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Aerodynamic Changes To Give Prowler New Lift

Since the next Prowler will weigh more than today's, structural upgrades have been proposed

For the first time, aerodynamic and structural upgrading for improved maneuverability is in the works for the EA-6B Prowler.

Constant upgrading of its sophisticated electronics has been the key to the EA-6B's success as a tactical jamming system over the years. However, structural modifications are necessary to accommodate the new electronics planned for the fifth generation ADVCAP (Advanced Capability) Prowler.

Next month, as part of a proposed maneuverability improvement program, NASA and Grumman will begin a six-month feasibility study in Langley, Virginia, and Moffit Field, California, to determine what airframe modifications are workable.

Introduced to the fleet in January of 1971, the Prowler is a four-seat derivative of the two-seat Grumman A-6, and protects the fleet by jamming enemy radar.

Grumman now has a $255 million, full-scale development contract with the Navy for the ADVCAP Prowler. (ICAP II Prowlers are rolling off the production lines today.) The ADVCAP test aircraft is slated to fly in 1989 and will be produced in the 1990s.

The maneuverability improvement program was proposed because additional electronics will increase the aircraft's weight. The goal is to achieve the same maneuverability as the original A-6, which was 10,000 pounds lighter than the first EA-6B.

Advanced Capabilities. *The ADVCAP Prowler will be 5,000 pounds heavier than the current ICAP II version. However, structural modifications now being studied will allow the next generation Prowler to handle the extra weight.*

"There will be a need for these changes when the aircraft's weight increases from 58,000 to 63,000 pounds," says Lew Byars, EA-6B vehicle project engineer. "Much of the additional weight will come from the ADVCAP's sophisticated passive detection system and two additional jammer stations." The new avionics detection system will weigh 2,500 pounds. Each new jammer station will consist of a 150-pound pylon and a 1,100-pound pod.

"Improved maneuverability will make the EA-6B a more capable and effective weapons system," says Fred McCloskey, EA-6B engineering manager.

Six aerodynamic and structural changes will be studied. One is an 18-inch fin extension. "It's like adding another feather on an arrow — it would increase stability of the aircraft," says McCloskey. "An advanced flap on the back of each wing is also planned. The flap's design, shape and contour would be changed to achieve higher lift capability."

Advanced speed brake ailerons on the wing tips would minimize wing rocking. "The main lateral control devices, flaperons, would be ineffective under the new ADVCAP configuration," explains McCloskey. "By using the speed brakes in conjunction with flaperons, the aircraft will have lateral control for higher angles of attack."

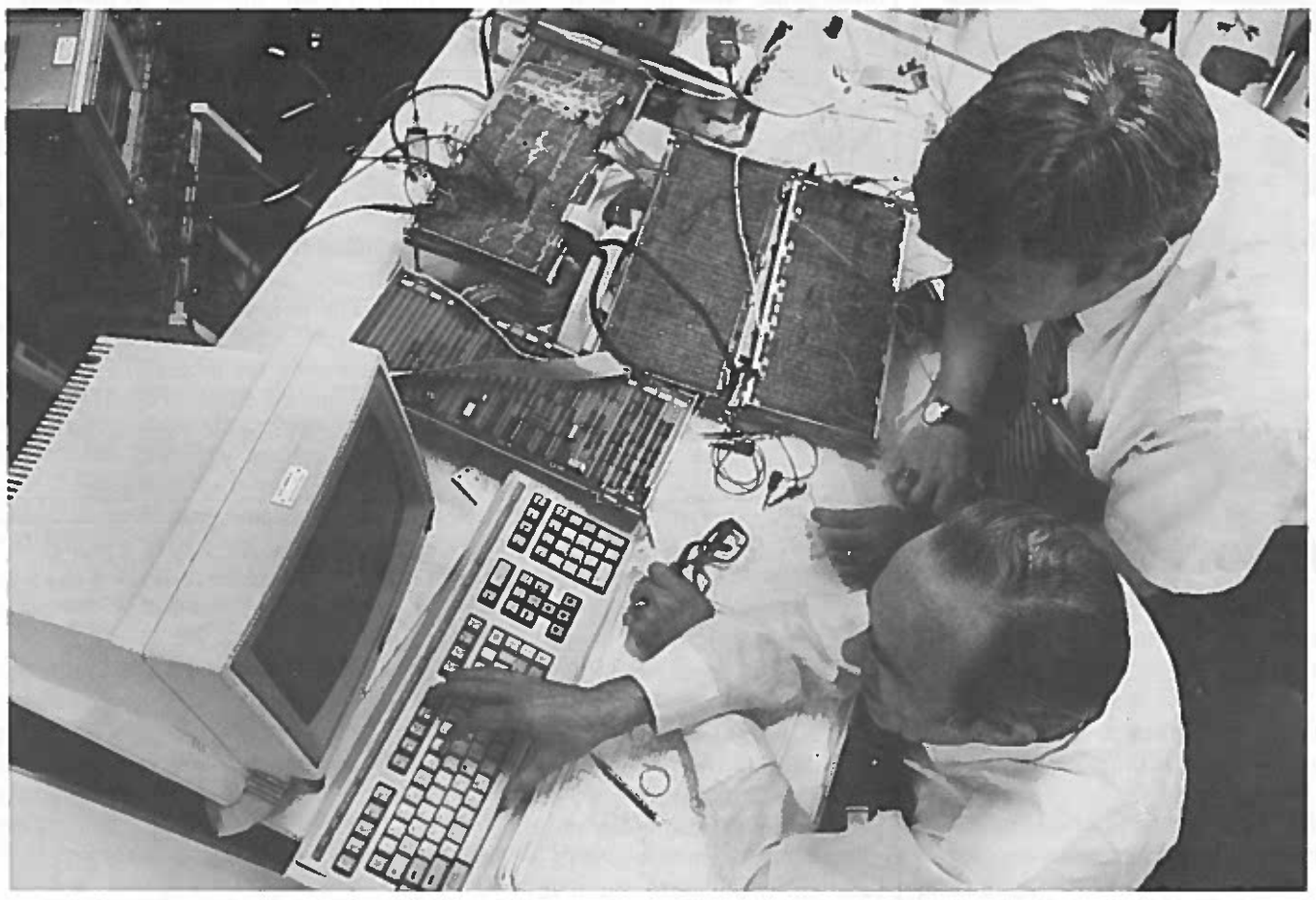
In conjunction with the flap changes, an advanced inboard slat droop flap and leading edge — located on the front of each wing — will increase lift capability. They will also provide lateral and directional stability. The last modification would be an improved glove strake, installed below each side of the cockpit. The glove strake cleans up air turbulence in the fuselage area of an aircraft.

