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U.S. ARMY MOBILITY EQUIPMENT MERADCOM RESEARCH & DEVELOPMENT COMMAND

DoD PHYSICAL SECURITY TECHNICAL SUPPORT AT THE 1980 WINTER OLYMPIC VILLAGE

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XIII OLYMPIC WINTER GAMES LAKE PLACID 1980

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PREPARED FOR
COUNTER INTRUSION LABORATORY
AND
PROJECT OFFICER, PHYSICAL SECURITY EQUIPMENT
USA MERADCOM
FT. BELVOIR, VA.

86938

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER: CONTRACT REPORT
2. GOVT ACCESSION NO.: AD-A094 574
3. RECIPIENT'S CATALOG NUMBER

4. TITLE (and Subtitle): DOD PHYSICAL SECURITY TECHNICAL SUPPORT AT THE 1980 WINTER OLYMPICS VILLAGE,
5. TYPE OF REPORT & PERIOD COVERED: FINAL REPORT
6. ~~PERFORMING ORG. REPORT NUMBER~~

7. AUTHOR(s): ~~MR.~~ SANFORD C./CURCIE; ~~MR.~~ ROBERT L./BARNARD
8. CONTRACT OR GRANT NUMBER(s): DAAB07-79-G-6201-E101

9. PERFORMING ORGANIZATION NAME AND ADDRESS: ANALYTICS, INC. 766 SHREWSBURRY AVENUE TINTON FALLS, NEW JERSEY 07724
10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS: (11) 2 Sep 80

11. CONTROLLING OFFICE NAME AND ADDRESS: U.S. ARMY MOBILITY EQUIPMENT RESEARCH AND DEVELOPEMENT COMMAND FORT BELVOIR, VIRGINIA 22060
12. REPORT DATE: 2 September 1980
13. NUMBER OF PAGES

14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office): (14) MERADCOM-TR
15. SECURITY CLASS. (of this report): UNCLASSIFIED
15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

DISTRIBUTION

DISTRIBUTION STATEMENT A
Approved for public release;
Distribution Unlimited

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

OLYMPICS, TERRORIST, COUNTER-TERRORIST, TACTICAL SENSORS, LIGHTING, COVERT ALARMS, THREAT, ILLUMINATION, INTRUSION DET., PHYSICAL SECURITY, DURESS SENSORS, SHORT RANGE RADAR, WINTER OLYMPICS, COUNTER INTRUSION SENSORS, CLOSED CIRCUIT TEL, PERIMETER FENCES, POSSE COMMITATUS

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

A review of those methodologies and areas of Department of Defense, USAMERADCOM, PM REMBASS, Navy NESEA support activities for the physical security/counter intrusion requirements at the 1980 Winter Olympic Games, "Olympic Village", Ray Brook, N. Y. Major support activities were furnished to the New York State Police (NYSP) as primary response/reaction force, with DoD elements serving in maintenance, logistic and technical support role.

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398976

2 September 1980

ANALYTICS 1483.01.01-TR

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DoD PHYSICAL SECURITY EQUIPMENT TECHNICAL SUPPORT AT THE 1980 WINTER OLYMPICS VILLAGE

This report is submitted to the U.S. Army Mobility Equipment Research and Development Command under Contract Number DAAB07-79-G-6201-E101.

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EXECUTIVE SUMMARY

This Final Report characterizes the performance of DoD-furnished equipment and support personnel employed in Counter-Intrusion/Counter-Terrorist (CI/CT) operations at the Olympic Village during the 1980 Winter Olympics at Lake Placid, New York.

Performance may be explicitly summarized as follows:

- All detected intrusions, for whatever reason, were so localized that New York State Police (NYSP) reaction forces or patrol units were able to make effective apprehension.
- All DoD-furnished systems and equipment performed to a better-than hoped-for level of performance, maintainability, interoperability and flexibility.
- It is technically practical and was shown to be highly feasible to integrate commercial, tactical and various hybrid items of hardware into fully functional systems to meet short-term operational requirements.
- All levels of execution of this project demonstrated the success of a goal-oriented team whose individual members came from various DoD organizations, police forces and contractor representatives.

The entire CI/CT operation was conducted in an atmosphere charged with intense media concentration, in a multi-national "community" of some 1,600 individuals, many from nations whose political ideologies are at variance with those of the United States. It is safe to say that there are those who would have enjoyed any incident, regardless of how trivial, which would have resulted in embarrassment to the host nation. No such event took place in and around the Olympic Village.

Personal conduct and behavior of all participants reflected the highest standards. Considering the extreme sensitivity of DoD involvement under such circumstances, the importance of this point should not be overlooked.

Achieving the degree of physical security counter-intrusion protection required, brought into play both civilian and military technologies. These have been adapted to provide positive security to the utilities, industrial and military installations as well as military patrol bivouacs. Principal subelements and technologies employed included:

- Unattended Ground Sensors (UGS). These detect seismic, magnetic, Infra-red (IR) or acoustic stimuli. They are capable of detecting a wide variety of intruders over a diverse range of ambient, terrain and climatic conditions. Special sensor monitors, recorders and large area displays were used to permit the positive tracking of intruders along the various avenues of approach leading into the Olympic Village.

- Closed Circuit Television (CCTV). Small, commercial cameras suitable for operation under extremes of cold, and under widely varying ambient lighting conditions were employed as part of the Village's perimeter defense system. The CCTV cameras were used in conjunction with hard-wired monitor and recording sets in the security control center.

- Motion Detection Radars. Four, X-Band, low power, short range military doppler radars were used to detect either as "gap fillers" or to confirm targets as an integral part of the Village's perimeter defense system. Audible signals permit target type classification, and a range gate permits determining range and azimuth to the intruder.

- Night Vision Devices. Both goggles and tripod mounted night vision devices were deployed with the New York State Police. The goggles permitted zone patrol and reaction forces to operate under conditions of virtual total darkness. The latter devices supplemented other security measures attendant to VIP transient aircraft on the ground at Saranac Lake.

- Lighting. The value of lighting as a deterrant to criminal activities has long been recognized. A good lighting system serves to enhance the effectiveness of patrol and surveillance forces, and materially improves the effectiveness of CCTV equipment and persons responsible for CCTV monitoring operations.

- Duress Sensors. Two types were deployed by DoD: the first an overt system was installed in places where a guard, a secretary, a teller or similar control station could be placed in a position of duress (e.g., harassment, hold-up, etc.), and was available to silently signal the need for assistance. The second arrangement provided for a covert 2-way communications capability between selected members of the security staff and the security control center.

- Communications. A variety of communication sub-systems were provided; these included hostage/terrorist telephone system control and intercept arrangements (i.e., crisis management telephone equipment), to the establishment of a village-wide emergency telephone number ("111"). Special automatic ring-down lines and "hot line" circuits were also provided to assist the New York State Police in effectively dealing with large-scale security measures. In addition, conventional hand-held, low power portable radios, vehicular radios and base station facilities were used to permit effective coordination and liaison between DoD elements and NYSP forces.

Two very important achievements were made in the design and implementation of the total counter-intrusion/counter-terrorist system(s) provided by the Department of Defense (DoD) to support state police and federal law enforcement operations. The first, mentioned briefly above, was the continuous covert means through which the NYSP's command level personnel could achieve a high Command, Control and Communication (C^3) capability within all residential areas of the Olympic Village. Residential areas were considered the priority targets for any group of terrorists. The use of this system, explained in detail in Section II, permitted intelligence gathering without violating civil rights, privacy, or the statutory requirements regarding electronic surveillance and/or wire "taps".

Secondly, use of this system, in conjunction with the CCTV arrangement, permitted the interrogation of a suspect by the responding state trooper under the guidance and skilled prompting from the (remote) security control center. The interrogation was very effective, much to the consternation of the suspect.

CONCLUSIONS

The following summarizes the conclusions reached as a result of on-going and after-action reviews:

1. DoD elements were fully capable of providing a Quick Reaction Capability (QRC) which is not found elsewhere, in those areas involving specialized physical security knowledge, protective surveillance and counter-intrusion assistance to civilian law enforcement and security authorities.

2. Tactical equipment offers advantages for short-term mission requirements in terms of its; (a) ease of operation, (b) quick deployment, (c) ruggedness, (d) recoverability, and (e) logistic train for maintenance and resupply. Such features are not generally duplicated in readily available commercial or fixed-plant hardware.

3. Due to the extensive Operational Testing (OT) and Human Factors Engineering (HFE) associated with military tactical equipment, skill levels and the training required for mastery of the equipment are quickly learned and absorbed by such para-military groups as police officers.

4. Very effective systems can be made operational for temporary turn-over to virtually any major police department, sheriff, or state police agency where terrorist operations are suspect. Many police officers are often deeply involved in USAR/USANG activities; many enjoy prior in-service experience, and are highly receptive to working with state-of-the-art DoD electronic equipment. The on-site infra-structure between DoD and NYSP officers was very close and highly cooperative.

RECOMMENDATIONS

The following recomendations are made:

1. That DoD/DARCOM anticipate requests for security assistance from the organizers of the 1984 Summer Olympic Games at Los Angeles, and possibly under Foreign Military Sales (FMS) for counter-intrusion operations at the 1984 Winter Olympic Games at Sarajavo, Yugoslavia.

2. That other federal, state and local agencies be appraised of the success and limitations achievable through the augmentation of their personnel by the use of remote sensing and surveillance techniques.

LESSONS LEARNED

Although the project was highly successful and achieved its goal and was a credit to all organizations and personnel who participated, there were several observations which fall in the category of lessons learned that have merit for future consideration and are appropriate as a matter of record. These lessons include the following:

1. Additional Use of Closed Circuit Television (CCTV): Security and crime prevention go hand-in-hand. It was the feeling of many participants, including NYSP personnel, that additional CCTV cameras, for example in the dining area cloak room, could have been helpful in preventing theft of outer garments, official team blazers, and other personal items. The likelihood of such theft inconvenienced some residents; they had no secure place to store such garments while in the dining area. However, there is a counter consideration that must be noted relating to the fact that excessive CCTV coverage can create an attitude or in fact be an invasion of privacy. There is, of course, a balance to be struck. The net analysis of the CCTV security coverage for this project is that it was adequate and short of increased manning in the control center along with other manpower and cost considerations. More coverage could not have been provided.

2. Morale: A minor morale problem existed in that the PO-PSE directed on-site personnel (military, DAC, and contractor) were not provided with appropriate off-duty consideration by LPOOC/IOC officials. The Army enlisted personnel on-site observed the fact that many other "volunteer" personnel were provided free access to events and transportaion.

3. Frequency Allocation: Action to obtain frequency allocations for DoD/Federal activities should be coordinated and accomplished at least 6 to 12 months before the starting date. A thorough study of projected frequency requirements is essential to ensure adequate communications capabilities for both direct and support systems.

4. Personal RF Communications: Experience gained from the XIII Winter Olympics projects a need for increased and enhanced "personal" RF communications, technical liaison, and provisions for physical security support personnel for future events such as the 1984 Los Angeles Olympics. Such systems preferably should provide a measure of privacy (20 F3Y modulation, or, at worst case, band splitting).

5. Tower Facilities: The top of the AN/PPS-15 65' guyed tower is an excellent location for the Army-furnished CCTV variable pan/tilt/zoom cameras (600 to 1000 line). A high resolution IR-viewer, capable of CRT operation is another feature which should be considered in the future.

6. Communications vs Control Center: Communications control and other control center operations need adequate separation, both in terms of physical separation and personnel responsibility. Although Olympic Village operations were adequate, personnel availability priorities for overall Olympic support by the NYSP forced a decision to operate the control center with two rather than the acknowledged requirement for three men per shift. As rated in the body of this report, architectural constraints prevented the best overall use of human resources available.

7. Time-Lapse Video Tape Recording (TL/VTR): Careful design and installation are necessary in using multiple camera sequencing for time-lapse VTR. Horizontal and vertical video alignment, black and white voltage values and other parameters must be carefully considered to prevent frame by frame picture tearing or smudging when frames are to be reviewed in the playback mode. DoD elements had little or no time to perform interface testing or to procure commercial grade TL/VTR equipment, large-area monitors, and to

meet the required operational dates. Use was made of on-hand, off-the-shelf items which could be assembled and made ready for immediate shipment to the field site.

8. Responsive Maintenance Support of Off-the-Shelf Equipment: Plans must include prior coordination with and a commitment by maintenance/service companies to ensure that off-the-shelf equipment is continuously operational. This is particularly true for sites that are far removed from population centers that normally have a greater abundance of service companies with the capability of repairing the varied electronic, acoustic, and other sensory devices. There is also a necessity for "selective spares".

SECTION I
DoD PHYSICAL SECURITY EQUIPMENT AND TECHNICAL SUPPORT AT THE 1980 WINTER OLYMPICS VILLAGE

Noting that a successful terroristic penetration, taking of hostages, and the resulting death toll, such as occurred at the 1972 Munich Summer Olympic, could not be permitted the slightest chance of success at the 1980 Winter Olympic Games, meant that the emphasis on security had to rank extremely high on the list of priorities, before and during the games at Lake Placid.

The growing use of terrorism as a political means, plus the presence of 1685 athletes from the nations of Europe, Asia and the Americas further increased the likelihood that some terroristic group would attempt to exploit the presence of the Olympics to further their cause. Once the final selection of the village of Lake Placid, New York was made as the site of the 1980 Winter Olympic Games, the planning and implementation of total security system became important to a variety of Federal, State, and Local officials.

Much of this burden fell upon the New York State Police (NYSP). For about two years they had studied the complex task of preparing and integrating requirements for Olympic security; this included not only conventional physical security arrangements, but also the allocation of resources for crowd control, criminal investigations, and traffic control requirements.

Several sports sites (venues) were involved, any one of which could have been attacked by terrorists, however, it was generally agreed that the Olympic Village, the official residence of the athletes' staff was the most vulnerable. Vulnerability existed because of a variety of reasons; first and foremost was the fact that athletes lived together by national groups. This meant a high degree of potential hostages would be concentrated together, especially in the midnight to dawn timeframe when no events were scheduled. At all other times national groups would be dispersed and the opportunity for seizing hostages reduced accordingly.

The Olympic Village is a thirty-six acre complex situated immediately to the South of State Highway 86, on the Old Camp Adirondack Road, in the Village of Ray Brook, New York. The village, built as a federal prison, was designed and constructed for the Bureau of Prisons (see Figures 1-1 and 1-2). The plans were based on other, earlier federal prison facilities with special adaptions for the local terrain and ambient climatic conditions. Figures 1-3 and 1-4 are photographs of scale models, showing the location and detailed layout of supplemental mobile residential, work and office trailers, which were required to provide specialized work space for participating teams. These FBI models served command personnel and were employed during the preparation of counter-intrusion strategies.

Conventional inmate housing was in the five "clam shell" buildings (Figure 1-4); however, to meet the temporarily inflated population, temporary housing was created out of mobile trailers and in a large portion of the facility's main, or central building.

Now, in many respects a prison would appear to offer the ideal arrangement for counter-intrusion purposes; however, this is not necessarily the case, because of the subtle design differences necessary

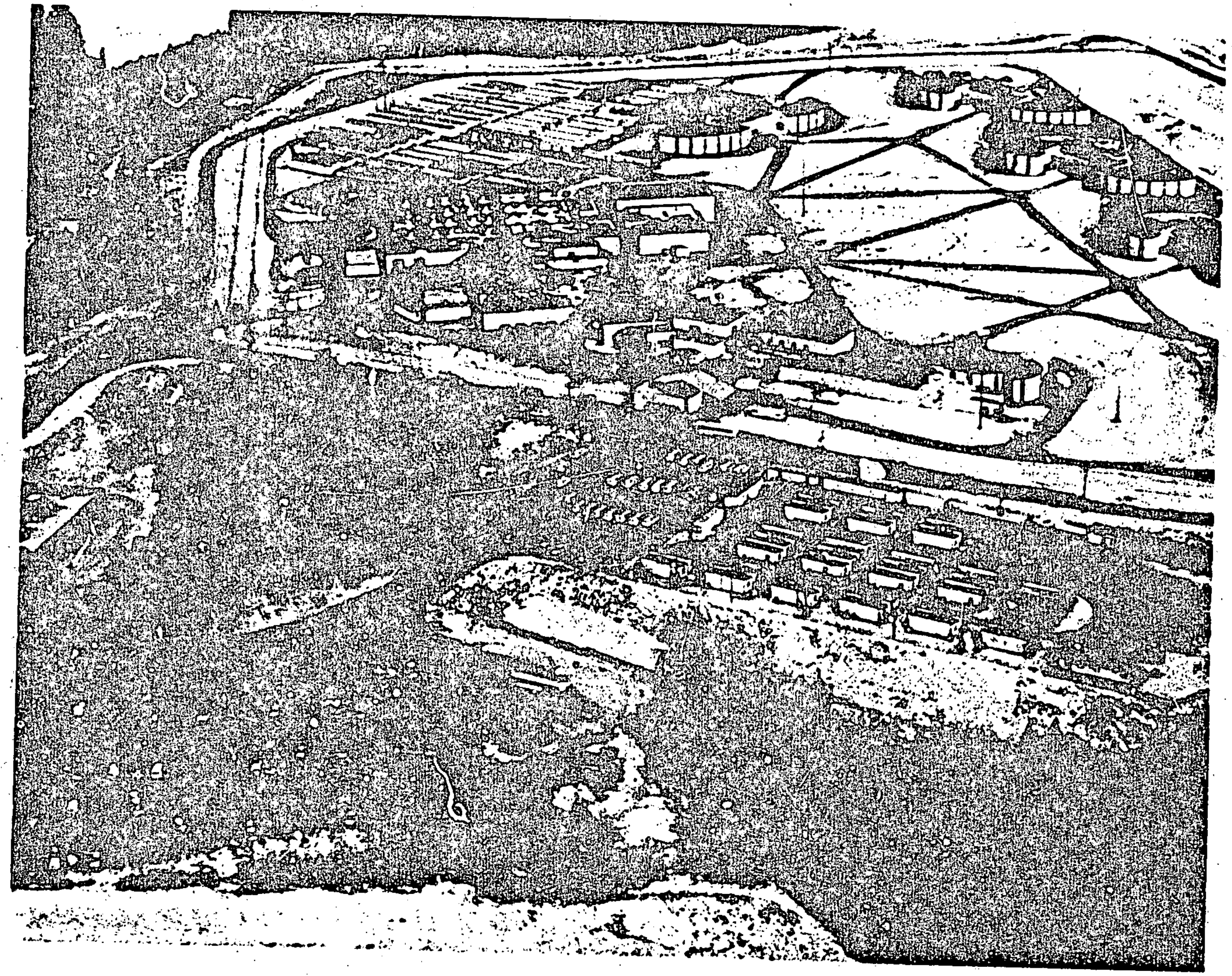

Figure 1-1. Aerial Photograph of Olympic Village (Courtesy NYSP).

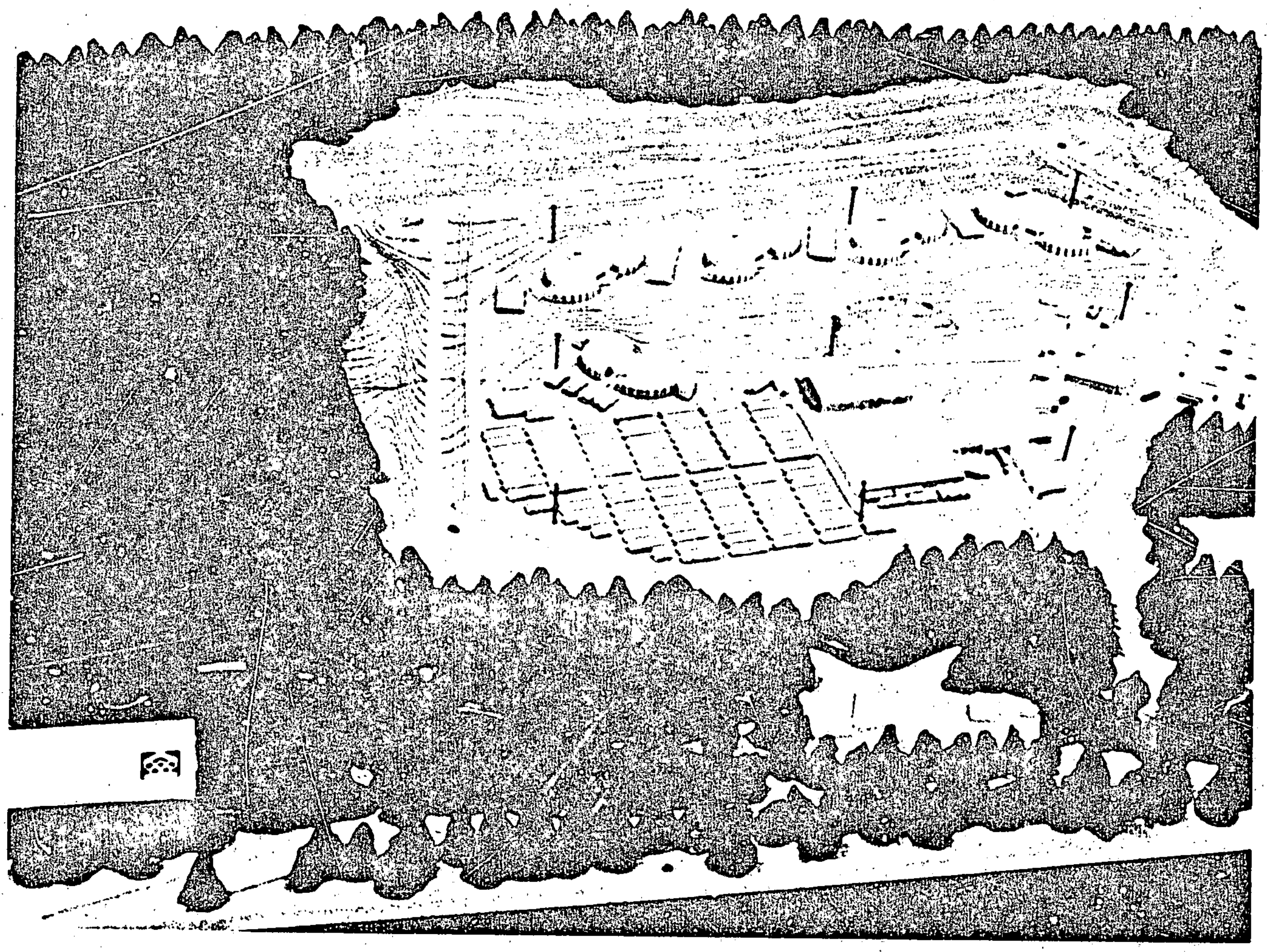

Figure 1-2. Architect's Scale Model Rendition of Village. Note Tempcrary Work and Residential Trailer Complex.

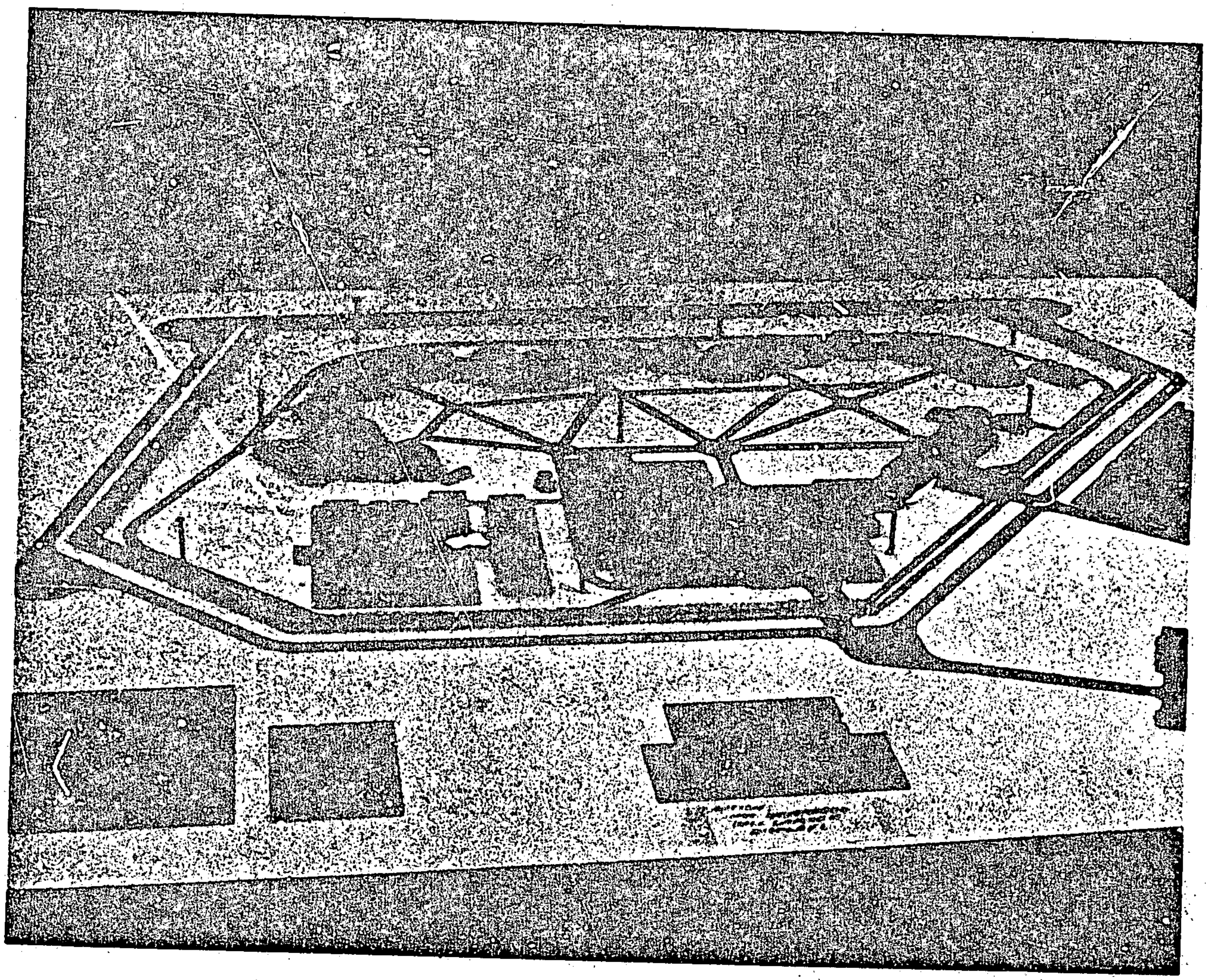

Figure 1-3. Scale Model of Olympic Village Prepared by the Federal Bureau of Investigation (FBI). Extensive Use was Made of Village Models, Aerial Photographs and Ground Reconnaissance in Planning Counter-Intrusion/Counter-Terrorist Strategy.

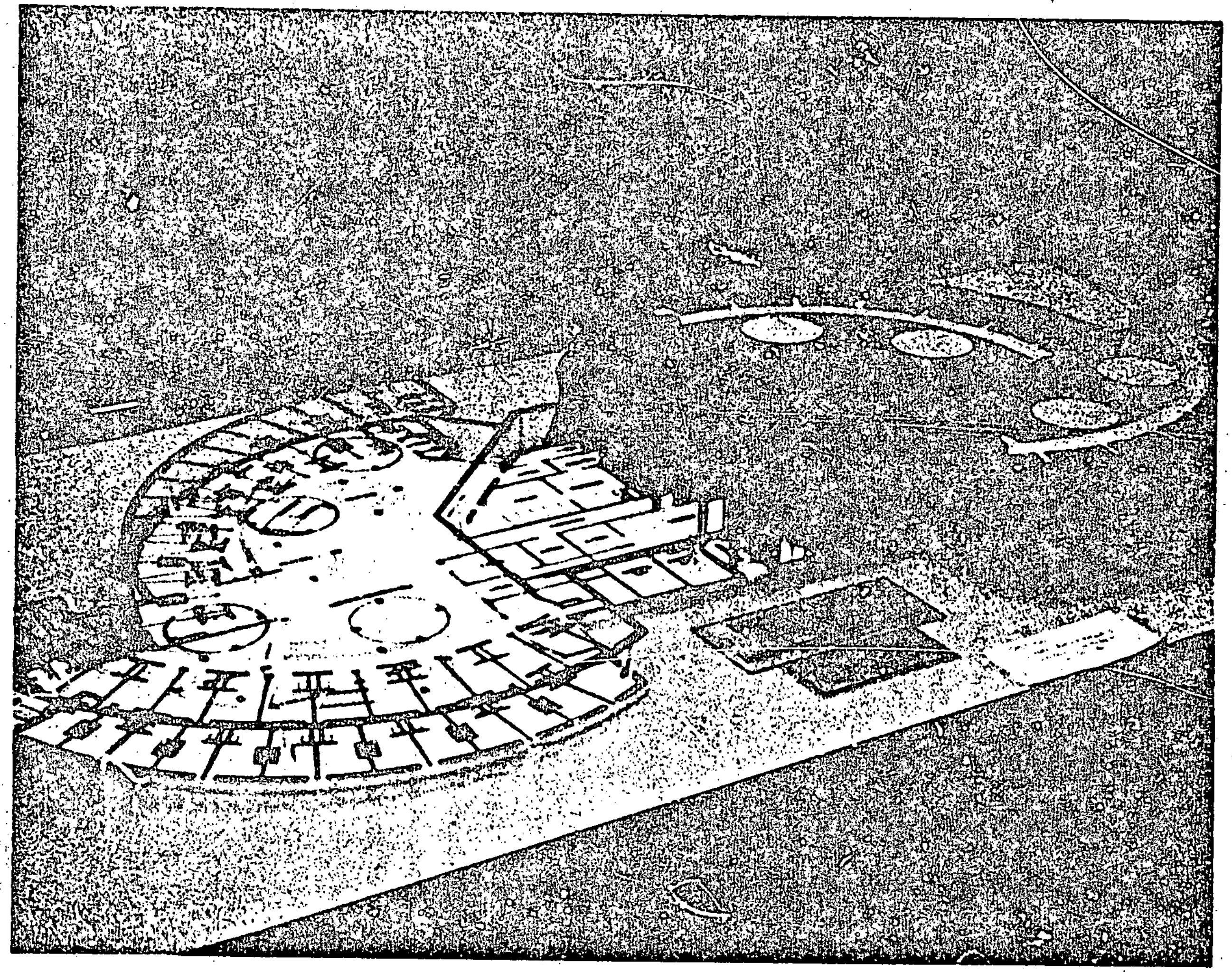

Figure 1-4. Scale Model of Individual Residential Building Constructed by FBI. Model Served as Three Dimensional Plan for Buildings H, I, J, K and L.

to meet the goal of keeping inmates in versus keeping intruders out. Figure 1-5 illustrates the basin-like location of the village/prison. With fences in place, an escaping inmate would have a difficult uphill climb. In fact, with a frozen snow cover, an escapee would find it tough going up the several terraces between the innermost fence and the tree line. The terraces would so reduce his rate of travel that the local guard force would have ample time to make a successful apprehension. The reverse is true for an intruding terrorist group; the terraces help speed up their rate of travel and would materially assist in a successful breaching of both security fences. In short, infiltration plans must have a different focus than ex-filtration plans.

During this initial phase of construction the State Police and various Federal law enforcement agencies foresaw the need for special, temporary methods of augmenting the village's defenses against unauthorized entry (e.g., counter-intrusion).

Two of the most important needs perceived were a reliable methodology for providing early warning to village security personnel, and a means whereby the presence of detected intruders could be confirmed to prevent false alarm and to ensure sufficient redundancy so that any one system would not become vulnerable or preempted by the extremes of cold, icing, snow or fog. Prisons, for the most part, depend on set procedures, such as head counts and lock-ups to provide the staff with early warning signs of attempted ex-filtration; the Olympic Village problem on the other hand, needed early warning of infiltration.

