# Voice Communication Solution Optimizes Work Environment for Rotorcraft Testing Team at NASA

The Jacobs Engineering Team, contracted by the United States Air Force, relies on Clear-Com's Eclipse-Median frame, V-Series panels, and CellCom wireless beltpacks to maintain contact, coordinate intricate procedures, and streamline operations.

**EXECUTIVE SUMMARY**

CUSTOMER: JACOBS ENGINEERING

(Contracted by the United States Air Force)

- Rotorcraft Testing
- Moffett Field, California
- 55 employees

BUSINESS CHALLENGE

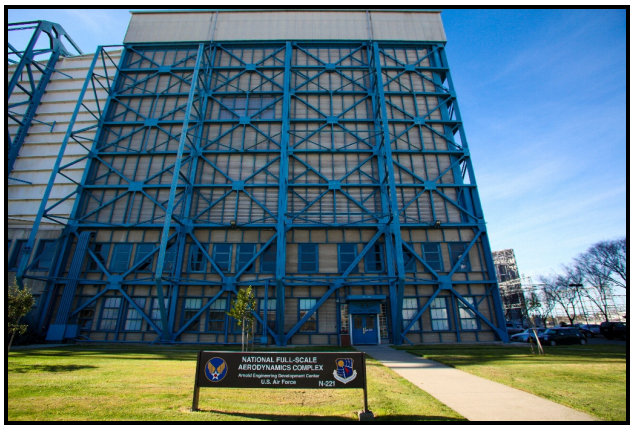
- Aged intercom system could not provide clear audio in noisy environments
- Limited beltpack capacity decreased productivity
- Lack of full-duplex communication between all test operation areas hampered the highly mobile team
- Trunking radios caused safety hazard

INTERCOM SOLUTION

- Eclipse-Median
- E-Que Card
- CEL-TA active transceiver antennas
- Eclipse Configuration Software (ECS)
- 20 integrated CellCom 1.92-1.93GHz wireless beltpacks
- 3 V-Series panels
- FOR-22 Radio Interface
- CCI-22 Two-Wire Partyline Interface

BUSINESS RESULTS

- 55 users maintain contact with the CellCom wireless beltpacks' duplex capabilities
- Users have volume control to hear better in loud environments
- "Listen Again" technology enables users to replay incoming calls
- Increased wireless coverage extended to blue room and control rooms
- Multichannel functions maximize work efficiency
- Integrated radios eliminates danger and permits adaptability
- Integrated recorder captures all critical information




**NASA'S National Full Scale Aerodynamic Complex (NFAC)**

## Business Challenge

NASA's National Full Scale Aerodynamic Complex (NFAC) which is operated by the United States Air Force in Moffett Field, California has the world's largest and only 80 by 120 feet wind tunnel where engineers perform full-scale rotorcraft testing. The test engineering team, contracted by Jacobs Engineering, requires reliable access to clear communication in order to successfully coordinate set up and testing in the wind tunnel. Nonetheless, the team's efficiency, mobility, and communication were limited by their aging intercom system, which had inadequate functionality, scalability, and flexibility.

Chris Hartley, a test engineer, was given the project of updating the existing intercom system to ultimately transform the communications environment. The communication was unclear at best with their UHF intercom system. "It gets pretty noisy when we're in the control rooms, because we have the tunnel going,

so there's blowing air around and on top of that," he says. "We got a lot of background noise in our current UHF system. We also have feedback problems where you get a squawk over the whole system if you pull out one of the hubs." Without clear audio quality, test engineers can never be entirely sure whether they are getting all the critical information they need.

The test operator, engineers, and others in the team need to communicate during testing and set up. "Our intercom system could only support up to four beltpacks, which was insufficient. We have as many as 30 people in one control room when we're doing a really big test," says Hartley. Their intercom system limited the number of users that could talk and listen.

More importantly, their intercom system didn't allow the highly mobile test engineers to communicate to and from any location. "We didn't have communication throughout the entire facility," Hartley says. Since the existing beltpacks didn't offer the range that the team needed, he informs us, "We've been doing it over the trunking radios, which are good, but they're kind of ridiculous because they're half-duplex." Thus, they wanted a solution that was full-duplex, which enables all users to talk and listen at the same time instead of having to take turns speaking.

