

SCHOOL OF ADVANCED AIR AND SPACE STUDIES

AIR UNIVERSITY

***The Marquez Way:
On Strategy, Logistics and Warfare***

by

Timothy R. Kirk, Colonel, USAF

A dissertation presented to the faculty of Air University in partial fulfillment of the requirements for the degree of Doctor of Philosophy

Maxwell Air Force Base, Alabama

2014

 21 AUG 14
Dr. Thomas Hughes, Committee Chair

 21 AUG 14
Dr. Melvin Deaile

 21 AUG 2014
Dr. Bill Allison

 21 AUG 2014
Colonel Thomas D. McCarthy, PhD
Commandant and Dear
School of Advanced Air and Space Studies

i

SCHOOL OF ADVANCED AIR AND SPACE STUDIES

i

Disclaimer

The views expressed in this academic research paper are those of the author and do not reflect the official policy or position of the US government or the Department of Defense. In accordance with Air Force Instruction 51-303, it is not copyrighted, but is the property of the United States government.

ABOUT THE AUTHOR

Colonel Timothy R. Kirk graduated from the U.S. Air Force Academy in 1993 with a Bachelor of Science Degree in Biology with a German Language Minor. A career maintenance officer, he has held a variety of positions at the squadron, wing and depot level, including serving as a squadron commander at Eielson Air Force Base, Alaska. He also served as a contracting officer earning an Acquisition Professional Development Program Level II certification in contracting. He holds a Masters Degree in Sports Medicine from the U.S. Sports Academy, Alabama, a Masters of Logistics Management Degree from the Air Force Institute of Technology, and a Masters of Airpower Art and Science from the School of Advanced Air and Space Studies.

Prior to his current position he served as the senior Afghan Hand responsible for COIN civil society anti-corruption efforts in the ISAF Combined Joint Interagency Task Force Shafafiyat (Transparency), and as the lead speechwriter for the Chairman of the Joint Chiefs of Staff, Joint Staff, Pentagon.



ACKNOWLEDGEMENTS

Since the beginning of my 21-year Air Force career I have heard the name Leo Marquez. I understood the name's association with excellence in logistics, aircraft maintenance and munitions, but I never really knew much about the man behind the name. Aircraft and munitions maintenance have taught me innumerable lessons on leadership and management, but none were more important than this: Air Force mission success always rides on the back of countless troops who toil anonymously in myriad dimensions of maintenance and logistics. The award created in Marquez's name recognizes a precious few of the best of these troops. Those so recognized represent the excellence of the whole field. They are truly a national treasure, and Marquez did much to make their contributions known. For this and other reasons the metaphoric Heisman Trophy for logistics bears the Marquez name.

Just as few sports fans know the story of John Heisman, I found few in aircraft maintenance and logistics know the story of Leo Marquez. This thesis is an opportunity to document this aspect of Air Force heritage by telling his story. My sincere hope is to better Air Force maintenance and logistics by sharing Marquez's story and bringing to light his ideas on logistics and strategy. This story of a poor Hispanic farm boy who grew to be a national leader in military logistics is one that could only happen in the United States of America. The testament of Leo Marquez reflects our way of life and the values we uphold.

Several people deserve heartfelt thanks for helping me complete this thesis. I thank Ian Bryan for his guidance and help as my thesis advisor and professor. Dr. Thomas Hughes has been the quintessential dissertation mentor and teacher in encouraging me to write on Marquez and in guiding me along this difficult journey. Thanks to my aunt and my mother for their help in getting this project going. I can surely say I would not be writing this study if not for the leadership and assistance of Lieutenant General Jean-Marc Jouas, Major General Marke Gibson, and Brigadier Generals Warren Berry and Thomas Deale. Colonels Ron Crosby, Russell Gimmi, Stacey Hawkins and Rick Plaumann provided immeasurable insight and leadership in shaping my thoughts on this field of study. Lieutenant Colonel Aaron Cowley and Ms. Chalmarie Bridges provided remarkable content and format advice without which I could not have completed this work. Lieutenant Colonel Yancey Cowen's personal example of an intellectual warrior has well informed, challenged, and motivated me. I also thank Dr. Robert Kirk and Bill Carrier for their wisdom, and most of all, Amanda Gray, for her invaluable support, prayers, and encouragement.

Most importantly, my God and my family deserve my most sincere praise and thanks for providing me the strength, inspiration, and support to pursue my life's work in the profession of arms.

Contents

| | |
|--------------------------------------|-----|
| DISCLAIMER | II |
| ACKNOWLEDGEMENTS | IV |
| ABSTRACT..... | VII |
| PROLOGUE..... | 1 |
| 1. THE LOGISTICS OF VICTORY | 23 |
| 2. THE MAKING OF LEO MARQUEZ | 29 |
| 3. THE MARQUEZ AIR FORCE CAREER..... | 42 |
| 4. THE MARQUEZ WAY WITH IDEAS | 122 |
| 5. THE MARQUEZ WAY AND PEOPLE..... | 137 |
| 6. THE MARQUEZ MASTERPIECE | 157 |
| CONCLUSION | 219 |
| BIBLIOGRAPHY | 229 |



Illustrations

Figure

| | |
|---|----|
| 1. Mission Capability Rates by Design Series | |
| Category FY80-FY99..... | 48 |
| 2. R&M 2000 Initiative Outline..... | 61 |
| 3. Rapid Assembly of Munitions Patent Diagram..... | 74 |
| 4. RAMS Precision Munitions Assembly..... | 75 |
| 5. Aircraft Maintenance and Munitions Fields | |
| and Manpower in 2004..... | 81 |
| 6. Air Force Operational Assets and | |
| Operations, FY91-FY06..... | 83 |
| 7. Mission Capability Rate History..... | 84 |
| 8. Total Non-Mission Capable for Supply History..... | 84 |
| 9. Total Non-Mission Capable for Maintenance History..... | 85 |
| 10. Effects-Based Operations..... | 94 |
| 11. Capability-Based Logistics..... | 95 |
| 12. Integrated EBO and CBL Theory..... | 95 |

ABSTRACT

This dissertation examines the life, career, and meaning of Lt Gen Leo Marquez. It begins with his childhood on a New Mexico farm. This follows his story through college and his career in the US Air Force. Marquez began his career as a fighter pilot until forced out of the cockpit by a medical problem, at which point he became an aircraft maintenance officer. It focuses on his career as a maintenance officer and logistician and the lessons he learned about airpower and military strategy as he rose in the ranks. Marquez's unique experience as a fighter pilot and logistician developed his thinking between the business of operations and logistics. Marquez believed that warfighting was inseparable from the resourcing activities necessary to fight wars. As warfighting and resourcing of war are two sides of the same coin, Marquez's theory directly challenges the modern American bifurcation of logistics from warfighting enshrined in the seminal Goldwater-Nichols Defense Reformation Act. Those reforms artificially divided key elements of military strategy that Marquez believed to be intimately linked, making the development of U.S. defense strategy structurally unsound. The implications of Marquez's theory suggest a reconsideration of the American way of war with respect to how the Nation organizes the military Service departments, Unified Commands, and how military requirements are developed and prioritized. The relevance of Marquez's theory becomes even more important as defense spending becomes more constrained in contemporary and future budgets. Marquez's experiences and insights suggest that the artificial division of warfighting naturally create wasteful spending amongst the Service components as they pursue narrow parochial approaches that are disconnected from realistic national security threats and realities. The analysis closes with course of action analysis based on the fundamentals of Marquez's thinking.

Prologue

Escape from Iran

All warfare is logistics. I intuitively suspected that there was much to learn about strategy by looking through the lens of that principle. Studying strategy, I wanted to get a warrior-logistician perspective. In January of 2007, I contacted one such leader, retired Lieutenant General Leo Marquez, to gain insights from him. I accepted his invitation to have breakfast with him in New Mexico. At that time, I had only just begun my research looking into Marquez's life and career as an Air Force officer. I had never met Marquez, and I knew very little about the man behind the name that had become so ubiquitous in my professional community of U.S. Air Force aircraft maintenance and munitions. I was interested in learning more about him, but arrived in Albuquerque without a sense of deep curiosity. That changed over the course of three days. I would quickly discover that Marquez's experiences and career record presented vital implications to contemporary strategic thinking, especially with regard to operations and logistics within the U.S. Air Force and, more broadly with the Goldwater-Nichols Act and the American way of warfare. Before I would get to the strategic implications, however, I would learn about the impact Marquez had on a single Air Force career, a family, and of a powerful connection Marquez felt to what he considered his Air Force family.

Breakfast was the only firm appointment. I sensed that the General was getting a feel for my intent to bring the heart of his story and worldview to life. As his comfort level grew, he invited me to an additional hour of interview. His demeanor was serious, but unpretentious. He made it clear to me that he expected the thesis to include a reasonable telling of his story, but also of his philosophy. The initial breakfast appointment turned into hours of discussion over several days.

At the end of my final scheduled appointment with the General, we said our goodbyes over coffee in his office. His “office” was an unassuming apartment in a humble Albuquerque complex littered with stacks of books and memorabilia piled on the floor. There was nothing resembling the trophy wall or room that is so familiar to retired career officers. Whatever awards and trophies he owned lay in unidentifiable stacks or leaned against the walls. I noted the distinct lack of ceremonial display of his collection, and asked him what item amongst the memorabilia was the one of which he was most proud. The General reached into a box on the floor and rummaged through the contents until he pulled out an autographed picture of President Reagan. It struck me that of all the trophies, military decorations and mementos, a simple photograph of his commander-in-chief and personal hero stood out against them all.

We shook hands, and I thanked him once again for his time and for the candid interviews. As I walked to the door, the General called out for me to stop. He asked me if I had time before my flight to ride with him to Kirtland Air

Force Base for an hour or so. I agreed to go and asked him what he had in mind. The General replied, "I have a story that you need to hear, but you'll never believe me if I tell you myself." I had no idea what to expect next.

We pulled into the air base wing headquarters parking lot minutes later. The General led me to the vice wing commander's office without a word about his intentions. He introduced me to the vice commander, Colonel Mohsen Parhizkar, USAF. The room was notably unlike the General's office. Each wall was loaded with an impressive array of artifacts depicting Col Parhizkar's distinguished career record. The environment was somewhat intimidating to me, a lowly major, especially since the purpose of this visit was unclear.

Col Parhizkar was a lean and serious looking officer, but his demeanor immediately softened as he gave the General a warm hug and a huge smile. We sat down at a small conference table, and the General introduced me and explained the nature of my project. Col Parhizkar nodded with an unspoken understanding of what the General needed him to do. He could clearly tell that this was one of the rare times that he was to tell a story that only these men knew. I listened carefully as Col Parhizkar recounted the events.

"A little history first, so you understand where I'm coming from and how all this really this came to be," he said, waving to the wall of monuments from his career, "because I was born and raised in Iran." He explained how he had been 17 years of age in 1977 when he came to the U.S. to attend school at a time when the U.S. and Iran enjoyed friendly relations. "The Shah was in charge in Iran, and my father was an army general under the Shah. I was one

of the privileged folks allowed to leave Iran and come here to get an education. The plan was to finish my college degree and become a doctor, a lawyer, or whatever I wanted to be, and go home.” Parhizkar explained that he attended the University of Arizona where he fell in love with the woman who would become his wife.

“A year later we got married. So, long before the revolution in 1979, I had decided that I would never go back home,” he explained, “But, I come from a very close family, and I hadn’t even seen my parents since 1977.” When the revolution brought down the Shah in 1979, the consequences were horrific for those who faithfully served the country in military uniform. He paused as if to ponder the gravity of what that meant to his family. “The revolutionaries took all the general officers that weren’t smart enough to flee the country with the Shah, and shot them all. The new regime executed them all with very few exceptions.”

He continued the story solemnly, “They took all the senior officers that weren’t shot for whatever reason and took their rank away, exiling them to different parts of the country. My father was one of the lucky ones and was exiled to remote northern Iran.” The Islamic authorities made it very clear to the exiled family that they were not to move from their new home without explicit permission. It would be years before he could see his parents again, if at all.

The colonel explained his plan to join the Air Force in 1983, but before doing so, he wanted to try to see his family in Iran. “Before I joined the Air

Force in '83, I went back to Iran only because I was fooled by that government's agents who told me, 'just come on in, brother. It will be no problem.' They gave me the entrance and exit visas saying 'don't worry about it, come see your family and we'll let you out whenever you want to go.' I should have known."

He happily went back home and visited with his family for the first time in five years. He explained that was a joyous reunion, but as we sat in the Albuquerque office, I could see consternation on his face that seemed to emanate from thousands of miles away. He continued his story as his lips drew thin even as he smiled. "After a four-week visit, I decided to go back to the U.S. The airline refused to give me a ticket until I had an additional stamp of approval from the Iranian government." The agent insisted that he had to get another stamp on his visa from the Iranian immigration office before he could book a reservation.

He argued with the agent about his situation, pleading his case with the one person who stood between him and an infamous bureaucracy. Parhizkar realized he had no choice but to make his way to the immigration office of the Islamic Republic of Iran. There he met with a gruff immigration officer who looked over his documents for what seemed to Parhizkar like a very long time. "So, you are a United States resident?" the officer asked. The young Parhizkar sheepishly nodded affirmatively. "You haven't served in Iran's military, have you?" the officer pried. Parhizkar knew bad news was coming.

At this point in the interview, I was intrigued. I looked at Marquez, who obviously relished this story as his lips nearly followed Parhizkar in silent

recitation. Parhizkar continued, “The officer told me flatly, ‘you owe us two years. We’re in the middle of war with Iraq, so here’s your bag; you’re going to show up tomorrow at 8:00 and go north.’ Obviously, that wasn’t my agenda. So, I escaped. Long story short, I escaped through Iran’s mountains, and into Turkey. Turkey had an agreement with Iran to return their fugitives, so I had to escape from Turkey to Bulgaria, which back then was a communist country, from there to England, and then back home to the USA.”

Not wanting to miss a single detail, I asked, “Sir, can I ask that you make the short story long? Tell me, how did you escape?” Marquez smiled as Parhizkar gestured toward a plaque on the wall that displayed what looked to be an old, yellowing magazine article. He said, “The reason it’s a long story is because many years later, that *Finding Freedom* article was written by Tim Barela.... It is the long story of how I was lured in and was kept, and how I had to escape because I had a wife that I left behind. I tell you all this as a precursor because that’s important to how General Marquez comes into this picture.” My eyes moved from the colonel to the plaque. Parhizkar stood and led me to the wall that held the memorial article. He continued to speak, but I was distracted by an urge to read the opening lines:

Through the hustle and bustle of the crowded terminal at New York’s J. F. Kennedy Airport, not one person seems to escape brushing shoulders with others while weaving through the mass of travelers. But, for one Iranian passenger, people instinctively clear a path. His clothes – a pullover jacket, jeans and tennis shoes – are filthy, torn and reek of stale sweat.... As he steps up to the customs desk, the woman at the window nervously eyes him. She notes his tattered apparel, coal-black hair, sun-bronzed skin and obvious mid-eastern features. Trying to regain her composure, she avoids staring into his dark eyes. She had been briefed

on terrorists, and is sure she faces one now. 'Your passport please,' she says, trying not to betray her fear.

Parhizkar was still speaking as I marveled over the article enshrined on his wall. It was 2007 and the Global War on Terror was on the news every night. This article contained captivating words from a time well before 9/11, and I was now even more intrigued to know about the story and its connection to Marquez. I was also wondering how it was possible that I'd never heard this story before:

He hands her the plastic bag. In it, she discovers his passport and, to her surprise, a green card indicating he is a U.S. resident.... She gives him a quizzical look and motions that it's okay to go. Only steps away from the counter, two men in dark suits grab his arms and drag him to a small room. Before they can say anything, the suspect humbly requests, 'Do anything you want to me, but first just let me kiss the ground'.... Suddenly one of the security guards can't contain his curiosity any longer. 'What happened to you? You look like you've been through hell.' The Iranian's smile fades slightly, and he responds, 'I have...'¹

Parhizkar explained further, "The year was 1982. I went to Iran in May, was supposed to come back in June, and I got stuck. I had to escape, and it took me several months to get back." My mind fixated on that statement. I was awestruck by the notion of his escape from Iran, which the colonel had relayed so casually, even though I knew that it must have taken considerable effort and involved a remarkable story. As it turns out, it certainly was. Parhizkar took the plaque from the wall and handed it to me as he recounted the tale, and the words leapt off the pages of the old Air Force publication:

Suddenly they were awakened by a terrified voice, 'Oh my God!' The youngest member of the group, a 17-year-old, was staring wide-eyed at

¹ Timothy P. Barela. *Finding Freedom*. Spangdahlem Spangled Banner, Sept. 25, 1987.

the mouth of the crevice. Parhizkar followed the boy's stare to the rim. He stopped breathing as terror swept over him. In front of him were five dogs...they were doomed.

Again, I was startled by the realization that there was a tale here that had hardly been told before, except for an obscure article in a Spangdahlem Air Force Base publication. It was very well written, and the story that emerged was about to tell me a lot more about General Marquez's own tale.

The low chuckling of the Turks momentarily shifted the group's focus. 'Go back to sleep, they are only wolves.' Somehow, Parhizkar and the rest of the escapees didn't find that comforting. Nobody but the Turks seemed to rest easy that night. Parhizkar went down on the third night. He collapsed and couldn't force his limbs to heave himself up. He was running a fever and the energy was sapped from his lifeless body. Although he felt guilty, a few of the men in the group managed to carry him all that night. After resting the next day, he was able to continue under his own power.²

I could barely take my eyes off the print story as Parhizkar continued his recounting "So in August of '82, I finally made it back into the United States, and reunited with my wife. On November 16th of that year, I raised my hand, swore allegiance and became a citizen. I joined the U.S. Air Force two weeks later. In March of 1983, I graduated from OTS and I was sent to my first assignment, Hill Air Force Base, where General Marquez was the commander. I was just a brand-new lieutenant working in Civil Engineering." At this point, Marquez looked to be transported in time; he was reliving in moment.

Parhizkar continued, "three months into it, we had this major inspection that came up, and I volunteered for a special duty. As a result, I am selected as the base officer of the quarter winner, or whatever. I found myself before

² Ibid.

General Marquez in his office to be recognized. It was, no kidding, a 10-minute basic introduction. Not even 10 minutes. We stood outside the door longer than we were inside shaking the general's hand." Parhizkar laughed aloud and slapped the table. "I mean imagine, you're a brand-new second lieutenant, and for the first time in your career, you're coming in contact with a two-star general. This is a big deal!" I nodded in agreement as I wondered where the story could be headed.

"I have a pretty unique last name, and I remember General Marquez kept looking at it saying, 'How the heck do you say this? Where do you start? Which letter comes first?'" Parhizkar continued as Marquez chuckled, "and we joked about it. So that was it. Two minutes, we were out of there. That was all General Marquez ever saw of me."

All he saw of him, that is, until months later when everything was on the line for Parhizkar's family. "In December of '84 for the first time, the government of Iran allowed my dad to actually apply for a passport, and approved it—against all odds." For some unknown reason, the Iranian government had decided to give Parhizkar's father a passport, meaning they would allow him out of the country. So the family worked very hard with the German embassy to get both parents visas. At the time, the U.S. had no diplomatic relationship with Iran, so they had to go to a country that did. Germany made sense because Parhizkar's father had attended senior officer school there during his military service under the Shah. However, he

explained, there were strings attached to ensure the passport wouldn't be used to allow anyone from Parhizkar's family to escape Iran.

"The government of Iran gives a single passport to my mom, dad, and my brother—all on one passport; they did it on purpose. This way they can't split, they can't leave one behind. When they got to Germany, they received a transit visa good for 72 hours. You can extend it for another 24 hours, but that's all. They only give you transit visas when you're going from their country to somewhere else, and you're not going to stay. My family's goal was ultimately to make it to the U.S. I thought to myself, as a military officer, I should be able to go to the embassy in Germany and plead my case to whomever it is in charge and say 'please, I'm a U.S. citizen. Could you give my parents a visa so they can come and visit with me?' The U.S. visas were good for 179 days."

Parhizkar realized that he had only a small chance of seeing his family for any amount of time at all, but the thought of six months with them in the U.S. was far beyond imagination after the fall of the Shah. He was desperate and planned the movement carefully. "In March of 1985, they took their passport and flew to Germany. I planned to meet them there, pick them up that morning, go to the embassy, get a U.S. visa, then come to the States and stay here for four or five months until they had to go back to Iran. I was so excited because my family had never seen my wife, they'd never seen my kid, and I haven't seen them since 1982. But didn't work out the way we planned."

Parhizkar explained that he reached the airport, reunited with his Mom, Dad, and brother, and immediately took them to the U.S. Embassy to get a

visa. “I wore my Air Force uniform proudly—in fact, on my flight there, I was pinning on my first lieutenant bars. I was so proud to have earned them, and to be an Air Force officer. I even wore my Class A service dress, with those shiny first lieutenant bars. I went into the embassy looking sharp. We took a number and stood in line. When we get to the front, the guy behind the glass looks at the Iranian passport, and of course, he raises his eyebrows in surprise. That was not something he had seen before. I recited my rehearsed plea, ‘Hello! I am U.S. Air Force Lieutenant Parhizkar. I know by law, my family can apply to become green card permanent residents. But we don’t have time for that, and they’re not looking to live in the U.S. right now, because they’ve got a family and everything back home. They just want to visit with me back in the U.S.A.’” The embassy employee was not impressed. The abnormality in front of him was far different from any routine request, and he was not willing to even entertain the idea of a U.S. visa. To a certain extent, this was understandable, considering the emerging threat of Islamic terrorism in the West and the still-recent memory of the U.S. embassy employees’ experience during the Iranian hostage crisis.

Yet Parhizkar appealed to the gentleman on the basis of his honor as a military officer. He explained, “I’ll sign anything you want, I give you my word as a U.S. Air Force officer that my parents will come back prior to when the visa expires in 179 days. All I want is for them to come and see my wife and my kid and my life in the U.S., but the gentleman looked me in the eye and said very sarcastically, ‘Listen, I’ve been doing this a long time, and these sort

of stories don't fool me. I am God, and I will not issue this visa.' His meaning was clear: He was God, he wouldn't allow anyone else to help us, so don't bother asking again. His word was final. The man threw the passport through the slot into my face and said, 'Have a nice day.'"

Parhizkar explained how devastated he was to hear this. He was embarrassed and shamed in front of his family, and his hope that his integrity as a military officer would mean something had been naïve. "I couldn't believe it. I was in tears. I had waited all these years for this moment to proudly take my family to the U.S., to make them proud of their son as an officer, and they're just throwing them out. My family must go back to despotic Iran. It was 8 in the morning, we haven't even checked into a hotel, and the 72-hour clock is ticking. So we go to a hotel, check in, and I'm literally sitting there in tears saying 'what do I do now?' I'm not about to give up. I waited too long for this, and if they go back – who knows? It may be years before they can get out again. I wasn't willing to take that chance. So I left them in the hotel, changed my clothes back to civilian, grabbed my bag, and I said 'don't move out of this hotel so I know how to get a hold of you. Stay there; I'm going back to the States.'"

His family was shocked to hear Parhizkar say this, especially since they had been reunited only an hour before. "We were all in tears. They cried, 'we haven't seen you in years and you're going to leave us in here and go back?' I said, 'I've got to. I've got to go see somebody. I'm going to go see the President of the United States. I'm an officer of the United States Air Force. I have the

right to go see the president. I'm going to go and plead my case. I'm going to get you guys a visa. Just stay right here and I'll be back.' I left them there and tried to stop crying.”

Parhizkar explained his conflicted journey to the U.S. as he confronted his hopeless situation, “I went back to the airport, bought a ticket on the first flight out, an 8-hour flight to Washington, D.C. I'm thinking to myself, ‘what am I doing? How the heck am I going to see the President of the United States? I can't even get through the gates of the White House!’ I was literally freaking out, and all I can think about is it's going to require somebody bigger than me to at least open that door. I really was thinking, no kidding, that I had to find somebody in the White House. That's how naïve I was in 1985. I had hours to think of a plan. ‘Who do I even know who's big enough?’ All I could come up with was, ‘I know one general. Three stars. He works at the Pentagon. I've got to go see him. If I can find General Marquez and he'll open that door for me, I know how to plead my case. The least that they could do is let my parents in.’ I got to Washington and called the Pentagon operator, and finally got connected to General Marquez's office. I spoke with a lieutenant colonel saying, ‘Listen, here's my story...’ and very quickly I told him my situation, ‘I really need to see the general. It's important! It's an emergency! Can you make that happen?’ He replied, ‘Ah, no, no, no. The general is really busy. He's got things booked. Maybe next week, if you're willing to wait.’ I said, ‘you don't understand. I left my parents in Germany. I've got to get on the next plane back!’ He replied, ‘No, I'm sorry, lieutenant, that's not how it works in the Pentagon.’”

Marquez smiled as Parhizkar explained the bureaucratic blockage, as if he could remember his staff and the layers of administrative protection that surrounded senior leaders. Parhizkar was undaunted, “I figured that I didn’t come all this way to just go back because the front office said so. I went to Pentagon that morning, found Marquez’s office, and I stood there next to the door. It was 6 o’clock in the morning. I didn’t want to miss Marquez – I was hoping to catch him before he went in, because I knew once he was inside the office, I’d never get past the dogs protecting him. About 7 AM, I saw a guy approaching. As he got closer, I saw stars shining on his shoulder, and I knew it was him. So I stood at sharp attention as General Marquez approached, and sounded off, ‘Good morning, sir!’ He was clearly busy and distracted, but he looked at me and stopped. He said, ‘Hey, good morning.’ He looked at my nametag, ‘aren’t you Lieutenant P—starts with a P?’ I said ‘Yes sir! Lieutenant Parhizkar.’ The general smiled and said ‘what are you doing here? How are you?’”

Parhizkar was stunned. General Marquez, whom he had met only once for a few minutes almost two years ago seemed to remember him. “Holy cow, he actually remembered me! I had worried that he wasn’t even going to even remember. I didn’t hesitate to speak because I knew once he entered the office it was over. I said, ‘I’m really here to see you, sir, it’s an emergency.’ Those were the only words out of my mouth, and General Marquez replied, ‘Well then, why are you standing out there? Come on in!’” When they entered the office, there sat the lieutenant colonel who had formulated a plan of attack to prevent

Parhizkar from seeing the general. He looked at the lieutenant with an evil look, as though to say “you little sneak. You are in serious trouble.”

Marquez led Parhizkar directly into his inner office, “We walk in this big office, big table, and I sit down and he sits down. I mean, no kidding, puts his hat away and sits, says, ‘Tell me the story.’ I didn’t expect that. I expected him to push me off, ask me to come back later, or something. Instead, after hearing my story, Marquez said, ‘Do you want anything to drink?’ ‘No, sir, I’m fine.’ I replied, and finished telling my story in more detail. The conversation continued until the lieutenant colonel knocked at the door and interrupted, ‘Sir, your morning meeting is assembled. Everybody’s here.’ Through the cracked door, I could see several other generals standing outside waiting. General Marquez said, ‘Well, this is really important. We’re going to have reschedule the meeting.’ He stood up and poked his head out the door and told everybody, ‘Hey guys, why don’t you come back in half an hour. I’m in the middle of something.’ All these generals walked out as they stole a glance inside to see what was keeping their boss. They looked shocked to see this lieutenant sitting inside the office. They clearly wondered what had been so important to bump their meeting. Marquez sat back down and looked me in the eye and said ‘Okay, so he told you your word is not good enough as an officer, huh?’ He then looked at the lieutenant colonel and said, ‘give me the number for General Chain.’³ Once he had the number, he placed a phone call

³ Gen John T. Chain, Jr. at that time was the director of the Bureau of Politico Military Affairs at the Department of State. He had previously served as the deputy chief of staff for plans and operations on the Air Staff where he and General Marquez were contemporaries.

and spoke bluntly after cordial greetings, 'I'm about to engage the U.S. ambassador in Germany. Here's your heads up. There's one of my officers sitting in my office, and here's the issue, so I'm about to do this. I just wanted you to know.'"

Parhizkar grinned as he continued the story. "Marquez hung up after friendly exchanges, looked back at his executive officer, and said, 'Now, get me the Ambassador on the phone.' After some time, the lieutenant colonel came back and said, 'We got their Operations Center on the line, and they're asking if you want to be patched through to the ambassador later, as he's not available; he's preparing for some dinner function.' General Marquez said, 'No, I will write him a note, and I want you to flash it.' Now, this was before email. A flash message was a special electronic communication, sent instantly, and when it got to the other end, the embassy staff would actually go knock on the ambassador's door and deliver it personally. It was for messages of immediate importance and was rarely used. So I sat down with the lieutenant colonel and he wrote the details as I relayed them. He then typed it, put it into a message format, and gave it to Marquez. The general told him, 'Flash it over there.'"

Parhizkar explained further, "Basically, the message said 'Hey, I just became aware that my lieutenant, Mohsen Parhizkar, was over there with his parents asking for a visa. Here's the story. His word wasn't good enough for your counselor. If his word as an officer isn't good enough for you, how's the word of a three-star general of the United States Air Force?' When the message was sent, Marquez told me, "You go back to the airport, get on a plane, go back

to Germany, and take your parents to the embassy.’ I stood there incredulous. ‘Sir? They just threw me out of the embassy and you want me to go back?’ Marquez replied, ‘don’t worry, you just go. Make sure you wear your uniform. I want you to wear your service dress when you go in.’” So, Parhizkar got a ride to the airport, got on a plane, and flew back to Germany. By the time he arrived at his parent’s hotel room, the 72 hours was almost up. Either the U.S. embassy would give them a visa or there would be no other choice but to put them on a plane back to Iran. The lieutenant donned his uniform for their return mission to the embassy.

Parhizkar smiled wryly as he continued the tale, “Looking sharp in my uniform once more, we walked in. There were lines of people, so we took a number like before. Ours was something like number 300—way down the list with a long wait ahead of us. All of a sudden, a door opened—a group was rushing out who obviously had been waiting for a guy in uniform—the group approaches and this nice guy in a suit calls out to me, ‘Sir!’ I was puzzled. They had just kicked me out, and all of a sudden I am a ‘sir’? The man shook my hand warmly and said, ‘we are glad to see you, sir. Sir, you didn’t have to go all the way to Pentagon to make this request. You could’ve told us. We will be very happy to help you get a visa for your family.’ I will never forget this. As the man led us into a back room, I looked at the service window where we had been turned away. It had blue curtains inside. I saw through the corner of those curtains, at customer window #3, the same guy who said that he was

God watched it all. He just looked at me as the counselor general, a man who worked directly for the ambassador, walked my family back to his office.”

Parhizkar continued “This new counselor was such a nice guy as he looked at me and said ‘Sir, please, sit right here and tell me what’s going on. You really didn’t need to wake the ambassador.’ Apparently the flash message had arrived after the ambassador had gone to bed. The gentleman politely explained how the embassy staff had actually knocked on the ambassador’s door, woke him up, and handed him this message from the lieutenant general. He also explained the gracious ambassador’s instructions to the staff, ‘We are going to help this lieutenant.’ But the counselor wanted to know the story behind the flash message, ‘Tell me what happened.’ So I told him, ‘that gentleman behind the window #3, he said he was God. He told me he didn’t believe me. He said my word was no good here. That’s the only reason I went for help. I believed my word as an officer should mean something. If our word is no good, what else have we got?’ When the counselor heard this, he briefly left the room and returned with an approved visa, and handed it to me. He said ‘Please, next time just come see me. You don’t have to go all the way to the Pentagon.’” The elated family caught the next plane out and made their way to Utah to finally meet Parhizkar’s wife and new daughter. They had 179 days together as a family for the first time.

Parhizkar was solemn as he continued. “I had an assignment to Squadron Officer School with a follow-on tour at Spangdahlem, Germany. So on the way to SOS, we took a detour from Hill, and went to New York so my

family could fly back to Iran out of JFK. They flew out a few days before their visa expired. I was sure to send all three of them back home prior to the 179-day deadline, even though by then I had filed the paperwork for my parents to get a permanent resident visa, and their green cards were approved before they left. They could've actually stayed legally, but I was resolute, 'because I have given my word, regardless, you have to leave. We will find a way to bring you back again, but you have to leave. I've got to prove to that embassy—especially to that one individual—that an Air Force officer's word is important. That's the key message I have to send. Because I know they'll be tracking, and he will be tracking, if nothing else.'" Parhizkar's family returned to Iran, while his wife and daughter accompanied him to SOS.

Parhizkar smiled and said, "One day I get a phone call, and they say, 'please hold for General Marquez.' General Marquez was keeping track of what happened to this case. He knew the visa was issued for 179 days, and he also knew it was expiring. He was calling to find out what happened. So of course, I said 'Sir, I put them on a plane and they went home.' General Marquez, however, was not pleased. He shouted back angrily over the phone, 'you did what?! After what we went through to get them here?! You idiot! You put them back on a plane?!' I said, 'Sir, I gave my word. I had to send them back; otherwise it would have gone against everything we promised. Whether it's my word or your word, they had to go back. Someday they'll return.' That someday came years later. But it all started with that act of greatness from a person that really, honestly, to this day, I can't believe did what he did.

Parhizkar wasn't one of those names he saw every day. The fact that he took the time to say 'Come on in' to his office is extraordinary. How many three-stars do you know that would give a lieutenant the time of day? On a Tuesday morning, the general has a staff meeting, all these people standing there waiting, and the general says to the lieutenant 'Come tell me your story.' That is extraordinary...in and of itself."

Colonel Parhizkar clearly had a strong emotional connection with that event. His voice grew deeply sincere as he said, "My family now lives in California. They are alive and healthy today and will tell you that Marquez is to thank for that—my dad still weeps when we speak of it—that act of kindness changed my life in so many ways." Parhizkar turned and looked at Marquez as he said, "What you did really opened up my life to something new. I made the Air Force a career because of this: because we look out for each other. We take care of each other. You taught me that going out of your way to help someone can be very powerful. To this day, General Marquez, I have had several cases where I went out of my way to help an Airman like you did for me. To this day, they send me notes that say, 'Sir, thank you for sticking your neck out for me,' and to tell me about how they're doing and how it all worked out. I have kept every single one of those notes from my troops. I kept them all because they served as a reminder of where I learned that principle. I got that because you did that for me, and that showed me it's a good thing to go out of your way to fight for your Airmen."

Colonel Parhizkar's summary really struck me, "My family is alive today, the oldest of their generation from Iran. I'm convinced the only reason they're still alive is because they made it here. I am not so sure that if they hadn't made it that I'd be in the Air Force today." He paused and looked at Marquez, "So here is one officer's story, and a leader that changed everything for me." Pointing at Marquez, he looked intently at the man and said, "He's my hero."

Marquez was more than that. Marquez's identity was important to this colonel for deeply humanitarian reasons. But Marquez was a rare warrior with decades of experience working in the gritty world of aircraft and munitions maintenance. He was trained to fight, but he made a career of transforming resources in logistics. Marquez was a warrior-logistician. I learned much more about why Parhizkar considered Marquez a hero, but also learned that Marquez's experience and thinking presented vitally important strategic implications. Marquez began his career as a fighter pilot until forced out of the cockpit by a medical problem, at which point he became an aircraft maintenance officer. His career as a maintenance officer and logistician gave him important ideas about airpower and military strategy as he rose in the ranks. The fusion of those two vocational dimensions in Marquez gave him remarkable insights on operations and strategy. Marquez saw the operations and logistics communities as inextricably linked, yet artificially separated by bureaucracy and mindsets in many ways, even in the midst of fighting wars. Marquez's career fused his professional identity as a fighter pilot with his eventual role as a logistician. That led Marquez to seek what he believed to be

the military ideal in a “combat logistician” mindset that bridged the business of marshaling resources with the business of using those resources to achieve military objectives. Marquez’s unique experience as a fighter pilot and logistician also developed his thinking between the business of operations and logistics at the strategic level with even broader implications. Marquez believed that warfighting was inseparable from the resourcing activities necessary to fight wars. As warfighting and resourcing of war are two sides of the same coin, Marquez’s theory directly challenges the modern American bifurcation of logistics from warfighting enshrined in the seminal Goldwater-Nichols Defense Reformation Act. Those reforms artificially divided key elements of military strategy that Marquez believed to be intimately linked, making the development of U.S. defense strategy structurally unsound. Marquez’s experience included an important series of operationally minded logistics initiatives that each contributed to victory in their own ways, but many directly contributed to the U.S. Air Force logistics successes of the Gulf War. Taken together, the implications of Marquez’s experience and theory are critical to modern strategists faced with contemporary security challenges.

1. The Logistics of Victory

His name has become synonymous with airpower. He was an exemplary aviator who challenged the conventions of his day, even to the peril of his career. Though a pilot, his most enduring contributions to national defense were delivered on the ground. As a general officer, his advocacy of airpower completely changed contemporary thinking on aerial combat. He advocated the modern air-minded officer when he wrote, “people who are unused to or unfamiliar with air work are incapable of visioning what airpower should be, of training the men necessary for work in the air, or of devising the equipment they should have.” He likewise became a staunch advocate for the profession of aircraft maintenance and logistics. He characterized this profession as equal in importance to the pilot’s profession. He extolled the virtue of the maintainer with the words, “the mechanics that keep the airplane in the air in their way are as important as the pilot. An air mechanic is entirely different from any kind of soldier or sailor.” He went on to advocate high standards of living and service for maintainers, and established new paradigms that incorporated the logistics of airpower. He wrote, “an airplane has to be supplied constantly with spare parts.... Whenever an airplane is ordered it should be ordered with the requisite number of spare parts to provide for its flying life; otherwise another airplane has to be torn to pieces to get spare parts for the one being repaired.” Through these and countless other contributions, his became one of the

greatest names in the history of airpower. His name was William “Billy” Mitchell, but this is not his story.¹

This is the story of another man who dedicated his life to our nation’s defense through airpower. He was an Air Force officer, a fighter pilot, an aircraft maintenance officer, and a senior logistician who served during a critical period in our Air Force’s history. Like Brigadier General Mitchell, Lieutenant General Leo Marquez dedicated his life to the development and employment of combat air power. But unlike Mitchell, Marquez’s flying career was cut short, so Marquez became the kind of logistician that Mitchell had envisioned as critical to airpower. Marquez is best known within the logistics community; the award given to logisticians for excellence in their profession bears his name. Former Vice Commander of Air Force Materiel Command Lieutenant General Terry L. Gabreski once evaluated the significance of Marquez’s contributions saying he “put logistics on the radar as a critical piece of the mission”.² In fact, General Marquez was the only logistician credited by name in the official Air Force *Gulf War Air Power Survey* for his contribution to logistics in Desert Storm, even though he retired three years before Desert Storm.³

Marquez retired from the Air Force in 1987 after 33 years of active duty. At his retirement, he was the deputy chief of staff of the Air Force responsible

¹ William Mitchell. *Winged Defense* (Mineola, N.Y.: Dover Publications, 2006). 160-177, 198

² Lt Gen T.L. Gabreski, interview by the author, 9 Jan 2007.

³ *Gulf War Air Power Survey*, vol. III, *Logistics and Support*, (Washington, D.C.: Government Printing Office, 1993), 224.

for logistics and engineering. Prior to that four-year assignment, he served as the commander of the Ogden Air Logistics Center and in a variety of other senior logistics positions. In each of these positions, Marquez contributed to the Air Force by improving the maintenance and logistics systems that support operations. The intent of this thesis is to document his life and career with an eye to distilling enduring logistics lessons and theories on people, ideas, and equipment.

This study explores Lieutenant General Leo Marquez's influence had on Air Force thinking about aircraft maintenance and logistics. How did Marquez impact the people, ideas, and equipment of Air Force operations and logistics? What about Marquez's early life, flying experience, and logistics experience prepared him to make an impact? Was Marquez instrumental in building the logistics organization that generated US Air Force combat power that performed so well during Desert Storm? What strategic lessons or theories for today's logistics and maintenance organizations can we derive from Marquez's career? The first part of this work examines Marquez's life and career. The final chapter is analytical and distills the lessons and strategic resource management theory resident in Marquez's ideations. This analysis should serve the reader in evaluating the merits of the theory for future application in Air Force logistics.

This study suggests lessons and theory for use by logistics and operations leaders. Marquez's successes and failures in logistics management during some of the most tumultuous times in Air Force history provide lessons

for both the experienced and the neophyte logistician. Future leaders will benefit from examining the way Marquez thought about solving problems, conducting air operations, and managing logistics. At the very least, this will provide a portion of the history of Air Force logistics. This is primarily the biography of Leo Marquez, but is limited in scope to particular events that directly contributed to his leadership theory, his strategic vision, and contributions to logistics. There is enough material for a much larger study of Marquez's life, a truly remarkable story only possible in America, but this effort distills the lessons and applies theory for future strategists' consideration. There is a story to tell about the man, but the point is to derive the lessons of his unique experience to an important dimension of strategy. Marquez brought much attention to logistics at the Headquarters Air Force level, but the implications of his thinking go far beyond the U.S. Air Force. His theories directly contribute to the strategist's understanding of the relationship between resourcing war and warfighting. Marquez's understanding of that relationship challenges the way America goes to war. The story presented here begins with the man and his work, and then takes a step back to understand his theory and its strategic implications beyond air operations. The relationship between warfighting and logistics is more than just a footnote to historic examples from Napoleon's march to Moscow to sweeping coalition successes in Operation Desert Storm. Marquez's insight and experience demonstrate that warfighting *is* logistics by its very nature, and failure to realize the immensity of that fact is like missing the strategic iceberg beneath perception's surface. The

mechanisms presented here for properly applying Marquez's theory to America's national defense enterprise are starter propositions for strategists applying Marquez's ideas, but the important aim for strategists is to properly appreciate what Marquez demonstrated during his career. Warfighting is comprised of various elements such as tactics, offensive, defensive, intelligence and psychology. Sun Tzu teaches, "All warfare is based on deception."⁴ Marquez's contribution reminds us that all warfare is *first* based on logistics.

