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ABSTRACT

Why Programs Die: The Stand-Off Target Acquisition System (SOTAS) Case Study

by Mark J. Lumer

This paper looks at a real DoD weapons system that was terminated by Congress in 1981. The paper reviews the origins of the program, and why it was killed. The author's research shows that a number of mistakes were made, both by the Government and Motorola, the prime contractor.

The author cites specific mistakes made by the Army Program Office, including acceptance of requirements from OSD that were not necessary, mistakes made by the source selection board in failing to adequately consider the difficulty in jumping from a component supplier to a systems integrator, and a poor bidding strategy by the contractor which made substantial overruns inevitable.

The paper concludes with lessons learned for program managers, acquisition personnel and contractors in how to avoid the pitfalls that doomed the SOTAS program.

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Why Programs Die: The Stand-Off Target Acquisition System (SOTAS) Case Study

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Why Programs Die: The Stand-Off Target Acquisition System (SOTAS) Case Study

by Mark J. Lumer

INTRODUCTION

This is a case study of a failed program. The Stand-Off Target Acquisition System (SOTAS) program was born in glory and died a political death in the halls of Congress and the Pentagon. How the program made its relatively quick slide from contract award to termination, and how a confluence of factors, most seemingly inconsequential in the grand scheme of things, contributed to the Congressional decision to kill the SOTAS program will make up the bulk of this paper. The final section will be devoted to a number of lessons learned for program managers, contracting officers, and the contractors they deal with.

The electronics industry is relatively unique in the United States, given a procurement system that allows virtually everyone to compete for government contracts. It has been asserted that anyone with a garage and a soldering gun can be an electronics supplier to the United States government. The U.S. electronics industry can be segmented into four major subgroups:

a. Systems Integrators

b. Systems/Components Producers

c. Subcontractors (defined as companies which

build to someone else's specifications)

d. Vendors (defined as companies which build to their own specifications only)

This case study documents the unsuccessful attempt of Motorola, a Systems/Component Producer to "step up" to the big leagues of Systems Integration.

METHODOLOGY

This research paper used two main sources for information:

a. The written record of the program, including the contract and program files, the Congressional Record and other data.

b. Interviews with most of the principals, including several of the Army program managers, senior civilian program officials, the first two Army contracting officers, a number of Army officials in the Pentagon, representatives from the prime contractor (Motorola Inc., Government Electronics Group) and other interested personnel. In two cases, individuals requested and received total anonymity in responding to interview questions.

BACKGROUND

SOTAS represented the solution to a critical battlefield need of the Army that had dated back several wars. For years,

the only way a battlefield commander could obtain accurate information about, and surveillance of, the forces opposing him was to send out reconnaissance teams and forward observers, or use spies. The problems with this personnel-intensive activity were twofold:

(1) Sometimes the people didn't get back (in Korea it was estimated that the battlefield life of a forward observer was seven minutes), or didn't get back in time; and (2) Sometimes the information they did bring back was limited in scope (due to weather or geographical factors) and/or not representative of actual enemy strengths. (General Longstreet's staff ride to the area adjacent to Little Round Top at Gettysburg, and his surveillance failure regarding the presence of Union troops there, is a prime example of the dangers of personal observation.) Additionally, each commander had to factor in the human element, discounting or accepting the reports of human subordinates, based upon any number of subjective factors.

SOTAS was designed to cure all those problems, by providing real-time radar imagery of virtually all moving targets on the enemy side of the battlefield.

THE SYSTEM

SOTAS consisted of a synthetic aperture radar mounted on a Blackhawk helicopter. Also attached to the helicopter was an anti-jam data link. The data link would send real-time

transmissions to a ground station. The ground station was tied into a communications net with division artillery, a tactical operations center, or anyone else that needed the information. Because the radar was capable of operation at extended ranges, the helicopter could stay on our side of the battlefield, well back from potential groundfire or attack by planes, missiles or other helicopters. The SOTAS helicopter could stay on station for long periods of time, and the fast scanning radar could provide immediate targeting and intelligence information on almost any moving target, including clusters of troops. In most cases, radar signatures could be used to identify the moving objects. The capabilities of the system were so profound that the Program Manager's office adopted a slogan "Defeat SOTAS-Don't Move".

