field Service is uniquely qualified to provide the most accurate, authoritative, and cost effective solutions to Hercules operators worldwide. A list of our Field Service Offices is located on pages fourteen (14) and fifteen (15) of this publication. Please keep this list handy and contact one of the FSRs if you ever need assistance while in their area.

Back Cover: HC-130H from U.S. Coast Guard Air Station Elizabeth City, NC, at RIAT '98. Photograph courtesy of PA3 David Schuerholz.

Parker Air Turbine Starters

by **Dennen J. Bunger,** *Air Turbine Starter Design Engineer, Parker Aerospace*

Starting the engines of the Hercules aircraft is one of the necessary, albeit less glamourous, tasks of each and every flight. Reliable and trouble-free engine starts require maintenance personnel to have a good working understanding of the starter and all of the components involved. In this issue, the Air Turbine Starters used on the Hercules aircraft will be examined along with some of the common pitfalls various operators have encountered.

Parker Aerospace manufactures two Air Turbine Starters for the Hercules aircraft: the 36E84-18 and the 36E165-2. The 36E84-18 is a grease lubricated model while the 36E165-2 is an oil lubricated model. These starters are used on all Hercules models prior to the C-130J. A brief description of the system used on the C-130J and its differences is given at the end of this article. The Parker Aerospace starters used on the Hercules (prior to the "J") are unique in that their drive mechanism automatically engages the engine and then completely separates the starter drive from the engine at the end of the start/motoring cycle. No component of the starter is driven by the engine; therefore, relative to the starter's useful life, only the time to start is cumulative - engine hours do not count. This important aspect of the starter's design was one of the deciding factors when it was selected for the C-130. These starters easily accommodate the high engine speed and the long mission periods associated with the Hercules.

The separable jaw engaging mechanism works reliably when operated within a specific "Design Window." Understanding why certain operating conditions are desirable is best accomplished by understanding how the engaging mechanism works. A basic law of physics states that when a mass of given inertia is accelerated, the torque required to produce the acceleration is equal to the product of the inertia and the acceleration. That torque, when applied to the starter's drive coupling, which is mounted on a helical spline, produces an axial force (much like the lifting force of a "jack screw"). It is that axial force which causes the starter's drive jaw to advance into engagement with the engine mounted jaw which in turn rotates the engine.

The inertia of the drive coupling and the helix angle on which the coupling is mounted are built-in when the parts are manufactured. The variable in the design that can be controlled is the acceleration of the device at start initiation. Acceleration is dependent upon the rate at which the pressure rises in the starter, which is dependent upon the rate at which the starter control valve opens. The rate at which the starter control valve opens is a function of the manifold pressure to the starter control valve.

The "Design Window" in which the starter functions most reliably can be achieved by pre-setting the valve-opening rate to accommodate the manifold pressure at which starts will typically be made. This has been proven by the United States Air National Guard C-130 squadrons who have elected to operate at a manifold pressure of 75 - 80 pounds per square inch gauge (psig) and a starter control valve opening rate adjusting screw setting of 3/8 inch. The result has been many years of operation without starter problems. The "Design Window" can be achieved at other operating manifold pressures, but each different manifold pressure will correspond to a different setting on the valve's opening rate adjusting screw.

Starter Lubrication

The 36E84-18 Air Turbine Starter utilizes Magna Lube "G" grease for lubrication. This unit is not serviceable in the field; grease can only be added when the starter is apart during overhaul. The major problem with this starter has been the large lip seal on the outboard end. The seal has exhibited a relatively short life, impeding reliable jaw advance. This, in turn, has typically resulted in prematurely worn starter jaws.

A new seal for the 36E84-18 starter has been thoroughly tested with great success on in-service aircraft. The new seal (Parker Part Number 5933139-101) is approved by both Lockheed Martin and the U.S. Air Force. It can be installed in the field on existing starters in accordance with Parker Service Bulletin 36E84-80-90. The new seal owes its success and long useful life to two thin, flexible Teflon sealing elements which

-Mounting Adapter & V-Band Clamp

accommodate the oscillatory motion of the starter's jaw mechanism at start termination without developing any frictional heat.

The 36E165-2 Air Turbine Starter for the Hercules was designed specifically to be oil lubricated. It replaces the earlier grease lubricated 36E84-18 starter, which was not designed to provide a motoring capability. On the 36E165-2 starter, oil circulates through all of the components, bearings, and gearing, absorbing the heat generated at these locations and then giving that heat up to the gear housing and sump as it circulates. Therefore, the starter may operate safely for extended periods without overheating. This feature is useful for activities such as water washing the engine. The extended operation is limited, however, because the starter's lubrication system is a closed loop system and does not circulate the oil through an intercooler.

The amount of oil in the 36E165-2 starter is very important! **Too much oil** is just as bad as **too little oil.** Too much oil increases the internal hydraulic pumping losses and drag, which increases the internal temperature. Both conditions - too much oil and too little oil - will result in premature breakdown of the oil, ultimately causing the oil to lose it's capacity to properly lubricate the dynamic elements of the starter.