Wind tunnel tests using an one-eighth scale ADVCAP model were recently completed at the two NASA sites.

"The modification concepts were proven during the wind tunnel testing," says McCloskey. "Now we enter the phase of determining how to make the changes structurally and what it will take to install them."

Eventually, Grumman hopes to equip an EA-6B with the structural modifications. Flight tests would take place in Calverton, Long Island.

"We plan to submit individual proposals under the program, but we'll use a single aircraft to provide a flying demo for all the changes," says McCloskey.■



Information, Please. *Dr. Napoleon Avaneas (at terminal) and Bob Noelsch are working on a hybrid high-speed communications network, or data bus. While a data bus is simply a system that lets computers 'talk' to each other, Aveneas' creation is no ordinary data bus. It is being designed to connect the lab's computers in the Engineering Development Center in Bethpage. Eventually, the labs will act, in effect, like individual black boxes in an aircraft to test electronic systems of the future. (Photo by Bob Settles)*

Meet The Real Top Gun — Dale 'Snort' Snodgrass

Tom Cruise may play the part in the movie. But starring as the real-life Navy Top Gun is Fighter Pilot of the Year Lt. Cdr. Dale "Snort" Snodgrass, the son of a Grumman employee.

Now up for Commander, the 37-year old engineering officer of squadron VF-143, Oceana Naval Air Station, Virginia, earned the fighter pilots' "Oscar" by proving he could get on the tail of an adversary better than any Tomcat pilot around. After studying the records of the best pilots in the air wing, the Atlantic Fleet's skipper picked Dale for this annual honor.

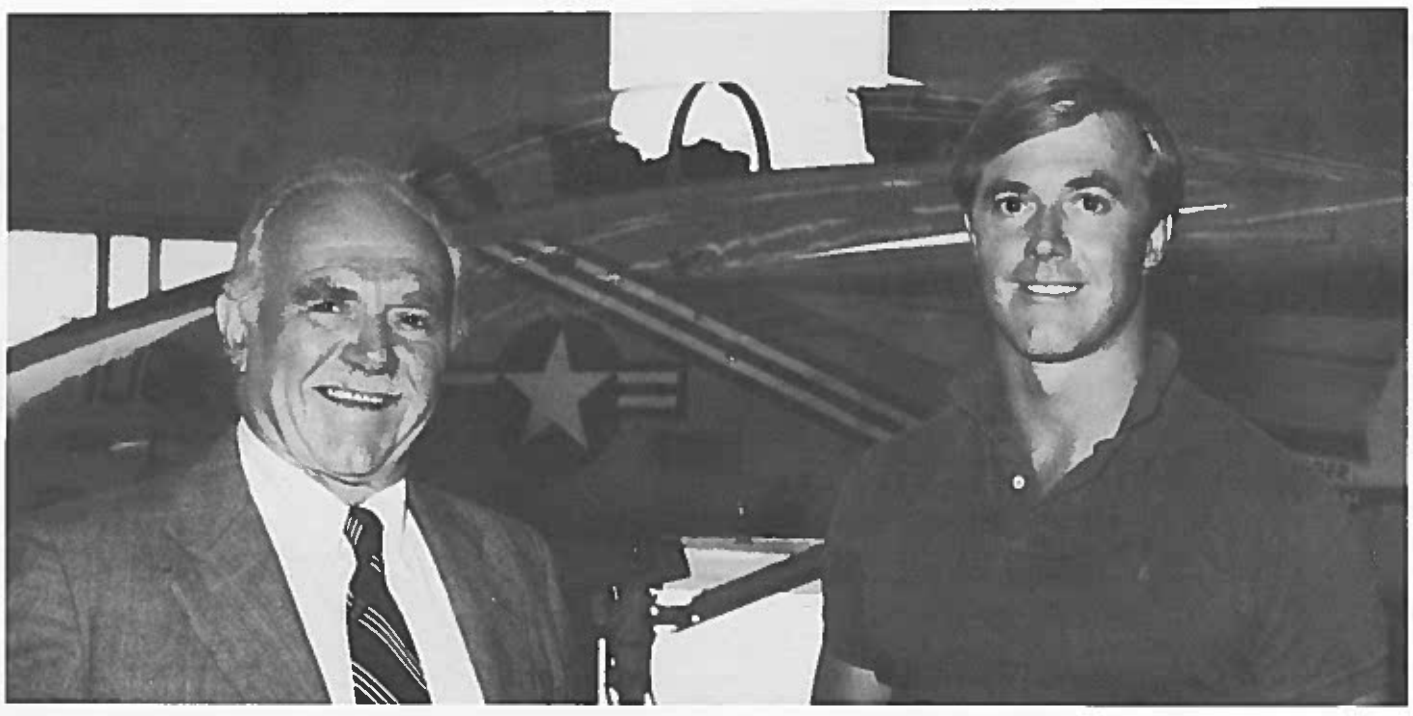
And you'd have to look long and hard to find a prouder, happier father than Reuben Snodgrass, Aircraft Systems' operations manager at the Automated Telemetry Station in Calverton.

Reuben and his wife, Virginia, raised Dale and his three sisters in Lake Ronkonkoma, Long Island.

Reuben, a former Marine Corps pilot, flew several aircraft during World War II, was head of flight test at Sperry, and was utility pilot no. 79 with Grumman. He didn't think, at first, that Dale would follow in his footsteps.

"Not when he was young. He liked building models but I didn't expect him to become a pilot," he recalls.

Dale became an accomplished swimmer and surfer, and still looks the part. He went to the University of Minnesota on a Naval ROTC scholarship where he was an All-America swimmer.



Tomcat Family. *Move over Tom Cruise. Meet the real 'Top Gun,' Lt. Cdr. Dale Snodgrass (R), with his dad, Reuben Snodgrass, Aircraft Systems' ATS Operations manager. Dale got to see his dad on July 1 when he and squadron executive officer Cdr. Larry Baucom arrived in Calverton to pick up an F-14. (Photo by Karl Thoma)*

Dale was commissioned nearly 14 years ago and immediately began to make his mark as a flier, graduating first in his flight training school class at Pensacola, Florida.