EARLY PROGRAM HISTORY

The impetus for the development of the SOTAS program grew out of the 1973 Israeli-Egyptian war. The Egyptian Army conducted tank maneuvers near the Suez Canal as part of planned exercises several days prior to their attack against Israel. At the conclusion of each day's activities, the Egyptians appeared to remove all their units from the berms nearest the canal. In actuality, they left individual and small groups of tanks behind secondary and tertiary berms and sand dunes. These tanks were undetectable, and the tactic enabled the Egyptians to mount an

attack with little advance warning. U.S. analysts, and Mr. Norm Augustine, who was then Assistant Secretary of the Army for Research and Development, recognized that the tactic would have applicability to the Fulda gap in Germany, and could easily be exploited by the Russians. Mr. Augustine endorsed the initiation of an effort that culminated in the development of the SOTAS program requirements by the Army's Training and Doctrine Command (TRADOC).

General Dynamics was awarded several contracts in the mid-1970s by the Army to look at creating an advanced development model of the system. In 1976, one demonstration model, using mostly commercially available material, was produced. Instead of a Blackhawk helicopter, a vintage 1960 Huey was used. The radar and communication links were basically off-the-shelf equipment. The model was shipped to Germany for participation in the annual Return of Forces to Germany (REFORGER) exercise.

The system's performance exceeded all expectations. One account of the exercise credited SOTAS with winning the battle. The system's accomplishments were so extraordinary that General Blanchard, the 7th Army Commander, refused to allow the system to be returned to the U.S. After some heated internal Army debates about field versus program needs, the Vice Chief of Staff of the Army, General Kerwin, directed that the system be refurbished and another one be built-- and both would be sent to Germany as soon as possible. Both of these systems ultimately stayed there for the next five years, despite the fact that there was no logistics

tail in place, no technical data had been developed, and all spare parts had to be individually ordered from a commercial vendor.

Back in the United States, the program office viewed the outstanding performance of the advanced development models (called the "Interim-Interim SOTAS" or "I² SOTAS") as a precursor of exceptional accomplishments to come. The advanced development models proved that the concept worked, and-- by using only ordinary, commercially-available equipment-- had increased Army capabilities by an order of magnitude. When the real system, using state-of-the art technology was fielded, SOTAS would be an unequalled force multiplier.

The program sailed through a variety of reviews within the Army bureaucracy, without a hitch. At the DoD acquisition board review, a request was made that the system have an electronic scanning (E-Scan) capability in addition to the mechanical scanning ability currently designed into the system. This technical requirement was added so the system would be able to accommodate more powerful radars, and provide quicker updates to receiving stations. Lieutenant General August Cianciolo, the first SOTAS Program Manager (as a colonel), later stated that accepting that requirement-- so that DoD approval would be obtained quickly and quietly-- was the program's first mistake. He noted that "the E-Scan requirement was neither wanted nor needed by the Army. There was no evidence that we had to have it to fulfill the mission." Neither General Cianciolo, nor anyone

else associated with the program, could know at the time that this new and unnecessary requirement would become the major cost overrun driver in the whole program. Having accepted the requirement, the program was authorized to enter engineering development.

ENGINEERING DEVELOPMENT

The solicitation for the engineering development of SOTAS was issued in the second quarter of FY 1978. It authorized the awarding of a cost-plus-incentive-fee contract. The contract was to be awarded based upon technical and management factors, with cost being a relatively minor one. Formal source selection procedures would be used to evaluate proposals and select the winning contractor. Government documents showed a Baseline Cost Estimate (BCE) of $92 million for the proposed contract.

PRE-AWARD PHASE

Two companies submitted offers in response to the solicitation: General Dynamics (GD), the contractor for the advanced development models, and Motorola, Inc.

Motorola's original proposal was for $79,229,708. GD came in at $103,332,074. The designs were significantly different. The Source Selection Evaluation Board (SSEB) found that Motorola's proposal to be technically superior to GD's effort.