LUBRICATING THE STARTER WHEN THE STARTER IS MOUNTED ON THE ENGINE IS THE ONLY WAY TO ENSURE THE STARTER HAS THE PROPER AMOUNT OF OIL. DO NOT ADD OIL WHEN THE STARTER IS OFF THE ENGINE.

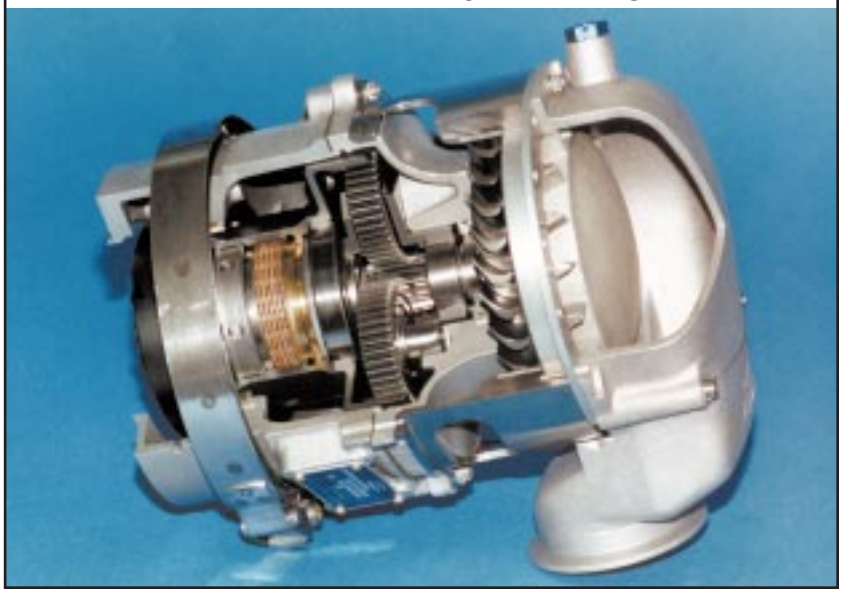
The proper amount of oil is 175 cubic centimeters (c.c.). MIL-L-23699 engine oil should be added through a fill port provided on the side of the starter's gear housing until it drips from the port. Squirt cans with a flexible neck are commonly used for this purpose.

Case History Review

Parker has delivered more than 1,500 of the 36E165 starters. Representatives of Parker have visited with many of the operators to review installation, operation, and maintenance procedures. Unfortunately, deficiencies resulting in poor starter performance have been found. Some procedures relative to starter inlet conditions have caused the starter to operate outside of its "Design Window"; some have been faulty installation procedures, and others have been faulty maintenance procedures. Some of the common problems are listed below along with their results.

1. Operating at manifold pressures well below and/or in excess of 75 - 80 psig with the valve rise rate adjusting screw set at 3/8 inch.

Turbine & Planetary Gear Stage



a. Operating at manifold pressures well below the start valve's minimum regulation level (37 psig) typically yields sluggish advancement of the engaging mechanism, missed engagement, worn jaws, and, ultimately, the inability to engage the engine.

b. Operating at high manifold pressure (100 psig and up) can produce high torque at starter engagement, premature failure of the starter's slip clutch, and, ultimately, the deformation of the locating dowel pins in the starter's mounting, possible shearing of the starter's drive coupling, and can possibly cause disconnection of the torque tube to the engine.

Stator - Flow Limiter & Clutch Pack

2. Undetected leaks in the ducting to the starter have had the same results as discussed under "Low Pressure" previously. Long engine starts typically result because starter output performance is directly related to the inlet pressure to the starter. Slow starts are also a clue to this condition.

3. Undetected leaks in the pressure sensing line from the starter to the start valve. In this situation the start valve senses low pressure and opens further than usual, producing high pressure at the starter and high output torque. The high torque will ultimately have the effect described previously. Fast starts are a clue to this condition.

4. The gasket, MS/9136-01, required by the mounting pad specification (AND20002, Type XIIS) has been inadvertently omitted. The result is reduced clearance between the mating jaws of the starter which may ultimately lead to prematurely worn starter jaws and non-engagement with the engine.

5. Applying lubrication oil to the starter before mounting the starter on the engine. This results in overfilling of the starter's gearbox causing sluggish jaw advance,worn jaws, and eventual non-engagement with the engine.

6. Not mounting the starter squarely to the starter mounting adapter. This has resulted in prematurely worn jaws and non-engagement with the engine. Heavy wear on one side of the jaws is a clue to this condition.

7. Immediately reinitiating a start after the person's finger has inadvertently slipped off the "Start" switch. This will result in worn starter jaws also. Always allow the start valve light to go off and allow at least thirty seconds to pass to permit the starter to coast to rest before initiating another start.

Differences in the C-130J

Since the C-130J utilizes the twin spool Allison AE 2100D3 engine, it is started through the engine accessory section rather than through the propeller gearbox. When starting the AE 2100D3, only the engine accessories, compressor, and gas turbine are rotated as opposed to earlier Hercules models in which the entire engine and propeller system was turned for starting. On the starter used on the C-130J, the output shaft and a portion of the drive shaft assembly continue to rotate with the engine after the starting cycle is complete. The remaining portion of the starter operates through a clutch assembly and does not rotate after the starting cycle is complete.

