

## CONSIDERATIONS FOR THE INTEGRATED DESIGN AND CONSTRUCTION OF SECURE SHIELDED FACILITIES

Protection against illegal electronic eavesdropping is essential to maintain confidentiality of government programs and proprietary matters of financial institutions and private corporations. A totally shielded facility is the ultimate protection against electronic eavesdropping.

Before constructing a shielded facility, initial considerations are given to program requirements, budgets, schedules, construction methods, security, and access. Design of shielded planes, power filters, egress problems, and construction alternatives must also be evaluated. Eventually, a decision on the specific type of shielding is made.

Four areas of protection are separately considered and engineered to suit:

- (1) attenuation of and shielding against radio frequencies, throughout the electromagnetic spectrum;
- (2) anechoic reflection/absorption;
- (3) electrical isolation of the entire facility against ground except at a single controlled point;
- (4) physical security against forced or uncontrolled entry.

Each program will require one or more, perhaps all of the above areas of engineered protection.

Facility shielding is accomplished by construction of a metallic enclosed work space, floor, all walls and overhead, together with a specially designed shielded door or doors, and special filters for each and every penetration of the metallic enclosure. Penetrations include windows, utilities, vents and drains, data and telephone lines, etc. Shielded enclosures may be small individual rooms or multi-story buildings. All sides, top and bottom of the metallic enclosures may be constructed of prefabricated components or they may be formed of metal panels continuously welded in place. Each has advantages, but larger facilities, which will not require relocation from time-to-time, can be more economically fabricated in place and once certified, may be expected to give service indefinitely. Earth movements from seismic forces or from heavy loaded passing

trucks often cause prefab components to shift necessitating periodic maintenance and re-certification of component-built facilities on a programmed basis.

Shielded test areas, wherein repeatable measurements are to be performed, require the addition of anechoic linings. These various linings reduce reflection off the shielding and can be designed for the specific portion of concern of the electromagnetic spectrum.

Certain shielded facilities require ground isolation. If any portion of the metallic enclosure is in contact with other steel or with concrete or earth or any signal-conducting material, signals can leave the chamber. Ideally, the facility must be di-electrically separated from the planet Earth except at a single controlled ground point where resistance should be less than five ohms.

Physical security is prescribed by Owner/Users and by Federal Government Agencies and is accommodated by specially designed and alarmed walls and slabs, openings and penetrations. These include custom designed and constructed vestibules with vault doors which have electronically controlled access and are signal alarmed/monitored at guard stations. Other physical security measures include sonic motion detection sensors, infrared intrusion devices, steel mesh in secured storage walls, combination locking devices, sound insulation in walls, personnel "mantrap" bars in air-conditioning duct work, and more.

The growing demand for secure integrated shielded facilities can best be met by those experienced companies capable of undertaking the single responsibility for all phases of planning, construction and warranty.

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*This article was written for ITEM '84 by Richard Willich, President, Dow Industries, Culver City, CA.*