One government official even described Motorola's approach to the radar aspects of the program as "elegant." Bill Kenneally, the Army's Deputy Program Manager for SOTAS said "the Motorola proposal was the best I ever saw in my time in government. It was logical, coherent and consistent. It had level after level of detail, down to the nth degree."

After face to face negotiations with both companies, the government's contracting officer, Grace Brady, issued a request for Best and Final Offers to the competitors. Motorola responded by further reducing its already amended offer of just over $74 million down to $54,887,275. The reduction was attributed to a management decision, without further explanation. The government's minimum negotiation objective was about $66.5 million. GD also dropped its price by over $20 million, to almost $84 million. Their explanation was a little more detailed-- highlighting some proposed efficiencies-- but for the most part reflected their management attempt to have the lowest price.

Miss Brady observed that "We were shocked by the price drops of both companies. Their strategies were both apparently based upon the mistaken belief that we were going to award the contract to the low offeror. As it turned out, Motorola would have won the contract at almost double its price. Instead, it put the Government in a real quandary at time of award, because of the "buy-in" aspects of Motorola's offer. The low contract price ultimately contributed to the appearance of overruns far in

excess of what they would have been had the contract been bid and awarded at a more realistic price".

Motorola's error in adopting a "low bidder" strategy was compounded by the Government's decision to award, rather than re-open negotiations and try to obtain a more realistic price. "We felt that we really didn't have time to re-open negotiations and try to convince both parties that price wasn't the most important factor. We were also concerned about technical leveling and leaks. Besides, the procurement rules didn't prohibit buy-ins, and still don't," added Miss Brady. Colonel (then Captain) Nelson Johnson, who served initially as the Army Materiel Command's CS2 team director in charge of validating Motorola's cost accounting systems, commented: "The government should have recognized that Motorola bought in by a huge amount and what that could mean to the program down the line. Once we went ahead with the award, we were playing with the cards stacked against us all the way."

The company had successfully passed all the other procurement requirements for award. The pre-award analysis recommended a complete award to the firm, although it did observe that this would be Motorola's largest government contract ever. The technical evaluation had also commented on Motorola's lack of systems development/integrator experience as a potential risk factor. Richard Wesenyak, the government's third contract specialist on the program noted years later that, "Motorola was a series of small companies masquerading as a large company. It

had radars, and semiconductors and other stuff, but it really was a black box supplier at heart. We overlooked the management risks inherent in switching from being a supporting player to taking over the lead role."

The company's management style was also the opposite of most systems producers at the time. Rather than having a single program manager in charge, Motorola always used a "troika" approach, with three co-equal leaders: a technical manager, a marketing type, and a business/program manager. Only toward the end of the program did Motorola move to a government "PM" organizational model. Mr. Wesenyak noted that "Motorola's triumvirate approach should have warned us that their management practices were incompatible with major systems efforts where you need a king, not three equal princes." The pre-award survey, and the source selection management evaluation team did not feel that this was a significant problem.

Colonel Nelson Johnson noted that "The government missed the fact that Motorola had no systems management experience to speak of. They were extremely weak in a number of areas. For example, when we conducted our first readiness assessment, it became readily apparent that the company had poor subcontract management capabilities. Four months into the program, they still could not tell us how much material would be needed, or how much would be made in house versus bought." A review of the pre-award survey confirmed Colonel Johnson's appraisal-- there were no specific comments regarding the expertise of their subcontracting

operation. Bob Holland, a retired Motorola employee, confirmed several years after the program's termination that the company had a very small contracting staff. In fact, he had been the only contracting professional at the division for a number of years.

Despite the many potential warning signs, both the contracts office and the PM decided to go ahead with the contract signing. The engineering development contract for SOTAS was awarded to Motorola, Inc. of Tempe, Arizona on June 19, 1979. The CPIF terms were:

Target Cost $52,048 960

Target Fee $ 2,838,315

Target Price $54,887,275

Minimum Fee: $1,548,171

Maximum Fee: $4,128,457

Share Ration: 75/25 (over and under target) [The Government share is always listed first)

POST-AWARD PHASE (1979-1980)

Problems developed almost immediately. Motorola was not validated for the government's accounting system for major programs, the Cost Schedule Control Systems Criteria (CSCSC). It took the company more than two years and well over $2 million to become compliant. In the first of several ironies, Motorola received its CSCSC validation letter from the Army Materiel Command after the contract was terminated.