Summary

It is important to recognize the air turbine starter is only one element in the Hercules start system. Problems with other elements of the system will almost certainly manifest themselves in the starter. It is important, therefore, to carefully evaluate any problems and to scrutinize the other elements of the system for the real cause of any difficulty experienced. Simply changing the starter without correctly diagnosing the problem will only lead to continued difficulty. ❑

Hercules Flap Quadrant Assemblies and Position Switches

The flap quadrant assembly on Hercules aircraft utilizes position switches that activate various systems based on flap position and play a vital role in flight safety. These systems include the landing gear warning system, the ground proximity warning system (GPWS), and the rudder boost pressure system. The GPWS switch is set to activate at a flap setting of 40% +/- 5% on all Hercules aircraft equipped with the system. The rudder boost pressure system switch is set to activate at 15% +/- 5% on all Hercules.

The landing gear warning switch, however, may be set to one of three different values. The setting depends on the flap quadrant assembly part number. In general, the landing gear warning switch is set to 70% +/- 5% on all baseline military C-130 aircraft, at 80% +/- 5% for KC-130 tankers and aircraft equipped with tanker provisions such as the C-130T, and at 60% +/- 5% on all L-100 commercial versions of the Hercules.

However, there are some exceptions to these general guidelines. For instance, some of the early U.S. Navy aircraft such as the KC-130F (tanker) were delivered with landing gear warning switches set at 70% +/- 5%.

The most reliable method for determining the proper setting for the landing gear warning switch is to correlate the part number of the flap quadrant assembly to a particular setting. The correct flap quadrant assembly part number for a particular aircraft can be determined by referencing the applicable Illustrated Parts Catalog (IPC) publication. In order to alleviate confusion in this matter, the table below is provided to help correlate flap quadrant assembly part numbers, primary application, and appropriate setting for the landing gear warning switch. It should be noted that the landing gear warning switch may only be adjusted a small amount due to the fact that different cams are used in different flap quadrant assemblies. Therefore, a flap quadrant assembly

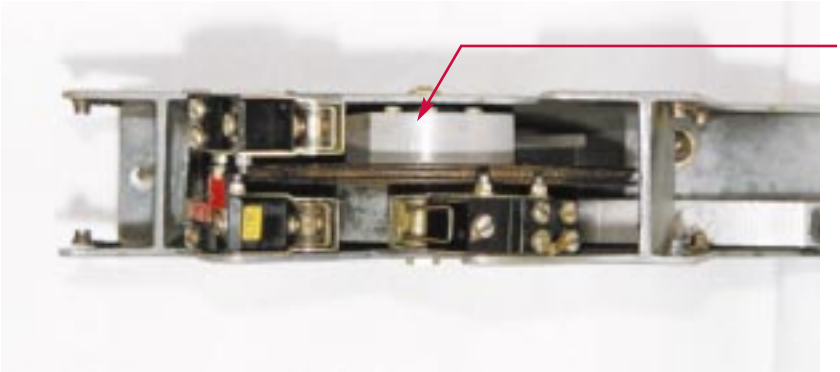
Flap Quadrant Assembly Part Number	Primary Application (Prior to C-130J)	Landing Gear Warning Switch Setting
371631-5 3317608-5 3317608-13	Commercial L-100 Aircraft	60% +/- 5%
371631-2 371631-3 3317608-1 3317608-9 3317608-11	C-130 Baseline Aircraft and KC-130F Aircraft	70% +/- 5%
371631-7 3317608-3 3317608-7 3317608-15	KC-130 Tanker Aircraft	80% +/- 5%

designed for a landing gear warning switch setting of 70% +/- 5% cannot be successfully adjusted to 80%. Instead, the correct flap quadrant assembly must first be installed. There is one additional note concerning aircraft equipped with Night Vision Imaging System (NVIS) lighting. Non-NVIS quadrants should not be substituted for NVIS quadrants on NVIS aircraft, but substituting NVIS quadrants for non-NVIS quadrants is acceptable.

When adjusting the setting of the landing gear warning switch, only adjust the switch by bending the adjustment tab on the actuator part of the switch. Never try to adjust the arm of the switch. Premature failure of the switch actuator arm can result if it is used for adjustment.

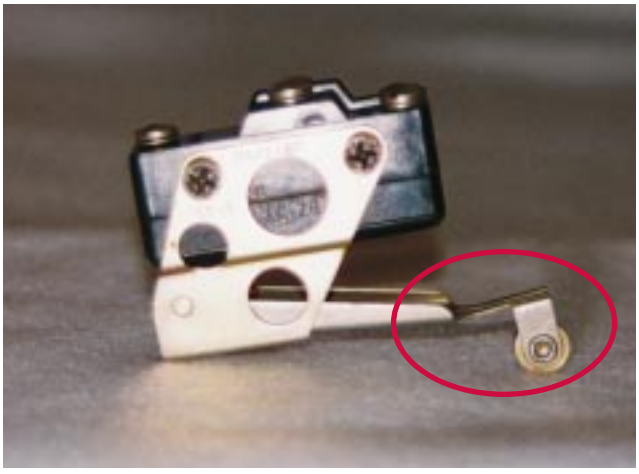
All of the preceding information applies only to Hercules aircraft prior to the new C-130J. The C-130J landing gear warning system is activated through the mission computer. The landing gear warning system on the baseline aircraft is set to activate at a flap position of 70% +/- 5%. The landing gear warning system on the tanker versions of the KC-130J will depend on whether or not refueling pods are installed. The system will activate at 80% +/- 5% when the pods are installed and at 70% +/- 5% when the pods are not installed.