He was later invited to the Navy's celebrated Fighter Weapons School at Miramar Naval Air Station, better known as Top Gun. Tom Cruise made Top Gun look tough, and it is. A fighter pilot must be rated among the top one percent just to get into this rigorous postgraduate program.

Besides F-14s, Dale has flown Israeli Kfirs and F-5 fighters, testing his fellow fighter pilots in aggressor squadrons. Those fliers appreciate his skill.

"I fly with 'Snort' and he truly is the best," says Lt. Kip Cinnamon, another member of VF-143.

Cdr. Larry Baucom, the executive officer of VF-143, said in the *Virginia Pilot*, Oceana's local newspaper, "There is no argument among the guys on the range about who the best one is out there. He hasn't lost yet since I've been flying with him."

But the real test is an encounter with the enemy. In 1981 the carrier *Nimitz* was patrolling the Gulf of Sidra. Snodgrass had a successful dogfight with a MiG 25 Foxbat, getting behind the MiG pilot first. The MiG was never in a position to fire, and departed quickly. Two other F-14s, after they were fired on, shot down two Libyan Su-17 fighters.

Lately, his assignments have been less stressful: he's had quite a few television appearances and interviews with newspapers. It's true that fame brings problems. With the media comparing screen idol Tom Cruise to Snodgrass, the other guys in the squadron have an opportunity for some good-natured needling.

"The razz level gets a little high," Snodgrass says. But the guys understand the value of the publicity.

"It's the perfect time to get fighter pilot of the year," says Cinnamon. Tying together Snort's achievement with the opening of the movie "is a significant morale raiser for the troops."

Snodgrass understands that. "It's nice to get the attention," he says, "but what's more important is that it keeps the Navy in the public spotlight."■

Grand Tour. *These Japanese sailors took part in the Statue of Liberty celebrations. But they couldn't leave before visiting Grumman. (Photo by Bob Settles)*

Grumman's Their Port Of Call

On July 7, a contingent of 135 newly-commissioned ensigns in the Japanese Training Squadron made Grumman a stop on their Statue of Liberty celebration tour.

The officers had sailed to New York harbor aboard a Japanese Navy cruiser and a destroyer to take part in the Tall Ships naval revue.

Along with several of their commanding officers and civilians from the Japanese consulate, they were given a company overview at headquarters and visited the E-2C final assembly area in Building 4. After the sailors' two-hour visit, they took a bus trip north to visit the United States Military Academy at West Point.

These young officers already knew something about the Hawkeye. The Japanese Self Defense Force owns eight E-2Cs, which patrol the airspace around the island nation.

Navy Begins Testing Souped Up Hawkeye

E-2C Hawkeye No. 34, re-engined with higher horsepower Allison turboprop engines, began Navy trials last week. It had been undergoing a flight test program at Calverton since April.

The plane was flown to the Naval Air Test Center in Patuxent River, Maryland, on Wednesday, July 16. The Naval Preliminary Evaluation program began the next day.

The new engines give the Hawkeye better fuel consumption, more power for takeoffs, and a faster rate of climb. This Hawkeye has already logged over 17 hours aloft in five flights.

Keep 'em Flying

The Naval Regional Contracting Office in Philadelphia awarded the Grumman Technical Services a two-year, $280,000 contract. Though the division held the previous contract, it had to defeat two other competitors for the follow-on award.

The division's Aircraft Services unit will continue to maintain "yellow gear" — engine test stands, motor generator units, tractors and other ground support equipment (GSE) — used to keep Sixth Fleet planes flying at Naval Air Station Sigonella, Italy.

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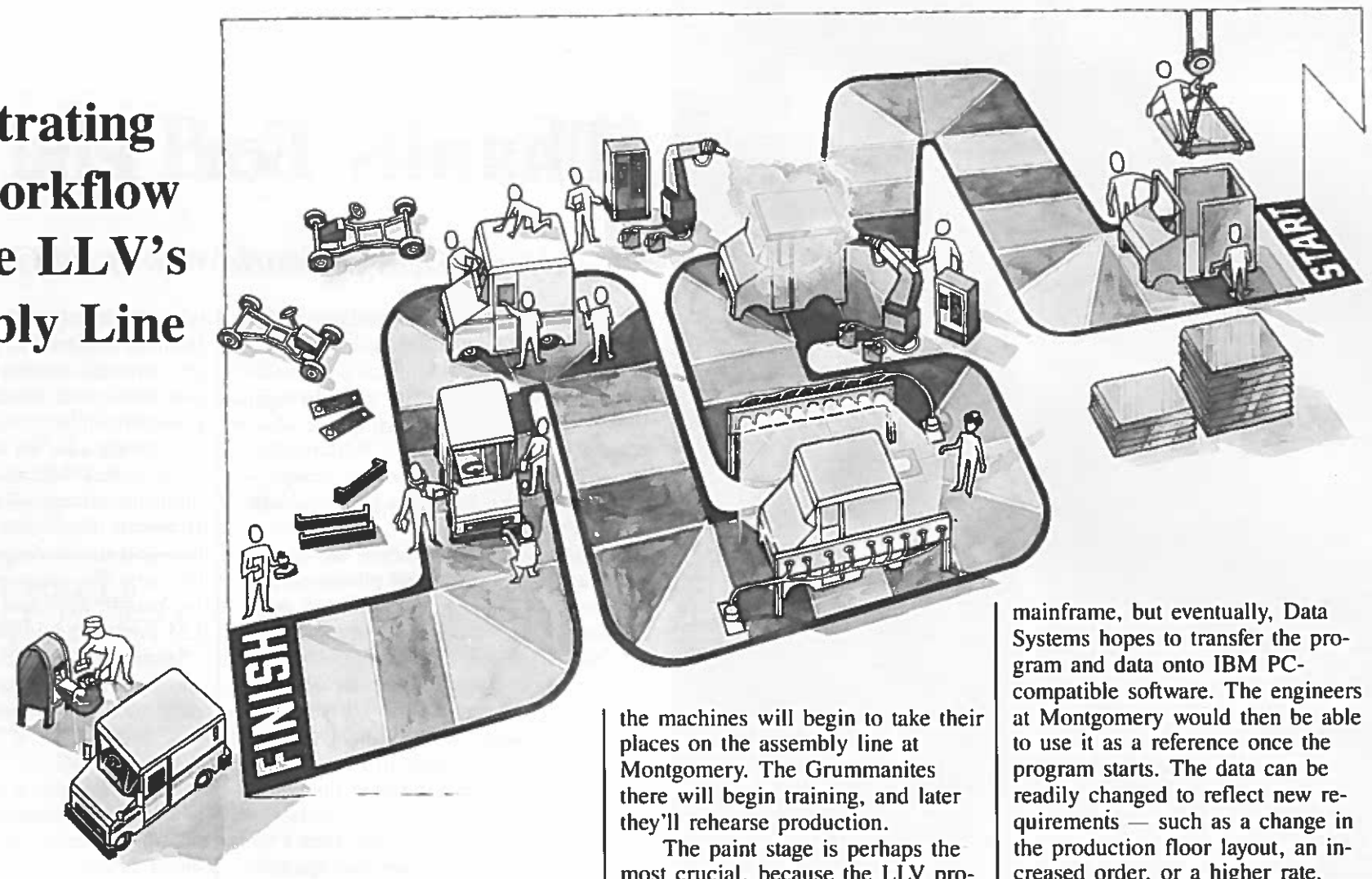
Orchestrating The Workflow On The LLV's Assembly Line