One such source of highly ruggedized, early warning devices, (e.g. tactical sensors) designed for quick installation and removal was the Department of Defense (DoD). However, such support brings certain legal constraints into play. "For example, the Army cannot provide support which would detract from combat readiness, compete with commercial

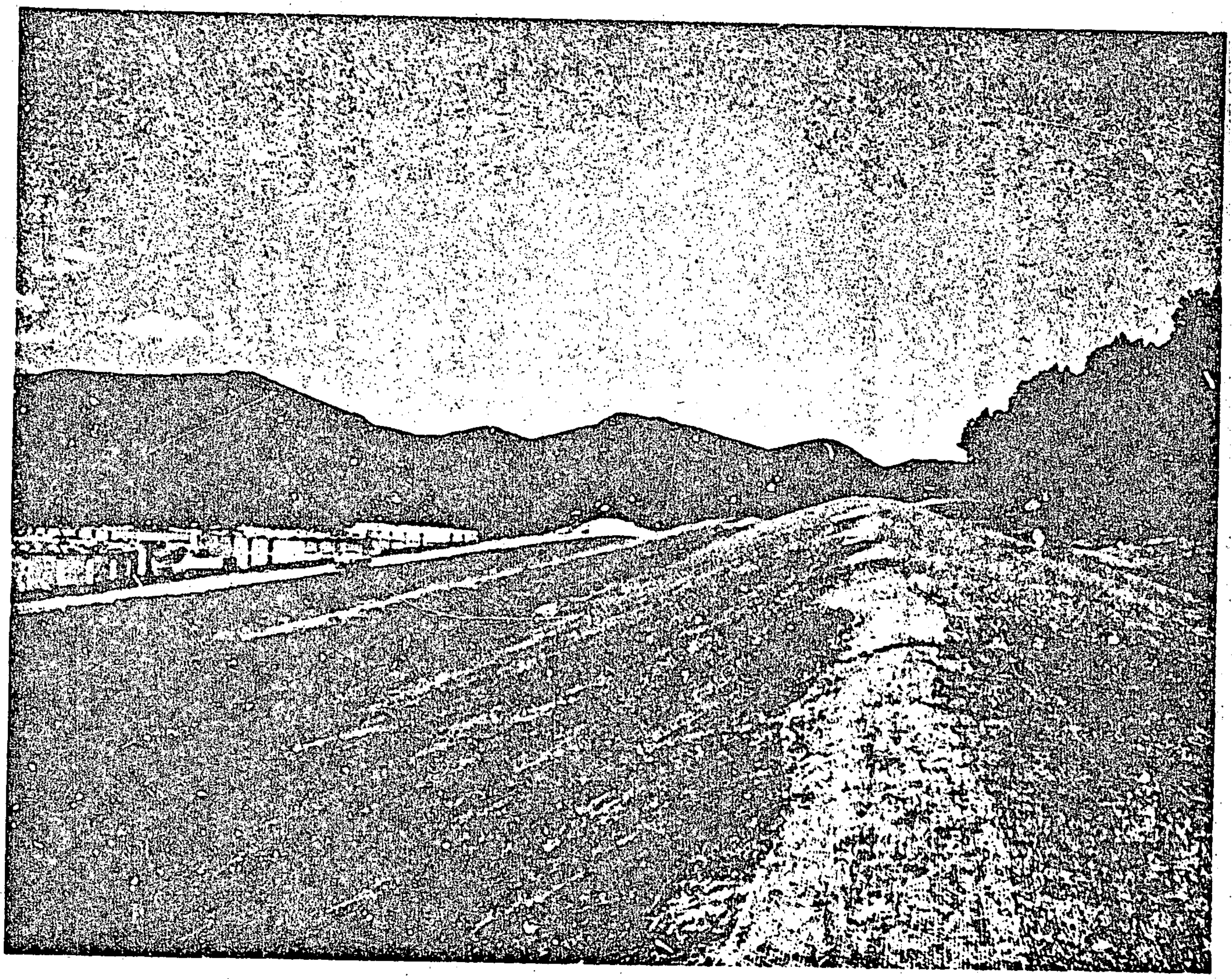

Figure 1-5. Infiltration Made Easier Through Basin-like Siting of the Olympic Village.

business or with local labor, or use soldiers to perform menial labor. The military equipment provided must be recoverable. Furthermore, the support requested from DoD had to be outside the capabilities of the Lake Placid Olympic Organizing Committee (LPOOC) and New York State which share responsibilities for hosting the Olympics." 1 The three major areas in which DoD support were provided to the 1980 Winter Olympic Games were: (1) Physical Security, (2) Communications-Electronics, and (3) Medical via the New York Army National Guard (NYARNG) under Task Force Placid.

Some of the specific physical security technologies where DoD support was considered were:

- Unattended Ground Sensors (UGS)
- Closed Circuit Television (CCTV)
- Short Range Motion Detection Radars
- Night Image Enhancement Viewing
- Lighting

It was felt that these would greatly enhance the State Police capability to localize and contain intruders in addition to providing the urgently needed early warning support.

Early in 1979, the New York State Police selected Analytics Inc., of Tinton Falls, New Jersey to prepare a technical assessment which would identify the requisite, tactically-oriented military assets needed for early warning and target confirmation. The tactical equipment had to withstand the rigors of rough handling and environmental

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1 Nason, Gardner M., Capt., Soldiers, January 1980, "1980 Winter Olympics - Total Army Support," Department of Defense, Washington, D.C.

exposure and could not require overly extensive training by police personnel assigned to the Olympics' detail. The training aspect was an important consideration, first because a 100% rotation of troopers was scheduled in mid-February, and secondly because individual troopers were rarely brought together into one central point from their respective duty posts around the state.

This technical assessment [2] was the vehicle by which State Police requirements were formally identified to both the State's official Olympic Task Force representatives and to officials of the LPOOC.

A recent article in the New York Times [3] headlined, "1979 TERRORIST TOLL PUT AT A RECORD 587." The article further stated, "A C.I.A. study of international terrorism that predicts more sophisticated attacks foresees a global rise in casualties because terrorists "may believe that a larger number of casualties are now necessary to generate the amount of publicity formerly evoked by less bloody operations." Nearly half the incidents last year occurred in the industrialized countries of Western Europe and North America (italics added, ed.). The study comments that many were the work of organizations from outside the region that had "chosen to export their grievances."

It was in light of these predictions, from intelligence based on F.B.I. data [4] [5] [6] and data from the State's criminal history files

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2 Analytics, Inc., "Counter-Intrusion/Counter-Terrorism Management Engineering Plan" (Ed: Martin, S., Curcie, S., et. al), August, 1979. Tinton Falls, New Jersey

3 New York Times May 11, 1980, New York, New York.

4 See for example, FBI Terrorist Research Center report, "The Birth of a Nation and Increase of Conflict," January, 14, 1980.

5 "Information on International Terrorists" January 2, 1980.

6 "Significant International Incidents, July 1, 1979 through September 30, 1979." FBI Terrorist Research Center Reports Updated.

and the NYSP BCI (Bureau of Criminal Investigations) files that the Winter Olympics security plan emerged.

A magazine article published just prior to the opening of the Olympic Village alledged that all recent prior Olympic events had been plagued with both intermal and external security problems. In "What Price Gold?"[7] the authors write, "Yet even a wild-eyed terrorist will not die for nothing. He wants maximum publicity for his swan song and chooses the time and place astutely-- usually directly in the media's lap. Which, on February 13, 1980 will be in Lake Placid, . . . covered by ABC Sports with a wall-to-wall TV blanket."

The FBIs Terrorist Research Center's publications are distributed to a variety of law enforcement officials. They provide valuable planning data and insight on potential terrorist organizations and their methodology for staging and carrying-out their activities. In short, even though no known overt terrorist attack took place during the Winter Olympic Games, it must be remembered that: (1) the scene was set and conditions were ideal; (2) political tensions had not lessened; and (3) that such attempts were becoming bolder, more lethal, and more widespread.

Looking back on the 1972 Munich Olympics for some degree of precedent, several key assessments surfaced concerning terrorist goals and costs they will bear. The attacking team consisted of five members of the Arab-sponsored Black September movement; they were able to scale the chain link fencing which surrounded the summer games village and after a few days of unparalleled suspense they exceeded the norm and

7 Lazarus, L., and Munson, H., "What Price Gold?" Swank magazine, January, 1980.

killed all eleven members of the Israeli Olympic squad at the Munich airport. The price paid by the Black Septemberists was cheap, 2 dead and 3 deported to Algeria where they were received with open arms. Two for eleven are not bad odds, especially when one considers the tremendous media publicity which the movement sustained.

The vulnerability of the Olympic Region to the accessable and relatively free border between the United States and Canada were the parameters which defined the type of support to be provided to the State Police by the Department of Defense (DoD). Considering the environmental factors under which work would have to be performed, the ever decreasing time span in which to accomplish the necessary tasks, and the possible constraints of a yet-to-be-finalized 1980 federal budget, was a less than enviable planning situation.

In September, 1979 in a letter to the Secretary of Defense, Mr. Petr Spurney, General Manager of the LPOOC, requested military support for physical security aspects of the Games. Based on this official request and the funding authorization provided by the Congress, the military establishment set into motion a complex series of events needed to translate the request into men and equipment to organize an operating physical security system.

PHYSICAL SECURITY RESPONSIBILITY

The responsibility for providing the physical security system for the Olympic Village was assigned to Col. Van D. Holladay, Project Officer, Physical Security Equipment (PO-PSE). This office is a staff adjunct to the Army's Mobility Equipment Research and Development Command (MERADCOM), located at Fort Belvoir, Virginia.

The PO-PSE assembled highly qualified engineers from within his own command and from other Army and Navy commands; these individuals were to take responsibility for such sub-systems as closed circuit television, tactical sensors, barriers and counter-intrusion methodologies. The efforts began with a comprehensive site survey: this provided an opportunity for many members of the counter-intrusion team to make their first official visit to Ray Brook, NY and to begin the process of coordination and liaison with NYSP and LPOOC counterpart personnel.

During these visits the threat profile was refined using FBI and NYSP constantly updated source data. Facilities, such as the in-place lighting systems, emergency power systems, fencing, and residential quarters were all thoroughly inspected and analyzed from the standpoint of equipment capability, equipment available, and lead-times necessary to ensure a fully functional system capable of operation by the troopers assigned to the Olympic Village security detail.

DoD civilian personnel performed seismic, acoustic and measurement of local ambient background condition. Drawings of the facilities to be protected were obtained and a myriad of other detailed matters were investigated. It was clear from the very onset that a formidable task was in the making, and that the dedication of every individual was going to be demanded on a virtually 'round-the-clock basis for the next three months.

Two very important considerations had to underlie the overall physical security environment. One is the federal statute which expressly prohibits the use of US Military forces in civilian law enforcement matters. Title 18 of the US Criminal Code 1835 provides for both fines and/or imprisonment for the use of military forces in civilian low enforcement matters. This act is frequently referred to as "Posse Comitatus" (in reality the act is <u>anti</u> posse comitatus) and is based on a very sound legal principal. In essence, military troops are not trained to protect the constitutional rights of civilians in law enforcement matters (for example, they are not trained to read Miranda "Bill of Rights" statements to suspects), as are conventional, trained, sworn duty police officers.

THE OLYMPIC "ATMOSPHERE"

The second underlying consideration given to US Military support operations had to do with the spirit of happiness, conviviality, and fellowship which prevails at all Olympics. We did not wish to turn the Olympic Village into anything that would cause people to comment on a "Stalag 17" environment. Figures 1-6, 1-7, and 1-8 illustrate the modern motif established by the LPOOC; the first figure shows a NSYP Trooper and his bomb "sniffer" dog with specially designed badge and blanket in the courtyard of the Village. A great deal of consideration by LPOOC's decorators had been given to the frequently voiced charge that the Village (as a prison) was bleak, overcrowded and inhospitable. All public and private areas were thus cheerfully decorated to provide an up-beat atmosphere. Therefore, except at the main entrance way to Building Q, where standard airport search and detection equipment were employed (Figure 1-9), the police and physical security systems were designed to blend, unobtrusively, into the background. Troops, DoD civilians, the system's integration contractor, and other personnel wore clothing and protective garments of civilian types and styles. Civilian vehicles were used in and around the Village instead of olive drab military trucks and sedans. A newspaper article summed-up the overall

Figure 1-6. Courtyard View of Village. Shown are NYSP "Trooper" with "Sniffer" Dog with Official Multi-Lingual Olympic Hostess.

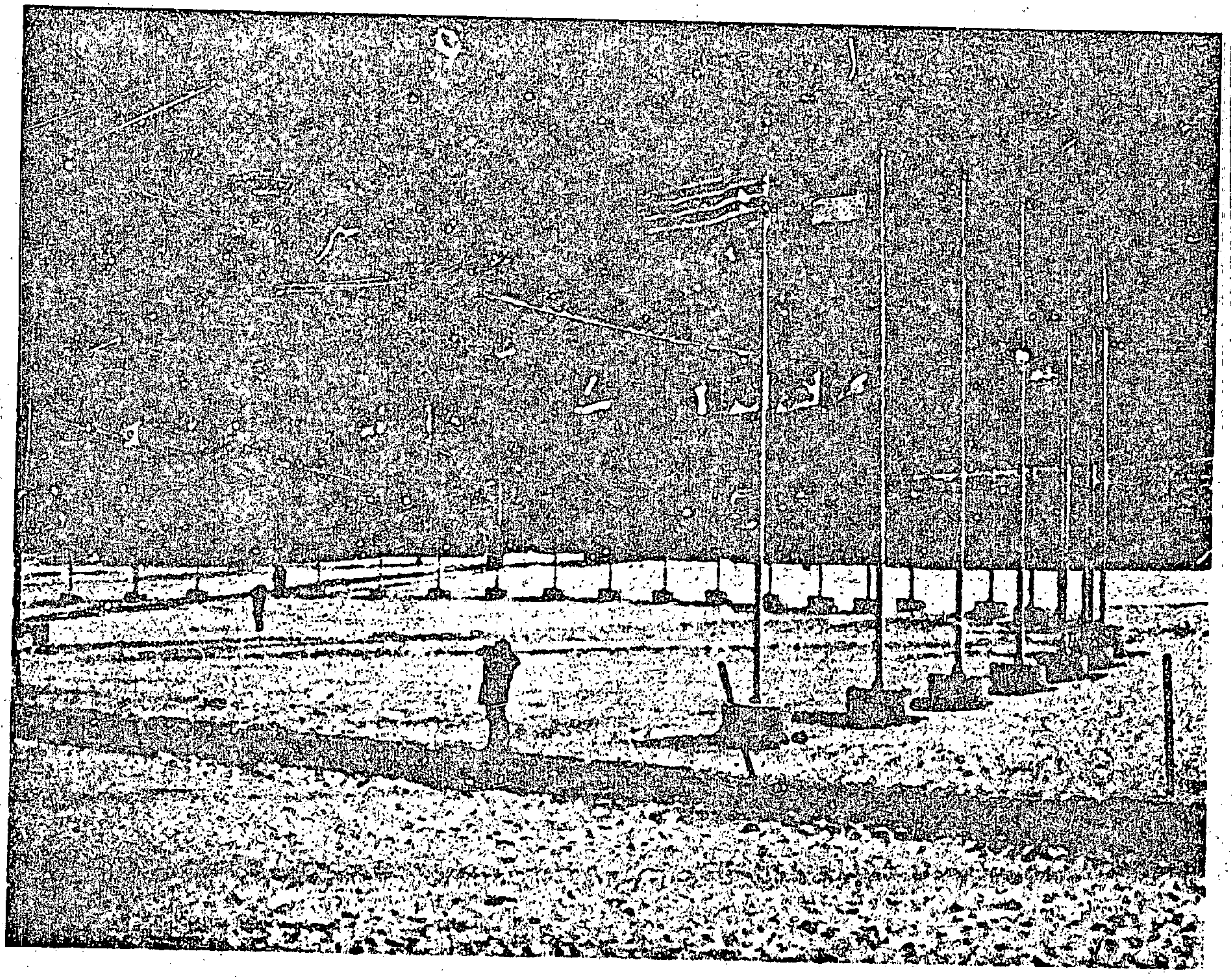

Figure 1-7. Ceremonies and Welcoming Area in Village's Courtyard. Building J Residence, Shown in Background; Note Rise in Elevation at Woodline to Rear of Building J.

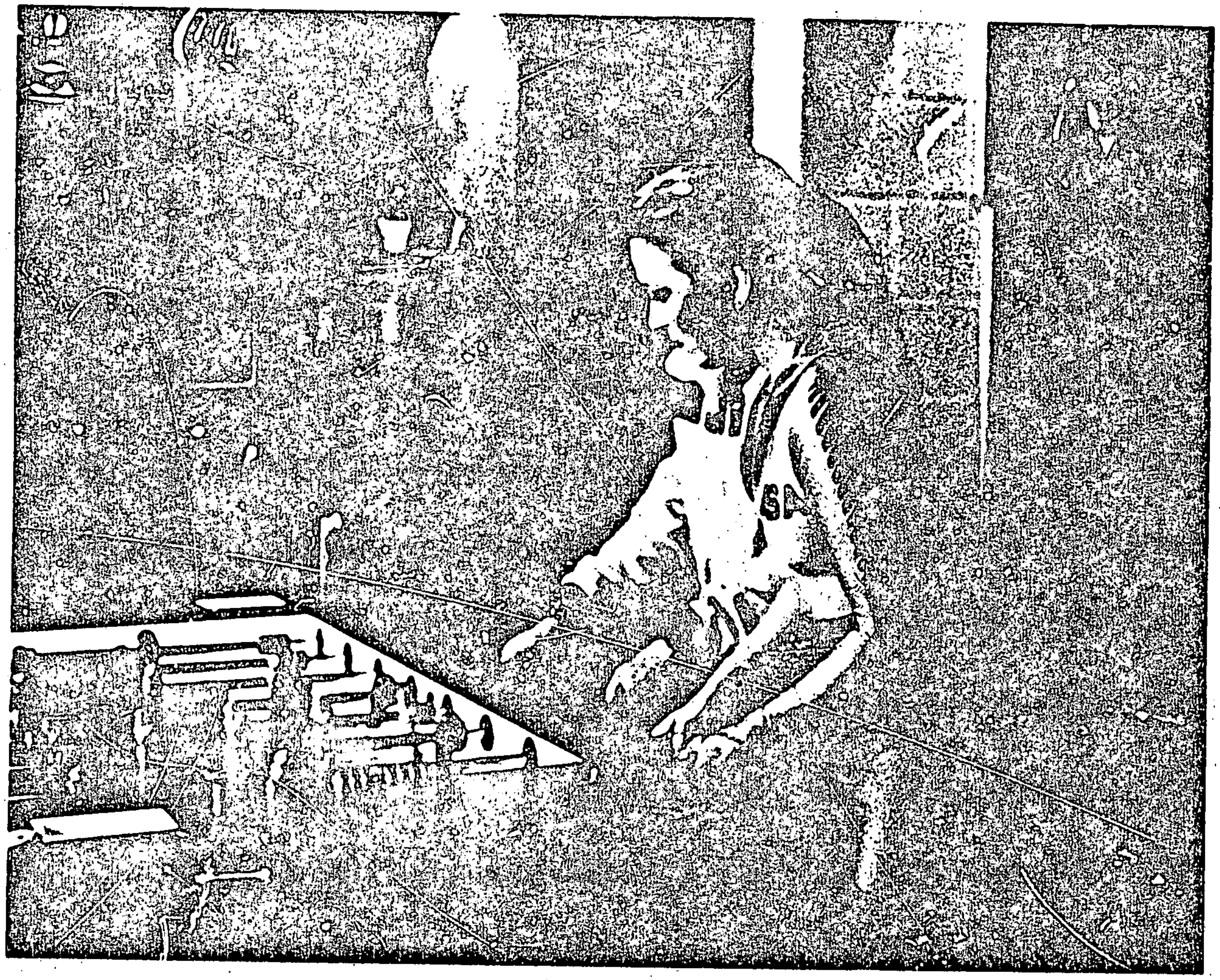

Figure 1-8. Miss Tanya Tucker, Popular Country-Western Star in Village's Game Room. Miss Tucker was One of Many Well Known Entertainers Who Visited and Performed in the Village's Well Equipped Theater.

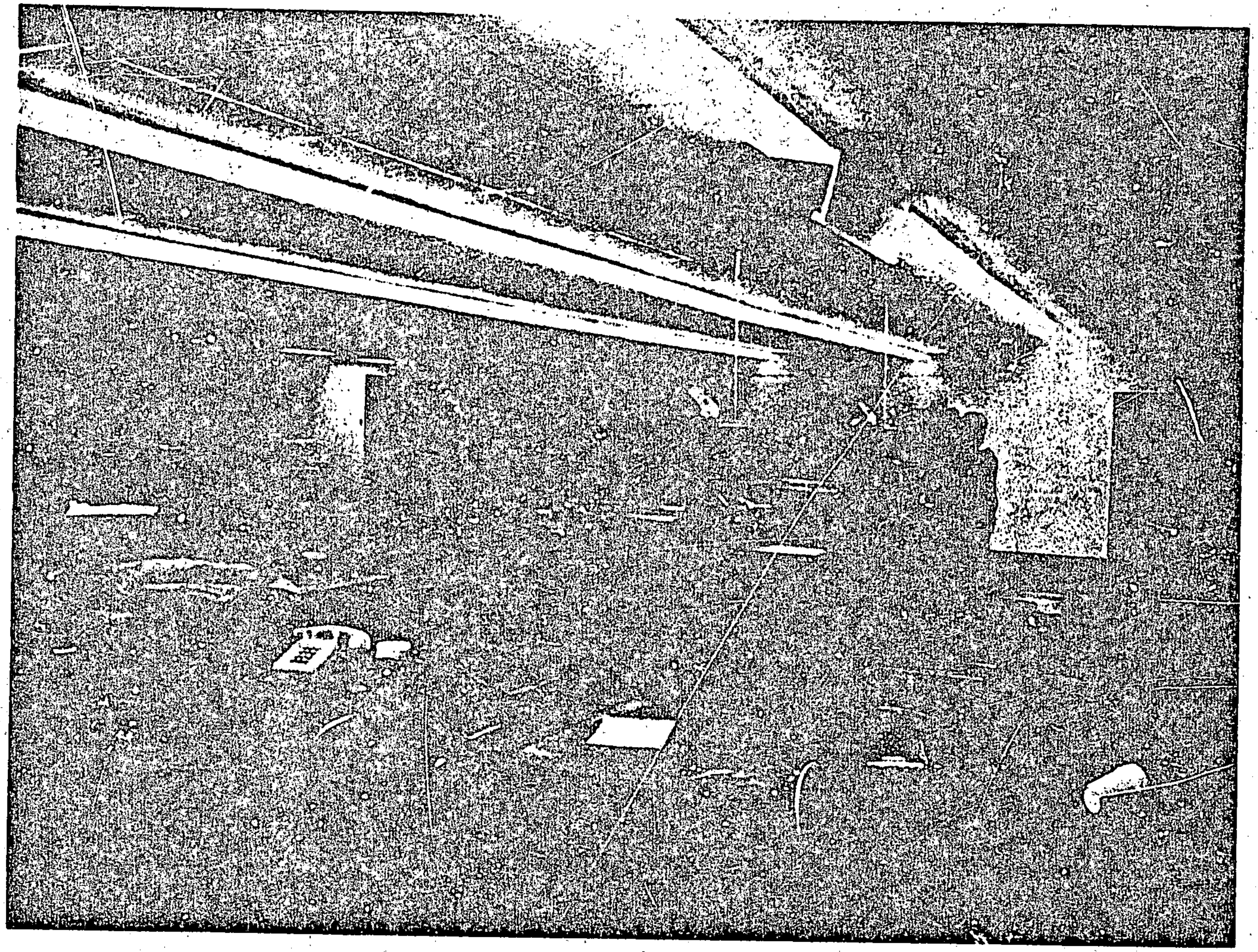

Figure 1-9. Interior of Building O. Baggage and Credential Inspection was Performed by State Police Assisted By Contract Guards. Accredation was Done in Advance of Arrival by Official Visitors, Residents, Etc.

situation with its headline, "Tight security in Village maintaining a low profile." [8]

AUTHORITY

The Congress of the United States in passing the 1979 Defense Appropriation Act, authorized DoD to provide, within certain limitations, logistical support, services and equipment to the 1979 pre-games and to the 1980 Winter Olympic Games. Much of this enabling legislation was sponsored by Congressman Robert McEwen (R-NY). A memorandum by the Secretary of Defense, dated October 27, 1978, designated the Secretary of the Army as the executive agent for all DoD support. A Department of the Army letter, dated August 6, 1979, directed further specific commitments to Mr. Petr Spurney, the General Manager of the XIII Winter Olympics, by the Under Secretary of the Army, Dr. Walter LaBerge.

As DoD's executive agent, the Army had the authority to task the other Armed Services to provide support. As a result, the US Navy's support via the Naval Air Development Center (NADC), at Johnsville, PA., and the Naval Electronics Systems Engineering Agency (NESEA), St. Inigoes, MD, were tasked to provide system and equipment for all Closed Circuit Television (CCTV), and the United States Marine Corps (USMC) was tasked to provide up to 100 DIRID (Dual, IR, Intrusion Detection) unattended ground sensors. Within the Army, Project Manager Firefinder/REMBASS (Remotely Monitored Battlefield Sensor System) was tasked with the problem of integrating all tactical sensor operations. Army Forces Command (FORCECOM) was tasked with providing troops; these came from the Military Intelligence (MI) Platoon of the 101st Air Assault Division, Fort Campbell, KY.

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8 Shapiro, Leonard, The Washington <u>Post</u>, Washington, D.C., circa February, 1980.

The US Army's Logistics Command (LOGCOMMAND) depot at Tobyhanna, PA., was tasked to provide technical and logistics support for the tactical sensor program.

These support actions were directly responsible and reported to Col. Van D. Holladay, (then) Commander of MERADCOM's Project Office for Physical Security Equipment. The PO-PSE staff was augmented by Department of the Army (DA) civilian employees selected from MERADCOM's Counter Intrusion Laboratories headed-up by Mr. Stuart A. Kilpatrick. In November, 1979, Analytics Inc., was placed under DA contract to provide systems engineering, integration, and support to the PO-PSE Lake Placid mission.

COUNTERING THE THREAT

Several techniques, methodologies and equipment types were available to counter the threat of unauthorized intrusion into the Village and its protected perimeter. Many of these evolved over the period of years as matters of Standard Operating Procedures (SOP), and until only recently were never quantified to ascertain their effectiveness. However, the Army, the National Bureau of Standards (NBS), the Bureau of Prisons, the Nucleur Regulatory Commission (NRC), and the United States Air Force have been actively engaged in the testing, rating and improving these practices and construction techniques; they had developed, rated and improved upon a wide variety of remote sensing techniques, sensor data communication links, and command and control designs, and central alarm station. This work also involved other disciplines such as Human Factors Engineering (HFE), behavorial sciences, and reduction of the response time necessary for the reaction force to meet, stop or apprehend the intruder(s).

For example, in evaluating the effectiveness of fencing there are many variables which must be considered; the height of the fence, the composition of the fabric, top and bottom rail construction, the use of in-board, out-board or "Y" type outriggers, the type of barbed-wire, or General Purpose Barbed Tape Obstacle (GPBTO) used with the outriggers, and whether two or more fences are to be employed, are among the considerations. At the Olympic Village, two parallel fences ringed the entire Village; these were 12' high, 20' apart and had no barbed wire or tape outriggers. For the Olympic period the outer fence was provided with a Fence Protection System (FPS) system, as part of the overall Bureau of Prisons physical plant.

Contrary to popular opinion, conventional chain link fences, even those provided with barbed wire or tape, may be breached by a well trained squad of from four to five individuals in a matter of seconds. At the Olympic Village, based on prior Army studies and actual field data, it was estimated that a successful penetration of the fence and entry into the closest residence building would see the first penetrator within the building within 30-seconds from the time the fence tampering alarm was stimulated.

This type of data and experience had to be integrated into the placing of Closed Circuit Television cameras so that the camera/monitor chain will detect activity outside of the fence prior to the fence tampering alarm sounds. At the Village, many athletes used either the inner or outer perimeter fence ways for jogging paths; in addition, the fence fabric served as convenient hand-holds for performing calesthenics such as early morning setting-up exercises. The placement of the cameras permitted observation of both the inner and outer perimeter fences by police personnel in the Security Control Center (SCC). It permitted a real time, continuous assessment, of all fence line activity. Typically, the location, Field Of View (FOV) and distance from the lens to any point along the fence line, provided an 8 to 15 seconds advance warning of an attacking force moving in on, and perpendicular to the Village's perimeter fence. Views from two of the monitors are shown in Figure 1-10 and 1-11.

It would have been a relatively simple undertaking to obtain Army Engineer support to fill the void between the two perimeter fences with military concertina wire. Obviously such an approach would have added to the overall delay time of fence penetrators; however, from a standpoint of the Village's feeling of fellowship and friendliness, this approach would have been quite unacceptable.

OLYMPIC VILLAGE DESCRIPTION

The XIII Winter Olympic Games conducted in the Lake Placid, NY area commenced on the 13th of February, 1980. Figure 1-12 illustrates the proximity to the Lake Placid area both to the Canadian border, and its relative isolation from major population centers of the state. The closest military installation is Plattsburg AFB, some fifty miles to the Northeast.

The construction of the Village was performed under the jurisdiction of the Federal Bureau of Prisons. The terrain in the area is hilly and undeveloped. The photograph in Figure 1-13 shows the heavily wooded surrounding areas which contain a number of well developed trails used for logging, hunting, skiing and snow mobile operations. Frozen streams and lakes provide easy access to many parts of the area.

The Village itself is a hexagonal plot of 36 acres, easily accessable from NY State Highway 86, and is immediately to the South of and contiguous to the New York State Department of Correctional

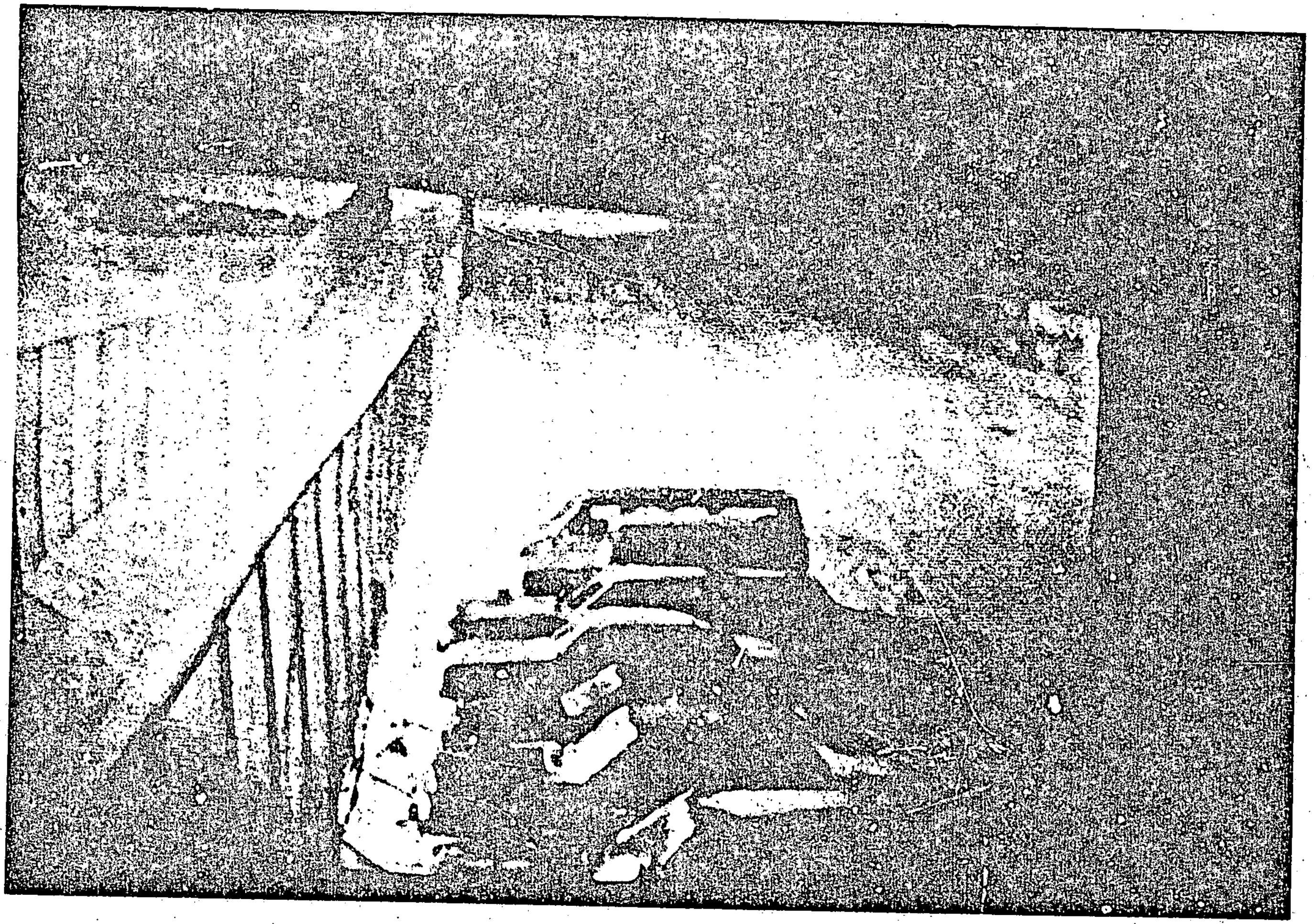

Figure 1-10. Close-up View of Conrac CCTV Monitor Presentation. Camera is Looking South Along Perimeter Fence from Building Q.