All technicians should refer to the appropriate technical publications for the most up to date information on part numbers, settings, and procedures. ❑



The photo to the left shows the underside of a typical flap quadrant assembly. The flap position switch for the GPWS has been removed so that one of the cams will be more visible. The cam that actuates the landing gear warning system is mounted in different locations, depending on the designated warning threshold (60%, 70%, 80%).

The photo below shows a typical position switch and switch actuator arm. Note that the arm of this switch actuator has been bent. This is the incorrect way to adjust this switch. The photo at right shows the same assembly with the microswitch removed. Note the highlighted area that actuates the microswitch. This is the tab that is to be used for adjustment of the switch. This tab may be bent slightly to cause the switch to actuate earlier or later, as needed.



"The World Cup of Air Mobility"

General Walter Kross, Commander, Air Mobility Command

The best airlift and tanker crews in the world gathered in the beautiful Pacific Northwest at McChord Air Force Base, Washington, the week of 21 June to compete in Rodeo '98. A total of seventeen C-130s from around the world participated along with aircraft such as the C-5, C-141, C-9, C-17, KC-10, and KC-135. Overall, fifty-four U. S. teams and eight international teams competed in the event.

Competition was keen throughout the week. Teams competed in events including airdrop, tanker, aerial port, maintenance, shortfield landing, security forces, and aeromedical evacuation. A "team spirit" truly permeated the event as teams stepped up to help others when needed. For example, one of the teams blew a tire upon arrival at the event. Another team gladly loaned them a tire so that they could still compete. Personnel at McChord worked to make sure the international teams felt welcome by providing everything from translators to assistance locating supplies and hotel reservations. According to FltLt.

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Congratulations to the Commander and Crew 3rd Wing, Elmendorf AFB, AK - "Best Air Mobility Wing"

Congratulations to the Commander and Team Royal Saudi Air Force - "Best International Wing"

Mark Stanley of the United Kingdom team, Rodeo involves a lot of "hard work and hard play." FltLt. Stanley, who was participating in his first Rodeo, went on to say that the sponsors from McChord had given them "absolutely superb, first class service." In addition to the competing teams, eleven nations sent teams to observe the competition. The observers plan to return as competitors at future Rodeos.

The new C-130J arrived at McChord on Wednesday evening and was on static display Thursday, 25 June. During the day, hundreds of personnel took the opportunity to take a first hand look at the latest member of the Hercules family. Lockheed Martin personnel presented a briefing on the C-130J to a packed room Thursday afternoon. Thursday evening, the C-130J conducted a very impressive flight demonstration that included a short field take-off and several low passes.

As with any competition, the goal of all the teams was to win. At an Air Mobility Rodeo, there are many awards presented to the winners of the various events. The most coveted and sought after award, however, is the General William G. Moore, Jr. Trophy which is presented to the Best Air Mobility Wing. This award represents the "Best of the Best." This year, the bragging rights belong to the 3rd Wing from Elmendorf Air Force Base, Alaska. Not only did the 3rd Wing, who operates C-130E aircraft, win the Best Air Mobility Wing Award, they also won awards for Best C-130 Wing, Best Airdrop Wing, Best C-130 Aircrew, and Best Shortfield Landing Crew. A special congratulations is extended to the Royal Saudi Air Force for their significant achievement in winning the Best International Wing Award. Lockheed Martin extends our congratulations to all of the competitors at Rodeo '98 for an excellent competition. Like you, Lockheed Martin is looking forward to Rodeo 2000, which will be held at Pope Air Force Base, NC. ❑

Technical Publications Review

by **Airlift Field Service Staff**

A wealth of information is available to Hercules operators in the form of technical publications. Lockheed Martin goes to great lengths to ensure the quality and applicability of all technical publications that are distributed to customers. In addition to the technical publications produced by Lockheed Martin, the United States government produces technical publications for their aircraft. The vast amount of technical publications available for the Hercules can be confusing, however, there is a manual that ties them all together. The first publication with which everyone associated with the operation of Hercules aircraft should become familiar is the List Of Applicable Publications (LOAP). The LOAP is the single source that will authoritatively state which publication is applicable for a particular aircraft and operation. A thorough understanding of the LOAP is vital to the successful use of technical publications. Although it would be impossible to adequately address all of the technical publications that are available, this article will give an overview of the most common technical publications applicable to Hercules aircraft prior to the C-130J currently in use by Hercules operators. Specifically, the following publications will be addressed: Service Manual Publications (SMP), Technical Orders (TO), Time Compliance Technical Orders (TCTO), NAVAIR publications, Service Bulletins (SB), and Airworthiness Directives (AD). In addition, the process of generating a Service Bulletin will be examined as well as the SBs role in TCTOs, Navy Technical Directives, and ADs. C-130J technical publications are substantially different and will be addressed in a future issue of *Service News.*