To the untrained eye, the digits and decimal points on Tim O'Mara's IBM screen could be any business data — an accounting record, perhaps. But this seemingly mundane information is a mathematical picture of the future paint shop for Grumman's Long Life Vehicle (LLV).

Grumman's Data Systems Division is using computer analysis techniques to help the LLV Division plan its manufacturing operation. Last month, ground was broken in Montgomery, Pennsylvania, for a new $7.5 million facility to build the LLV. In order to handle a demanding production schedule — 99,150 LLVs at 75 per day — the facility will rely on the latest manufacturing technology.

The first assignment: balancing the workflow in the final assembly area. Grumman Data Systems is also computer-analyzing the facility's two robotic paint "cells," or work areas.

"Computer analysis enables us to plan what action we'll take when something goes wrong," says Jim Blake, a manufacturing engineer from Montgomery, Pennsylvania. Blake, Vice President Larry Parsons, tooling engineer John Boatman, and manufacturing engineer Earl Kitchen have been working on the LLV project in Bohemia, Long Island for over a year.

"Data Systems is providing us with a detailed analysis of what can go wrong and possible solutions — especially with the new robotic paint machines. We will then design safeguards into the production system, and set up procedures to solve problems quickly."

"The need for this kind of analysis was determined by the high volume and production rate of the LLV," says Phil Angelillo, manager of modelling and simulations for Data Systems, "which represents a new departure for Grumman."

Grumman's best-known products, military aircraft, are turned out in small quantities due both to sheer complexity and the government's pocketbook. The LLV is simple in comparison.

But a brief stoppage of a high-volume assembly line can be costly — due to the high rate, it doesn't take long to fall behind. And the only way to make up lost time is through costly overtime. So, problems that crop up must be fixed, fast.

The LLV operation will encompass three assembly line stages — body buildup, paint, and final assembly — each with its own conveyor belt. In final assembly, which Data Systems analyzed first, over 300 distinct tasks will be done at 27 workstations.

Since the conveyor belt will move every six and a half minutes, balancing the workload is a top priority.

The episode of "I Love Lucy," when Lucy and Ethel went to work in a chocolate factory, illustrates this point. The conveyor belt brought them more chocolates than they could wrap, so they ate them.

In the LLV plant, the assembly line will be much more complex than Lucy's chocolate factory — and the myriad problems that might occur are no laughing matter. So, careful planning will ensure no workstation races ahead of the next. Data Systems has used time studies of all the different final assembly operations, information collected by the LLV crew.

"It's a challenge, since there will be many things happening at once," says O'Mara, a systems analyst for Data Systems. "Without the computer, it would be very difficult to do this type of analysis."

The computer model of final assembly is now complete, but that isn't the end of the story. "We'll have to do some fine tuning, no doubt," says Blake. Early this fall, the machines will begin to take their places on the assembly line at Montgomery. The Grummanites there will begin training, and later they'll rehearse production.

The paint stage is perhaps the most crucial, because the LLV program will use a technology that's still relatively new to industry: robotics. The Data Systems computer model relies on a staggering array of information — everything from how many minutes it takes to apply primer, to the ceiling height in each paint cell.

"Anything that has to do with robots has the potential for complications," says Blake. "For instance, the truck body has to be in just the right spot in order for the robot to do the job efficiently. There's very little margin for error, and the 'what-ifs' Data Systems has provided us with are a good way to predict what could happen."

Data Systems created computerized scenarios from various failure rates — including those attested to by the robot's manufacturer — and various kinds of failures, such as a clog developing in the robot's sprayer. It details the consequences on down the line.

"We then pose solutions to the computer model," says O'Mara. "The computer can tell us how a particular solution will work — what its strengths and weaknesses are."

"Someone could be sent in to do the job manually while the robot is down," notes Blake. "There are many alternatives, and no final decisions have been made. But having these scenarios helps."

Like any production process, there's no way to identify all the problems that will occur until the job actually begins. The Grummanites predict a learning period of six months before the job is up to speed.

The project involves simulation techniques used by Data Systems for previous customers, including the Aircraft Systems' Building 3 machine shop. Data Systems has also simulated material handling systems for Federal Mogul, a large Midwest auto parts distributor.

The program is run on an IBM mainframe, but eventually, Data Systems hopes to transfer the program and data onto IBM PC-compatible software. The engineers at Montgomery would then be able to use it as a reference once the program starts. The data can be readily changed to reflect new requirements — such as a change in the production floor layout, an increased order, or a higher rate.

In addition to simulating operational problems, the project will identify the right mix of stocks and materials needed to keep a job on track, as well as the right amount of storage space. For the LLV, Grumman will use "just-in-time" manufacturing methods, which require minimum inventories. The challenge is to identify just what constitutes the bare necessity.

The factory isn't the only area where Data Systems is lending its computer smarts. GDS is also helping LLV formulate a computer system that will interconnect all work areas at Montgomery.

"This will provide us with up-to-the-minute information, which is crucial. Every step will be very tightly controlled," says Blake.

All of their careful planning will pay off next April. At that time, the first LLV will depart Montgomery for one of the 29,393 U.S. Post Offices nationwide.■

Unit Values

The Grumman Employee Investment Plan has reported the following unit values as of May 31 (compared to April 30 figures):

Equity Fund
3.766 up from 3.621

Fixed Income Fund
5.308 down from 5.393

Guaranteed Income Fund
2.6 up from 2.24

Company Stock Fund
$29.81 up from $28.31

Note: It usually takes several weeks to formulate these values. EIP members can call Ext. (111) 54400 (outside Grumman, call 516-575-4400), for a recorded message which is made as soon as the new unit values are available.