Leo Marquez wasn't perfect. He made mistakes and acknowledged shortcomings. This work assumes that Marquez's contributions or failures were not solely the result of his initiative. His subordinates, peers, and superiors no doubt contributed to events in innumerable fashion. For the purposes of this study, Marquez is given credit or blame based on the work of his command, teams, or subordinates, and the relative merit of his theory or ideation. Marquez's various programs touched many organizations, and literally thousands of leaders and workers made his programs a reality, for good or bad. This work documents some of those experiences, then turns an eye toward the implications of his thinking on logistics as a strategic enterprise. Specifically, this study will examine the Air Force Combat Ammunition Center (AFCOMAC) training program, the Reliability and Maintainability 2000 (R&M 2000) initiative, along with Marquez's number one priority for equipment development and management--the product improvement process. This area represents Marquez's true passion. His near

⁴ Sun Tzu, *The Art of War*, Filiquarian Publishing (London, 2006). p. 7

obsession was to complete an enduring contribution to national defense comparable to a notion he found in one of his favorite poems, his own *Wonderful One-Hoss Shay*.⁵

Yet, the implications are must broader than any specific program or initiative. These serve as lenses to view Marquez's way of strategic thinking. The implications touch on everything from operational "effects-based" theory to national strategic-level theory behind the Goldwater-Nichols Department of Defense Reorganization Act of 1986 and the contemporary American way of war. Since that time, the American military had thought, trained, and fought more jointly, which was a central goal of Goldwater-Nichols. But the law also created a statutory fire-wall between those who fight the nation's war's—the combatant commands—and those who resource them—the Service components, an unnatural division of strategy and the antithesis of Marquez's ideas. Marquez's experience demonstrated novel ways of prioritizing military human resources, strategic ideas, and equipment management, but the theoretical implications suggest a rethinking of national military strategy, organization, and operational execution. In fact, his insights suggest that reform was misguided with respect to logistics, and offer a new way of thinking about resourcing strategy and how organizational structure obliges strategists to misunderstand the strategic role of logistics.

⁵ This work, Oliver Wendell Holmes, *The Deacon's Masterpiece; or, The Wonderful One-Hoss Shay*, (McGraw-Hill, 1965), will be discussed at length in later chapters.

2. The Making of Leo Marquez

Amateurs talk about tactics, but professionals study logistics.

--Gen. Robert H. Barrow, USMC, Commandant of the Marine Corps

The story as told by Marquez himself in a series of interviews in 2007 gives a great deal of insight on his own recollection and how he saw his life. This chapter is a distillation of those interviews, and the sources validate the facts where available. Those facts are important, but how Marquez saw his upbringing and its formative affect on his career are of primary interest. Both of these elements combine to form the basis of compelling implications on strategic theory that are discussed in a later chapter.

Leo Marquez was born 27 January 1932 in rural central New Mexico. He grew up in a small farming village just outside of Belen, NM, on the east bank of the Rio Grande. His father was born in 1907 in Peralta, NM, and the family later settled in the region across the river from Belen. His father had been a schoolteacher, mill worker, and plant laborer, but wanted to work the land for a living. He bought a modest farm where the family lived and grew hay to sell on the local market. He spent the meager profits to improve and expand their farm. This farmland would serve as a virtual logistics laboratory that formed, honed, and polished Leo Marquez's concepts of production, efficiency, and innovation. His parents had the motto, "You can't get into trouble if you're

busy,” and work he did. Marquez’s farm work instilled a work ethic that served him well in later years.¹

Leo Marquez spoke only Spanish until he went to public school at age six. A voracious reader, Marquez devoured the volumes contained in the school libraries. The young Marquez loved learning and found that reading was the pathway to knowledge. The family farm did not have electricity until 1948, and his routine farm chores kept him busy during daylight hours, so the young schoolboy read almost exclusively by kerosene lamplight. Marquez had to be up at dawn to begin the day by milking the family’s four Jersey cows. His mother used that dairy to make butter by hand, and for cream and milk for the family meals. Little did the family know, that dairy would also benefit from Leo’s first production improvement initiative.

The Dairy Value Stream. When Leo began high school, he enrolled in an elective agriculture class. One day, the instructor’s lesson covered the dairy business. The students learned that local dairy distributors were buying up the entire product they could from local farmers. Marquez immediately recognized an opportunity—the family should go into the dairy business. He left school at the end of the day with visions of expanding their farm operation with profits from the dairy product. When he explained the idea to his father over dinner, he suggested, “Dad, we ought to start milking cows for a living.”²

¹ Lt Gen L. Marquez, interviewed by the author 23 Jan 2007, and Washington D.C. United States Air Force Historical Research Center, Gen. Leo Marquez, "End-Of-Tour Report." 10 July 1987.

² Lt Gen L. Marquez, interviewed by the author 23-25 Jan 2007, and Marquez, Leo. Remarks to the Air National Guard Senior Commanders. San Antonio, Texas. November 20, 1985.

Nonplused, Dad simply replied with a grunt and a lift of his brow, and continued eating. Marquez thought his big idea was brushed aside. The next day his dad mentioned at dinner that he'd visited the local dairy distributor who had offered to buy their dairy product, particularly the heavy cream. His dad quickly purchased a hand-cranked separator that improved their production by separating the heavy cream from the milk as fast as the cows produced it. The family captured the milk and cream in five-gallon cans, and every other day the dairy representative picked up the cans--this became the family's first direct cash crop. Dad reinvested the profits into more dairy cows, and soon their profits began to grow almost exponentially.

The increased revenue, however, brought new challenges. More cows meant more dairy product and more revenue. But that required more work to hand milk the cows, and more hay to feed them. The family responded with two initiatives to increase efficiency and production. First, they realized they could improve process efficiency. Electricity had finally reached their valley, which allowed for electric milking machines that greatly improved milking process. Marquez could milk more cows in less time and finish other chores sooner.

Second, the family bought their first John Deere tractor with a six-foot sickle mower and a Case three-man hay baler.³ This machinery offered a huge production capacity improvement over baling hay by hand. Before the baler,

³ Lt Gen L. Marquez, interviewed by the author 23-25 Jan 2007, as identified in C.H. Wendel, *150 Years Of JI Case*, Krause Publications, February 19, 2005, p. 74.

the process consisted of either cutting the hay stalks by hand with a scythe or hiring a mower to cut the hay down. The boys had to rake the hay into rows or stacks and leave it to dry for four to five days before they could bale it. The time to dry is a critical part of the process, because increased moisture reduces quality of the hay for feed and increases risk of mold or even spontaneous combustion of hay while in storage. The slow speed of the old process meant the family had to work throughout the summer to bale enough hay just to feed their livestock. A hundred bales per day was a miraculous production with this old process.

The new tractor, mower, and baler brought a dramatic increase in capacity. After the mower cut the hay down, the crop was raked into rows by running over it with a crimper, allowing them to bale the hay almost immediately (usually the next day) without days of drying. The Case baler followed the tractor which one man drove while two men followed on the baler tying and removing the bales. The Case baler had a counter device to track production numbers, as well. This new process commonly produced 900 bales per day.⁴ This increased capacity meant the Marquez farm could easily produce enough hay to feed their own livestock even with their increased numbers of dairy cows. Marquez soon learned he could profit directly from this increased capacity that the new technology empowered.

Once their own hay was produced, Marquez's father could hire out his services to other farms to quickly produce their hay and turn additional profit.

⁴ C.H. Wendel, *150 Years Of JI Case*, Krause Publications, February 19, 2005, p. 73.

There were only two other commercial baler options available in the valley in those days. The boys that Marquez played baseball with were employed in these competing operations, and the daily production of hay bales soon became an informal competition amongst the boys. Each evening at baseball practice, the boys would report their production numbers, which became a greatly prized unofficial local record. Marquez worked constantly to improve his process and thus speed to break the latest record. Through this process improvement obsession, he learned the value of incentives to promote individual performance. Marquez was motivated to find improvements he might not otherwise discover thanks to the incentive of holding the record. By the end of his last summer at home, he set the record that was never broken by his peers. His Case baler's counter read 1200 bales in a single day.⁵

Increases in production and efficiency led to a very profitable enterprise for the family. As their hay production increased, the family bought more dairy cows and produced more dairy products with the help of electrical machinery, and the high quality of the hay feed translated to high quality dairy product. As revenues increased, the family bought even more land and produced more product. By the time Leo left home for college, the family farm had grown from 30 to 150 acres, and from four to 200 dairy cows. Marquez learned valuable lessons from the development of the dairy value stream. His father credited Leo for the dairy idea, and Marquez took great pride in ownership of the

⁵ Lt Gen L. Marquez, interviewed by the author 23 Jan 2007, and Marquez, Leo. Remarks to the American Society Of Military Comptrollers. Dallas, Texas. April 24, 1984.

process. The dairy's lessons instilled a work ethic and a sense of pride that would produce still more valuable results in Marquez's future profession.

Leadership Lessons from Sports. Marquez's farm work prepared him to excel at sports. After the hay was baled, Marquez and his brother had to load those hundreds of bales onto a flatbed trailer and stack them into storage. Each bale weighed between 80 and 100 pounds, so bucking hay through the summer developed back and upper body strength. His milking chores were a constant, even during the school year, and required morning and afternoon attention. The family had no means of transportation other than the school bus, and the school was four miles from their home. Marquez had time to finish his morning duties and make it to class on time by taking the bus. After school, however, he had to run home to milk the cows again in order to make it to sports practice on time. Between the aerobic capacity produced by this running, and the strength created by bucking hay, Marquez became an athlete. In addition to summer baseball, he played basketball and football at school. It wasn't until his junior year that he discovered his true talent: boxing.⁶

At 5'10" and 127 pounds, Marquez was as skinny as he was strong. One day in his junior year gym class, the boxing coach asked Marquez if he'd ever boxed. Marquez replied that he never had, but he wanted to try. Marquez would compete in the "Gnatweight" category. The coach liked Marquez's prospects because most of the competition in that weight class would be much

⁶ Boxing in New Mexico was very popular and a "Golden Age" of the sport in the state was just drawing to a conclusion around that time, see Chris Cozzone, *Boxing in New Mexico, 1868-1940*, McFarland Press, March 1, 2013, p. 362-79.

younger freshmen. Marquez spent the remainder of his sophomore year boxing season learning the basics against much shorter and less developed opponents. As the coach suspected, Marquez won all of his bouts that season.

In his junior year, Marquez was taller but had not gained much weight. The “Gnatweight” class was still filled with underclassmen. Marquez fought his way through the season undefeated. Yet one other boxer remained a significant challenge to his record—the defending New Mexico champion, Ricky Stevens. Stevens was a senior and a regional boxing hero.⁷ He was highly regarded for his aggressive style and his undefeated record. Certainly no boxer expected to compete with Stevens; merely surviving uninjured was an accomplishment. He was a brutal attacker and would often overwhelm his opponents early and win by either knockout or technical knockout.

Marquez’s coach took him to see Stevens fight in Gallup, NM, before the state tournament so Marquez could get a glimpse of what awaited him. Marquez watched the fight with rapt attention. He saw the fighters meet at center ring, touch gloves, and head back to their corners to await the bell. He noticed Stevens did not do the typical pre-fight ritual of grabbing the ropes and flexing the knees to loosen up. Instead he retreated to the shallow corner and crouched like a sprinter waiting for the starting gun. As soon as the bell rang, he shot across the ring and met his opponent who was just turning around to

⁷ Ricky Stevens was most certainly a prominent name in New Mexico boxing along with his brother, George. Research reveals records of their stature and championships, (see The Gallup Independent newspaper for 12 Feb 48, and 1948 Albuquerque High School Yearbook) although no record of Stevens’ match with Marquez has been found.

face him. Before his opponent knew it, Stevens was upon him and began to punch violently. Stevens used surprise and an aggressive offense to gain the initiative--the psychological effect kept his opponent on his heels the whole fight. With each of the three rounds, Stevens resumed the relentless attack and never lost the initiative.⁸

Marquez realized that if he allowed Stevens to gain the initiative he'd lose the match. He also knew that Stevens' experience and conditioning meant that a long fight favored Stevens. Marquez worked with his coach to inventory his own strengths and weaknesses and develop a strategy. Marquez practiced his strategy constantly during the week before the championship. When he finally entered the ring with Stevens, Marquez looked placid, calm, and almost passive. He slowly strolled to center ring to meet the firebrand Stevens. Marquez lightly touched gloves with Stevens, retreated to his corner, grabbed the ropes with both hands, and did several deep-knee bends with his back turned to Stevens. Stevens assumed his sprinter's stance and waited to begin his assault. Stevens assumed Marquez was like every other opponent and wouldn't be ready for the surprise offensive. Stevens' was wrong. At the bell, Stevens launched across the ring to deliver his bewildering blows. Marquez continued to hold the ropes after the bell sounded, and did one extra deep-knee bend. He could hear Stevens' feet sprinting across the ring, but kept his back turned. At the very last moment before Stevens reached him, Marquez pivoted sharply, leaned forward, extended his arm, and locked his elbow,

⁸ Lt Gen L. Marquez, interviewed by the author 24 Jan 2007.

positioning his glove at head-level. Stevens was still mid-stride in his sprint to reach Marquez and was caught completely by surprise. Stevens ran full-speed and face-first into Marquez's fist just as his elbow locked into place. The impact was frightful. Stevens lay flat on his back and out cold. "I thought I had killed the poor sonofabitch!" Marquez recalled.⁹ The strategy had worked. He'd beaten Stevens with surprise.

Marquez continued to fight in Golden Gloves competitions until he entered college. He found the competitors from around the nation much more capable than those he met in high school, so he decided to hang up the gloves to concentrate on his studies. He graduated from Belen High School in 1949 with a diploma and many extracurricular lessons. He learned valuable lessons from his athletic experiences, but none more valuable than the lesson he took from the Stevens fight. He learned never to fear a challenge no matter how threatening or dangerous. Regardless of the size of the challenge, Marquez knew he could use his mind to formulate a winning strategy. This quality would serve him well in the military challenges yet to come.

Further Reflections on the Farmer. Marquez gained one more vital lesson from his days growing up on the farm. Through a dearth of resources, funding, and additional labor, Marquez learned that a good farmer is a jack-of-all-trades. A good farmer is master of working the land, but is also part electrician, part painter, part carpenter, part plumber, part doctor, part

⁹ Lt Gen L. Marquez, interviewed by the author 23 Jan 2007, and Washington D.C. United States Air Force Historical Research Center. Gen. Leo Marquez, "End-Of-Tour Report." 10 July 1987.

veterinarian, part planner, and part logistician. His days of working with his father taught him to do things for himself rather than look to others for help. When his dad bought more dairy cows, he had Leo and his brother build a new stable for them. When the new electric milking machines broke or needed a new part, Marquez had to take care of it. When the farm needed a new process for storing more hay bales, Marquez had to create and execute his own process. He also had to ensure the quality of his own work. He was his own quality assurance inspector.¹⁰ These attributes on the farm allowed the family to do the job done with minimal laborers and cost. The stakes were high for the family and young Leo Marquez felt the pressure. Marquez matured into a leader who one day would face greater hardships in combat and draw on the lessons of the farm.

The Farm Boy Goes to College. Marquez worked hard on high school academics, got excellent grades, and was rewarded with an appointment to the US Naval Academy at Annapolis.¹¹ But he had second thoughts on his attempt to join the Navy. He thought of himself as a desert-rat, a man accustomed to the dry farmlands he'd grown up in. He could not imagine himself in a career on the high seas. He respectfully declined the Annapolis appointment and, after graduating from high school in 1949, decided to pursue agriculture at New Mexico A&M land grant College in Las Cruces.¹² He never expected he'd

¹⁰ Lt Gen L. Marquez, interviewed by the author 24 Jan 2007.

¹¹ Lt Gen L. Marquez, interviewed by the author 24 Jan 2007, and Marquez, Leo. Remarks to the Small Business Group, Sacramento, California, August 21, 1984.

¹² New Mexico A&M would become New Mexico State in 1960. See Walter Hines, *Aggies of the*

end up spending most of his life in uniform. Marquez received several small scholarships for academics, agriculture, and baseball, and worked to make ends meet. He did not want to burden the family now that he was no longer working on the family farm. His father helped him get started in school, but Leo Marquez took it from there.¹³

Initially Marquez planned to study dairy science at NM A&M. He was so enthusiastic about the dairy business that he visited a local dairy farm as soon as he reached the campus. He entered the small dairy and saw the owner working alone. Marquez explained that he'd grown up on a dairy farm but was here at college and had become homesick. Marquez asked if he could help at the dairy for free to relieve his homesickness. The farmer just looked at Marquez and continued to work without missing a beat. To Marquez, the absence of the word "no" meant "yes". Marquez spent the morning and evening working in the dairy, which seemed to help the farmer quite a bit. The farmer had more than he could handle alone. At the end of the day, Marquez explained his real intentions. He admitted to the farmer that he wasn't really homesick but needed a job and had wanted to prove his worth. The farmer replied that the university routinely sent students to apply for work. However, most had never worked on a farm, were unfit, and most quit after the first day. If Marquez wanted work that badly, the farmer explained, he'd have a job at the

Pacific War: New Mexico A&M and the War With Japan. Yucca Tree Press; First Edition, October 7, 1999. And Michael Taylor, *Aggies, Oh Aggies: the Glory Years*, 7 October 2010, for more on the culture of that period.

¹³ Lt Gen L. Marquez, interviewed by the author 23 Jan 2007.

dairy as long as he wanted. Marquez had secured the means to fund the remainder of his first-year college bills. He worked in the dairy throughout freshman year.

Marquez moved on to other jobs. He served as a proctor in the freshman dormitory and worked security guard duty at the physical sciences laboratory over weekends and at night. These jobs allowed him to earn as much as 1 dollar an hour while doing his homework. By his senior year, he was the chief security guard in the lab and could adjust his work schedule to accommodate his studies. As Marquez recalled, "It was good money for doing nothing".¹⁴ He also worked as a referee in local basketball leagues.

Marquez enjoyed his academic studies, but dairy science was not challenging enough. As a sophomore, he switched to a combined zoology and chemistry major. He harbored a secret ambition to become a medical doctor since his early teenage years. He had watched his grandmother succumb to an agonizing bout with cancer and always wished he could comfort those likewise afflicted. He thought the zoology/chemistry course of study might advance him toward a medical career, but a stronger, more deeply seeded urge would return to him later in college.

Since his formative days on the farm near Belen, Marquez had been fascinated by aviation. He'd gazed at aircraft flying over the farm as he worked and was enthralled by the advanced machines and the skill of the aviators. He

¹⁴ Lt Gen L. Marquez, interviewed by the author 24 Jan 2007, and Washington D.C. United States Air Force Historical Research Center. Gen. Leo Marquez, "End-Of-Tour Report." 10 July 1987.

had watched in awe with his brother as Air Corps fighters and bombers took off from the runway at Albuquerque, but he never planned a career in military aviation. The work on the farm seemed just too far away from the action of the flight line or the thrill of aerial combat. But the notion of flying fascinated him, and he soon saw an opportunity to make that distant idea a reality. He entered the Air Force Reserve Officer Training Corps on the campus, as was required in the first two years of most land grant school programs.¹⁵ His new major qualified for the commissioning program, so he stayed in the program as an elective his final two years. He discovered that his upbringing had prepared him for scientific study and military training, and he excelled in the program. He did well enough that the Air Force obliged his desire to become a pilot and an officer. He graduated from New Mexico A&M in spring of 1954, and in July married Stella Alvarez of Las Cruces.¹⁶ On November 3rd of that year, he was commissioned as a second lieutenant in the US Air Force.¹⁷ Thus began a 33-year journey where Marquez would put his farming roots, his athletic skill, and academic knowledge to the test in more ways than he ever imagined.

¹⁵ The Fight Against Compulsory ROTC (Free Speech Movement Archives website www.fsm-a.org accessed) 22 Feb 2014, and Gene M. Lyons and John W. Masland, *Education and Military Leadership*, Princeton, 1959, p. 209-242.

¹⁶ Lt Gen L. Marquez, interviewed by the author 23 Jan 2007.

¹⁷ Department of Defense form DD214 for Leo Marquez.

3. The Marquez Air Force Career

You will not find it difficult to prove that battles, campaigns, and even wars have been won or lost primarily because of logistics.
- Dwight D. Eisenhower

Logistics...as vital to military success as daily food is to daily work.
- Alfred Thayer Mahan

The essence of flexibility is in the mind of the commander, the substance of flexibility is in logistics.
- RADM Henry E. Eccles, USN

Second Lieutenant Leo Marquez started basic flight training in January of 1955. The Air Force assigned him to Greenville AFB, Mississippi where he earned his pilot rating in January of 1956 after logging 140 flight hours between T-28 and T-33 trainer aircraft. Marquez then attended the basic instructor's course at Craig AFB, Alabama, until May of 1956, when he went back to Greenville AFB for instrument instructor school where he remained to serve as an instructor pilot with the 3505th Pilot Training Squadron. In November of 1958, he was selected for an assignment as a fighter interceptor pilot, and went to Moody AFB for the interceptor pilot course where he flew the F-86D Sabre. On August 3rd, 1959, he was assigned to the 525th Fighter-Interceptor Squadron at Bitburg Air Base, West Germany. The 525th Fighter-Interceptor Squadron flew the F-102 Delta Dagger, widely known to the aviators as the Deuce.¹

¹ US Air Force Form 11, Officer Military Record, January 1966, and US Air Force Report on Individual Personnel, 3 Jan 1987 for Leo Marquez.

Trouble in Paradise. The Marquez family arrived in West Germany bigger and happier than ever. Their number had grown to four with the birth of their daughters, Paula and Patricia, in Greenville. The challenges of overseas living in those days were particularly difficult with two children under the age of two. The challenge continued to grow with the birth of their first son at Bitburg, and by 1961 the Marquez's were expecting their fourth child. Meanwhile, Captain Marquez continued his flying duties with the squadron and absolutely cherished the work. However, the long hours of work coupled with the rigors the growing family and the wet winter weather conditions of central Europe led to chronic cold symptoms for the un-acclimated Marquez who had grown up in the dry desert climate of New Mexico. His flight surgeon prescribed Aspirin, phenacetin, and caffeine (APC, administered in a single pill) to relieve his symptoms.²

Soon after he started this regimen he suffered even worse conditions, which weakened Marquez to the point where he could hardly climb the stairs to the alert hangar. He left work early one day after feeling very poor, went home, collapsed into bed, and decided he needed to return to the doctor. The next morning, he went to the hospital and saw the flight surgeon. He reported feeling a loss of energy and general illness. The doctor drew some blood, examined Marquez and decided to admit him for observation over the next few days. Marquez went home to collect some overnight toiletries, and had Stella drive him back to the hospital, as he was too weak to walk. When Marquez

² Lt Gen L. Marquez, interviewed by the author 23 Jan 2007.

walked back into the flight surgeon's office, a nurse suddenly screamed, "there he is!" and rushed to meet him. The whole office responded, put him in a wheelchair, and rushed him back to an examination room. His blood test had come back and registered potentially fatally low hematocrit levels. Such levels indicated a severe hemorrhage and a medical emergency. Marquez received a transfusion of four units of blood and stabilized soon afterwards. The official diagnosis was a hemorrhage of the gastrointestinal tract, but the site and cause of the bleeding was undetermined. The medical professionals theorized the APC tablets had somehow induced the intestinal bleeding, but could not verify the cause. The key word in the diagnosis was "undetermined." The medical regulations of the time were nonnegotiable: the rules for undetermined internal bleeding confined him to duties not including flying (DNIF).

Marquez's medical condition improved, and he eventually regained normal health. The administrative implications, however, had just begun. The group commander offered to give Marquez executive officer duties for a year in hopes that his flight status would be reinstated. Marquez soon realized that this was not meant to be. The Air Force Surgeon General's office permanently grounded Marquez in 1961 for the hemorrhagic event. The medical condition never resurfaced, and Marquez had no further health problems during the rest of his career, but the damage to his flying career had already been done.³

³ Lt Gen L. Marquez, interviewed by the author 24 Jan 2007, and Marquez, Leo. "A General's Reflections: Stress and Combat." *Air Force Journal of Logistics* 10 (Fall 1986): 22-26.

Seeking Alternatives. The Air Force offered to place Captain Marquez in missile operations. Marquez was marginally interested, but first asked his next-door neighbor for advice. His neighbor was an executive officer in the 38th Tactical Missile Wing. His friend got Marquez an audience with the commander, who told Marquez the wing could use him as either a missile operations officer or a missile maintenance officer. The commander gave Marquez the choice, but he'd have to apply for transfer via the personnel system. Marquez thought the idea of missile operations was too boring, and decided to apply to be a missile maintenance officer.⁴

Later that month, his application came back disapproved by higher headquarters in Wiesbaden. Marquez decided he wasn't going to accept this decision without finding out the reason why. After all, 38th TMW leadership had told him that they could use him, and he thought there might have been a mistake in the process. Marquez drove to Wiesbaden headquarters to talk to the personnel staff to find out why he'd been denied. At the personnel office, he got what he considered to be the usual runaround, and no one would give a reason for the denial. He went up the chain from sergeant to captain to major, with no answer. He finally requested an audience with the colonel at personnel who signed the disapproval.

The colonel agreed to see Marquez, and dressed him down when he entered the office. "You know, you're creating quite a stir around here, young man. What's your problem?" Marquez replied, "I don't have a problem, sir. I

⁴ Lt Gen L. Marquez, interviewed by the author 24 Jan 2007.

just want an answer to a question. Why was my request for transfer into missile maintenance disapproved? Nobody will tell me why. I just want to know.”⁵ The colonel was evidently sympathetic to Marquez’s earnest desire to find a reason for the denial. Marquez clearly wasn’t just some dumb fighter jock messing with his staff--he had a legitimate request. The colonel quickly changed his tone and offered to help. “OK, I’ll check it out,” the colonel said. He left the office and came back with Marquez’s personnel folder. He quickly realized the reason why. The colonel explained that the wing was undergoing a transfer from the Matador to the Mace missile system, and the personnel system had loaded up nine Mace missile maintenance officers for assignment to the wing as a part of the transition. The wing had no room for an additional missile maintenance officer. Marquez was disappointed to hear this unassailable reason—it clearly wasn’t a mistake. He thanked the colonel for the answer and his willingness to help.

The colonel read further into Marquez’s personnel folder, and took pity on him. “What else would you like to do?” the colonel asked. Marquez replied that he wanted to stay with the airplanes. If he couldn’t fly them, he wanted to fix them. The colonel said, “Let me check on it for you.” He picked up the phone, called a few numbers, and finally reached the contact he was looking for. Marquez heard the colonel explain the circumstances over the phone. The colonel ended the call by saying, “Got it. Thanks.” He hung up and looked at

⁵ Lt Gen L. Marquez, interviewed by the author 24 Jan 2007, and Washington D.C. United States Air Force Historical Research Center. Leo Marquez, "End-Of-Tour Report." 10 July 1987.

Marquez. “Can you make it to Chanute, Illinois, by the 23rd of October?” he asked. Marquez looked at a calendar on the wall. The day was September 20th, 1961. “Yes, sir. I can make it,” he heard himself say. The colonel told him to return to Bitburg and get ready to move. He would send orders via electronic TWIX right away so he could get his car to the port at Bremerhaven in time. Marquez thanked the colonel, saluted, drove home, ran up to see Stella, and said, “We’re leaving.” Stella replied, “Where are we going?” “We’re going to Chanute,” Marquez replied. “Where’s Chanute?!” Stella exclaimed. Marquez smiled, and spent the next hour extolling the virtues of Rantoul, Illinois, as they planned the move together. There was much to do and very little time to get it done. But, Marquez was on his way to becoming an aircraft maintenance officer.⁶

Snow White and the Dwarfs. Captain Marquez, Stella, and the four kids arrived in time for the start of classes at Chanute AFB on October 25th, 1961. Marquez’s seven USAF classmates were all second lieutenants fresh from their commissioning sources. The faculty observed that everywhere Marquez went, the lieutenants trailed behind him faithfully. The faculty humorously nicknamed the class Snow White and the Seven Dwarfs. The class took this nickname with pride, and continued to call themselves “the Dwarfs” for decades later. The class enjoyed a great camaraderie, and the junior officers relied on Marquez’s Air Force experience for lessons beyond the school curriculum. Studies at Chanute gave Marquez something to ponder. The

⁶ Lt Gen L. Marquez, interviewed by the author 23 Jan 2007.

program was built around teaching Air Force Regulation (AFR) 66-1, the core aircraft maintenance regulation. Marquez recognized that AFR 66-1 was a Strategic Air Command (SAC)-oriented and highly centralized maintenance control regulation. Marquez started thinking about the aircraft maintenance organizational structure, and the fundamental theory behind the regulation. Marquez's thoughts on this subject would prove to be very important in the future.

On to Washington State. Captain Marquez graduated from the Aircraft Maintenance Officers Course in June of 1962. His next assignment was as the F-106 Delta Dart propulsion branch assistant officer-in-charge (OIC) at McChord AFB, Washington starting on the 16th of July.⁷ Because he was a higher-ranking company grade officer with little maintenance experience, the commander gave him the assistant OIC position to gain some experience.

After a few months as the assistant OIC, Marquez was chosen for a new position in the organization that would give him a broader view of logistics. The materiel control officer (MCO) position was normally filled by a career supply officer. A vacancy emerged at the unit at McChord with the sudden unexpected departure of the previous MCO. The commander, Colonel Kenneth D. Thompson, had to look for a replacement from within the organization until the system could provide one. Marquez was a likely choice for two reasons. First, he was a relatively senior company grade officer in an assistant OIC

⁷ US Air Force Form 11, Officer Military Record, January 1966, and US Air Force Report on Individual Personnel, 3 Jan 1987 for Leo Marquez.

position. Second, Colonel Thompson admired Marquez's initiative and integrity. Marquez received a glowing report from his direct supervisor, Major Richard Chandler, who clearly believed Marquez was the man for any tough job. It reads,

He was especially selected to fill this vacancy due to the superior manner in which he established bench stock in the jet engine section and observations of his management abilities.... he was universally accepted by the base supply officer, base supply supervisors, all wing maintenance personnel, and myself as the best officer ever to have filled this position.⁸

Thompson's view of Marquez largely came from this one incident where he stumbled upon Marquez working in the tool crib. Marquez was tearing the place apart with his enlisted Noncommissioned Officer-in-Charge (NCOIC) who went by the nickname, Charlie. Charlie was a mechanic assigned to the tool crib after he'd broken his leg in an off-duty accident. Marquez had visited Charlie one morning to ask how things were going when Charlie made an observation. He told Marquez that he wondered when the last materiel inventory had been done on the parts and tools stored in the tool crib. Soon after his arrival, Charlie noticed a bunch of parts in the section labeled as F-86 engine components. The F-86 fleet had left McChord more than 10 years before. If Charlie was right, there were a whole bunch of expensive parts that had been lying around unnoticed and taking up valuable space for a decade or more. Marquez had taken up the effort to inventory and organize all the equipment in the squadron, and to properly dispose of all excess materiel. No

⁸ Letter of evaluation, signed by Major Richard E. Chandler, the 325th Fighter Wing Maintenance Control Officer, signed on 1 April 1963.

one had told Marquez to do it, but he'd recognized a lack of inventory control and organization and was going to fix it. Colonel Thompson reasoned that any officer who sought to do extra inventory work such as this would excel as a materiel control officer. Colonel Thompson had no idea just how right his hunch was.

When Marquez arrived at the supply squadron, the senior enlisted leadership asked him to sign for the supply account. This constituted some forms upon which his signature would accept responsibility for the materiel stocked in the base warehouse. The troops explained that these forms were customary and had to be retained in the squadron files as long as he held the job. Marquez figured there must be millions of dollars worth of parts and equipment in the warehouse he'd be responsible for, and asked to see a warehouse inventory. The troops explained that there was no actual written inventory, but that the normal MCOs just signed it and filed it away without question. Marquez replied that he wasn't going to sign the form until they had conducted a one hundred percent warehouse inventory. The silence was deafening.⁹

The enlisted troops left the meeting and went straight to the Chief of Supply, a lieutenant colonel who was Marquez's supervisor for this newly assigned position. The Chief of Supply called Captain Marquez on the phone and explained the facts to him. As Chief of Supply, he was directing Marquez

⁹ Lt Gen Leo Marquez, interviewed by the author 24 Jan 2007, and United States Air Force Historical Research Center, Gen. Leo Marquez, "End-Of-Tour Report." 10 July 1987.

to sign the form without some ridiculous warehouse inventory that would waste weeks of labor-intensive effort. Marquez respectfully replied that if by signing this form he became responsible for the materiel in the warehouse, he would want to see the inventory. Marquez also explained his rationale. How could an officer be responsible for materiel when he had no idea what materiel was there? How could an officer transfer responsibility for the materiel to his successor if he had no idea what materiel was once there, was now there, or the disposition of any materiel discrepancies? Marquez flatly refused to sign the form, and asked to conduct the full inventory. He took his responsibility for government property very seriously, and simply could not take responsibility without knowing what was there. Marquez soon realized he was talking to a busy signal; the Chief of Supply had hung up on him.¹⁰

The next phone call was from Colonel Thompson. Thompson yelled over the phone, "Marquez what the Hell is going on down there?" Marquez replied that he needed to conduct an inventory before he could sign and accept responsibility for the base supply account. Thompson replied, "Look, we haven't done a wall-to-wall inventory in 10 years, and probably never will again. Sign the damn form." Marquez objected, "But, sir...." Thompson became infuriated, screamed, "Sign the goddamn form, Captain!" and hung up the phone. Marquez took that to be a direct order, and signed the form. He

¹⁰ Lt Gen L. Marquez, interviewed by the author 25 Jan 2007, United States Air Force Historical Research Center. Gen. Leo Marquez, "End-Of-Tour Report." 10 July 1987.

wondered to himself just how bad he'd screwed things up. Marquez would later learn, however, that while his screw-up created quite a commotion, upset some senior officers, and troubled various NCOs, he'd also earned the respect of everyone in the unit with his unfamiliar level of integrity. The troops now knew he was willing to take a chewing for the right cause. Colonel Thompson and the Chief of Supply now knew they never had to wonder about the integrity of Marquez's work or the value of his signature. It wasn't simple stubbornness in Marquez, but an inner desire to do the right thing as an officer. Marquez learned that such a reputation is one of the most valuable things an officer can have, and resolved never to do anything to jeopardize it.

Maj. Chandler's evaluation of his work is evident in his letter of evaluation, stating,

He demanded absolute loyalty from his noncommissioned officers and men. He, in turn, took a personal interest in the career of every man under his jurisdiction. He protected them when necessary and disciplined them when they deserved to be. Under his supervision, the three tool cribs were restored to effective and organized operations, and maintained an inspection order at all times. The pre-issue accounts were re-accomplished and records accurately maintained. The high value and reparable processing activity was cleaned out, reorganized, and systematized for speedier operations with fewer personnel.¹¹

The direct impact of Marquez's leadership was recognized as superior, especially considering his role well outside of his professional background. It seems worthy of note that Marquez was making an impact as a leader who came from a minority demographic. As an officer of Hispanic heritage, it is

¹¹ US Air Force Form 707, Officer Evaluation Report, and US Air Force Report on Individual Personnel, 6 June 1963 for Leo Marquez.

notable that his leadership was authentic and compelling to his troops as well as his superiors. That laudable tone is consistent in Marquez's performance reports, and it speaks both to the character of Marquez as a leader who rose from ethnic and economic obscurity to deliver superlative results, and to the nature of the US Air Force in that day as a meritocracy where minority status was not a negative factor in any way. The report continued,

In effect, material control operates at a greatly increased effectiveness with fewer personnel than authorized. His bearing and behavior is in the finest traditions of the United States Air Force. Captain Marquez will make an outstanding commander, an extremely valuable man to the United States Air Force in any capacity. I would be more than pleased to serve with him at any time and fight for his services in my organization, in any organization that I am privileged to supervise.¹²

Marquez's commander was impressed, too. He wrote and endorsed his annual appraisal by saying,

"Captain Marquez is one of the most confident, dependable, aggressive, and versatile officers I have ever met.... Captain Marquez is the type of officer that a commander would single out for accelerated advancement to a position of greater authority and responsibility. He is an aggressive thinker, team worker, and acts positively."

Colonel Thompson endorsed this report by saying,

"Captain Marquez is an unusually versatile officer and extremely effective in the diverse duties he has been assigned to in this past year. He is an excellent leader of men, respected by all, positive, firm, and considerate. His loyalty is unquestioned."¹³

Squadron Command. Captain Marquez's reputation for integrity and leadership contributed to the decision to make him commander of the

¹² US Air Force Form 707, Officer Evaluation Report, and US Air Force Report on Individual Personnel, 6 June 1963 for Leo Marquez.

¹³ Ibid.

Organizational Maintenance Squadron (OMS) in January of 1964. The OMS conducted all flightline on-equipment maintenance activities for two F-106 fighter squadrons' aircraft. The OMS also conducted periodic maintenance (Phase) inspections in a dedicated dock and had a small non-powered aerospace ground equipment (AGE) repair section. This particular OMS had about 300 troops assigned, and was responsible for generating the F-106 squadrons for the air defense interceptor mission of Air Defense Command (ADC). Marquez soon noted the poor morale of the troops, many of who had enlisted simply to avoid being drafted into the Army.¹⁴ When Marquez took command, the unit had no administrative officer and a first sergeant that believed in negative reinforcement as the default leadership style. Marquez quickly worked to exchange the man for a new first sergeant, and successfully lobbied for a talented administrative officer. Together with the squadron aircraft maintenance NCOIC, Chief Master Sergeant (CMSgt) Potter, the team formed the core of Marquez's plan to improve unit morale and performance.

Marquez began his agenda for change by making a priority of keeping the troops informed. In the days before the advent of information technology, the rumor mill was often the singular source of information for the troops.

Marquez noted that this phenomenon often resulted in fabricated, incomplete, or downright deceiving notions circulating throughout the unit. Prior to Marquez's arrival, commander's calls were conducted on a regular basis, but

¹⁴ Nipper, Ronald M. "Leo Marquez, Leo. "A General's Reflections: Stress and Combat.": Air Force Journal of Logistics 10 (Fall 1986): 22-26. Logician" (Air War College Thesis, Air University, 1968), p. 5

the meeting took place only once on a particular day, and traditionally began with a chewing from the erstwhile first sergeant. Marquez thought the value of good information was too high to be introduced by such negativity, and further believed only a fraction of the troops made it to commander's call due to the round-the-clock shift work schedules in the squadron. Marquez revamped the program to deliver three or four commander's calls in a single day, each at a time and place convenient for shift workers. He front-loaded the meeting with valuable and up-to-date information about current issues, pay, health care, and the unit's mission. He then entertained questions in order to address rumor control. The troops responded well. So well, in fact, that he discovered many troops from other units on base were attending his meetings because the information was so useful and hard to come by. The OMS had started to become an enviable place to work, and morale was on the rise. Colonel Dean Davenport, the wing commander of the 325th Fighter Wing, said of Marquez,

Captain Marquez is an outstanding flight line maintenance officer. He holds the respect of his subordinates while demanding that they meet high standards of productive effort. I personally selected him to head high priority projects, and they were accomplished in an outstanding manner. He should be considered for promotion at the earliest possible date.¹⁵

Marquez's team was improving, but they were about to face a tougher test. The wing deployed 9 aircraft and 75 troops to Alaska to help with the air defense mission. Alaska Defense Command had the slower F-102 Deuces in its

¹⁵ US Air Force Form 707, Officer Evaluation Report, and US Air Force Report on Individual Personnel, 6 August 1964 for Leo Marquez.

inventory, and had discovered the Deuce wasn't fast enough and didn't have sufficient range to intercept all of Soviet aircraft probing Alaska's airspace. The F-106 was much faster, had better range than the Deuce, and was commonly thought of as the "Ultimate Interceptor."¹⁶ ADC rotated F-106s into Alaska to help deal with the problem.¹⁷

Marquez went to Alaska with his troops in support of the mission, which was an open-ended TDY with no firm return date. The perception was that the Russians were coming, and with the Cuban missile crisis fresh in everyone's minds, this was a frightfully real possibility. Marquez and his troops struggled to keep the jets ready in the extreme Alaskan conditions. The main maintenance effort was located at Elmendorf AFB where three jets were stationed for repairs and rotated through the alert bases. The alert locations had two jets each in Anchorage, King Salmon, and Galena.

This dispersion made the mission all the more difficult to control, especially after 1736 hours on Friday, 27 March 1964. At that moment, the largest earthquake ever recorded in North America, and the second largest ever recorded by a seismograph, struck just outside Anchorage.¹⁸ Marquez's troops were on duty in each of the locations, and Marquez was at Elmendorf when the quake hit. It was absolutely devastating in each location. Marquez and some

¹⁶ David Donald. "Convair F-106 Delta Dart: The Ultimate Interceptor." *Century Jets*. (London: AIRtime Publishing Inc, 2003), p. 182.

¹⁷ Leo Marquez, Oral History Interview by Ronald Nipper, January 1988, typed manuscript, 5, K239.0512-2027 c.1, AFHRA.

¹⁸ Thomas J. Sokolowski. The Great Alaskan Earthquake & Tsunamis of 1964. (National Atmospheric and Oceanic Administration website, <http://wcatwc.arh.noaa.gov/64quake.htm>) accessed 22 Mar 2007.

of his troops were on the flightline when the quake hit, and the rolling effect lasted three and a half minutes. He and his troops struggled to keep some 30 T-33s on the ramp from jumping their chocks and running into things. They did their best by hanging on to the wingtips to keep the jets in place until the rolling ceased.¹⁹ For hours after the event, the base struggled to get control of the situation. Rumors of tsunamis and Soviet air strikes permeated the minds of the troops, and aftershocks came rolling in every other minute. The order came down to load up the interceptors with force in anticipation of a Soviet opportunist gambit. The heightened alert lasted for days while troops struggled to return power, water, and services as well as clean up the mess. There was simply no plan for such a contingency, either with the TDY folks or the permanent party command. Marquez learned his lesson: when the stuff hits the fan, it's too late to get organized. The TDY lasted 9 months before becoming a permanent detachment to support the air defense mission. Marquez and his troops eventually returned home later that year, but none would forget the chaos, confusion, and destruction of the great quake of 1964. Colonel S. A. Steer, Jr., 325th Fighter Wing, Deputy Commander for Materiel, rated Marquez's performance by saying,

Based upon daily contact, Captain Marquez is an outstanding maintenance officer. His strongest asset is his management ability. His demonstrated ability resulted in his new assignment as commander of the 325th Organizational Maintenance Squadron. I strongly recommend that he be sent to Air Command and Staff College and that he be promoted to major as soon as he becomes eligible.... This would permit

¹⁹ Leo Marquez, Oral History Interview by Ronald Nipper, January 1988, typed manuscript, 6, K239.0512-2027 c.1, AFHRA.

him to be given an assignment such as Chief of Maintenance of a flying organization so that the Air Force will better benefit from his outstanding management capability. Socially, both he and his wife and family are a credit to the Air Force under any occasion.²⁰

Major Marquez relinquished command in 1966 to attend Air Command and Staff College at Maxwell AFB, Alabama. He formed a carpool and study group with some of his fellow students. They all committed to work the normal 5-day a week schedule to treat school just like any other job. His goal was to earn distinguished graduate status and a master's degree from George Washington University. He succeeded at both.²¹ After graduation, Marquez received orders to Bien Hoa Airbase in Vietnam. The next year in Vietnam would provide Marquez with several important lessons that would serve him well in the future.