Aircraft Flight Manuals, Operating Manuals, and Performance Manuals

Lockheed Martin publishes a flight manual for the commercial versions of the Hercules, which are technically known as Model 382 (L-100), 382E (L-100-20), and 382G (L-100-30). The flight manual is numbered AFM 382/E/G and contains information for the L-100, L-100-20, and L-100-30. The AFM 382 series for commercial aircraft is complemented by an Operating Manual and a Performance Manual. The Operating Manual is numbered OM 382-XX for the L-100, OM 382E-XX for the L-100-20, and OM 382G-XX for the L-100-30. The "XX" in the Operating Manual numbers represent operator unique designations since each OM is customized for the operator. The Performance Manual is titled SMP 1118. Within these publications are the normal and emergency operating procedures and all the preflight, inflight, and postflight checklists for the pilot, copilot, and flight engineer.

Lockheed Martin also publishes flight manuals for non-U.S. military operators of the C-130 series of aircraft. Most readers will realize that there are some noteworthy differences between the C-130 series and the 382 series, even though both are referred to as "Hercules" aircraft. The flight manuals published for non-U.S. military C-130 operators are titled FM 382C - ( ). The flight manual is complemented by various checklists for particular crew positions and situations. For example, different documents will contain checklists for pilot, copilot, preflight, inflight, etc. The checklists are titled FM 382C - ( ) - CL - Specific Checklist Number. The flight manuals and checklists are customized for each operator with regard to installed equipment, procedures, etc. Each operator is assigned a unique identification number for these publications which is inserted in place of the parentheses in the titles listed above. For example, a particular operator's flight manual may be titled FM 382C - 25 and the checklists titled FM 382C - 25 - CL - Specific Checklist Number. The flight manuals and checklists for non-U.S. military operators are complemented by the Performance Manual titled SMP 777.

The U.S. government has its own series of flight manuals, checklists, and performance manuals for the aircraft that it operates. The U.S. Air Force series of documents is titled TO 1C-130(Model) - 1 and is used by the Air Force, Air Force Reserves, and Air National Guard. The U.S. Coast Guard publishes its own flight

manual series (CGTO 1-C130H-1) with the exception of the 1-1 performance manual. The U.S. Navy series of these documents is titled NAVAIR 01 - 75(Model ID) - 1 and is used by the Navy and Marine Corps.

Lockheed Martin Service Manual Publications (SMP) and Technical Manuals (TM)

There are many documents bearing the prefix "SMP," but only the most commonly used will be discussed here. Each of the pertinent documents is listed below with an explanation of its purpose and applicability.

SMP 515 - B: Corrosion Prevention and Control Manual. This publication is applicable to military C-130 aircraft that are operated by non-U.S military organizations and all commercial L-100 operators.

SMP 515 - C - ( ): Progressive Inspection Program. This publication is tailored to each individual operator and identified by a unique number in place of the parentheses. For example, an operator's Progressive Inspection Program may be titled SMP 515 - C - 25. Lockheed Martin tailors the SMP 515 - C to take into account the equipment installed on the aircraft, the customer's unique operating environments (desert, mountains, coastal, etc.) and the customer's unique mission requirements (low level, unimproved airstrips, etc.). After studying the elements listed above, Lockheed Martin engineering constructs a Progressive Inspection Program for the customer utilizing work cards. These work cards outline individual tasks that make up complete inspections. When constructing an SMP 515 - C program, Lockheed Martin uses the experience derived from over 2,000 aircraft coupled with extensive structural analysis, test articles, and functional system tests. This assures that the resulting program provides continued airworthiness of the fleet with minimum maintenance downtime. Progressive Inspection Programs are used by both domestic and international commercial operators and by international government operators. The SMP - 515 - C program addresses C-130B and later aircraft in addition to 382E and 382G aircraft.

SMP 515 - E: Support Equipment Manual. This publication contains all of the support equipment available from Lockheed Martin that is applicable to the Hercules aircraft. This includes test units, work stands, etc.

SMP 581: Maintenance Manual. Lockheed Martin produces this manual for the 382E/382G commercial aircraft series.

SMP 582: Wiring Diagram Manual. Lockheed Martin produces this manual which contains the wiring diagrams for the 382E/382G commercial aircraft series.

SMP 583: Structural Repair Manual. Lockheed Martin produces this manual for all non-U.S. government operators of Hercules aircraft. This includes both the 382E/382G commercial series of aircraft and internationally operated C-130 aircraft. Each customer also receives a supplement to the SMP 583 containing any peculiar items installed on the aircraft plus information concerning the paint scheme.

SMP XXXX: Illustrated Parts Catalog (IPC) and Other Manuals. Lockheed Martin produces a customized IPC for each non-U.S government Hercules customer. Since the IPC for each customer is different, a unique identification number replaces the Xs in the title shown here. Each customer's IPC contains only the parts that are installed on their aircraft. Other unique manuals are produced for customers on an "as needed" and are assigned a unique identification number which replaces the Xs in the title.

TM 382C - 2 - (Manual Number): Maintenance Manual Series. Lockheed Martin produces this series of manuals for C-130 aircraft sold to non-U.S. government operators. These maintenance manuals address C-130B and later aircraft and provide the theory of operation, checkout procedures, troubleshooting, and remove and replace instructions for each system on the aircraft.

