

Surveying A WALL OF FIRE

Judith Frank and David Woolley, LS

JFA's Party Chief Steve Backes (green vest) and Dave Woolley (orange vest) set up next to one of the drums. Note detonating cord and bags of gasoline.



Give me the ones with fire in their bellies and a steel-blue glint in their eyes. Stand them next to spine-rattling jet engines, pyrotechnics, and gut-rumbling bombs that explode with a blast of heat that could seemingly melt nails. Ask them to donate their time, put them in an orange vest, and watch them smile from ear to ear. These are the hardcore surveyors. They love this profession! They'd survey the boundary of Hades just for the hell of it! We at Johnson-Frank & Associates (JFA) have been very fortunate to have done a variety of survey projects that are cutting edge, over the top, and far from mundane. We appreciate the conventional survey that challenges our abilities to fit all of the pieces of the puzzle together, but there are times when we really relish the assignments that call for "the hard-



core." Just such a challenge was the opportunity to survey a 2,500 foot Wall of Fire at the annual air show of the Marine Corps Air Station (MCAS) in Miramar, California, the original home of "Top Gun." This Wall of Fire would set a record for *The Guinness Book of World Records*.

Volunteer surveyors Dave Woolley, Steve Backes, and Roger Frank, had not anticipated the level of excitement this 14th day of October 2000 would bring. They had reported to the Explosive Ordnance Department (EOD) three days before the air show for orientation. On October 14th, they set up instruments adjacent to the flight line, working alongside team members from the MCAS Miramar Marine Corps Explosive Ordnance Disposal Team, the San Diego Bomb Squad, San Diego Sheriff's Bomb Squad, Navy Explosive Ordnance Disposal, Army Explosive Ordnance Disposal, and the Los Angeles Bomb Squad, to name a few. All of the groups involved volunteered their time, and all materials had also been donated. Our role was to survey and certify the length of a Wall of Fire that would be detonated from bombs and gasoline containers during the grand finale of the show.

Prior to the grand finale pyrotechnic event at twilight, the air show was in full swing with the world famous Blue Angels, the F-117 Nighthawk Stealth fighter-bomber, the B-1B Lancer bomber, MiG-17's, P-51 Mustangs, an AV-8B Harrier, an F-14 Tomcat, and other aircraft that sliced and punched their way through the sky. The air show on this day in October 2000 was dedicated to the 50th Anniversary of the Korean War and "The Forgotten Warriors," veterans of the Korean War. Approximately one million spectators filled the stands and milled about on the field to salute the accomplishments of both men and machines. Not a bad arena for setups.

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Miramar's History

MCAS Miramar once was part of a huge *ranchero* owned by Don Santiago Anguello, Mexican Army Commandante of San Diego's presidio. In 1890, Edward Scripps arrived from the East Coast and established a ranch on 2,000 acres in the Miramar area. He is credited with naming the mesa Miramar, meaning "a view of the sea" in Spanish. Ownership of Miramar later went to the Jessop family and the area became a settlement of cowboys and ranchers. In 1917 the Army bought the Miramar area and established Camp Kearny. Few permanent structures existed in Camp Kearny when more than 65,000 men passed through the camp to mobilize for World

War I. After WWI the camp was a demobilization center and by 1920 it no longer served as a military base. The base came back to life in 1932 when the Navy brought in the *U.S.S. Akron* and *U.S.S. Macon*, the largest aircraft of the times. A

mooring mast was built for these dirigibles, but once the *Akron* and *Macon* crashed at sea the camp was idle once again.

Activity picked up again with the onset of World War II, and runways

Marines fill bags with gasoline as surveyors look on.




GUINNESS
WORLD RECORDS
CERTIFICATE

On 14 October 2000
the Marine Corps Air Station (MCAS)
Miramar Explosive Ordnance Disposal Team
set a world record when they created
a wall of fire measuring 762 m (2,500 ft)
in San Diego, California, USA
during the MCAS Miramar Twilight Air Show

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Each specially-equipped bag was filled with five gallons of gasoline and sealed.

were constructed in 1940. During World War II both the Navy and the Marine Corps used the base. In 1947 the Marine Corps moved to the El Toro base in southern California and Miramar was re-designated as a Naval Auxiliary Air Station. Although Miramar prepared and supported carrier groups and squadrons during World War II and the Korean War, it was during the Vietnam War that Miramar rose to fame for its program in training air combat maneuvers and fleet air defense. "Top Gun" and "Fightertown, USA" became its new aliases. In 1993, a Base Realignment and Closure committee decision recommended that Miramar be re-designated as a Marine Corps Air Station. Although all of the Navy's F-14 Tomcats and E-2 Hawkeye squadrons were relocated to Fallon, Nevada, Miramar still houses F/A-18 and KC-130 Hercules squadrons, as well as CH-46E Sea Knight and CH-53E Super Stallion helicopters.

JFA has a long history of working with the Southwest Division of the Naval Facilities Engineering Command, and subsequently the United States Marine Corps personnel stationed at MCAS Miramar. Back in 1993 we provided re-

search, aerial control, and ground utility location for GIS mapping for the developed part of the base from Interstate 15 to the western boundary. In 1995 we did GPS aerial control and topo for the old Camp Elliott portion of the base. Our most recent project involved surveying the boundary of the 23,500-acre base as well as reviewing, plotting, scanning, and indexing every recorded land document within the base boundary. Our field crews searched for more than 800 points and found more than half. We set more than 250 boundary corners and did boundary calculations on 2,500 points. We searched for maps and deeds back to the 1850's and scanned more than 10,000 documents, including more than 500 maps. The title report items alone numbered more than 550. You could say we have a "working knowledge" of the area.