'Thanks For The Mem

On July 31, George Skurla retires as Grumman presic

A few days after his 65th birthday, George Skurla is standing in his old office in Plant 5 in his familiar pose: leaning on the windowsill with an unlit cigar in hand. "When I was starting out 42 years ago, I told my wife, "I'll consider myself a success if I become a group leader and make $10,000 a year," Skurla says with a grin.

Scattered about the office are empty cardboard boxes, stacks of photos and paintings, and mementoes collected during his 42-year career at Grumman.

You can tell that adjusting to retirement is not going to be easy for Skurla. "It's like flying, and you just don't want to land," he says. "There's plenty of fuel in the tank and you want to keep flying for another 10 hours. It's been that great."

On July 31, Skurla retires after a successful Grumman career that spanned more than four decades. In the Sixties, he directed the company's LM program at the Kennedy Space Center. In the early 70s, he headed up Product Engineering. A year after orchestrating the "Big Push of '73" when the production lines at Calverton were in trouble and had to be put back into shape, Skurla was elected Grumman Aerospace president.

'By the year 2000, we may not be the biggest company around, but we should be one of the best balanced.'

From 1974 to 1985, George Skurla was Grumman Aerospace President. As vice president of Calverton Operations (at right), he orchestrated the 'Big Push of '73.' He began his Grumman career in 1944. After eight months in the shop, he joined the Engineering Department (below).

"I never wanted to be president," he says. He repeats this statement for the disbelievers. "I was perfectly content running Calverton. I loved the excitement and the challenge."

In 1975 he became the subsidiary's chairman of the board. When the company reorganized in early 1985, he was elected President of the entire corporation. But for his tenure as head of Grumman Aerospace he will be remembered best.

He predicts that when people look back on company history, 1985 will be seen as the beginning of the "new" Grumman. "Not only in terms of organizational structure but also in corporate commitment and entry into nontraditional marketplaces," he says. "Winning Joint STARS, CASS and IFTE — where we beat out some of the best established electronic system houses in the business — is proof that we are fast becoming a different type of company with a different personality.

"By the year 2000, we may not be the biggest company around, but we should be one of the best balanced," says Skurla. "Teaming will definitely be more of a way of life for us. Our military customers and the increasingly competitive business environment are driving us in this direction.

"For the companies that are building the 'right stuff' — and for the moment we are — the future looks good," adds Skurla. "But we're going to have to work harder than ever to carry the momentum we now have into the '90s and beyond. With so many R&D programs in house, the demands on our financial, technical and managerial resources are unprecedented."

Skurla says his 42 years at Grumman were packed with excitement and moments of "agony and ecstacy." However, there were some tough times that he'd like to forget — especially in the early 70s when over 2,500 engineering people were laid off. "The F-14 and LM programs had peaked," says Skurla. "I was head of Product Engineering; it was depressing to have to let go some darn good people because our business base had shrunk. It had to be done, but it wasn't easy."

Skurla slides a box of old reports out of the way and opens the closet door in his old office. A file cabinet is hidden by memorabilia. A Grumman coffee mug is precariously balanced on a stack of old photos and cigar boxes; an airplane model is wedged between an "Anytime, Baby" baseball cap and a Pride of Workmanship plaque. "Pride in the quality of your work. That's the key to a company's future," says Skurla.

"Quality has always been our hallmark," says Skurla. "We've had a few bad times, but we've always turned it around. However, you have to constantly emphasize quality — you can't let up on it. It goes hand-in-hand with our long-standing reputation for design excellence."

As head of Grumman's LM program at the Cape during the Sixties, Skurla says he was paranoid about quality. "The whole world was looking at us. Our vehicle was going to bring men to and from the moon. We can hold this period up as a magnificent example of Grumman's commitment to quality. On missions, our LM was 99.99 percent reliable. NASA gave us super high ratings."

Pride is the underlying factor. "If you have pride in your organization, you will keep striving for quality without being told. You'll say, 'my group turns out top quality work.' And, if you make a mistake, you're not afraid to admit it and fix it."

'If you have pride in your organization, you will keep striving for quality without being told.'

The shelves of the bookcase are getting dusty; the old sofa looks like it belongs in the family playroom. An oil painting is haphazardly tossed in the corner. The painting features Skurla's portrait and Plant 5 late at night. The parking lot is empty except for Skurla's car; the only lights on in the building are in his office.

"I don't consider myself a typical workaholic," protests Skurla. "I'm just in love with the business and enjoy my job. Hard work and long hours come easy in those circumstances." Below the display

ries... It's Been Great!'

t after industrious career that spanned four decades

case, a pillow, sheets and comforter are stuffed into one of the cabinets.

Grummanites never knew when Skurla would stop by to see how things were going. He'd stay overnight in his office during snowstorms and at daybreak would often help plow the snow off the Bethpage parking lots. On weekends, he'd drop in on his old friends on the Calver-

'I don't consider myself a typical workaholic. I'm just in love with the business and enjoy my job.'

ton production line. Often, Skurla would offer encouragement to a proposal team in the wee hours of the morning.

Though his corporate position required him to attend black tie affairs and meet with top officials of the military, government and industry, Skurla has always seemed more comfortable pounding the pavement around the company. He frequently visited the fleet to see how the Grumman "hardware" was performing.

He describes his management style as "a mixture of thunderbolts and rainbows." He's been known to yell with the best of them, but he's also apt to forgive easily.

"I prefer the 'hands-off,' non-dominating management approach," says Skurla. "Over the years I've picked people who quickly got to know my gut feelings about the business. It told them the boundaries I wanted them to operate in and they went from there. You are only as good as the people who work for you and I've always been fortunate to have a staff of loyal, hardworking Grummanites flying wing with me.

"One of the primary responsibilities of top management is to develop younger people. It is the legacy that every manager should try to leave behind," says Skurla. "I'm proud of all the people who worked for me. Many have become stars in this company."

On the way back to the corporate headquarters, Skurla stops by Plant 2, where he began his career. Directly behind the main lobby is an old bench press with a plaque on it that reads: "George Skurla started here in 1944."