TM 382C - 10: Engine/QEC Build-Up and Group Assembly Parts List. Lockheed Martin produces this manual for all non-U.S. government operators of the C-130 aircraft.

U.S. Government Publications Equivalent to SMP & TM Publications

As with the flight manuals, the U.S. government publishes its own manuals for maintenance operations. The U.S. Air Force publishes the Technical Order series and the U.S. Navy publishes the NAVAIR series. Once again, the U.S. Air Force publications are used by the Air Force, Air Force Reserve, Air National Guard, and U.S. Coast Guard (with supplemental manuals). The U.S. Navy publications are utilized by the Navy and Marine Corps. A sample comparison between

SMP/TM #	USAF T.O. #	USN NAVAIR #
SMP 583 SMP 515B SMP 515C SMP 58/582/TM 382C-2-Series SMP ZZZZ* *Z Indicates Operator Unique Identifier	1C-130(X*)-3 1C-130(X*)-23 1C-130(X*)-6 1C-130(X*)-2-Series 1C-130(X*)-4 *X Indicates Aircraft Design Series (such as B, E, H, etc.)	01-75GA(X*)-3 01-75GA(X*)-23 01-75GA(X*)-6 01-75GA(X*)-2-Series 01-75GA(X*)-4

SMP/TM and TO/NAVAIR publications is shown above. The U.S. Air Force is gradually phasing in a system known as Organizational Maintenance Manuals (OMMS). The OMMS system contains the following general headings:

-Index
-General Systems
-Fault Reporting
-Fault Isolation
-Job Guides

In any case, users of Lockheed Martin, U.S. Air Force, or U.S. Navy publications may always refer to the appropriate List Of Applicable Publications (LOAP) for a complete listing of available publications.

SBs, ADs, TCTOs, and TDs

This is another very important group of publications and is produced on an "as needed" basis. This group includes the following publications: Service Bulletins (SBs), Airworthiness Directives (ADs), Time Compliance Technical Orders (TCTOs), and U.S. Navy publications generally identified as Technical Directives (TDs) and more specifically as Airframe Bulletins/Changes (AFB/C), Avionics Changes (AVC), and Powerplant Bulletins/Changes (PPB/C), etc. Each of these publications is discussed briefly below.

Service Bulletins & Airworthiness Directives: SBs are issued by Lockheed Martin and may call for either an inspection, a modification, or both. Inspections may be one time or repetitive. If the SB is critical to the safety of flight, the title will be changed to "Alert SB." Since there are two general families of Hercules airplanes, the SBs are numbered accordingly.

The SB generation process begins when a problem area is identified by a Lockheed Martin Field Service Representative, an operator, a Hercules Service Center, or a member of Lockheed Martin engineering. After the problem is identified, Lockheed Martin engineering determines the solution to the problem. The next step is the review process. All pertinent Lockheed Martin departments are involved in the review process. The review process culminates with the circulation of the Final Draft, which incorporates all of the needed changes. The final document is then published as either a Service Bulletin or an Alert Service Bulletin. If the subject of the Service Bulletin affects current aircraft production, it may also be published as a Line Production Change. Courtesy copies are forwarded to the appropriate users and regulatory agencies such as the U.S. Air Force, U.S. Navy, U.S. Federal Aviation Administration, etc. After Lockheed Martin publishes an SB, other agencies may elect to produce additional publications for their particular fleet.

A typical SB for a commercial (L-100 series) Hercules looks like the following:

382-32-46

"**382**" identifies this SB as being applicable to the L-100 series of aircraft.
"**32**" identifies the Air Transport Association (ATA) chapter number associated with the subject of the SB (Landing Gear in this example).
"**46**" is simply a numerical identification given to this SB (i.e. this is the 46th SB issued in this chapter).

The corresponding SB applicable to the C-130 series of aircraft is shown below:

82-860

"**82**" identifies the SB as being applicable to C-130 airplanes.
"**860**" is the numerical identification of this SB. Note that ATA chapters are not used in C-130 SBs.

ADs are issued by the U.S. Federal Aviation Administration (FAA) for serious conditions associated with the safety of flight. Most, but not all, ADs will be associated with an SB. ADs are considered mandatory for all U.S. operators of the 382E/382G series aircraft.

Time Compliance Technical Orders: TCTOs are the U.S. Air Force equivalent to SBs. TCTOs, however, are produced solely by the U.S. Air Force and do not necessarily correspond to SBs. As with other U.S. Air Force publications, TCTOs apply to Air Force, Air Force Reserve, Air National Guard, and U.S. Coast Guard aircraft. TCTOs may call for either an inspection, a modification, or both. The U.S. Air Force also issues Urgent TCTOs and Interim TCTOs. An Urgent TCTO is equivalent to an Alert Service Bulletin.

Technical Directives: AFB/C, AVC, PPB/C, etc. are the U.S. Navy equivalent to SBs and apply to Navy and Marine Corps aircraft. As can be seen from the titles, the Navy categorizes the Bulletins and Changes according to major aircraft system to simplify indexing. A "Bulletin" calls only for an inspection while a "Change" calls for a modification.