Motorola fired their proposal manager, Ed Soohoo, on the day they were notified that they had won the contract. (He had been hired away from Lockheed, and the government expected him to become the program manager for Motorola.) "In hindsight, the firing of Ed Soohoo should have thrown up a red flag in our faces", stated General Cianciolo. "I should have stopped the thing right there and said, 'That is completely unacceptable', but I took the company's word that he had been hired just for the proposal, not for the entire program."

A readiness assessment for CSCSC validation took place in late December, 1979. It showed a $12 million overrun. A follow-on review conducted in February, 1980 revealed a $27.5 million overrun, and a six month schedule slip.

Motorola had issued the subcontract for the E-Scan antenna to Lockheed within 30 days of the government award for $11 million. Motorola insisted on very tight specifications, although the prime contract allowed for trade-offs in meeting performance requirements. As it became apparent that the E-Scan effort was hemorrhaging dollars, Motorola refused to relax any of the specifications. Less than nine months after contract award, the Lockheed subcontract had grown to over $40 million. "They treated Lockheed like some minor vendor that needed its feet held to the fire, instead of the high-tech company they were," recalled Mr. Kenneally. "Motorola should have backed off on the specs since they had flexibility in other areas".

Another aspect of Motorola's corporate ethos was its pride

in ignoring the political aspects of government contracting. Although it was the largest employer in the state of Arizona, the company had never involved itself in politics. Motorola was particularly proud of the fact that it had never needed to play those games. Miss Brady stated "One of their managers remarked that the company hadn't contacted their two senators or the local congressman on any government contract problem. They weren't needed. Motorola's reputation of quality work, delivered on time and for a fair price was enough to ride over any rough spots."

On the government side, things were equally unsettled. The first PM left the program two months after award, as part of a normal military rotation. His replacement, Colonel Wayne Davis, became disenchanted with the civilian Deputy PM. Bill Kenneally, the deputy, left the program for the Army War College seven months later. The PM ordered his staff not to speak to or provide program information to Mr. Kenneally while he was at Carlisle Barracks.

As the overruns mounted and money was pulled from other Army programs as billpayers, Colonel Davis made it clear that SOTAS was the Army's top priority program. Other PMs and programs would just have to suffer. This did not win friends for the program downstream. Approximately one year after taking over, Colonel Davis was relieved of duty and transferred by the Commander of the Army Electronics Research and Development Command (ERADCOM). The ERADCOM Chief of Staff, Colonel William "Roy" Crawford, took over the reins as the third SOTAS PM. His

initial meeting with his PM staff was something of a disaster, according to Lorraine Chickene, procurement analyst for the program. Colonel Crawford indicated that if the Commanding General of ERADCOM said "to pull the plug" on the program, he would do it without a moments hesitation. This "shoot from the lip" tendency would eventually become a significant contributor to the program's demise.

FLANKING MANEUVERS

Unbeknownst to both Motorola and the Army, General Dynamics had apparently not taken the loss of the program kindly. They began a "whispering" campaign within DoD and Congress to either get the source selection overturned or have the program killed. The message was fairly straightforward: "The Army picked the wrong guy." As news of the cost overruns spread, a second phrase was added to the first "and at the wrong price". The SOTAS Deputy PM, Bill Kenneally (who had returned to the program after Colonel Davis' removal), recalled Congressional staffers complaining to him about how Motorola was ripping off the government. The comment surprised him because Motorola was not profiting from the program either monetarily or by reputation.

In addition to the apparent political efforts, GD made several unsolicited proposals to the program office to continue their limited involvement in the program. Although each of these proposals was ultimately rejected, GD employees continued to have

access to the program office for several more years (they continued to receive contracts for the I2 models fielded in Europe through 1984.) This created significant opportunities for information collection which would eventually be used against the program.

(Author's note: Attempts to reach the appropriate GD officials to interview for this research paper were unsuccessful.)