Except for a skeleton night crew, the plant is empty. It's stiflingly hot. Skurla takes long strides through the plant. "That's where Jake Swirbul used to climb on a crate and talk to the troops . . That's where the Hellcats were assembled...we rolled them out the doors at a rate of 20 a day.

"Yep, this is where it all started," Skurla says, as he waves to a lone Grummanite working on a bench across the cavernous plant.

Growing up in New Jersey, Skurla wanted to be a dirigible engineer. "But the Hindenberg crash put an end to that," he says. He enrolled in the University of Michigan to study aeronautical engineering.

Though the U.S. had yet to enter to war, preparations were well underway. Skurla enrolled in a naval aviator course and learned how to fly. He was hooked. He wanted to sign up for the Royal Canadian Air Force, but his family talked him into continuing his education. Unfortunately he injured his back lugging a classmate's trunk up the dormitory stairs. An operation that fused two spinal discs extinguished his dream of being a naval aviator.

With diploma in hand, Skurla began his search for his first job. His cousin suggested Grumman. Skurla recalls being a bit taken back by the location. "In those days, the University of Michigan's football stadium seated 86,000 and there I was, going to work for a company in a town called Hicksville, in the middle of Long Island's potato fields.

"In the summer, you could see the simmering heatwaves over the farm fields all the way to Wantagh and Hempstead," continues Skurla. "Life was simple. We built Hellcats. The company was much smaller and more informal — a very tight-knit family. We had common causes: win the war and bring the boys back home. Today, the planes are more complex and loaded with electronics, computers and software; the competition is fierce; the daily pressures of doing business are far greater."

Leaving the building, Skurla points to the trees that now line the road bet-

'You can only be as good as the people who work for you....I've worked with a great bunch of people.'

ween Plants 2 and 5. Saplings just a few years ago, they are at last providing some shade. "One night over 20 years ago, I was working late and there was a major snowstorm raging outside. Plant 5 used to be fenced in. We had to walk quite a way to the fence gate, instead of walking straight across the lot to our cars. I cursed that fence, turned to my co-worker and said, "If I'm ever president, I'm going to tear down those fences."

He did tear down the old fences, and trees were planted in their place a few years ago. Skurla shakes his head and says, "Those trees will be here long after we're gone.

"I've been very fortunate," he says, "I've worked at Grumman during the war, the jet age, the Apollo era through the 80s. I've met with presidents, admirals, generals, astronauts — and even my hero, Charles Lindbergh. I've had the opportunity to fly in all Grumman's tactical aircraft including the F-14D Super Tomcat. I've worked with a great bunch of people. I've had one hell of a good time through it all."

His advice to younger Grummanites: "Learn the importance of being earnest. Let people know what you aspire to become. Work hard, take pride in your work — and don't carpool." He winks, and closes his office door.■

George Skurla has accumulated over 16 hours in the F-14 — including several flights in the Super Tomcat (above). Skurla was one of the first to welcome back Grumman families from Iran when they had to be evacuated in December 1978 (at left). During the LTV takeover attempt in 1981, Skurla, Jack Bierwirth and Joe Gavin join fellow Grummanites at a rally in Plant 4.

Bravo! 'Nunzio' The Robot Gives Rivetting Performance

After test runs in Bethpage, robot will go to Stuart, Fla.

The Jo 'Mach 16 Robot moves with such grace that it could be set to Beethoven.

Like a seagull, the main part of the robot swoops down to its base and grasps a drill bit with its jaws. Stretching forward, the robot then begins to work on an aluminium aircraft part. A team of Grummanites was responsible for teaching this 37,000-pound robot to "dance" through its work routines.

The Jo 'Mach project is part of Grumman's overall factory modernization program as well as the joint Navy/Grumman Industrial Modernization Incentives Program (IMIP).

After completing development testing of the robot in Building 12, Bethpage, Grumman is expected to begin actual production work this week. That way, all will be running smoothly by the time the robot is moved to Stuart early next year.

Grumman is the first U.S. corporation to use the Italian-made Jo 'Mach 16. The robot, nicknamed "Nunzio," will aid in the assembly of stabilizer and wing control surfaces — automatically drilling, countersinking, dimpling, and fastening. Initially, it will work on aluminum wings and tails for Navy E-2C's and C-2A's. Later, it will handle the titanium, stainless steel, and composite surfaces of future aircraft, possibly including the V-22 Osprey TiltRotor.

'If Quality Control looks at the first piece and says 'this looks good,' they know the second one will be of the same quality.'

"When the robot switches to the more difficult-to-machine materials, no modifications will be needed — that's why we bought it," says Phil Barone, project engineer. "While only 12.5 pounds of arm thrust is necessary for the aluminum work, 100 pounds of arm thrust is required for stainless steel." The robot has a maximum arm thrust capability of 600 pounds. Its arm can move in seven different directions and can also automatically change 18 tools. The tools are kept in a drum base located at the foot of the robot and above its computer.

"If Quality Control looks at the first piece and says 'this looks good,' they know the second one will be of the same quality. This cuts down on costs," says Barone.

The first production part will be an aluminum left-hand elevator, a steering control on the tail of an E-2C. In addition, Grumman's Bethpage team will conduct three test runs on aluminum outboard flaps for the E-2C. Completed work will be sent back to Stuart.

The robot was programmed and debugged by Material and Manufacturing Development engineers. Rick Pignoli, a mechanic from Stuart, came to Bethpage five months ago for extensive training on the robot.

"When I came up here, I wasn't familiar with robotics or computers," says Pignoli. "I read through mounds of manuals for weeks before actually working on the robot. It was like learning to swim."

Each morning Pignoli walks into the laboratory where the Jo 'Mach 16 is kept. Although there are a few other pieces of machinery nearby, the Jo 'Mach 16 takes up most of the huge room.

'I constantly have to be on my toes — Nunzio is extremely complex.'

From a raised platform, Pignoli turns on a computer terminal, and programs the robot to begin the first task of the day. Throughout the eight-hour shift, the Jo 'Mach 16 will use all its 18 tools in test runs of different metals. Though the robot is huge, it is quiet. "Even when the robot is drilling, it's not very noisy," notes Pignoli.

"Accuracy is important, so that when it is moved to Stuart, production can begin immediately," Pignoli continues. "Right now, we're very busy in Stuart working on the E-2C C2-A, F-14, and Boeing 767 wing center section programs. By January, there should be a lull and we'll be able to bring Nunzio up to speed."