Contrary to what many people expect, the existence of one of these publications does not guarantee the existence of the others. For example, the existence of a SB on a particular subject does not guarantee there will be a corresponding TCTO or TD. One of the primary reasons for this is the difference in maintenance philosophy (inspection intervals, component overhaul requirements, structural modifications, etc.) and also that Lockheed Martin, the Air Force, and the Navy do not always qualify or use the same suppliers for various components. Therefore, a problem may arise that affects one, but not all of the parties. In a case such as this, the affected party will issue a SB, TCTO, or TD. In many cases, though, a given SB has counterparts in both a TCTO and a TD.

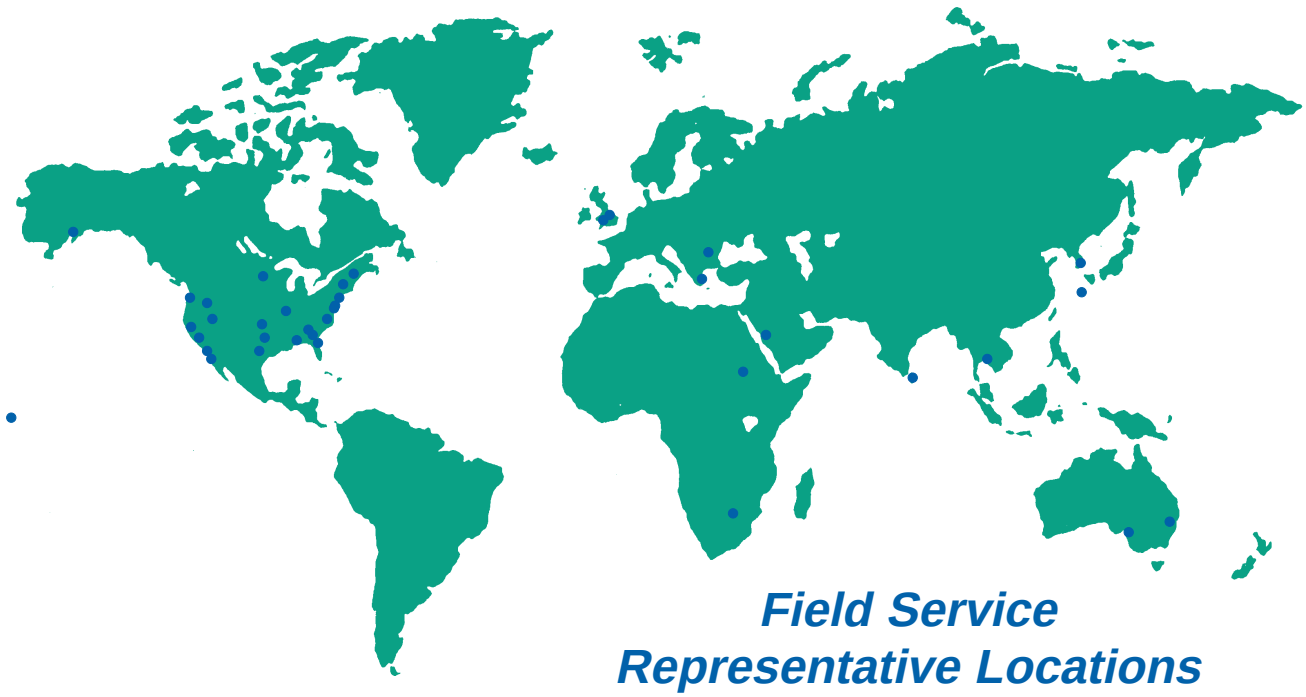
Engineering Change Proposals (ECPs) & Line Production Changes (LPCs)

Engineering Change Proposals: ECPs are internal Lockheed Martin documents that detail a problem that has been found in production aircraft or spare parts. After the problem has been identified and Lockheed Martin engineering has designed a solution, the ECP is produced. After a thorough review process, the ECP may eventually become either a Line Production Change, an SB, or both.

Line Production Change: LPCs are improvements in design that are incorporated in the aircraft production line at the plant.

Summary

As stated at the beginning of the article, there is an abundance of publications available to Hercules operators. When in doubt, always consult the appropriate List Of Applicable Publications (LOAP) for the publications system in use. Questions concerning the use of any Lockheed Martin produced manual may also be addressed to the Hercules Support Center at telephone: 770-431-6569, facsimile: 770-431-6556, or via E-mail: hercules.support@lmco.com. ❑



Field Service Representative Locations

Lockheed Martin Aeronautical Systems Field Service Representatives are located around the world. The map above shows the locations of the current Field Service Offices. Each office is staffed by one or more highly experienced career professionals. The following list shows each office and the appropriate contact person and telephone number. All Field Service Offices, including Hercules, C-5, C-141, L-1011, P-3, and S-3, are listed. In addition to the Field Service Offices, the Hercules Support Center, at our main facility in Georgia, is always ready to assist Hercules operators in any way . If you are ever in need of technical assistance, please contact the nearest Field Service Representative or the Hercules Support Center at the location listed below:

Hercules Support Center
Attention: T. J. Zembik
2251 Lake Park Drive
Smyrna, GA 30080-7605