Vietnam Experience. Marquez arrived at Bien Hoa in the late summer of 1967. He was assigned as the assistant OIC of maintenance control and was directly responsible to the chief of maintenance for centralized maintenance control, also referred to as job control. The base was organized in the old 66-1 structure that Marquez had learned so much about at Chanute. Under 66-1, job control was responsible for planning and scheduling all maintenance activities. Job control coordinated with the various maintenance squadron duty sections to dispatch workers to accomplish scheduled tasks. This was extremely centralized, and Marquez observed the unit struggle at Bien Hoa as

²⁰ US Air Force Form 707, Officer Evaluation Report, and US Air Force Report on Individual Personnel, 2 April 1965 for Leo Marquez.

²¹ Lt Gen L. Marquez, interviewed by the author 23 Jan 2007.

the centralized control system tried to keep up with the 17 individual flying and maintenance operations on base.²² The base operated a variety of aircraft including three squadrons of F-100s, C-123 Ranch Hand defoliant aircraft, AC-47 gunship aircraft, O-1 Birddogs, O-2 Skymasters, A-1 Skyraiders, the A-37 Dragonfly, and others.²³

Marquez eventually persuaded the DCM to reorganize roughly half of the maintainers to the flying units. This plan sprang from the idea that each unit could focus on its own mission and maintenance priorities, and could call maintenance control if it needed additional help. This initiative represented a major departure from the 66-1 construct, but it was far more flexible.

This flexibility improved mission performance, but was not welcome amongst leaders with a SAC background. Officers and NCOs who had been raised on the importance of centralized maintenance control simply could not accept the notion of letting line units conduct their own work. Deviation tracking, tail number scheduling, and a single wing maintenance plan were hallmarks of good maintenance to SAC troops. Marquez thought that these things were important, but were luxuries of peacetime operations and had no utility in combat. The DCM went along with the plan, but had to send at least one irate SAC-trained chief master sergeant home for his continued objection.²⁴ Marquez found virtue in organizing the unit to meet the mission instead of

²² Lt Gen L. Marquez, interviewed by the author 22 Jan 2007.

²³ Leo Marquez, Oral History Interview by Ronald Nipper, January 1988, typed manuscript, 7, K239.0512-2027 c.1, AFHRA.

²⁴ Leo Marquez, Oral History Interview by Ronald Nipper, January 1988, typed manuscript, 11, K239.0512-2027 c.1, AFHRA.

inflexibly holding on to an organization based on an impracticable regulation.

This pragmatism would form the central idea behind an important future

Marquez contribution to Air Force maintenance reorganization. The results

were documented in Marquez's performance reports, which read,

Major Marquez has performed in an absolutely superior manner during his short tenure with this wing despite severe handicaps. Significantly, most of his senior experience personnel rotated from his section shortly after his arrival, and his working force strength dropped to very low levels. Since Maintenance Control directs the efforts of about 1350 personnel employed on about 160 aircraft of six different types, supporting aerospace ground equipment, precision measurement equipment, reparable parts repair, etc.²⁵

The results of his maintenance control philosophies were a credit to his record,

according to the report. This is important as it stood out in Marquez's memory

as an important distinction in his development as an officer, and in the

shaping of his thoughts on maintenance and logistics as a part of operations.²⁶

The record states that,

Major Marquez was faced with a difficult, complex, and dynamic management problem... He then proceeded to improve maintenance operations overall by establishing tighter and more comprehensive control of work planning and scheduling, improving aircraft scheduling for maintenance and flight operations, and creating extremely harmonious relations with operational and support elements. His timely and appropriate actions, accomplished under a severe personnel planning handicap, have been a key factor in the continuance of the outstanding record being compiled by this wing in Southeast Asia.²⁷

²⁵ US Air Force Form 707, Officer Evaluation Report, and US Air Force Report on Individual Personnel, 5 March 1968 for Leo Marquez.

²⁶ Lt Gen Leo Marquez, interviewed by the author 24 Jan 2007.

²⁷ US Air Force Form 707, Officer Evaluation Report, and US Air Force Report on Individual Personnel, 5 March 1968 for Leo Marquez.

On 30 January 1968, Major Marquez was in the maintenance control center and recognized a name on the transient alert board. His old friend, Grizz Wolters had been a student pilot under Marquez's instruction at pilot training. Grizz flew an F-4 to the base and would remain overnight. Marquez stepped out of control and walked the few dozen yards to the flightline. He could see the Phantom parked on the far-reaching, flat, empty transient parking surface. He walked over to the jet, and found his old buddy completing his post-flight checklist. The two men shook hands and caught each other up on where they'd been, how their families had grown, and about their Vietnam experiences. Marquez was happy to see that his friend had done well for himself--he was flying the hottest new jet in the inventory. His pal gave him a tour of the F-4, including its armaments. The plane was a sight to see, and Buzz's only complaint was the lack of an internal gun. Despite that, the jet had thrust to spare, and looked like a tough customer with its load of six 500-pound general purpose bombs, four AIM-7 Sparrow missiles, and twin 370-gallon external wing tanks. After inspecting the plane, Leo made plans to have a beer with Grizz later that evening, and went back to work. It wouldn't occur to him until hours later that he had failed to recognize a terrible, potentially fatal mistake.²⁸

Marquez was shaken from his slumber that night at 0200 when the first 122-mm rocket round impacted the base and exploded. The whole world erupted around him. The Tet Offensive had begun, and Bien Hoa was about to

²⁸ Lt Gen L. Marquez, interviewed by the author 22 Jan 2007.

receive a blistering bombardment followed by a Viet Cong-directed ground attack. Marquez made his way to a nearby revetment to take shelter. His thoughts turned to getting to maintenance control to find out what was going on and to direct recovery efforts. He slowly made his way to the building between mortar and rocket impacts, ducking into shelters along the way. He sprinted across the soccer fields and finally reached maintenance control to find the place in total confusion. No one knew what was going on, or how to reach senior leadership, let alone what to do next. Marquez took charge and began directing troops to follow recovery procedures.

He was just starting to get a handle on things when his memory suddenly jarred his consciousness. A chill went up his spine when he remembered the fully loaded and fueled F-4 parked only yards away from the building on the open ramp. If a mortar hit that jet, the troops in maintenance control would never know what hit them. Marquez felt no panic, but calmly told the senior NCO he was in charge. "I'll be back in a few minutes," Marquez heard himself say.²⁹ He ran outside to see the rugged Phantom right where he left it, but his heart stopped when he looked at the parking space next to Grizz's F-4. An F-100 Super Sabre had been hit and was in flames mere feet from the Phantom. Marquez knew he had to move that F-4 to shelter. He ran towards the loaded aircraft and looked for a tow bar and tug vehicle. He saw a tug vehicle and tow bar about 50 yards down the ramp. He also spotted a young Airman running at full speed across the apron. Marquez yelled to the

²⁹ Lt Gen L. Marquez, interviewed by the author 22 Jan 2007.

young man and motioned for him to meet up. Marquez looked at the young maintainer and asked, "You know how to drive a tug?" "No, sir," he answered. "OK," Marquez replied, "you climb up in the cockpit of that F-4 and ride the brakes, I'll get the tug." Marquez drove the tug over to the plane as explosions continued to rage around the base. He managed to hook up the tow bar, and with the young Airman in the cockpit controlling the brakes, the two of them towed the jet to a concrete-reinforced revetment shelter. They would end up towing 3 jets in all to the revetments that night. Marquez thanked the Airman, and rushed down the flightline towards another scene of havoc.

Days later, Marquez wished he'd gotten the young man's name that had helped him do the dangerous job. After a week of searching, he found the young sheet metal worker. The kid was trying to conceal his identity as the one who helped Marquez that night, because he thought he had done something wrong or was in trouble. Marquez shook his hand and explained his intent was much to the contrary. He intended to see to it that the young Airman got a medal for his bravery during the Tet Offensive, and he did.³⁰

Marquez left the parking apron and ran down the flightline towards the fires and sounds of an intense commotion. As he got closer, he saw a security forces' staff sergeant crouched in a foxhole. Marquez jumped into the position and asked the NCO, "where's the officer-in-charge of your team?" "He's dead," the staff sergeant replied. The NCO had taken charge of the air base ground

³⁰ Lt Gen L. Marquez, interviewed by the author 22 Jan 2007. Note Lt Gen Marquez could not recall the airman's full name as he was not in Marquez's chain-of-command, but remembers buck Sergeant Blanchard received the Air Force Commendation Medal for his deeds that night.

defense team and was leading this part of the firefight against the Viet Cong attack. "Give me an M-16," Marquez ordered. The NCO handed Marquez the weapon, and Marquez joined the fight. A few minutes later, the wing commander, Colonel George W. McLaughlin, drove by their position in his staff vehicle. The car had a rotating light mounted on the roof. It was flashing brightly as the car pulled up to them. Marquez ran over to the vehicle and shouted, "Colonel, turn that goddamn light off!" Colonel McLaughlin scoffed, "aw, those guys can't hit anything." Marquez glowered at him. "Yes they can!" he screamed back. Just then, bullets began to whiz by the staff car, and the colonel obliged Marquez's request to turn off the light. "What's the situation?" the colonel asked Marquez. "We've got a few dead, but we're holding on OK," he replied, "we need more men with rifles on this line." The colonel agreed and went to seek reinforcements for the position. Not long afterwards, the sun began to dawn and the attack subsided.

Marquez's position held, and Marquez soon went back to maintenance control to resume his duties. He did not remember feeling a sense of fear during the incident, but rather a sense of urgency. He felt busy as though there was much to do and no time to get it done. Marquez didn't think of his deeds as heroic, but instead that he was merely doing the job of an aircraft maintenance officer defending his jets, his flightline, and his troops. He figured the enlisted men did the heroics that night. Unlike some of the officers he knew at Bien Hoa, the NCOs seemed to know exactly what to do and had the

bravery to do it.³¹ Colonel George W. McLaughlin, Colonel Commander of the Third Tactical Fighter Wing, evaluated Marquez saying, “Major Marquez has absolutely demonstrated that he is perfectly suited for any duty that demands expression, poise, and intelligence. He is a leader of the highest caliber.... He exudes confidence and is capable of assuming the responsibilities for Chief of Maintenance. I would promote him well ahead of his contemporaries.”³²

IYAAYAS. Months after the failed Tet Offensive had subsided, Marquez experienced another formative lesson that would contribute to his future leadership decisions. His friend and fellow officer at Bien Hoa was the base munitions squadron commander. He contacted Marquez to request his help on an important issue. Ammo troops were always a different breed. They worked in the munitions storage area (MSA), a fenced-off, sequestered area of the base located far away to provide safe explosive distance. Living the life of near expatriation simply to do their jobs made Ammo troops an extremely independent and close-knit bunch of folks. In addition, the Ammo business was mysterious to much of the rest of the Air Force. No one really understood exactly what went on behind the MSA fence. The only people who ever went there were the Ammo troops. A security checkpoint at the MSA entrance made sure no interlopers toured the area without close supervision.

The Ammo troops promoted their own sense of intrigue at wing-level events. They could be counted on to be loud, proud, and obnoxious. The

³¹ Lt Gen L. Marquez, interviewed by the author 22 Jan 2007.

³² US Air Force Form 707, Officer Evaluation Report, and US Air Force Report on Individual Personnel, 5 January 1969 for Leo Marquez.

Ammo breed seemed to revel in their status as a rarity. And why not? They had one of the most important and dangerous jobs on base; a thankless, labor-intensive, far-from-sight job that allowed no margin for error. Ammo's role was clear in the mind of the Ammo troop. Ammo made the mission, Ammo was the mission. A combat wing without the Ammo, they reasoned, was nothing but a high-speed taxi service.

If an Ammo officer came calling with his hat in his hand, the problem had to be substantial. Ammo was typically quite self-sustaining. If nothing else, the world of Ammo was as improvising as it was Spartan. Marquez wondered what it was that he could possibly do to help out his Ammo friend; but whatever it was, he was more than willing.

His friend explained that a huge barge of munitions was floating up the Mekong River to deliver the base's allocation soon. The Ammo troops had to unload it and transport the explosives to the MSA. However, Ammo's entire fleet of M35 2-1/2-ton trucks (lovingly referred to as the deuce and a half) was down for maintenance in the base motor pool. If Ammo didn't find some deuce and a halves in the next few days, the delivery wouldn't happen. Without those munitions, the base would soon be relegated to a high-speed taxi service.³³

The munitions squadron commander had beaten his head against the wall to get the transportation squadron to fix the trucks, but to no avail. Marquez's Ammo friend needed him to pay a visit to the motor pool to see if he

³³ United States Air Force Historical Research Center. Gen. Leo Marquez, "End-Of-Tour Report." 10 July 1987, and Lt Gen Leo Marquez, interviewed by the author 22 Jan 2007.

could beg, borrow, or steal transportation for these munitions. Marquez agreed to check it out. He left the flightline and made his way to the base transportation vehicle maintenance section. He was not prepared for what he saw.³⁴

The motor pool was in bad shape. The work area was an open dirt parking lot. The constant rains of the Mekong Delta region had turned the lot into a mud pit packed with broken vehicles. Marquez made his way to the duty office and found a master sergeant and lieutenant in supervision. Major Marquez walked through the door into the office. Neither of the two men came to their feet or looked at the visiting major. "I am Major Marquez from maintenance control. Where is the major in charge here?" Marquez asked. The lieutenant looked up at Marquez. He had a look on his face that showed he was overwhelmed and out of his league. "We don't know, major. We haven't seen him in a few days," he replied. Marquez thought for a moment about the situation. This would obviously require a delicate maneuver without some senior supervision, but Ammo needed those trucks.

Marquez asked, "Can you take me to your vehicle repair status board and show me how the M35 fleet looks?" The master sergeant perked up at this question. The idea of a major interested in vehicle repair status was almost amusing. No, not amusing, it was funny as Hell. He relished the chance to paint the grim picture. He led Marquez to an office with a status grease board that showed a broken and dilapidated fleet of trucks. Out of two dozen trucks

³⁴ Lt Gen L. Marquez, interviewed by the author 23 Jan 2007.

in the yard, twenty were hard broke with no parts available. The rest were in various states of scheduled maintenance with no firm estimated time of completion. Marquez could see how bad the situation was for the motor pool troops. They had lots of broken vehicles, no parts, poor morale, and evidently absentee leadership. Marquez sighed, and looked at the senior NCO. He said, "I want to help you get those trucks out of here, but we're going to have to do some non-standard work here. We need those trucks fast, so we've got to move out. Are you with me?" The master sergeant looked at the lieutenant, who didn't say no, and looked back at Marquez. "OK, major. What do we need to do?" he said.

Marquez called back to his aircraft maintenance line chief. When the chief reached the phone, Marquez gave him a list of instructions. He was to find every aircraft mechanic who fancied himself a shade-tree vehicle mechanic--they needed anyone who had any experience at all working on vehicles. He was also to find every available electrician, and collect a couple of consolidated tool kits. He was to bring all that to the motor pool right away--they had a little homework project to do.

After he hung up the phone, Marquez turned back to the vehicle shop chief. He asked him for a complete list of all the parts required to repair the M35 trucks. He also wanted a triaged list of the trucks, listed in order of repair difficulty. By the time his maintenance detail arrived from the flightline, Marquez had a pretty good idea of the situation. He needed several dozen parts, some of which could be procured in Saigon, others that would have to

come from either the States or the Philippines. He told his crew to begin cannibalizing the worst trucks for parts to bring up as many trucks as they could. After his team did some initial analysis, Marquez realized they could bring enough trucks on-line to help Ammo make their delivery, but the problems were systemic, the parts shortages were chronic, and the conditions were pitiful. The motor pool would need more long-term attention to get things right.

The repair work underway, Marquez went to brief his boss on the situation. The chief of maintenance was shocked when he heard the story. But the maintenance colonel also realized that the combat support group commander, who owned the vehicle repair and transportation functions, would be upset to learn his motor pool had been hijacked by a maintenance officer. The two men went to see the wing commander, Colonel McLaughlin. They wanted to brief the big boss before the news reached him from the motor pool's chain of command.

Marquez briefed Colonel McLaughlin on the whole story, plus the specific solutions he had in mind. The short-term problem could be fixed by placing a contracting officer and a briefcase full of cash on a C-47 to all the major cities in the region, including the Philippines. The contracting officer could load up with the necessary parts to build a stock level fitting of a vehicle parts store. Next, base supply could begin tracking vehicle parts just like aircraft parts, and could make routine stock purchases. Colonel McLaughlin was shocked to hear this wasn't already happening. Marquez explained that it was no fault of

the troops in motor pool, they were just doing their best with the little resources they had.

That is when the support group commander entered the office, saw Marquez, and stared at him in fury. He'd clearly received word about Marquez's activities in the motor pool, and he was livid. The support group colonel raised his voice and began to accuse Marquez of interfering in support group business and demanded an explanation. He wanted to know what made Marquez think he could take over his motor pool. "You've clearly mistaken yourself for the major in charge of vehicle maintenance, Marquez! Sounds like you need to stay in your lane and take care of your own damn job!" he bristled.

Marquez suddenly felt the room uncomfortably hot. He thought that perhaps he had screwed this up. Should he have elevated the issue before he intervened? Should he have taken more time to inform the chain of command early in the game? No, the job was too important to wait for help from above. Right? Wasn't it? Maybe the support group commander was right, he'd risked a lot by not tending only to his own job, and now he and his boss were in for it. Marquez braced for the next impact. The room went quiet.

Then Colonel McLaughlin spoke, "Colonel, do you know where the major in charge of vehicle repair is at this moment?" The support group commander looked surprised. "No, sir. I haven't seen him yet today," he answered. Colonel McLaughlin's voice grew stern as he said, "I know. Apparently, no one has seen him for quite some time. Perhaps you should find him and bring him back here. I have a few initiatives I want to discuss with the both of you." The

support group commander didn't know what to say. He'd come here to levy charges against Marquez, but it hadn't occurred to him that his own major wasn't yet involved. Colonel McLaughlin sounded even more annoyed when he then said, "Colonel, go find your major and don't come back without him." The support group commander muttered, "Yes, sir," turned, and left without another word. Colonel McLaughlin looked back at the two maintenance officers and said, "Now, how much cash is our airborne contracting officer going to need?" "Things are looking up," Marquez said to himself, and finished briefing the boss on his plan.³⁵

The next day Marquez got a phone call from the munitions commander. The Ammo leader was ecstatic to see a handful of M35 trucks driving through the MSA checkpoint. He thanked Marquez for the help, and invited him out to the barge download operation to see first-hand how his vehicular assistance would be used. Marquez gladly accepted and met his friend at the MSA. They drove together out to the docks and watched as munitions were moved from the barge to the trucks, then drove back to the MSA with the shipment. They watched as the Ammo troops opened the shipping containers and inventoried the components.

Marquez was startled by what he saw. He had imagined that bombs, missiles, bullets, flares, and rockets came ready-to-use out of the box. He was wrong. The munitions were delivered as sub-components. Bomb bodies were

³⁵ United States Air Force Historical Research Center. Gen. Leo Marquez, "End-Of-Tour Report." 10 July 1987, and Lt Gen Leo Marquez, interviewed by the author 22 Jan 2007.

separate from their fuses and fin sections. Chaff and flare units had to be built up into modules before they could be loaded onto aircraft. Bullets had to be placed into a variety of loading machines before they were ready for the aircraft. Missiles came in large boxes and had to be serviced, inspected, and built up with fins before they were ready. The number of combinations seemed infinite. The tasks of receiving, breakout, build-up, and delivery of these munitions were a massive undertaking. Clearly, Marquez was mistaken in his assumption that all Ammo had to do in the MSA was smoke cigarettes and play volleyball.³⁶

He asked his friend what seemed to be a thousand questions about the configuration and build-up efforts Ammo troops had to do to make the daily mission happen. His friend explained that it took years of senior NCO expertise, process efficiency, and some artful creativity to make it all happen. “It ain’t like the tooth-fairy. You don’t just wake up with all this ready and neatly placed under your pillow,” he explained, “this business takes a lot of work, a lot of planning, and a lot of flexibility. Things can get real busy around here.” Not like the tooth fairy, indeed, Marquez thought. The MSA scene impressed him. He did not yet understand why, but it was an image that would stick in his mind for years to come.³⁷

Lieutenant Colonel Farl G. Kauffman, the Acting Deputy Commander of Materiel, provided Marquez’s final evaluation from Bien Hoa,

³⁶ Lt Gen L. Marquez, interviewed by the author 23 Jan 2007.

³⁷ Lt Gen L. Marquez, interviewed by the author 23 Jan 2007.

Major Marquez performed in an absolutely superior manner during this reporting period. A fine individual and superb maintenance officer, his quiet, efficient manner instills confidence both up and down the command structure. He has shown particular talent in organizing and planning the daily tasks required in support of the unit mission. His timely and appropriate reactions he has initiated in this respect have offset a steady decline in skill levels and occasional severe shortage in personnel, with a result in increase in productivity.³⁸

The report details how Marquez's focus was on operational capability, in addition to his emphasis on getting the most out of a workforce that was short on personnel. That operational focus was consistently noted in Marquez's performance reports, and stands out here as a key contributor to sortie generation and combat logistics:

For example, when enemy offensive actions required augmentation of the flying rate, he reappraised the inspection system and reorganized the concept of a two-phase package from four phases, which resulted in an overall increase of over 600 hours per month available flying time. As an added bonus, a more reliable product was delivered... he devised a more logical schedule, which has resulted in a reduction from over 30 to less than 5 cancellations per month, while producing more sorties.³⁹

Colonel Homer K. Hanson, Commander of the Third Tactical Fighter Wing, added,

I concur with the rating and comments of the reporting official. Major Marquez has clearly demonstrated his superiority in a field of technical complexity and unique responsibilities. He is an exemplary leader who possesses the qualities of an executive manager so essential to leadership. Major Marquez is an outstanding officer, deeply concerned for the mission of the wing and policies of his supervisors. I would promote him well ahead of his contemporaries.⁴⁰

³⁸ US Air Force Form 707, Officer Evaluation Report, and US Air Force Report on Individual Personnel, 6 June 1969 for Leo Marquez.

³⁹ Ibid.

⁴⁰ Ibid.

Oh, Canada. Major Marquez left Vietnam in late summer 1968 for his next assignment as an exchange officer with the erstwhile Royal Canadian Air Force, which, by late 1968, had become the Canadian Forces Air Element of the newly formed unified Canadian Forces (CF). He was assigned to the Canadian aircraft maintenance effort on their fleet of F-101 Voodoo and F-104 Starfighter aircraft. The USAF was preparing to transfer all remaining F-101s to the CF, while the older CF Voodoos would retire to the bone yard at Davis-Monthan AFB, Arizona.

Marquez worked day-to-day as a flightline maintenance officer within the ranks of the CF flying operation, and worked as an additional duty project officer for the exchange. He learned valuable lessons from the resource-constrained CF maintainers. Marquez observed that the USAF's answer to almost every problem was to throw money at it. The Canadians, on the other hand, didn't have that option because of their relatively meager defense budget. As a result, the Canadians tended to be more resourceful and creative. They had to think in ways foreign to most USAF officers who were accustomed to falling back on spending more money or excess capability built into a program. Marquez that, "instead of always pulling our dollar arrow out of the quiver, we must pull out the brain arrow."⁴¹ In fact, Marquez focused his efforts on pulling out the brain arrow to solve problems from that point on in his career.

⁴¹ Nipper, Ronald M. "Leo Marquez, The Logistics Warrior" Air Force Journal of Logistics, Spring 1986, p. 9-11.

As project officer, Major Marquez was tasked with working the plan for modifying the transfer aircraft so they would be compatible with CF force structure. The program called for spending \$38 million on the transfer modification, a huge amount of money in the Canadian defense budget of 1968. Pierre Trudeau had become Prime Minister on 20 April 1968 and had to go before the Treasury Board to request the funds.⁴² He asked the CF to brief him on the plan and justification for the modification expenditures.

Marquez was tasked to brief Prime Minister Trudeau on the subject. Marquez prepared the briefing, donned his USAF uniform, and appeared before the Prime Minister and his staff. During the briefing, Marquez noticed that Trudeau seemed to be staring at his uniform with a quizzical look on his face. Near the conclusion of the briefing, the Prime Minister of Canada interrupted Marquez. "Excuse me," the Prime Minister said, "but what rank are you again?" "I am a major, sir," Marquez replied. "Tell me," Trudeau said pensively, "is not that an American uniform?" "Yes, sir," replied the USAF major. "Well then, why are you briefing?" the Right Honorable Pierre Trudeau challenged. Marquez answered with care, "Sir, I am a member of your establishment. I am an exchange officer here, and I wear my own uniform but I work for you." The Prime Minister was impressed. "Extraordinary," was all he said. Marquez continued, "You also have chaps over there working with us. There is a guy in my position back there somewhere." Again, the Prime Minister simply said, "Extraordinary." The briefing concluded with no further

⁴² Lt Gen L. Marquez, interviewed by the author 23 Jan 2007.

questions. Prime Minister Trudeau was satisfied with the program, and with his extraordinary American exchange officer's presentation.⁴³

Marquez's performance reports document his contribution to the CF mission, stating,

Major Marquez occupies a key staff position within Canadian Forces' Headquarters and has performed in a most commendable manner. He has combined his proficiency as an aircraft maintenance officer with a high degree of intelligence and sound reasoning to produce outstanding results in his job. His mature and diplomatic approach to every task had deeply impressed his supervisors and has earned him the admiration and respect of his colleagues.⁴⁴

In this report, there are shades of Marquez's "dollar arrow" philosophy that later registered with his broader strategic thinking. The logistics processes Marquez worked on within the organizational priorities of the day certainly represented cost savings that proved valuable to the cash-strapped Canadian Forces. The report specifically mentions cost savings that resulted from Marquez's leadership:

His keen perception, broad technical background, and cost-conscious attitude have resulted in the implementation of several techniques and programs which will ultimately produce significant monetary savings to the Canadian Forces. His employment of the value analysis team technique has led to increased emphasis on component repair and overhaul management on the J79 engine. Converting the J79 engine from periodic overhaul inspection and component replacement at a field level will result in savings this fiscal year of approximately one half million dollars. He developed and implemented a specific aircraft structure integrity program for the CF104, which has provided sufficient data on which to base a detection to defer the depot level repair program for two years. This, too, will result in extensive savings.⁴⁵

⁴³ Leo Marquez, Oral History Interview by Ronald Nipper, January 1988, typed manuscript, 15, K239.0512-2027 c.1, AFHRA.

⁴⁴ US Air Force Form 707, Officer Evaluation Report, and US Air Force Report on Individual Personnel, 1 March 1970 for Leo Marquez.

⁴⁵ Ibid.

The report further indicates that Marquez's value to the team was consistent with his previous performance as a leader who instilled confidence up- and down the chain of command. It also indicates that Marquez was an important role model as a minority leader filling duties alongside foreign-partnered military officers.

He is a positive force in the problem solving activities of this directorate. He dispenses meaningful direction to his subordinates and intelligent and pertinent suggestions to his superiors.... He is a self-starter who produces without supervision in adverse situations. Major Marquez is an outstanding representative of the U.S. Air Force in Canada.⁴⁶

One of the most significant lessons Marquez would ever learn came to him via his Canadian hosts. During his job working with CF aircraft maintenance, Marquez saw a poem a CF officer used as a paradigm for the profession. Oliver Wendell Holmes wrote the poem in 1858. It was titled "The Deacon's Masterpiece; or, the Wonderful 'One-Hoss Shay'—A Logical Story."⁴⁷ The poem describes a man who reasons that a horse carriage, also called a "shay," never seemed to wear out but rather routinely broke down. The story detailed the rationale,

Now in building of chaises, I tell you what,
There is always somewhere a weakest spot,
In hub, tire, felloe, in spring or thill,
In panel, or crossbar, or floor, or sill,
In screw, bolt, thoroughbrace, lurking still,
Find it somewhere you must and will,
Above or below, or within or without,
And that's the reason, beyond a doubt,

⁴⁶ US Air Force Form 707, Officer Evaluation Report, and US Air Force Report on Individual Personnel, 1 March 1970 for Leo Marquez.

⁴⁷ Lt Gen L. Marquez, interviewed by the author 23 Jan 2007.

A chaise breaks down, but doesn't wear out.⁴⁸

The Deacon went on to design a single horse carriage based on this concept, ergo the Wonderful One-Hoss Shay. Every component and sub-component of the carriage was designed to last 100 years to the day. The carriage never broke down because its parts worked in concert; the mean time between failures for each component was equal. Therefore, the carriage dutifully served its purpose until the day came exactly 100 years later. On that day, the carriage simply disintegrated right before onlookers' eyes.

The CF officer explained that the poem served as the perfect example of the proper way to think about aircraft maintenance. Aircraft don't break down, and parts don't fail, but sub-components of the system fail at different rates and cause the overall system to fail. He theorized that if aircraft systems could be designed with reliability in mind, the failure rates could be anticipated and mitigated. Marquez was intrigued by the poem and the logic therein. It would one day form the basis for his own reliability initiative.⁴⁹

Marquez enjoyed his time in Canada, and continued to love working on the airplanes. He was reaching a decision point in his career, however, and was unsure what he might do. It was the summer of 1970, and as his exchange tour drew to a close, he pondered whether he should expect to make it to the 20-year point. Many of his peers had already made lieutenant colonel, and he was beginning to feel like he'd been lost in his assignment to the Great

⁴⁸ Oliver Wendell Homes, "The Deacon's Masterpiece; or, the Wonderful 'One-Hoss Shay'—A Logical Story." *The Autocrat of the Breakfast Table* (Boston, MA: The Atlantic, 1858), p. 238

⁴⁹ Lt Gen L. Marquez, interviewed by the author 23 Jan 2007.

White North. His career had apparently languished as his contemporaries made names for themselves in high-profile duties back in the states. He waited to see where his next assignment would take him and his family, and he couldn't help but wonder if this move would be their last with the Air Force. He resolved to extend his tour in Canada for a third year, and his evaluation demonstrates that his extension proved valuable to the CF exchange program:

Major Marquez's performance has been absolutely superior. He has demonstrated time and again, over diversified projects, keen judgment and logic in the resolution of complex maintenance management problems.... [He has] outstanding ability to comprehend complex situations and the degree of meaning and intent associated... He demonstrates outstanding leadership and has the complete respect of subordinates, peers, and superiors alike. He is dynamic and aggressive yet cooperative. He exudes confidence which can only come from complete understanding of all aspects of his career area. He consistently displayed a high degree of diplomacy and technical competency in dealing with his peers and superiors of various Canadian Forces Headquarters staff.... He has demonstrated a capability to accept additional responsibility and is highly recommended for accelerated promotion.⁵⁰

To the Tidewaters. Marquez had no way to know just how absurd his doubts about his career were. He got a phone call from now Major General McLaughlin who had become the Deputy chief of staff for Logistics at Headquarters TAC. The general bristled when he heard of Marquez's plan to remain in Canada. He said, "No. Don't do that. I need you. I'm here at Langley and they just promoted me again and made me the Deputy Chief of Staff (DCS) Logistics. You know I don't know anything about logistics. I need

⁵⁰ US Air Force Form 707, Officer Evaluation Report, and US Air Force Report on Individual Personnel, 6 August 1970 for Leo Marquez.

someone I can trust down here that can help me.”⁵¹ Marquez agreed, and orders soon showed up assigning Marquez to Langley. He moved the family to Virginia and was surprised to see the next promotion list had his name on it. He felt very satisfied that his career was back on track, and got to work on headquarters business. He had no idea that news of his below-the-zone promotion to full colonel would be announced a mere 9 months after he pinned on.⁵²

Lieutenant Colonel Marquez was the project officer for the F-111 Aardvark program at Tactical Air Command (TAC). The Aardvark was in deep trouble. The new D-model was still not ready for operational use because the avionics software suite wasn't on-line yet. The airframe and engines had issues too. The windscreen had serious problems with bird strikes, and the fuel system leaked like a sieve. Marquez's job was to coordinate with all relevant agencies to fix these issues and get the system fully operational. He spent the better part of two years working with Air Logistic Centers (ALC), Air Force Systems Command (AFSC), and Air Force Logistics Command (AFLC) staff agencies. His evaluations would reveal his maturation into a logistician with a reputation for excellent coordination, subject matter expertise, and incomparable results:

Lieutenant Colonel Marquez has achieved significant results as Chief of the F-111 Branch. This admittedly is one of the most challenging

⁵¹ Leo Marquez, Oral History Interview by Ronald Nipper, January 1988, typed manuscript, 15, K239.0512-2027 c.1, AFHRA.

⁵² Leo Marquez, Oral History Interview by Ronald Nipper, January 1988, typed manuscript, 16, K239.0512-2027 c.1, AFHRA.

positions in the Deputy Chief of Staff for Materiel function. Many major problems formed obstacles to the attainment of combat-ready status for the first F-111 wing, which provided Lieutenant Colonel Marquez a broad vehicle on which to demonstrate his ability and performance.⁵³

The report details the massive undertaking and highly complex tasks associated with bringing the F-111 up to combat readiness, and documents Marquez's briefings to senior leaders on the status of those efforts, where

His most recent... briefing to the Commander of Tactical Air Command was commended by the staff.... Lieutenant Colonel Marquez and his entire branch have handled gargantuan workloads, the majority of which were priority in nature, attesting to his competence and skill as a manager. Lieutenant Colonel Marquez's talent should be fully exploited as the Director of Materiel for a tactical fighter wing.⁵⁴

Marquez's leadership clearly respected Marquez's willingness and ability to tackle complex cost constraints and budget considerations. The report specifically details at length the nature of those efforts, and indicates that the efforts prior to Marquez's arrival were adrift and devoid of leadership of the necessary caliber:

Lieutenant Colonel Marquez assumed the management colossus of cutting and re-tailoring an immensely expensive program to conform to an extremely restricted budget. He forcefully drew together the TAC staff, ASD, Air Force Logistics Command, and Headquarters Air Force and coordinated a meaningful plan. Lieutenant Colonel Marquez possesses extraordinary management skills and has provided the thrust and direction to a program of staggering cost and complexity. That result of his efforts is a prioritized program that retains maximized capabilities within severe budgetary constraints.⁵⁵

⁵³ US Air Force Form 707, Officer Evaluation Report, and US Air Force Report on Individual Personnel, 6 June 1972 for Leo Marquez.

⁵⁴ US Air Force Form 707, Officer Evaluation Report, and US Air Force Report on Individual Personnel, 6 June 1972 for Leo Marquez.

⁵⁵ Ibid.

Marquez's reputation with senior leaders appears as a significant aspect of his performance as a leader. Major General George W. McLaughlin, the TAC staff director of materiel management, endorsed Marquez's evaluation,

I have worked closely with Lieutenant Colonel Marquez on numerous special projects for the TAC commander and am well aware of his continuing superior performance. His individual efforts have been responsible for many significant improvements in the overall maintenance management of the F-105 and F-111 programs. He consistently demonstrates the outstanding ability to combine sound reasoning, exceptional communicative skills, and superb staff work in achieving required objectives. Lieutenant Colonel Marquez is one of the top staff officers on my staff. He is directly responsible for numerous improvements in the F-111 weapon system, resulting in an increased combat potential. Recommend early promotion to Colonel.⁵⁶

Likewise, his second evaluation at TAC staff captures the significance of his work and Marquez's growing stature as a respected leader in logistics. The laudatory language contained in this report indicates that Marquez had arrived at a level of recognized prominence within the headquarters staff and at the senior leadership levels of the various units with which he worked on a regular basis.

Lieutenant Colonel Marquez is a logistics manager of the highest order. He continually displayed a total grasp of complex F-111 logistics problems, as well as a thorough and analytical approach to achieving their satisfactory resolution. He maintained tremendous rapport with other key agencies, including the tactical air command F-111 wing commanders. Due to these personal attributes, he is considered to be the focal point of the F-111 program management within Headquarters Tactical Air Command. His efforts are well recognized by his subordinates, contemporaries, and leaders.⁵⁷

Marquez's record also documents a consistent theme of effective cost reduction under significant budget constraints. The report seems almost exasperated by

⁵⁶ US Air Force Form 707, Officer Evaluation Report, and US Air Force Report on Individual Personnel, 6 June 1972 for Leo Marquez.

⁵⁷ US Air Force Form 707, Officer Evaluation Report, and US Air Force Report on Individual Personnel, 7 June 1973 for Leo Marquez.

the complexity of the financial tasks combined with the enormity of the aircraft modifications required:

This officer has the very responsible task of allocating TAC's share of the F-111 program modification funds. This task is unbelievably difficult because of the large number of modifications proposed and the extremely limited amount of funds available. He continually produces... the funding priorities which are the most cost effective. Due to Lieutenant Colonel Marquez's careful management, all F-105 phase-outs, conversions, and aircraft modification programs have been conducted with a minimum of turmoil and in an effective and timely fashion.

The report heaps praise on Marquez as a standout leader and manager, saying:

Lieutenant Colonel Marquez excels in dealing with senior staff officers and general officers. His personable nature and dedication to his assigned and inherent responsibilities produce the highest degree of motivation in his junior officers and noncommissioned officers. He has the uncanny ability to get the most from himself and his people under the most trying of circumstances. Due to his demonstrated management leadership, I recommend that he be promoted immediately.⁵⁸

The senior leader who endorsed Marquez's performance report confirms that impression. Brigadier General H. J. Gavin, the Deputy Chief of Staff for Logistics, made it clear that Marquez's performance stood out and earned him a distinctive reputation as a thinker and a leader:

Lieutenant Colonel Marquez is the rare person who combines unqualified expertise with superior intellectual organization.... He is recognized for his acumen by general officers and juniors throughout his sphere of contacts. He is truly a superior officer with great potential. I strongly recommend that he be promoted now, well ahead of his contemporaries.⁵⁹

⁵⁸ US Air Force Form 707, Officer Evaluation Report, and US Air Force Report on Individual Personnel, 6 June 1973 for Leo Marquez.

⁵⁹ US Air Force Form 707, Officer Evaluation Report, and US Air Force Report on Individual Personnel, 6 June 1973 for Leo Marquez.

By the time Marquez was to leave Langley for a new assignment, he had become the logistics subject matter expert on the F-111. This fact alone made him a natural choice for his next job. General McLaughlin was assigned to command Sacramento ALC, which was the depot responsible for the F-111. McLaughlin endorsed one of Marquez's evaluations by saying:

I have worked very closely with Lieutenant Colonel Marquez during the reporting period due to his responsibility for the F-111 program within the command. He is a superior officer in every way. Several years ago, he worked for me as a young officer in Southeast Asia. I considered his potential to be unlimited at that time. Since then, he has served an exchange tour in Canada, wherein his responsibility was equivalent to a colonel position in the U.S. Air Force. At the present time, I would place Lieutenant Colonel Marquez above 75% of the colonels that I know.⁶⁰

McLaughlin took Marquez with him to Sacramento ALC to be chief of the F-111 Systems Division in the Materiel Management Directorate (MM) in 1973. His final evaluation at TAC staff captures the significance of his work there as documented by Colonel Gerald D. Rotter, TAC Director of Maintenance Engineering:

Lieutenant Colonel Marquez is one of the most dynamic officers I have known. He has done a superb job in directing the maintenance effort for the TAC fighter force comprised of over 1,200 aircraft. His efforts in formulating work packages, flow schedules, numbers of aircraft and modification work, and program depot maintenance have ensured maximum work accomplishment [and] significantly enhanced their combat capability. His outstanding ability to immediately get straight to the crux of a problem, regardless of the apparent complexity, ensures early identification of cause factors and results in an expedited resolution of the problem. He demonstrates superior flexibility and adaptability in analyzing requirements, procedures, and problem areas in new and rapidly changing programs.⁶¹

⁶⁰ US Air Force Form 707, Officer Evaluation Report, and US Air Force Report on Individual Personnel, 6 June 1972 for Leo Marquez.

⁶¹ US Air Force Form 707, Officer Evaluation Report, and US Air Force Report on Individual Personnel, 7 June 1974 for Leo Marquez.

Brigadier General H. J. Gavin endorsed the report, saying, "I concur. Lieutenant Colonel Marquez is one of few truly superior officers. His exceptional intelligence is fortified by uncommon good judgment and purpose. I work with him frequently and view his unlimited potential worthy of rapid advancement in positions of increased responsibility." Lieutenant General Edmond F. O'Connor also endorsed the report, "Colonel Marquez has demonstrated superior performance in one of our most demanding logistics management positions. He is extremely knowledgeable, well educated, and young. A true professional who should be given tough, challenging jobs early."⁶² Marquez left Langley with a promotion to colonel and once more worked for General McLaughlin on the challenges of the F-111 program.

Going to California. Colonel Marquez arrived at Sacramento Materiel Management division (ALC/MM) and immediately resumed his F-111 support campaign. The F-111 was a very high-visibility program, and had a high degree of interest on the Air Staff and Major Command (MAJCOM) staffs. Marquez spent most of his time on the road conducting high-level briefings and to seek funding for system components. He traveled to the Pentagon every quarter to brief Lieutenant General William W. Snavely, the Air Force Deputy chief of staff for Systems and Logistics, as well as the Office of the Secretary of Defense (OSD) staff. These were tough briefings, and Marquez every time had to be fully informed and at the top of his game. He worked to learn every

⁶² Ibid.

aspect of the F-111 weapon system. This preparation served him well when he was called upon to brief the TAC commander, General Robert Dixon, on the leaky fuel system. The general sense at TAC was that the F-111 wasn't getting the right support from the logistics system, and everyone at MM expected the TAC commander to go on the offensive. General Dixon was known for his ferocious impatience, which earned him the nickname the Tidewater Alligator.⁶³ This would not be a gentlemanly conversation, but rather a real furball of a confrontation. General Dixon was quite brutal on unsavory briefings and the poor souls who briefed them. Marquez knew the briefing would be a fight, but remembered the lesson of the Ricky Stevens bout--he could win the fight with his mind.⁶⁴

Colonel Marquez stood at the front of the TAC commander's conference room ready and confident. He placed a brown paper bag on the floor just under the table and patiently waited for his audience. General Dixon quickly blew into the room and started to speak loudly before he sat down. "Oh, so this is the former TAC officer who is now coming in here to tell me why this bloody airplane isn't worth a damn. This is bound to be very interesting. I advise those of you who can't stand the sight of blood, you better leave now," he said menacingly. Marquez began briefing his charts, and with each slide, General Dixon would quip a highly sarcastic question. Marquez saw Dixon's agenda was to make a spectacle of this ALC representative. He thought to

⁶³ Rebecca Grant, "Dixon" *Air Force Magazine* vol. 87, no. 3 (March 2004): 66.