Within the Pentagon, the program was also receiving bad press. Program estimates now reflected a 100 percent cost growth, with the final price approaching $110 million. Representatives from OSD complained about the overrun numbers and questioned whether the program should be halted or terminated. Senior people within Army headquarters also challenged the program as too expensive, and gold-plated. People whose programs had been raided for money by SOTAS now added their voices to the opposition chorus. Other constituencies within ERADCOM, especially those working on another radar program called the APS-94, also undermined the program. This became a particularly sensitive issue, since Motorola was also the producer of the APS-94, and there were company officials who saw SOTAS as a threat to the APS-94 production line.

POLITICAL IMPLICATIONS

Ronald Reagan swept into office in 1980 with a mandate for change. During the campaign, he had made a particular point of

the apparent damage the Carter administration had done to the defense capabilities of the nation. The "hollow Army" theme and the continuing menace of the Soviet Union led most American voters to support Mr. Reagan. "Peace through Strength" was more than a slogan. It was a call to action that the country responded to. Still, there were voices who were critical of the program. A number of radio and television commentators believed that Mr. Reagan would just throw money at a profligate Pentagon, which would only increase their wasteful practices. This fear was exacerbated by Caspar Weinberger, known as "Cap the Knife" on the domestic side, but who now seemed to endorse virtually every major program proposed by the Services and OSD.

It became politically necessary for the incoming Administration to show that it would not tolerate a feeding frenzy at the defense trough. Within the Department of the Army, the task of implementing efficient management practices and controlling the bureaucracy went to Jim Ambrose, the newly appointed Under Secretary of the Army. Mr. Ambrose was a former employee of Ford Aerospace, where he was known as a troubleshooter par excellence, with little tolerance for programs and people that were not performing up to speed. One Army staff member, who requested anonymity said, "Jim Ambrose was Darth Vader in a sweater vest. The Army was going to do things his way-- or else. He became personally involved in every major Army program, way down into the weeds. He micro-managed everything." An industry consultant, who also insisted

upon anonymity, stated his belief that Mr. Ambrose "... had to kill a major program to show two things: one, that he was in charge, and two, that the new Administration would not be a patsy for big defense contractors. I believe that he selected the SOTAS program as the sacrificial offering because it had cost problems, and because the Army as a whole was really behind it. After SOTAS was killed, nobody crossed Jim Ambrose inside the Army for the next seven years." This theory was totally rejected by Lieutenant General (retired) Emmett Paige, former Commanding General of ERADCOM. He indicated that the ultimate decision to kill the program was not politically motivated at all.

POST AWARD PHASE (1981)

The end of 1980 and the beginning of 1981 saw a continuation of problems for the SOTAS program. Several contractors, most notably Computer Sciences Corp.(CSC), had been terminated; the antenna problem was not solved and overruns continued, albeit at a slower pace. Despite these issues, there was some hope that the situation would be corrected. There was a substantial reduction in the monthly overrun rate, although there was no way to get back anywhere close to original projections. Several critical technical roadblocks, including the weight of the equipment in the helicopter, had been solved or had solutions identified.

Motorola was requested to explain its poor performance on the program by the Army in early 1981. In late February, 1981 the Vice-President for the Government Electronics Group (the senior company official in the Phoenix area), James Lincicome, wrote to General John Guthrie, Commanding General of the Army Materiel Command that "Relative to the past, we, as well as the Government, underestimated the magnitude of the major system development, due to:

* Unknowns in the development effort which were not apparent at the outset of the program

* Greater than anticipated start-up problems, and

* departure from proven Motorola methods of management"

In the spring of 1981, Mr. Ambrose directed the PM to conduct a review, with outside assistance, of low cost alternatives in an effort to reduce program costs. The reviews found no reasonable alternatives to the basic program, although certain requirements were relaxed.

Later that spring, Dr. Richard DeLauer, the Under Secretary of Defense, called for a DSARC review of the SOTAS program. During the ensuing meeting, the PM, Colonel Crawford, was asked to go over the program's current status. He indicated that costs were finally under control, and that virtually all of the technical problems had been resolved. At that point, someone-- accounts differ on whether it was Dr. DeLauer or another attendee-- asked if Motorola would accept a

fixed price cap on the contract. Colonel Crawford answered yes. He was then asked how long it would take to negotiate and finalize the fixed price, and he indicated two weeks. With those two statements, the program's fate was sealed.