The extreme Florida heat won't affect Nunzio. The robot's computerized sections are internally air-conditioned and the machine itself is kept in an air-conditioned room. The room temperature is about 70 degrees in Bethpage and will be the same in its Florida home.

Before moving to Stuart five years ago, Pignoli had worked in Bethpage for 13 years. "Although I was apprehensive at first, I jumped at the chance to come up and learn something new," the new robot operator says. "After some trial and error, I now feel comfortable operating the robot. However, I constantly have to be on my toes — it is extremely complex."

And he is still learning each day. "I carry pocket instructions just in case, because there is so much to remember," he says. Pignoli hopes to train others to operate robots once he becomes proficient. If Grumman begins using the robot 24 hours a day, additional operators will be needed. The company may purchase two more robots.

Pignoli and his co-workers at Stuart look forward to seeing Nunzio in action. "The robot is there to do the dirty work and to get the work out faster. Currently, it takes one person 14 hours to complete what the robot can do in a shorter time in an eight-hour day. We won't know exactly how long it will take the robot to complete this task until after the first production piece is finished." Pignoli says.

'Nunzio' Is Given Life. *Rick Pignoli, Jo 'Mach 16 robot operator, Building 12, Bethpage, programs robot for testing. In a simulation run, the robot drills a left-hand elevator, a steering control on an E-2C. Production on the part is due to begin this week. (Photo by Bob Settles)*

"Once we get going, four out of five people who build up each structure manually will still be doing that," he continues. "Once the fifth person — that's me — finishes operating the robot, the part goes to them. My job was redefined, and other new jobs will be created. For instance, people will be needed to maintain the robot."

Barone says, "Before a robot is put on a production floor, those who will have anything to do with it are trained so they know why it's there, what it's supposed to do, and how to run it. It's extremely important that everyone understands how the robot works because if a problem arises, it can be fixed that much quicker."

'By January, there should be a lull and we'll be able to bring Nunzio up to speed.'

The robot is equipped with a two-part safety system. First, an invisible beam surrounds the perimeter of the machine. If someone or something breaks the beam, the robot will stop and a reset button must be pushed.

A second beam surrounds the robot's arm. If a person is standing within six feet of the arm, it will again automatically shut down.

Grumman's first robot was acquired in 1982: the ASEA IRb-60, nicknamed "Alfie". This robot, in Building 3, Bethpage, is less sophisticated than the Jo 'Mach, according to Barone. Alfie is used for pilot hole drilling and routing of F-14 contoured sheet metal panels.

"When I'm running the robot, its arm is an extension of my own," says Pignoli. "It amazes me that Nunzio is capable of doing so much. Robotics is the future, and Grumman is staying on top of it. It's a pretty exciting place to be."■

Personals

We wish to thank my co-workers and ESO for their concern and kind words of sympathy during the recent loss of my husband Tony. **Charlotte Auricchio and Family**

My family and I wish to thank my co-workers and ESO for their kind expressions of sympathy during the recent loss of my father. **Alan Nazzaro**

My family and I wish to thank all of my friends, co-workers and ESO for their kind expressions of sympathy during the recent loss of my father. **Ralph A. Minerva**

I would like to express my heartfelt appreciation to my co-workers and ESO for their thoughtfulness and kindness shown to me and my family during the recent loss of my brother. **Doris Scanlon**

My family and I would like to express our sincere thanks and appreciation to all our friends and ESO for their kind expressions of sympathy during the recent loss of my mother. **Leonard Woods**

My family and I want to thank all our Grumman friends for their kind expressions of sympathy on the loss of my father. Your thoughtfulness helped ease the pain. **Ray Weick**

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Service Milestones

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John S. Caramanica, Forming Heat Treat, Bethpage, Aircraft Systems
Walter R. Clark, Dir. Aerospace Ops., Washington, Grumman Corp.

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Robert J. Fitzpatrick, Vice President, Bethpage, Grumman Corporation

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Anthony Adamo, Inv. Rel. & Cont., Bethpage, Aircraft Systems
Hans G. Biegler, Paint, Calverton, Aircraft Systems
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Warbird. *This Wildcat is one of eight Grumman planes on display at the New England Air Museum in Windsor Locks, Conn.*

Vintage Grumman Birds Displayed In Conn. Museum

History can be relived at the New England Air Museum in Windsor Locks, Connecticut.

Eight vintage Grumman birds are part of the museum's permanent collection of more than 40 aircraft, propulsion systems, and other exhibits. There are also about 50 loaned historical pieces.

You won't want to miss the F6F-5K Hellcat fighter, restored to all its World War II glory. The Hellcat is credited with giving the U.S. Navy control over the Pacific in World War II, accounting for 5,156 air victories.