⁶⁴ Lt Gen L. Marquez, interviewed by the author 23 Jan 2007.

himself, "I know more about this airplane and its problems than any single person on this earth. Certainly more than any person in this room, and I'll be damned if I am going to let him intimidate me."⁶⁵ He reached for the brown paper bag. He confidently pulled a fuel system component mock-up out of the bag and placed it on the table in front of General Dixon. Marquez confidently explained each component in the system, the history of the problems, and Marquez's initiatives designed to fix the problems. General Dixon was impressed with the mock-up, and asked if he could keep it. Marquez said he'd brought it for the general's use, and that he could certainly have it. General Dixon passed the mock-up to his executive officer and instructed him to place a sign that said "Leo" on it. He wanted to remember the officer's name that was responsible for fixing the system.

This was just the first of many briefings Marquez would do for General Dixon. Before all was said and done, General Dixon would have 8 pieces of hardware in his office with the name "Leo" attached. Marquez had confidence in his solutions, and routinely offered to bet the general a dollar his solution would work. The TAC commander was more than happy to oblige. The final score of the dollar bets was Marquez 7, General Dixon 1. Once again, Marquez's strategy had worked, and he'd survived the fight. He had won a serious showdown as a logistician.⁶⁶

⁶⁵ Lt Gen L. Marquez, interviewed by the author 23 Jan 2007.

⁶⁶ Leo Marquez, Oral History Interview by Ronald Nipper, January 1988, typed manuscript, 19, K239.0512-2027 c.1, AFHRA.

Marquez's evaluations from this time demonstrate the level of proficiency and innovation his work represented at the time. Colonel William C. Worrell, the Director of Materiel Management, wrote,

Colonel Marquez is one of the most capable officers I have ever known. For the period of this report, he has functioned as system manager for the F-111, and as such has provided vital logistic support to this essential weapon system. Attendant to this responsibility and the high visibility of the F-111, Colonel Marquez has provided key status and forecast presentations to all major commanders on a frequent basis. This has required the highest degree of logistic insight, communication, and personal presence. Colonel Marquez is a highly intelligent individual who possesses the rare combined talents of perception, persuasiveness, and communicative ability. He has demonstrated leadership and organizational capabilities of the highest order. His potential appears unlimited.

Brigadier General William C. Fullilove, the Vice Commander of Sacramento Air Logistics Center, endorsed the report by saying, "Concur. Colonel Marquez is one of the sharpest officers I have known in 30 years of service. I would not hesitate to give him any job I wanted done well."⁶⁷

You Gotta Believe. In the summer of 1975, Colonel Marquez was assigned to Warner Robins ALC as the MM. It was there that he met a leader he truly admired. A.H. "Hal" Cotton was Marquez's deputy, but was in many ways a mentor for Marquez. Cotton showed Marquez a variety of managerial techniques that improved his ability to lead and manage in the mostly civilian world of depot logistics. Together they developed a system that focused on AFLC metrics, or numerical measures, and communicated with the employees.

⁶⁷ US Air Force Form 707, Officer Evaluation Report, and US Air Force Report on Individual Personnel, 6 June 1975 for Leo Marquez.

They directly correlated daily efforts with the impact they made on command metrics, the AFLC-mandated mission measures of success. Surprisingly, most of the employees were unaware of the command metrics or how their jobs related to the measurements. Marquez developed a program where supervisors could reward significant performance and contributions with a small sticker that read "You Gotta Believe."⁶⁸ When the program began in 1975, Warner Robins was in last place compared to the other 4 depots in all command metrics, save one. In that metric, Warner Robins was in fourth place. By October 1976 through the focused work of the employees and their commitment to excellence, Warner Robins now held first place in each of 11 metrics.⁶⁹

The AFLC commander sent Marquez to Carnegie-Mellon University to attend the Advanced Management Program for Executives during his time at Warner Robins. That course, coupled with the Industrial College of the Armed Forces correspondence course, served as Marquez's senior service schooling instead of War College. The residence program at the Pittsburgh, PA, campus focused on management and accounting theory. Marquez studied profit and loss statements, business planning, and executive cost accounting methods. He observed that corporate strategic planning of the day was much like Air Force strategic logistics planning then; the planning horizon was usually only 6

⁶⁸ Leo Marquez, Oral History Interview by Ronald Nipper, January 1988, typed manuscript, 21, K239.0512-2027 c.1, AFHRA.

⁶⁹ Washington D.C. United States Air Force Historical Research Center. Gen. Leo Marquez, "End-Of-Tour Report." 10 July 1987.

months out. He gained an appreciation for the ability to question strategic plans and challenge basic planning assumptions. This lesson would form the basis of his future thoughts on strategic planning in Air Force logistics.⁷⁰

Major General Carl G. Schneider, the Vice Commander, wrote Marquez's evaluation,

Colonel Marquez is a dynamic leader with an exceptionally broad knowledge of logistics, who performs his duty with ingenuity and creativity. His ability to get on top of a program was evident by the superior briefing he presented to the Chief of Staff of the Air Force and major command commanders during the Chief of Staff of the Air Force review of the F-15 program, only two months after he assumed duties as Director of Materiel Management. The direction and guidance provided to the C-141 Stretch program, the first modification program to be reviewed by the Defense Systems Acquisition Council, has resulted in an on-schedule, under-cost program, favorably commended by the Deputy Secretary of Defense. Leo Marquez performs in one of the toughest jobs in the Air Force. He has done a superb job in leading the major directorate of this Air Logistics Center to achieve the #1 position in the command. His accomplishments are fully recognized and reflected in all indicators used to assess management of material resources for the Air Force. He personally developed a number of techniques to instill a spirit of competitiveness and pride in his workforce of 2700 people.

That is endorsed by Major General William R. Hayes, Commander of the Air Logistics Center, who wrote,

“COLONEL MARQUEZ IS THE BEST. (Sic) He sees the big picture and acts accordingly. With unending energy and enthusiasm, he successfully accomplishes the most technical tasks. A truly outstanding colonel who has proven without qualification that he is ready for increasing responsibility and rapid advancement.... Leo Marquez is one of the finest colonels I have ever known.”

In Marquez's final evaluation from Warner Robins, General Hayes summed up his tour by saying, “Colonel Leo Marquez is the very best colonel I know. He is

⁷⁰ Leo Marquez, Oral History Interview by Ronald Nipper, January 1988, typed manuscript, 25, K239.0512-2027 c.1, AFHRA.

smart and knows how to work the key problems to solution. He gets things done and at the same time sustains the admiration and respect of all who serve with him. His potential is unlimited.”⁷¹

The Air Staff. In September of 1977, Colonel Marquez received a phone call from Major General William R. Nelson, who worked on the Air Staff in the Systems and Logistics Division. “Congratulations,” General Nelson said. Marquez was confused, “about what, sir?” General Nelson continued, “You are coming up to be my deputy. How soon can you make it here?” Marquez was confused; he had heard nothing about a new job. “Sir, what are you talking about?” “You mean they didn’t tell you?” General Nelson asked. “Sir, this is the first I’ve heard of anything like that,” Marquez sighed. He was enjoying his time at Warner Robins; after all, they were finally on top. “I’m sorry, I shouldn’t have called you. I thought you already knew. I just called to welcome you and say that I need you here next week,” Nelson explained. “Does my boss know?” Marquez replied. He didn’t want to leave Robins, and the tone of his voice relayed that. “I know you don’t want to, but you are coming here,” Nelson insisted. “Yes, sir. I’ll see my boss this afternoon and see if I can make it there when you want me,” Marquez relented, and grudgingly hung up the phone.

He was ready to fight the new job. He hadn’t had a full 2 years in his current job, figuring in his education time. He imagined there must be a go-

⁷¹ US Air Force Form 707, Officer Evaluation Report, and US Air Force Report on Individual Personnel, 6 June 1976 for Leo Marquez.

getter out there somewhere who wanted to be a deputy logistics so-and-so at the Pentagon. He was doing serious work and improvements at this depot. He felt sure that his boss would agree with him, and would do something to keep him there. Marquez was wrong. When he saw his boss, the conversation was short. "You have to go," Major General William Hayes said. That was that. Marquez had lost. It was time to go to Washington, DC. The news wasn't all bad in DC, however. Little did he know that in a few short months his name would appear on the promotion list once again. In November 1977, Marquez was selected for promotion to brigadier general.⁷²

As much as Marquez despised having to go to air staff, he would later realize this job would provide critical experience necessary for his future job as deputy chief of staff. He started out as deputy director of maintenance and supply. After only 8 months, he moved to work in the Directorate of Logistics Plans and Programs. Colonel Marquez was placed in charge of the logistics portion of the Air Force budget, and to complicate matters, the new Director of Plans and Programs was delayed and had not yet arrived at the Pentagon. This meant that Marquez would be the lone logistics advocate on the Air Staff Board, which was filled with brigadier and major generals. Colonel Marquez was concerned he might get pushed around by the senior officers who would be looking for a few good budget offsets. A colonel on the board might make easy pickings for enterprising generals. To make matters worse, the 1980 fiscal year

⁷² Lt Gen L. Marquez, interviewed by the author 23 Jan 2007.

(FY80) budget was the slimmest budget to-date in recent memory Money would be tight.

To Marquez's surprise, the situation was as cordial and gentlemanly as possible. The senior officers seemed to understand Marquez's difficult and unenviable position. As the cut drills ensued, Marquez found that he got fair treatment on the board. That was the good news. The bad news was that the budget was so tight that the Air Force didn't have enough money to purchase the required peacetime spare parts, let alone any surge capacity. Marquez grew concerned that the Department of Defense (DOD) was mortgaging the present to pay for the future. The Air Force was purchasing new F-16, A-10, and F-15 aircraft to replace older airframes, but wouldn't see the new jets right away. In the meantime, the board would have to make difficult choices on parking certain jets for lack of funds. If war ensued with the Soviets, God forbid, there certainly wouldn't be enough parts in the supply system to generate the necessary capability. Marquez felt the need to vocalize his concerns, and soon was sharing the facts with anyone who would listen.⁷³

One such person was Deputy Assistant Secretary of the Air Force, Lloyd Mosemann. Marquez thought highly of Mosemann, and had worked with him extensively on a variety of budgetary issues. One day, Marquez visited Mosemann at his office and went on a harangue about the spare parts issue. Mosemann listened intently, then said, "OK. Let's go see the secretary." Marquez understood he meant Dr. Hans Mark, the Secretary of the Air Force

⁷³ Lt Gen Leo Marquez, interviewed by the author 24 Jan 2007.

(SecAF). Colonel Marquez was more than a bit surprised. After all, the SecAF rarely, if ever, discussed budgetary matters with colonels. He had all his facts and figures in order, but going to see Dr. Mark went well beyond his expectations.⁷⁴

Dr. Hans Mark was a key figure as the top executive leader of the U.S. Air Force. Dr. Mark was born in 1929 in Mannheim Germany where World War II would shape his childhood and family on the front lines of global ideological conflict. His father, Professor Herman R. Mark, was a leading chemist who sought to continue his work apart from Nazi political influence. Professor Mark moved his family to Austria where they resided for several years. When Hitler moved on his Anschluss effort to politically combine Germany and Austria under the Nazi regime, Professor Mark moved the family to London, and later in 1939 obtained a position in Canada where his family would reside in the opening days of the war.

In 1940, Professor Mark finally moved his family to the U.S., and in 1945 Hans Mark became a US citizen and continued his education. After the war ended, Hans Mark wanted to study at the University of California at Berkeley because at that time it was a leading institution in the study of nuclear physics. The university had a policy of only admitting California residents as new students, but Berkeley Professor Joel Hildebrand was an old and close personal friend of Mark's father. Professor Mark had become a notable chemist at the Polytechnic Institute of New York, and Professor Hildebrand was able to

⁷⁴ Lt Gen L. Marquez, interviewed by the author 23 Jan 2007.

gain special consideration for Professor Mark's talented son. Since the family's reputation was central to gaining an opportunity for his advanced education at a prestigious school, Hans Mark devoted himself to serious research and academic achievement.

Mark found himself among the leading minds in nuclear physics, and the privilege of being a part of that program was not lost on him:

In due course I was admitted to the university, and I arrived in Berkeley in September 1947, shortly after my eighteenth birthday. In those days Berkeley was the major center of activity in nuclear physics, and Professor Ernest Lawrence, who had received the Nobel Prize in physics for his invention of the cyclotron in 1939, was the leading figure of the university's scientific establishment. Professor Hildebrand was kind enough to introduce me to Lawrence soon after I arrived in Berkeley, and it was an awesome moment for me when I was able to shake the hand of this truly great man. Living in Berkeley in those days was a heady experience. Among my teachers in the physics department were several who would, in due course, win their own Nobel prizes.⁷⁵

After graduating with a degree Physics from Berkeley in 1951, Mark went on to earn a Ph.D. in physics from the Massachusetts Institute of Technology (MIT) in 1954. He served as head of the neutron physics group at the laboratory of nuclear science at MIT thereafter, and returned to Berkeley in 1955 as a research physicist at Berkeley's Lawrence Livermore Radiation Laboratory. He became administrator of Berkeley's nuclear research reactor and chairman of Berkeley's Department of Nuclear Engineering. In 1969, just 18 years out undergraduate school, NASA hired Dr. Mark to lead the Ames Research Center in California. Though he had acquired a highly respectable

⁷⁵ Mark, Hans. *The Space Station: A Personal Journey*. Duke University Press, December 1987, p. 10-11.

professional reputation and a prominent education, Dr. Mark's humble upbringing helped him maintain a down-to-earth and approachable personality that he would maintain throughout his career, as Marquez would discover. Dr. Mark was also very aware of the implications of the Cold War as the political sequel to World War II. He rose to the SecAF position through a career where his education and experience helped technological innovations and weapons in the ongoing ideological struggle, and the hope for avoiding war that had borne his family throughout his life.

The Secretary of the Air Force met with Lloyd Mosemann and Colonel Marquez in Dr. Mark's office. Mosemann began the conversation by saying, "Leo just is not happy with the budget and doesn't think logistics is getting their fair share." Dr. Mark then patiently listened to Marquez's concerns, and politely entertained his objections regarding the paucity of programmed spare parts. Once Marquez finished, Secretary Mark explained the situation. He described the geopolitical challenge the Air Force faced, particularly with respect to the Soviets. United States' intercontinental ballistic missiles (ICBM) were going to become more susceptible to a Soviet-first strike very soon. The nation wouldn't be able to close that gap for another decade if the MX Peacekeeper ICBM came on-line, and that was still a big if. If the nation didn't buy the new fighter aircraft, we wouldn't have any technological advantage to stand on in the near future. The Soviets knew they couldn't compete with these new designs, and they were watching attentively to see if the US would really buy and field them. If the U.S. loaded up airfields in the US and Europe

with advanced and highly capable fighters, the Soviets surely wouldn't dare challenge America. Marquez objected using the rationale that without spare parts, even the new jets would have to sit stationary of those airfields.

Dr. Mark conceded the point and reasoned that spare parts are easier to get from congress once the systems had been purchased. He knew it was a gamble, but it was one they had to take. Besides, he opined, if the Soviets saw the new jets just sitting on the airfields, they wouldn't know we don't have parts. The effect would be the same. The USAF needed those systems fielded in order to make a statement. The US would be far less likely to face a war with those weapons in hand. If war did break out, the parts would come soon afterwards. Marquez realized Secretary Mark had a point, and he made it well. Marquez realized he'd been wrong about the spending priorities, and committed to Dr. Mark's vision for the future. He thanked Dr. Mark for the talk, and left the office. He didn't like it, but was amazed at how much the conversation had changed his point of view. He was also indelibly impressed by the fact that Dr. Mark took the time to explain it personally. He would never forget the well-reasoned, well-spoken, and remarkably gracious Dr. Hans Mark.⁷⁶

In November 1978, Marquez pinned on the star of a brigadier general. The job at the Pentagon had obviously been a better career move than he could have imagined. He'd worked very hard in a losing budget battle during that time. Marquez would later be proven correct in one respect, though; the USAF

⁷⁶ Lt Gen L. Marquez, interviewed by the author 23 Jan 2007.

fighter fleet suffered badly in 1980-81 for a lack of parts. The Reagan administration's renewed military spending coupled with General Creech's reforms in TAC helped reverse the trend later that decade,⁷⁷ but the early 1980s were days of mission capable rates in the neighborhood of 60 percent (see figure 3.1).

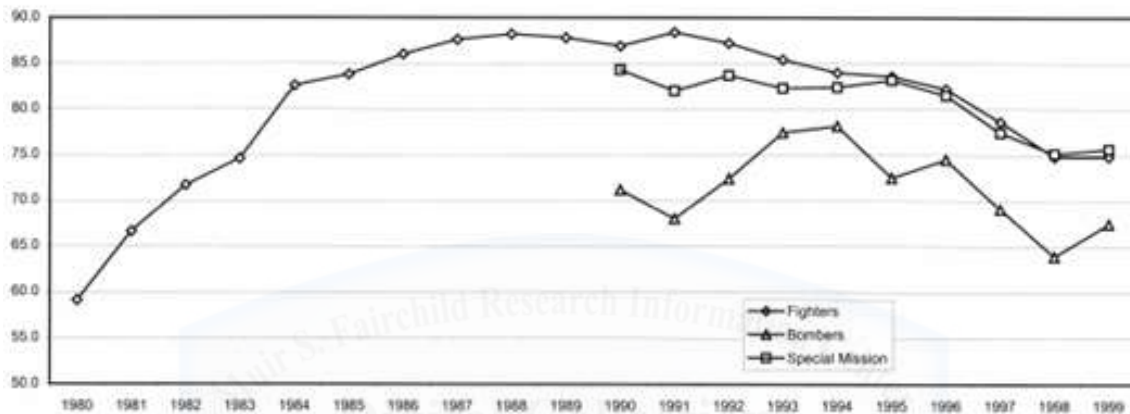


Figure 1.

**Mission Capability Rates by Mission Design Series Category
FY80-FY99**

Source: Director of Logistics, *Ten Years Lookback: Standards and Performance FY89-FY98* (Langley AFB: ACC, November 1998)

In June 1979, Brigadier General Marquez was assigned to the AFLC staff at Wright-Patterson AFB, Ohio. His job was the deputy chief of staff for plans and programs, or XR. One of his first jobs in XR was to deal with antiquated logistics computer systems. A modernization program called the Advanced Logistics System (ALS) had been cancelled in 1974, and AFLC had no

⁷⁷ "How TAC Increased Command-Wide Productivity 80% from 1978 to 1984." *Government Executive* 17, no. 5 (May 1985): 14-18.

replacement solutions in place. Marquez's organization would have to find a way to harness computer system technology to forecast demand, control spare parts (referred to simply as "spares") production, and prioritize efforts for the depot system.

AFLC had started with a clean slate after ALS, and the project had languished. Marquez was familiar with the program from his days at the Pentagon, but the air staff had simply grown tired of hearing about the program. No one was sure AFLC would make any progress on the program. Marquez had his team prioritize the processes that could be computerized, coming up with 16 distinct processes that a computer system could manage. He then had software engineering projects integrate efforts on these 16 areas in 9 different computer modules.⁷⁸ The system would emerge a few years later as the AFLC Logistics Management System (LMS).⁷⁹ LMS modules proved remarkably successful over a decade later in Desert Shield/Desert Storm. In the opening stages of deployment planning, AFLC used LMS to accelerate spares production with prioritized forecasts. The depots accelerated repair of nearly 80,000 critical parts and expedited the overhaul of over seventy aircraft. AFLC estimated the ability to forecast and accelerate the required production gave the Air Force a cumulative 931 days of additional flying service.⁸⁰

⁷⁸ Washington D.C. United States Air Force Historical Research Center. Gen. Leo Marquez, "End-Of-Tour Report." 10 July 1987.

⁷⁹ Leo Marquez, Oral History Interview by Ronald Nipper, January 1988, typed manuscript, 30, K239.0512-2027 c.1, AFHRA.

⁸⁰ John T. Correll, *Let's Hear it for the Loggies*. Air Force Magazine vol. 74, no. 8 (August 1991): 6.

Marquez built his programs around a framework of a strategic planning process he learned from private industry. After his Carnegie-Mellon education program, he realized he needed to better understand strategic planning in commercial corporations. He interviewed a variety of corporate leaders on their planning concepts and programs.

He visited a handful of leading production-oriented companies, but two of them were the most memorable to Marquez. The first was the Chrysler Corporation in Detroit, Michigan. He visited the vice president in charge of the strategic planning for the company's automobile production. The corporate leader welcomed Marquez in to his huge fine art-filled office. The VP impressed Marquez with paintings, statues, and collectibles from all around the world. His office was a sight to behold, but Marquez had come to see their planning process. Marquez remarked that he loved the art, but he had little time and wanted to go over their planning process. The VP scoffed. After all, the coffee and doughnuts were on their way, and they'd have plenty of time to discuss the planning after coffee. Marquez patiently waited as the VP enjoyed the fine coffee and doughnuts exquisitely presented on a sterling silver tray. Before long, the VP announced it was time for lunch at the country club. Marquez was aghast. They still had not talked one bit about the planning process. The VP promised to tell him everything he needed to know... after lunch. The two men got into a limousine and rode to the country club for a meal. The whole presentation was rich and ostentatious. They leisurely returned to the VP's office over an hour later when the subject finally came up. The VP took

Marquez to a large bookshelf in the office and showed him a 13-volume book display. He explained to Marquez that this was the corporate strategic plan. Marquez asked how long it took to put the plan together. The VP answered that his team took between seven and eight months to produce it. Marquez then asked how the company used the plan, and how often it was reviewed. The VP matter-of-factly stated that he didn't know how anyone else used it, he just produced it. The review process was as required by his immediate supervision. No regular strategic planning review process existed at the company.⁸¹

Whether Marquez's sense of General Motors was correct or not, the experience contrasted sharply with a subsequent visit to Ross Perot's Electronic Data Systems (EDS) in Plano, Texas. Ross Perot founded EDS in 1962. He had worked for IBM where he formed a vision for a line of electronic data processing management services for corporations who lacked the expertise or capital investment to provide organic electronic services. IBM was not interested in developing this portfolio of services, so Perot decided to form his own company and search for clients who were interested. Perot worked out a leasing arrangement with a local company with excess computing capacity, and EDS began to provide what would come to be called information management services to retail customers.

EDS's business model was highly competitive because Perot understood how alternative information services drove up costs and increased risk for

⁸¹ Lt Gen L. Marquez, interviewed by the author 23 Jan 2007.

many companies that tried them. The limited numbers of other providers were offering these services paid for by the hour. In terms of risk, this meant that companies that wanted to adopt these innovative technologies had a difficult time assessing the cost of the service. So Perot offered fixed-cost contract options that shared the risk between EDS and their customers and made costs for the service predictable. That model was key to EDS's gaining of a key client, the Frito Lay Corporation. The profits from that contract enabled EDS's investment in new information systems and innovative capabilities that would transform the industry. EDS would go on to help transform government electronic recordkeeping and become renown for process innovation. Marquez suspected that he would find strategic insights from Perot when he arrived for his appointment with EDS's mercurial leader.⁸²

Marquez felt a completely different reception at EDS than at General Motors. Perot welcomed Marquez personally at the door of the company and took him to his office that was unassuming and unpretentious. The two men discussed various business matters a while before Perot announced it was time for lunch. Rather than taking a limousine ride to a posh country club, Perot and Marquez walked into the company cafeteria. The two men picked up trays and proceeded through the lunch line along with the EDS employees. Marquez noted that Perot greeted each employee by their first name, and each employee replied in kind by saying "Good afternoon, Ross!" or "Hello, Ross!" Marquez assumed the two men would get their food and retire to an executive dining

⁸² Ross Perot. *My Life & The Principles for Success*, Tapestry Press, 2nd edition (2002), p. 78.

room away from the cafeteria. To Marquez's surprise, Perot found two empty seats at a table in the middle of the cafeteria. The two men ate along with the rest of the employees. Marquez was shocked by the quality of the food. He complimented Perot for the great selection and exquisite quality of the lunch. Perot replied that he entertained corporate leaders from all around the world and regularly brought them to eat at the EDS cafeteria. Without exception, the leaders loved the cafeteria food, and complimented Perot for the fine eating available to the employees. Perot told Marquez that he always answered the same way, "You know, you'd be surprised how good the food was in *your* place if *you* ate there."⁸³ "Score one for Ross Perot," Marquez thought. Perot then detailed how EDS was being acquired by General Motors, and further explained how he was using satellite technology to network GM's global production efforts. He was also offering DOD some of the bandwidth to network defense applications.

EDS impressed Marquez, and the strategic planning was exceptional. However, Marquez did not realize at the time that he and Perot would share something in common: helping others escape from Iran. In December of 1978, just weeks before the Shah was exiled from Iran, two EDS employees ran into serious trouble. During the summer of 1978, The Shah's government of Iran was doing business with EDS. However, the Shah was under enormous pressure from revolutionary elements in Persian society to respond to general allegations of government corruption. Officials had announced they would stop

⁸³ Lt Gen L. Marquez, interviewed by the author 23 Jan 2007.

their monthly payments to EDS in conjunction with an investigation into alleged corruption. EDS executives met with Iranian officials in December of 1978 to demand resumption of payment. Their message was an ultimatum that if payments did not resume in 30 days, EDS would pull out of the country altogether. In a move that is still disputed today, the Iranian government responded to the ultimatum by arresting EDS's top executives in Iran, Paul Chiapparone and Bill Gaylord on December 28th, 1978. The authorities set their bail at \$12 million, which was roughly the total amount that Iran had paid EDS for their services until that time.⁸⁴

Perot did something truly extraordinary soon after he got the news of their arrest. He felt a great deal of loyalty to EDS's employees and when the gears of government moved too slowly to do anything to help, he turned to the EDS staff for a solution. When one of his advisors suggested that EDS break the men out of prison, Perot replied, "I'm thinking of the same thing... Put together a list of EDS people who could help do it. We'll need men who know Tehran, have some military experience and are one hundred percent trustworthy and loyal."

While some of the EDS executives thought that extreme, Perot was firm because

He owed Paul and Bill a lot.... He felt a special debt of loyalty to the men who had gambled their careers by joining EDS when it was a struggling young company. Many times he had found the right man, interviewed him, got him interested, and offered him the job, only to find that, on

⁸⁴ William Gaines and Mike Dorning. The Myth Of Perot's Iran Rescue, Chicago Tribune, July 9, 1992.

talking it over with his family, the man had decided that EDS was just too small, too new, too risky.... Perot owed it to Paul and Bill to get them out.⁸⁵

The rest of the story turned out a lot like Parhizkar's tale of escape detailed in *Finding Freedom*. In fact, many of the resources between the two tales were probably connected. The clandestine pathways into and out of Iran were few and far between. Perot's team of commandos did eventually infiltrate Iran clandestinely and extracted Paul and Bill, though the details on how they got them out and the role of the revolutionary movement are disputed.⁸⁶ What is clear, though, is that Perot had gone above and beyond conventional explanation to help get his people out of Iran. During his visit, Marquez would have no idea that he would one day play a very similar role. The exact date of Marquez's visit to EDS cannot be determined, but based upon his tour of duty and the period in which his visit must have occurred, Marquez was certainly dining with Perot not long after the secret EDS rescue took place.

Perot explained to Marquez that the company did not have a single bound volume called a strategic plan. Rather the company had an ongoing strategic planning process that never ended. Perot figured that as soon as the plan was bound and placed on the shelf, it became obsolete. The company was always in one phase or another of the process, and the planning was shaped by the emerging business reality around them. Marquez realized that EDS had

⁸⁵ Ken Follett. *On Wings of Eagles*. Penguin Group, New York, 1984. p. 86, 46.

⁸⁶ See William Gaines and Mike Dorning. *The Myth Of Perot's Iran Rescue*, Chicago Tribune, July 9, 1992, for details on the disputed facts. Some credit the commando team for the riot that led to the escape, while others credit Iranian revolutionaries.

the right idea and left Plano, Texas with a better idea of how to do strategic planning than he'd ever had before.

Ogden ALC. In December 1980, Marquez was selected for promotion to major general. With this promotion came the opportunity every logistics officer dreams of in their career: the chance to command an Air Logistics Center. In July 1981, he took command of the Ogden ALC in Utah. His first challenge came early when a problem cropped up with the F-16 that year. Marquez had grown up on the F-111 and was accustomed to seeing the entire fleet routinely grounded for some issue. The F-16 was much newer and far more reliable. Thus, when Marquez agreed to ground the fleet for the problem, it got lots of attention. The grounding condition didn't take long to fix, but Major General Marquez was resolute that senior leaders would know their airplanes were safe. He figured they would rather be safe and ground the fleet rather than push their luck and hurt someone or lose a jet. The decision set the right tone at ALC, and particularly in the System Program Office (SPO). Marquez was impressed by the F-16 SPO, and found their efforts resulted in a highly supportable weapon system. He reflected that, thanks to the SPO's work and the simple design, and especially compared to the F-111, the F-16 was a piece of cake to support.⁸⁷ This meant Marquez had time to focus on taking care of the people of Ogden ALC.

⁸⁷ Leo Marquez, Oral History Interview by Ronald Nipper, January 1988, typed manuscript, 37, K239.0512-2027 c.1, AFHRA.

Major General Marquez took an interest in good relations with the labor force. When Marquez arrived at Hill, there were several ongoing problems between the union and management over working conditions. In fact, Senator Orrin Hatch held hearings in the local community to hear workers' concerns about the base.⁸⁸ Soon after taking command, Marquez sent the labor union president a note and invited him for a friendly lunch at the officers' club. The union didn't know what to think. The union presidents' office called Marquez's secretary and asked if the invitation was a joke. After all, no one could remember the general having lunch with the union unless there was a formal event or perhaps a contentious issue. Marquez called the union president and assured him it was no joke. Marquez wanted to have a talk with him. The president asked what they were going to talk about. Marquez quipped, "I don't know. Maybe we'll talk about the weather. I just want to get acquainted informally." The union president agreed to meet Marquez for a lunch that became the first of monthly lunch meetings between the two men.

Marquez's idea was to keep the lines of communication alive and open between the two. This worked to everyone's advantage. When Marquez heard of union labor grievances from the president, he looked into the claims. Of the first 9 union complaints, Marquez determined that 8 of them were due to management problems, and made sure to fix them.⁸⁹ Once the union

⁸⁸ Leo Marquez, Oral History Interview by Ronald Nipper, January 1988, typed manuscript, 42, K239.0512-2027 c.1, AFHRA.

⁸⁹ Leo Marquez, Oral History Interview by Ronald Nipper, January 1988, typed manuscript, 39, K239.0512-2027 c.1, AFHRA.

leadership saw he was serious about doing the right things per the labor agreement, contentious union problems ceased to exist. ALC management learned to stick to the rules, and the union learned that they could have confidence in ALC management and decisions. It was a win-win situation.⁹⁰

Major General Marquez repeated his initiatives from Warner Robins designed to communicate the ALC's performance in command metrics. He directed supervisors to post the metrics and to show employees how their jobs impacted the metrics. He also brought back a form of the sticker initiative, this time it was a bumper sticker that read "To the Top of the Hill."⁹¹ This was a part of a larger initiative he called "Spruce Log." The catchphrase encapsulated his desire to spruce up the logistics center's appearance and performance standards. Marquez felt this initiative did more than any other to unify the ALC and get employees focused on process improvement.

Marquez was familiar with General Bill Creech's standardization and appearance initiatives in TAC.⁹² In fact, he met regularly with General Creech at Hill AFB since the base had a TAC fighter wing as a tenant unit. The two often discussed their initiatives, and Marquez was happy to duplicate what TAC was doing to improve facilities and to standardize appearance. Marquez worked with union leadership to form Spruce Log committees responsible for

⁹⁰ Office of History, Ogden Air Logistics Center, "History of the OO-ALC." 10 Oct 80-30 Sep 82, Vol. 1.

⁹¹ Leo Marquez, Oral History Interview by Ronald Nipper, January 1988, typed manuscript, 38, K239.0512-2027 c.1, AFHRA.

⁹² "Turnaround in TAC Sortie Production." *Supplement to the Air Force Policy Letter for Commanders*, March 1981, 32-33.

tidying up the base. Historically the union leadership frowned on such initiatives because it involved civil service members doing cleanup duty outside their personnel job description, particularly in the GS-12 supervisory ranks. Marquez assured the union there were no strings attached to this initiative; no one would attempt to take advantage of the workforce. Their participation was important because no one knew better where the messes were than the workers who saw them every day. The union agreed to the Spruce Log initiative, and Marquez let the union run it as their own initiative. The plan was to commence as soon as the snow melted in the spring.⁹³

Each summer the depot conducted a youth work program. The young people hired for the program were referred to as “over-hires.” These were students on vacation from school and needed a job for the summer. In those days, Ogden ALC would hire approximately 700 over-hires each summer and give them apprentice-level administrative support duties. With the advent of Spruce Log, however, the duties were different. Marquez ordered the program managers to whittle down the office jobs to a mere handful of important positions. The rest of the 700 over-hires would be put to work painting the base.⁹⁴

Many objections emerged around the base. The loudest came from the Civil Engineering (CE) squadron. Their concern was that high school kids

⁹³ Washington D.C. United States Air Force Historical Research Center. Gen. Leo Marquez, "End-Of-Tour Report." 10 July 1987.

⁹⁴ Office of History, Ogden Air Logistics Center, "History of the OO-ALC." 10 Oct 80-30 Sep 81, Vol.1.

weren't skilled enough to paint the base's buildings. If a bunch of young over-hires messed up the paint job, the buildings would look terrible. Marquez disagreed with this line of reasoning. He remembered painting his first building on the farm when he was 10 years old, and his father would not tolerate poor paintwork. He had learned to handle a brush when he was even younger than the over-hires. Besides, if it was in fact messed up, it just became a base coat. The base could paint over it again.

Marquez learned from General Creech the significance of standardized color schemes and fresh base-wide paint jobs.⁹⁵ Creech saw folks took greater pride in the base when it sported a freshly painted look. Creech also knew the troops would take an even greater degree of pride if they painted the bases themselves. Marquez knew he didn't have enough military troops to paint the base, and the civilians couldn't be tasked with it because of union concerns. The over-hires would make a perfect choice for the work. He placed special attention on training the over-hires how to paint well, and the kids did not disappoint. About forty of the kids quit because the work was too hard, but the hundreds that remained proved quite skilled and resourceful. One day Marquez saw a crew painting late in the evening. He assumed they were working overtime and stopped to talk with the crew about their hours. He discovered that the crews had divided up into a two-shift operation because the painting equipment was rented on a daily basis. The over-hires were making

⁹⁵ Lt Gen L. Marquez, interviewed by the author 23 Jan 2007, and Leo Marquez. "The Logistics Warrior". Air Force Journal of Logistics, Spring 1986, p. 9-11.

maximum use of the resources at hand. Unlike the TAC initiative, which drew carping about the work, Marquez's Spruce Log program repainted all the base buildings without any complaints from the workforce. The over-hires delivered magnificently, and Marquez was pleased to tell General Creech all about it at their next meeting.

The meetings between General Marquez and General Creech also allowed the two men to discuss the operations and maintenance organizational changes TAC was spearheading. In 1975, TAC had begun experimenting with the Production Oriented Maintenance Organization (POMO) that represented a radical departure from the classic 66-1 construct. In 1979, the Air Force issued a new maintenance regulation, AFR 66-5, which instituted the organizational structure that eventually became the Combat Oriented Maintenance Organization (COMO) and the Combat Oriented Supply Organization (COSO).⁹⁶ Marquez liked what he heard from General Creech about these changes, and told the TAC commander about his experience at Bien Hoa. He firmly agreed that the Air Force should organize and train the way it planned to fight, and that adhering to an antiquated SAC regulation was a mistake. Marquez couldn't help but think it possible that TAC reforms didn't go far enough. The fighter squadrons still trained organizationally separated from their maintenance counterparts. However, they deployed to fight a war

⁹⁶ James C. Slife, *Creech Blue : Gen Bill Creech and the Reformation of the Tactical Air Forces, 1978-1984* (Maxwell AFB, AL: Air University Press, 2004), 86-87.

with maintenance integrated in their unit. General Creech and he differed on that point, however. It was one of the few things the two men disagreed on.⁹⁷

Unfortunately, Ogden ALC had a bad reputation in the press and in the greater local area. The US Congressman from the region, The Honorable Jim Hansen, noted to Marquez the nickname for the base he'd repeatedly heard was the Weber County Rest Home.⁹⁸ To Marquez's surprise, the congressman had never been to the base to see the work they performed. Marquez bet the congressman his two stars that if he couldn't find any other work force the size of Ogden that could outperform them in any fair measurement. The congressman paid a visit to the base, and quickly became a big supporter.⁹⁹

The problems with the local press persisted, however, until Marquez found an opportunity to directly confront the issue. One local television reporter ran a series of pieces alleging the base was a den of thieves that had lost control over its government dollars and property. Marquez tried to reach the reporter by phone, but his calls went unreturned. Marquez then called the station manager and asked for the identity of the sources used for the reportage. The station manager reluctantly agreed to disclose the accusers and to allow the base to respond to the charges. The people responsible for the allegations were three disgruntled former employees of the base who hadn't worked there in years. One of them had been retired for over twelve years. The

⁹⁷ Lt Gen L. Marquez, interviewed by the author 22 Jan 2007.

⁹⁸ Leo Marquez, Oral History Interview by Ronald Nipper, January 1988, typed manuscript, 43, K239.0512-2027 c.1, AFHRA, and Office of History, Ogden Air Logistics Center, "History of the OO-ALC." 10 Oct 80-30 Sep 81, Vol.1

⁹⁹ Leo Marquez, Oral History Interview by Ronald Nipper, January 1988, typed manuscript, 43, K239.0512-2027 c.1, AFHRA.

accusations were nothing but old saws based in hearsay and fabrication. The station could produce no relevant evidence to support their claims. The former workers had stridently accused the base of routine wrongdoing, including workers stealing huge number of tools for their home use. When challenged, however, the former workers refused to appear on camera or publicly reveal their identity. Marquez went on television and argued that the anonymous accusers who were too scared to make their accusations in person were not to be believed. He offered to open up the base to any local citizen who wanted to see for themselves.

Marquez went on the offensive to mend the base's reputation. He made the point that the base was there to serve, and did good work.¹⁰⁰ Marquez also responded by writing an editorial in the base paper to defend the base workforce and the quality of their workmanship. He was prepared to defend the base's reputation, and observed the practice of challenging any accusers openly in the press. He challenged employees to defend themselves in their own spheres of influence as well. Over time, the allegations began to subside, and public relations with the community improved. Before long, the press was reporting stories of the base's success and good work. Major General Marquez's strategic communications helped change the base's reputation in the community.¹⁰¹

¹⁰⁰ Leo Marquez, Oral History Interview by Ronald Nipper, January 1988, typed manuscript, 45, K239.0512-2027 c.1, AFHRA.

¹⁰¹ Office of History, Ogden Air Logistics Center, "History of the OO-ALC." 10 Oct 80-30 Sep 81, Vol.1. and Hoey, Capt. Brian. "Nuts, Bolts, and Bucks." Airman, May 1984, P. 8-16.

Back to Washington, DC. In the spring of 1983, Major General Marquez received an invitation for him and his wife to meet with the Secretary of the Air Force Verne Orr at the Pentagon. Secretary Orr was looking for a replacement for the position of deputy chief of staff for logistics and engineering. The position would become vacant that summer, and Marquez was on the list of possible candidates. The interview went well, and Marquez got the job. On 1 August 1983, he assumed his new duties as deputy chief of staff, and with the job came a promotion to Lieutenant General.

The first issue Marquez dealt with was an old subject near and dear to his heart. He had to find a way to deal with the spare parts shortages created by the meager budgets of recent years. Marquez had his team develop a point paper on solutions to the parts problems and a proposed way forward. The paper made it to the Secretary of Defense, and became his personal 35-point program to fix spare parts shortages.

Marquez's team next formed the Air Force Management Analysis Group (AFMAG) to analyze the spare parts program. Marquez designated Major General Dewey K.K. Lowe to head the group. He would have over 100 logisticians in the group, and they would spend two months analyzing the parts problem. AFMAG generated a report with over 178 specific recommendations to mitigate, and eventually solve, the problems.¹⁰² In addition, the AFMAG report made an additional 128 recommendations on

¹⁰² Marquez, Lieutenant General Leo. "Fair Value For Your Defense Dollar." *Program Manager* (May-June 1985), 27.

improving Air Force support equipment.¹⁰³ Marquez then formed a general officer committee and chaired the group to oversee the execution of the AFMAG recommendations. The solutions included far-reaching process changes in Air Force acquisition programs. Virtually no aspect of the acquisition process went unchanged. The AFMAG solution amounted to a complete reform of supply chain management for the Air Force.

These were the days of the famous allegations of \$600 toilet seats, \$435 claw hammers and \$7,600 coffee pots in the DOD, and Marquez was resolved to change the acquisition process in order to keep costs down as much as possible while solving the parts problem.¹⁰⁴ The initiatives focused on buying parts in bulk to keep the price down, using competition among commercial sources to the maximum extent possible, standardizing cost accounting principles, and ensuring the Air Force solicited components that actually performed as required task.¹⁰⁵ Marquez was particularly concerned with the lack of competition in Air Force procurement. Only 34 percent of parts were competitively sourced at the time of AFMAG.¹⁰⁶ Marquez instituted two new pricing programs to address the issue. These programs were called the Spares Management Analysis and Review Technique (SMART) and the Price Analysis and Review Techniques for Spares (PARTS). These programs screened pricing

¹⁰³ Marquez, Lieutenant General Leo, "Air Force Procurement Reform: An Assault on Four Fronts". *Defense Management Journal*, (Fourth Quarter, 1985), p.15

¹⁰⁴ Leo Marquez, Oral History Interview by Ronald Nipper, January 1988, typed manuscript, 50, K239.0512-2027 c.1, AFHRA.

¹⁰⁵ Leo Marquez, Oral History Interview by Ronald Nipper, January 1988, typed manuscript, 51, K239.0512-2027 c.1, AFHRA.

¹⁰⁶ Hoey, Capt. Brian. "Nuts, Bolts, and Bucks." *Airman*, May 1984, 10.

and cost data for both low-quantity, high-value items like A-10 main landing gear struts as well as high-quantity, low-value items such as MIL-SPEC 27.83 washers. Within two years of implementation, these programs applied market competition to acquisitions and significantly reduced costs to the Air Force. For example, SMART reduced the cost of A-10 landing gear struts 51%. PARTS reduced the cost of washers from \$1.44 per washer to \$0.45 per hundred washers.¹⁰⁷ These initiatives laid the groundwork for the acquisitions and logistics processes that would later support Operation Desert Shield/Desert Storm.