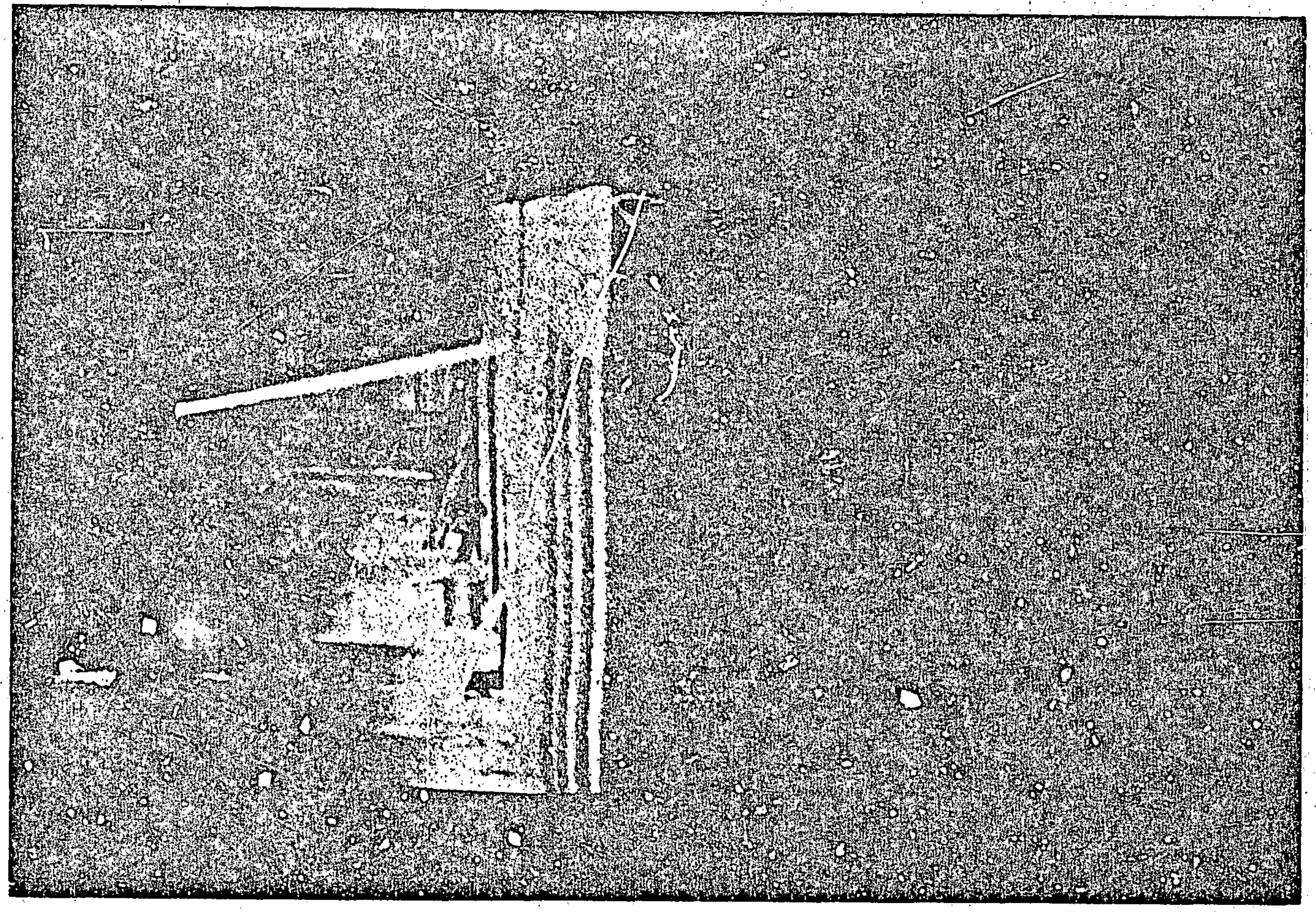

Figure 1-11. Detail of CCTV Surveillance Along Rear Loading Dock of Building B. Local Village Lighting was Supplemented with DoD-Furnished Sodium Vapor Lamps.

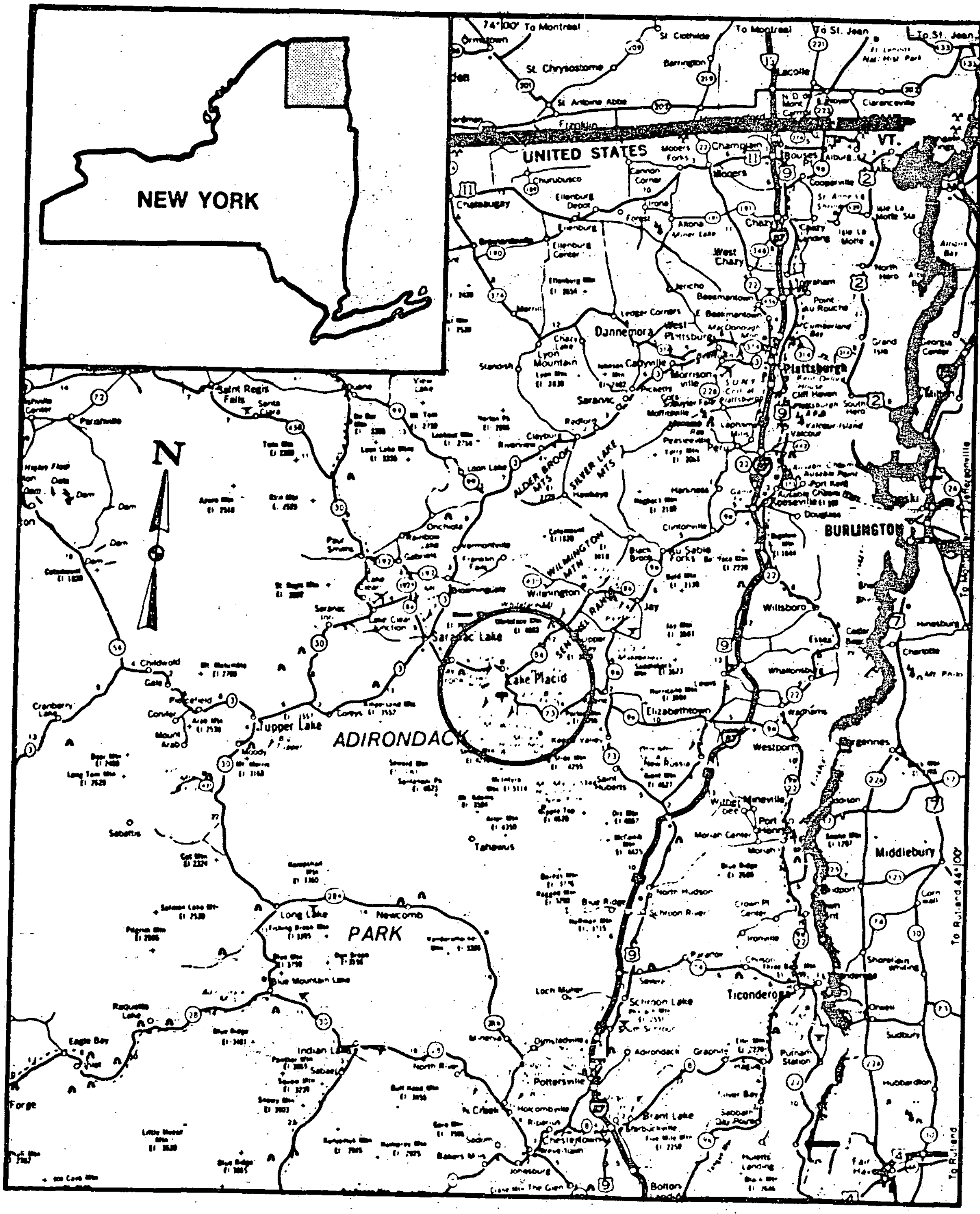

Figure 1-12. Map of Upper New York State Showing Location of Olympic Control Region, Lake Placid, and Proximity to Canadian Border.

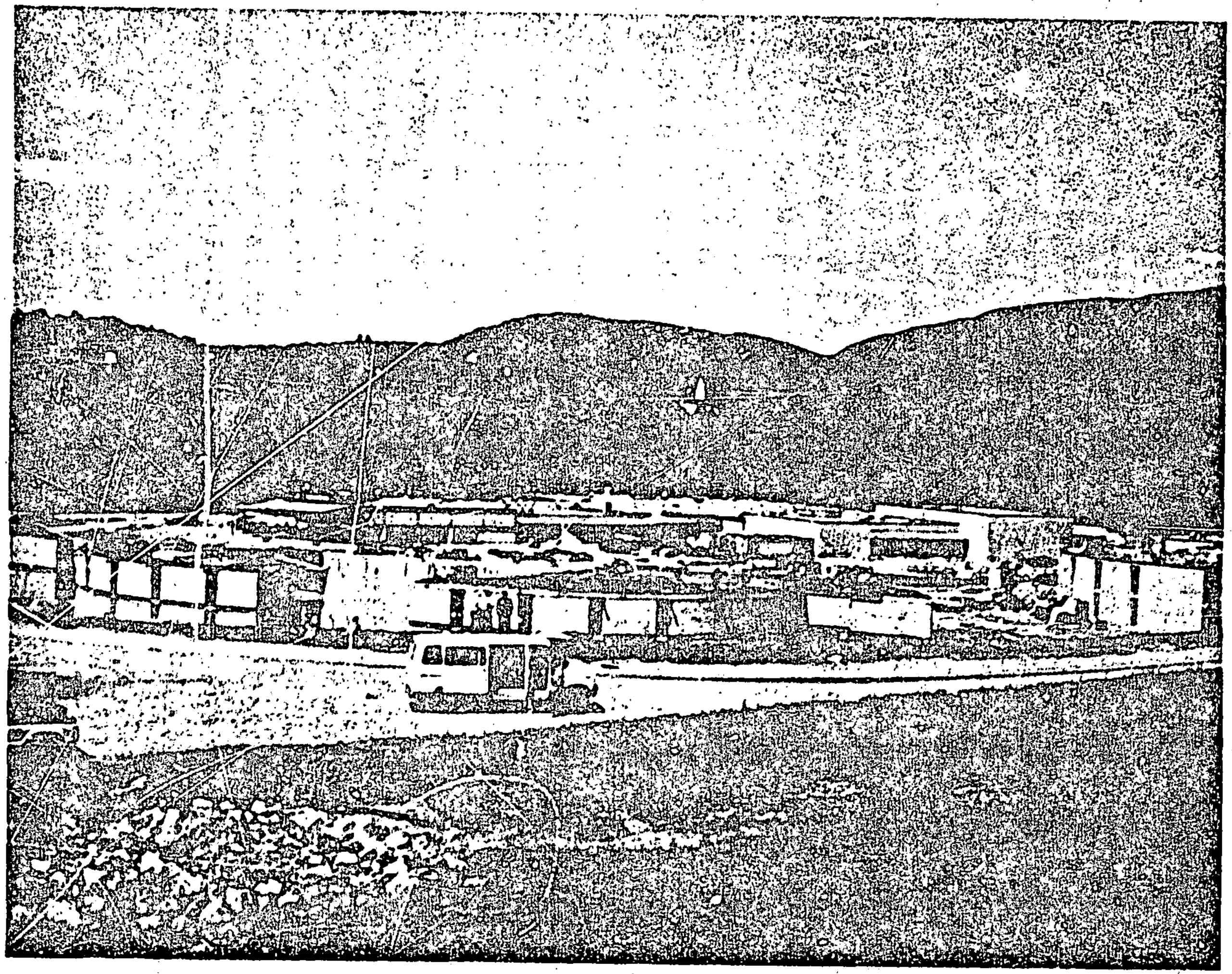

Figure 1-13. Scene Taken in Summer of 1979 When Preliminary Site Surveys, Data Collection and Site Coordination Visits Were Performed on Behalf of the State Police.

Services, Camp Adirondack facility. Within the complex there are 11 permanent buildings; five of these are designed for the housing of Federal prisoners; however, all buildings, including some temporary construction were included in the complex known as the Olympic Village. The two "clam shells" at the bottom (i.e., South) perimeter, designated Buildings E and F, respectfully, were used for the housing of female athletes (100% of Building E, and 50% of Building F). Other housing for Olympic teams included the remaining "clam shells," portions of the Village's hospital area and about one half of Building B, the large building immediately to the North of the Ceremonies Staging Area. Supplementing these permanent buildings were approximately 100 trailers, 60 of which were used for residential purposes and the remainder for equipment maintenance, laundry or team office space.

The Village had two entries: single pedestrian entry designated Area C at Building Q and an interlocking gate arrangement at the vehicular "Sally Port" designated Area M (Figure 1-14). Building Q, a temporary structure, scheduled for removal after the Games was equipped with air-terminal type metallic detector entry control systems, X-Ray devices for baggage inspection, Closed Circuit TV at the entry way, overt duress alarm switches, telephones and other devices. Building Q was manned by New York State Police personnel, augmented by Pinkerton security guards. The "Sally Port" was manned by State Police personnel, and was under the surveillance of the CCTV camera/monitor chain. Bomb "sniffer" dogs and handlers were available at all times, and proved highly valuable in expediting the inspection of the vast amounts of technical, official and personal luggage which accompanies a large Olympic team.

Within Building Q there was a badge/identification exchange desk. Since entry into the Village was tightly controlled, individuals, workmen, casual visitors, and others, without proper Village

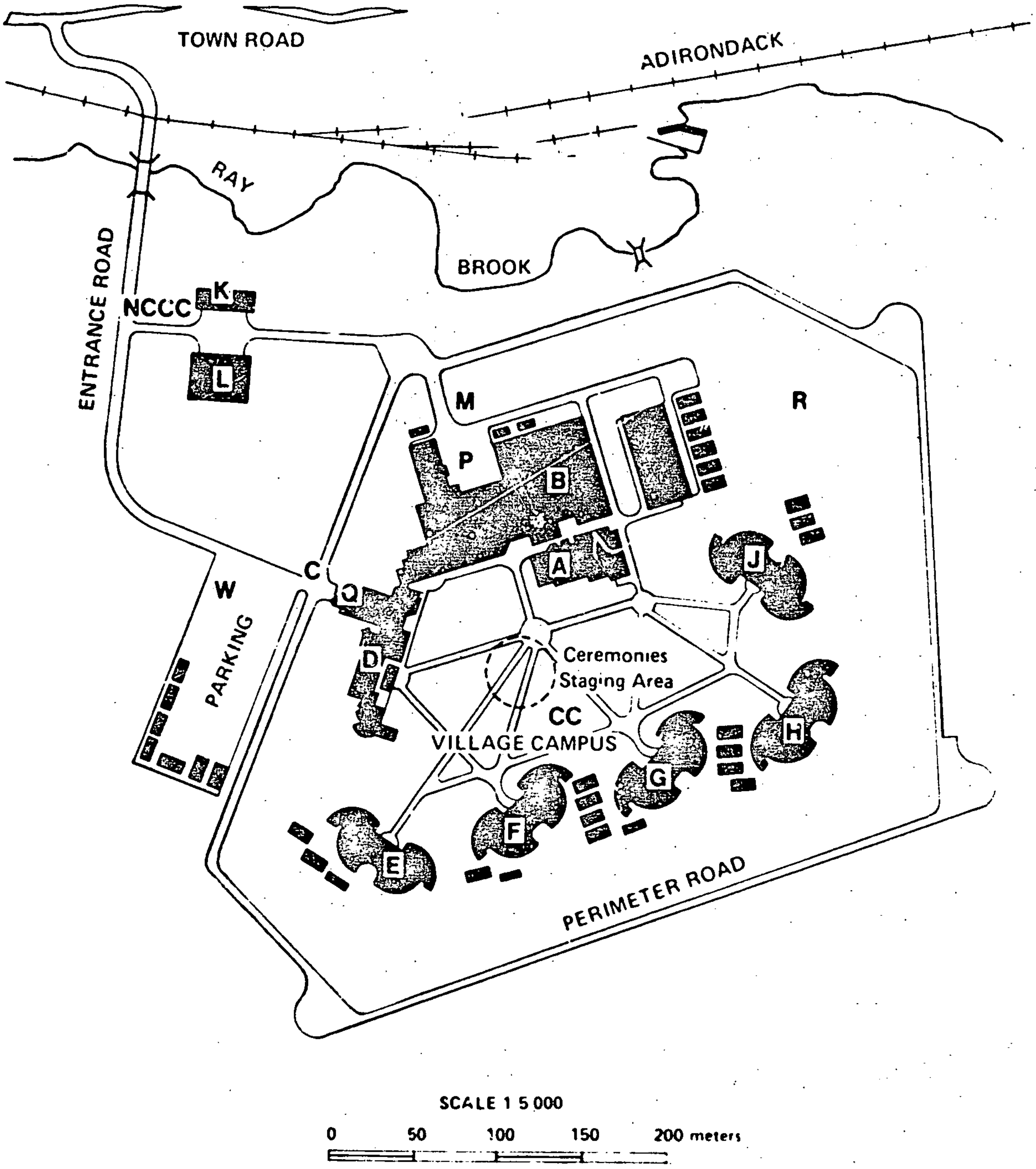

Figure 1-14. Plan Drawing of Olympic Village.

accreditation, had to be screened in a rigorous inspection and certification process at the badge exchange desk. Casual vistors were not permitted entry as a standard procedure; on-call technicians had to be verified by a previously accredited (badged) member of the physical security team, and personal identification (for example, a driver's license) had to be left in exchange for a temporary (blue) visitor's badge. The collateral credentials were returned upon departing, and the visitor was signed out by his "sponsor".

In short, all aspects of the screening processes conducted in Building Q were thorough and unyielding in compliance to NYSP standing orders. For accredited visitors and residents, a careful comparison of the photo on the badge with that of the bearer was made; this was accomplished regardless of the number of times an individual had been granted entry by a trooper earlier.

Security restrictions were not limited to the vicinity of Building Q, but were initiated at the main access road. There, official as well as casual visitors were subject to vehicle and badge inspection. The duty post for this identification was manned 24-hours daily by a team of two Troopers. Persons desiring access to the general site had to convince the guards of their bona fides. Parking was restricted to a lot well removed from the building complex, and official parking lot passes had to be displayed. Casual visitors had to run a formidable gauntlet of armed police to get to Building Q, where those who succeeded, faced an entry identification process undertaken with increased earnestness.

In close proximity to the visitor's parking lot was an area designated for the sanitization of buses by the sniffer dogs and their handlers. A temporary trailer placed there provided an operating base for the bomb sanitization detail.

One other important aspect bearing on security was the rigorous system of vehicular passes required for access into the Olympic Travel Region (OTR). The OTR functioned as a cordon sanitaire. Permanent residents were granted vehicle passes; official visitors, such as the Army's support elements were granted a limited number of passes to reduce the number of vehicles in the Olympic Region. A full description of the vehicle, off-street parking certification, and the approval of the owner's command/organization was necessary before the NYSP/DOT would issue the necessary decal. In short, the vehicle control system served its purposes. Little if any extraneous traffic was seen in the OTR, and thousands of vehicles which attempted to run the breach were denied entry.

SYSTEM'S INTEGRATION AND SUPPORT

As stated previously, the Physical Security Project Officer, Col. Van D. Holladay and his staff selected the SENCOM Division of Analytics Inc., in Tinton Falls, NJ, to serve as system's integration and support contractor. Contractual obligation was assumed early in November, 1979, and the following work was undertaken immediately.

ON-SITE INTEGRATION

In cooperation with USAMERADCOM engineers, the Village's lighting system was carefully evaluated in terms of the placement of television cameras. Arrangements were made for an extensive series of after-dark illumination tests and ambient light level measurements. In most instances, some improvement in the perimeter fence defense zone's lighting was obtained by directing the 80' mast-mounted 6 lamp HPSV (High Pressure Sodium Vapor) lamp assemblies. However, the addition of supplemental HPSV flood and spot lights was required to ensure that lighting levels remained high even with moderate amounts of snow being blown about.

As this work was being accomplished, the installation of television cameras, supplemental HPSV lighting, and the CCTV parallel runs of 75-ohm coaxial cable began. In all, some 15,000 feet of cable was laid by electr cians of Randall Electric, Syracuse, NY. Dual cable runs were used, one for the video output of each camera, the other for a common synchronizing pulse needed to coherently synchronize each camera. Technical details regarding the entire CCTV "chain" are contained in Section II.

At each camera location, a fully protected electronic junction box (J Box) was installed. The J-Box provided line voltage smoothing and filtering, and served as the interface between the larger diameter cable runs going to the Security Control Center (SCC), and the small diameter cables used to access the camera(s).

Other on-site work included:

- Review, analysis and changes to the procedures used with the Village's emergency power system (three 500-KVA diesel engine generator sets) and appropriate "load shedding" equipment.

- Coordination and structural analysis of the roof of Buildings B and D to permit the installation of tower base and anchor plates.

- X-Band calibration and boresighting operations, using fire apparatus loaned by the Saranac Lake Fire Department (SLFD), for installation of the AN/PPS-15 radomes being fabricated. (Figure 1-15)

- Coordination with the Bureau of Prisons and the Village's Olympic Staff (Local Superintendent, Director of Operations and Maintenance) on requirements for telephone

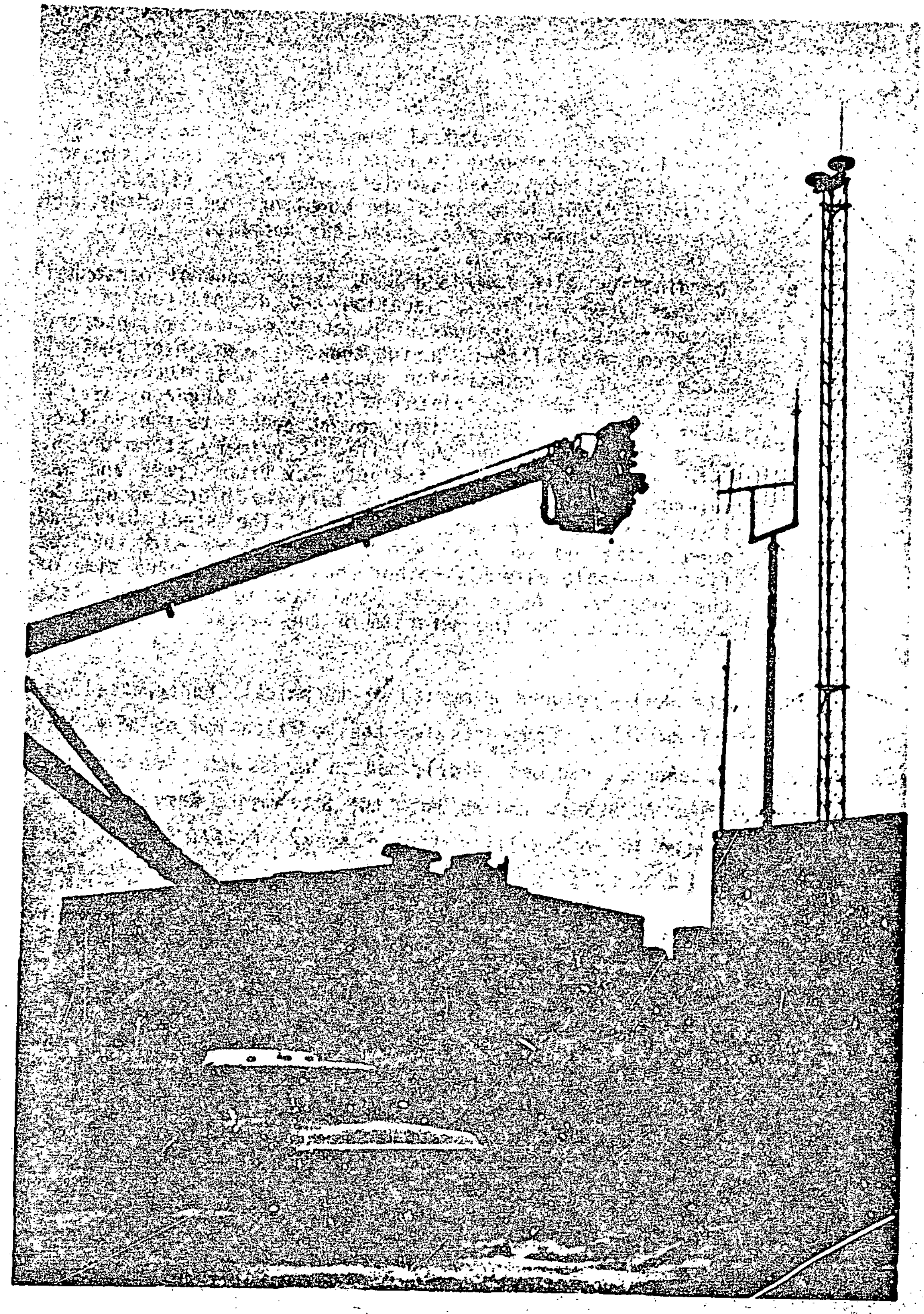

Figure 1-15. Cooperation and Assistance of the Saranac Lake Fire Department was Invaluable in the Siting and then the Installation of AN/PPS-15 Radomes and Other Communication Antennas.

lines, expanded electrical service into the security control areas, temporarily relocating roads, the siting of installation trucks and trailers within the Village, the availability of blueprints and construction drawings and one-thousand-and-one other technical details.

- Coordination with Army and USMC sensor control personnel on the types, numbers, location and disposition of the sensor fields and avenues of penetration leading into and away from the Village. During the course of investigating these potential penetration routes, it was discovered by troops under the supervision of Sgt John Bergeron, of the 101st Air Assault Div., that covert access to the Village could be made through the Village's primary storm drain. This large diameter pipe fed into Ray Brook Creek and was intended to have heavy steel bars to block access by intruders. The reconnaisance founa the steel bars had been installed on the "wrong" (secondary) side of the first man-hole assembly rather than on the primary side of the manhole. As a result, the manhole cover was tack welded closed for the duration of the Games.

Off-site work included a myriad of technical, contractual and support material details. Contracts for the modification of AN/PPS-15 radars (cable extenders, radomes, etc.), had to be issued. The arrangements to draw four AN/PPS-15 radars from the Sacramento Army Depot was greatly facilitated by Mr. William Vander Meer, of ERADCOM, at Fort Monmouth, NJ.

Unattended Ground Sensors (UGS) required contractual support; for example, special lens hoods had to be designed and fabricated to prevent wind blown snow from blinding the sensor's optics.

Analytics contracted for the engineering services and installation of two USAMERADCOM designed Large Area Display (LAD), electronically illuminated map assemblies, using Light Emitting Diodes (LED) which were activated synchronously with associated sensor IDs.

The CCTV system required the purchase of additional Time-Lapse/Video Tape Recorders (TL/VTR), modification of Navy-furnished J-Boxes to accomodate RG-11/U coaxial cable, the procurement of special adapters and connectors, and the on-site fabrication of mounting plates, bulkhead connectors and local patch and test facilities.

Motorola, Inc., was placed under contract to provide communication control consoles; 12 consoles were flown in from Chicago to Syracuse, NY, then trucked to Lake Placid one night between midnight and 0400. By noon the following day, the consoles were set-up, wired, and in-place, ready to start accepting CCTV monitors, sensor monitors and recorders, radars and a host of other technical equipment.

Following this, Motorola air delivered MX-350 low power hand-held portable transceivers with external speaker/microphones, batteries, and battery chargers. Audible tone coded duress sensors for use with the overt alarm system from their Lauderdale, FL manufacturing plant were also received on site.

General Electric of Syracuse, NY modified two vehicular radios belonging to PM Firefinder/REMBASS, for operation on the frequencies specifically assigned for use at Lake Placid. The list of dedicated supporting contractors is too long to mention in detail. It is notable, however, that in every instance industry was able to meet or exceed scheduled delivery dates. Local transportation bottlenecks, due to the extremely limited facilities in the Lake Placid and Saranac Lake areas caused most concern to those awaiting equipment. In one or two instances it was necessary to send small cargo items at air passenger rates aboard Air North, the region's only regular commuter carrier. In one or two instances, both men and material arrived via private aircraft flown by Analytics' pilots.

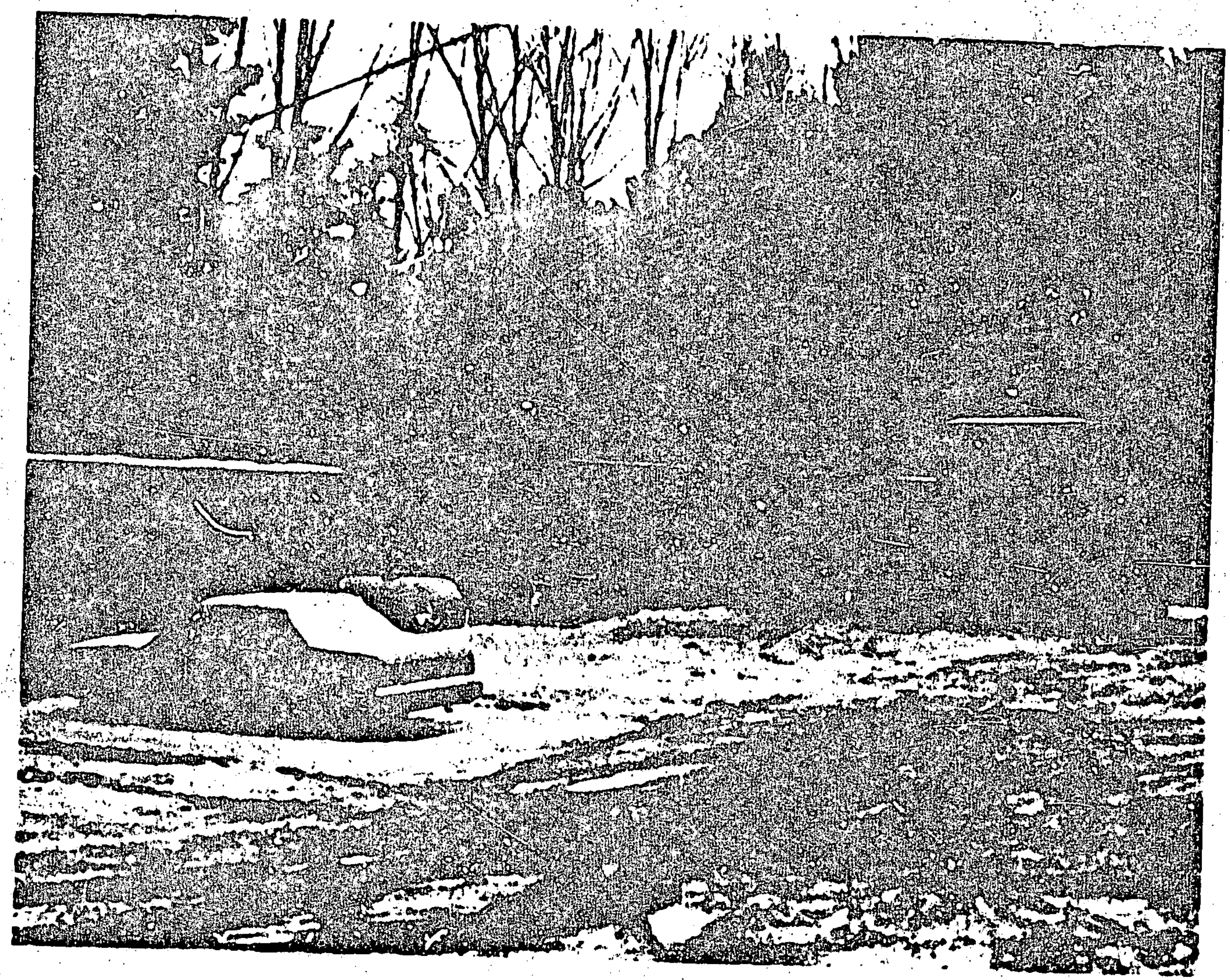

Figure 1-16. Work and Office Trailers Used by the DoD Physical Security Team during Set-up, Operation, and Teardown. Mil Van Was Used for Spare Parts Storage.