TERMINATION PHASE (1981)

Negotiations with Motorola to alter the contract to fixed price did not go well. General Paige led a team of PM and ERADCOM personnel out to Motorola to give the company an ultimatum: fixed price or else. The company declined to accept a fixed price cap on the contract. General Paige then called Mr. Ambrose and recommended termination. Mr. Ambrose apparently spoke with Dr. DeLauer, who agreed. General Paige later said, "Motorola's failure to sign up to a fixed price contract showed they had a lack of confidence in their numbers and their ability to manage the program. It seemed that they thought SOTAS was a cash cow they could milk for cash flow purposes. Their position was unacceptable to the government."

General Paige's support for termination was based upon knowledge that the program would be resurrected by Congress for Fiscal Year 1983. He had worked with Tony Battista, the senior staff member on the House Armed Services Committee, who supported the termination action as a "get tough" tactic, and had agreed to sponsor a new Army SOTAS-like program in the next budget. The Congress ordered the SOTAS program terminated

accordingly.

On 2 December 1981, less than 30 months after award, the SOTAS contract was terminated for the convenience of the Government. The Government and Motorola eventually settled the contract for $83,181,923.

One final irony remained for the program. Although General Paige had arranged for the program to be resurrected in the next fiscal year, he apparently had not consulted with General John Wickham, the Army Chief of Staff. In a subsequent meeting with his Air Force counterpart, General Wickham gave control of the program to the Air Force, and agreed that they would be the executive agent for it. The program, now called JOINTSTARS, lives today and performed exceptionally well during DESERT STORM. The system is mounted on a Boeing 707 airframe, not a helicopter, and a good deal of information processing is done right on board. The Army continues to manage the ground station part of the program.

PROGRAM MISTAKES

Mistakes made in the SOTAS program, by both the Government and Motorola, were many. Both groups had a certain naivete about the way DoD weapons systems programs are managed. The reality of how those programs are supported and survive within both the Executive and Legislative branches is significantly different than the answers in program management textbooks.

GOVERNMENT MISTAKES

1. The Government failed to suspend award in the face of indisputable evidence of a buy-in. Although neither the Federal Acquisition Regulations (FAR) nor the Defense FAR Supplement prohibit buy-ins, and the General Accounting Office (GAO) has said they are not illegal, the government should not have proceeded to make an award. The buy-in by Motorola made the overruns look much worse than they really were. The overruns contributed to an adversarial working relationship between the government and Motorola. The overruns gave ammunition to both GD and internal government opponents of the program. The buy-in was irrelevant to the source selection decision.

2. The pre-award survey did not emphasize the quantum leap in effort the SOTAS program would be. Motorola's attempt to "step up" to a major systems integrator role was addressed with only a few sentences. The potential implications for the government should have been highlighted.

3. The assessment of risk by the management evaluation team was insufficient. Motorola's lack of systems management experience, their failure to be CSCSC validated, and their peculiar management style should have alerted the government to conduct a much more in-depth analysis of the company's capabilities. The lack of CSCSC validation created a rolling baseline, which prevented the Government from ascertaining the

true extent of the overrun for a number of months.

4. The PM should have fought harder against the inclusion of the E-Scan antenna requirement, since the Army experts in TRADOC had not included it as a necessary capability. Had the PM been successful, the largest overrun account would not have existed. OSD should share equal blame for adding a requirement that was not needed by the user. General Cianciolo remarked that "You must always remember that 'better' is the enemy of the 'good'".

5. The marketing of the program was poor. The second Army PM, Colonel Davis, lost perspective on what his job was. The third PM shot from the lip, and put the program in an untenable situation.

6. The program office should have protected its political flanks better. Congress approves most programs one year at a time; what it authorizes one year, it can terminate the next. The PM needed to ensure that Motorola participated in the political arena, at least to the extent of marketing the system to the Arizona congressional delegation. Both the PM (through the Army's public affairs office) and Motorola should have had a scout in the halls of Congress to find out if the program was under attack. With SOTAS, neither the PM nor Motorola knew they were under assault until it was too late. Internally within ERADCOM, and within Motorola, competing factions should have been warned to stay in line, and not contribute to the "anti-SOTAS" elements.