Marquez had kept a copy of the Deacon's Masterpiece with him since his days in Canada. He continuously thought about the idea of the Wonderful One-Hoss Shay and how the Air Force might implement this concept. In his job as deputy chief of staff, he found the perfect opportunity. Along with the parts shortage issues, the Air Force was suffering from poor parts reliability and a resultant poor performance of major weapon systems. In 1984 Marquez asked the RAND Corporation to do a study on how much the Air Force could save in parts procurement/repair dollars and manpower if reliability improved. The results were startling. If the Air Force could double the reliability of only fighter engine propulsion and fire control systems, it would save 50 percent of the total cost of fighter spare parts and 40 percent of maintenance man-hours

¹⁰⁷ Marquez, Lieutenant General Leo, "Air Force Procurement Reform: An Assault on Four Fronts". *Defense Management Journal*, (Fourth Quarter, 1985), 15.

expended. These findings sparked a significant initiative promoted by several key leaders.

Marquez was the logistics expert, and everyone expected the logistics team to think in terms of reliability costs. This emphasis formed the foundation of the R&M 2000 initiative Marquez would pioneer. R&M 2000 featured several programs designated by “Rivet” nomenclature.

| Reliability & Maintainability 2000 Initiative | |
|---|----------------------------------|
| Programs | Focus |
| <i>Rivet Improve</i> | Product Improvement/Reliability |
| <i>Rivet Train</i> | Expanded formal and OJT training |
| <i>Rivet Workforce</i> | Maintenance Manpower |
| <i>Rivet Mile</i> | ICBM Launch Systems |
| <i>Future Look *</i> | Long-Range Strategic Plans |
| <i>Blue Two *</i> | Grass-roots Depot improvement |

** Legacy initiatives incorporated into R&M 2000*

Figure 2. R&M 2000 Initiative Outline

Source: Author’s original work

Marquez named the component reliability improvement program Rivet Improve. Several other key players helped emphasize the Rivet Improve concept amongst Air Force senior leadership. Air Force vice chief of staff General Larry D. Welch, assistant vice chief Lieutenant General Howard W. Leaf, and the deputy chief of staff for research, development and acquisition Lieutenant General Robert D. Russ all worked together closely on the reliability issue. General Leaf wrote a policy letter outlining Marquez’s program for the chief of staff’s and secretary of the Air Force’s signature. It was signed and became important

guidance for the future of Air Force logistics and engineering.¹⁰⁸ Marquez credited these fellow officers for their support in making the policy a tenant of every major program. The mindset quickly became the hallmark of Air Force Council meetings, program management reviews, and as a focus for dealing with contractors.

The Rivet Improve program had to be credible with contractors, and Air Force leadership made hard choices to make sure everyone got the message. When major systems components did not meet their specified failure rates, the program was officially in jeopardy. The AN/ALR-74 Radar Warning Receiver was actually cancelled due to lack of reliability, and the Low-Altitude Navigation and Targeting Infrared for Night (LANTIRN) navigation pod was deferred because of reliability issues. The Air Force got the word out: design reliability in aircraft and space system subcomponents was critically important. As tempting as it might have been to compromise on this issue in order to get the latest and greatest systems, the Air Force stood firm.

The Rivet Improve program focused on promoting proven designs, high-quality piece-part components, commercial industry-standard specifications instead of outdated military specifications, and sources with proven quality assurance programs. This focus would pay huge dividends in the reliability of these systems in combat a few years later, and the long-term sustainability of

¹⁰⁸ Leo Marquez, Oral History Interview by Ronald Nipper, January 1988, typed manuscript, 52, K239.0512-2027 c.1, AFHRA.

the systems in the long run.¹⁰⁹ Improved reliability also meant lower cargo and manpower requirements to generate combat airpower since units would require fewer people and less equipment.

As Rivet Improve became a reality, Marquez was able to focus on other dimensions of the overarching R&M 2000 initiative. R&M 2000 included several constituent “Rivet” programs that focused on specific aspects of logistics. These are discussed in the next chapter, but it is important to note Marquez’s R&M 2000 focus sprouted a significant movement in the Air Force for acquisition reliability.

As General Marquez’s career drew to a close in 1987, he saw beyond many of their contemporary logistics issues to future combat problems. His End-of-Tour Report notes his concerns over the emerging realities of technology in combat. He described a perspective that began to dawn on him when he took his last post at the Pentagon, “I saw a really basic need to look at the way we did things, to get a long-range view of what I thought was coming downstream. By assessing what were going to be the changes brought about primarily by new technologies and by the realization of how and where we might have to use military force, we tried to start changing them in the logistics infrastructure.”¹¹⁰ In an earlier speech he described the nature of the war he saw coming as one where “we will be able to sustain our forces in the major

¹⁰⁹ Leo Marquez, Oral History Interview by Ronald Nipper, January 1988, typed manuscript, 53, K239.0512-2027 c.2, AFHRA.

¹¹⁰ Leo Marquez, End-of-Tour Report, January 1988, 2, K239.0512-2027 c.2, AFHRA.

theaters of Europe and the Pacific while we deploy... to other potential conflict regions during the early stages of a major global conflict.”¹¹¹

He further noted “an inbred philosophy stating that the Air Force would continue operations in a sanctuary mode” would lead to logistics failure once “subjected to very strong disruptive attacks.” Marquez believed that philosophy threatened combat success because the assumption of safe operating locations made the Air Force dependent on “very complex test equipment [and] secure electrical power and conditioned air for our big test stations” and a requirement for “a lot more people forward.”¹¹² He further lamented the Air Force had become “basically unprepared to cope with operating our bases under stress and under fire.”¹¹³ In another speech he labeled this phenomenon by saying “Alas! We have evolved into a ‘Fortress Bitburg’ support structure: the aerospace version of the Second World War’s Maginot Line.”¹¹⁴

His goal on the air staff was to “reduce our manpower intensity in the forward areas” and get “new airplanes that [are] a lot more reliable and a lot easier to fix and will take fewer people to maintain [with] fewer spare parts, etc.”¹¹⁵ He also remembered the lessons of his experience at Bien Hoa with the highly complex munitions delivery, breakdown, and buildup process. Marquez was acutely concerned that the experienced Ammo troops from that era were

¹¹¹ Marquez, General Leo. Remarks to the Baltimore Chapter of The Society of Logistics Engineers, Baltimore, Maryland. April 26, 1984.

¹¹² Leo Marquez, End-of-Tour Report, January 1988, 3, K239.0512-2027 c.2, AFHRA.

¹¹³ Leo Marquez, End-of-Tour Report, January 1988, 4, K239.0512-2027 c.2, AFHRA.

¹¹⁴ Marquez, General Leo. Remarks to the Air National Guard Senior Commanders. San Antonio, Texas. November 20, 1985.

¹¹⁵ Leo Marquez, End-of-Tour Report, January 1988, 5, K239.0512-2027 c.2, AFHRA.

retiring. That coupled with the fact that the Air Force had little experience in combat munitions operations since Vietnam. The Air Force needed warriors in munitions logistics, and warriors need realistic combat training.¹¹⁶

The programmatic focus of all these ideas emerged in R&M 2000's Rivet Workforce program for managing maintenance people and the AFCOMAC training program for advancing the ideas of munitions logistics in combat. The R&M 2000 initiative focused on improving Air Force combat readiness and equipment performance. The following chapters examine the theory behind these initiatives and their impact on the Air Force.



¹¹⁶ Marquez, General Leo. Remarks to the Charles A. Lindbergh Chapter of the Air Force Association, Dayton, Ohio. March 16, 1984, and Marquez, Lieutenant General Leo. "The Logistics Warrior". Air Force Journal of Logistics, Spring 1986, p. 9-11.

4. The Marquez Way with Ideas

My logisticians are a humorless lot ... they know if my campaign fails, they are the first ones I will slay.

- Alexander

I don't know what the hell this 'logistics' is that Marshall is always talking about, but I want some of it.

- Fleet ADM E. J. King: To a staff officer (1942)

Leo Marquez was impressed by reason and ideas. His speeches and papers referenced thinkers like Martin Van Creveld, Karl von Clausewitz, Barry Watts, Jeff Record, Ed Luttwak, Franklin Spinney, and Mark Twain.¹ He analyzed these ideas and synthesized them into his own theory of combat logistics. This theory formed the foundation for what Marquez considered necessary for an Air Force logistics officer, Air Force supply chain management, and the combat force structure.

Thanks to his experiences as a fighter pilot in Europe and as a maintenance officer in Vietnam, he thought a great deal about how logistics relates to combat, and applied his theory to success in the next campaign. He observed, "Repeatedly, history tells us war is not like peace. We logisticians must debunk the myth that the Air Force will operate in wartime like it does in peace." He focused on one key professional issue, "The question remains: How do officers prepare themselves for war?" The central idea in his theory

¹Marquez, General Leo. Remarks to the Small Business Group, Sacramento, California. August 21, 1984. and Leo Marquez. "A General's Reflections: Stress and combat." *Air Force Journal of Logistics*, Fall 1986, 26.

expressed more than the officers' responsibility for the mission, the troops, and themselves. Marquez enjoined Air Force officers to prepare to win wars by first educating themselves, not only in a formal program, but in personal reading and study. He reasoned, "[Edward] Luttwak tells us the military structure is so seriously flawed that we are incapable of changing the system from within. He asserts a refocusing can only be accomplished from outside the Department of Defense. He may be right, but we must act as if he is *dead wrong*. We must change the focus of our education and training institutions, and we must change ourselves... We logisticians must think and act like warriors."²

The notion of logistics warriors permeated his professional thinking. He corrected anyone who considered logistics to be the systemic "tail" of the Air Force. He once exclaimed, "I don't ever, ever, ever want to hear the term 'logistics tail' again. If our aircraft, missiles, and weapons are the teeth of our military might, then logistics is the muscle, tendons, and sinews that make the teeth bite down and hold on—logistics is the jawbone! Hear that? The JAWBONE!"³ He was as reasoned as he was passionate about logistics in combat when he concluded, "History confirms that wars cannot be won, not peace sustained, without a strong logistical base...our judgment must be keen and our wisdom practical. We must think in the medium in which we would be ultimately tested—as logistic warriors in combat."⁴

² Marquez, Lieutenant General Leo. "The Logistics Warrior" Air Force Journal of Logistics, Spring 1986, 11.

³ Air Force Logistics Management Agency, *Quotes for the Air Force Logician*, Maxwell AFB, Alabama (September 2001), 17.

⁴ Marquez, Lieutenant General Leo. "The Logistics Warrior" Air Force Journal of Logistics, Spring 1986, p. 11.

Enter AFCOMAC. It was this spirit that led to one of Marquez's most important ideas on combat logistics. The memory of his munitions experience at Bien Hoa never left him. He remembered the remarkably complex logistical operation required to generate the needed munitions. Marquez had assisted in getting the requisite heavy vehicles from the motor pool, only to find that his friend's squadron had much more to do than simply accept delivery of bombs. The barge delivered hundreds of individual components that had to be assembled to meet the mission; the various possible permutations were in the thousands. The combination of heavy lifting, rough physical conditions, highly complex combinations, strict accountability, hazardous material, and changing requirements made the munitions business one of the toughest challenges Marquez had ever witnessed.

Marquez was so impressed by the challenge that when he became deputy chief of staff for logistics and engineering in 1984, he looked into the state of munitions logistics in the Air Force. He discovered a disturbing trend. The Vietnam era Ammo enlisted troops were retiring and the Air Force had little time to capitalize on their expertise. To make matters worse, the in-garrison training in tactical units had scant resources to conduct large-scale training efforts. Training munitions assets were designed to train crews on how to configure specific munitions loads, but were unsuitable in number or quality for practicing massive build-up operations. Furthermore, most day-to-day training sorties used small 25-pound training bombs armed only with a small spotting charge. These were entirely unlike the munitions that units would use

in combat. The problem was understandable considering the circumstances where “full scale ordnance was rarely exercised for reasons which make absolutely perfect sense in peacetime—live ordnance costs too much, adequate ranges and buildup locations are extremely limited and delivery and loading of real munitions disrupt routine flightline operations” due to explosive safety requirements.⁵ Marquez assembled a Tiger Team of Ammo and logistics professionals to examine the problem and find solutions.

The Tiger Team confirmed that the Air Force faced “a glaring shortfall in our ability to support sortie generation on a sustained basis in combat.”⁶ The situation called for an initiative to produce Ammo experts capable of mass ordnance generation to meet tasked operational plan (OPLAN) missions. Marquez was acutely aware of the Red Flag concept that trained fighter pilots in an intense simulated combat environment, and resolved to establish a similar concept for munitions. The idea was a school to provide Ammo troops realistic training in combat scenarios of planning and execution of typical fragmentary orders (FRAG). The training would utilize mass live-ordnance in combat quantities and expose students to the rigors of typical combat environments. Marquez and the Tiger Team built the concept around the central idea of training munitions logistics warriors for combat. The Air Force Combat Ammunition Center (AFCOMAC) was born.

⁵ William D.B. Swezey, “AFCOMAC: In the Right Place at the Right Time,” *TAC Attack*, January 1992, 24.

⁶ *Ibid.*

How to Pay for It? The idea was as elegant as it was simple. The complicated matter was how to fund such an ambitious project. Marquez had few funds available to establish the school, and the project would have to wait for years if it was programmed into the budget. The requirement was critical, however, and Marquez didn't want to wait years for AFCOMAC to become a reality. Marquez worked with MAJCOM representatives to find budgetary offsets to make funds available right away.

The most pressing requirement was to find a location capable of handling the enormous amount of live-ordnance necessary for the program. Marquez approached his counterpart in the US Army for assistance. The Army had more standing explosives-sited facilities that were possible candidates. This joint cooperation paid off when the Army offered the use of Sierra Army Depot near Herlong, California. The base had few facilities, but was located in such a remote area that live-ordnance wouldn't be a problem. Marquez agreed to the deal, and came up with a plan to build the school at Sierra with existing funds taken from the existing budget. Secretary of the Air Force Verne Orr approved the initiative in August of 1985, and by March of 1986, the first class of 70 students entered the AFCOMAC training program.⁷

Early Results. AFCOMAC's faculty represented some of the most experienced Ammo professionals in the Air Force. Marquez handed the curriculum development to the school's experienced munitions faculty. Their

⁷ Beale Air Force Base Factsheet website
http://www.beale.af.mil/library/factsheets/factsheet_print.asp?fsID=3968&page=1, accessed 16 March 2014

charter was to get students to “think on the balls of their feet, anticipate and fix real world problems, recognize and select options, understand the latitudes and flexibilities of choice and its impact on technical order compliance or explosives safety... to generate munitions quicker and smarter to beat the FRAG.”⁸ The vision was to build a school the Air Force could be proud of, the “MIT of Munitions”, the “Berkeley of Bombs”, the “College of Kaboom”, and grant graduates the skills required for inclusion in “Phi Blasta Kappa.”⁹

The school developed a warrior ethos built around Marquez’s theory of logistics warriors. Their mission was to win the next war by building a cadre of highly trained warriors who could assemble and deliver combat munitions without incident. The school’s motto officially became “To Keep the Peace, Prepare for War,” which further reflected Marquez’s ideas. Their warrior ethos was encapsulated in their esprit-de-corps, and the graduates universally recognized their Spartan battle cry, “If You Ain’t Ammo, You Ain’t S---.”¹⁰

The faculty developed new exercises and initiatives to expose students to the rigors of combat. The course eventually culminated in a one-week field exercise known as “Iron Flag” which served as a final examination for all students. The program taught students planning skills and emphasized combat flexibility. The students conducted a simulated deployment to a bare base environment and planned and executed break out and build-up of

⁸ William D.B. Swezey, “AFCOMAC: In the Right Place at the Right Time,” *TAC Attack*, January 1992, 25.

⁹ Pat McKenna, “Bomb U. Airmen Study the Science of Blowing Up Stuff,” *Airman*, September 1999, 26.

¹⁰ Pat McKenna, “Bomb U. Airmen Study the Science of Blowing Up Stuff,” *Airman*, September 1999, 26.

munitions to meet a simulated combat FRAG. The simulation then introduced elements designed to simulate combat fog and friction. The students were tested on their ability to adjust their plans in order to meet the frag. This Iron Flag concept of AFCOMAC has been described by an AFCOMAC dean, Major Lee Levy, as “like the first 20 plays in a football game... if you don’t have your playbook ready by the time the whistle blows, you’re in trouble. And when the opposition starts reading you well, you might have to throw the playbook away and adjust.”¹¹ The AFCOMAC experience gave Ammo troops their first combat frags in a training environment. Much like Red Flag’s preparatory impact on fighter pilots, Iron Flag created a cadre of Ammo troops with the competence, spirit, and flexibility Marquez had envisioned for logistics warriors.

By the summer of 1990, nearly 3,000 students had graduated from the AFCOMAC training. Those graduates had generated the munitions required for over 6,000 combat sorties in a rigorous simulated combat environment.¹² The product of Marquez’s idea of logistics warriors would soon be tested in a much more challenging environment of unforeseen significance. Operation Desert Storm tested Ammo troops with an examination unlike any previously seen in the Air Force, and AFCOMAC graduates helped form the jawbone of the logistics force.

The Storm. Operation Desert Shield was the immediate US build-up in the Middle East after Iraq invaded Kuwait in 1990 and it brought the opening

¹¹ Quoted in McKenna, “Bomb U.” p. 27.

¹² William D.B. Swezey, “AFCOMAC: In the Right Place at the Right Time,” *TAC Attack*, January 1992, 25.

stages of the Ammo logistics challenge. At the start of the operation, 48,000 tons of munitions were pre-positioned in the area of responsibility (AOR) at Oman and aboard three Afloat Pre-positioned Fleet (APF) ships in the region. Pre-positioning was a product of the program now known as the Global Asset Positioning (GAP) program. This concept was a four-pronged plan that included Theater Munitions stocks, CONUS munitions stocks, Standard Air Munitions Packages (STAMP), and the APF.¹³ STAMP and sealift delivered the bulk of the munitions for the operation. STAMP rapidly deployed assets early in the campaign with sealift delivering the majority of assets from CONUS stockpiles over time. This division of transportation of assets spread the delivery between fast airlift and slower ships. Although the ships were slower, they could carry far greater payload than the mobility aircraft.

By the time of the cease-fire in Operation Desert Storm, over 350,000 tons of munitions were either in the AOR or in transit to the AOR.¹⁴ This presented the immediate problem of where to store these explosive assets so they could be fed to the eight main operating bases in theater. At the start of the operation, there were only four locations site planned as MSAs. Munitions troops had to plan for the building, development, and expansion of the MSA plan to an eventual 24 storage areas.¹⁵ A major munitions depot storage and distribution location was carved out of the Saudi Arabian desert at a place

¹³ David K. Underwood and John E. Bell, "AEF Munitions Availability" *Air Force Journal of Logistics*, Winter 1999, 14.

¹⁴ *Gulf War Air Power Survey*, vol. III, *Logistics and Support*, (Washington, D.C.: Government Printing Office, 1993), 223.

¹⁵ *Ibid.*, 240.

called Al Kharj. This depot could handle 14 million pounds of explosives classified as UN Hazard Class/Division 1.1 materials, the mass detonation designation for most general-purpose bombs. The munitions planners also stood up similar large MSAs at Jeddah, Al Minhad, Al Dhafra, Taif, and Doha, which brought the total explosive storage capacity to in the AOR to 47.8 million pounds.¹⁶

Variability in demand makes a logistician's life more difficult. Research confirms operational risks arise from readiness problems that usually result from increased variability.¹⁷ The munitions distribution process mitigated that risk by spreading the assets to these various depots and feeding the primary combat bases as stocks were expended. This centralized inventory concept is very similar one now known as Risk Pooling (RP). RP seeks to reduce demand variability's effect by aggregating requirements into a centralized delivery system with several stockpile nodes. This system ensured no single base would run out of any particular explosive component while another base had excess assets.¹⁸ The Gulf War Air Power Survey described the situation where "Explosives storage capability at most Gulf bed down locations was either nonexistent or insufficient to permit on-base storage of the required munitions stockpile. Deploying forces were faced with organizing munitions storage and

¹⁶ Ibid., 262.

¹⁷ Jason L. Masciulli and William A. Cunningham, "MICAP Shipping Policies" *Air Force Journal of Logistics*, Fall 2001, 43.

¹⁸ Steven L. Martinez, Marvin A. Arostogui, Stephan P. Brady, "Improving the Logistics Pipeline" *Air Force Journal of Logistics*, Winter 2002, 14.

accountability activities, developing flow plans and flight-line delivery functions, and organizing explosives safety programs.”¹⁹ This operation required Ammo troops to build from the ground up. The environment was absolutely bare base conditions from the Ammo perspective; precisely the environment AFCOMAC had prepared them for.

Another important aspect of the munitions operation was the diversity of the force deployed to the theater. Troops arrived from bases around the world from a variety of units with varied missions. The Ammo leadership recognized the issue early on, and adopted a principled training approach similar to the AFCOMAC experience. Munitions units immediately began training inexperienced troops on assembly operations with live assets, as the AFCOMAC curriculum had envisioned, in order to prepare them to meet coming frags. The training focused on explosive safety and technical order compliance in rigorous desert heat and Mission-Oriented Protective Posture (MOPP) suits. The Gulf War Survey noted the impact stating:

Training of munitions personnel involved in Desert Shield and Desert Storm paid huge benefits to the Air Force... personnel from as many as forty bases would be represented in the maintenance force at one Gulf base. Thus, training that newly formed force became essential. One statistic reveals most about quality munitions training: the zero significant explosives accidents involving Air Force personnel. That safety record is directly attributed to strong supervision, demand for following appropriate technical data, and emphasis placed on quality training and quality safety practices.²⁰

¹⁹ *Gulf War Air Power Survey*, vol. III, *Logistics and Support*, (Washington, D.C.: Government Printing Office, 1993), 241.

²⁰ *Gulf War Air Power Survey*, vol. III, *Logistics and Support*, (Washington, D.C.: Government Printing Office, 1993), 243.

The report also noted the environmental conditions of the munitions operation. Since the MSAs were geographically separated from other infrastructure, they provided little shelter from the elements. The Gulf War Survey's authors were so impressed by these conditions they made the following assessment:

Munitions activity was on a continuous 'high.' Forward operating locations were established, and redistributing munitions between depots, units, and between countries occurred on a daily basis to meet urgent operational tasking. Munitions personnel worked in 120-degree heat to meet critical mission takeoff times and to build up and deliver munitions to the flight line in support of Coalition air operations. They succeeded in the face of some of the most difficult conditions ever encountered by Air Force members, although they didn't come under fire, for the most part, and were not subjected to actual chemical or biological warfare conditions.²¹ (Emphasis added)

In Operation Desert Storm the Air Force assembled and expended over 138 million pounds of munitions during more than 60,000 combat sorties. Munitions troops had to assemble those munitions with the various fuses, fin assemblies, guidance units, and other components well in advance of their tasked sorties. The assembly process in Desert Storm was vastly improved over the process Marquez had witnessed in Vietnam.

The old assembly process involved building bombs on wooden dunnage or munitions trailers. This was inefficient, slow, and manpower intensive. The Department of Defense munitions community worked with contractors in the 1980s on an improved assembly process using gantries and a conveyor system.

²¹ Ibid., 243.

Marquez's AFCOMAC team developed a key process design to improve munitions component assembly during his tenure.²² The new system was tested at AFCOMAC during that period, and in 1987 the US Patent Office awarded Ver-Val Enterprises a patent for the Rapid Assembly of Munitions System (RAMS).

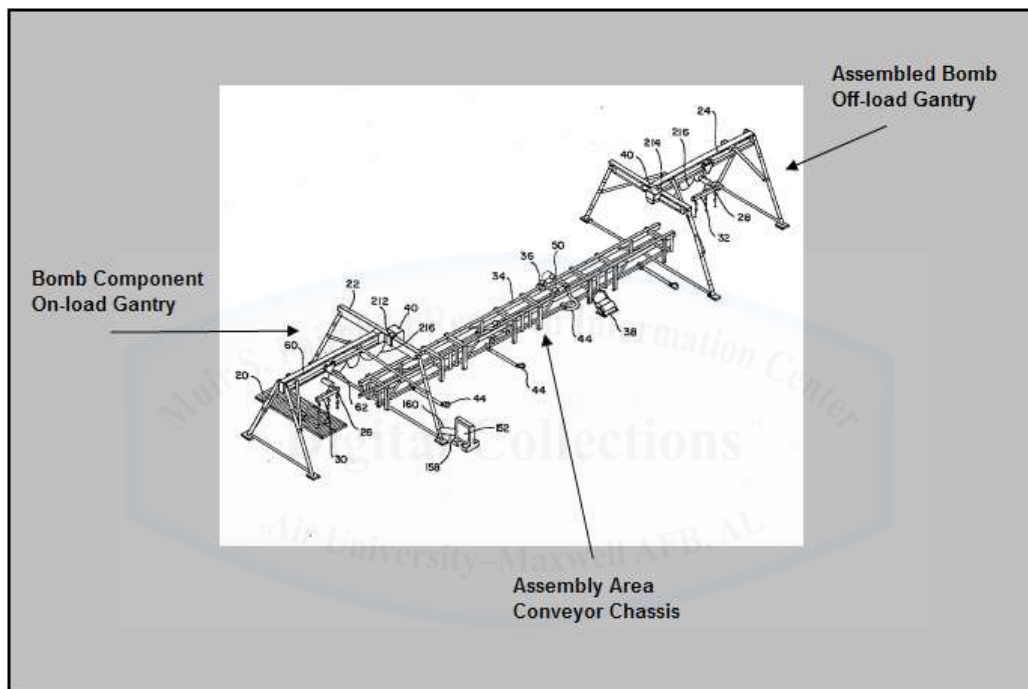


Figure 4.

Rapid Assembly of Munitions Patent Diagram

Source: Wallace L. Brown and O. Mark Madamba. US Patent 4708048, "Munitions Assembly System", November 24, 1987.

The RAMS was a huge improvement over the old process. Pneumatic hoists on gantries lifted up to three bomb bodies at a time on a bomb bar, roller conveyors moved bomb bodies with ease, and arming wire dispensers

²² Lt Gen L. Marquez, interviewed by the author 13 Apr 2007.

streamlined the process. Other improvements such as built-in lighting and the fact that troops didn't have to continually stoop to access the munitions vastly improved working conditions.²³ The RAMS made mass assembly of complex precision munitions in the quantity required for Desert Storm an unprecedented success.



Figure 5. RAMS Precision Munitions Assembly

Source: Author's personal collection

AFCOMAC trained students on the deployment and utilization of the RAMS for munitions assembly operations both at home station and at deployed bases. AFCOMAC graduate Ammo troops were prepared for the rigors of delivering the stunning number of assembled explosives thanks to their simulations and exercises that utilized the new RAMS. All Ammo troops were trained on RAMS, regardless of whether they attended AFCOMAC or not, but lessons from AFCOMAC experience improved the RAMS employment as an

²³ Brown; Wallace L. and O. Mark Madamba. US Patent 4708048, "Munitions Assembly System", November 24, 1987.

integrated part of the production process. The overall impact of AFCOMAC on Desert Storm was so significant that the Gulf War Survey singled out the contribution calling it “A ‘force multiplier’ in training the munitions personnel.”²⁴ The survey noted the assembled munitions stockpile could have sustained the war well beyond 28 February 1991 had the need arisen. The amount of munitions in the pipeline combined with the troops’ assembly capability could have sustained the war expenditure rate another 120 days.²⁵ The survey also notes Marquez’s contribution to the establishment of the school that had become such a logistics force multiplier in Desert Storm. “Lt. Gen. Leo Marquez, [then] Air Force Deputy Chief of Staff for Logistics and Engineering, recognized that the Vietnam-experienced midlevel technicians and junior officers were leaving the Service... General Marquez ordered the establishment of a course designed to teach munitions combat production techniques” it read, and the report concluded by stating, “In summary: there were no known instances of missions cancelled because munitions were unavailable. This record was accomplished with zero significant safety accidents involving Air Force personnel.”

The munitions logistics warriors Marquez had envisioned had responded to the challenge and met the frag in Desert Shield and Desert Storm. Lt. Gen. Leo Marquez’s theories on the importance of logistics warrior ethos and combat experience directly contributed to the logistics successes of Desert Storm. The

²⁴ Ibid., 244.

²⁵ *Gulf War Air Power Survey*, vol. III, *Logistics and Support*, (Washington, D.C.: Government Printing Office, 1993), 386.

lesson from this experience teaches the value of Marquez's warrior ethos theory. By planning for war in times of peace, the Ammo community was able to excel in the combat environment.



5. The Marquez Way and People

Strange as it may seem, the Air Force, except in the air, is the least mobile of all the Services. A squadron can reach its destination in a few hours, but its establishment, depots, fuel, spare parts, and workshops take many weeks, and even months, to develop.

- Winston S. Churchill

Because of my wartime experience, I am insistent on the point that logistics know-how must be maintained, that logistics is second to nothing in importance in warfare, that logistic training must be widespread and thorough...

- ADM Robert B. Carney, USN

General Marquez advanced R&M 2000 during his tenure as Air Force deputy chief of staff for logistics and engineering. R&M 2000 was an umbrella for several programs to improve Air Force logistics. This initiative included the Rivet Workforce (RW) program designed to improve Air Force human resource management. He introduced RW to shape logistics manpower into the future. Likewise, Marquez introduced the Rivet Train (RT) program designed to enable RW with formal and on-the-job (OJT) aircraft maintenance training. Marquez theorized that product improvements and increased systems reliability would change logistics manpower. These ideas were rooted in lessons Marquez gained from his farming background, but they also directly resulted from his ideas about combat and logistics. Ultimately, Marquez was interested in matching human resources to combat requirements. The processes and institutional management that shaped and employed those resources were relevant to how they would go to war. Marquez knew those processes would drive performance, and his ideal fusion of operations and logistics demanding

more capability from each troop drove his initiatives. Marquez observed that aircraft maintenance mechanics were trained and qualified in a highly specialized Air Force Specialty Code (AFSC). The problem he saw was such specialization meant many repair activities required a lot of different mechanics. He noted metaphorically, “I had nose guys, ear guys, mouth guys, and eye guys... I needed guys who could work on the whole face.”¹ His concerns stemmed from his theory of combat logistics. In a high-intensity fight with the Soviets, the Air Force was more vulnerable and less capable with high specialization. Since the mechanics of that time could only work on a particular system, and many repair activities spanned several systems, combat success depended on too many people, and attrition of any particular AFSC could cripple the combat effort. For him, combat was messy. It would make no allowance for the peacetime categories of Air Force AFSCs and the manpower numbers that the system would demand.

Just as Marquez thought of a farmer as a multi-disciplined worker, he believed combat logisticians should be multi-system qualified to be effective in combat. He theorized that airpower’s key advantage is its flexibility, but the logistics workforce hampered flexibility by becoming too inflexible for combat. His theory dictated that proper care of logistics people included the flexibility to work a broader scope of systems without improvisation. Marquez established RW to change the structure of the logistics workforce, and RT to properly equip this new flexible force.

¹ Lt Gen L. Marquez, interviewed by the author 23 Jan 2007.

He established an action task force in late 1984 to study the workforce and recommend changes according to his theory. Marquez's charter outlined the two initiatives, "If we increase our reliability and (weapon systems) failures start to go down, we need a different type of technician.... We need to train individuals differently.... We need more generalists to work on the whole system."² The task force established the objectives for RW, "to develop technical expertise on a particular weapon system, combine jobs with similar underlying technologies, tailor training policies for enlisted force development, and restructure unit manning" for the future force.³ The study continued to refine solutions, and RW was slated for a three-year implementation beginning with avionics specialist fields in April of 1987.⁴ This chapter examines the RW initiative and the theory of Air Force logistics upon which it is based. The RW initiative ended up making nearly a decade-long impact, and had unintended consequences and long-lasting implications that impact the Air Force today. Evidence suggests RW had an impact in Desert Storm and further set the stage for a decade of Air Force manpower reductions.

Air Force active duty enlisted manpower strength was relatively constant during Marquez's tenure as a deputy chief of staff. The mean total enlisted

² Leo Marquez, Oral History Interview by Ronald Nipper, January 1988, typed manuscript, 53, K239.0512-2027 c.1, AFHRA.

³ Edward Boyle, Lt Col Stanley J. Goralski, and Maj Michael D. Meyer, "The Aircraft Maintenance Workforce Now and in the Twenty First Century," *Air Force Journal of Logistics*, Fall 1985, 4.

⁴ Capt Elaine A. Robinson, "Rivet Workforce and the F-16 Block 40" *Air Force Journal of Logistics*, Summer 1989, 16.

strength was 489,140 with a standard deviation of 4778 from FY83-FY87.⁵ When RW began in 1987, active duty aircraft maintenance manpower numbered around 135,000 people, or 28 percent of the total enlisted force.⁶ These troops were organized in 43 distinct specialties with almost 70 additional sub-specialties or “shredouts” designating specific systems.⁷ The guard and reserve maintenance troops were similarly organized, and followed RW restructuring for the most part, only retaining some vestigial specialties required for legacy systems. Marquez’s initial purpose for RW was based upon his theory on combat flexibility, but by 1987 the Air Force was beginning to realize a corollary benefit: personnel reductions. The robust Reagan budgets of the mid-1980s started to dwindle later that decade, and the air staff projected force reductions in the near future.⁸

The RW Plan. The RW plan distinguished between Tactical Air Forces (TAF), Military Airlift Command (MAC) and Strategic Air Command (SAC) specialty categories. The plan consolidated AFSCs within these categories by functional area and weapon system. The plan began by locking Air Plane General (APG) mechanics into crew chief specialties assigned to specific airplanes to build expertise. Flightline APG, engine, and hydraulics mechanics were consolidated into this single AFSC (designated 452XX), and the system tracked expertise by special experience identifiers (SEI). Avionics mechanics in

⁵ “Air Force Almanac,” *Air Force Magazine*, May 1987, 80.

⁶ CMSgt August W. Hartung, “Rivet Workforce,” *Flying Safety*, February 1987, 11.

⁷ Hartung, “Rivet Workforce,” 1987, 11.

⁸ Brig Gen Michael E. Ryan, “F-16 Aircraft Maintenance and Munitions Manpower Requirements,” staff report, 23 February 1989 in Capt Elaine A. Robinson, “Rivet Workforce and the F-16 Block 40” *Air Force Journal of Logistics*, Summer 1989, 19.

navigation systems (A shop), instruments and flight controls (B shop), and communication and navigation (C shop) were consolidated into the Integrated Avionics career field (452X2) and avionics aerospace ground equipment (AGE) specialties were eliminated. Avionics utilized three designations (45252A, B, or C) through the 5-skill level, but 7-skill level mechanics had to be qualified on all three functional groups.⁹ Electrical and environmental mechanics were combined into 452X5 (TAF), 454X5 (SAC), and 454X6 (MAC) AFSCs. RW also combined pneudraulics and aero repair specialties into one specialty (454X4), sheet metal repair combined with corrosion control to form structural maintenance (458X2), engine mechanics consolidated to form a back shop specialty (454X0), and machinists and welders combined to form metals technology (458X0).¹⁰ Each AFSC transition took place over the course of three years, though RW initiatives continued to spark changes, corrections, and adjustments well into the 1990s.¹¹ By 1994 the total number of AFSCs was reduced to 24, and by 2004 the number was down to 19 aircraft maintenance and munitions specialties (not including four outlying AFSCs with only 1 person designated). The AFSCs were re-coded in the mid-1990s to a new scheme of 2A0-7XX and 2WXXX. Table 5.1 shows the AFSC organization and constitution in 2004.

⁹ CMSgt Robert Gordick, "Tactical Air Command: Rivet Workforce Integrated Avionics, Photo-Sensor," HQTAC/LGQZ Briefing, 17 June 1987 in Capt Elaine A. Robinson, "Rivet Workforce and the F-16 Block 40" *Air Force Journal of Logistics*, Summer 1989, 18.

¹⁰ CMSgt August W. Hartung, "Rivet Workforce: Where We Are, Where We're Headed," *Flying Safety*, October 1988, 15.

¹¹ CMSgt Mike McMahan, HQ USAF/ILMM, Headquarters U.S. Air Force, Washington, D.C. Combat Air Forces Roadmap, staff briefing, January 2002.

| | | |
|-------|---|--------|
| 2A0X1 | Avionics Test Station & Components | 2,780 |
| 2A1X1 | Avionics Sensors Maintenance | 1 |
| 2A1X4 | Airborne Surveillance Radar Systems | 1 |
| 2A3X1 | A-10, F-15, & U-2 Avionics Systems | 1,904 |
| 2A3X2 | F-16, F-117, RQ-1, CV-22 Avionics Systems | 1,914 |
| 2A3X3 | Tactical Aircraft Maintenance | 11,041 |
| 2A4X1 | Aircraft Guidance & Control | 1 |
| 2A4X2 | Aircraft Communication & Navigation Systems | 1 |
| 2A5X1 | Aerospace Maintenance | 12,126 |
| 2A5X2 | Helicopter Maintenance | 931 |
| 2A5X3 | Integrated Avionics Systems | 6,812 |
| 2A6X1 | Aerospace Propulsion | 6,696 |
| 2A6X2 | Aerospace Ground Equipment | 4,852 |
| 2A6X3 | Aircrew Egress Systems | 1,064 |
| 2A6X4 | Aircraft Fuel Systems | 1,959 |
| 2A6X5 | Aircraft Hydraulic Systems | 2,230 |
| 2A6X6 | Aircraft Electrical & Environmental Systems | 4,233 |
| 2A7X1 | Aircraft Metals Technology | 825 |
| 2A7X2 | Nondestructive Inspection | 684 |
| 2A7X3 | Aircraft Structural Maintenance | 3,150 |
| 2A7X4 | Survival Equipment | 751 |
| 2W0X1 | Munitions Systems | 7,351 |
| 2W1X1 | Aircraft Armament Systems | 8,351 |
| 2W2X1 | Nuclear Weapons | 941 |

Figure 6. Aircraft Maintenance and Munitions Fields and Manpower in 2004

Source: Air Force Personnel Center figures in “Career Field Breakdown,” *Airman*, January 2005, 38

The RW Legacy. In order to understand the impact of RW, one must first understand how the Air Force has changed since 1987. The total number of active duty aircraft maintenance mechanics in 2004, not including an estimated 1,451 senior supervisory positions, was 79,858 out of a total enlisted workforce of 298,315. This number is a similar percentage of the total force as in 1987 (27 versus 28 percent), and is an overall reduction of roughly 40 percent of available active duty maintenance manpower. Guard and reserve manpower reductions ranged between five and six percent during this same period. This dramatic cut in manpower was accompanied by associated cuts in

total aircraft (36 percent) and total flying hours (34 percent).¹² Those cuts largely took place immediately after Desert Storm, and average fleet size and hours normalized after FY93. For instance, fleet size dropped from 8,494 to 6,855 between FY91 and FY94, but the fleet shrunk by only half that amount between FY94 and FY06. Likewise, flying hours dropped from 3.66 million to 2.31 million between FY91 and FY94, and averaged 2.3 million hours through FY06.¹³

These manpower reductions might therefore be deemed appropriate considering the overall reduction of Air Force assets and operations. However, a most important measurement with potential impact to the maintenance workforce is the average age of the air fleet. In 1987, the average age in years was 15.2 for the active fleet, and the total fleet average was well under 20.¹⁴ By FY06, the average age of the fleet jumped to 24. In addition, the 1987 force was largely organized as an in-garrison Air Force. In the 1990s, the Air Force began transforming into an expeditionary force supporting numerous combat operations. Figure 5.2 illustrates the changes on the following page.

¹² "Air Force Almanac," *Air Force Magazine*, May 1987, 80-89. and "Air Force Almanac," *Air Force Magazine*, May 2006, 853-66.

¹³ AFTOC and AFKS/REMIS, Jan 07 in Mark D. Johnson, Deputy Chief of Staff for Logistics, Installations and Mission Support, Headquarters U.S. Air Force, Washington, D.C. AFMx21 Follow-on Strategy, staff briefing, 8 February 2007.

¹⁴ "Air Force Almanac," *Air Force Magazine*, May 1987, 80.

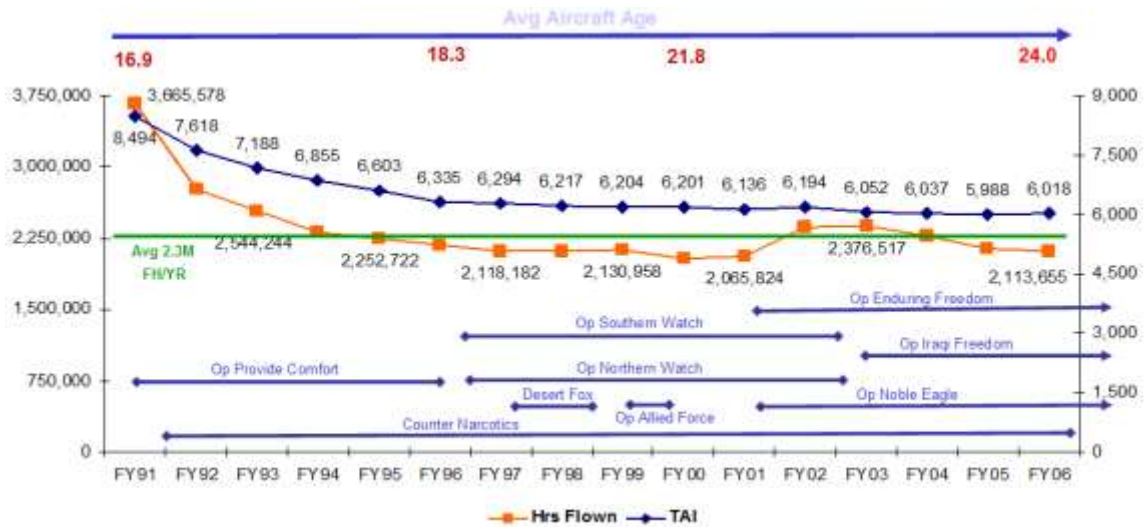


Figure 7. Air Force Operational Assets and Operations, FY91-FY06¹⁵

Source: AFTOC and AFKS/REMIS, Jan 07 in Mark D. Johnson, Deputy Chief of Staff for Logistics, Installations and Mission Support, Headquarters U.S. Air Force, Washington, D.C. AFMx21Follow-on Strategy, staff briefing, 8 February 2007.

The fleet’s increased age combined with increased operations tempo and the expeditionary force significantly stressed maintenance and munitions manpower. This is particularly true considering the significant manpower reductions in the same period. The evidence suggests RW made such reductions possible without significant losses in capability by increasing the flexibility and capability of mechanics. A metrics-based conclusion on the impact of RW after Desert Storm is difficult due to several confounding variables. For example, budget cuts in parts procurement and systems support at the wholesale level had a significant impact, as well as parametric

¹⁵ AFTOC and AFKS/REMIS, Jan 07 in Mark D. Johnson, Deputy Chief of Staff for Logistics, Installations and Mission Support, Headquarters U.S. Air Force, Washington, D.C. AFMx21Follow-on Strategy, staff briefing, 8 February 2007.

degradations associated with ageing aircraft systems. The following figures demonstrate the situation since 1991 (maintenance data collection systems do not reliably document metrics prior to FY91).