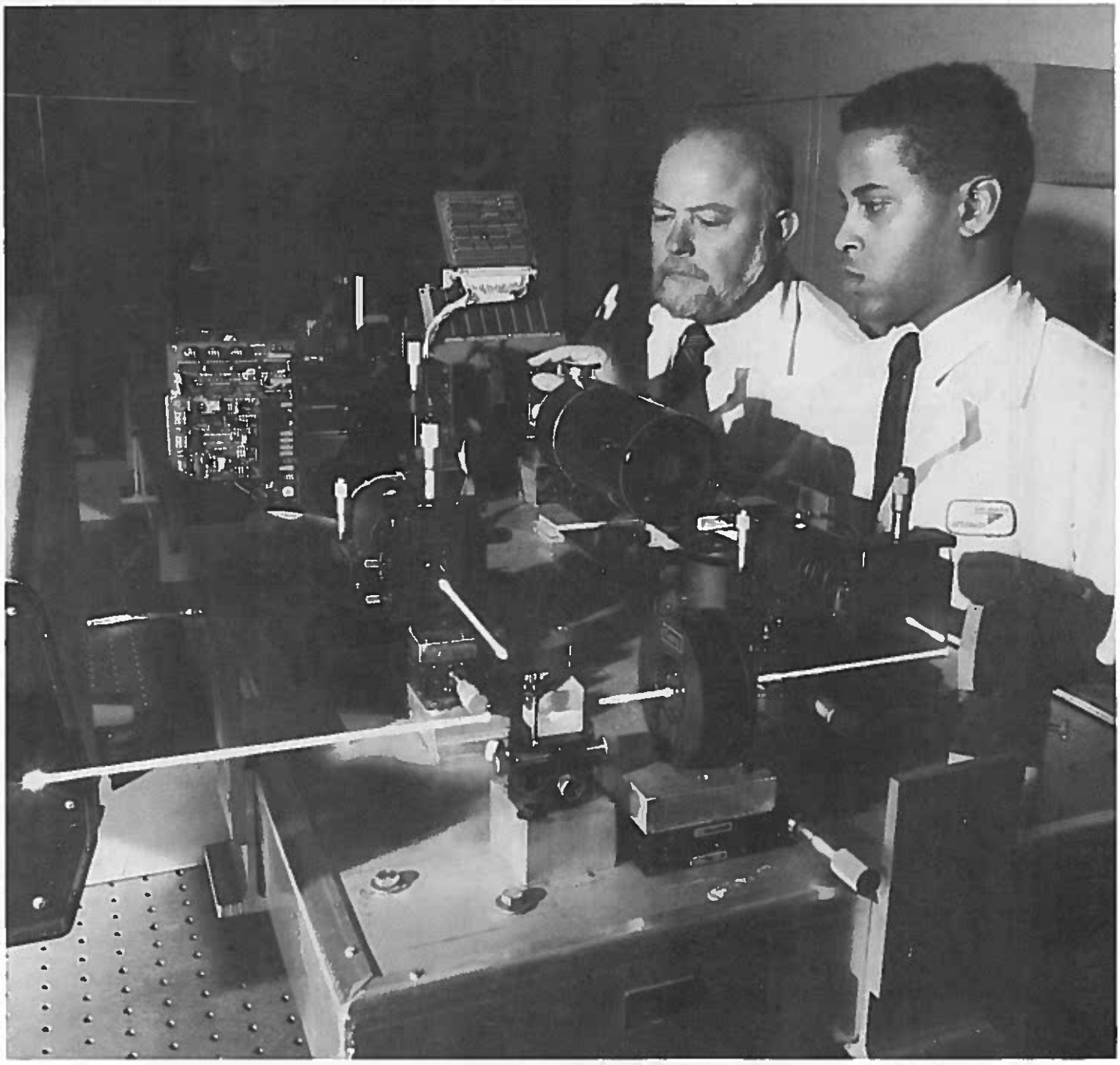
Two Grumman Albatrosses are at the museum: a damaged 1952 HU-16 and a 1953 HU-16E. The twin-engine Albatross was used as an air-sea rescue and transport plane in its day.

One of the more unusual planes on display is an experimental 1960 Grumman K-16B Tilt Wing aircraft. This one-of-a-kind plane is an early example of the vertical takeoff and landing concept, which eliminates the need for a runway.

Museum flyers and discount coupons are in all Employee Services offices. The regular admission is $4 for adults, $3.50 for senior citizens, and $1.50 for children between the ages of six and 11. Group rates are also available. Cockpit tours cost an additional $10 per person; no one under age 12 permitted. Lectures and films on aviation history are featured daily for a modest fee.

The museum is open seven days a week, year-round, from 10 a.m. to 6 p.m. The museum is located on the northwest section of Bradley International Airport, halfway between Hartford, Connecticut and Springfield, Massachusetts. Take I-91 to Connecticut Exit 40 and follow the signs.

GrummanWorld
July 25, 1986

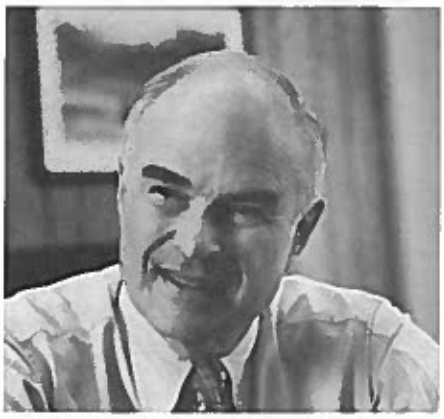


(Photo by Bob Settles)

Fine-Tuning A Radar Signal

In Grumman's Building 26, senior research scientist Bob Brandstetter and research assistant Dick Smith run an experiment on a radar signal that has been converted to a laser beam. Changing an electronic signal to an optical one makes it easier to zero in on interference, screen it out, and increase the radar's range. Brandstetter and Smith are using a Grumman-patented filter that does this automatically. This technology could greatly benefit the radar systems of future aircraft.

A Letter From The Chairman



Many Grumman people have mixed feelings about George Skurla's retirement at the end of this month. They are happy for him and wish him well, but they're also sorry to see this day arrive.

I guess it's no secret that one of the people with mixed feelings is George Skurla, and that's easy to understand. No one has loved the company more or given more to it than George.

If I had to pick one word to characterize George and what he stands for, that word would be integrity. Integrity in living up to his promises; in making a product we're proud to put the Grumman name on; in delivering the product the customer expects.

He can look back on a long series of accomplishments over the past 42 years. As director of operations for Grumman at Kennedy Space Center, he headed the Grumman team in the final assembly, test and prelaunch check-out of the Apollo Lunar Module. The day that men walked on the moon was one of the proudest in our country's history — and our company's.

In the early '70s, when production and delivery schedules at the Calverton, Long Island, facility seemed hopelessly tangled, George went out there and turned it around.

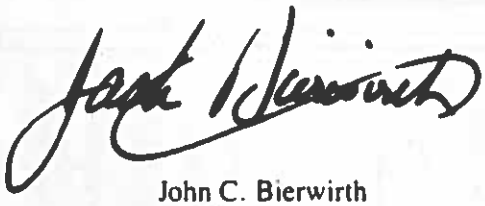
As Grumman Aerospace president, he completely reorganized our manufacturing base. He developed a plan for the introduction of modern machinery, for reallocating work between Long Island and the rest of our manufacturing complexes, and for making the company more competitive.

As president of Grumman Corporation, George helped to implement the divisionalization program, getting all parts of the company to cooperate in the plan.

We are fortunate that he will stay on as a senior management consultant. Although we have a policy that requires senior officers to retire at 65, it's really a retirement from the day-to-day responsibilities of the job. The presidency of any large company is an incredibly big responsibility, a heavy personal load. Without those burdens, George will be in a position to take on key assignments where his experience and understanding will make him, in some ways, even more valuable to us than he was before.

George Skurla combined hardheaded business judgment with real concern for Grumman people — and that combination made him an outstanding leader. Practically all of the programs that will carry our company into the next century — our major aircraft programs, our electronics work, our research and development efforts — got started and thrived during George's watch.

He can feel great pride and satisfaction in passing such a brightly lighted torch.



John C. Bierwirth
Chairman

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