Furthermore, the trunking radios could not be used in some of the rotorcraft testing areas because the intensity of the radio frequency interfered with the testing instruments' measurements, which was a safety hazard. "The trunking radios are all-around tools, but a sledge hammer in some places like the control rooms. We can't actually key the trunking radios because our instruments are so sensitive that they will actually get changed," says Hartley. "We can be reading 10 lbs of force on this bar and the measurement is telling us 100 lbs of force. That's only because someone keyed it and it disrupted the set up. It's for sure a safety issue." Even with the UHF system and trunking radios, the test engineers still didn't have freedom to roam through all the test operation areas.

The engineering team wanted an intercom system that could not only resolve existing difficulties, but one with highly developed functions to tackle future challenges. Hartley says, "We buy these intercom systems which we put a lot of capital investment in and they just stay in their current state. It's more helpful to have something that we can update and modernize as we grow." Rom Rosenblum, an Applications Engineer from Clear-Com, and Jaz Wray, a Regional Sales Manager from Clear-Com, introduced them to a solution that met all their needs and surpassed their expectations.

# The Intercom Solution

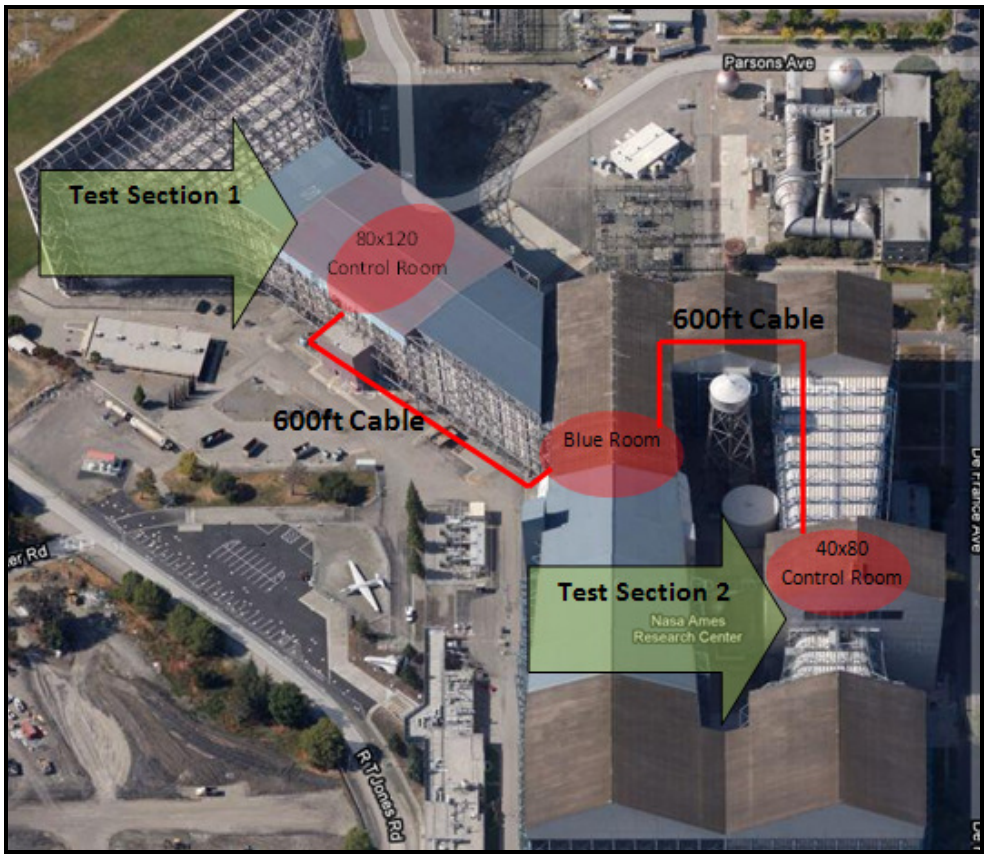
**PRODUCT LIST**

- Eclipse-Median Digital Matrix Intercom System
- Eclipse Configuration Software (ECS)
- V-Series Panels
- E-Que Card
- CellCom 1.92-1.93GHz Digital Wireless Beltpacks
- CEL-TA Active Transceiver Antennas
- FOR-22 Radio Interface
- CCI-22 Two-Wire Partyline Interface

Since Clear-Com has had a long history of supplying intercom equipment to the military and NASA, it was only natural for Hartley to seek a consultation from Rosenblum and Wray regarding Clear-Com's voice communication solutions. They steered him towards Clear-Com's Eclipse-Median, Eclipse Configuration Software, V-Series panels, 20 integrated CellCom wireless beltpacks, and interfaces because they enabled clear wireless communication to all the test operation areas and supported the user capacity.