Precise Survey Required

Our familiarity with the runways at MCAS Miramar is also tied into another survey project that JFA performed in March of 1999 and November 2000. When visibility is less than three miles, pilots must rely on Instrument Flight Rules (IFR) rather than on Visual Flight

Rules (VFR). When flying IFR, they also rely on Instrument Landing Systems (ILS). It is critical that accuracy be maintained when aircraft are flying IFR. The base personnel had recently installed a new ILS that would not pass a flight check test. Apparently there was a digital anomaly in the flight graphics when a plane was on approach to the ILS. It was suspected that a reflection/refraction from the ground was the culprit. We were charged with providing a very precise survey of the area. Precise in this case called for ¼ foot contours, vertical profiles, digital photographs, and dimensions of all surface features.

Working 350 feet from the centerline of the runways proved to be a very exciting aspect of the job. Throughout the day we had F16s doing "touch and goes" right next to us. Even at a distance of 350 feet, these planes rattled us to the bone. The decibels from the jet engines can literally blur your vision. Some would land, and others would only touch down on a couple of hundred feet of runway, then pull up and loop around for another pass.

Gaining access to a base can be difficult, but access to a runway is nearly impossible. The survey work turned out to be the easier part. We were required to have an escort at all times and our escort was in constant contact with the tower. We were not permitted to wear caps or any clothing that could become separated from our bodies. We had to request permission to cross a runway or to be within a given perimeter of the apron. Before being allowed to cross a runway, we first had to walk around our vehicle, dislodge any rocks from the tires, and do a complete visual inspection of the vehicle. Debris on a runway can be fatal to a flight if sucked up into an engine. There are other rules and regulations, but the picture should be clear. I didn't question the standards; I sure didn't want to try to explain that a 1986 Chevy pickup was responsible for the demise of a multi-million dollar jet engine.

To prepare for the air show event we set out our 2,500-foot line as well as

Backes and Woolley stand by as a witness for Guinness (wearing black shirt) officially records information.



250' intermediate stations. The work was completed using a Geodimeter 500 series instrument. As experts in measurement, we applied all atmospheric corrections, checked our tribrachs, and measured the line multiple times from each end. The day of the show we repeated the procedure for the official Guinness witnesses. Marine Corps personnel poured five gallons (23 liters) of unleaded gasoline into 334 bags stretched out in a 2,500-foot string. A detonation cord that coiled like a cobra beneath each sack connected the bags. The gasoline bags were spaced 10 feet apart and the cord would burn at a sizzling speed of 25,000 feet per second. Ten drums were

placed at 250 feet apart with explosives in and around them. The explosives were set and we measured the layout.

Our final certification letter stated the

length of the line as well as the positional tolerance of each point and relative error in the line. After all of this "precise" work, the Marines added another 30-40 linear feet of gasoline to the lines. There was little question that the line was 2,500 feet long. It was a very complex but well-coordinated mission. I know that I will not work with a finer group of professionals than Master Sergeant Anderson and the others on the line with us during the project.

Bring on the Fire!

Once the math was done, we sat back to watch the show. Planes screamed through the darkening sky and the fire was detonated. Initially it was a small bonfire but in a matter of seconds it erupted into an unbelievable wall of flames and heat. Flames rose 200-300 feet, dwarfing military vehicles and other structures in view. The crowd's hush became a roar and the bomb squad technicians joined in with shouts of resounding approval. The heat could be felt from a distance of 1,000 feet and more. In a matter of seconds it was over but the experience is with us forever. We had been partners in a feat that had never been accom-

Bags were aligned and spaced ten feet apart.





Red and white ILS tower is visible in background as explosive experts fill the gasoline bags.

nothing like a chance to blaze a path to a new adventure and carve a new grin across a weathered face. ▼

Authors' note: This article was written prior to the September 11th attack on America. We are so proud to have worked with these brave young men and women who are serving our country. We know first hand that they accept a challenge and will do all that is necessary to succeed. We extend our heartfelt sympathy to the families and friends of the brave men and women from the VMGR-352 "Raiders" Transport Squadron 352 who lost their lives on January 9, 2002, in Pakistan and the fallen heroes of the "Flying Tigers" HMH-361 who perished January 20, 2002 in Afghanistan in support of Operation Enduring Freedom. Semper Fi.

JUDY FRANK is the Administrative Coordinator, and **DAVID WOOLLEY** is the Vice President of Johnson-Frank & Associates (JFA), located in Anaheim, California. Judy's husband, **ROGER FRANK**, is JFA's co-founder, current owner, and president. Roger has written three previous articles for Professional Surveyor.

plished before. Expectations were met and the record is published on page 143 in the 2002 hardcover edition of *The Guinness Book of World Records*. We were proud to be a part of the team to set a world record. We also felt pride

and satisfaction with the integral role we played as surveyors to remind us that this profession is not always confined to stay within the nine dots. Surveying may be mundane to some, but to the "hardcore surveyor" there is