SUPPORT FACILITIES

Initial plans for the housing of PO-PSE and Analytics' personnel was based on an understanding that quarters would be provided by the NYSP or LPOOC officials. However, it became apparent in late December that the existing arrangements for accommodations were severely overtaxed and could not be made available. As a result, Analytics was tasked to provide necessary housing. Since no satisfactory permanent structures could be obtained, mobile home units were the last alternative. Fortunately, the New York State Department of Correctional Services (DCS) in Albany, NY and at Camp Adirondack gave approval for the Army to set-up three trailer units to house up to 15 individuals. Arrangements were also made to provide temporary utilities (power, water, sanitation), and on January 22, the three leased trailers were positioned.

The location of the temporary trailer site was very convenient to the office/shop trailer complex which was also set up by Analytics. With the installation of propane and electric heating systems and full telephone service, the arrangement was quite satisfactory in terms of official vehicle parking, the siting of storage vans, and overall convenience to the cafeteria arrangements provided by Camp Adirondack. Figure 1-16, illustrates the office trailer complex in the mid period of operations.

Each mobile home unit was equipped to accommodate up to five individuals under normal conditions. One trailer was used primarily by PO-PSE and Department of Army (DAC) military and civilian personnel; the second trailer was used to house military personnel from the 101st Air Assault Division. The third trailer housed Analytics' permanent on-site staff, on-call technicians, Army representatives of the New Equipment Teams (NET) from Fort Monmouth, NJ and overflow TDY personnel.

Site restoration work, the removal of the trailers, had to wait for ground thawing, which in the Adirondacks, occurs in late May, or early June. Restoration involved the removal of electric service lines, water and sanitation facilities, and the installation of sufficient ground cover, mulch and seed to restore the site to its original condition.

MESSING

Contractural arrangements were made between Analytics and NY DCS to provide food service for all assigned PO-PSE personnel. The quality and quantity of food provided was excellent, and there was virtually no restrictions placed on additional helpings. The cafeteria/mess hall became an important spot for meeting with NYSP representatives, and for working out daily work schedules, shopping lists, vehicle assignments and other tasks.

TRANSPORTATION

As explained earlier, the use of Privately Owned Vehicles (POV) was restricted within the OTR. Therefore, the Project Officer decided to use vehicle pooling to the maximum extent possible. The following on- and off-road vehicles were obtained through lease and/or purchase by Analytics:

- 1 - Sedan, 4-door
- 2 - Utility Vans, 6-8 passenger

- 1 - Four wheel drive, vehicle
- 1 - Snowmobile, for off-road use by sensor implant team
- 1 - 3/4-ton pick-up truck for two, one week periods.

Motor pool arrangements for service and POL were made by Analytics with the operator of a local Exxon service station at Saranac Lake. Service assistance in the starting of vehicles during periods of extremely cold weather, towing, and repairs was determined to be absolutely essential in an environment in which anti-freeze protection to -50°F is required.

SECTION II
SYSTEM EQUIPMENT AND DETAIL
REMOTELY MONITORED SENSORS (REMS)

Remote unattended ground sensors were deployed to provide (1) physical security and early warning protection along trails and paths leading to the Olympic Village, and (2) as part of the Village's overall perimeter defense system.

Activations from REMS were transmitted by radio frequency (rf) data link to monitor sets in the Olympic Village control center. The rf signals were processed by the monitor sets for presentation on area displays and hard copy recorders.

For the trail monitoring systems, REMS assets were used in a stand-alone mode. In the perimeter defense role the REMS assets were operationally integrated into other surveillance systems, particularly the CCTV system and surveillance radars.

SYSTEM DESCRIPTION

REMS was the primary means for detecting intrusions. Figure 2-1 illustrates a typical installation in the dense pine forests contiguous to the Olympic Village where the sensors performed in a stand-alone mode. When employed for perimeter defense purposes the sensors were used in conjunction with other surveillance systems. Figure 2-2 shows the location and density of sensors used along the Village's perimeter.

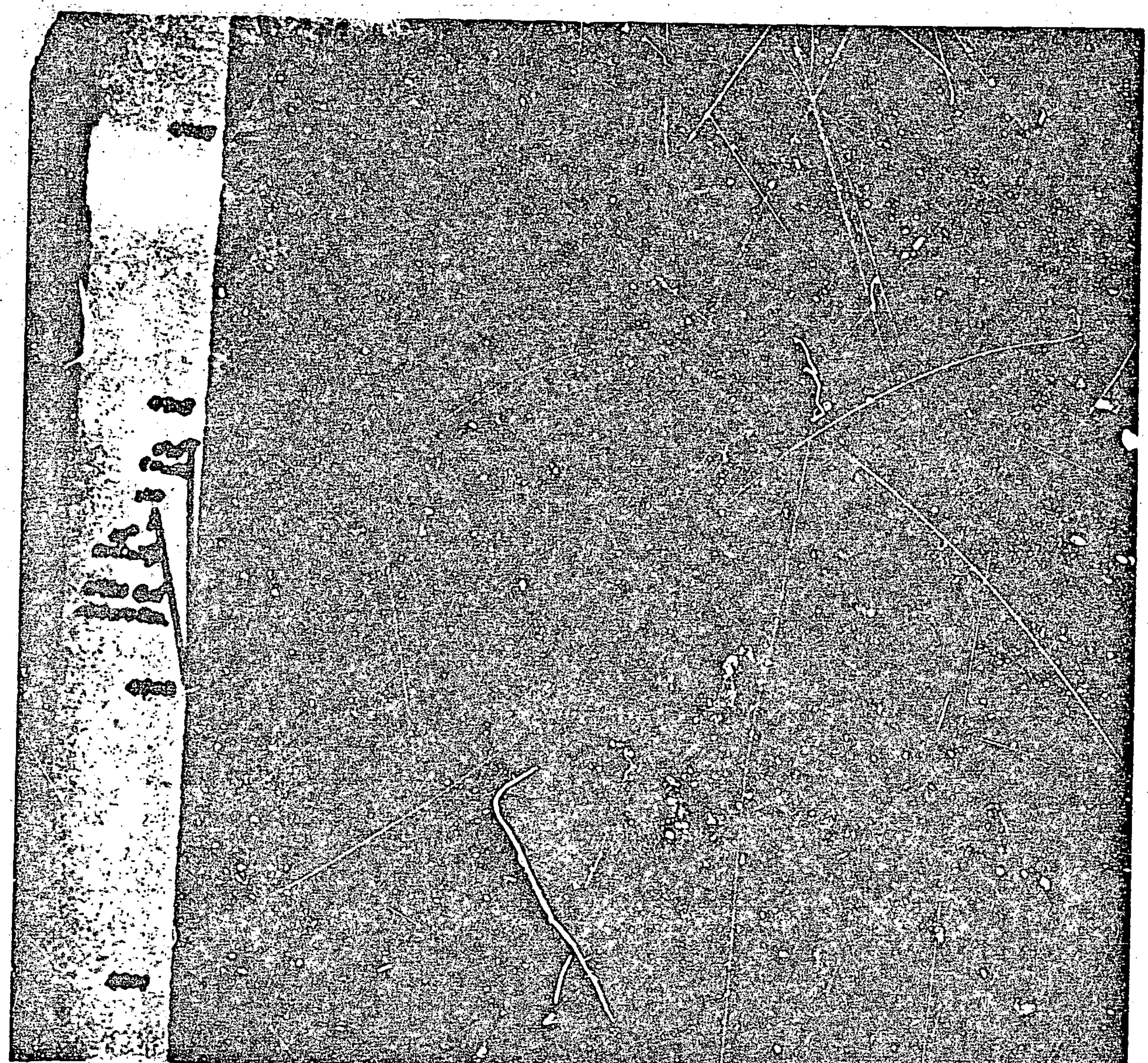

Figure 2-1. Large Area Display Showing Detail of "Strings" 2, 3, 4, 5, 6 and 7 Trail Surveillance Sensors. IR Magnetic and Acoustic Types are Shown.

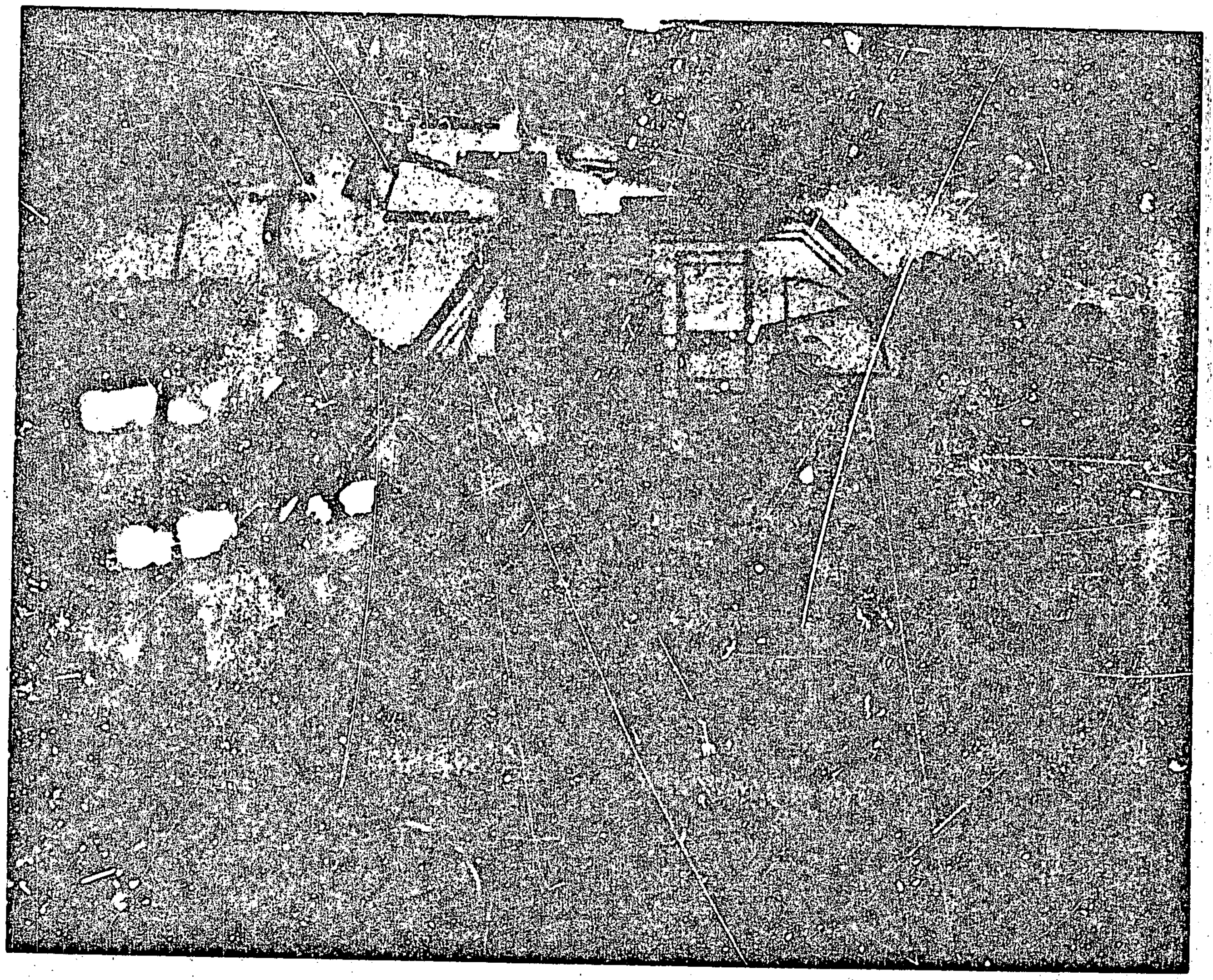

Figure 2-2. Sensors Implanted at Village Tree Line were Backed-up by AN/PPS-15 Surveillance Radar. Locations and Azimuths were all Verified by Field Tests and Triangulation.

The sensor deployment concept for the dense pine forest required twelve "strings" of sensors. "String" sizes ranged in number from three sensors (two DIRIDS and an AAU) in String #3, to twenty-nine individual sensors (DIRID, Magnetic and MINISID with AAU) in String #8. All "Strings" included DIRID sensors and were augmented by magnetic and/or acoustic (confirming) sensors.

Figures 2-1 and 2-2 also illustrate the method (large area displays) used to present sensor activation data to control center operators (personnel of the New York State Police). Two such devices were employed; one strictly for perimeter surveillance areas, the other for deep forest trail surveillance. These Large Area Display Systems (LADS) were developed by the Counter Intrusion Laboratories of USAMERADCOM, Ft. Belvoir, Va. Basic hardware, quill-lights (see Figure 2-3) and mounting hardware were "salvaged" from prior developmental programs. Operation of LADS permitted sensor-detected intrusions to be visually tracked and plotted within the Village's control center. In this arrangement, sensor identification (ID) messages, in addition to being processed through receivers and recorders (see below), were displayed to police personnel in a wink-light mode on photo-enlarged maps of the Village and surrounding terrain. Logical progression of intruders from sensor to sensor, and the time required (i.e., rate of travel) was easily interpreted.

The military application for such displays, for use in Rear Area Protection (RAP), or conventional, CONUS-oriented assets protection physical security systems, was amply demonstrated under a wide range of operational conditions.

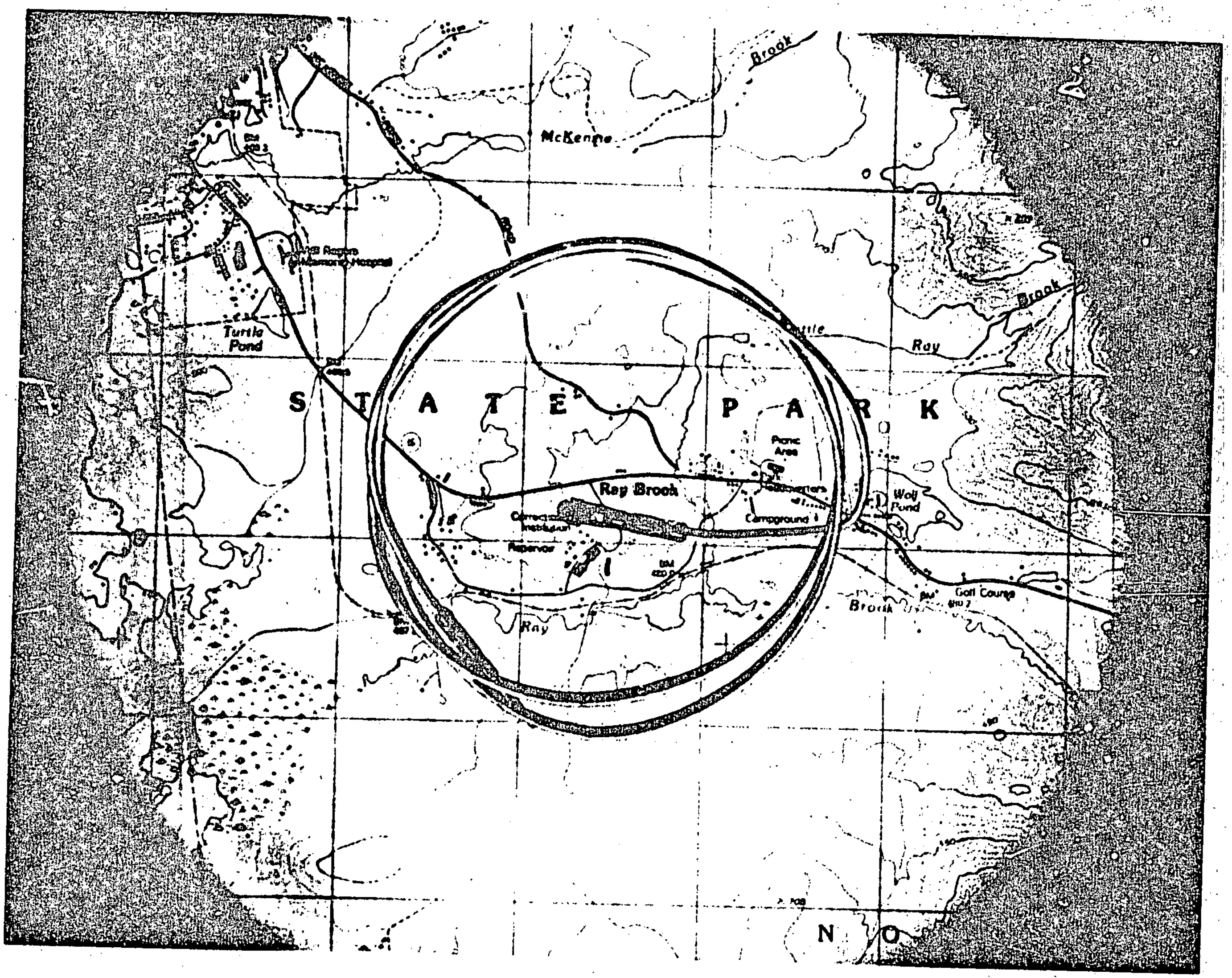

Figure 2-3. Quill Pen LED Used with Large Area Display. Jack End (Upper Right) Plugs into Decoder Element of Display.

PURPOSE AND SCOPE

Major components of the ground sensor system consisted of:

a. AN/GSC-171 Directional Infrared Intrusion Detector (DIRID). This is a detection and counting sensor. Internal heat-sensing optics sense heat changes above local ambient temperatures in the IR region. The DIRID employs two user assignable ID codes to signify direction of target travel relative to the sensor. Figure 2-4 shows the installation of a DIRID.

b. AN/GSQ-154 Miniature Seismic Intrusion Detector (MINISID). The MINISID is a seismic type device typically deployed along trails or roads to monitor personnel infiltration and vehicle movements. It can be deployed with the AAU or MAGID (see below) to serve as a confirming sensor. Alarm signals are transmitted in Phase III format at 300 bps to a monitoring receiver.

c. DT-516 Magnetic Intrusion Detector (MAGID). The MAGID operates as an ancillary to MINISID; it detects local geomagnetic field changes caused by ferromagnetic materials carried by personnel or vehicles passing through its surveillance area. The MAGID sends an alarm pulse by wire to the MINISID. The MAGID was used to distinguish between intruders and wildlife.

d. DT-383 Add-on Audio Unit (AAU). The AAU provides audio detection of personnel or vehicle intrusion. Each time MINISID senses an intrusion, a detect signal is sent to the AAU. If the AAU receives three detect signals during a 25 second period, the AAU's microphone is activated. Audio background noise is then transmitted with (host) MINISID's ID as a 15-second burst of audio information.

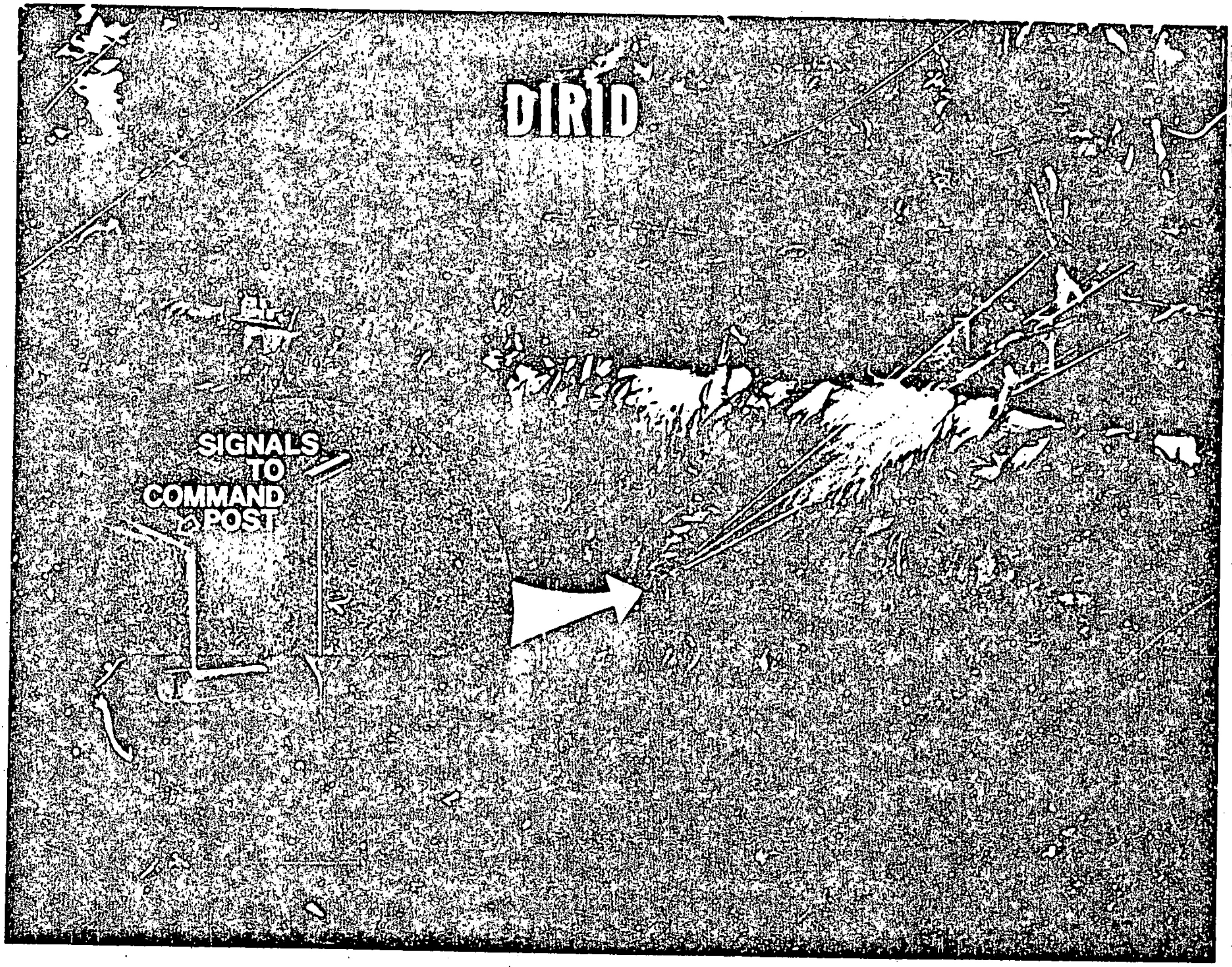

Figure 2-4. Boresiting of the DIRID's IR "Bend" to Obtain Right and Left Relative Target Direction of Travel.

e. AN/USQ-46 RF Monitor Set (PORTATALE). This is a portable VHF receiver designed to receive, decode and display Phase III sensor identification and audio (from the AAU) transmissions. Its secondary purpose is to provide signal data and power to the Signal Data Recorder.

f. RO-376/USQ Signal Data Recorder. The RO-376 tactical (Tac) recorder is an X-T plotter used to provide in chart form a permanent record of sensor activations as detected by the AN/USQ-46 rf monitor set.

g. OQ-60/USQ-46 Emission Generator Set. This device is used to test all signal processing and presentation functions of radio frequency monitoring sets and data display devices. It was used to perform routine diagnostic testing and performance validation of all phases of the REMS unattended ground sensor system.

h. Supplemental Materiel. Figure 2-5 illustrates the physical configuration and interconnection between sensors (DIRID case shown) and the battery box used to house the Lithium Battery BA-5590. Special end caps, complete with protective O-rings, feed-through hole, etc., were fabricated so as not to degrade any USMC or Army-furnished sensor assets.

Figure 2-6 illustrates the functional interface between all major elements of the unattended ground sensor system. Sensor strings were apportioned between rf monitors and each monitor drove an X-T plotter, i.e., a "Tac Recorder". Output of the recorders were then employed as inputs to the USAMERADCOM-furnished Large Area Display Systems (LADS). Additional monitors and recorders were accommodated by rf multicoupler. These, in turn, were used as inputs to the second LADS.

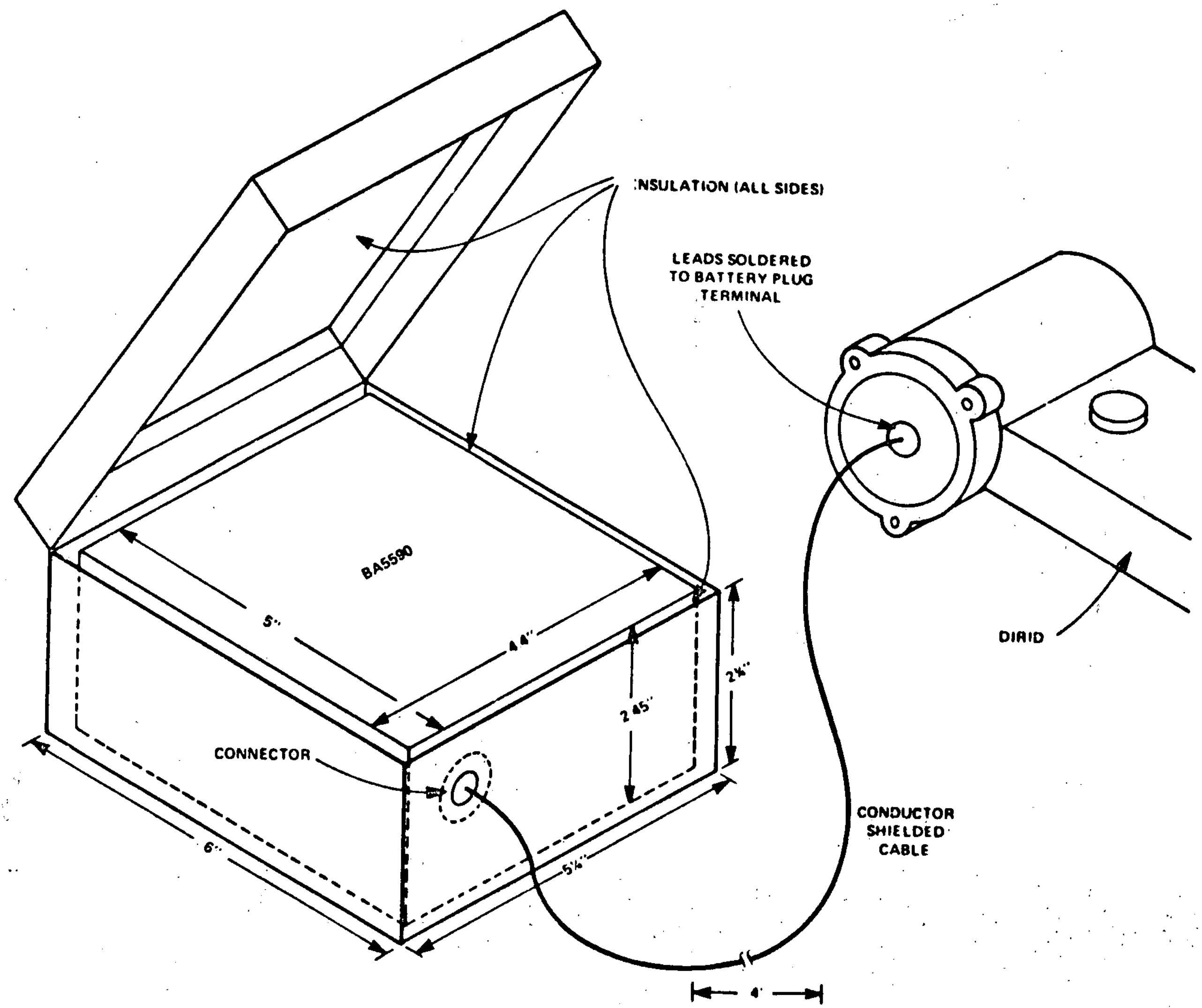

Figure 2-5. Use of Lithium Battery BA5590 Required Fabrication of Special "Outbound" Battery Box with all Phase III Sensors. Fabrication was Performed by CS&TA Labs, Fort Monmouth, New Jersey.

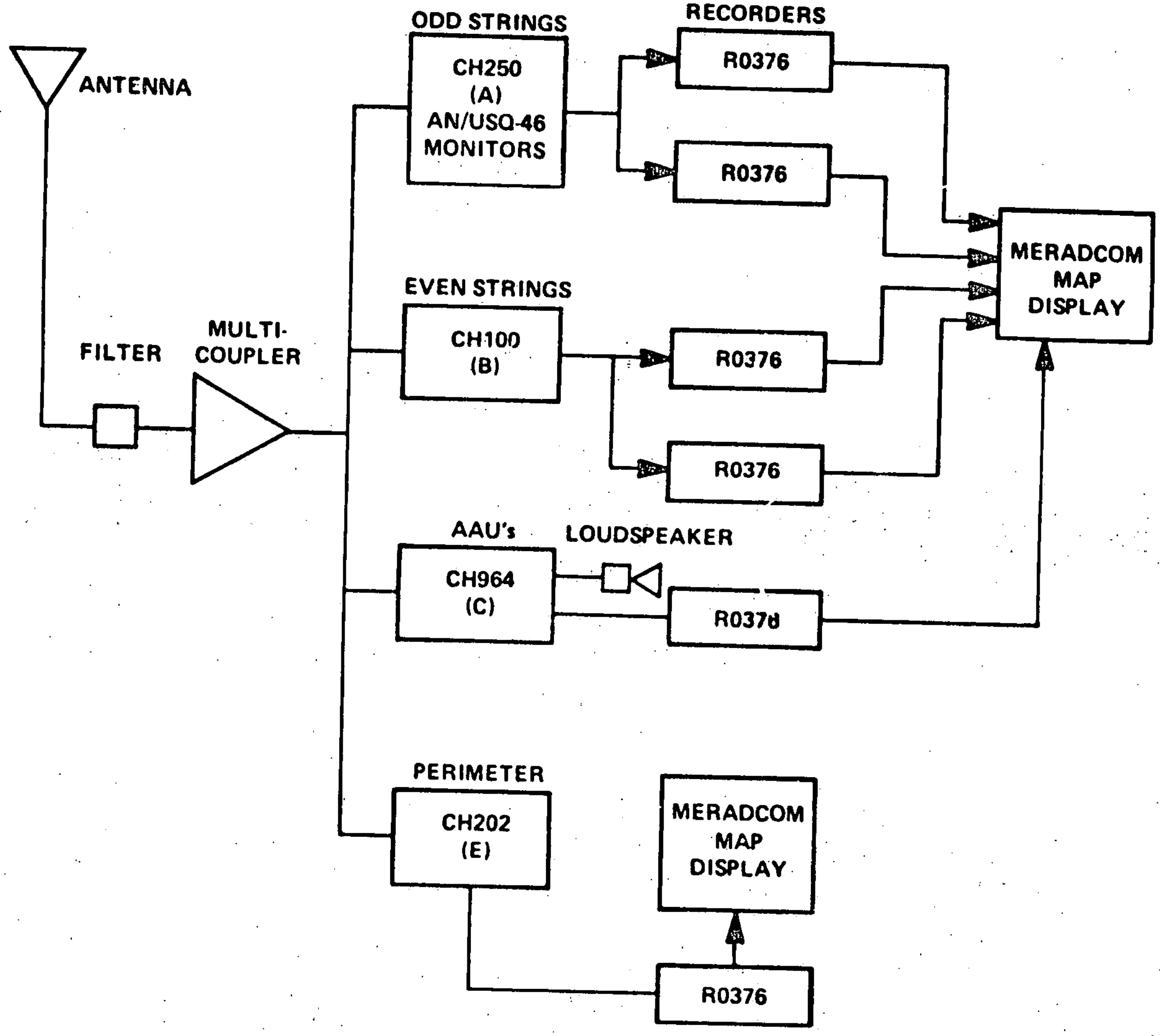

Figure 2-6. Sensor Equipment Functional Interface of all Major Devices.