Tel: 770-431-6549
Fax: 770-431-6556
E-mail: hercules.support@lmco.com

Alaska

Anchorage (C-130)
J. W. (John) DeLion
Tel: 907-245-1854

Australia

Edinburgh (P-3)
J. L. (Jack) Miller
Tel: 61-8-8393-3456

Manly (C-130)
F. H. (Fred) Kasell
Tel: 61-2-9976-2401

Botswana

Gaborone (C-130)
E. A. (Ed) Cunningham
Tel: 267-320-900

California

El Toro (C-130)
P. E. (Paul) Johnson
Tel: 714-726-3670

Moffett Federal Airfield (C-130)
T. G. (Tom) Blackburn
Tel: 650-903-9385

North Island NAS (P-3, S-3)
R. A. (Bob) Bartsch
Tel: 618-435-8910

Point Mugu NAWS (C-130)
R. O. (Bob) Case
Tel: 805-488-4979

Travis AFB (C-5)
W. H. (Bill) Wolley
Tel: 707-424-5253

Delaware

Dover AFB (C-5)
C. W. (Cliff) Spell
Tel: 302-677-2372

England

Brize Norton (L-1011)
R. R. (Bob) Groom
Tel: 44-1993-845374

Gatwick (L-1011)
V. M. (Tino) Jimenez
Tel: 44-1293-462353

Swindon (C-130)
M. I. (Mike) Brooks
Tel: 44-1249-892-315

Ethiopia

Addis-Ababa (C-130)
L. C. (Butch) Eberhart
Tel: 251-1-510064

Florida

Cecil Field NAS (S-3)
M. W. (Mike) Griffith
Tel: 904-772-8517

Jacksonville NAS (P-3, S-3)
H. S. (Harry) Mattox
Tel: 904-771-5801

Georgia

Robins AFB (C-5, C-141)
R. C. (Ralph) Bradley
Tel: 912-926-5372

Greece

Athens (P-3)
W. E. (Gene) Taymon
Tel: 30-1-55-48-821 ext. 5139

Hawaii

Barbers Point NAS (P-3)
T. J. (Tim) Hodges
Tel: 808-681-3444

Idaho

Boise (C-130)
C. S. (Charlie) Dodson
Tel: 208-363-0075

Illinois

Scott AFB (C-5)
S. C. (Spence) Heywood
Tel: 618-744-0188

Japan

Okinawa (C-130)
R. (Russ) Riggins
Tel: 81-98-899-2990

Korea

Pohang (P-3)
L. L. (Larry) Seaman
Tel: 82-562-90-6357

Louisiana

New Orleans NAS (C-130)
D. L. (Dave) Perry
Tel: 504-394-5228

Maine

Brunswick NAS (C-130)
J. E. (Jerry) Greenwood
Tel: 207-725-0170

Maryland

Patuxent River NAS (P-3, S-3)
B. F. (Bud) Neubauer
Tel: 301-866-9348

Washington National Airfield (C-130)
D. T. (Dale) Benton
Tel: 301-967-1562

Minnesota

Minneapolis (C-130)
J. R. (Jim) Taylor
Tel: 612-713-2723

New York

Schenectady (C-130)
R. M. (Mike) Daymont
Tel: 518-382-5852

Stewart MCRB (C-130)
A. E. (Alan) Borg
Tel: 914-567-1817

North Carolina

Cherry Point (C-130)
S. (Scheel) Selby
Tel: 919-447-2692

Elizabeth City (C-130)
E. F. (Ed) Brennan
Tel: 919-335-6055

Oklahoma

Altus AFB (C-5)
D. W. (Dennis) Riehl
Tel: 580-482-8303

Pennsylvania

Philadelphia ASO (P-3, S-3)
G. W. (Wes) Barnett
Tel: 215-697-4363

Willow Grove NAS (P-3)
L. G. (Larry) Morris
Tel: 215-443-6149

Romania

Bucharest (C-130)
E. J. (Eric) Wisner
Tel: 40-1-795-2356

Saudi Arabia

Jeddah (L-1011)
G. T. (Gary) Morgan
Tel: 966-2-684-2891

Sri Lanka

Colombo (L-1011)
G. L. (Gary) Bozley
Tel: 94-1-252081

Texas

Corpus Christi (P-3)
D. R. (Don) Tiedt
Tel: 512-937-3623

Fort Worth (C-130)
G. N. (George) Gilliam
Tel: 817-731-4217

Thailand

U-Tapao (P-3)
W. R. (Bill) Scott
Tel: 66-38-710-232

Utah

Ogden Air Logistics Center (C-130)
W. B. (Wayne) Levesque
Tel: 801-773-9086

Washington

Whidbey Island (P-3)
R. B. (Ron) Geyer
Tel: 360-257-8995

LOCKHEED MARTIN

Lockheed Martin Aeronautical Systems Support Company
Airlift Field Service Department
2251 Lake Park Drive
Smyrna, GA 30080-7605

Congratulations to the Commanding Officer and Crew U.S. Coast Guard Air Station Elizabeth City, NC

Winners of the Sky Watch '98 Concours d' Elegance Award Royal International Air Tattoo