There are five spaces of the NFAC involved in test operations: the two wind tunnel test sections, two control rooms, and the "blue room" which houses circuitry. The Eclipse-Median serves as the central communications hub in the blue room. Connecting the CellCom wireless beltpacks to the Eclipse-Median system is the E-Que card, a cellular control card that provides a seamless integration between the digital wireless and wired matrix systems. CEL-TA active transceiver antennas, which can be placed over 3,000 ft

away from the Eclipse-Median, are strategically stationed throughout the blue room and in the control rooms to offer sufficient coverage area. Test engineers can then communicate to other roaming CellCom wireless beltpack users and/or users of the V-Series panels, which are fixed in the control rooms. This solution interconnected all the control rooms and the blue room together and enabled full-duplex communications.




**NASA's NFAC Test Operation Areas**

Moreover, the team chose 20 CellCom wireless beltpacks that operate in the license-free 1.92-1.93GHz frequency band and utilizes cellular auto-roaming technology. The E-Que card gives them the ability to expand to a maximum of 35 CellCom wireless beltpacks. That was a tremendous increase in user access to communication as the number of beltpacks grew from four to twenty. CellCom also includes the key ability for the wireless intercom user to roam between different areas under a single system.

Additionally, the V-Series panels and CellCom wireless beltpacks permit each user to choose point to point or custom group communications. With their former system, everyone heard everything that was said, which produced confusion and created distraction. Now, information is private, manageable, and relevant.

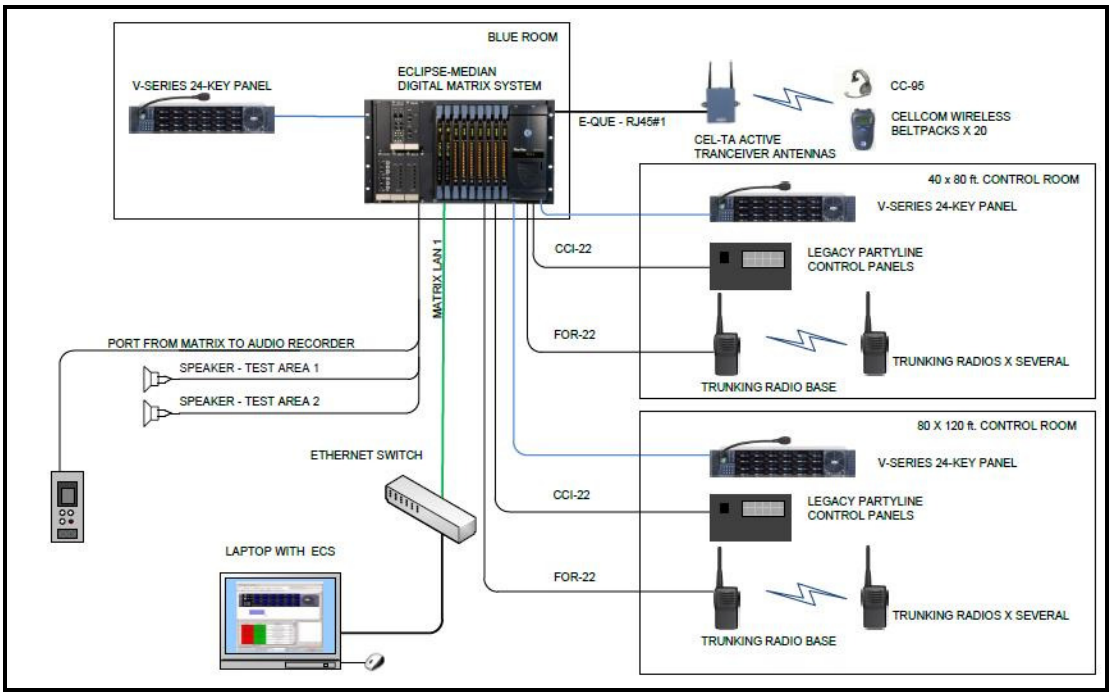
Clear-Com gives the engineering team new levels of control over sound quality as well. The finer features of the Clear-Com products enable the engineers to turn up the master and speaker volume. Furthermore, all V-Series panels feature Clear-Com's "Listen Again" technology, which employs digital audio memory to allow the user to replay 30 seconds of received incoming calls, aiding communication in noisy and demanding environments.