Table 2-1 lists the composition of Strings 1 through 12 by ID and sensor type. Figure 2-2 further illustrates the density when sensors were emplaced around the Village's outer perimeter at the edge of the woodline, and Figure 2-7 shows the transition zone from cleaned area to dense forest along the southern perimeter of the Village.

LAYOUT AND INSTALLATION

Preliminary planning as documented in the draft of the Analytics' Management Engineering Plan (MEP) emphasized the use of seismic sensors (i.e., the MINISID). Follow-on detailed site surveys conducted in conjunction with personnel from the Army's 101st Airborne Division (Air Assault) Military Intelligence (MI) Unit and the US Army Intelligence Center and School (USAICS) indicated a need for infrared devices; in addition, because of the seismic propagation anomolies in snow and ice, extensive modifications would have been required to the MINISID to ensure a high Probability of Detection (P_d) of intruders.

Fortunately the United States Marine Corps (USMC) had recently completed procurement of a quantity of infrared sensors (DIRID) for use by their Sensor Control and Management Platoons (SCAMP). The Marines made the DIRID assets available on a loan basis for the period of the Olympics. They also provided supporting personnel from Camp Pendleton and Camp Lejeune to assist Army personnel in deployment, installation, and overall operations and maintenance.

In addition it was important that sensor batteries perform under conditions of cold climatic environments and not require replacement over the planned-for 30-day mission life. Personnel from Army Project Manager Firefinder/REMBASS, the Combat Surveillance and Target Acquisition (CS&TA) Laboratories, and the R&D Technical Support Activity at Fort Monmouth developed, tested and fabricated an external power pack

TABLE 2-1

NR	TYPE	CHANNEL	ID
STRING #1			
1-1	IR	250	1, 2
1-2	IR	250	3, 4
1-3	AAU	964	1,
1-4	IR	250	5, 6
1-5	MAG	1030	9
STRING #2			
2-1	IR	1030	11, 12
2-2	MAG	250	19
2-3	IR	1030	3, 4
STRING #3			
3-1	IR	250	11, 12
3-2	AAU	964	15
3-3	IR	250	13, 14
STRING #4			
4-1	MAG	250	9
4-2	IR	1030	11, 12
4-3	AAU	964	5
4-4	IR	1030	15, 16
4-5	IR	1030	13, 14
4-6	IR	1030	17, 18
STRING #5			
5-1	IR	250	21, 22
5-2	MAG	1030	29
5-3	IR	250	23, 24

NR	TYPE	CHANNEL	ID
STRING #6			
6-1	IR	1030	21, 22
6-2	MAG	250	29
6-3	IR	1030	23, 24
6-4	IR	1030	23, 24
STRING #7			
7-1	IR	250	31, 32
7-2	MAG	1030	39
7-3	IR	250	33, 34
7-4	IR	250	7, 8
7-5	AAU	964	9
7-6	IR	250	35, 36
7-7	IR	250	37, 38
STRING #8			
8-1	IR	1264	7, 8
8-2	IR	202	63, 64
8-3	IR	202	35, 36
8-4	IR	1264	33, 34
8-5	IR	1264	51, 52
8-6	MAG	1264	29
8-7	IR	202	31, 31
8-8	MAG	202	39
8-9	IR	1264	27, 28
8-10	IR	1264	55, 56
8-11	MAG	1264	19
8-12	IR	202	15, 16
8-13	IR	202	13, 14

TABLE 2-1 (Continued)

NR	TYPE	CHANNEL	ID
STRING #8			
(cont)			
8-14	MAG	202	19
8-15	IR	1264	13, 14
8-16	IR	202	53, 54
8-17	IR	1264	17, 18
8-18	IR	1264	17, 18
8-19	IR	202	21, 22
8-20	IR	1264	23, 24
8-21	IR	202	57, 58
8-23	IR	1264	61, 62
8-24	IR	1264	65, 66
8-25	IR	202	43, 44
8-26	IR	202	37, 38
8-27	IR	1264	45, 46
8-28	IR	202	47, 48
8-29	IR	1264	41, 42
STRING #9			
9-1	MAG	202	9
9-2	IR	1264	3, 4
9-3	IR	1264	3, 4
9-4	IR	1264	71, 71
STRING #10			
10-1	IR	202	11, 12
10-2	IR	202	5, 6
10-3	MAG	1264	9
10-4	IR	202	1, 2

NR	TYPE	CHANNEL	ID
STRING #11			
11-1	IR	1030	55, 56
11-2	MAG	250	69
11-3	IR	1030	53, 54
11-4	MAG	250	59
11-5	IR	1030	51, 52
11-6	IR	250	51, 52
11-7	IR	250	53, 54
11-8	MAG	1030	59
STRING #12			
12-1	IR	1030	41, 42
12-2	IR	1030	43, 44
12-3	MAG	250	49

Figure 2-7. Olympic Village. View Shows Tree Line Along Southern Perimeter. Note the Depression of the Building Complex Relative to the Surrounding Terrain.

and electrical cable interconnect using the Lithium Organic Battery BA-5590 in lieu of the sensor's conventional Battery BA-1546/U. This proved to be a sound approach. Battery problems were eliminated throughout the mission and sensor performance was not degraded in any way even after numerous activities and continuous exposure to a sub-zero environment.

OPERATION AND MAINTENANCE

Installation of the sensor equipment involved both inside plant and outside (field) work. An extensive local support and fabrication effort was also maintained on site with the assistance of highly skilled sensor technicians from Tobyhanna Army Depot.

Inside Plant Installation. A combined team of USMC, Army, government civilians, contractors and the systems integration contractor performed this task. It was performed in conjunction, cooperation, coordination and competition with several other related and non-related major installation efforts taking place at the same time, and under the same sense of urgency, all within the somewhat cramped quarters of the Village's command center.

To this extent it must be noted that everyone involved showed a willingness to help, stand aside, lend a hand, run an errand, and to generally contribute to the success of the *overall* mission. It was this sense of mission objective, coupled to an understanding of total mission requirements which led to the timely completion and success of all on-site work.

Other physical security systems which were being installed concurrently included radars, television, and overt and covert duress systems. In addition, electrical work, installation of security blinds, rf transmission lines, local signal wires, 12-volt dc loops, telephone cables and ancillary State Police equipment were all being accomplished simultaneously.

Field Installation. This was no less arduous than any similar cold climatic condition exercise. Both SCAMP (USMC) and MI (Army) personnel were highly dedicated. Frozen soil, the lack of deep snow coverage and the necessity to obliterate telltale installation signs (tracks, ground disturbances, exposed cables, etc.), required that this work be performed with great care and technical skill.

Pending the arrival of special purpose vehicles (i.e., snow mobile, 4-wheel drive truck), field installations were highly dependent upon local support. This, in turn, placed greater emphasis on troops having to do a great deal more hard physical labor than originally anticipated. Not a single word of complaint was heard.

Training. The only training required on the REMS system for the NYSP personnel who would operate the control center or supervise operations at the Olympic Village. Initial training was conducted by Army personnel early in December 1979 at the NYSP Academy. Additional training was conducted on-site prior to activation of the complete physical security system. Each shift of NYSP personnel received final On-the-Job Training (OJT) as they manned the operational system. Follow-on assistance was available for the duration of the operation.

Recovery. Army and USMC personnel recovered all emplaced sensors after the conclusion of the games. The REMS equipment was shipped to Tobyhanna Army Depot for repair, refurbishment and return to the responsible activity.

ADVANCED DEVELOPMENT (AD) REMBASS SENSOR PROTOTYPES

During the latter part of the Winter Olympic Games schedule, arrangements were made with the Office of the Project Manager Firefinder/REMBASS for an informal demonstration, under actual field conditions, of the new prototypes REMBASS sensors supplied to the government by the RCA Corporation. Two types of devices were demonstrated; (a) the hand emplaced sensors shown in Figure 2-8 and the hand-held Portable Monitoring Set (PMS), illustrated in Figure 2-9.

The sensors and companion monitor represent the "second generation" of Army unattended ground sensor development. An important consideration for operability in conditions of cold climatic extremes is the regular use of the Lithium Battery (BA-5590) internal to the equipment, without the necessity of having to fabricate an outboard cold weather battery case such as was required with the "first generation" sensors used elsewhere in the perimeter and trail defense arrangements.

Three prototype sensors were emplaced along a wooded trail. In early February a seismic-acoustic classifying sensor was put in place; a magnetic detection sensor and an infrared detection sensor were installed on 20 February.

Because of the operational nature of the physical security effort, it was not possible to accommodate formal testing or continuous monitoring of the prototype sensors; however, when activated by members of the USA/USMC implant teams, the sensors reported very accurately. The string of prototype REMBASS sensors was still functioning when recovered on 29 February having withstood temperatures in the range of -20°F. At the time of recovery the classifying sensor was properly discriminating between personnel and vehicular targets.

Figure 2-8. Prototype Advanced Development Model of US Army REMBASS Seismic/Acoustic Hand Emplaced Target Classifying Sensor.

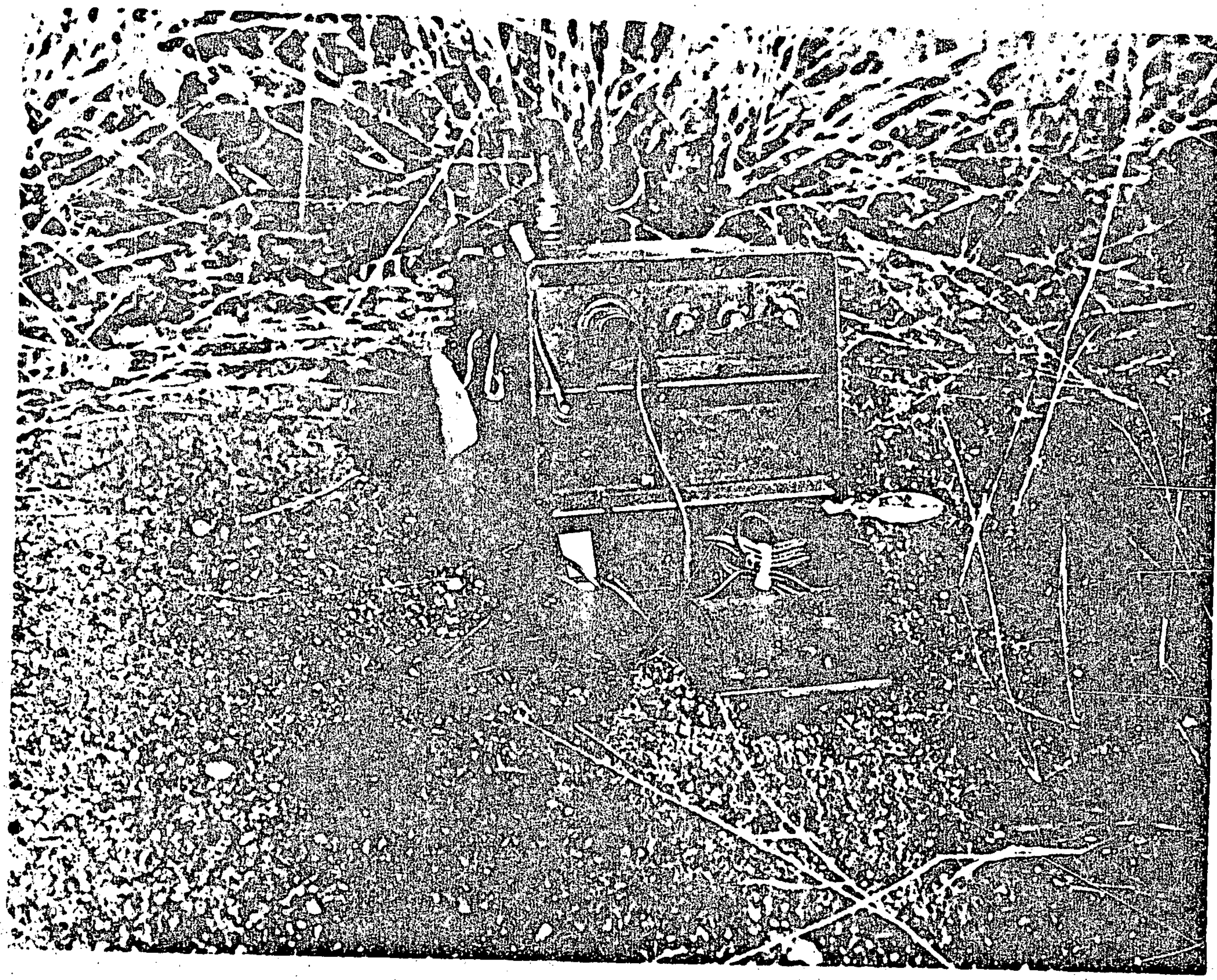

Figure 2-9. Close-up View of US Army REMBASS Portable Monitoring Set (PMS), Used to Receive and Display Sensor Messages and ID Codes.

In brief, sensor and equipment performance for the period of deployment, was very satisfactory.

SURVEILLANCE RADARS (AN/PPS-15)

The Very Short Range/Ground Surveillance Radar (VSR/GSR) was used to provide augmented counter-intrusion capabilities from both central command posts and from local village patrol zones. In the former case the VSR/GSR was used, especially to confirm intrusions and break-points reported by ground sensors deployed in both trail and perimeter defense. In the locally deployed mode, the VSR/GSR was used to perform self-initiated surveillance by members of the NYSP's local security force.

Four modified AN/PPS-15A(V)1 Radar Sets were obtained from the US Army Sacramento (CA) Depot by Analytics. These were transported to General Dynamics Electronics Division in San Diego, CA, where basic modification of the units was performed by the manufacturer.

The Radar Set includes a 9-meter multi-conductor cable which permits operation of the rf wave guide and scanning assembly remote from that of the display and control module. Because the Olympic Village was built in a depression (note Figure 2-7), and because of the height of the various residence buildings, the radar, even when mounted on the roof of Building D, was essentially blind to intruders at ground level emerging from the Southern perimeter's tree line. Thus elevation of the radar's rf assembly was essential to provide unobstructed Line-of-Sight (LOS) and to ensure that the centroid of the beam provided maximum illumination of places where potential targets would attempt to breach the perimeter defense.

Because of the confirming nature of the radar application at the Olympic Village, the control and display modules were integrated into the control consoles associated with the unattended ground sensors. This integration was carried through with the large area display map, on which radar azimuths and range data were incorporated so that the two systems could be viewed as a single integrated entity. The relationship is illustrated in Figure 2-10.

SYSTEM DESCRIPTION

The AN/PPS-15A(V)1 radar set is a battery-powered, solid-state, coherent doppler, line-of-sight, very short range ground surveillance radar. It is used to detect and locate moving personnel and vehicles in line with the radar's beam. Target detection and identification are accomplished by operator's recognition of characteristic sounds in the radar's audio output. An alarm lamp and speaker provide automatic visual and audible indications when a moving target(s) is detected. Indicators provide digital azimuth and range information.

The set can be operated as a hand-held radar, mounted on its own tripod for local or remote (normally up to 9-meters), or longer range remote (to 45-meters as modified for this application). Rotation of the radar was done electrically and automatically over either one of two scanning widths 800 ₥ * (45°) or 1600 ₥ (90°) as selected by the operator.

Once the target has been detected either by the radar or by other surveillance devices the radar can be used to track the movement

*₥ = mils

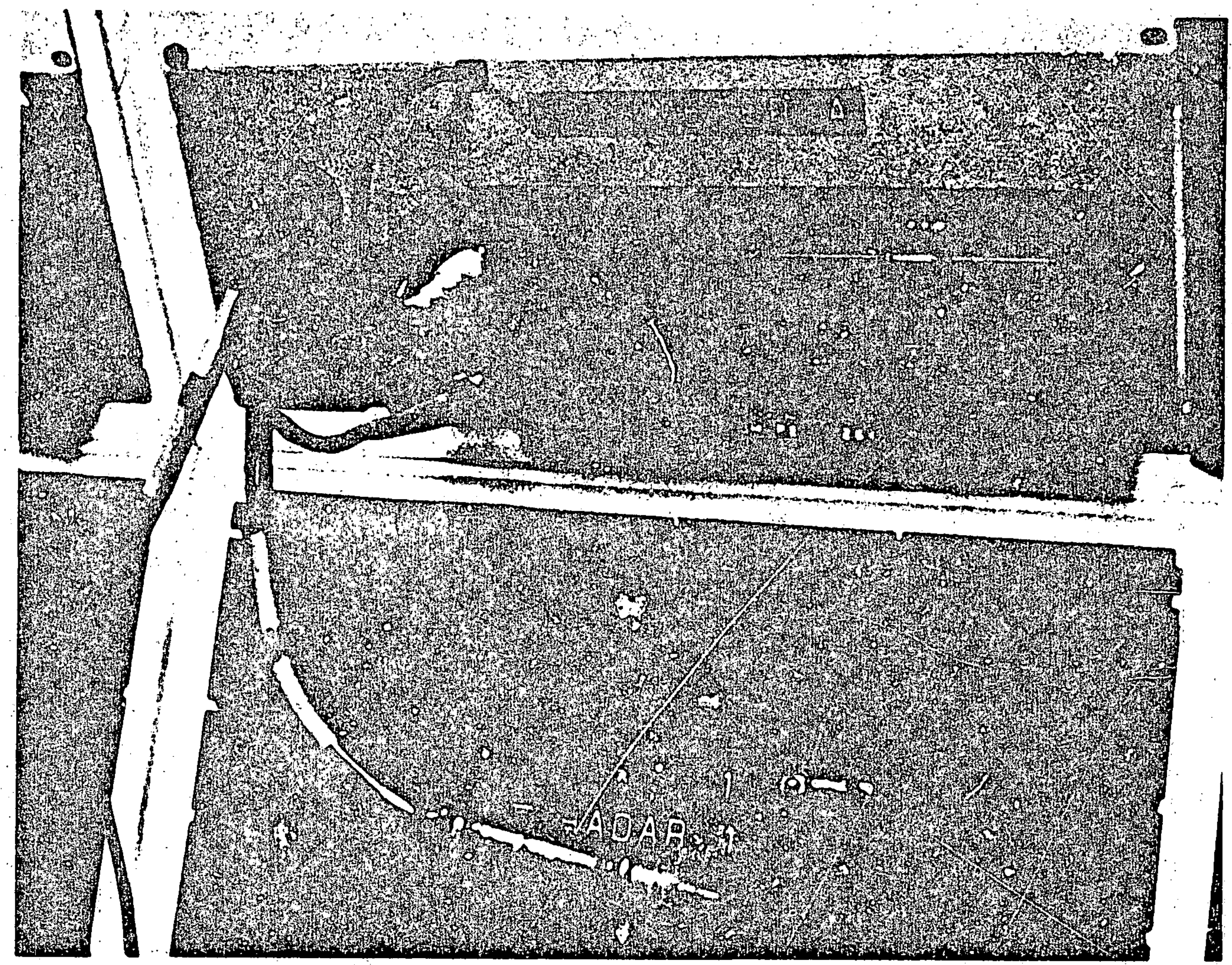

Figure 2-10. Details of AN/PPS-15 Radar Display/Control Unit and AN/USQ-46 Sensor RF Monitor Set.

and range of the target. Tracking of the target will provide information about direction, locations and speed. Only moving targets can be detected.

Target information is presented by the radar set by both visual and audible indications. The prime method of target indication is provided by the target's audio signature through the radar's headset(s) or through audio amplifier-driven loudspeakers.

Figure 2-11 shows the components of the AN/PPS-15A(V)1 radar set. Note the receiver/transmitter group (right hand side of illustration) consists of two assemblies: (1) the control indicator, and (2) the antenna assembly. It is between these two assemblies that the remote control cable assembly was used. It should also be noted that the 9-meter remote cable cannot be successfully used on specially modified radars. This is due to impedance differences in the two cables, and compensations which are performed internally to the radar set for modified or unmodified operation.

Mounting of the two radar sets on the Command Center required the erection of a 65' guyed tower. A Rohn type 40G was installed. There were some difficulties encountered. First, excavation for the tower's pedestal and outer guy anchor point had to be accomplished through soil that was frozen to a depth of 18-24 inches. Secondly, because of wind loading and ice accumulation, substantial guying was required; one guy point perpendicular to Building D was excavated; however, the other two guy points had to "touch down" at 180° increments and at approximately 45° angle inclination. Roof drawings and detailed discussion with the construction contractor's resident engineer and finally with the principal A&E architect resolved the problem of where and how to secure the two guy points which had to penetrate the roof of Building D.

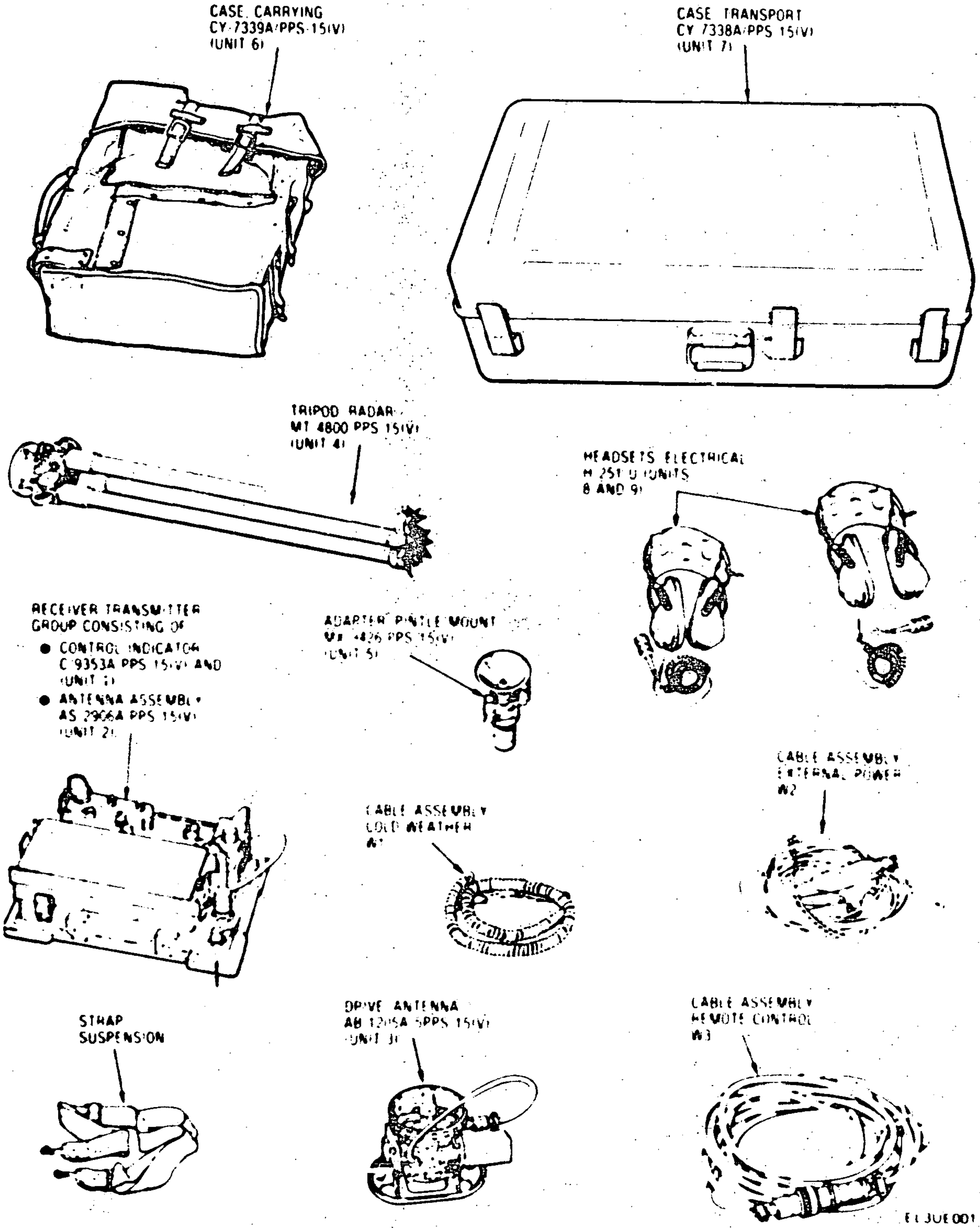

Figure 2-11. Components of Radar Set AN/PPS-15A.

Once the excavations, pouring of concrete, installation of anchor rods and base plate set-screw were accomplished the actual erection of the tower went quite rapidly. Based on ambient temperatures and the wind chill factor at 65 feet AAT (above average terrain), the temperature at tower top typically reached -50°F. This obviously necessitating extremely short work periods.

Survey data and local calculations indicated adequate performance (i.e., line-of-sight) would be obtained from a radome AAT elevation of somewhere between 55 to 65 feet. Prior to installation, positive verification of radar performance was established when, in response to an urgent request, the Saranac Lake Fire Department (SLFD) responded with a 100-foot "snorkel" fire apparatus and complete crew. Thus, both height and location of the then planned radar sets could be ascertained with a positive degree of assurance. Radar siting involved personnel from the New Equipment Training Team at Fort Monmouth, and from the developers project office at ERADCOM, also at Ft. Monmouth. The use of a specially designed corner reflector antenna carried about by a volunteer "target" materially assisted in the overall installation. Poor visibility, driving snow and the ranges employed required that a positive "return" be received at the radar to ensure that false readings due to clutter were not being plotted. Key areas along the Southern and South-Western perimeter were thus boresighted and benchmarked in terms of range and azimuth. Final adjustments and mechanical positioning of the two "garbage can" radomes were made to ensure unhindered rotation of both (left and right) radar antenna assemblies. See figure 2-12.

LAYOUT AND INSTALLATION

Final cut-over of the AN/PPS-15 radar set included a coordinated effort involving the following participants: Mid-State

Figure 2-12. View of 65′ Guyed Tower, AN/PPS-15 Radomes and Miscellaneous Antennas at Security Control Center. Refer to Figure A-2.1-7 to See Why Tower was Required to Obtain Line-of-Sight (LOS).

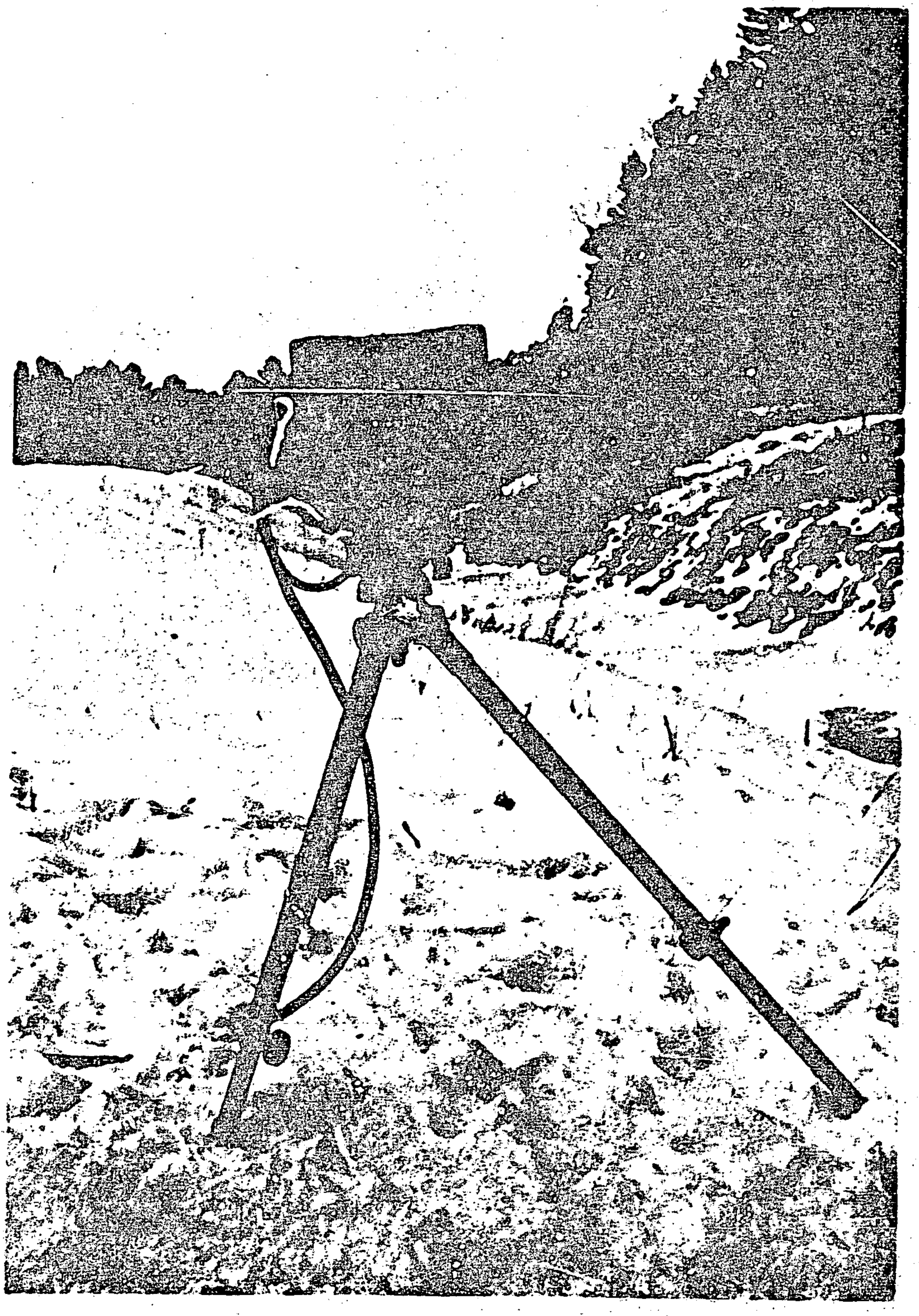

Figure 2-13. Radar Set Used in Northeast Corner Perimeter Surveillance. Remote Cable Permitted 12 Volt Power from and Trooper to Remain in Police Vehicle.

Communications, Utica, NY; Saranac Lake Fire Department; technical representatives of General Dynamics Electronics Division, San Diego, CA; Sgts. Costello and Bastian of the Army's New Equipment Training (NET) Team, Ft. Monmouth, NJ; and CWO Pete Taylor, of ERADCOM, Ft. Monmouth, NJ. General systems integration-level support was provided by Analytics.

One major engineering problem that arose during the final set-up was "tweaking" and adjustment of the radars. This problem was caused by the affect the various turbine-type air ventilators had upon the radar's doppler logic; the ventilators became operational at about the same time as the radars were being installed. It should be noted that the Olympic Village complex (Ray Brook Federal Penetentiary), was a totally new, hitherto unoccupied multi-building penal complex. Devices relating to Heating, Ventilating and Air Conditioning (HVAC), were, in many instances being activated for the first time.

A local field expedient was tried and proved to be successful in reducing the background "clutter" returned to the radar in the form of doppler shift from the numerous rotating turbine ventilators. The field "fix" consisted of wrapping virtually all of these devices with conventional screening material and securing the screen in place with twine or nylon lacing cord.

A great deal of credit must be given to all of the above individuals and organizations; the weather was severe with temperatures hovering at the freezing point. The wind chill factors at roof top levels and particularly at the radome level being most severe.

