

# Land Mobile Stabilized Vehicle (LMSV)





Satcom Scientific, Inc., of Orlando, Florida USA has developed a new type of transportable earth station designed to transmit compressed digital video, Voice-over –IP, and high-speed internet connectivity in a vehicle that is capable of these types of transmissions while moving at speeds of up to 65 mph (104 km/hr). The LMSV was designed and built for Maritime Telecommunications Network (MTN) who leased the vehicle to NBC News for use in news coverage for *Operation Iraqi Freedom*. The vehicle was used in Iraq by NBC reporter David Bloom, and was appropriately dubbed “The Bloom Mobile”.

Satcom Scientific chose a stock 2003 Ford F-450, 4-wheel drive crew-cab diesel truck as the platform of choice since this vehicle has proven to be a very reliable, rugged, and stable vehicle for other transportable earth stations built and delivered by Satcom Scientific. The rear seat of the crew-cab truck was removed and three EIA-19 equipment racks were installed in that area to house the rack-mounted electronics. Swivel-base seats were installed on the passenger side that allowed the operator to rotate his seat to access the electronics. The truck featured an automatic transmission, special run-flat tires manufactured by Goodyear, and a heavy-duty cooling package that was essential for desert operations.

The truck featured a 10 Kw on-board generator that provided electrical power to the unit while it was moving. The electrical system also included a 60 amp DC Converter that would recharge the vehicle batteries when the truck was connected to utility power while being used in a fixed location. In addition, a 1500-watt power inverter allowed the rack-mounted electronics to be powered from the vehicle’s storage batteries. A transfer switch allows the operator to select power from either the vehicle’s internal system or from the local utility grid. A multi-tap isolation transformer is used to protect the on-board systems when the vehicle is operated from a 95-250 VAC utility supply if that power was available.

The truck featured factory in-dash air conditioning, but was also equipped with a 16,000 BTU air conditioner for extra cooling capacity in desert environments. The air conditioner featured a specialized sand filter that could be easily cleared of sand and other foreign objects. This air conditioner also cooled the interior of the antenna radome so that the electronics could be kept within operational tolerances.

The design team at Satcom Scientific integrated many safety features into this vehicle suitable for warfare operations. Several run-flat tires and wheels were adapted to the vehicle for quick-change ability. A 150 psi air compressor with air hose, adaptors, and an air impact wrench are standard features on this vehicle to allow tires to be removed or repaired in the field if the truck happened to roll over shrapnel or other objects that would damage the tires.

Underbody compartments housed tools and interconnect cables. Additional watertight storage boxes were mounted on the deck that housed air, oil and fuel filters, drive belts, and many other truck spares that would have been difficult to obtain in the Middle East. Storage space was also allocated for an extensive first aid kit, emergency rations and water and CBR (Chemical, Biological, and Radiological) protective clothing.



A SeaTel gyro-stabilized 1.2-meter antenna system was used for the transmit/receive satellite antenna. This antenna is mounted inside a radome that prevents the antenna being affected by wind and blowing sand while the vehicle is in operation. The uplink and downlink electronics are packaged in a single-thread configuration, and mounted inside the radome. A *Codan* block up/down converter is used because of its compact design. A Xicom 200-watt TWT Amplifier supplies more than ample power to the Ku-band system in case environmental or atmospheric conditions require a higher power level.

The truck features a Microwave Radio Corporation *Coderunner 4* Analog/Digital receiver to accept the outside video that was transmitted from a distant location by wireless means. The modulation technique was COFDM, which allowed for great distances between the camera transmitter and the receiver mounted inside the LMSV. This distant location, depending on terrain, can be as much as 12 miles away from the LMSV. In Iraq, NBC used a *Coderunner 2* Analog/Digital transmitter was installed on an M-88 tank vehicle where David Bloom and his cameraman were located. From this location they were able to transmit live video footage back to the LMSV, which was usually farther back in the moving army column. A *Link* digital video encoder converted the video signal to a DVB output at 70 MHz for transmission to the satellite.

A Cisco 2600 Router was at the heart of the VoIP system that allowed multiple telephones and/or computers to be connected to the system for two-way communications over the satellite. A channel bank unit and Ethernet switch allowed for the connection of these devices. The LMSV also utilized two steerable high-resolution digital cameras that were mounted to the front and rear of the LMSV that could be used for security, surveillance, or live full motion news coverage of the area around the LMSV.

Multi-channel Audio monitoring and Color Video monitoring was available in the rack-mounted electronics and assured the crew that the signal was getting to the satellite and back again. A compact spectrum monitor was also part of the monitoring package that allowed the operators to monitor the carriers on the transponder while on the move. As an emergency back up, an Iridium satellite telephone and a GlobalCom satellite telephone were also installed inside the LMSV.

The LMSV is another “First of its kind” developed by Satcom Scientific, and a tremendous success for NBC in front-line wartime broadcasting of “*Operation Iraqi Freedom*”. The LMSV has been nominated for an engineering Technical Emmy award in the United States.