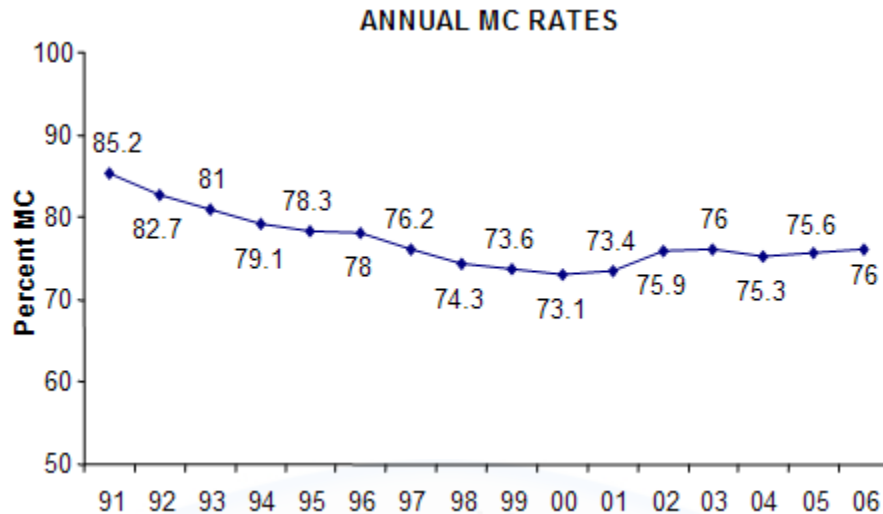


Figure 8. Fleet Mission Capability Rate History
(Percentage of aircraft able to complete a tasked mission)

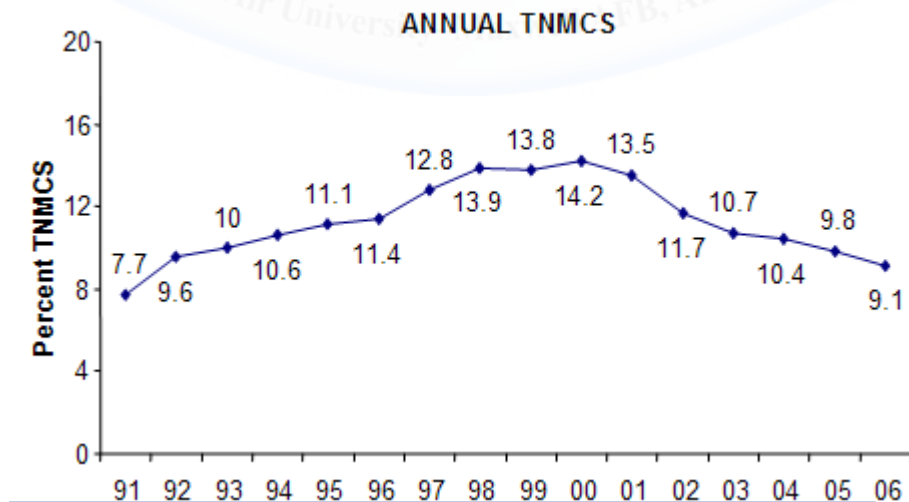


Figure 9. Total Non-Mission Capable for Supply History
(Percentage of non-mission capable aircraft due to parts shortage)

Source: AFTOC and MERLIN, Dec 06 in Mark D. Johnson, Deputy Chief of Staff for Logistics, Installations and Mission Support, Headquarters U.S. Air

Force, Washington, D.C. AFMx21Follow-on Strategy, staff briefing, 8 February 2007.

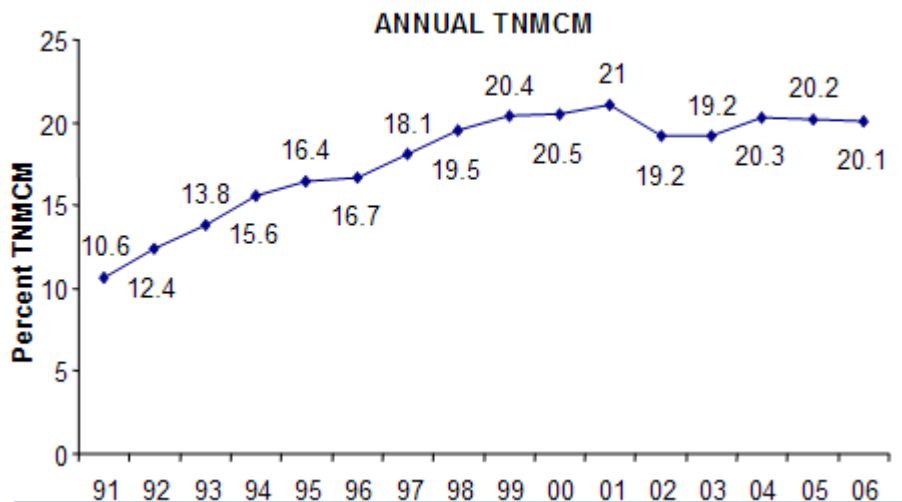


Figure 10. Total Non-Mission Capable for Maintenance (TNMCM) History

(Percentage of non-mission capable aircraft requiring maintenance)

Source: AFTOC and MERLIN, Dec 06 in Mark D. Johnson, Deputy Chief of Staff for Logistics, Installations and Mission Support, Headquarters U.S. Air Force, Washington, D.C. AFMx21Follow-on Strategy, staff briefing, 8 February 2007.

The mission capable (MC) rate declined between FY91 and FY06 for a variety of reasons. The portion of the decline attributed to parts shortages is depicted in figure 5.4. Research has documented shortages of spare parts funding in FY95 and FY96 that supplied only 58 and 74 percent of operational requirements.¹⁶ This data indicates growing supportability issues through the 1990s that clearly impacted mission capability rates. Figure 5.5 indicates the

¹⁶ Mark Humphrey, "NMC Escalation and Erosion of Mission Capable Rates," DRC Contract #GS-477SG, Sep 99 and Andy Sherbo, "Operations and Maintenance Funding and the Art of Readiness." Air Force Comptroller, Apr 98, 32, 10-14 in Steven A. Oliver, Alan W. Johnson, Edward D. White, Marvin A. Arostegui, "Forecasting Readiness," *Air Force Journal of Logistics*, Summer 2001, 34.

portion of mission capability decline attributed to maintenance issues, which could reflect any number of reasons. For example, the increased fleet age could be a culprit in inducing more breaks and new ways of breaking. It is important to note, however, that the TNMCM metric has changed over time. In the early 1990s, aircraft were considered MC with conditions considered not MC in the late 1990s and the current decade. The MC rules once allowed for aircraft to be MC with operational checks due in specific cases of job accomplishment. Those rules were changed to make MC status more stringent when maintenance required functional check flights or systems checks. The new rules stipulate aircraft are not MC until all associated checks are accomplished, and in many cases this rule adds many hours of not MC for maintenance time.

It is impossible to know exactly how many hours of TNMCM time this added or how much it contributed to the metric's trend, but the rule change certainly made some impact on the measurement without notice. The rules were not the same through the history of the metric. That being said, maintenance manpower shortages, cannibalization practices to mitigate parts shortages, or insufficient personnel training could certainly contribute to the MC decline by driving up TNMCM. RW emerges as a possible culprit if the workforce was too generalized or insufficiently trained. As the next few items demonstrate, however, the evidence does not support an indictment of the RW initiative.

In 1999, General Richard E. Hawley, Commander, Air Combat Command, addressed Congress on the impact of the maintenance manpower drawdown and poor retention rates resulting from high ops tempo in the 1990s:

We have a very low-experienced force... lower retention means a shortage of five-level maintenance personnel, the journeymen technicians who should constitute the bulk of the workforce. That means too much of the maintenance work is being done by younger three-level personnel, who require more supervision and take longer to do a job.¹⁷

A 1998 congressional hearing heard testimony from Air Force Senior Master Sergeant David Rodriguez who detailed the problems in aircraft maintenance associated with ops tempo and reduced parts supply:

Operations tempo has greatly impacted the way we accomplish maintenance. We have to accomplish more maintenance in less time. Prior to every deployment to Southwest Asia (SWA), we spend a minimum of four months preparing the aircraft for the deployment... When deployments or vulnerability windows to deploy to SWA are six months apart, as they currently are, we have to accomplish a year's worth of maintenance in just eight months.... During Operational Readiness Exercises, all aircraft are made available for the flying schedule. This results in the SWA aircraft maintenance preparation coming to a complete halt. So, instead of having eight months to complete a year's worth of maintenance, you now have about six to seven months to complete it all. The increase in sorties required for pilots to remain mission ready has also impacted maintenance. In the past, we could launch just two launch windows in order to meet their requirement. Now we have to launch three missions in order to meet this new requirement and during one week out of the month we launch a fourth set of missions. This minimizes the amount of time we have to repair aircraft between missions. This in-turn causes us to use our 7-levels to fix problems as quickly as possible, and valuable experience for our 5-levels and training opportunity for the 3-levels is lost. We are asking for more and more from our personnel but we are not supplying them with the parts, equipment and the time necessary to gain experience

¹⁷ Otto Kreicher, "Hawley's Warning," *Air Force Magazine*, July 1999, 52.

needed to do their jobs.¹⁸

Similarly, significant research has concluded that the interplay of cost-savings initiatives in parts support, cuts in manpower, increased operations tempo, and inaccurate wholesale logistics forecasting methods were to blame for the reduced mission capability rates since 1991.¹⁹

The increasingly elderly fleet further compounded these detrimental effects. The indicators of these issues are found in several depot and fleet maintenance metrics. For example, the total amount of planned depot aircraft maintenance work increased by 41 percent between FY91 and FY06, from 350,000 hours to 594,000 hours. Likewise, the total amount of unplanned depot “over and above” work increased 47 percent during the same period, from 29 thousand hours to 56 thousand hours. Additionally, the mean time between maintenance actions in the field decreased 43 percent in this timeframe, from 40.2 minutes to 22.8 minutes. Similarly, maintenance man-hours per flying hour increased 50 percent from 9.4 hours to 14.1 hours. Not surprisingly, the average age of the total fleet increased by 42 percent during that period, from 16.9 years to 24 years.²⁰ These correlated declining depot and field maintenance metrics indicate the negative effects of fleet age on fleet

¹⁸ House, Statement prepared for House National Security Committee Readiness Hearings, 1st sess., 1998.

¹⁹ Maj Stacey T. Hawkins, “Logging The JSF: Acquisition Logistics and Fleet Management for Modern Fighters,” SAASS Thesis (Maxwell AFB, AL: School of Advanced Air and Space Studies, 2005), 45.

²⁰ AFTOC and AFKS/REMIS, Jan 07 in Mark D. Johnson, Deputy Chief of Staff for Logistics, Installations and Mission Support, Headquarters U.S. Air Force, Washington, D.C. AFMx21 Follow-on Strategy, staff briefing, 8 February 2007.

health during a high ops tempo context. RW most likely had a positive effect on the nascent expeditionary Air Force by increasing capability in individual mechanics and flexibility in maintenance units. This conclusion is supported by relevant data from Desert Storm, as well.

RW and Desert Storm. Marquez's RW theory was based on the idea of combat flexibility and capability. He was thinking more of combat in central Europe than he was about a fight in Kuwait. However, he realized R&M 2000 and RW could mean much more capability in much smaller forces. All R&M 2000 efforts were aimed at cost reductions in addition to increased capability and flexibility. The ultimate test, however, would be logistics results in combat. Marquez made an interesting prediction in 1987 when he said, "Our real salvation is to bring about the fruits of R&M 2000 and get the force structure to where it can support a force fully a third larger than we have now for the same dollars we are spending today."²¹ A short 3 years later, R&M 2000 would be put to the test in southwest Asia.

As the deployment of US forces commenced after Iraq's invasion of Kuwait, the limited bed down space in-theater became an issue. In September of 1990, USCENTAF Forward directed a limitation of the size of deploying forces' manpower saying, "Base populations continue to increase and every effort must be made to limit deploying populations."²² As the war progressed, a

²¹ Leo Marquez, End-of-Tour Report, January 1988, 5, K239.0512-2027 c.2, AFHRA.

²² *Gulf War Air Power Survey*, vol. III, *Logistics and Support*, (Washington, D.C.: Government Printing Office, 1993), 331.

perception developed amongst senior leadership that, “too many support personnel were in the theater” and the Air Power Survey authors sought to resolve the issue noting, “The narrative record is ambiguous: some interviews created the impression that the deploying forces deliberately minimized the number of personnel sent to the AOR. This would make sense considering the Commander-in-Chief Central Command's cap on the number of personnel permitted in the theater.”²³ The authors studied the manpower issue in great detail, and painstakingly examined the data from personnel system, OPLANS, and deployment records. Their goal was to answer the question surrounding the deployment by analyzing aircraft maintenance personnel specifically since they constituted the highest percentage deployed troops. They observed, “The evidence indicates that, in the absence of solid guidelines, the various headquarters and deploying units held down the number of maintenance personnel deploying sometimes deploying a considerably leaner force than they would have used for the same number of aircraft in the United States... The question is, did they?”²⁴ After completing their thorough analysis, the authors came to a remarkable conclusion. They found the number of deployed aircraft maintenance troops was significantly lower than Air Force plans called for. Specifically, they found a difference “of almost thirty-five percent” fewer troops than expected according to Air Force doctrine were responsible for generating the combat sorties in Desert Storm. They postulated:

²³ *Gulf War Air Power Survey*, 357.

²⁴ *Gulf War Air Power Survey*, 360.

Two answers are possible. Either the AFWMPRT data are grossly wrong, implying that the Air Force had no idea how many people were in the AOR, a damning indictment of its personnel systems, or the Air Force went to war on the eight bases with one-third fewer maintenance specialists than it thought it needed. If the latter possibility is accepted, the perception that more people were in the AOR than needed is contradicted by the results of this study.²⁵ (Emphasis in original)

They went on to conclude, “There is no evidence that too many maintenance personnel were in the AOR; in fact, the evidence... is that the Air Force went to war with one-third fewer personnel than it would have planned.”²⁶

This finding emerges as a remarkable validation of Marquez’s vision for R&M 2000 and RW. One possibility is the Air Force planning processes were based on pre-RW concepts that called for oversized planning in combat operations. This seems unlikely, however, in light of actual aircraft performance. RAND Research has determined deployed fighter MC rates were higher during Desert Storm than the Air Force expected. This fact is remarkable since, “except for the EF-111A and F-111E, *every deployed MDS experienced about twice as many Code 3 breaks per sortie during Desert Storm as the nondeployed units during Desert Shield.*” (Emphasis in original) The study concluded, “By all measures, overall [maintenance] support to Desert Storm units exceeded all expectations. Despite incredible increases in both aircrew-reported discrepancies and scheduled-maintenance workloads, MC rates hardly diminished.”²⁷

²⁵ *Gulf War Air Power Survey*, 362.

²⁶ *Gulf War Air Power Survey*, 363.

²⁷ Raymond A. Pyles and Hyman L. Shulman, *United States Fighter Support in Operation Desert Storm*, RAND Report MR-468-AF (Santa Monica, CA: RAND, 1995), 18.

This evidence indicates Air Force aircraft maintenance capability and flexibility was dramatically better than anyone imagined when it confronted a real-world test. A second possibility is R&M 2000 & RW increased aircraft maintenance capability and flexibility to such a degree as to fulfill Marquez's idea of "real salvation." With either possibility the fact of unanticipated combat capability remains. The Air Force had executed the most remarkable display of combat air and space power in history with a force one-third larger than its aircraft maintenance support was supposed to handle, a maintenance and logistics force shaped by Lt. Gen. Leo Marquez. In fact, the Gulf War Air Power Survey punctuated the remarkable story of undermanned deployed aircraft maintenance performance in the war by saying, "base-level maintenance capacity exceeded the demands generated by the Gulf conflict."²⁸

Both the Ammo and the Aircraft Maintenance performances in Desert Storm serve as important legacies of Marquez's leadership that reached far beyond his time in the Air Force. These legacies are certainly shared with a broad cast of subordinate leaders who turned the visions into realities, but Marquez demonstrably orchestrated the logistics processes and professionals in a way that prepared them for their ultimate expeditionary challenges in the Middle East years after his retirement. Operational successes in Desert Storm could easily outshine these positive legacies due to their highly visible nature, but the logistics team Marquez helped shape and develop delivered a kind of

²⁸ *Gulf War Air Power Survey*, 362.

invisible excellence. No mission failed because of logistics, and that is a remarkable achievement.

Maintenance under operations and back. One further operational question lingers within the logistics community that Marquez shaped and considered. Marquez was acutely aware of the U.S. Air Force's tendency to cycle back and forth between aircraft maintenance troops working for operations in the fighter or bomber squadrons, and maintenance working within a dedicated organization. The matter has always been a controversial one within the professional communities affected by either organizational design. Marquez saw the structure both ways during his career, and when asked about it, voiced very little personal preference on the question. He believed that the troops would make it happen regardless of the organizational structure, and that there were advantages and disadvantages to each system.

However, Marquez was far more concerned about the issue of grooming leaders appropriately within each organizational context. He noted that he had become an "accidental logistician" after starting his career as a pilot, but under the "maintenance works for maintenance" construct, most pilots did not get the opportunity to lead maintainers and other mission support troops until they were very high-ranking wing commanders. Marquez recalled "many pilots weren't getting that broad [beyond flying] leadership responsibility until they were two- or three-star generals. That's too late!"²⁹ Marquez did not believe the management of maintenance was an issue dependent on an organizational

²⁹ Lt Gen L. Marquez, interviewed by the author 22 Jan 2007.

chart, nor did he think the organizational structure affected enlisted leaders much day-to-day. However, he did believe that operator leaders needed leadership experience with logistics and maintenance decisions earlier in their careers. Marquez said he would never advocate for one side of the argument or the other, but rather advocated for developing pilots who had experience with enlisted troops and the complexities of maintenance. “Which group is going to make up the majority of your general officer corps? The pilots are, and you don’t want them facing complex maintenance issues and the issues specific to the enlisted corps too late in their career to know what they’re doing.”³⁰

Neither side of the “Ops-Maintenance” debate can claim Marquez as an advocate, but he was concerned about the type of leaders each system produced based on the leadership positions they might be destined to hold.

Not that Marquez would avoid a debate on the subject of what developed the best leadership experience. He was particularly passionate about leader development in maintenance and logistics. Marquez saw an advantage in maintenance leaders gaining experience within operational squadrons. The general principle he observed was vesting leaders at the lowest possible level with the authority and responsibility for management of the mission, coupled with a high degree of accountability within the unit. The Air Force has trended the other way, with centralized management initiatives that place funding and decision-making at bases far away from field units, along with the enduring cantonment of maintenance management outside of operational squadrons.

³⁰ Lt Gen L. Marquez, interviewed by the author 22 Jan 2007.

Marquez never specifically criticized these initiatives on the record, but in principle, he favored pushing authority, responsibility and accountability out and down to the lowest possible level, and opposed over-centralization that distances leaders from where the troops make the mission happen.



6. The Marquez Masterpiece

The requirement is for a spectrum of strategies that are flexible and noncommittal, a theory that by intent and design can be applied in unforeseen situations. Planning for uncertainty is not as dangerous as it might seem.... But planning for certitude is the greatest of all military mistakes.

- RADM J.C. Wylie, USN

People who are unused to or unfamiliar with air work are incapable of visioning what air power should be, of training the men necessary for work in the air, or of devising the equipment that they should have.

- BGen William "Billy" Mitchell

Theory's Strategic Implications. Lt Gen Leo Marquez promoted a theory of airpower. He didn't write this theory in an explicit treatise on airpower strategy, but his papers and speeches outline his theoretical ideas that coalesce to form an overarching theory. The precepts of theory include the idea of the logistics warrior, the elemental link between logistics and combat, the need to use the metaphorical "brain arrow" in problem solving, the importance of redundant capability, and the critical necessity to nurture logistics personnel.

His theory was founded on the premise of flexibility as airpower's key essential trait. He learned this principle as a fighter pilot where he trained to win aerial combat, a realm dependent on speed and flexibility. His theory recognized flexibility did not just happen on its own, nor was it a product of some fantastic magic. It took logistics, especially within air forces. As Winston Churchill once noted, "Strange as it may seem, the Air Force, except in the air,

is the least mobile of all the services.”³¹ As an aircraft maintenance officer, Marquez learned the truth of Churchill’s assertion. He saw airpower’s flexibility as a product of logistics processes. He knew that to produce combat airpower, “logistics” had to be a verb rather than a noun.

Combat logistics is distinct from traditional logistics in many ways, according to Marquez; therefore it requires warrior logisticians. He envisaged these warrior logisticians as master craftsmen, process engineers, supply chain managers, mechanics, and strategists who wield the weapon of their mind to plan, prepare, deliver, and sustain combat capability. Combat airpower requires combat logistics: a responsive and adaptive transformation of raw resources into combat airpower capability. According to Marquez’s theory, this transformation of resources forms the foundation of combat logistics, combat logistics forms the foundation of airpower’s flexibility, and airpower’s flexibility enables victory in combat. He metaphorically viewed combat logistics as the jawbone supporting the teeth and fangs of combat airpower.

This theory helps explain the strategic role of airpower logistics. Modern airpower theory can benefit from Marquez’s theory of combat logistics by recognizing the strategic linkage between raw resources, combat capability, operational tasks, and strategic objectives. All of strategy demands an intimate link between the material and operations in warfare, and this is especially so for air forces. Modern logisticians and airpower strategists can expand their

³¹ Air Force Logistics Management Agency, *Quotes for the Air Force Logician*, Maxwell AFB, Alabama (September 2001), 26.

understanding of the relationship between operations and logistics through an analytic synthesis of Marquez's theory with contemporary strategic thought on airpower. The product of this theoretical synthesis links the essential elements of combat logistics with the operational effects of airpower.

The contemporary strategic concept of effects-based operations (EBO) emerged from the highly successful air campaign in Desert Storm. In 2001 then Brigadier General David A. Deptula described the origin of the concept: "The design of the air campaign grew out of a mindset questioning how to impose force against enemy systems to achieve specific effects that would contribute directly to the military and political objectives of the Coalition."³² In other words, airpower should be closely tailored to create effects that support American strategy. This concept of EBO is further described by the erstwhile Joint Warfighting Center as, "Effects are derived from objectives. They help bridge the gap between objectives and tasks by describing the conditions that need to be established or avoided within the operational environment to achieve the desired end state."³³ One can visualize this strategic concept in the illustration below:

³² Brig Gen David A. Deptula, *Effects-Based Operations: Change in the Nature of Warfare*, (Arlington, VA: Aerospace Education Foundation, 2001), 14.

³³ *Commander's Handbook for an Effects-Based Approach to Joint Operations*, Joint Warfighting Center, US Joint Forces Command, 24 February 2006, III-5.



Figure 11. Effects-Based Operations

Source: Dale Shoupe, 505th Air Command and Control Wing, “Air Operations Center Operational Assessment,” SAASS AOC Senior Staff Course briefing, March 2007

According to Marquez’s theory of combat logistics, the tasks of airpower are derivatives of the combat capability provided by logistics. In this sense, combat logistics synthesizes a variety of techniques, sciences, and processes to transform resources into combat capability. This synthesis includes concepts of ability, including reliability, maintainability, supportability, and sustainability, to effectively design and execute the resource transformation process. Similar to the way operational effects bridge the gap between operational tasks and objectives, these combat logistics processes deliver capability: a bridging of the gap between resources and operational tasks. One can therefore term Marquez’s theory as one of capability-based logistics (CBL). This relationship can be visualized in the illustration below:



Figure 12. Capability-Based Logistics

Source: Author's original adaptation

This representation is not meant to be an all-inclusive description of the necessary components of capability, but rather a graphic description of the relationship between resources, tasks, and objectives. When one unifies EBO theory with CBL theory, a clear illustration of Marquez's idea of combat logistics emerges:



Figure 13. Integrated EBO and CBL Theory

Source: Author's original adaptation

In this construct, operations warriors execute operational tasks to generate the desired effects that yield the commander's objectives. The construct is a derivative of the combat logistics process where logistics warriors transform raw resources into desired capabilities to enable operational tasks. Based on this theory, Marquez dedicated his efforts to building the logistics warrior mindset, training airpower's logistics warriors, and improving the

processes for acquiring, sustaining, and deploying under the stress of combat. Marquez understood how pilots, trained in peacetime, nonetheless deliver combat effects in war. He took that concept and developed professional warriors who deliver combat logistics capability in war.

This construct explicitly links raw resources with strategic objectives. It demonstrates that logistics and operations are indivisible in the world of strategy. The relationship might seem intuitive, but the airpower strategist must carefully consider the implications of this relationship more than ever as resources decline while global security commitments persist. Stephen Biddle noted in his examination of victory and defeat in modern battle how, “The importance of materiel preponderance has been exaggerated, and the role of variations in the use of that materiel has been underappreciated.”³⁴ Resource superiority is not as important as transformation and employment superiority in the form of precisely executed combat logistics processes.

As resources decline, logistics processes become more important. US airpower strategy in the past often operated with relatively unconstrained resources when compared to potential adversaries. As resource constraints become an increasingly important strategic reality, airpower strategists must reach for Marquez’s proverbial “brain arrow” to achieve strategic objectives in resource-constrained contexts. The fact is the “dollar arrow” might not be available as a strategic option in the future and strategists must include

³⁴ Stephen Biddle, *Military Power: Explaining Victory and Defeat in Modern Battle*. New Jersey: Princeton University Press, 2004, 195.

combat logistics in resource considerations. Modern airpower strategy must explicitly connect combat logistics, combat operations, and strategic objectives to avoid wasted effort while creating the capability for success. The time-honored principle of war, “Economy of Force,” demands nothing less in transforming resources to capability at the heart of combat force generation.³⁵

Marquez understood the truth of Admiral J.C. Wylie’s assertion about the requirement for a spectrum of flexible strategies. He knew the nature of war required strategic readiness for uncertain combat conditions. That nature is an important distinction between civilian and combat logistics. Commercial logistics seeks efficiency in order to keep costs down and remain competitive in the marketplace. Combat logistics is certainly interested in efficiency and lower costs, but must be more concerned with maintaining the measure of capability necessary to meet unanticipated requirements in unforeseen situations.³⁶ Commercial logistics processes seek to be lean by eliminating excess capacity to reduce costs, whereas combat logistics processes should build as much excess capability as required to gain and maintain combat flexibility. However, Marquez also understood that excess capacity must be carefully engineered for specific strategic purposes. Though combat logistics processes are different from their commercial counterparts, cost is still an

³⁵ Wade, Norman, *The Sustainment & Multifunctional Logistician's Smartbook: Warfighter's Guide to Logistics, Personnel Services, & Health Services Support*. Lightning Press, 2013, 33.

³⁶ Magruder, Carter, *Recurring Logistic Problems as I Have Observed Them*. Center of Military History, United States Army, 1991, 93.

essential consideration, both in dollars and in lives, and has been for ages.³⁷ The Marquez theory recognizes that demand forecasting in combat logistics is exactly the same thing as strategic vision, and when resources are unconstrained, strategy gets sloppy due to the human proclivity to reach for the “dollar arrow”.

Marquez’s logistics warrior builds processes to transform resources into capability that is flexible enough to respond to warfare’s unforeseen demands, as demand forecasts are notoriously unreliable in war.³⁸ Marquez resisted inflexible “Fortress Bitburg” logistics. He believed the logistics warrior must think about that which is seen as well as that which is uncertain, and military history is replete with the consequences of mistaking assumptions for facts.³⁹ As Wylie well described, “Planning for uncertainty is not as dangerous as it might seem.... But planning for certitude is the greatest of all military mistakes.”⁴⁰ The current defense construct makes divisible something that is not—logistics resourcing and strategy. That reality necessitated several shifts in thinking about logistics throughout the history of war. The G-N reformation took many lessons from American military history into consideration, but

³⁷ Engels, Donald, *Alexander the Great and the Logistics of the Macedonian Army*. University of California, 1980, 110-128.

³⁸ Henderson, James, *Military Logistics Made Easy: Concept, Theory, and Execution*. AuthorHouse, 2008, 88-90.

³⁹ McGee, William L. *Amphibious Operations in the South Pacific in World War II*. BMC Publications, 2000, 433. and Pagonis, William G., and Jeffrey L. Cruikshank, *Moving Mountains: Lessons in Leadership and Logistics from the Gulf War*. Harvard Business School Press, 1992, 193.

⁴⁰ RADM J.C. Wylie, *Military Strategy* (Annapolis, MD: Naval Institute Press, 1989), 72.

notably, and perhaps understandably, left some critical logistics lessons on the table.

Logistics and War in History. Martin Van Creveld, a leading scholar on logistics in war, notes that “hundreds of books on strategy and tactics [in war] have been written for every one on logistics.” Even at that under-representative rate, Van Creveld notes that the scholarship is pretty thin, “even the relatively few authors who have bothered to investigate this relatively unexciting aspect of war have usually done so on the basis of a few preconceived ideas rather than on a careful examination of the evidence.” Van Creveld notes the organization the historical development of military logistics in three periods.⁴¹ Magazine-feeding, predatory warfare, and the systemic continuous resupply of armies from a base, notably beginning in 1870 along with the Industrial Revolution’s advances in both requirements and capabilities.⁴²

However, Van Creveld argues that these classic categories do not represent the evidence well. In his examination of the evidence, he concludes that while the means of logistics have changed with new mechanical technologies, the translation of supply to fighting power has not followed these neatly arranged categories. More importantly, Van Creveld notes that the fundamental basis of logistics success in the history of warfare is meeting ever-elusive requirements. Past wars demonstrate that the means of logistics do not compensate for complexity, variation and real-world friction in defining and

⁴¹ K.G. Ruppenthal, *Logistical Support of the Armies* (Washington, DC, 1953), 280-288.

⁴² Martin Van Creveld, *Supplying War: Logistics from Wallenstein to Patton*, 2004; New York, NY: Cambridge University Press, p. 231-232.

meeting combat requirements. “To work out this [requirement] with its thousands of component parts in theory...is almost an impossible task.” As a result, “most armies seem to have prepared their campaigns as best they could on an *ad hoc* basis....”⁴³

Van Creveld goes on to conclude that Allied centralized planning for resourcing war in World War II was not to credit for victory, but rather adaptability to meeting operational requirements. “Consequently, it would hardly be an exaggeration to say that victories of the Allies...were due as much to their disregard for the preconceived logistic plans....it was the willingness – or lack of it – to override the plans, to improvise and take risks, that determined the outcome.”⁴⁴ While Van Creveld’s examination touches primarily on the tactical and operational contributions of logistics to the outcome, the principle emerges that the more distant the planning from the requirements, the less relevant the planning becomes. That principle reveals part of the problem with the separation of warfighting and resourcing at the strategic level. Despite modernization and advanced technology, any war resourcing effort is only as good as the relevance of the requirements that system seeks to meet.⁴⁵

⁴³ Martin Van Creveld, *Supplying War: Logistics from Wallenstein to Patton*, 2004; New York, NY: Cambridge University Press, p. 236.

⁴⁴ Martin Van Creveld, *Supplying War: Logistics from Wallenstein to Patton*, 2004; New York, NY: Cambridge University Press, p. 236-237.

⁴⁵ Matching plans to requirements is so elusive in warfare’s history that the process itself is often repeated multiple times as requirements change, and World War II was no exception; see Frederick Morgan, *Overture to Overlord*, 1950; London, UK, p. 282-283.

Legislating Resource Isolation. Perhaps the most significant implication from Marquez's strategic theory emerges from the re-evaluation of a legislative effort just underway upon the eve of Marquez's retirement from the Air Force. The Goldwater-Nichols Defense Reorganization Act of 1986 promised to unify the Joint U.S. Armed Services in new ways to promote an improved American way of war.⁴⁶ Although Marquez's experience was primarily in the U.S. Air Force, far from the higher-echelon debates about "jointness," his theory of logistics offers a crucial element that was missing in America's defense transformation through Goldwater-Nichols (G-N). Lessons from his experience and ideas have new bearing in light of nearly 30 years of G-N implementation. The corollary implications of Marquez's airpower theories with respect to Joint logistics are perhaps nuanced enough to have eluded evaluation during G-N's establishment and implementation, but they are exceptionally vital to the future of joint military operations. Those important subtleties are directly related to Marquez's "Brain Arrow" observation and his exhortation to link intimately the resourcing and the fighting of war. If it is true that modern airpower strategy must explicitly connect combat logistics, operations, and objectives to avoid wasted effort, then it is also true for joint military operations in any environment. In the case of G-N and America's strategic future, the fiscal environment may become the most important consideration of all.

⁴⁶ James R. Locher III, *Victory on the Potomac: The Goldwater-Nichols Act Unifies the Pentagon* (2002; repr. College Station, TX: Texas A&M University Press, 2007).

For many experts, the primary issue G-N addressed was the unified command over service components' forces in combat⁴⁷ But observers, including the architects of the legislation, also believe there is more to accomplish in transforming the U.S. defense establishment in order to achieve an ongoing advantage in grand strategy.⁴⁸ Marquez's ideas point to logistic reforms as one fertile field for improvement.

Two Sides of the Equation. If issues of unity of command and joint component cohesion on the battlefield remain unresolved for some, from another angle the virtual wall of separation G.N. creates between those who fight our nation's wars and those who resource them remains a stark limit and outright weakness in the American way of war. In essence, G.N., by separating via law those who make war and those who supply war, make divisible something that is not. While the subject of unified command over forces in the field and how those forces plan and execute operations is undoubtedly the "sexy" side of G-N matters, the resource and logistics issues are more substantive and consequential. This of course is hardly a new condition in military strategy:

Antoine Henri Jomini erected a theory of the art of war upon the trinity—strategy, grand tactics, and logistics.... Jomini's attention was mainly captured by the latest improvements in artillery, particularly by a new "steam" gun that seemed to hold horrendous promise. A far more portentous phenomenon, steam-propelled rail transport, he dismissed as an instrument of peace only, although five years earlier a French general had declared in the Chamber of Deputies that the strategic use of

⁴⁷ Bernard E. Trainor, "Jointness, Service Culture, and the Gulf War," *Joint Forces Quarterly* 3 (Winter 1993-94): 74.

⁴⁸ Locher, *Victory on the Potomac*, 448.

railways would cause a revolution in military science, and across the Rhine Friedrich List was trying hard to impress the same point on his countrymen.⁴⁹

The consequences of this propensity for strategists to focus on the operational side of military affairs have gained significance over time. Since the start of the industrial age, increased use of technology, larger fighting forces, and the role of mobility in warfare have all magnified the centrality of logistics in war. At some point in history, the importance of logistics began to close in on the importance of operational art, such that negligence of the former might nullify any potential brilliance of the latter. Some strategists had to learn the hard way of the transformational effects that logistics would have on yesterday's battlefields where, according to historian Richard Leighton,

The new juggernaut armies' voracious appetite for food, fuel, and munitions dictated a basic change in the method of supply. From the earliest times the swiftly moving, hard-hitting, self-contained force, living off the country and a lean baggage train, had been the dream of every commander. In the hands of Hannibal, Xenophon, Subotai, Gustavus, Marlborough, Napoleon, Jackson, and Sherman, such forces had performed spectacular exploits. When armies became chained to depots and their trains grew heavy and sluggish, as happened in some of the wars of the eighteenth century, warfare itself became a mere appendage of logistics in which, as Frederick the Great is said to have observed, 'the masterpiece of a skillful general is to starve his enemy.'⁵⁰

If it is true that warfare has become an appendage of logistics, then to maintain a myopic focus on the operational expression of warfare is to miss out completely on the nature of the enterprise. This myopia is precisely the issue

⁴⁹ Leighton, Richard. *Global Logistics and Strategy*, Vol. I. 1940 - 1943 (US Army Green Books) p. 29.

⁵⁰ Leighton, Richard. *Global Logistics and Strategy*, Vol. I. 1940 - 1943 (US Army Green Books) p. 30.

that Marquez observed in his theory, and his intent was to make “logistics” congruent with “combat” in all senses of meaning. His theory also has bearing upon the resource acquisition side of logistics, which is naturally part of the logistics enterprise. Marquez recognized that overspecialization, the bias toward operational tasks and effects, and a view of logistics as adjunct to warfighting were poison to the modern strategist.

Marquez’s discernment about these weaknesses in strategic thinking coalesced around the troubling omission of logistics principles in popular classic works on military strategy. He was very fond of the master strategist, Karl von Clausewitz, and studied his work with devotion throughout his career. He was, however, also acutely aware that “Clausewitz did not even use the term ‘logistics’... [He] was well aware that certain activities, notably ‘marches, camps and quarters’ and subsistence, sometimes exerted a decisive influence on the outcome of battles and campaigns, but he dismissed them as irrelevant to his discussion.”⁵¹ This absence of strategic logistics strategic theory was the kind of thinking that Marquez spent the latter half of his career contending with professionally and developing in his own personal thinking.⁵²

The fundamental premise of G-N with respect to logistics is that “warfighting” and “resourcing” are distinct and not only can be separated, but should be. G-N legislation directs such a separation by creating unified commands designated to fight the nation’s wars with units supplied by service

⁵¹ Leighton, Richard. *Global Logistics and Strategy*, Vol. I. 1940 - 1943 (US Army Green Books, 1995) p. 36.

⁵² Lt Gen L. Marquez, interviewed by the author 23 Jan 2007.

components. From a battlefield perspective, this may sound like a good idea, but from a material perspective it is at best a sentimental notion and at worst a luxury enjoyed by only the most resource-rich nations in the world. This point is precisely what Marquez saw in his experience in Canada, where the relatively resource-poor Canadian forces were forced to think their way through problems because they lacked the resources to simply throw at whatever issue arose.

Certainly Marquez understood scarcity growing up on a farm. In his youth, Marquez did not see operating the dairy farm as distinct from resourcing it, and he intuitively understood that any attempt at separating those two functions at any level would be nonsense and dangerous. A farmer needed to be a jack-of-all-trades, but Marquez also learned the intricate linkage between requirements, procurement, and operations from his farm experience. He saw first-hand the relationship between the capacity-building Case bailer and the resulting dairy output, for example, and that microcosmic perspective developed his vision on the relationship between operations and logistics.

Marquez's resulting thoughts and theory on the issue directly contribute to an enlightened understanding of G-N from a resource perspective. By separating through legal artifice those who fight wars in unified commands and those who resource those wars, the G-N construct faces strategic perils as resources become more constrained in the future. In a defense establishment with nearly limitless resources, the G-N construct may stand up to scrutiny,

but in the emerging resource-constrained environment, understanding the strategic effect of this artificial separation is vital.

This issue did come up during the original G-N debate, but the preeminence of the “warfighter” idea seems to have won out:

A minority view urges increased authority for combatant commanders through a greater resource allocation role. Not wanting to divert these commands from their principal war-fighting function, Congress intended that the JCS chairman and joint staff would represent their resource needs. To many, this approach continued to remain preferable to schemes that would require greater involvement by the commands.... JCS Chairman General Henry H. Shelton agreed, “More involvement by the combatant commanders in resourcing would not be healthy. We want to keep them focused on war-fighting.”⁵³

General Shelton’s sentiment may echo with virtuous tone, but the artificiality necessary to divide war-fight from war-resource is exactly what Marquez’s theory exposes. Napoleon Bonaparte certainly proved the crushing consequences of “losing the battle with logistics” during his Russian campaign in 1812, even as he focused on warfighting.⁵⁴ Marquez’s theory illustrates that the effects in battlespace operations are simply not possible without the transformation of resources necessary to accomplish operational tasks. By limiting unified commanders’ focus to the tasks, the G-N Act puts mission accomplishment at risk at several operational and even strategic levels, creating a dependency on a very large quantity and diverse nature of available resources.

⁵³ Locher, *Victory on the Potomac*, 441.

⁵⁴ Robert Harvey, *The War of Wars: The Great European Conflict, 1793-1815* (New York: Carroll and Graf Publishers, 2006), 641, 642.

To determine what “healthy,” might look like (to borrow General Shelton’s term), Marquez’s theory presents enduring principles relating to the current state of joint logistics and national strategy. The entirety of the issue may be difficult for strategists to recognize simply because our military culture obliges us to think about task execution first and resource allocation later.⁵⁵

Strategists today may take for granted the “backstage” contribution of resources to battlefield success, but future resource constraints will likely challenge missions to a degree that contemporary military professionals have not seen in generations. Historically, such thinking did not always hold sway with respect to the U.S. military. Lessons learned from World War I inspired strategists at the dawn of World War II to realize that forcing the separation of resourcing from operations would be like forcing separation between operations and intelligence:

Strategic planning and direction, if it were to be aggressive and imaginative, must not become shackled to the judgments of [centralized] experts...This was the danger, the Joint Planners feared, in any attempt to create a separate logistical planning committee to advise the JCS directly. In any given situation, they held, the range of alternatives was broader and more flexible than any statistical computation of available troops, materiel, and shipping would indicate.⁵⁶

Perhaps the most important note in that examination is the recognition of resources as a strategic element indivisible from operations at all levels of strategy. A division of resourcing from warfighting was recognized as a

⁵⁵ Don M. Snider, “Jointness, Defense Transformation, and the Need for a New Joint Warfare Profession,” *Parameters* XXXIII, no. 3 (Autumn 2003): 17-30.

⁵⁶ Robert Harvey, *The War of Wars: The Great European Conflict, 1793-1815* (New York: Carroll and Graf Publishers, 2006), 641, 642.

fundamental artificiality that jeopardized the mission. The commodity of intelligence deals with the two-way flow of information from the tactical to the strategic level and vice-versa, but the same flow of information with respect to resource requirements and availability was necessary to create mission-ready capability, where:

Strategic planners had to consult the logistical experts, much as they consulted the intelligence experts, in order to obtain factual data bearing on the situation. From these data they should draw their own conclusions, weighing in the balance not merely logistical limitations but also the state of organization and training, the enemy's capabilities, the pressure of strategic necessity, and other pertinent factors.⁵⁷

Marquez's theory suggests linking again the resourcing and fighting of wars up and down the chain of command. G-N reforms created a strategic liability by legislating an artificial resource-war fighting divide. According to Marquez's way of thinking, the only way to mitigate that strategic liability is to rely upon an excessively large excess resource capacity at great expense. By compensating for the negative aspects of the nature of the Services, the G-N Act created an unnecessarily wasteful and expensive system. At the very least, Marquez's theory should challenge us to consider how our current defense organization obliges us to reach for the "dollar arrow" in unexpected and often unrecognized ways.

Precision in Thinking. The reasons for the G-N reform are clear and understandable. James R. Locher III was a professional staffer for the Senate

⁵⁷ Leighton, Richard. *Global Logistics and Strategy*, Vol. I. 1940 - 1943 (US Army Green Books, 1995) p. 58. Emphasis added.