CLOSED CIRCUIT TELEVISION (CCTV)

This was one of the most important, most visible and most frequently employed elements of the physical security system. The system was Engineered, Furnished and Installed (EF&I) by personnel from the Electronics Video Systems Branch of the Emanations Security Division of the US Naval Electronic Systems Engineering Activity (NESEA), St. Inigoes, Md. Decisions regarding the siting of individual surveillance cameras were under the direction of USAMERADCOM engineers working in conjunction with NYSP and Analytics' on-site personnel.

It must be noted that at this time, CCTV systems, unlike conventional tactical equipment (sensors, radars, etc.,) are not "militarized" items, in-stock and available to be drawn from a depot or central supply point. For physical security functions, CCTV systems are designed to meet specific mission requirements. The necessary equipment, such as cameras, monitors, tape recorders, and sequencers, were procured from a variety of industrial and commercial sources serving the government, the CATV and the TV Broadcasting industries. Many of the components used in long-term high-level CCTV security systems being "long-lead" items, delivery requires from 6 weeks to several months.

In most instances, several logical sequential steps are required for large-scale, complex installations; for example: an operational concept, or detailed, Required Operational Capability (ROC) must be agreed upon and formulated. Technical requirements, such as picture elements (pixels), Fields of View (FOV), and lighting intensities, must be analyzed. The next step normally entails an analysis of "facility constraints," during which voltage drops, line losses, ambient temperatures (indoor and out), Human Factors Engineering (HFE), and a host of other technical items are considered. Additionally, a technical analysis of the image quality required must be made. The number of lines of resolution (1000, 700, or 525), gray scale resolution, and in the case of time-lapse video tape recording, image sequencing speeds sufficiently high enough to assure detection between "snapshots", typify items to be evaluated. An analysis of hardware availability is also required; the issues here include whether the required item(s) are readily available and are they off-the-shelf and if so, do they require additional engineering development? Lead times for procurement orders must be carefully considered. The last step in this process involves the operator and maintenance training required to ensure effective use of the CCTV system as well as a check on its reliability.

It is therefore important in considering the many aspects of the total physical security system to allocate sufficient time to perform a respectable level of systems engineering and integration. It is believed that, had an additional sixty days been available prior to turn-on date, a "queued-alarm CCTV" system could have been implemented, which would have greatly reduced the number of monitors used because they would be activated only when a valid alarm or detection occurred. The queued system arrangement would have performed very efficiently when tied into the perimeter defense elements, with monitor activations responding only when fence and/or sensor stimulations took place within the FOV of a specific camera. The queued-alarm concept not only permits a great reduction in on-line monitors and supporting consoles, but also in the human effort associated with monitoring screens.

SYSTEM DESCRIPTION

Figure 2-14 illustrates the NESEA system installed; Figures 2-15 and 2-16 show the layout of the video monitoring equipment, switches and common sync feed equipment.

There are many factors which impact on the design; these include such issues as:

- Cabling: The installation of 14 NESEA furnished cameras required approximately 14,000 feet of RG-11/U (75-ohm

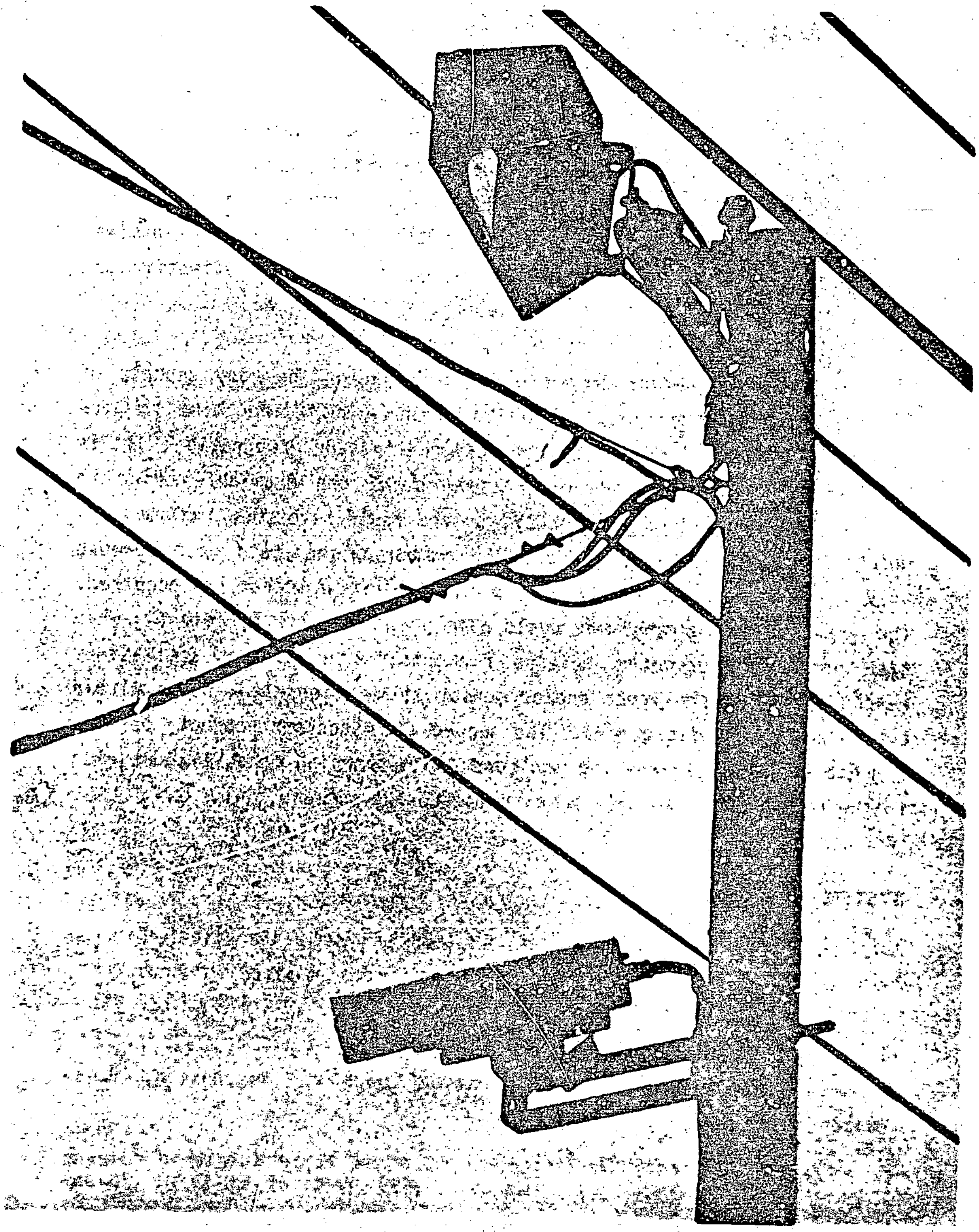

Figure 2-14. DoD Furnished CCTV Surveillance Camera and 150 Watt High Pressure Sodium Vapor (HPSV) Flood Light for Auxiliary Lighting

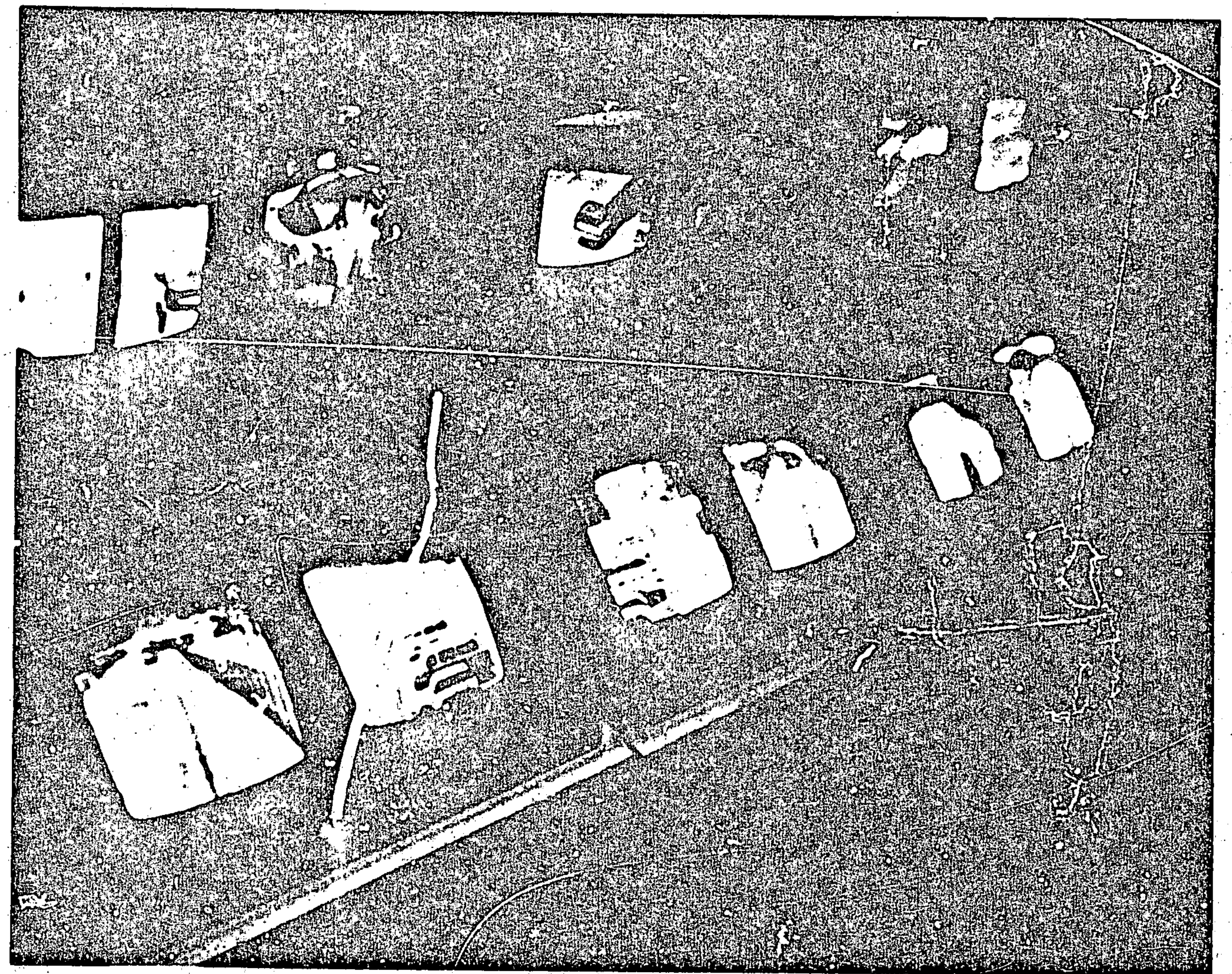

Figure 2-15. Close-up of DoD Furnished CCTV Monitor Bank. Shown Atop Console is Overt Duress Alarm Receiver and Display.

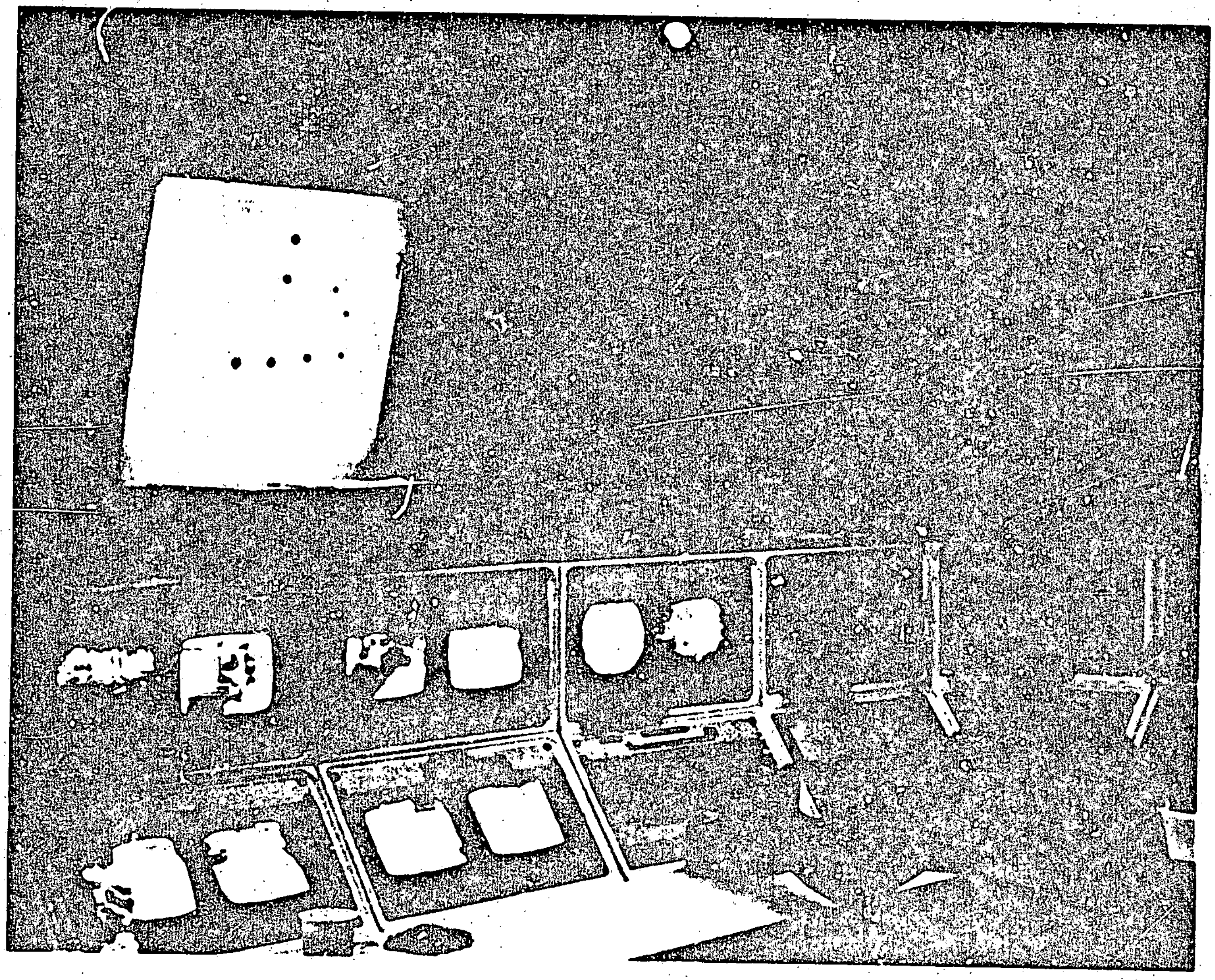

Figure 2-16. CCTV Monitors and Displays. CCTV Master Control Panel at Trooper's Left Hand.

coaxial cable) and about 2,000 feet of RG-59/U cable for interior inter-rack cabling. Installation of the cable involved trenching, aerial suspension, splicing, and affixing connectors/terminations.

- Fields of View, Resolution, etc.: Figure 2-17 illustrates, in highly simplified form, the depth of field, focus and angular coverage provided by most conventional CCTV optics. Three lens sizes were employed: (1) a 75mm lens on that camera surveying the Building B rear loading dock; (2) 25mm lenses on all fence line surveillance cameras, and (3) an 8mm wide-angle lens (fish eye) for the Building B loading bay interior surveillance.

- Lighting for Optimum Night Operations: Unless a facility designed for widespread application of CCTV, extensive modifications to lighting must be made to ensure efficient and optimized performance of the system. Typical lighting used in conjunction with CCTV systems is the High Pressure Sodium Vapor (HPSV), of either the flood or spotlight type. Lighting also requires additional electrical support, diurnal switches or manual on/off switches, and replacement bulb elements.[1]

- Quality of the Image: It is important that total image quality be defined to avert ambiguities and to ensure that positive, incontravertable evidence is obtained in the data to be stored and replayed. Noise, tearing and other background clutter must be held to the lowest possible levels.

- Distribution of Assets: Each additional camera requires additional input and output (video) coaxial cables, a dedicated video monitor, support lighting, monitor or operator personnel, electrical service and distribution boxes, switching points, and dividers. There are significant costs associated with each add-on.

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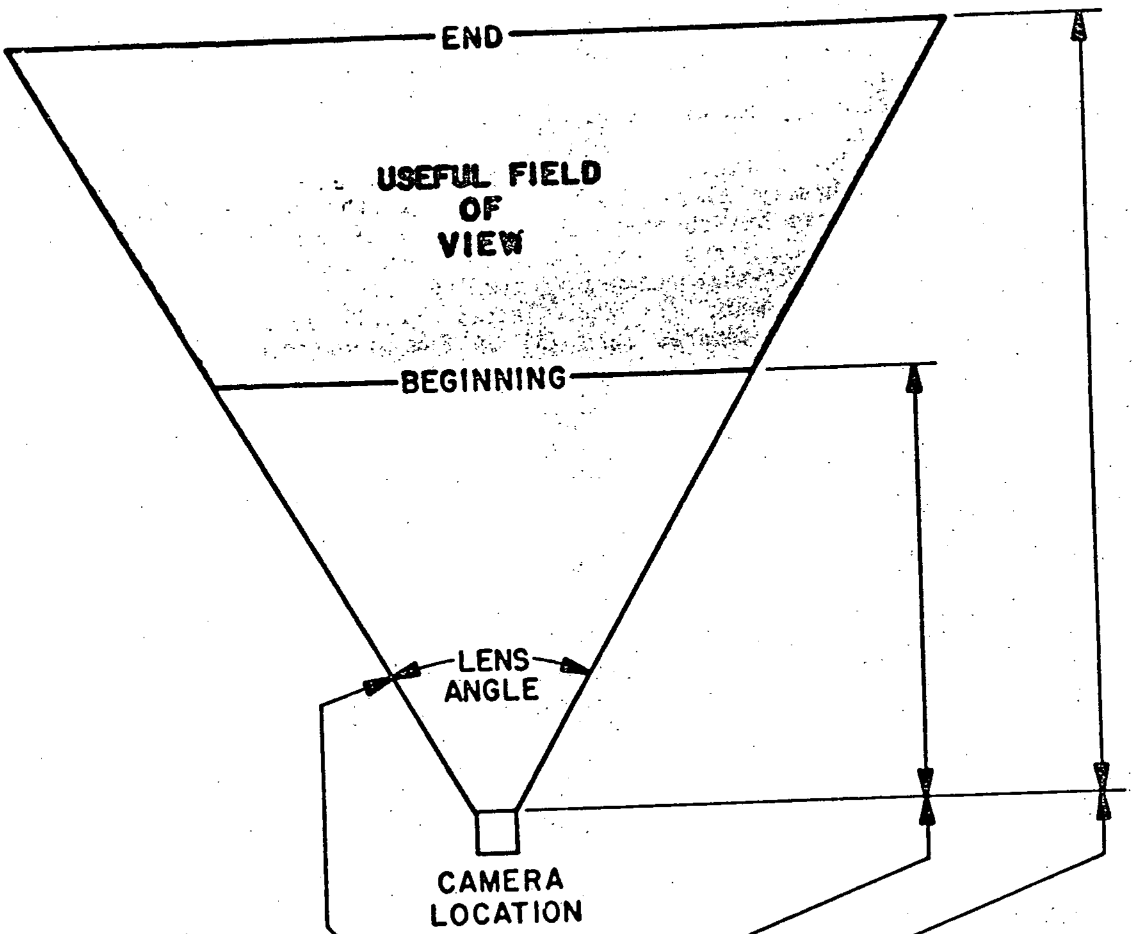
1 This subject is addressed sufficiently in US Army Mobility Equipment Research and Development Command, Counter Intrusion Laboratory report entitled, "An Evaluation of Perimeter Barriers and Lighting Effectiveness" (Unclassified), dated 1 June 1979.



LENS			
12.5mm	54°	75'	150'
25mm	28°	150'	300'
50mm	14°	300'	600'
75mm	9.6°	450'	900'

Figure 2-17a. Comparison of Lens Sizes, Field-of-View (FOV) and Depth of Field for Standard CCTV Optics.

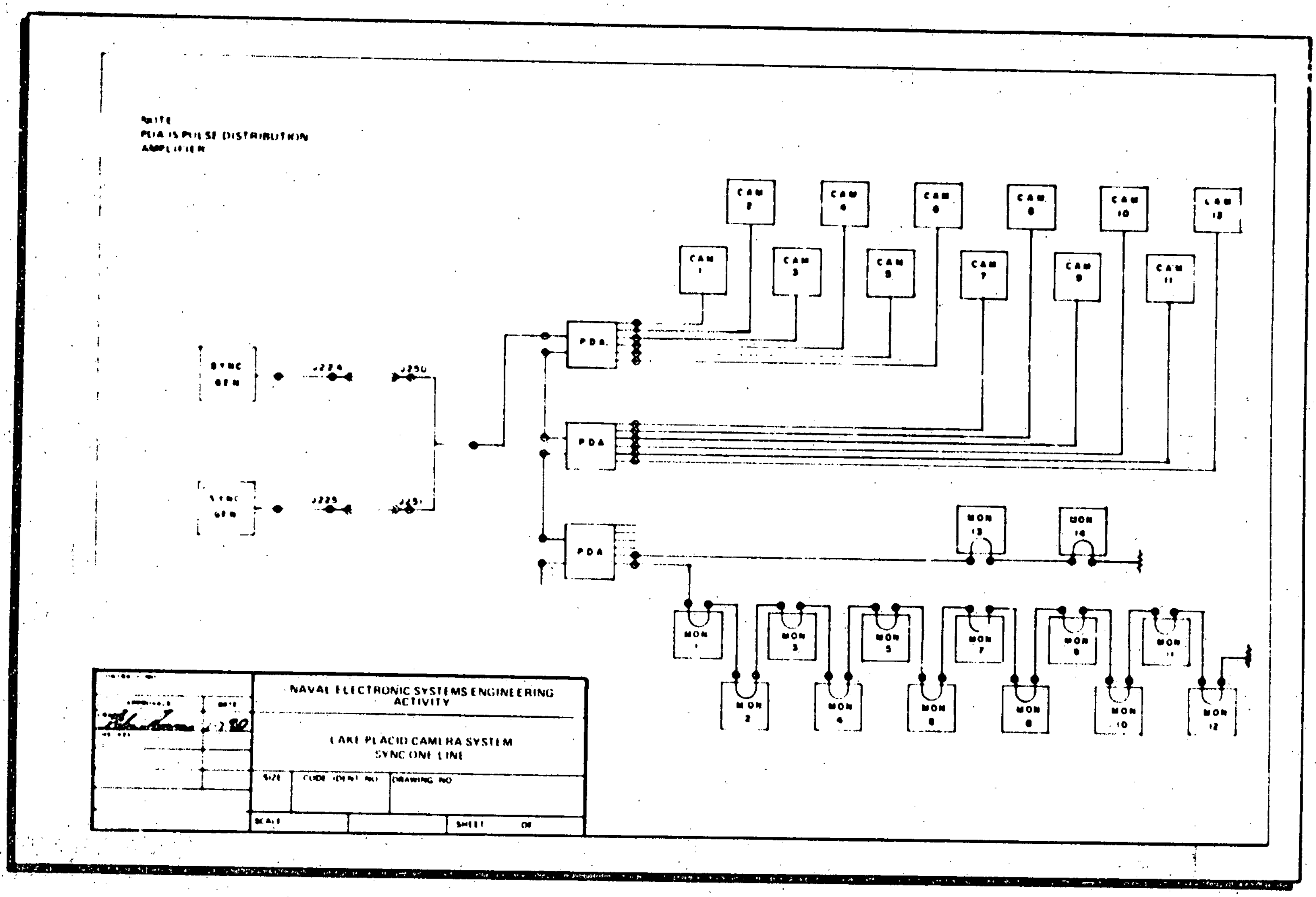


Figure 2-17b. Functional Block Diagram of Closed-Circuit Television System (CCTV).

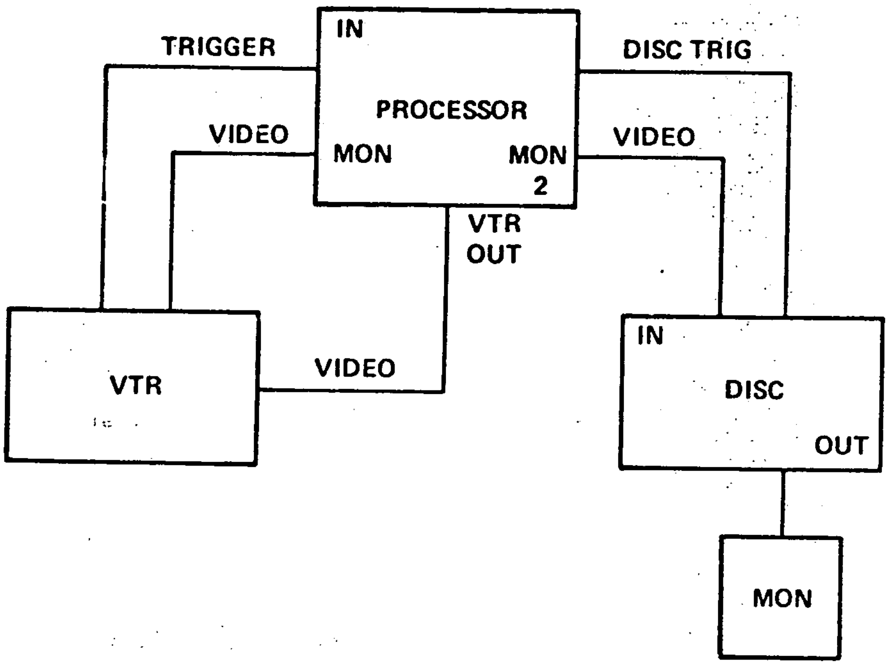


Figure 2-17c. Details of CCTV's Video Tape Recording (VTR) Arrangement.

PURPOSE AND SCOPE

CCTV systems were designed as confirmation devices for other sensor/alarm systems; however, even simple systems have been known to yield positive benefits to the user. The cameras and monitors installed at the Olympic Village were used in the following manner:

- Fence and loading dock surveillance
- Pedestrian Entrance and Exit-way surveillance
- Interior surveillance
- Sally Port (vehicular entry) surveillance
- Variable Pan Tilt and Zoom, by Bureau of Prisons

Two monitors were used solely for the Time-Lapse/Video Tape Recorder (TL/VTR).

In conjunction with both the Bureau Prisons CCTV system and the DoD CCTV system, a major effort was directed toward realigning existing lighting arrangements and by adding new (temporary) lights. This was essential to gain optimum performance of the cameras. Exterior security lighting constructed as part of the permanent prison complex consisted of five 80' high mast system, each supporting six 250 Watt High Pressure Sodium Vapor (HPSV) floodlights. These lights were originally adjusted to provide the maximum light intensity for the Village interior. Several exercises were conducted in early evening (6 PM) during which lighting cluster were lowered and the individual units re-oriented to achieve a lighting balance between the interior and exterior of the Village. Originally, 120' high mast systems were planned; however, as a result of Adirondack Park Agency objections to incursions above the natural skyline, mast installation was reduced to 80' height.

Although adjustment of the light clusters improved the situation considerably, it did not provide for adequate illumination levels where the fence changed direction, particularly in the vicinity of the pedestrian access gate (Building Q) and at the loading docks. To boost light levels approximately eight additional HPSV floodlights were installed. They were mounted on the same 40' wooden poles used for the CCTV cameras.

In addition, due to the long re-start time required for the high wattage HPSV clusters in the event of a power failure, additional quartz lamps were provided to ensure instant restart when and if the emergency standby power system was used to pick-up the village's electrical load. The quartz lamps did not "blind" the AN/PVS-5A night vision devices; they did prove satisfactory to provide adequate levels of short term illumination at various places along the fence line.

LAYOUT AND INSTALLATION

Figure 2-18 shows the location of the NESEA furnished television cameras. Each camera was mounted on an adjustable steel bracket attached to a pole or building wall. The mounting height of each camera averaged about 18-20 feet above local ground level. Each camera was fed from a Navy-furnished distribution box; this junction box served as the logical transition from a large diameter (low loss) coaxial cable to the smaller gauges used to actually feed the camera. The box also served as a smoothing filter for 110V power drawn from local buses. Each bus was, however, on the same power phase of the primary distribution system to avoid ground loop voltages between phases.

Signals to the camera consisted of synchronizing pulses from a Pulse Distribution Amplifier (PDA). Video received from the cameras went to a dedicated equalizing Video Distribution Amplifier (VDA), where the video was corrected for line loss, "damped" to reduce hum, and

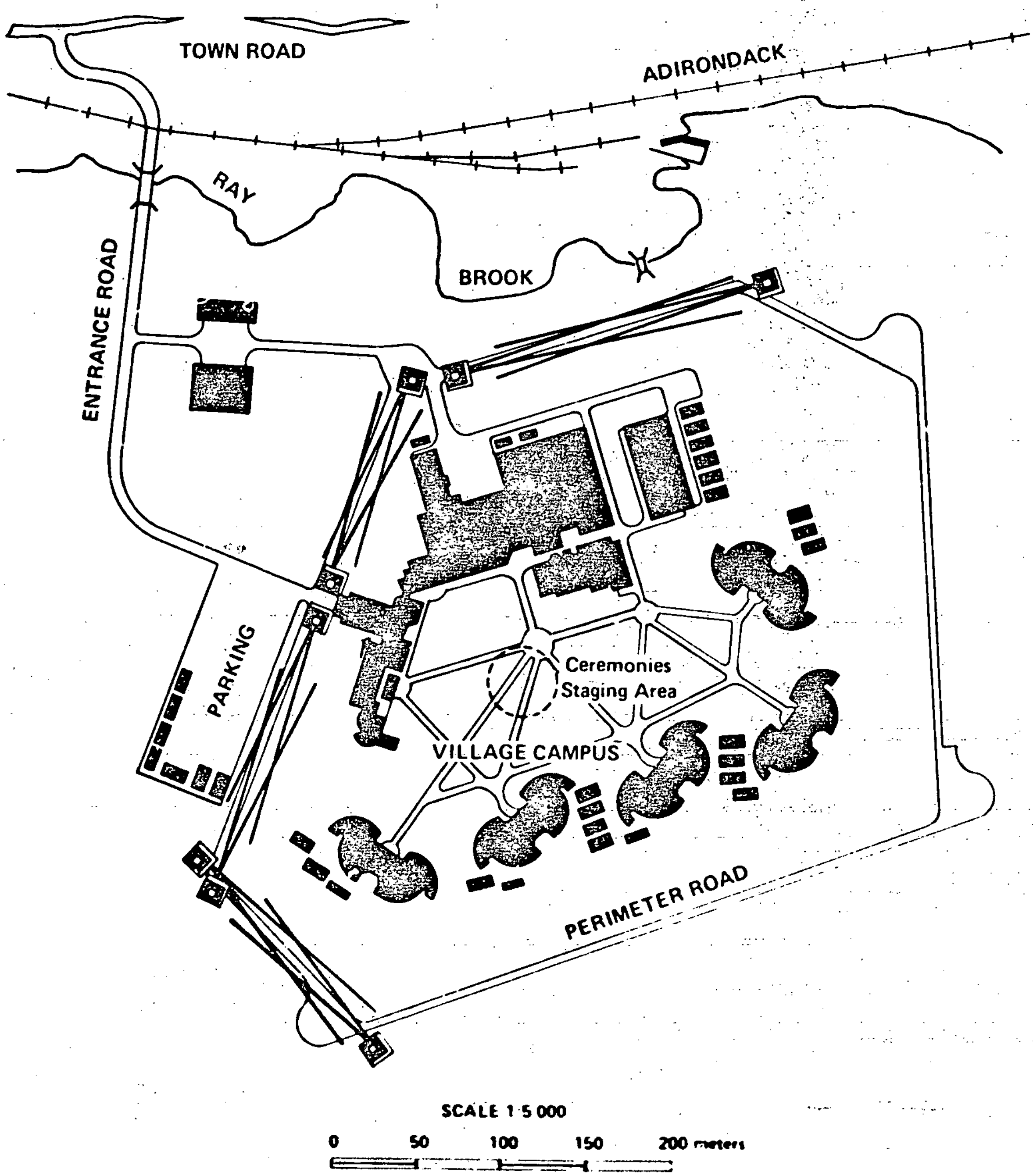


Figure 2.18 Perimeter Fence Surveillance CCTV Camera Locations. Cameras Associated with Pedestrian and/or Vehicular Sallyports, Internal Security, Etc., Not Shown but are Discussed in Text

distributed to three parallel outputs. One output fed the dedicated 9" CRT monitor, the second output was fed to an 8-port sequencer, and the last output was used for troubleshooting and waveform measurements.