7. The loss of both the first PM and his deputy within a nine month period created problems from which the PM office never recovered. Under the Goldwater-Nichols Act, as amended, this type of situation should not occur again.

8. The source selection process discounted GD's experience with troops and its advanced development (AD) system over Motorola's outstanding proposal and the paper solutions it contained. General Cianciolo noted that "we went for the elegance of design versus experience. I'm not sure that we picked the right guy."

CONTRACTOR MISTAKES

1. Motorola's bidding strategy was poor. It believed (as did GD) that the low bidder would win. They were totally wrong. Their buy-in ultimately caused most of the problems that led to the program's termination.

2. Motorola's systems management capabilities, staffing procedures, their troika approach to management, and their subcontract management capabilities, were poor. Had Motorola worked the E-Scan antenna trade-offs with Lockheed instead of sticking to a firm but excessive specification, much of the overrun could have been avoided. If one person was in charge, rather than a three-headed team, more efficiency could have been obtained.

3. Motorola's political naivete hurt the program. As a

component supplier, Motorola's political needs were nil. As a major systems supplier, they needed to protect their turf. Their failure to take advantage of their position as the largest employer in Arizona eliminated an avenue that could have saved the program after everyone else wanted the program terminated.

LESSONS LEARNED

The SOTAS program is a primer for government and contractor PMs in how **not** to run a program. The distinct advantages that the program had-- one, an outstanding AD system that performed exceptionally well, two, total Service support (at least at the senior level), three, an outstanding technical proposal from a company with a great reputation and inherent political power (remember that Barry Goldwater was still a senator then)-- were squandered.

Government PMs should know:

* The procurement system does not adequately assess risk or systems experience.

* Maintaining strong political support, directly with information briefings to appropriate staffers, or through the company briefing its elected officials, is critical. Part of this process is keeping an ear open to disappointed competitors, so their assertions can be refuted.

* Accepting new requirements may help in the short

term to get the system through various internal decision points, but can ultimately kill the program.

POSTSCRIPT

There was a lot of learning done on the program, especially after the termination. Motorola never attempted to become a major systems supplier again (at least into 1993). They did however, greatly expand their contracting and subcontracting units. Bob Holland, the Motorola contracting professional, became an expert on terminations, and now runs a consulting business on that topic. He expects to be very busy in the next few years.

The Army continues to yearn for its own SOTAS-like system. It is presently looking at concept proposals from industry for a system much like SOTAS, although it is unlikely that a go-ahead will be received from OSD.

More than the prime contractor loses when a program is terminated. Six other contractors, mostly doing program support, had all their contracts terminated on the same day Motorola's prime contract was killed. One firm, Adaptive Sensors Inc., a six person think tank, had received almost 100 percent of their contracts from the SOTAS program. When it was canceled, the company's income went to almost zero.

While most of the players are retired, the remaining government employees have not forgotten the errors and mistakes

that were made. One even wrote a research paper about it for the Industrial College of the Armed Forces (ICAF).

PERSONS INTERVIEWED

1. Miss Grace Brady, first government contracting officer
2. LTG.(ret.) August Cianciolo, first PM, SOTAS (as a Colonel)
3. LTG.(ret.) Emmett Paige, Commander, ERADCOM (as a Major General)
4. Mr. William Kenneally, first Deputy PM, SOTAS
5. Colonel(ret.) Alex Johnson, fourth PM, SOTAS
6. Colonel Nelson Johnson, Chief, SOTAS field office (as a major)
7. Mrs. Lorraine Chickene, Procurement Analyst, PM SOTAS
8. Mr. David Usechak, Deputy PM, Jointstars (Army)
9. Mr. Robert Porter, Motorola employee
10. Mr. Bob Holland, consultant (former Motorola employee)
11. Dr. Harold Finn, President, Adaptive Sensors Inc.

Discussions were also held with:

a. Two individuals who requested complete anonymity; and

b. Mr. Richard Wesenyak, third contract specialist for SOTAS, prior to his death, but not specifically for this research paper. This paper is dedicated to him.