Committee on Armed Services who drafted the G-N Reorganization Act of 1986 and has written and spoken extensively about the discourse that led to the legislation. According to him, the genesis of Goldwater-Nichols rooted deep:

The Army and the Navy were not able to solve their differences during World War II. Afterward, Congress settled the dispute in terms broadly favorable to the Navy's concepts—ones that preserved Navy and Marine Corps independence more than they met the requirements of modern warfare. Despite repeated operational setbacks over the next forty years, subsequent reorganization efforts offered only slight improvements. Such was the setting for the mid-1980s battle that produced [G-N].⁵⁸

The imperative to improve systems for operational and tactical joint force employment was clear: "The Pentagon badly needed reform. The military bureaucracy had tied itself in knots since World War II and lost outright the Vietnam conflict and three lesser engagements: the USS Pueblo seizure, the Desert One Raid, and the peacekeeping operation in Beirut."⁵⁹

When General David Jones, the Chairman of the Joint Chiefs of Staff (CJCS) testified before Congress on 3 February 1982, his remarks launched a movement that would constitute the largest reform effort of the Pentagon since the establishment of the Department of Defense. He said, "The system is broken. I have tried to reform it from inside, but I cannot. Congress is going to have to mandate necessary reforms."⁶⁰ The opposition inside the Pentagon was powerful, and it took years for the necessary momentum to build and Congress to act. In 1985, Admiral William Crowe became CJCS and embraced

⁵⁸ James R. Locher III, "Has It Worked? The Goldwater-Nichols Reorganization Act", *Naval War College Review*, Autumn 2001, Vol. LIV, No. 4, Naval War College, Newport, Rhode Island

⁵⁹ Locher, *Victory on the Potomac*, 4.

⁶⁰ Locher, *Has It Worked?*, 101.

Congress's effort to legislate reform. "The Pentagon's official position in opposition constrained his public efforts," Locher recalled, "but behind the scenes Admiral Crowe pushed for reorganization. In 1986, these factors led the Senate and House to enact sweeping reforms despite the continued opposition of the Pentagon."⁶¹

The obstacles to meaningful reform in this context were formidable. In order to approach the necessary changes to the defense establishment, and "to balance joint and service interests," Congress designated nine specific purposes for the G-N Act:

...[1] strengthen civilian authority; [2] improve military advice; [3] place clear responsibility on combatant commanders for accomplishment of assigned missions; [4] ensure that the authority of combatant commanders is commensurate with their responsibility; [5] increase attention to strategy formulation and contingency planning; [6] provide for the more efficient use of resources; [7] improve joint officer management; [8] enhance the effectiveness of military operations; [9] and improve DOD management.⁶²

In many ways, the desired improvements directly addressed imprecisions created by the old organizational structure. The Services were insular and did their respective tasks well enough, but when joint action was called for, they were unable to create the linkages necessary to work together. There was a Service-specific myopia that clouded joint vision.

The Joint Chiefs collectively and the service chiefs individually were not in the operational chain of command; nonetheless, the JCS often acted as if it were part of the chain, and individual chiefs played operational roles when the unified commanders involved were from their respective

⁶¹ Locher, *Has It Worked?*, 102.

⁶² Locher, *Victory on the Potomac*, 437.

services. Chains of command within a unified command were obstructed by what came to be called “the wall of the component.”⁶³

The need for breaching that “wall” was understandable, and clearly the G-N reforms addressed many of these improvements directly. Yet while a new level of precision in joint operational thinking resulted from the G-N Act, according to Locher,

The effect of Goldwater-Nichols with respect to more efficient use of resources has been barely acceptable, if that—a grade of D... the services continue to fund Cold War systems, cannot seem to break their attachment to them, and the Joint Requirements Oversight Council has rubber-stamped the services’ choices... the inability of the defense establishment to make some fundamental decisions has squandered the post-Cold War period.⁶⁴

This self-critique represents a manifestation of what Marquez saw during his career. The institutional proclivities toward procurement of big-dollar systems has continued and in many ways accelerated. Though G-N replaced the “wall of the component” with legislated joint emphasis, in many ways the law built even higher the wall between logistics and warriors, a philosophy antithetical to Marquez’s vision and theory.

Under G-N, the Services retained the powers of procurement in order to shield the warfighters from the need to think about anything but fighting wars. The question is whether that wall is appropriate, or even whether fighting a war can be viewed as distinct from resourcing the fight. Marquez’s theory suggests otherwise, affirming that the war fighting discipline by definition includes the disciplines of resourcing and logistics. While the latter disciplines are adjunct

⁶³ Locher, *Has It Worked?*, 104.

⁶⁴ Locher, *Has It Worked?*, 111-112.

in many ways to the conduct of fighting, they may well prove more proximate to the outcome of war than operational art. Excellence in fighting wins battles, but excellence in logistics wins wars.

Marquez's experience certainly provided him examples of that principle in places like Vietnam, Canada, and in the Pentagon. The first example emerges from the luxury that resource-richness offers to the military enterprise. America has enjoyed a half-century leading the world in defense spending, by some estimates more than many other world countries' spending combined.⁶⁵ That kind of resource-richness is an unimaginable advantage in national defense, but to Marquez's way of thinking, it erodes the metaphorical "brain arrow" in providing far too many "dollar arrows." Fundamentally, G-N or any other reform would have to address this overriding tendency toward monetary solutions over intellectually creative ones directly and beyond mere budget cuts. A new precision in military thinking is certainly called for, but the wall of separation that G-N erected does little to address this phenomenon and in fact promotes the problem.

A review of the current state of joint logistics reveals the profound extent of this strategic challenge. What G-N crafted in the name of strengthened civilian control of the military and unified command has left us with a resourcing legacy that remains ineffectual in driving efficient and effective material solutions. As long as a wall of separation insulates the Services from

⁶⁵ Data from Stockholm International Peace Research Institute, *SIPRI Military Expenditure Database*, 2013, concluded that the USA spent more on defense in 2012 than the next ten countries combined. Compiled by Peter G. Peterson Foundation at pgpf.org

unified command realities, it will be exceedingly difficult to dislodge the supremacy of “dollar arrow” thinking. The options for dealing with the problem include repeal of G-N reforms to return to the Service-driven status quo, or further refining G-N reforms with respect to resourcing wars in recognition of post-G-N operational successes. Nothing in Marquez’s theory suggests that a call for complete repeal of G-N is necessary at the operational level. Therefore, the following analysis assumes that G-N has been successful in reforming the Services’ role in operations. The way forward, then, is further reform of G-N to effectively restore the proper relationship between warfighting and logistics. Credit is certainly due to G-N reforms, and Marquez’s theory does not necessarily address the entire national defense enterprise, but the implications of his theory reach across warfare’s supply chain.

Critics might object to further strengthening CoComs by giving them any new budgetary authority. Unified commanders may have already become too influential in their roles that now eclipse their civilian diplomatic counterparts. This and other critiques of the status quo are worth reasonable consideration, but the issues created by G-N with respect to resources remain unresolved. The amount of power vested in the Unified commanders truly reveals an over-engineered construct that eclipses civilian regional influence, the inherent offset imprecisions of the G-N construct. The implications are vast, from the sheer enormity of the regions included under a single combatant command to the absurdly drawn lines of responsibility around dynamic regional security threats (i.e. India and Pakistan). If Unified commanders are deemed too

powerful from the civilian-military perspective, then the number of Unified commands could be scaled up as their regional responsibilities are scaled down in order to add precision to the system while mitigating military power. Future reforms should address fundamental issues with the Unified commands and their respective sway, but those solutions are outside the scope of Marquez's theory. Marquez said nothing of what to do about overly ambitious strategic and operational *reach* within the context of his theory. What Marquez does provide is insight on strategic and operational *grasp* when matching resources to the mission. This aspect of the status quo of G-N is a vital element to national strategy that deserves considerable attention in future reforms because the resources available will likely diminish. The problem of resource constraint is becoming more acute, as evidenced by sequestration and other budget-cutting initiatives. Marquez's theory calls upon strategists to increase their intellectual precision when it comes to resources and warfighting, and the fundamental relationships legislated into existence by past reforms that did not anticipate modern constraints or the resource precision those constraints demand.

The Status Is Not Quo. The G-N defense reform act created a system of distinct "warfighters" and supporting Services. The Services are designated to organize, train and equip (OT&E) forces, and Unified Combatant Commands (COCOMs) assume control of those forces in the conduct of war, combat operations, or low-intensity conflict/humanitarian operations (among other mission sets). Joint doctrine defines the unified commands as organizations

with broad missions under a single commander, composed of Service components, established by the President through the Secretary of Defense (SecDef), with the advice of the Chairman of the Joint Chiefs of Staff.⁶⁶

The military Services each provide the unified commanders with assigned forces for the conduct of operations in the form of Service component commands. A Service component command consists of the Service component commander and the Service's forces such as individuals, units, detachments, and organizations that have been assigned to the commander. Services conduct their "organize, train, and equip" functions in a steady state, while the unified commands exercise authority under Secretary of Defense direction to order the Service components to conduct operations. This authority includes those functions of command "involving organizing and employing commands and forces, assigning tasks, designating objectives, and giving direction over all aspects of military operations, joint training and logistics necessary to accomplish the missions assigned to the command."⁶⁷

The "logistics" portion of that authority only deals with the logistics of mission execution. In essence, the Services determine the form and function of the materiel that they bring to the fight, and once the fight (or operation) begins, the unified commanders are responsible for the logistics in the fight. The responsibility ultimately still falls to the Service components to perform the tasks necessary to fulfill logistics requirements, but the unified commanders

⁶⁶ Joint Publication (JP) 1, *Doctrine for the Armed Forces of the United States*, 25 March 2013.

⁶⁷ Joint Publication (JP) 1, *Doctrine for the Armed Forces of the United States*, 25 March 2013, IV-7.

have their own logistics staff (J-4 or CJ-4) who direct Service component logistics, including logistics support of other Services in the joint force.

Joint doctrine defines joint logistics as “the coordinated use, synchronization, and sharing of two or more Military Departments’ logistics resources to support the joint force.”⁶⁸ This definition denotes those logistics resources that the Services have already brought to the fight, and whatever enterprise logistics resources available at any time in the theater. This broader context of joint logistics resources supports operations through the Service components and is referred to as the joint logistics enterprise (JLEnt).

According to doctrine, the JLEnt

projects and sustains a logistically ready joint force by leveraging Department of Defense, interagency, nongovernmental agencies, multinational, and industrial resources. The identification of established coordination frameworks, agreements, and other connections creates an efficient and effective logistic network to support the mission.⁶⁹

Although this is a potentially broad network of resources in some cases, it can be a meager collection in austere environments. In either case, “the joint logistics environment is the sum of conditions and circumstances that affect logistics.”⁷⁰ Once again, the “sum” referred to in this definition is limited to the summation of all resources brought to the fight by the Services. It does not include precursory policies, trade-offs or programmatic decisions that the Services undertook that led to the resource status quo, where “Service

⁶⁸ Joint Publication (JP) 4-0, *Joint Logistics*, 16 October 2013, I-2.

⁶⁹ Joint Publication (JP) 4-0, *Joint Logistics*, 16 October 2013, I-7.

⁷⁰ Joint Publication (JP) 4-0, *Joint Logistics*, 16 October 2013, I-8.

components...provide the expertise while the Joint Force Commander's staff focuses on integrating the *capabilities* with operations.”⁷¹ The nature of those capabilities is pre-determined by the Service components through the Joint Capabilities Integration and Development System (JCIDS) long before operations commence.⁷² The unified commands state their requirements for those capabilities, but that process still depends on the Services to independently recognize and deliver those capabilities.

The Joint Requirements Oversight Council (JROC) validates capability requirements through the JCIDS process. The JROC has “advisory responsibilities to the Chairman of the Joint Chiefs of Staff in identifying, assessing, validating, and prioritizing joint military capability requirements.”⁷³ JCIDS defines and coordinates with the Services to create capability batches referred to as Joint Capability Areas (JCA). These JCAs are effects-based definitions that govern missions or Service commitments to Joint missions. Together the collection of JCAs serve to prioritize programming inputs for DOD the Planning, Programming, Budgeting, and Execution (PPBE) processes.

The JCAs are portfolios of similar defense capabilities that drive procurement and investment decisions and operational planning. The intent of this process is to solidify both the joint nature of requirements oversight in the

⁷¹ Joint Publication (JP) 4-0, *Joint Logistics*, 16 October 2013, I-2, I-4. Emphasis added.

⁷² Davis, M. Thomas, *The JROC: Doing What? Going Where?*, National Security Studies Quarterly, Summer 1998, p. 22.

⁷³ CJCS Instruction 3170.01H, *Joint Capabilities Integration and Development System*, 10 January 2012

development of systems and budgets, and to affirm civilian oversight of defense requirement validation. Toward those ends, the Vice Chairman of the Joint Chiefs of Staff serves as the JROC Chairman, which is a role that analysts have called “one of the most critical developments in the budgetary area” of G-N.⁷⁴ Several senior DOD leaders also participate as advisors to the JROC. The Under Secretary of Defense for Acquisition, Technology, and Logistics, the Under Secretary of Defense (Comptroller), and the Under Secretary of Defense for Policy are included in order to provide their advice based on specific expertise throughout the JCIDS process. G-N authors would argue that this process is the bridge between fighters and resources, but it ultimately fails to account for the implacably insulated nature of the Services and their self-interested relationships with the unified commands.

The desired outcomes of this process include a joint input to the CJCS in “preparing strategic plans and related joint logistic and mobility plans that conform to resource levels projected to be available [and] performing net assessments of the Armed Forces of the United States and its allies as compared with those of potential adversaries”⁷⁵ while avoiding wasteful duplication of capabilities among the Services. The process incorporates direct input from the unified commands via integrated priority lists (IPLs) the commanders prepare for the CJCS to report to Congress regarding joint

⁷⁴ Lederman, Gordon Nathaniel. *Reorganizing the Joint Chiefs of Staff: The Goldwater-Nichols Act of 1986*. Westport, CT: Greenwood Press, 1999, 119.

⁷⁵ CJCS Instruction 5123.01F, *Charter of the Joint Requirements Oversight Council*, 10 January 2012

requirements and any anticipated shortfalls. The CJCS “provides an assessment of the IPLs and a description of the extent to which the most recent future-years defense program addresses the requirements on the consolidated lists; and a description of the funding proposed in the President’s budget to address each deficiency.”⁷⁶

This process adds a deep joint dimension to defense requirements, capabilities, and spending. However, the “dollar arrow” has only grown in prominence as defense spending has continued to grow. For example, U.S. defense spending in 1999 totaled nearly \$400 billion in 2013 inflation-adjusted dollars. By 2010, that amount grew to over \$700 billion.⁷⁷ Those figures include a great deal of variability due to combat operations overseas and therefore do not necessarily reflect a directly correlated increase. However, the overall trend demonstrates the cost growth that increases the “dollar arrow’s” influence potential. During both periods, the most important point with respect to this phenomenon is the JROC’s relative ineffectiveness in shaping Service-driven spending priorities. In the 1990s, the influence of the Services on big-ticket systems was evident as “the JROC was unsuccessful in influencing the development of weapons central to each service’s identity such as the Air Force’s F-22 fighter, the Army’s Comanche helicopter, and the Navy’s Aegis ships.”⁷⁸ These systems ultimately would yield to immediate spending

⁷⁶ CJCS Instruction 5123.01F, *Charter of the Joint Requirements Oversight Council*, 10 January 2012, A-2.

⁷⁷ Walker, Dinah. *Trends in U.S. Military Spending*, Council on Foreign Relations Center for Geoeconomic Studies, 30 July 2013, p. 1.

⁷⁸ Lederman, Gordon Nathaniel. *Reorganizing the Joint Chiefs of Staff: The Goldwater-Nichols Act of 1986*. Westport, CT: Greenwood Press, 1999, 124.

pressures of operations, but that is not equal to the JROC process working toward that end. As Michael O’Hanlon assessed, the ever-increasing spending record with respect to G-N process performance and ever-expanding global U.S. military commitments as, “probably inconclusive....”⁷⁹

Details Dominate the Domain. One conclusive detail of G-N is the force-providing nature of the Services. That enduring Service-biased influence on strategy was exactly what Congress sought to ameliorate with the G-N legislation, as “Congress intended Goldwater-Nichols to increase the previously under-represented poles of various DOD organizational tensions in order to increase the vitality of DOD's pluralistic decision making process...”⁸⁰ From Marquez’s theoretical perspective, little has changed in the resource-rich environment that focuses the mind on dollar-based solutions to security problems. The wall of separation that artificially separates war fighting from resourcing helps to preserve this condition. Think of the model for Marquez’s theory in the figure below:



Figure 14. Integrated EBO and CBL Theory

Source: Author’s original adaptation

⁷⁹ O’Hanlon, Michael E. *The Science of War: Defense Budgeting, Military Technology, Logistics, and Combat Outcomes*, 31 August 2009, p. 7.

⁸⁰ Lenderman, *Reorganizing the Joint Chiefs of Staff*, 208.

Artificially breaking the model by giving responsibility to different sets of decision makers with their own staffs and priorities improperly influences the nature of the objectives that are accomplished, either by choice or by resource-driven obligation. This is all the more true when one half of the model is governed by the deep institutional biases that G-N was designed to overcome. Marquez's theory suggests, and other analyses agree, that the effects of G-N on the overall resourcing of operations were well-intended half-measures taken to preserve the bifurcation of war fighting for the sake of the war fighter.⁸¹

If a division of OT&E and operational execution is indeed an artificiality, as Marquez's theory suggests, then such a divide would no doubt have a far-reaching impact on both the strategic thinking on each side of the divide and the ability to wage war. However, the reality of those impacts would certainly depend on the magnitude of the variables in question. If resources are plentiful, then the two (or more, in the case of all unified commands and all the Services) competing sides have a larger resource pie to share. With larger shares available during operational demands, then the gaps between the requisite resources and operational objectives would notionally be narrower. On the other hand, as the shares at stake get smaller, those gaps begin to widen and the overall operational capacity is diminished.

⁸¹ See Carter, Ashton B. and William J. Perry. *Preventive Defense: A New Security Strategy for America*. Washington, DC: Brookings Institution Press, 1999. And Coleman, John C. *Tumbling "Component Walls" in Contingency Operations: A Trumpet's Blare for Standing Joint Task Force Headquarters*. Unpublished manuscript, School of Advanced Military Studies, U.S. Army Command and General Staff College, Fort Leavenworth, KS, 1991.

This is consistent with the views of reform-minded defense strategists at the outset of the G-N debate. The problem at the time can be summarized with Lenderman's assessment:

Each Service's philosophy by implication downplayed the roles of the other Services. The result of having strong Services buttressed by Service-specific philosophies of warfare was the strengthening of Service-specific specialization over [unified] commanders, who would subsume each Service's assets within a larger framework.⁸²

That fundamental problem of divergent Service philosophies and the resulting impact on resource provision and OT&E in many ways remains relevant. The result from a resource-perspective is a status quo political settlement that generally divides defense spending equally among the Services. Though the JROC process influences the JCAs, shapes budget priorities, and gives incremental nudges on spending, the Services retain a great deal of direct influence on how their equal shares are spent.⁸³

How Much Has Really Changed? From a resource standpoint, the status quo begs the question of how much has G-N really changed the defense enterprise. The degree to which reform is now evident is an essential aspect of further analysis. The original issue of logistics that the defense reformers sought to address was the broken link between strategy and logistics:

The first problem in the acquisition process...is that there is no assured connection between the national military strategy and the formulation of military requirements.... The issue is whether the platforms and weapons that are identified as new requirements are the most appropriate

⁸² Lenderman, *Reorganizing the Joint Chiefs of Staff*, 110.

⁸³ Holland, Gary W., Lt Col, USAF, *Resource Allocation: The Department of Defense's Achilles' Heel*, Unpublished manuscript, Air University, U.S. Air Force Fellows, Maxwell AFB, AL, 2003, p. 52.

platforms and weapons to execute an integrated, unified military approach, not the approach of a single Service.⁸⁴

We can clearly measure that defense spending has not diminished, or at least has not differed from the spending patterns of the past, and the broken link between strategy and logistics remains disconnected and is kept so by the very reform intended to fix it. While the budget-sharing context among the Services may have changed with the inclusion of the JROC and the JCIDS process from a bureaucratic process perspective, the budgetary realities have changed little.

The 2014 U.S. defense budget included for the Army \$129 billion, the Air Force \$144 billion, the Navy (including the Marine Corps) \$155 billion, and for OSD/Joint activities \$97 billion.⁸⁵ There have been small variations in that distribution in past budgets due to variations in combat operations and some special procurement initiatives, but the recent trend certainly holds to the distribution.⁸⁶

Under these fiscal circumstances, the perspective of General Colin Powell is an important consideration of the consequences on spending priorities:

Almost the only way previous chiefs reached agreement on advice was by scratching each other's back. Well, the joint staff spent thousands of man-hours pumping out ponderous, least common denominator documents that every chief would accept, but few secretaries of defense or presidents found useful. This partly explains why the joint chiefs had never spoken out with a clear voice to prevent the deepening morass in Vietnam.⁸⁷

⁸⁴ Staff Report to the Committee on Armed Services, *Defense Organization: the Need for Change*, 16 October 1985

⁸⁵ Summary of the DOD Fiscal Year 2014 Budget Proposal (Office of the Secretary of Defense website, <http://www.defense.gov/news/2014budget.pdf>) accessed 26 Mar 2014.

⁸⁶ According to the OSD website's data, the total previous variation not counting combat operations is less than 5 percent.

⁸⁷ Locher, *Victory on the Potomac*, 439.

In light of this observed tendency, Locher naturally concluded that “The potential of resource allocation reforms has been realized only once, when General Powell used his new resource advisory role in 1990 to formulate the base force....DOD’s most important and difficult resource issue since the passage of Goldwater-Nichols.... Besides this critical contribution, JCS chairmen have yet to provide definitive resource advice to defense secretaries.”⁸⁸ The reason for the limits on meaningful resource allocation advice relates directly to the wall of separation and Marquez’s theory on resourcing the fight.

The Services have their own philosophies of warfighting, their own institutional theories on warfighting via their own domains, a necessity to broker their share amongst the other services, and an interest in promoting their systems and capabilities within the framework of the JROC process:

Unfortunately, the JROC operates by consensus, just like the old Joint Chiefs of Staff. At a time when the Defense Department needs decisive priorities and tradeoffs, the JROC simply rubber-stamps service initiatives. Owens acknowledged that the decisions still squander enormous funds.⁸⁹

The compelling nature of these interests is evident in the fact that Service “wish lists” that circumvent the SecDef and CJCS to request additional budget authority directly to Congress have become a normal part of the annual budget process (with the exception of a period of duration under Secretary Gates’s administration). Recently, these have totaled as much as \$36 billion

⁸⁸ Locher, *Victory on the Potomac*, 442.

⁸⁹ Locher, *Victory on the Potomac*, 443.

worth of equipment.⁹⁰ It seems that no amount of bureaucratic joint process is likely to alleviate these institutional forces, especially should resource constraints continue to tighten and result in greater competition for budget share in the future.

The state of play that artificially separates warfighting from the resourcing of war in unified commands directly impedes meaningful outcomes due to the nature of the Services. An examination of reform alternatives is necessary to understand what might be possible if the wall of separation was lowered or removed by adjusting G-N.

The defense enterprise has wrestled with this problem for a long time, and many leading thinkers have devoted significant effort to finding solutions. For all that effort, the problem remains unresolved, and the consequences represent an ongoing challenge. It may be that Marquez's theory offers key insights into the solution, for "the business of the combatant commands is the Department's core business and the inability to relate resource allocations to its core business should be regarded as a fundamental failure in how DOD understands its own business."⁹¹

Sisyphus Push: What Should G.N. Look Like? A variety of recommendations emerge from previous defense reform analysis and Marquez's insights. Some focus on the nature of the JROC processes, recommending a

⁹⁰ Roxana Tiron. Military Gives Congress a \$36 Billion Wish List (Bloomberg website, <http://www.bloomberg.com/news/print/2014-04-03/military-gives-congress-a-36-billion-wish-list.html>) accessed 26 Mar 2014.

⁹¹ Defense Science Board, *Enabling Joint Force Capabilities*, August 2003, p. 25

reversal of the process flow so that requirements come *from* the JROC instead of going *to* the JROC. Here, the nature of the Services comes into play:

The history of the JROC where the services bring forward the requirements only invites a consensus approach. When the current membership is made up of the Vice Service Chiefs who have loyalties to their own service programs, how can one expect that they would vote to cut their own major program? However, there should still be an avenue to bring up issues from the services, but this should be the exception vice the norm.⁹²

Others, such as the Center for Strategic and International Studies (CSIS), indicate that the entire JROC governance system is outdated and obsolete, though not necessarily toward the ends one might expect. Recognizing the inherent complexity of the DOD's governance challenge, that analysis recognizes that the requisite management processes are beyond the ability for a single defense secretary to comprehend and administer. The mandate for reports, findings, and judgments drives unintended consequences that complicate the system. That reality undermines the operational needs of the unified commands, both immediate and future. As a study from CSIS puts it,

Key stakeholders are underrepresented in governance processes and forums. This is especially problematic for the department's self-proclaimed internal customer, the joint warfighter, represented today by the Joint Staff and the combatant commands. It is also true for congressional and civilian U.S. government and international partners, all of whom are critical to achieving DOD's goals.⁹³

The CSIS study suggests the SecDef needs to replace the director for program

⁹² See Holland, Gary W., Lt Col, USAF, *Resource Allocation: The Department of Defense's Achilles' Heel*, Unpublished manuscript, Air University, U.S. Air Force Fellows, Maxwell AFB, AL, 2003, p. 52.

⁹³ Hicks, Kathleen H. *Invigorating defense governance : a beyond Goldwater-Nichols Phase 4 report*. The CSIS Press, Center for Strategic and International Studies, March 2008, p. 2

analysis and evaluation with a new director, the Deputy Secretary for Strategy, Execution and Assessment (DSEA) whose purpose is to integrate defense strategy efforts and conduct analysis on Service program efforts to bring about a greater level of institutional accountability. However, that study recommends placing a now defunct unified commander of the U.S. Joint Forces Command in an oversight role of the JROC and stops short of any further inclusion of the combatant commander.

In fact, the CSIS study held to the philosophy that resources “should still be organized, managed, and budgeted along Service lines.” It even went so far as to recommend the restoration of authority for all acquisition responsibility to the Services, thus removing the JROC requirements process entirely except for a notional requirements validation function. The study acknowledged, “The risk of relying upon Service-centric resource allocation and acquisition processes is the possibility – some would say likelihood – that the Services will acquire weapons systems and provide capabilities that meet their own parochial visions for how they want to operate, rather than meet the joint capability requirements of the Combatant Commanders,” but went on to simply assert, “The U.S. military fights as a joint team. The decisions over what to buy for that joint team must be made from a joint perspective, even though the Military Services remain the primary means for actually acquiring the ready, trained, and equipped people that comprise these capabilities.”⁹⁴

⁹⁴ Clark A. Murdock and Michèle A. Flournoy, et al. *Beyond Goldwater-Nichols: U.S. Government and Defense Reform for a New Strategic Era Phase 2 Report*. Center for Strategic and International Studies, July 2005, p. 78.

The CSIS study declared unambiguously that the bifurcation between war fighting and resourcing not only exists as a very real thing but rises to a critical level of importance. This position seems to have become more than a doctrinal and legislative imperative, and has come to resemble a theological article of faith. As CSIS explained it:

Relying on the regional Combatant Commands for a more robust role in determining longer-term requirements would be a mistake. The regional commands must not lose focus on their core function, the planning and conduct of military operations today and tomorrow. This near-term preoccupation with today's threats and missions is not consistent with planning how to define and cope with future threats and challenges. Moreover, expanding the time horizon of the regional commands would divert them from their core responsibilities.⁹⁵

Perhaps the dysfunction whose remedy has remained so elusive is buried within that statement. The unified commands' core responsibilities are now defined exclusively on one side of G-N's "wall of separation." Marquez's theory and its logical extension suggest defining core responsibilities where the unified commands should be responsible for the conduct of fighting wars and conducting operations in a way that *includes* the resourcing of those operations. If war fighting and war resourcing are, by definition, indivisible, then the unified commands are today diverted from their core responsibilities. That diversion is certainly not the fault of joint leadership, for G-N has legislated this diversion by redefining their roles in a way that is contrary to the nature of warfare.

⁹⁵ Clark A. Murdock and Michèle A. Flournoy, et al. *Beyond Goldwater-Nichols: U.S. Government and Defense Reform for a New Strategic Era Phase 2 Report*. Center for Strategic and International Studies, July 2005, p. 82.

Marquez's ideas challenge currently accepted dogma. His theory defines the profession of arms and all the responsibilities that go with it in a way that fighting is inseparable from resourcing. The logical conclusion of this theory points out and opposes the assumption that the Services *must* exist for OT&E purposes and that unified commands are to focus on half of the profession of arms while institutionally decreed to be focusing on the whole thing. The G-N reform in bureaucratic processes and all the efforts to make them work are merely surface-level fixes that contribute to the artificial fog and friction and mistake the nature of the profession of arms.

The noble attempts to make this G-N reform work in the real world require Herculean efforts at multiple levels of futility. The CSIS study noted:

The JCIDS process is very labor-intensive – one COCOM officer estimated that it takes five thousand man-hours to clear a major document through all the wickets – and the results so far have been mixed, at best.... Joint Forcible Entry and Joint Undersea Superiority began development in late 2003 and have yet [18 months later in 2005] to achieve the level of detail needed to assess whether the planned capabilities meet the requirements...the J-8 is trying to develop a more streamlined capability-based assessment process, but it is far from clear whether shaving weeks of time off an inclusive, elaborate consensus-based process will produce meaningful results.⁹⁶

No doubt many COCOM and Joint Staff officers would agree. The additional bureaucracy necessary for the requirements process to work has become nothing short of Byzantine, and the efforts necessary to make them actually work from a reform perspective have proven daunting. For example, “the

⁹⁶ Clark A. Murdock and Michèle A. Flournoy, et al. *Beyond Goldwater-Nichols: U.S. Government and Defense Reform for a New Strategic Era Phase 2 Report*. Center for Strategic and International Studies, July 2005, p. 79.

resource allocation area is where there is some unfinished business. Attempts were made in the mid-90's with the Commission on Roles and Missions" but quickly disintegrated.⁹⁷

Another aspect of resourcing that G-N does not adequately address is the divestiture of capability. While the acquisition of capability is clearly wrapped in complex Joint processes intended to force the Services to deliver validated Joint capabilities, once those are acquired there are few processes controlling their divestiture. In the contemporary context, legacy systems with proven track records of delivering for unified commanders are expensive to retain as they age and expensive to dispose when their lifecycle is complete.

The Services are often in a position where they must choose between maintaining those legacy systems and procuring new ones. While the new procurement activity is subject to G-N processes, the divestiture of those proven legacy systems remains a Service prerogative. Such decisions can elevate to Congressional debates, and have already done so in the case of close air support capabilities. Currently, the Air Force intent is to replace the A-10 Warthog with the F-35. The decision to divest itself of the Warthog system saves Service-specific budget dollars in the near-term, but potentially costs unified commands a critical capability and drives an increased requirement for the new F-35. This debate brings the resourcing aspect of warfighting to the

⁹⁷ Holland, Gary W., Lt Col, USAF, *Resource Allocation: The Department of Defense's Achilles' Heel*, Unpublished manuscript, Air University, U.S. Air Force Fellows, Maxwell AFB, AL, 2003, p. 51.

forefront, as the warfighters realize their legitimate role in determining which resources deliver the capabilities they require.

The nature of the Services in this case is understandable as budgets are constrained, whereas “no one is happy about recommending divestiture of this great old friend, it’s the right military decision... and it’s representative of the extremely difficult choices that we’re being forced to make.”⁹⁸ However understandable the short-term budgetary implications of such a decision are, the ability for a Service alone to make such a far-reaching decision illustrates the hole that exists in G-N reform and points out how such decisions can only be resolved at the highest political levels under the G-N system. Unified commanders may well believe, as John McCain does, the Air Force is “going to do away with the finest close-air-support weapon in history?” but they have little legal or formal basis to do anything about it the plan despite their obligations as the nation’s warfighters. G-N necessitates that debate on the grand political stage. The nature of the Services that G-N sought to mitigate retains a powerful sway in divestiture decision-making, which then necessarily forces requirements for procurement of new capabilities to grow.⁹⁹

Resourcing War and the Limits of Goldwater-Nichols. The implications of Marquez’s theory may have bearing on the DOD’s continued frustrations with costs and resource allocations, but the question remains to

⁹⁸ General Mark A. Welsh, as quoted in “Air Force Plan to Get Rid of A-10s Runs into Opposition”, *Washington Post* website (<http://www.washingtonpost.com/business/economy/air-force-plan-to-get-rid-of-a-10s-runs-into-opposition>), 10 April 2014, accessed 11 April 2014.

⁹⁹ Senator John McCain, as quoted *Ibid.*

what extent. The dominance of warfighting over logistics has a common-sense appeal, especially when a nation has abundant resources. It appears rational that unified commanders should focus on the tasks in front of them rather than the long-range procurements and next-generation threats. Perhaps this is a truism, but strategists do well to challenge these assumptions as the artificial effects of the “wall of separation” come into view. Again, the lessons of history remind us that in World War II, the U.S. military regarded a wall of separation as disadvantageous and settled upon a theater-focused (i.e., unified command-focused) requirements approach:

Whether any other logistical system, based on a more specific prediction of future requirements, would have worked better can only be conjectured. The most likely alternative in 1942, and seemingly the only method by which concrete requirements could be projected at long range...was the one employed by the British. They calculated their requirements theater by theater.... General Patrick Tansey (U.S. Army), chief of Logistics during a large part of the war, concluded in 1945 that the British system of calculating requirements was superior to the American [system].¹⁰⁰

When challenging the “wall of separation” assumption, it is important to recognize the distinction between the previously described operational logistics and system resourcing. Within that context, the level of precision in analysis is key. The processes for resource requirements, acquisition, and sustainment are distinct yet interrelated by nature. Operational support logistics has its own distinct processes that are directly linked to the others. The current defense enterprise draws the lines of responsibility for those processes

¹⁰⁰ Leighton, Richard. *Global Logistics and Strategy, Vol. I. 1940 - 1943* (US Army Green Books, 1995) p. 186.

according to G-N legislation, joint doctrine, and Service policy. The questions posed by Marquez's theory address the level of precision in our definition of operational responsibilities and the level of precision the definition achieves. The G-N legislation defines the current structure with a rough distinction between procurement of capability and the use of that capability. Marquez's theory expands that definition beyond mere use of the capability to include a degree of procurement responsibility assigned to unified commands. Consider Senator Goldwater's thoughts on the original state of play prior to the G-N Act:

In 1945, we needed a military establishment that could conduct integrated planning and resources allocation, and I am sorry to say we still need it. Moreover, all of the things that President Truman said we did not need, we still have.... The absence of mission integration is like an orchestra that cannot play together. The Department of Defense is like an orchestra with 41 sections, and many of them are the best in the business, but because they're not integrated, they sound like Alexander's Ragtime Band.¹⁰¹

These thoughts hint at original reformer intent consistent with Marquez's theory. The quote suggests the desired mission integration includes operational planning and resource allocation from a DOD perspective. The G-N Act added a level of resource allocation with the JROC, but the nature of the Services appears to circumvent the intent by ensuring the Services have a role in the definition of requirements and the acquisition process itself. In the context of the unified commands and Marquez's theory, task execution is conducted in relative isolation from resource acquisition. While the expectation of that organizational design is to allow unified commanders to

¹⁰¹ Locher, *Victory on the Potomac*, 326.

focus exclusively on warfighting, Marquez would suggest that warfighting includes a larger role in the acquisition of resources.

The 2004 Joint Defense Capabilities Study Team (JDCST) report published findings from a study the SecDef commissioned in 2003. The Honorable Pete Aldridge, former Under Secretary of Defense for Acquisition, Technology, and Logistics led the team, whose purpose “was to examine and improve DOD processes for determining needs, creating solutions, making decisions, and providing capabilities to support joint warfighting needs.”¹⁰² The team began the study with a review of all relevant existing studies along with interviews with senior officials from the Services and unified commands. Their initial findings validated the status quo:

Services dominate the current requirements process. Much of DOD’s focus is on Service programs and platforms rather than capabilities required to accomplish Combatant Command missions. A Service focus does not provide an accurate picture of joint needs, nor does it provide a consistent view of priorities and acceptable risks across DOD.¹⁰³

The Service-driven myopia noted in the study demonstrated characteristically deleterious effects beyond the inability to articulate joint needs, but proved unable to examine an appropriate spectrum of alternative solutions:

Service planning does not consider the full range of solutions available to meet joint warfighting needs. Alternative ways to provide the equivalent capability are not adequately considered—especially if the alternative solutions are resident in a different Service or Defense Agency.¹⁰⁴

The negative effects of these observations resulted in an inefficient method of

¹⁰² 2004 Joint Defense Capabilities Study Team Final Report, Department of Defense, Washington, DC. p. 2.

¹⁰³ *Ibid.*, p. 6.

¹⁰⁴ *Ibid.*

guiding and correcting major acquisitions, which invariably contributes to runaway costs and program delays:

The resourcing function focuses senior leadership effort on fixing problems at the end of the process, rather than being involved early in the planning process. OSD programming guidance exceeds available resources and does not provide realistic priorities for joint needs. “Jointness” is forced into the program late in the process during an adversarial and time-consuming program review. The resulting program does not best meet joint needs, or provide the best value for the nation’s defense investment.¹⁰⁵

The JDCST went on to recommend a variety of joint processes to give the unified commands a more prominent voice in articulating requirements at the strategic level, allow the Services to offer concepts of solutions rather than weapons systems, and put the SecDef in the direct decision-making position for all major acquisitions. Finally, the team recommended a specific review process focused on program execution on an annual basis.¹⁰⁶ In effect, this major review proposed a massive centralization effort in process rather than organizational structure. The governing body referred to as the Strategic Planning Council would firmly establish the SecDef as the chair of a central committee that would “provide senior leaders with a venue to offer formal inputs to shape defense strategy and support effective over-sight throughout the end-to-end process of strategy development, capabilities planning, resourcing, and execution.”¹⁰⁷ While these recommendations would change the

¹⁰⁵ 2004 Joint Defense Capabilities Study Team Final Report, Department of Defense, Washington, DC. p. 1-3.

¹⁰⁶ 2004 Joint Defense Capabilities Study Team Final Report, Department of Defense, Washington, DC. p. 2-7.

¹⁰⁷ Ibid.

process for defining requirements and place the Services in a different role on the front end of the acquisition process, massive centralization into a top-down committee may not be the best means of reform.

As long as the Services retain their characteristic bias toward systems that favor their own philosophies, the problem of requirements, programs and execution will continue. The level of changes required to make a difference will no doubt require reforms at a G-N (potentially congressional) level, and will likely include a redesign of component contributions to the unified command force. As it stands, SecDef assigns forces to combatant commands, and unified commanders issue orders to Service components for operational tasks, but unified commanders should also issue orders for resources and capabilities. This would expand the focus of the unified command staffs from this-war to next-war to a certain degree, but would certainly have a disruptive effect on the Services and their acquisition processes.

Other realities influence the resource equation to such a degree that meaningful reform within the current process may not produce substantial cost savings. The sheer magnitude of military obligations around the world, coupled with significant commitments like NATO, dictates a level of expenditure that may in fact be a bargain even at today's elevated budget numbers.¹⁰⁸ The opportunity for reform and savings probably rests with the

¹⁰⁸ O'Hanlon, Michael E. *The Science of War: Defense Budgeting, Military Technology, Logistics, and Combat Outcomes*, 31 August 2009, p. 36.

globally forward posture of U.S. forces and the commitments that drive them, since, as O'Hanlon points out in *The Science of War*,

the premium that the United States places on operating globally, and with a high-tech advantage, leads among other things to very large budgets for the Navy and Air Force. Each of these has a budget comparable in size to that of the U.S. Army; it is unusual for a country's air and naval capabilities each to cost as much as its ground forces.¹⁰⁹

The Way Ahead. Marquez's theory clearly indicates the need to examine the results of G-N reforms with respect to resource allocation and the role of unified commands. Ultimately, Marquez's theory suggests that just as G-N put the unified commands in charge of operations, so too should they be in charge of resource acquisition. Some Allied partner nations use a more joint approach to logistics that provides a model for our thinking about this idea. For example, the Australian Defence Forces are organized around a Joint Logistics Command that is responsible for operational logistics support. However, a reform step along these lines would have limited impact outside of operational support unless a notional Joint Acquisition Command was also created to handle resource procurement. Such steps may lead to improvements in the results G-N was looking for, but strategic studies such as the following offer insights on this issue and are worthy of further analysis.

Monte Cannon looked at the relationships between unified commands and the Services as a principal-agent proposition and concluded:

Componency in a unified theater command must be viewed as a delegation based upon functional specialization... because the services are experts in the application of combat power in their respective

¹⁰⁹ O'Hanlon, *The Science of War*, p. 38.

domains, and because the capabilities they possess are tailored expressly for that domain, a joint force commander, in effect, must “hire” the services to fight a war.¹¹⁰

This keen insight is essential for understanding the nature of organizational structures and their relative impact on the status quo. Principal-agent theory describes personal or institutional agency relationships in which one entity assigns tasks (the principal) to another party who completes the tasks (the agent). Agency theorists describe this relationship in a variety of constructs and contexts through the lens of a contractual relationship where risk, incentives and compliance play important roles in determining outcomes. The degree to which organizational reform addresses the principal-agent relationship between the Services and the unified commands will be a significant factor in determining the success of the reform. Clearly the G-N reforms addressed that relationship with respect to operational responsibilities, but preserved the Services’ role as principal in most ways when it comes to resource acquisition.¹¹¹

This hiring process for the Services accompanies the notion that the unified commander has operational tasks to complete, and the “hired” Service components accomplish those tasks with the resources issued to them by the Services. This relationship has bearing on the command and control of forces in combat, but also impacts the resources the Services choose to provide. The

¹¹⁰ Cannon, Monte R., “Cleaning Up the Joint: Command, Control, and Agency in American War Fighting,” Air University Dissertation (Maxwell AFB, AL: School of Advanced Air and Space Studies, 2012), 283.

¹¹¹ Kathleen M. Eisenhardt, *Agency Theory: An Assessment and Review*. The Academy of Management Review, Vol. 14, No. 1 (Jan., 1989), p. 57-74

Services have retained their principal role within the acquisition process, however, and the attempts at making that process more joint directly threaten Service interests. A centralized Joint Acquisition Command might necessarily supplant the Services' role as principal, but the degree remains a question of processes.