The sequencer was used in conjunction with a (consumer-grade) RCA cassette type, time lapse video tape recorder (Model TC3250 with internal date/time generator). A 5:1 time lapse ratio was used; this permitted up to 10 hours (1 duty shift plus spare) of recording on one 2-hour VHS-type cassette. Each frame furnished by the sequencer was date-time-group (DDD HH MM SS) signatured so that specific events could be recalled on the appropriate monitor sequentially, in a timely manner. A stop field action control permits the freezing of single pictures for analysis or photography.

A separate monitor, storage disc and TL/VTR was available for playback-review and analysis in a NYSP furnished office trailer approximately 50' from the security control center. Initially it had been planned to record the output of seven fixed, plus one selectable camera-monitor chains. This, however, proved to be excessive information packing for the portable TL/VTR. Machine by machine variations and minor manufacturing imperfections prevented recording 8-channels on one machine and obtaining high-quality playback.

Post event analysis of the problems associated with playback of the Olympic physical security video tapes was made both at NESEA and USAMERADCOM. In general, it is agreed that the Sony Type TVO-9000 3/4" time-lapse VTR should be substituted for the RCA VTR. Compared to the RCA VTR, the reliability, stability and overall capabilities are worth the additional cost ($6,000 versus $3,000), however, only two of the more extensive Sony VTRs would have been required, instead of the three RCA VTRs because of the higher MTBF associated with the machine.

In addition, a registration/inspection monitor such as the Conrac 12' SNA series would have been a highly desirable complement to the equipment on hand. The capability of performing registration adjustments as part of the overall periodic "tuning and tweaking" would have permitted reduction of the frame-to-frame variables and permitted higher quality recordings.

However, field tests indicate that even on the Sony VTR that it is undesirable to record on one VTR and hope for extremely high quality when playing back on a second "identical" VTR. For best results, two VTRs should have been available at the site with cross-switching, so that tape review by one VTR could have been accomplished by placing a second VTR "on line".

Another desirable item of equipment to permit trouble shooting, maintenance and registration adjustment would have been a Cross Pulse Generator, for example the Video Aids Corporations type CPG-1.

The use of Silicon Imaging Device (SID) cameras, such as the RCA TC-1160, in areas where high light levels exist should be evaluated for a variety of physical security applications.

It was therefore decided to record those cameras trained on: (1) entrance way, (2) the exit doors, (3) the loading bays, and (4) the internal loading bay fish eye lens. This was an improved expedient and worked well for the few remaining days of operation.

The source of cameras furnished by NESEA were from commercial, off-the-shelf items capable of surviving a wide range of climatic extremes. Unlike Bureau of Prisons variable tilt/pan/zoom cameras, the NESEA cameras had fixed lenses and did not traverse or tilt. Maintenance required substitution of the entire camera so that the integrity of the nitrogen gas isolation arrangement would not be adversely effected. Camera reliability was generally quite high. Replacement was accomplished in 30 minutes using either a stepladder or a "cherry picker/bucket truck" for access to the camera's electronics and mechanical hardware. The use of two-way, portable radios between the field maintenance personnel and control center personnel greatly facilitated such operations.

In retrospect, it appears that a multi-camera CCTV system of a degree adequate to meet a counter-intrusion situation is perhaps the most labor-intense system that will be fielded. Numerous runs of coaxial cable must be cut, dressed, tagged and have appropriate connectors installed. Heavy gauge exterior cables also require extensive handling and represent another source of labor-intense allocation of resources. However, it is felt, as a result of after-action interviews with all troopers involved, that both the variable pan/tilt/zoom Bureau of Prisons system and the NESEA system were invaluable.

OPERATION AND MAINTENANCE

Operation of the components of the CCTV system were quickly grasped by the assigned NYSP troopers. They mastered the equipment and placed great reliance on CCTV for all aspects of routine surveillance and confirming purposes, to the degree that quick restoration of failed or malfunctioning equipment was a high priority item.

The large number of cameras, monitors, video tape recorders, sequencers, switches, video- and pulse- distribution amplifiers, and waveform analysis equipment, and the attendant reliance placed on this fully operational system, makes it clear that provisions for at least one full-time maintenance technician, on-site, is required. Dependence upon on-call contract service, the unfamiliarity of these servicemen with the equipment ~~installed~~ at the Village, and the resultant increased time it took to restore outages, can best be described as a makeshift maintenance arrangement. PO-PSE endeavored to have NESEA provide a more reliable maintenance capability, but manpower could not be made available, due to conflicts with other high priority Navy requirements.

The same situation applied equally to the Bureau of Prisons installed cameras, monitors and master control panel. The service company and its personnel based in White Plains, New York, for the most part were not as responsive to the needs of the physical security mission as the nature of the operation required.

OVERT DURESS SENSOR SYSTEM

Twenty remote transmitters and one alarm receiving device were provided as a means to permit security personnel (NYSP and Pinkerton's) to summon assistance in the event of an emergency. The alarm receiving unit was installed at the Olympic Village Command Center. The alarm transmitters were assigned to NYSP and/or Pinkerton guards on duty within the confines of the Village.

Duress alarm transmitters require the momentary actuation of a built-in (or remote) push button which in turn causes an automatic 10-second audible alarm tone to sound at the alarm receiver. Audible tone codes permit the differentiating of one transmitter from another. Up to 20 individual discrete alarm transmitter codes were available on the model used.

The purpose of the overt duress alarm system is to permit guards to summon calls for assistance in a highly unobtrusive manner.

Foot patrol personnel normally carry the alarm transmitter in a uniform pocket. Fixed post personnel can have the unit affixed to a wall, or desk kneehole so that activation can be made without obvious use of the hands. The overt duress alarm system was issued to Pinkerton personnel (i.e., guards) in both fixed and portable modes, and the NYSP personnel (i.e., troopers) in fixed mode only. The reason for the difference in issue methodology was that the NYSP troopers were already equipped with low-power, multi-channel, "handy-talkie" (HT) state-police-issued radios; Pinkerton guard forces had no portable communication link.

The scope of the overt duress alarm system was to provide coverage to all exits within the village, where badge control and/or verification was exercised, and other sensitive positions. These "sensitive" positions included the mayor's office, his local (on-site) apartment, the US Postal Service facility and Building B Primary Electrical Equipment Room.

Portable mode transmitters were passed from guard to guard at the end of each shift. Typical of this form of operation was Pinkerton Guard Posts 17-A to 17-F, all located at entrance/exit ways in the Building B complex. Hard-wired actuators to the specific duress rf transmitter installations were exemplified by a typical residence hall set-up. Three primary means of exit/ingress existed; two rear doors, one front (or primary) entrance. The two rear doors were covered by Pinkerton guards; the main entrance was controlled by a NYSP trooper. One rf duress transmitter was provided with three push-button actuators, each unobtrusively installed at the two guard and one trooper post. Low voltage "zip cord" electrical wire and doorbell pushbutton switches were used to complete all electrical connections. Footpad pressure, air pressure, or mercury tilt switches were available, but were not installed. Double latching type switches would have materially reduced nuisance type alarms.

The overt duress alarm system consisted of two major items: 1-each Motorola MRD1132CB VHF, FM Receiver, shown in Figure 2-19, a 150.8-174 MHz single frequency, double conversion superhetrodyne unit, and 30-each Motorola SP2700061 1-watt, FM security transmitters, set-up on twenty-three discrete audible tones (reference Figure 2-20). Seven units were assigned as either spares, or were provided with identical audible tones to those in use so that multiple security transmitters could be used to cover a single patrol zone post.

Extensive rf propagation testing commenced prior to the receipt of the actual equipment to ensure that at least a very high probability of successful reception at the Security Command Center would take place. This required an outdoor antenna (unity gain) to overcome the attenuation caused by the extensive use of re-enforced concrete, metal roof construction techniques both at the transmitter as well as at the receiving end.

LAYOUT AND INSTALLATION

Each unit was bench tested by a contractor provided technician. The unit was tested for frequency stability, power output and valid tone assignment, and 2 new Alkaline-type 9-V transitor batteries were installed in each security transmitter. Conventional in-line watt meters, a spectrum analyzer and bench test equipment were available and used to the extent necessary.

One member of the Analytics' implementation staff performed detailed coordination with the site commander of the NYSP forces to ensure that a coherent assignment plan regarding zones and posts was in effect and would be employed throughout the operational period. Siting of the individual units was also thoroughly coordinated in terms of the total response force and the number of units available for distribution.

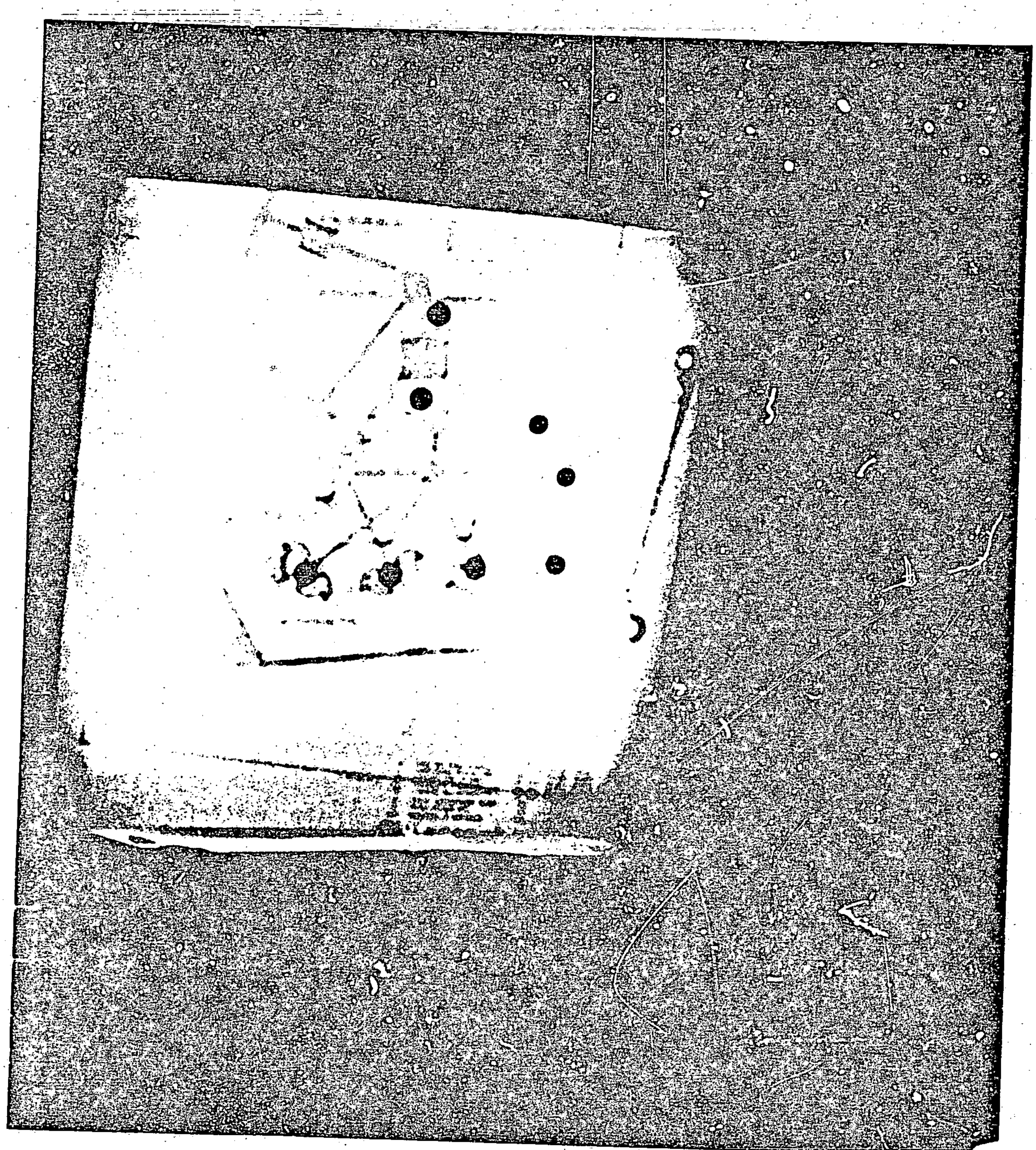


Figure 2-1?. Overt Duress Alarm Receiver and Village Map Display.

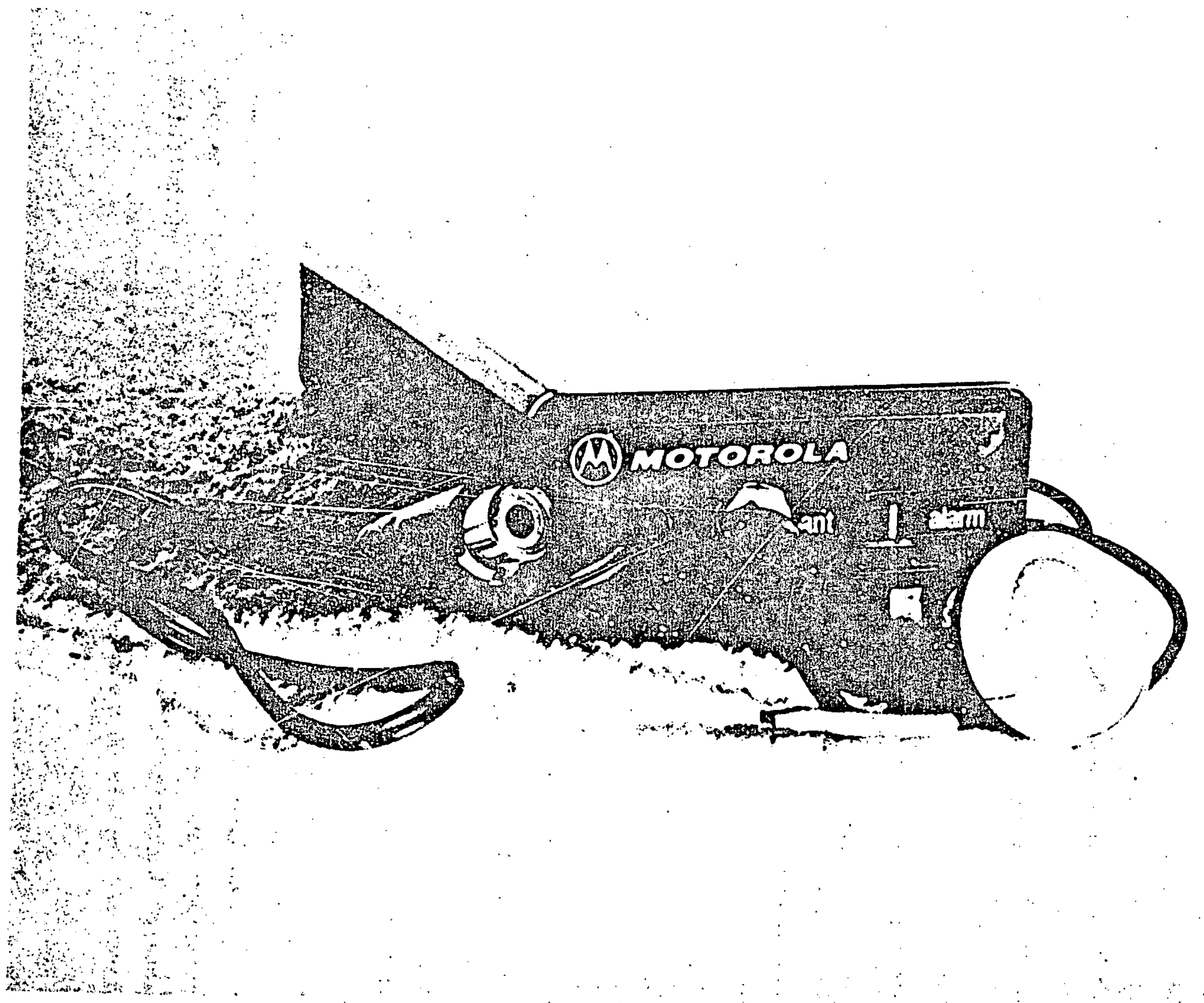


Figure 2-20. Motorola's 1-Watt Overt Duress Sensor Transmitter. This Device Was Employed in Both Fixed and Portable Configurations by Building Guards.

Various type switches (pushbutton, foot pressure, air pressure, etc.) were considered, but only the doorbell (pushbutton) type was employed. The use of remote pushbuttons in parallel with the security transmitter's own actuator button permitted many of the units to be sited in a physical location permitting optimized rf line of sight.

The system was made operational in all residential halls, and the entry control building (Building C) before the arrival of the first official residents. Each unit was thoroughly tested. Security transmitters for issue to the Pinkerton guard force were distributed and a brief training session provided for individuals of each of the three daily shifts. The Nuisance Alarm Rate (NAR) during the first day was quite high as the Pinkerton guards experimented with finding the most comfortable location for the transmitters in conjunction with the type and fit of the individual's uniform. Within the first complete duty day, however, the NAR rate was reduced. As the users matured and became more familiar with the total security system, an accidental triggering would typically be followed up by a telephone call informing the control center of an accidental actuation. Near the end of the operational period, the NAR was at zero for several consecutive days. Periodic tests of each security transmitter was made; this with both prior notification to the Village's Control Center, and followed up by a brief announcement over the state police "handy-talky" radio. There is no current drain when the security transmitter is in the standby mode. As a result, no battery replenishment was required.

No maintenance action was required on the alarm receiver. Sensitivity and adjacent channel rejection was considered to be adequately checked because of the success in transmitting periodic test alarms and because no (off-channel) false alarms were received.

The frequency selected for the operation of the Receiver and Transmitters (155.740MHz) was selected based on current police assignments in Eastern New York, Vermont and Western Massachusetts. If the same crystals are to be employed elsewhere, a thorough EMC survey should be undertaken to ensure clear on-channel and co-channel operations and/or the possibility of desensitization based on local ambient rf levels.

COVERT COMMUNICATION SYSTEM

COAT-TAILS is a proprietary, covert communications system for use by selected personnel likely to become hostages. It permits retention of Command, Control and Communications (C^3) capabilities by commanders of reaction forces in situations where conventional telecommunication arrangements are likely to fail.

Induction actuated earpiece (reference Figures 2-22 and 2-23), an ultra-miniature, flesh-colored, self-contained receiver of user work induction loop signals.

PURPOSE AND SCOPE

At the Olympic Village the system was used by police troopers assigned to each of the seven major residential facilities: the "clam shells," the Polyclinic, and the residential portion of Building B. COAT-TAILS and all associated components of the system was covert in that: (a) it was concealed on the trooper's body, and (2) that it was capable of transmitting and/or receiving messages from other covert communications equipment.

Built-in electret, miniature microphones worn on the user's body permitted the rebroadcast of any conversation conducted within the normal hearing range of the user; thus, there was no invasion of privacy or "bugging" within its capability. Furthermore, to ensure conservation of battery power, operating procedures provided for the system to be activated in the event of an actual terroristic attack.

COAT-TAILS was a development arising from participation in, and analysis of, other hostage/terrorist situations wherein the lack of intelligence regarding the true intent of the terrorists, or a means of alerting key personnel among the hostages was felt to be a material shortcoming in the successful conclusion of such cases. An engineering analysis of the Olympic Village telephone plant was made, and it was determined that any telephone within the Village could be made "hot" thus, enabling it to become a monitoring/surveillance device even though the instrument remained "on hook". This application was not pursued to avoid possible charges of "bugging", invasion of privacy, etc., from marring the entire spirit of the 1980 Winter Games.

COAT-TAILS, although a "stand alone" system, was designed so that it could be used in conjunction with other facilities such as the Lynch Communication System Crisis Phone, various emission generators and spectrum analysis equipment. For example, through the use of the audio patch panels provided by US Army Signal Engineering Agency, CONUS, Ft. Ritchie, Maryland, it was possible to access (both) internal and external lines, NY Bell Telephone Company trunks, or to "patch" into any of a variety of radios.

Because of the sensitive nature of high-quality covert surveillance equipment, salient elements of the COAT-TAILS are described in broad, generalized terms only.

COAT-TAILS consists of three major subsystems: (1) that worn by the user, (2) the duplex, low power, covert, transceivers installed in all residential areas, and (3) the control panel situated at the Village's Security Control Center.

Essentially each of these subsystems consisted of the following components:

User Equipment - A 162.XXX MHz transmitter, Figure 2-21 A, detuned to provide a power output of about 150 milliwatts (mw), an electret monural F microphone and miniature battery pack completed the transmit portion. In future models, stereo electret microphones will be employed; these will work in a noise-cancelling mode, and will be user body optimized to ensure maximum intelligibility of conversations. Figures 2-22 and 2-23 illustrate the user's earpiece assembly.

A 167.XXX MHz, relatively narrow band receiver (Figures 2-24 and 2-25). The output of the receiver was used to either drive an induction loop (reference Figure 2-21), or in the case of Residence Hall "H" a miniature earphone.[1]

Actuator switch, enabling the unit to be turned on or off B

Harness C, which contained both the induction loop user to drive the user's earpiece and to house transmitter, receiver and battery pack for both the transmitter and receiver D

1 Building H was heated using built-in, floor type induction heating coils. These operated at 60 Hz, with very high Gausian levels; sufficient to totally wipe-out the extremely low power induction system employed in COAT-TAILS.

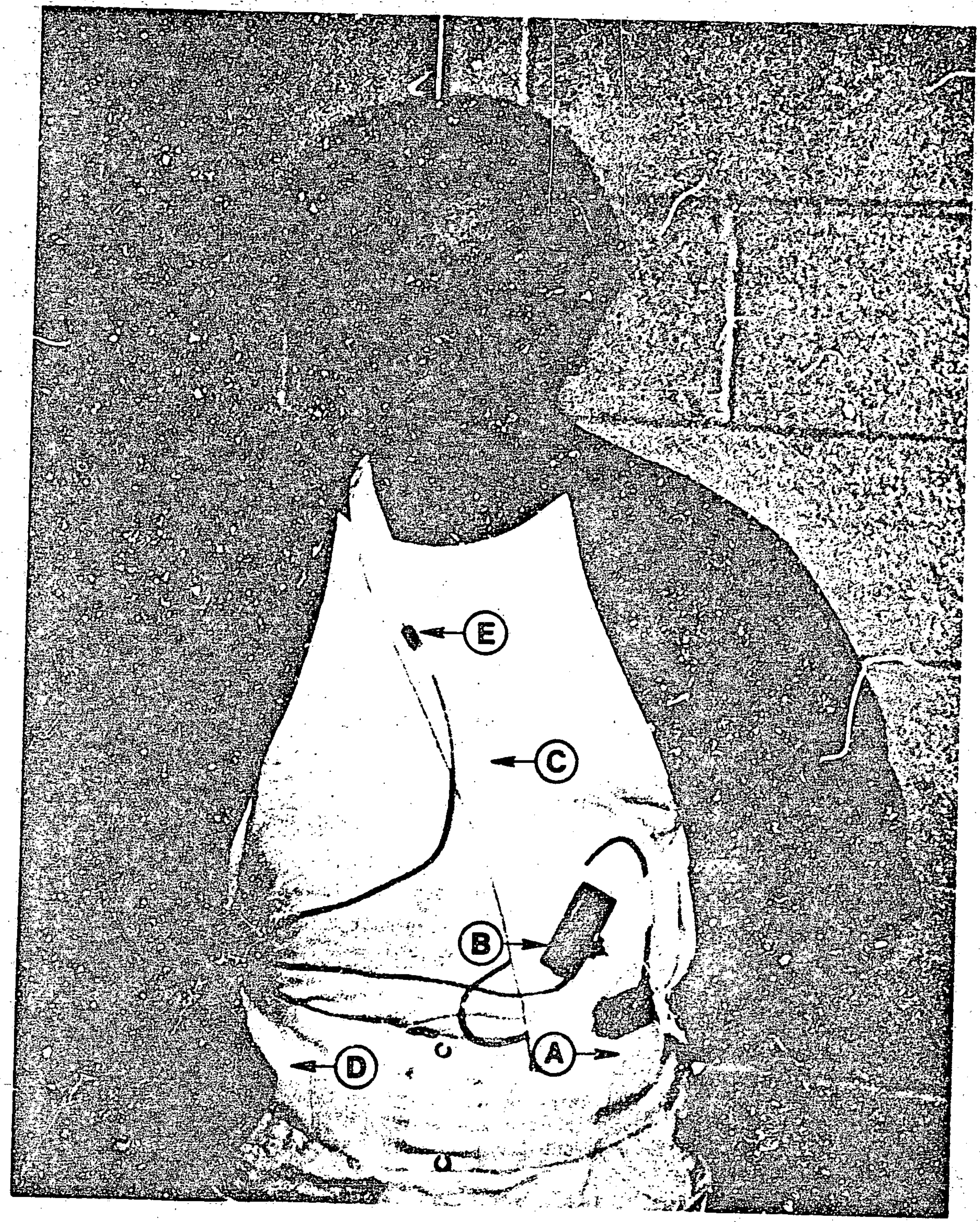


Figure 2-21. Close-up of User-worn Covert Communication Equipment.
(Refer to Text for Keys to A – D.)

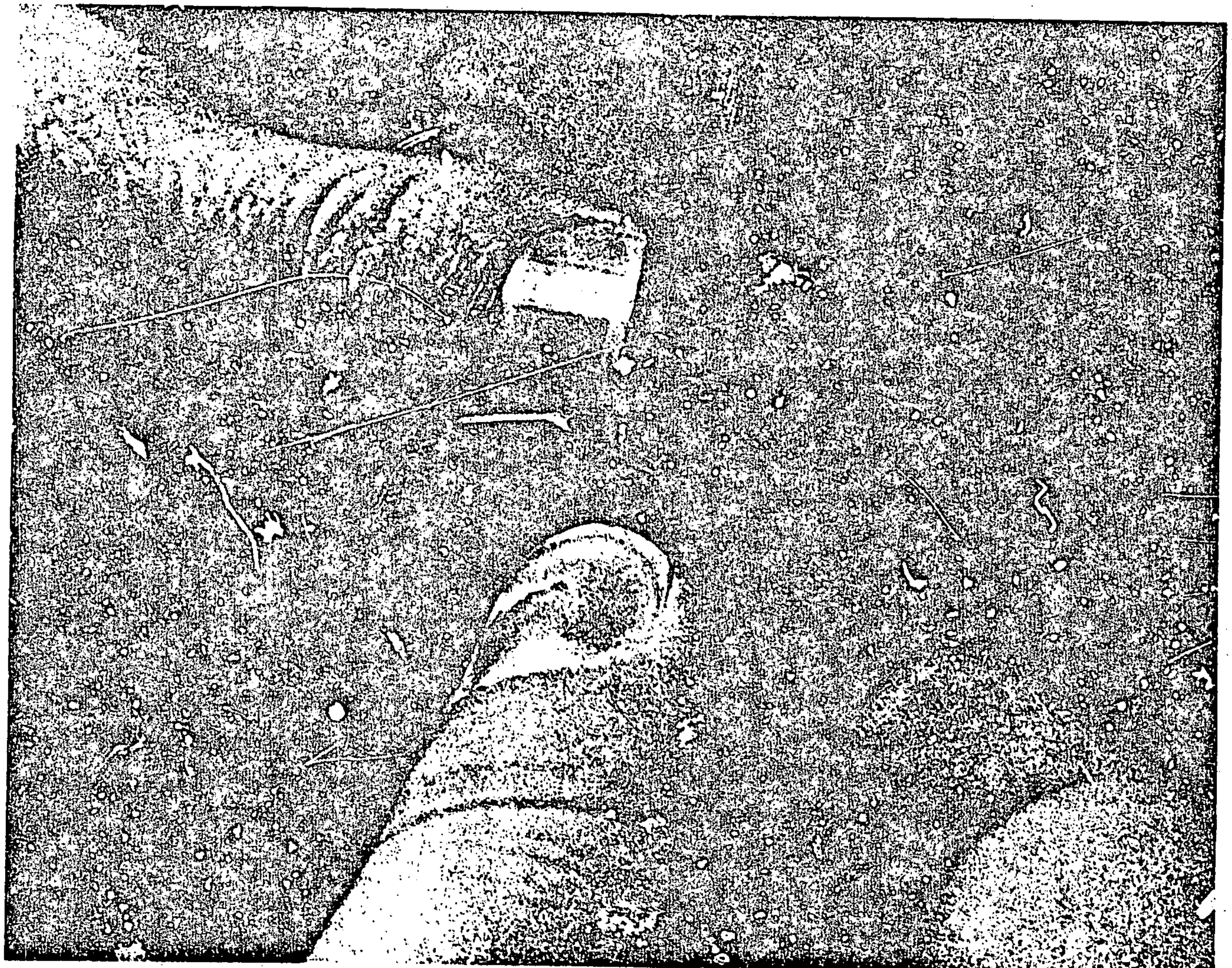


Figure 2-22. COAT-TAILS Induction Driven User Worn Earpiece and Replacement Battery.

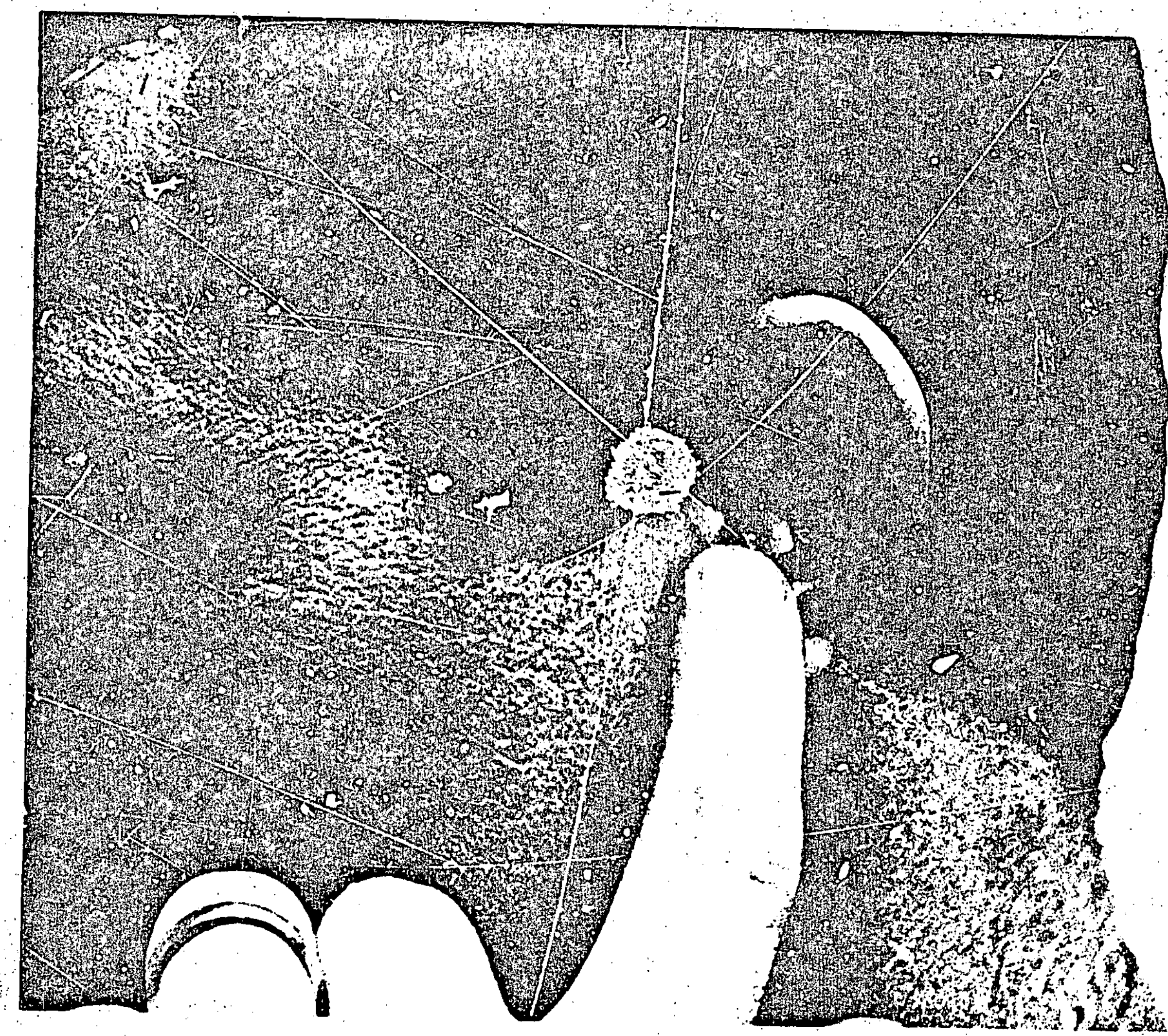


Figure 2-23. Close-up of COAT-TAILS Induction Earpiece.