Likewise, a recorder was interfaced to the Eclipse-Median and programmed through the Eclipse Configuration Software to capture the audio feed to and from the V-Series panels. Therefore, the team can always refer back to critical information and instructions that are recorded.

> "The features in the product were much better than any of the other competitors. It was something that would do everything that we wanted it to, but still have a nearly limitless number of features for the future."
> -Christ Hartley, Test Engineer, Jacobs Engineering

Hartley states, "We didn't have to interrupt any of the infrastructures that we already have, because we do have a lot of installed panels throughout the tunnel and the control rooms. We could just interconnect the systems so that was a really big help." Not only is the advanced Clear-Com technology backward compatible with its own legacy products, but in this case, the 50 legacy control panels from another system was integrated with the Eclipse-Median through the CCI-22 interface without any disruption to the communications network.

He adds, "The Clear-Com system allowed us to integrate our trunking radio features so we can actually trigger the trunking radios from the CellCom wireless beltpacks and broadcast out on it. It doesn't affect our equipment anymore." Incorporating the trunking radios with the Clear-Com system via FOR-22 interface eliminated the problem of induced measurement errors and created a safer testing environment.




**Application Diagram**

In addition, Hartley says, "With all this capability, we might only be using 10 to 15 percent, but there's so much more room to grow. We like systems like this where we're able to upgrade later."

Jaz Wray and Rom Rosenblum were key consultants that helped resolve their communication challenges. He says, “Jaz Wray and Rom Rosenblum have been infinitely helpful with any small question I have. With any large question, they’re willing to meet in person to make sure the system is going to work right.”

# Results

Today, the test engineers are confident that the information they give and receive through their CellCom wireless beltpacks will be loud enough to hear and clear enough to comprehend. The Eclipse-Median frame, V-Series panels, and CellCom wireless beltpacks have eliminated the frustration of repeating information, raising their voices, and struggling to hear critical information.

Hartley reports, “The quality of communication is vastly superior over our last system. I think the users that are on Clear-Com are a lot easier to understand and sound a lot better.” The team is also more productive with fewer questions and unknowns since calls can be replayed and instructions are always clearly recorded.

**Technicians on CellCom Wireless Beltpacks and Clear-Com’s CC-95 Headsets**

The 55 employees, from aircraft mechanics to management, now have greater opportunity to access full-duplex communication from the control rooms and blue room. Hartley says, “We have a lot more people on the CellCom wireless beltpacks. They can move from station to station to do whatever needs to be done so that was a big improvement for us.”

Operations are more efficient with the V-Series panels and CellCom wireless beltpacks because communication channels can be customized for each and every type of test. “We have accomplished a number of helicopter tests, a fixed wing test, and a propel wing test. We have a wide range of test customers. The application fits all of our test set-ups. It’s very dynamic and fluid,” expresses Hartley. “The features in the product were much better than any of the other competitors. It was something that would do everything that we wanted it to, but still have a nearly limitless number of features for the future.”

Like the Clear-Com products themselves which are unmatched by competitors, Hartley say that Wray and Rosenblum from the Clear-Com team have been “amazingly helpful” and “very quick to handle our problems and any of our technical difficulties.” Even as the testing team continues to grow and face new challenges, they are confident that Clear-Com will rise to the occasion and resolve any difficult issue that surfaces.

*Note: CellCom® and FreeSpeak® are different brands representing the same digital wireless intercom system (with minor technical differences). Due to trademark limitations, CellCom and CellCom Integra (formerly CellCom50) are only available in the U.S. and Canada; and FreeSpeak and FreeSpeak Integra (formerly FreeSpeak50) are available in all countries other than the U.S. and Canada.*

**Americas and Asia-Pacific Headquarters**
California, United States
Tel: +1.510.337.6600
Email: SalesSupportUS@clearcom.com
www.clearcom.com

**Europe, Middle East, and Africa Headquarters**
Cambridge, United Kingdom
Tel: +44 1223 815000
Email: SalesSupportEMEA@clearcom.com

**China Office**
Beijing Representative Office
Tel: +86-10-65811360/65815577