The trend in DOD and the Services toward process centralization emerged as resources dwindled in the post-conflict environment. The creation of organizations such as the Army Installation Management Command (IMCOM), the Air Force Vehicle and Equipment Management Support Office (VEMSO), and the emerging Air Force Installation and Mission Support Center (AFIMSC) are but a few examples of this centralization trend. The USAF has centralized all supply chain operations and management into a wing command construct and numerous other centralization trends have emerged across the DOD. The question of whether the joint centralization of acquisition processes would achieve notable efficiencies is open to debate.

Examination of historic trends and allied experience suggests the results would offer a mixed bag. A RAND report assessed this question over 20 years ago and concluded:

Centralization is a traditional solution that may be ill suited to the new era. The most effective path to reform may, in fact, lie in the opposite direction: toward non-hierarchical and highly integrated organizational structures that promote trust rather than conflict and maintain close ties to the military customer.¹¹²

¹¹² George Donohue, et al. *DOD Centralization: An Old Solution for a New Era?* Arlington, VA: RAND, 1993, p. 1.

The military customer for the purpose of this analysis could be either the Service components or the unified commands, depending on the point of reference. Viewing the Services as the customer, Cannon's principal-agent analysis reveals the problem. The unified commands should again take on the customer role, cutting out the Services from the acquisition principal role. The Services would then compete against each other for filling unified capability orders. Acquisition principal authority is a critical part of necessary reforms, and removing the Services from that role facilitates the restoration of the proper relationship between fighting and resourcing war.

The RAND report also reviewed allied defense forces to see if any evidence suggested joint acquisition structures improved acquisition outcomes:

Are these foreign centralized agencies indeed more efficient? Unfortunately, there is little reliable data to indicate clearly that foreign organizations manage their limited military R&D resources more efficiently. On the other hand, there is considerable data, as well as anecdotal evidence, to suggest that weapon systems developed by centralized acquisition agencies experience persistent cost overruns, are less capable than U.S. systems, and are not necessarily responsive to military requirements.¹¹³

Once again, the issue emerges on what processes define requirements and where does ultimate responsibility rest for those processes. The DOD has not tried to centralize acquisition in a joint agency, though the conversation has been going on for decades. The conclusion relevant to Marquez's theory is that the organizational structure is not what matters to the outcome, but where the principal-agent responsibilities fall certainly does. While G-N created a

¹¹³ Donohue, *DOD Centralization*, p. 2.

relationship between the Services and unified commands that elevates the joint commanders to a principal role in operations, it did not do the same with respect to acquisition. In fact, the Services remain in that role, even with added joint and DOD oversight through the JROC.

When Congress looked at creating a centralized acquisition process within the DOD, their conclusions were against the idea. European allies like France and Britain served as models for centralized acquisition, and congressional subcommittee reports urged against adopting the idea:

Foreign centralized systems place considerably lower priority on the legitimate military requirements of the uniformed services. Instead, they tend to elevate the importance of such nonmilitary considerations as the promotion of arms exports and the pursuit of broad technological and industrial objectives.¹¹⁴

The German defense establishment also tested the centralization waters and concluded that such experimentation was not worth continuing:

Following major political scandals involving equipment budget shortfalls and cost overruns in the early 1980s, it became clear that the more centralized planning system implemented in 1971 had not brought about a significantly more efficient and cost-effective military acquisition system.¹¹⁵

The level of precision in these studies, however, is lacking when it comes to Cannon's principal-agent lens with regard to centralization potential. Ultimately, Marquez's theory places primary concern on that issue.

The centralization trend of IMCOM, VEMSO, and ISC does not necessarily portend a centralization of acquisition. Yet the organizational

¹¹⁴ Donohue, *DOD Centralization*, p. 4.

¹¹⁵ *Ibid.* p. 7.

structure of centralized or decentralized acquisition systems is not nearly as important as who is in charge. As RAND points out, the warfighter has resource needs, observing that military acquisition must meet those needs to perform satisfactorily at any cost. Clearly, the unified commands have not yet played the role of principal in the acquisition process, and that improvement is key to achieving the relationship between operations and resources that Marquez's theory suggests.

Therefore, the Marquez way indicates that just as G-N put the unified commands in charge of operations, so too should they be in charge of resource acquisition. There may be a number of organizational approaches to putting the unified commands in the role of acquisition principal, but the issue of whether they are centralized or decentralized organizational structures is adjunct to the unified principal role. The essential notion that Marquez's theory challenges is that unified commands have no role in resource acquisition and must focus only on fighting and conducting operations.

Such an approach might not guarantee significant savings. The portion of the budget that deals with acquisition is only a fraction of the larger defense spending pie. Yet Marquez's idea is at the core of G-N attempts to make acquisition more joint. There is therefore some recognition of this principle in previous reforms, but the Services have proven to be powerful institutional forces against those attempts. To continue the advancements that the G-N Act realized with the first steps nearly 30 years ago, further reforms must directly confront the issue with respect to the Marquez theory. Future reforms must

address the current state of a legislated “wall of separation” between operations and resources. This is especially true in light of the emerging environment where complexity, knowledge, and information growth induce exponential rates of changes in capabilities, costs and accessibility.

Victims of Complexity. The matter of whether reform focuses on the future or the past is worthy of consideration. The RAND study’s conclusion that highly decentralized acquisition may be preferable touches on this point. In the past, the defense amalgamation G-N intended to reform was founded upon a large series of bureaucracies. That institution was built to operate in a world with a discrete level of technological tools and aids available for administrative execution of acquisition processes. However, the technological rate of change has increased in many areas, some to an exponential degree. When debates about the need for defense reform that would lead to the G-N Act were just beginning, the world’s first cell phone was going on sale.¹¹⁶

In view of the massive technological changes since G-N was passed, when considering the form and function of future defense reforms, it seems important to think about the expected rate of technological change in the future. Futurist R. Buckminster Fuller first postulated ideas about this phenomenon where man’s accumulated knowledge and information storage could be notionally expressed in terms of units and essentially accounted for as a sort of commodity over recorded history. Fuller used a notional model for

¹¹⁶ Stewart Wolpin. The First Cellphone Went on Sale 30 Years Ago for \$4,000. (Mashable website <http://mashable.com/2014/03/13/first-cellphone-on-sale/>) accessed 14 March 2014.

expressing the sum of man's knowledge and the time it took to accumulate that knowledge in order to estimate the rate of change over time. He established a baseline for one unit of knowledge as expressed by the total information documented or transmitted by the year one AD.

He then reviewed the various developments in knowledge management and technology over time and estimated that the rate of accumulation led to a doubling point somewhere around the 16th century. At 1500 AD, according to his calculations, mankind had achieved a notional commodity of two knowledge units. However, his estimates said that the next doubling of the knowledge commodity only took 250 years, and the one after that took only 150 years. That increased rate of change in the knowledge commodity is now a phenomenon of which mankind is becoming acutely aware.¹¹⁷

In 2006, the IBM corporation estimated that by 2010 the notional information doubling rate (IDR) would increase at such a pace that in mankind's accumulated knowledge would double every 11 hours. If this estimate is correct or even nearly correct, then the future world for which strategists must prepare for operations will be one where the IDR brings about substantial new innovations every few hours. The world of the G-N Act's authors looked remarkably different than the world in which we now live. Yet looking forward from today, the amount of change in the same 30-year period could be exponentially greater. This IDR trend, coupled with expected

¹¹⁷ Fuller, R. Buckminster. *Critical Path*. New York: St. Martin's Press, 1981. P. 229-252.

diminishment of defense resources, renders both Marquez's "dollar arrow" less available and the "brain arrow" more accessible and urgent.¹¹⁸

It is understandable, from a dissenting point of view, to propose that the cost function of the defense enterprise is a victim of an ever-increasingly complex environment. The cost of capability rises as complexities increase, so the Defense Department's spending on capability is inescapable. After all, the F-35 weapon system has "10 million lines of [software] code on the airplane [and] 10 million lines of code on off-board systems. That is just an awful lot of software."¹¹⁹

However, it is likewise not difficult to imagine the strain on public perception of the DOD's credibility when the consequences of that complexity account for billions of dollars spent on limited capability:

According to the Pentagon's chief weapons tester, Dr. J. Michael Gilmore, the [FY2015 F-35's] software that the Marines say will make their planes combat capable will, in fact, "provide limited capability to conduct combat." What is more, said Gilmore, if F-35s... are actually used in combat, "they would likely need significant support from other fourth-generation and fifth-generation combat systems to counter modern, existing threats, unless air superiority is somehow otherwise assured and the threat is cooperative." Translation: the F-35s that the Marines say they can take into combat in 2015 are not only ill equipped for combat but will likely require airborne protection by the very planes the F-35 is supposed to replace.¹²⁰

¹¹⁸ IBM white paper. The Toxic Terabyte. (IBM website http://www-935.ibm.com/services/no/cio/leverage/levinfo_wp_gts_thetoxic.pdf) accessed 2 April 2014.

¹¹⁹ Lorraine Marin, Lockheed general manager, as quoted in Air Force Magazine, *Climb Time for the F-35* by John Tirpak, Vol. 96, No. 12, December 2013, p. 22.

¹²⁰ Adam Ciralsky. Will It Fly? 16 December 2013. (Vanity Fair website <http://www.vanityfair.com/politics/2013/09/joint-strike-fighter-lockheed-martin>) accessed 2 April 2014.

The advent of this complexity syndrome is clearly related to the exponential IDR growth, and the nexus of these two trends certainly represents the heart of future reform. Marquez’s metaphorical “brain arrow” represents a critical future approach to reform that takes into account these change rates, complexities, and innovations in a way that the “dollar arrow” cannot, especially in a resource-constrained fiscal environment.

Tools of technological innovation offer to help balance, or at least mitigate, the original observations that drove the G-N legislation:

The U.S. military's preference for decentralization, functional responsibility, and specialization represented by the services' predominance, brought the benefits of those poles of the organizational tensions but risked losing the advantages of centralization, geographic command, and the generalist perspective. The services' focus on specific environments enabled them to strive for excellence in their respective media but threatened to impede coordination of the services' efforts within a unified strategy...¹²¹

The notional set of advantages offered by centralization may be transformed by technology and innovative application of capabilities that favor decentralized approaches. This trend is an essential part of Marquez’s metaphorical “brain arrow” in looking at future reforms.

Orchestrating Reform. RAND’s observation over 20 years ago has the ring of truth to it in light of these change phenomena, where centralization is “ill-suited to the new era. The most effective path to reform may, in fact, lie in the opposite direction.”¹²² This observation suggests that both the G-N “wall of

¹²¹ Lederman, Gordon Nathaniel. *Reorganizing the Joint Chiefs of Staff: The Goldwater-Nichols Act of 1986*. Westport, CT: Greenwood Press, 1999, 234. Emphasis added.

¹²² George Donohue, et al. *DOD Centralization: An Old Solution for a New Era?* Arlington, VA: RAND, 1993.

separation” and the centralization trend are suspect candidates for reform. Marquez’s theory calls for an increased role for unified commands as acquisition principals. Future defense reform should focus on enacting a decentralized distributed acquisition approach that designates the Services as acquisition agents that are “hired” by the unified commands on a competitive basis, with the commands acting as acquisition principals under strategically-imposed fiscal constraints.

This vision directly challenges the “focus on warfighting” ideation that has governed doctrine for 30 years, but the principal-agent relationship that G-N established for operations must be reordered for resource acquisition in order to achieve anything but half-measure solutions, wrapping the Services in joint processes that only further complicate an already complex acquisition environment. This aim also directly challenges the centralization trend that places acquisition under a central committee in Washington, DC. Arguably, if the Services have proven to be out-of-touch with unified command requirements due to their characteristic nature, then what can be gained by vesting acquisition authority in political appointees who lack the expertise that the Services bring to the discussion?

The Marquez approach suggests future reforms should follow a radically decentralized model that places requirements definition, system selection, and supportability option decisions squarely in the hands of the unified commands as a joint panel of acquisition principals. The reformed process would identify the Services as the agents for specified JCA and portfolios tasked with specific

system procurement and reporting to the unified commands, CJCS and SecDef. The unified command staffs would acquire a portion of the components' planning and budgeting staff allocations in order to add capability to the J5 (strategic plans and policy) and J8 (programming and budget) functions in order to support interface with the Services headquarters. The unified commands would define requirements, make budget requests through the SecDef, and execute their budgets by competitively selecting resource solutions that the Services offer in response to the unified requirement. By creating a resource-limited and competitive environment for the Services, such reform would simultaneously take advantage of the nature of the Services and ensure that procurement and divestiture of resources are consistent with valid real-world requirements.

Such reform should place the SecDef, CJCS, and JROC in the role of standardization and evaluation of acquisition priorities and capabilities among the unified commands and as an enforcer of fiscal adequacy in budget execution for the Services. Rather than expecting the top echelon of military and civilian leaders to tackle the monstrously complex process of requirements and resourcing from the top-down, this new reform should put the senior leadership in the role of the referee for unified command requirements. The strategic duties at the senior levels of the DOD should be to impose fiscal constraints by incentivizing resource distribution for capability offerings by the Services to the unified commands. In this way, unified commands, rather than Services, prioritize DOD resource allocation, pushing acquisition programming

and execution down to the lowest possible levels within the Services and unified commands. The JDCST report makes an applicable recommendation for a strong feedback and review process at the senior strategic level:

This portion of the process focuses on assessing how well the Department did at what it set out to do. The “providers,” primarily the Services, would report on “what they actually got” for the resources provided. The “users,” led by the CoComs, would report on whether they were able to perform their missions with the capabilities provided and whether those capabilities were sufficient to execute the strategy.¹²³

The principle function at the top strategic level is as the enforcer, not as a tactical analyst and decision maker. The importance of fiscal constraint as the *primary* duty at that strategic level cannot be overstated. If the SecDef and CJCS are not given the resource reigns, if they do not fiscally constrain the acquisition agents, or if they do not reward innovative and cost-effective solutions at the lowest possible levels, then such reform will fail in promoting the Marquez “brain arrow”—a vital role of future reform.

The basic features of Marquez-oriented G-N reforms should include:

1. Decentralized requirements development
2. A competitive environment for Service capabilities at a level closest to the warfighter
3. A principal-agent relationship that places warfighting and resourcing in the same responsible organization
4. Divestiture authority resident solely in the Unified commands and Joint Staff, and prohibition of Service-driven acquisitions apart from Unified command-initiated requirements along with some requisite level of research and development.

Marquez’s theory, put simply, suggests that the farther acquisition activities

¹²³ 2004 Joint Defense Capabilities Study Team Final Report, Department of Defense, Washington, DC. p. 2-7.

and requirements development are from Washington, DC, and the closer these are to the warfighter, the better.

Vantage Advantage. Ultimately, while these changes may appear radical based upon the reasoning of G-N Act reformers, the natural evolution of warfare that Marquez recognized in his theory demands that strategists bring reform thinking up-to-date. Marquez's theory reflects his unique vantage point, with a career that evolved from an operationally-focused fighter pilot to a resources-focused logistician; his career perspective enabled him to identify these subtleties. That is not to say that his perspective was new. Post World War II logistics reports offered similar perspectives in 1954, saying:

Military thought, in short, has clung to two characteristically Clausewitzian ideas: that the primary function of the soldier is to use the tools of war in combat, not to fashion or provide them, and that material forces have not yet diminished the classic and decisive role of courage, leadership, and the arts of command. The development of warfare has subjected both these principles to considerable strain. The once clear distinction between the use and the providing of weapons has been virtually obliterated, and modern war engages more soldiers in the latter task than in the former.¹²⁴

What Marquez offers is a bridge to understand the relationship between resources and objectives, and the necessity of achieving a deliberate balance in distribution of responsibility at operational levels of command. Future reform may certainly capitalize on this advantageous vantage point, or it may yet slip back into a lack of clarity on the concept which has plagued the U.S. defense

¹²⁴ Leighton, Richard. *Global Logistics and Strategy, Vol. I. 1940 - 1943* (US Army Green Books, 1995) p. 41.

establishment for some time, as “...one highly placed officer in 1943 held that a certain committee handled not only logistics matters but also... requirements, production, supplies and materiel.”¹²⁵

The higher level of understanding that Marquez’s theory urges strategists to achieve has vital implications on future end states and continuing advantages. The implications of his thinking range from operational logistics integration to the very nature of national military strategy resulting from the Goldwater-Nichols Defense Reform Act. The directions in which Marquez’s theory push the strategist’s thinking may yet become clearer as a rapidly changing world unfolds. In the near-term, it seems likely that significant resource constraints may compel us to think in at least one of these directions, and the time for the next round of reforms may be limited. It seems prudent to review past lessons and consider future realities from the Marquez perspective in order to prepare our strategic thinking.

Considering the Marquez way offers insights distilled from his strategic thinking, no inherently magical elements are found there. Marquez was, however, a uniquely talented individual who rose to a very high rank. He was a uniquely prepared thinker who cut his teeth in fighter operations and matured into the Air Force’s top logistician. His theory certainly offers us a deeply considered perspective that is difficult to discover anywhere else during the same period.

¹²⁵ Leighton, Richard. *Global Logistics and Strategy, Vol. I. 1940 - 1943* (US Army Green Books, 1995) p. 43.

At a bare minimum, Marquez's theory directly challenges the DOD resource logistics status quo. Future reformers may succeed where others have failed, should they favor the lessons of Marquez rather than applying further imprecise joint fixes in an already laborious and complex process amidst a growing trend of centralized management. If strategists are inclined to listen to the advice of the Hispanic farm boy who became an accidental logistician, then Marquez's thinking warns against allowing that quick-fix trend to manifest itself any further within defense acquisition and operational logistics.



Chapter 7

Conclusion

This would all be easy if it wasn't for the logistics.

- BGen Warren D. Berry, USAF

The Man Behind the Name. Perhaps Billy Mitchell first looked at aircraft maintainers as a breed apart, yet coequal in importance with the pilots who fly. “To attempt to use soldiers or sailors as mechanics merely jeopardizes the lives of the people who go into the air.... They should do only sufficient exercises to keep them in good [enough shape to] work on the planes.”¹ Yet Leo Marquez elevated maintainers and logisticians beyond the role of noble squire who cared for the steeds of the U.S. Air Force. He lived his life promoting the idea that logisticians were combat leaders who had an even more significant impact on the outcome of the battle than any other. Marquez knew first-hand that failure in logistics meant losing the war.

Marquez began his career as a fighter pilot where he learned directly about victory and defeat. He trained in an unforgiving aerial environment that was all-too dependent on complex logistics indistinguishable from magic. After mastering that craft, he became an aircraft maintenance officer and shook off any illusions. His career as a maintenance officer and logistician gave him insights and lessons about airpower and military strategy that he likely would

¹ William Mitchell. *Winged Defense* (Mineola, N.Y.: Dover Publications, 2006). 176-177

never had noticed had he not been grounded as a pilot. Ironically, the shame and disappointment many pilots would feel from being medically disqualified turned out to be a blessing to a warrior-logistician. Marquez's unique experience developed his thinking between the business of operations and logistics. Marquez believed that warfighting was by nature inseparable from the resourcing activities necessary to fight wars. As warfighting and resourcing of war are two sides of the same coin, Marquez's theory directly challenges the modern American bifurcation of logistics from warfighting enshrined in the contemporary defense reforms. Those G-N reforms in effect today artificially divide key elements of military strategy that Marquez believed to be intimately linked, making the development of U.S. defense strategy structurally unsound as it stands amidst diminishing resources.

The implications of Marquez's theory suggest a reconsideration of the American way of war with respect to how the Nation organizes the military Service departments, Unified Commands, and how military requirements are developed and prioritized. The relevance of Marquez's theory becomes even more important as defense spending becomes more constrained in contemporary and future budgets. Marquez's experiences and insights suggest that the artificial division of warfighting naturally create wasteful spending amongst the Service components as they pursue narrow parochial approaches that are disconnected from realistic national security threats and realities.

Yet Marquez was more than that. Marquez's identity was important to Airmen for deeply humanitarian reasons. Marquez was a rare warrior with

decades of experience working in the gritty flightline, back shop and Ammo worlds of aircraft and munitions maintenance. He was trained to fight, but he made a career of transforming logistics leaders. Marquez was a warrior-logistician. I learned much more about why the award for excellence is named for the man, and why many considered him a hero. Though Marquez's experience and thinking presented vitally important strategic implications, his life made a deep emotional impact on Mohsen Parhizkar and countless others in the Air Force logistics community.

Leo Marquez passed away on December 30th, 2011. He was laid to rest at Santa Fe National Cemetery in New Mexico not far from the dairy farm that shaped his life inexorably. Kirtland Air Force Base saw to the military honors at the funeral. The air base wing commander, Colonel John Kubinec, an aircraft maintenance officer himself, personally ensured the details were in order. Mohsen Parhizkar saw to family needs and was there for his hero.

His passing was met by a flurry of condolences from around the globe as those who served with him remembered his service and leadership. Marquez certainly felt very attached to the Air Force family, as he said

It's a great society, the military family. Do I have any regrets? No. I tell you what, I can't think of a day, one day, one single day in 33 years that I wished I wasn't in the Air Force. Because to me, it was a great opportunity to not only serve my country, but to be able to do things that I would never have been allowed to do anywhere else. We have an incredible Air Force. The capabilities we have are just incredible because we've got terrific people. Trained, motivated, educated... incredibly good people.²

² Lt Gen Leo Marquez, interviewed by the author 24 Jan 2007.

Marquez certainly influenced the Air Force he was so proud of, especially in the logistics realm. The fact that Marquez began his career as a pilot with over 2,000 hours in fighter jets, rather than a purely mission support officer, doesn't place him in the highest regard of some corners of senior Air Force logisticians. Yet at the grass roots level Marquez viscerally appealed to aircraft maintenance and munitions professionals. The award that bears his name is a highly coveted symbol of the very best in U.S. Air Force aircraft maintenance. The Aircraft Maintenance Professionals Association lists Marquez as the "Godfather of Aircraft Maintenance" with the citation:

There have been many men and women who have had a positive influence on the craft and profession of Aircraft Technicians.... One of these sections of aircraft maintenance is that within the military. Military aircraft do not fly themselves, it takes a lot of things to happen for our military to have safe, airworthy aircraft which help to provide our freedom. Having skilled maintainers allows the military to have the aircraft that they need when they need them. These skilled professionals look only to complete their responsibilities with the utmost integrity. History has forgotten their names.... Lt. Gen. Leo Marquez is affectionately known as the 'Godfather' of maintenance. He earned this title by raising the bar for the maintainers and making them more than just another occupational specialty. He improved their efficiency, effectiveness and made them a profession worthy of respect in the United States Air Force.³

Marquez earned many honors in his life and career, including the Distinguished Service Medal, the Legion of Merit and the Bronze Star for combat in Vietnam. He was also named a distinguished graduate of New Mexico State University and was awarded an Honorary Doctor of Letters degree

³ The Aircraft Maintenance Technicians Association website, <http://www.amtausa.com/fam2.html>) accessed 22 Mar 2014.

from that institution. Marquez served as a university regent, and on the Board of Regents of the Museums of New Mexico. He also led on multiple boards of directors in the private sector. Kirtland Air Force base remembers Marquez for his leadership during a round of base closures where he led a delegation to Washington, DC to lobby for the base to remain open. The base dedicated a park to his honor and placed a bronze plaque that lauds his “legendary leadership in maintenance and logistics” and reads in part, “He was instrumental in the successful fight to save Kirtland AFB from closure.”⁴

Marquez’s successes and failures in logistics management during some of the leanest, most tumultuous times in Air Force history provide lessons for both the experienced and the neophyte logistician. Future leaders will benefit from examining the way Marquez thought about solving problems, conducting air operations, and managing logistics. His career marked the rare transition of a combat operations officer into a combat logistics officer. Marquez thought of himself as, “the accidental logistician.”⁵ Accidental though it might have been Marquez’s logistics career was fruitful and effective. Like many combat aviators, he recognized the largely thankless contributions of his aircraft maintenance troops and focused on taking care of them as best he could:

My obsession – it’s almost an obsession – was systems reliability, for two reasons: one, just for mission accomplishment. That’s one thing, that’s the primary thing. But the other one is to take the load off my troops. If the damn thing is available for use twice as long as the old one was, then that’s less work for the guys fixing it. I finally got the ops guys to side

⁴ Kirtland AFB website <http://www.kirtland.af.mil/news/story.asp?id=123318919> accessed 2 March 2014.

⁵ Lt Gen L. Marquez, interviewed by the author 23 Jan 2007.

with me on this, because they took as, well, like they were above all that. That was something that only sub-humans did, so why worry about it?⁶

Marquez's experience had given him a broader view of the Air Force operational enterprise, and that was a view he wanted to promote within the logistics profession:

And this is the kind of thinking that I'm trying to push by saying I'm not interested in pure maintenance officers; I'm not interested in pure supply or transport. I want logisticians. Guys who can look at a picture and say "Hey, I'm not claiming to be smarter or more present than anybody else, but..." it's just that I was accidentally exposed to all these things growing up, so by the time I reached the position I was, I could truly say that I'm a logistician. I'm not just a maintenance guy; I'm a logistician. You see things a lot differently.⁷

Marquez took great pride in leveraging new ideas for innovative outcomes and for saving taxpayer dollars. He is still remembered for his leadership in creating AFCOMAC, and Marquez was exceptionally proud that AFCOMAC had been created at no additional cost to the Air Force:

The one that I'm most proud of is the way we did set up AFCOMAC and didn't tap the Air Force for a single penny. We didn't go through the POM, we didn't get authorization, we didn't get any of that crap. We just built the damn thing, with resources we had available that were going to be used anyway. There wasn't a single penny spent that would not have been spent otherwise. I personally am very, very proud of that achievement. I think that's something that we did that served the Air Force for decades to come.⁸

AFCOMAC has trained over 15,000 Airmen in the art and science of munitions storage, build and delivery during more than 25 years in operation. In honor of Marquez, the AFCOMAC schoolhouse celebrated its 25th anniversary by

⁶ Ibid.

⁷ Lt Gen L. Marquez, interviewed by the author 22 Jan 2007.

⁸ Ibid.

dedicating their facility as Marquez Academic Hall in honor of his contributions to the school's success.⁹ He was convicted of the need to grow leaders with the heat of combat. AFCOMAC represented that thinking in its training, but Marquez felt that leaders across the logistics enterprise needed to feel combat stresses to hone their leadership abilities:

I saw too many colonels that came up against a problem and didn't know how to handle it. That's why I developed my theory of 'vulcanization'. The officer has got to be seasoned in the trenches. They've got to be down there and they've got to experience difficulty, experience defeat, even, so that they can learn to respond to it, so that when they get hit – down there where it doesn't really matter if you make a big mistake. If you're a full colonel and you make a mistake, hey, that has huge consequences. So you need to learn to make your mistakes early when you're young and learn from them and get seasoned.¹⁰

His own academic research examined the science of human motivation in order to improve aircraft maintenance management in the Air Force.¹¹ He reflected on his own combat experience and wrote of the lessons he learned to help future officers take care of their troops and the mission.¹² Marquez made it a priority to demonstrate good leadership, straight talk, creativity in problem solving, and an ability to challenge assumptions on the basis of the merit of ideas:

To me, the great thing about the Air Force from my experience is that it is the greatest meritocracy that we have in our society. You only get there

⁹ Beale Air Force Base Factsheet website
http://www.beale.af.mil/library/factsheets/factsheet_print.asp?fsID=3968&page=1, accessed 16 March 2014

¹⁰ Lt Gen L. Marquez, interviewed by the author 23 Jan 2007.

¹¹ Leo Marquez. "Motivation Of Individuals In Subgroups Of A Complex Aircraft Maintenance Organization" (Air Command and Staff College thesis, Air University, 1967), 67.

¹² Leo Marquez "A General's Reflections: Stress and combat." *Air Force Journal of Logistics*, Fall 1986, 26.

by merit. You don't get there because your father-in-law is this and that and the other. Out in the private sector you see it all the time, a lot of ass kissing and nepotism. In the Air Force, you only get ahead by figuring it out and making good things happen.¹³

When Marquez was pressed about regrets he must have had throughout his career, he didn't have many that came to mind. However, one particular thing seemed to nag at him a bit as an aviator. He confessed to feeling like his aviation skill had not come to fruition in a unique way:

Gus Grissom, we were in Germany together. Gus said to me, "You're a good stick. You can make it into the space program." Well, I never did. I had flown with Charlie Duke. Charlie Duke walked on the moon, and Charlie was in the 526th Fighter Interceptor Squadron at Ramstein, and I was in the 525th, and we flew a lot together. And hell, I could whip Charlie's ass anytime in an airplane, so I said, "God damn it, Charlie Duke. Charlie walked on the moon and I didn't do it." That's my only regret, in the whole Air Force career I never walked on the moon.¹⁴

Marquez's life story is however full of interesting brushes with historically significant events. He survived the Great Alaska Earthquake and the Tet Offensive, and he was inside the Pentagon during the 9/11 attacks of 2001.¹⁵ Many people might have thought it wise to avoid spending too much time near Marquez lest trouble test him once more. For all the anecdotes told here, many more from his life and career remain untold. Marquez would eventually return to flying status as a general officer and was able to fly as a distinguished visiting pilot at various units:

¹³ Lt Gen L. Marquez, interviewed by the author 23 Jan 2007.

¹⁴ Ibid.

¹⁵ Charles Brunt, "N.M. Witnesses Describe Havoc", *Albuquerque Journal*, 12 Sep 2001, A4 and Tracy Dingman, "Broken Glass" *Albuquerque Journal*, 10 Sep 2006, M4 and Belshaw, Jim. "Anonymous Note. Signed, Ignorant," *Albuquerque Journal*, 6 Jul 2005, B1.

I went to my flight surgeon and said, “Hey, let’s start the process of getting me cleared.” Did the physical, and I went down and went to the altitude chamber and all the other stuff, and I passed everything. We put the paperwork together, and I got back on flying status. So I was flying again on a limited basis. I loved it! The one thing I did not fly however, was a buff. But I flew everything else, C-5s, C-141s, you name it, I flew it. I was very grateful for the opportunity to do that.¹⁶

Marquez pointed to his work ethic as the most valuable lesson from his career.

He credited his life on the farm as an important aspect of his development as a leader:

I think my work ethic was the biggest thing, because I learned to work hard growing up from my dad. I learned to work hard, and I worked hard all my life. That and the fact that it’s – I learned that I have the ability, to shut down the emotion and see if I can intellectualize it. I don’t care – as soon as I intellectualize it, then I can proceed with it. So it’s my ability to clamp the emotions out of the way and deal with it until I get it intellectually sound. I deal with things intellectually. I don’t deal with them emotionally.¹⁷

Perhaps the most important lessons from Marquez’s career involve airpower theory and strategy. Marquez’s contributions to the Air Force both in his own time and beyond are a testament to the utility of his theories. His work contributed to Air Force logistics success in combat in Desert Storm and the expeditionary wars of the 1990s. His theory of combat logistics, particularly when viewed alongside EBO theory and the G-N reform act, provides a fine framework for understanding warfighting and preparation for air and space dominance in the 21st Century. The intuitive farm boy who revolutionized his family’s dairy operation grew up with ideas that present an

¹⁶ Lt Gen L. Marquez, interviewed by the author 23 Jan 2007.

¹⁷ Lt Gen L. Marquez, interviewed by the author 25 Jan 2007.

important perspective on the flaws in how our nation goes to war. The implications of his theory offer revolutionary thinking about the relationship between warfighting and resourcing war, and make it clear that those disciplines are inseparable parts of the same whole.

Marquez's near-obsession, however, was to develop product improvement processes to yield a modern Wonderful One-Hoss Shay. R&M 2000 practices continue to improve Air Force logistics in more modern manifestations. The Air Force may never design and build an aircraft where every part lasts the same length of time like the Wonderful One-Hoss Shay, but every ounce of reliability and maintainability gained through continuous process improvement contributes to victory. Marquez understood his dream of the One-Hoss Shay wasn't really possible but he dedicated himself to getting as close as possible. If such a system were ever created, naming it The Marquez Masterpiece after his logistics legacy would be a logical choice. In the words of Oliver Wendell Holmes, "Logic is logic. That's all I say."

Bibliography

AFTOC and AFKS/REMIS, Jan 07 in Mark D. Johnson, Deputy Chief of Staff for Logistics, Installations and Mission Support, Headquarters U.S. Air Force, Washington, D.C. AFMx21 Follow-on Strategy, staff briefing, 8 February 2007.

AFTOC and MERLIN, Dec 06 in Mark D. Johnson, Deputy Chief of Staff for Logistics, Installations and Mission Support, Headquarters U.S. Air Force, Washington, D.C. AFMx21 Follow-on Strategy, staff briefing, 8 February 2007.

“Air Force Almanac,” *Air Force Magazine*, May 1987, 80.

Air Force Regulation (AFR) 66-5. *Production Oriented Maintenance Organization*, 15 July 1979.

Anderton, David A. “POMO and POST: Keystones of TAC’s Readiness.” *Air Force Magazine* 62, no. 1 (January 1979), 46–50.

Belshaw, Jim. “Anonymous Note. Signed, Ignorant”, *Albuquerque Journal*, 6 Jul 2005, B1.

Stephen Biddle, *Military Power: Explaining Victory and Defeat in Modern Battle*. New Jersey: Princeton University Press, 2004.

Boyne, Walter J. *Beyond the Wild Blue: A History of the United States Air Force, 1947–1997*. New York: St. Martin’s Press, 1997.

Brig Gen David A. Deptula, *Effects-Based Operations: Change in the Nature of Warfare*, (Arlington, VA: Aerospace Education Foundation, 2001), 14.

Brig Gen Kathleen D. Close, “Air Force Maintenance for the 21st Century (ADMx21)” *Exceptional Release*, Spring 2007, 12.

Brig Gen Michael E. Ryan, “F-16 Aircraft Maintenance and Munitions Manpower Requirements,” staff report, 23 February 1989 in Capt Elaine A. Robinson, “Rivet Workforce and the F-16 Block 40” *Air Force Journal of Logistics*, Summer 1989, 19.

Brunt, Charles. “Chamber of Commerce, KAFB Representatives in D.C.”, *Albuquerque Journal*, 11 Sep 2001, A1.

Brunt, Charles. “N.M. Witnesses Describe Havoc”, *Albuquerque Journal*, 12 Sep 2001, A4.

Capt Elaine A. Robinson, “Rivet Workforce and the F-16 Block 40” *Air Force Journal of Logistics*, Summer 1989, 16.

CMSgt August W. Hartung, "Rivet Workforce," *Flying Safety*, February 1987, 11.

CMSgt August W. Hartung, "Rivet Workforce: Where We Are, Where We're Headed," *Flying Safety*, October 1988, 15.

CMSgt Mike McMahan, HQ USAF/ILMM, Headquarters U.S. Air Force, Washington, D.C. Combat Air Forces Roadmap, staff briefing, January 2002.

CMSgt Robert Gordick, "Tactical Air Command: Rivet Workforce Integrated Avionics, Photo-Sensor," HQTAC/LGQZ Briefing, 17 June 1987 in Capt Elaine A. Robinson, "Rivet Workforce and the F-16 Block 40" *Air Force Journal of Logistics*, Summer 1989, 18.

Commander's Handbook for an Effects-Based Approach to Joint Operations, Joint Warfighting Center, US Joint Forces Command, 24 February 2006, III-5.

Dale Shoupe, 505th Air Command and Control Wing, "Air Operations Center Operational Assessment", SAASS AOC Senior Staff Course briefing, March 2007.

David K. Underwood and John E. Bell, "AEF Munitions Availability" *Air Force Journal of Logistics*, Winter 1999, 14.

Dingman, Tracy. "Broken Glass" *Albuquerque Journal*, 10 Sep 2006, M4.

Edward Boyle, Lt Col Stanley J. Goralski, and Maj Michael D. Meyer, "The Aircraft Maintenance Workforce Now and in the Twenty First Century," *Air Force Journal of Logistics*, Fall 1985, 4.

Engels, Donald, *Alexander the Great and the Logistics of the Macedonian Army*. Univ of California Press, 1980, 110-128.

Gulf War Air Power Survey, vol. III, *Logistics and Support*, (Washington, D.C.: Government Printing Office, 1993), 221.

Henderson, James H. *Military Logistics Made Easy: Concept, Theory, and Execution*. AuthorHouse, 2008, 88-90.

Hoey, Capt. Brian. "Nuts, Bolts, and Bucks." *Airman*, May 1984, 10
Dillon, Lt Col Bill. "Lt Gen Marquez on MOA and Maintainers". 6803 Whittier Avenue, Suite 200, McLean, Virginia 22121. Mo 29, September 1967. 1-3.

House, Statement prepared for House National Security Committee Readiness Hearings, 1st sess., 1998.

"How TAC Increased Command-Wide Productivity 80% from 1978 to 1984." *Government Executive* 17, no. 5 (May 1985), 14-18.

James C. Slife, *Creech Blue: Gen Bill Creech and the Reformation of the Tactical Air Forces, 1978–1984* (Maxwell AFB, AL: Air University Press, 2004), 86-87.

Jason L. Masciulli and William A. Cunningham, "MICAP Shipping Policies" *Air Force Journal of Logistics*, Fall 2001, 43.

John E. Bell, "Total Not Mission Capable for Maintenance Study," AFLMA Project #LM199934800, Oct 00, quoted in Steven A. Oliver, Alan W. Johnson, Edward D. White, and Marvin A. Arostegui, "Forecasting Readiness," *Air Force Journal of Logistics*, Summer 2001, 32.

Leo Marquez "A General's Reflections: Stress and combat." *Air Force Journal of Logistics*, Fall 1986, 26.

Leo Marquez, End-of-Tour Report, January 1988, 5, K239.0512-2027 c.2, AFHRA.

Leo Marquez. "Motivation Of Individuals In Subgroups Of A Complex Aircraft Maintenance Organization" (Air command And Staff College Thesis, Air University, 1967), 67.

Magruder, Carter, *Recurring Logistic Problems as I Have Observed Them*. Center of Military History, United States Army, 1991, 93.

Mark D. Johnson, Deputy Chief of Staff for Logistics, Installations and Mission Support, Headquarters U.S. Air Force, Washington, D.C. AFMx21 Follow-on Strategy, staff briefing, 8 February 2007.

Mark Humphrey, "NMCM Escalation and Erosion of Mission Capable Rates," DRC Contract #GS-477SG, Sep 99 and Andy Sherbo, "Operations and Maintenance Funding and the Art of Readiness." *Air Force Comptroller*, Apr 98, 32, 10-14 in Steven A. Oliver, Alan W. Johnson, Edward D. White, Marvin A. Arostegui, "Forecasting Readiness," *Air Force Journal of Logistics*, Summer 2001, 34.

Marquez, General Leo Remarks to the Air National Guard Senior Commanders. San Antonio, Texas. November 20, 1905.

Marquez, General Leo. Remarks to the American Society of Military Comptrollers. Dallas, Texas. April 24, 1984.

Marquez, General Leo. Remarks to the Baltimore Chapter of The Society of Logistics Engineers, Baltimore, Maryland. April 26, 1984.

Marquez, General Leo. Remarks to the Charles A. Lindbergh Chapter of the Air Force Association, Dayton, Ohio. March 16, 1984.

Marquez, General Leo. Remarks to the Small Business Group, Sacramento, California. August 21, 1984.

Marquez, Lieutenant General Leo, "Air Force Procurement Reform: An Assault on Four Fronts". Office of the Assistant Secretary of Defense (Acquisition and Logistics) Washington, D.C., Fourth Quarter 1985. 14-18.

Marquez, Lieutenant General Leo, Biography. United States Air Force. Secretary of the Air Force, Office of Public Affairs, Washington, D.C. 20330.

Marquez, Lieutenant General Leo, Biography. United States Air Force. Secretary of the Air Force, Office of Public Affairs, Washington, D.C. 20330.

Marquez, Lieutenant General Leo. "Fair value For Your Defense Dollar." *Program Manager* (May-June 1985), 27.

Marquez, Lieutenant General Leo. "Spares, Prices, and Performance." *Air Force Journal of Logistics*, Fall 1984, 9-11.

Marquez, Lieutenant General Leo. "The Logistics Warrior" *Air Force Journal of Logistics*, Spring 1986, 9-11

Marquez, Lieutenant General Leo. "The Short War: Strategy for Defeat." *Air Force Journal of Logistics*, Winter 1986, 2-4.

McGee, William L. *Amphibious Operations in the South Pacific in World War II*. BMC Publications, 2000, 433.

Nipper, Ronald M. "Leo Marquez: Air Force Logistician" (Air War College Thesis, Air University, 1968).

Nowland, Mark C. "Implementing Force Structure Reductions for Air Combat Command F-15s." Research Report no. AU/ACSC/213/1998-04. Maxwell AFB, AL: Air Command and Staff College, 1998.

Otto Kreicher, "Hawley's Warning," *Air Force Magazine*, July 1999, 52.

Pagonis, William G., and Jeffrey L. Cruikshank, *Moving Mountains: Lessons in Leadership and Logistics from the Gulf War*. Harvard Business School Press, 1992, 193.

RADM J.C. Wylie, *Military Strategy* (Annapolis, MD: Naval Institute Press, 1989), 72.

Raymond A. Pyles and Hyman L. Shulman, *United States Fighter Support in Operation Desert Storm*, RAND Report MR-468-AF (Santa Monica, CA: RAND, 1995), 18.

“Rivet Workforce,” *TIG Brief*, May-June 1989, 13.

“Robust Units.” Briefing slides, ca. 1978. Creech Papers. Air Force Historical Research Agency, Maxwell AFB, AL.

Maj Stacey T. Hawkins, “Logging The JSF: Acquisition Logistics and Fleet Management for Modern Fighters,” SAASS Thesis (Maxwell AFB, AL: School of Advanced Air and Space Studies, 2005), 45.

Steven A. Oliver, Alan W. Johnson, Edward D. White, and Marvin A. Arostegui, “Forecasting Readiness,” *Air Force Journal of Logistics*, Summer 2001, 31.

Steven L. Martinez, Marvin A. Arostogui, Stephan P. Brady, “Improving the Logistics Pipeline” *Air Force Journal of Logistics*, Winter 2002, 13.

Thompson, Julian, *The Lifeblood of War: Logistics in Armed Conflict*. Brassey's, 1991, 51-76.

“Turnaround in TAC Sortie Production.” *Supplement to the Air Force Policy Letter for Commanders*, March 1981, 32-33.

Van Creveld Martin, *Supplying War: Logistics from Wallenstein to Patton*. Cambridge University Press, 2009, 290-298.

Wade, Norman, *The Sustainment & Multifunctional Logistician's Smartbook: Warfighter's Guide to Logistics, Personnel Services, & Health Services Support*. Lightning Press, 2013, 33.