

# Larry Lamm

Lawrence M. Lamm (known as the "Larry Lamm") (23 June 1923 - 16 December 1985), was perhaps the most Influential System Schematic Developer to date.

LAMM Schematics, originated by L. M. Lamm for McDonnell Douglas, are highly distinctive, easily readable, aircraft systems-oriented schematics, which meet most of the requirements of DOD-STD-863B. They are used by many Airlift and Tanker groups, such as Engineering Design, Manufacturing, Liaison, Flight and Maintenance Training and Publications, and promote a widespread understanding of aircraft systems. Everyone involved in designing, manufacturing, operating and maintaining the C-17 should understand the system concept.

## World War II

During World War II, Larry was a member of a six man team that monitored maintenance of all heavy ground radar equipment in the India-Burma Theater. In 1946, he started a three year tour as a contract field engineer with the 20th Air Force and gained extensive experience with B-29 aircraft electronics. In 1949, Larry joined the Naval Aviation Engineering Service Unit (NAESU) for what turned out to be an eight year tour of duty and it was during this period that his understanding of military electronics maintenance matured considerably.

In addition, Larry began to conceptualize the LAMM Schematics "simplified systems schematics" philosophy.

Some of the assignments and experiences that helped Larry formulate his vision were as follows:

- <li> NAESU Field Engineer with the First Marine Aircraft Wing during the first nine months of the Korean War.
- <li> NAESU Field Engineer to assist in training the First Marine All Weather Squadron for deployment to the Korean War with a fully computerized air-to-air fire control system (VMFN-513 with the Douglas F3D and AN/APQ-50, a 430 vacuum tube system).
- <li> Larry Lamm was the American who instructed the first class of French Nationals when they decided to install U.S. air-to-air fire control in their aircraft.
- <li> NAESU Consultant to Bureau of Naval Weapons (BuWeps) on air-to-air fire control systems.
- <li> Supervised over 60 NAESU Field Engineers.

## Adopting Military Schematic Tactics to Douglas Aircraft Company

In 1957, Larry joined the El Segundo Division of the Douglas Aircraft Company and was given engineering responsibility for the electrical and electronic equipment in the Skyraider F4-D (Navy All Weather Interceptor) during final assembly and production flight testing. It was during this period that his knowledge and understanding of the manufacturer's problem in aircraft electronic maintenance grew substantially. In 1959, he was assigned by Douglas Aircraft to the Naval Air Test Center, Patuxent River, Maryland, as the Senior Douglas Representative at the electronics Test Division. During this assignment, he offered his services to BuWeps and Naval Air Technical Services Facility (NATSF) in their effort to improve basic specifications, such as XFMTD-156 governing aircraft maintenance manuals. In 1963, Larry returned to Douglas Aircraft at LAMM/System, Boeing

## Over 40 Years of LAMM Schematics

Long Beach, California, and thereafter devoted his efforts to the improvement of maintainability concepts on the Douglas DC-9 and C-5A aircraft. Larry became heavily involved with the improvement of maintainability concepts on the DC-9 and began to see some of the problems that suppliers, engineers, and maintainers were having. One example is that they had difficulty grasping a quick understanding of how the various aircraft systems worked in an integrated fashion. This, of course, is critical to maintaining and troubleshooting aircraft effectively and efficiently. He saw that they had to review engineering orders, factory drawings, and any number of assorted technical/flight and maintenance manuals to get a simple understanding of how the various complicated systems interconnected and worked together. One of the many problems was that each person was a specialist in his own technical field, e.g., hydraulics, avionics, airframe, etc.; therefore was not familiar with the other fields. Combining all of Larry's past experiences, the idea for an integrated, functional "systems" approach to schematics began to take form. In September 1966, the first LAMM Schematic manual was released for Delta Airlines. It was for the DC-9 and contained just 25 schematics. Today the Air Force C-17 Globemaster LAMM Schematics Manual has over 1,400 schematics and the MD-11 has 2,620 schematics. Moreover, because of Larry Lamm's brilliant and futuristic vision, there are LAMM Schematics for the following aircraft: DC-3; DC-8, DC-9, MD-80, MD-90, DC-10, KC-10, MD-10, MD-11, 717, CH-47 and C-17. (Individual LAMM Schematics are also used throughout various commercial and military aircraft maintenance manuals.)

## Before Lamm Schematics

Prior to Larry's creation of LAMM Schematics, only the following types of illustrations existed:

- # schematics were often sketched up by a cognizant engineer or were supplier drawings that were component oriented and not system oriented;
- # only the design engineer assigned to that system had a detailed knowledge and understanding of that system;
- # schematics were inadequately defined and lacked standards, they were inconsistent in style, format, and quality.

## LAMM Schematics purpose

- <li> System-oriented, shows all interfaces between various systems and their functionality
- <li> Depicts the integration between hardware, software, electronics, flight control, indication and all fluids
- <li> Establish an accurate relationship between a system malfunction and a defective Line Replaceable Unit (LRU), thus reducing maintenance time and cost
- <li> Provide a user with an inexpensive, quick and easy source for familiarization, training and troubleshooting

## The three levels of LAMM Schematics

### \* System Block Diagram

- Broad scope, little depth
- \* Simplified System Schematic
- Intermediate depth and scope
- \* System Schematic
- Detailed and shows all LRUs, wiring and all functional interfaces between sub-systems

#### Intelligent LAMM Schematics

Today, Larry's idea continues in a twenty-first century concept of Intelligent LAMM Schematics (I-LAMMs). Imagine an animated LAMM Schematic where fluids flow; electronics move tripping switches; actuators open and close; flaps extend, and one can see the cockpit indication, all at the same time. Furthermore, fault codes could be programmed, so that when they are selected one can actually see the fault occur. All I-LAMM can be sped up, slowed down and/or stopped for instructional use. Any electronic publication, e.g., parts manual, maintenance manual or wiring manual is just a click of a mouse away. Training, familiarization and/or troubleshooting time can be cut in half with I-LAMMS.

The brilliance of Larry's functional, simplified "systems approach"; LAMM Schematic is more appropriate today than ever before. Young engineers and technicians are more at ease with video games, cell phones, and computers than reading. With nothing more than a glance whether utilizing a paper LAMM Schematic or an I-LAMMS, comprehension and system function comprehension is almost instantaneous. Being fluent in the English language is not necessary to understand LAMM Schematics. We continue to create LAMM Schematics utilizing the same philosophy and standards that Larry conceived over 40 years ago. Many have tried to copy and duplicate them, but have not been successful.