Fixed plant equipment:

a. Residence Halls, etc. This consisted of a full duplex transceiver providing for nominal 50-Z unbalanced receiver and transmitter ouptuts and for 600-Z unbalanced telephone wire input output connections. It is capable of operating in the 155 to 175 MHz band; nominal minimum duplex frequency separation is 5 MHz. The units employed are illustrated in Figures 2-24 and 2-25.

b. Control Center. This installation consisted of a control panel where transmissions to an officer in a selected building, or multiple buildings would be originated. All incoming, in-plant telephone lines to and from COAT-TAILS duplex transceivers terminated in the control console. Illumination of a designated Light Emitting Diode (LED) identified the receiver being activated; twin loudspeakers permitted the use of multiple line monitoring (i.e., mute-select). Output ports from the COAT-TAILS control console were then fed into a 8:600-Z) impedance matching transformer so that selected audio input/output levels could be passed into the Village Telephone Frame Room. In the Frame Room additional jumpers were provided so that the call could be placed on internal lines or external trunks. Figures 2-26 and 2-27 illustrate the layout of the COAT-TAILS control panel.

c. Spectrum Analyzer and Wide Band Receiver. Auxiliary (outboard) COAT-TAILS equipment incorporated a precision spectrum analyzer which, with its own signal generator and tone burst generator, could be used to tune-in on, or to emulate the spectral characteristics of any AM, AM/SSB or FM radio between 50 KHz and 1 GHz. This device was employed in the event that it was necessary to communicate with a terrorist who, for example, was using a radio of foreign origin; its tone-coded squelch (CTCSS), frequency deviation, operating frequency, etc., could be matched so as to ensure that a controlled communication link was easily established and maintained.

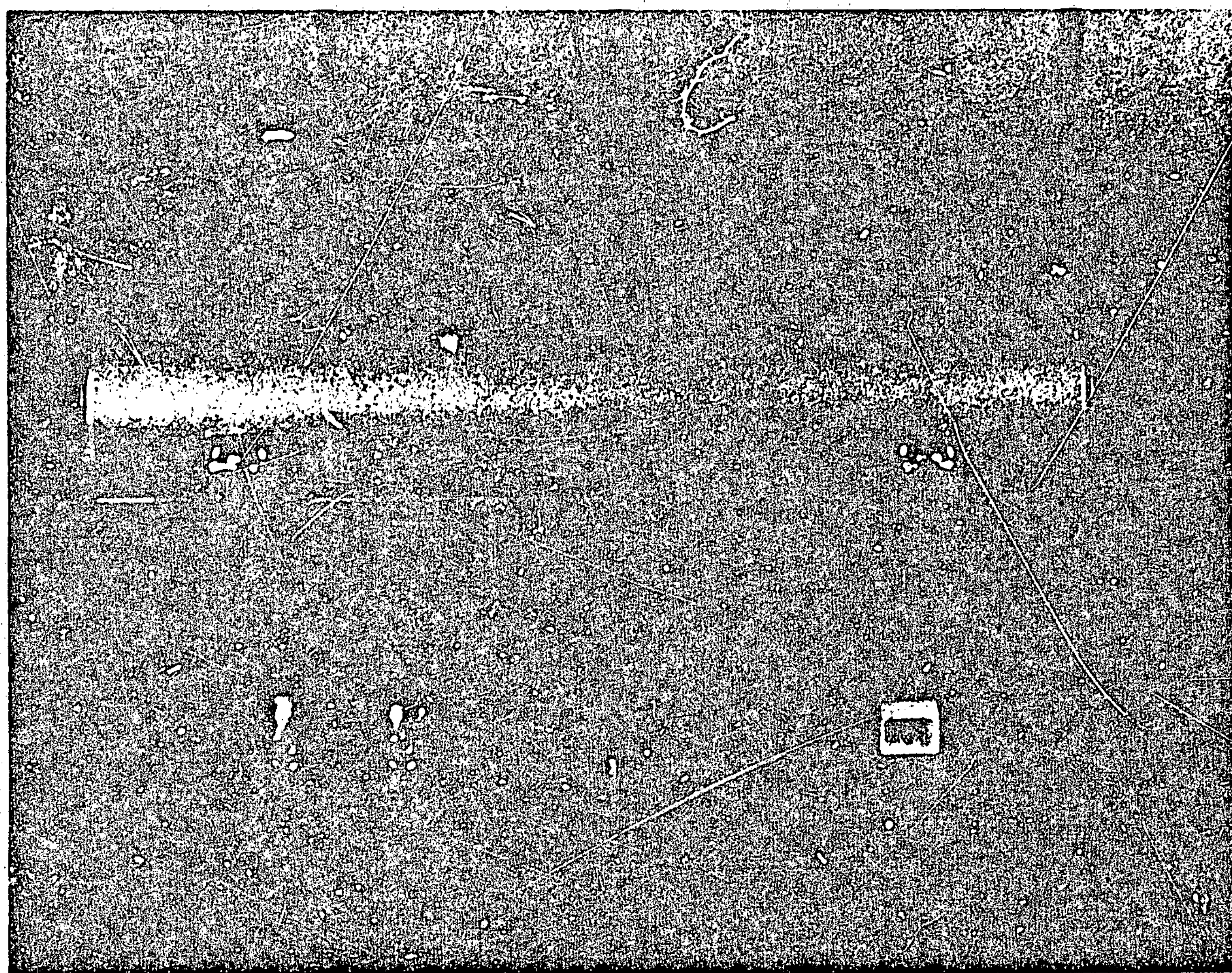


Figure 2-24. Remote COAT-TAILS Transceiver Unit; 2 RF Ports (TX and RX) and 2 Each 600-Z (TX,RX) Terminations are Provided. NiCad Batteries Power the Unit.

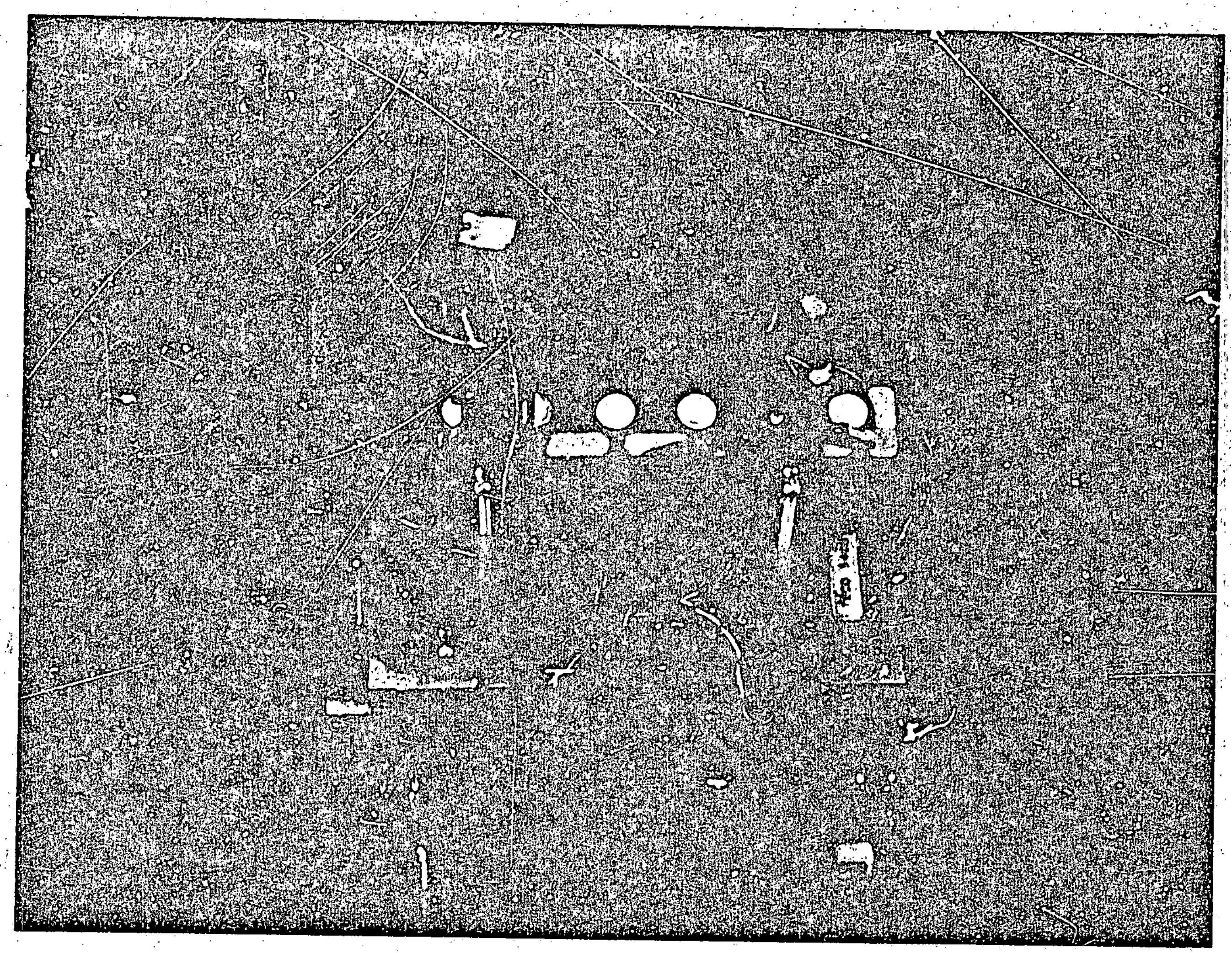


Figure 2-25. Details of COAT-TAILS Transceiver.

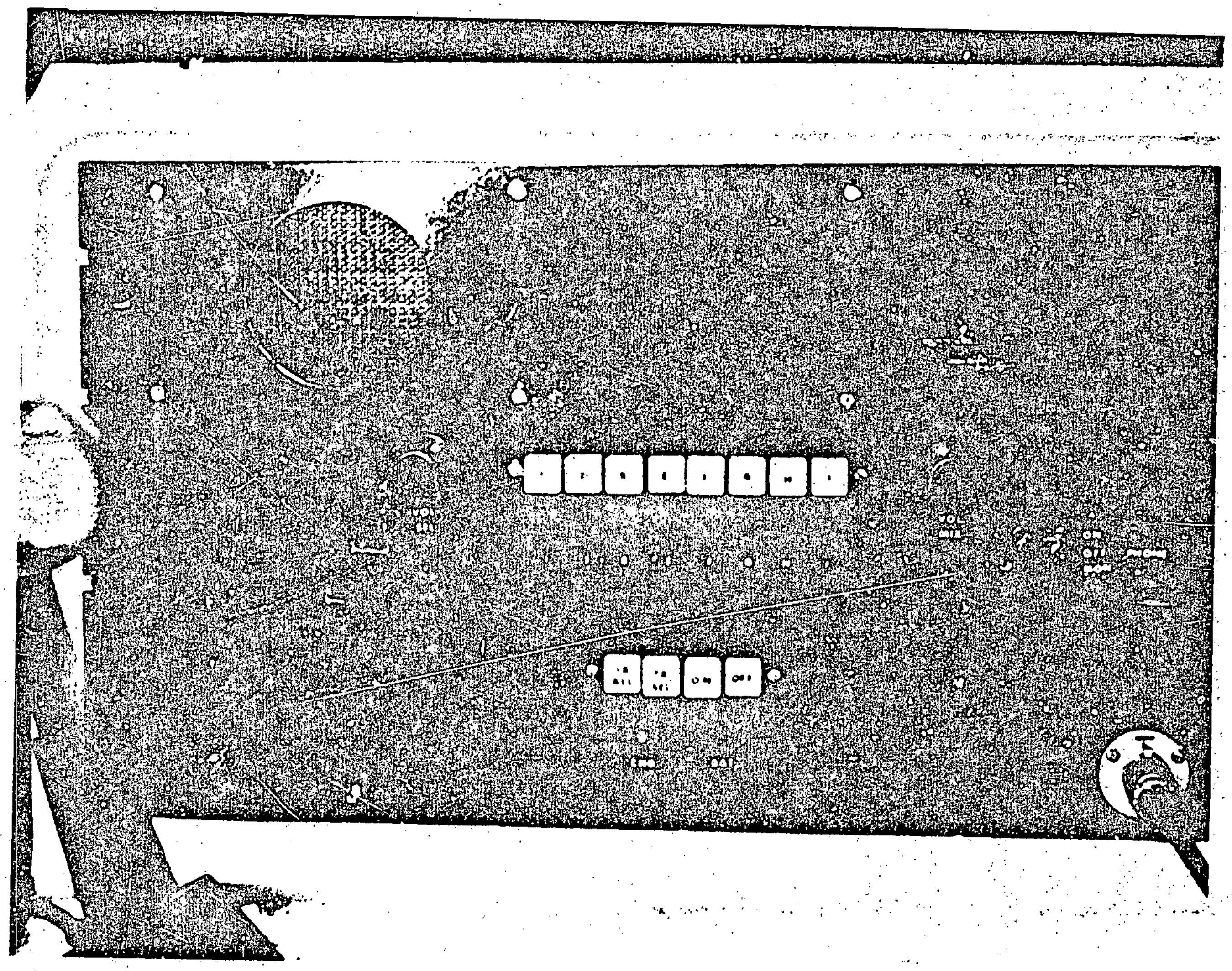


Figure 2-26. Details of COAT-TAILS Communications Control Panel at Security Control Center. Eight 4-Wire 600-Z Phone Lines Terminated Here; a Pair from Each Remote Transceiver.

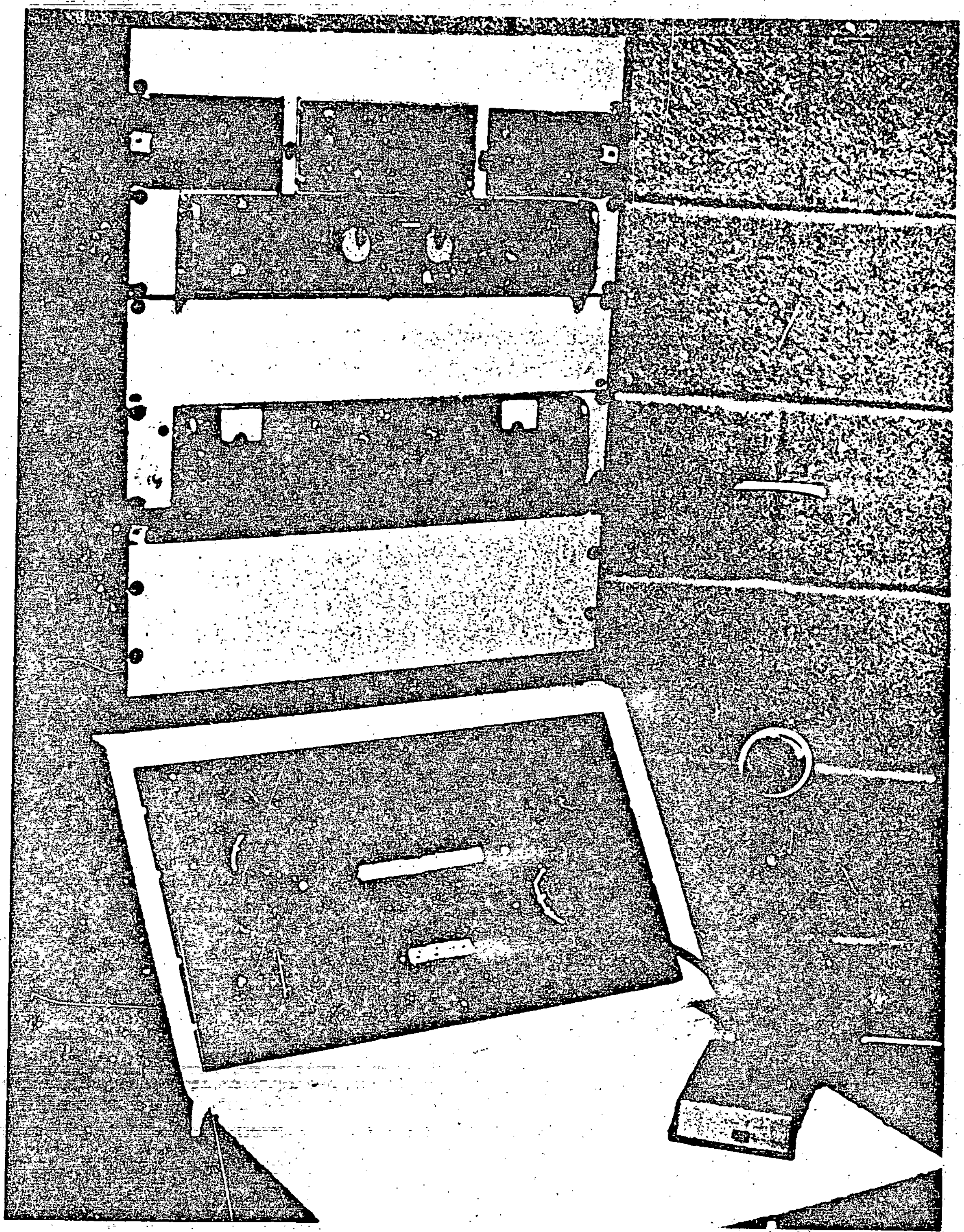


Figure 2-27. COAT-TAILS Control Rack, Spectrum Analyzer (above) Permitted Direct Tuning from 30 MHz to 980 MHz. Synthesized Emission Generator (not shown) Permitted Operation Between 100 KH3 and 1 GH3.

The wide-band continuously tunable receiver consisted of a basic unit (30 to 600 MHz) and up-converter (600 MHz to 1 GHz), and a CRT "panoramic adapter". This device was for use in conjunction with the spectrum analyzer; it permitted rapid tuning and visual monitoring of all received signals within its bandpass; it would have been employed to help track down illegal radio transmissions, or to identify the sources of interference such as those generated by the local amateur radio station. (NOTE: This amateur station was a constant source of interference to a host of communications and surveillance activities, yet, there was little if anything that could be done in the short time period. The station should have been set-up at some remote point, e.g., at a downtown location, not in close proximity to a high security area).

OPERATION AND MAINTENANCE

Operation and maintenance was performed by an electronic technician employed by Analytics; his skill permitted all first and second echeleon maintenance to be performed on site and with a minimum downtime. Users reporting trouble had their corrective maintenance actions performed on an on-call basis, or in a few instances involving more complex problems, the malfunction was corrected during an off-duty shift. The sudden, unexpected decision of the Chinese delegation not to occupy conventional residential hall quarters, and instead to use a portion of the Polyclinic, seriously depleted the number of spare user and fixed plant modules. It meant the COAT-TAILS was operating on a zero baseline maintenance float.

Actuator mechanisms were a source of irritation to the system. NYSP close-fitting, well-tailored uniforms give very little room for tolerance and the daily dressing/undressing associated with the over-the-neck/shoulder harnesses. Subsequent improvements have been made although probably would not be all that necessary in more loose fitting clothing such as military fatigues or field uniforms.

TRAINING

Training was conducted at Ray Brook over a two-day session and included both the theory and tactical utilization of the equipment and the system as a whole.

In addition to actual hands-on experience in the wearing and actuating of the equipment, each member of the using class of troopers was provided with limited distribution instructional matter.

Instruction of the troopers stationed at the Control Center was conducted on a one-to-one basis over the course of three duty shifts with periodic review on an as-required basis. Step-by-step operating instructions were posted alongside of the console for ready reference purposes.

FENCE PROTECTION SYSTEM

The Olympic Village was enclosed within two 12-foot high link fences, with a 20-foot separation between each fence. Gates at each corner permitted maintenance personnel to access the easement between the two fences. Each fence was wired with a vibration-based Fence Protection System (FPS), manufactured by General Telephone and Electronics (GT&E) and installed for the Federal Bureau of Prisons.

The FPS alarm system also included the vehicular entry (sally port) interlocking gates at the Northwestern corner of the perimeter. Both the inner and outer fence were provided with the electret cable used in the 11-zone FPS system. For the Olympic Village use only, the outer fence was activated. Upon termination of the games, the sensor cables from the FPS were shifted from the outer to the inner fence for the Bureau of Prisons anti-escape application rather than the DoD/NYSP anti-intrusion application for the Olympics.

The fences, FPS and annunciator system (See Figure 2-28) were designed to provide: (1) a postive and effective barrier, (2) an effective intrusion alarm, and (3) positive indication, permanent record and control over the entire fence system.

Ease with which the twin fences could be penetrated, cut, climbed or breached is not included; it is a topic, however, which is adequately treated in various military technical and field manual reports and commercial technical publications.

No barbed wire, GPBTO, outriggers, or between fence concertina wire was installed.

Adherence to reasonably exacting construction techniques and standards for the fence fabric, and installation standards for the electret cable is required. For the most part, the installation of the fabric and sensors at the Village was well within the manufacturer's prescribed limits. However, one area of the system deviated from this standard. This was at the North leg of the inner and outer fences near the Northeastern corner of the facility. Large sections of the fence fabric, etc., were removed after initial installation to permit passage of approximately 100 house and/or work trailers into the Village. Retensioning of the fabric, re-installation of top and bottom rails, and re-installation of hardware, was generally not of the same uniform quality as the original installation.

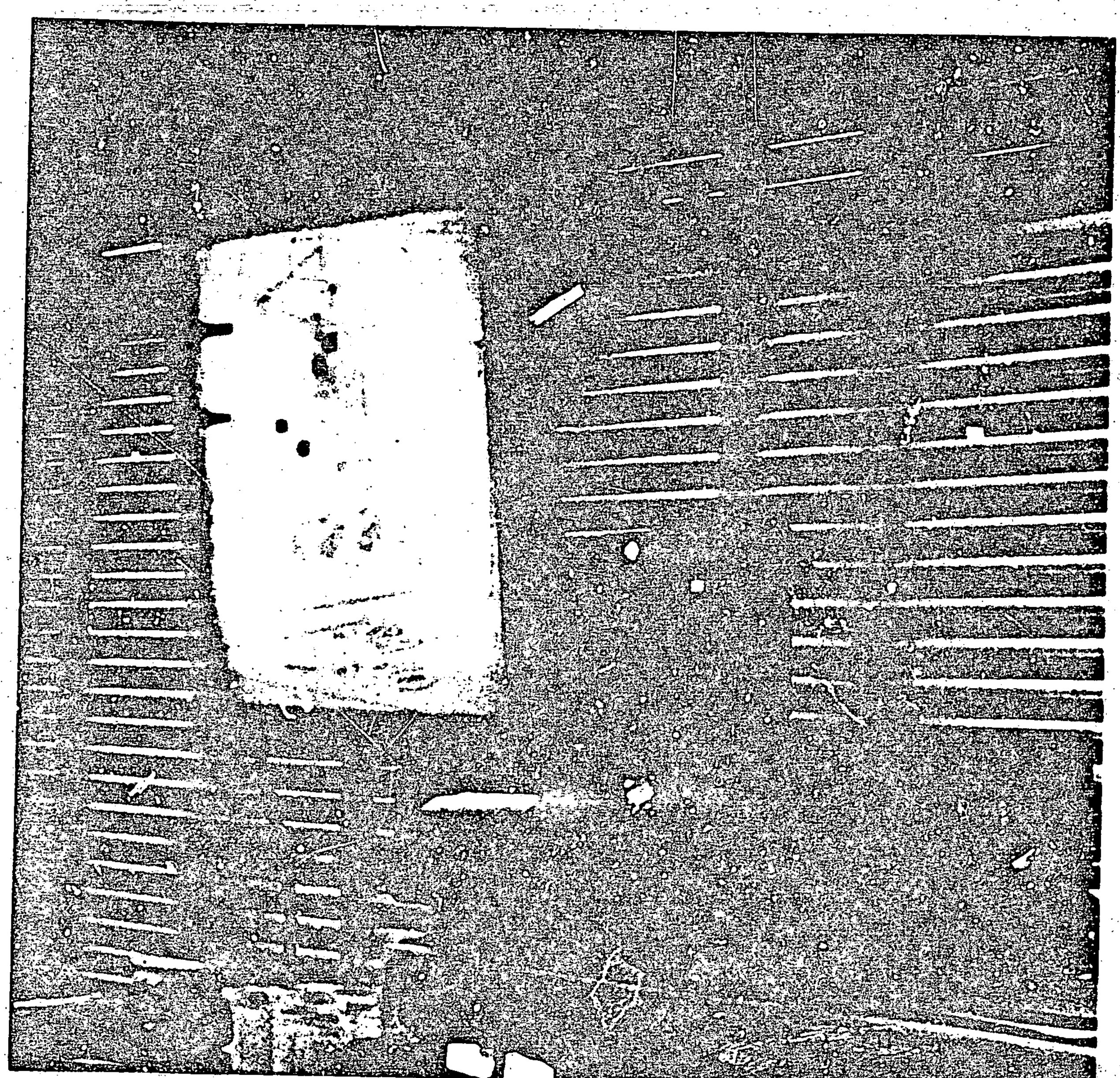


Figure 2-28. Fixed and Mobile FTA Annunciators. Also Shown, (upper left) is Map of Village Used to Orient Variable Pan/Tilt/200M CCTV Cameras.

OPERATION AND MAINTENANCE

After assuming operational maintenance for the fence, FPS and mobile annunciator system, a series of test penetration attempts against the facility were conducted. Three men, equipped only with wooden step-ladders and portable radios, performed a variety of climbing, scaling and shake tests against the total perimeter line. Some areas were virtually insensitive to any amount of "tampering" while others performed in accordance with the locally set logical level (3-vibrations within a 10-second "window").

To the extent that the fence alarm did activate, the Vindicator microprocessor-controlled annunciator and display panel performed very well. Zone, steps to clear, audible alert, etc., were all properly displayed and printed out. However, many attempts at scaling the fence were undetected; it was found that the more acute the angle used when emplacing the ladder at the fence, the less likely an alarm would be generated, even after repeated climing and dismounting. (NOTE: We did not scale the fence then leap to the ground; rather the person scaling climbed the ladder and then dismounted in the interest of saving time and avoiding injuries.)

In essence, the FPS appeared to have "dead spots". They were more noticable along the Western perimeter and the Northeastern corner. In addition, several potential areas whereby the fence could have been breached were given special surveillance.

Midway through the Winter Games, there was a catastrophic failure of the fence alarm's controller and annunciator system. Telephone calls to the manufacturer resulted in a temporary fix. However, this too failed after a few hours. At this time a decision was made to bring in a technician employed by an Analytics' sub-contractor who was familiar with digital logic; he diagnosed the fault and effected remedial actions. The fault resulted from the accidental unplugging of the system's primary power unit situated in the power room, approximately 50 feet from the security area. When the system's internal NiCad batteries failed after the floating charge had been removed, the entire system "crashed."

During program validation, the presence of spurious alarms, and other minor problems continued, and a manufacturer's representative was brought to the site. A program of diagnostics, software validation, and a complete system walk-through was provided to DoD and Analytics' personnel. No further problems arose with the controller/display or the mobile annunciator. By the end of the event, all facets of the system were well received by troopers assigned to the security control center.

Operational Shortcoming. In the design layout of traffic patterns, the traffic flow of buses and controls over athletes riding these buses soon proved to be inadequate. Parking and loading areas more distant from the pedestrian entrance (Building Q) were never really used. As a result, large queues of milling people tended to form close-in and around the main entrance. To alleviate this problem, buses were routed along the Eastern perimeter road to a point where a U-turn was made and the buses then returned down the perimeter road and parked parallel to and near the perimeter fence. As athletes then waited to board their respective buses a new problem arose; they used the fence to lean and store equipment against, or used the fence as exercise bars. This, in turn, caused significant activity of the alarm system, much to the annoyance of the troopers on duty. In such situations, Zones 1 and/or 2 were simply "secured" and the two television cameras surveying that portion of the fence monitored more closely. Other situations involved pranksters tossing objects between the two fences, then attempting to scale either the inner (or outer) in an attempt to retrieve the object.

A small picket fence or comparable barrier such as a snow fence would have kept personnel and equipment away from the alarm-equipped fence. On the other side of Building Q, i.e., the Eastern perimeter to the North and extending from Building Q, down to the vehicular interlock gate (sally port), several vehicles were parked head-in or rear-in, perpendicular to the outer perimeter fence. When some Army National Guard ambulances parked that way, scaling the fence without activating the FPS became but a minor challenge. It was then possible for an intruder to climb onto the roof of a parked ambulance and swing over the top rail without the fence alarm being activated. Again, the CCTV camera served more effectively then did the FPS.

It should be noted that there is no such thing as the ubiquitous sensor/security device; a variety of synergistically arranged devices are absolutely necessary to achieve even minimum levels of security.

NIGHT VISION EQUIPMENT

Two types of Night Observation Devices (NOD) were furnished by the Army in support of NYSP physical security mission objectives. One type of NOD was the AN/PVS-5A personal goggles (20 pairs) is shown in Figure 2-29 and 2-30. The second type was the NOD/LR (Night Observation Device/Long Range), consisting of 600mm viewer and tripod assembly (2 units), this is illustrated in Figure 2-31.

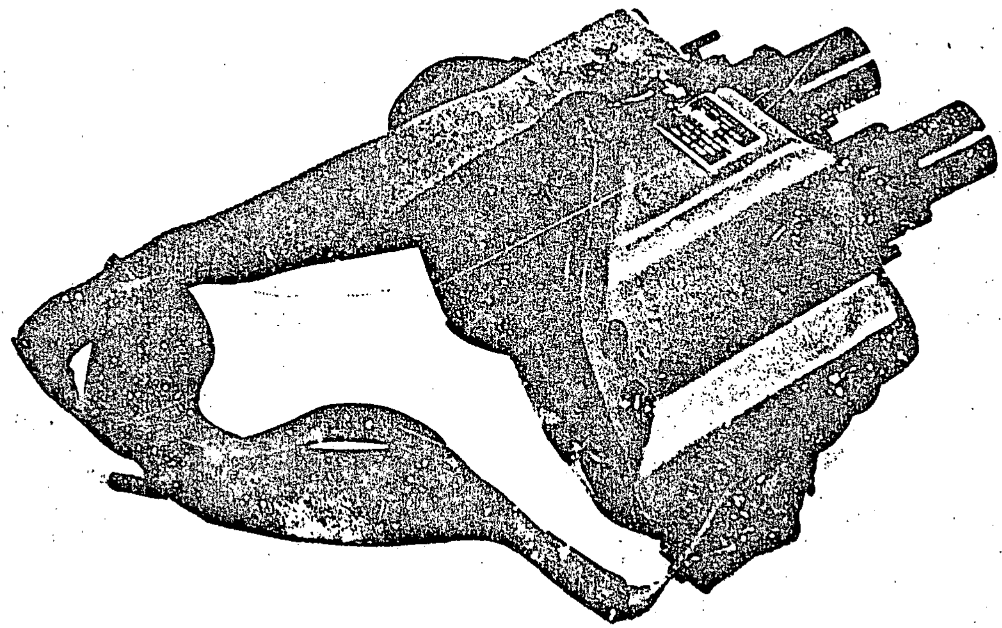


Figure 2-29. AN/PVS-5 Night Vision Goggles.

Figure 2-30. Night Vision Goggles Worn by Typical User.

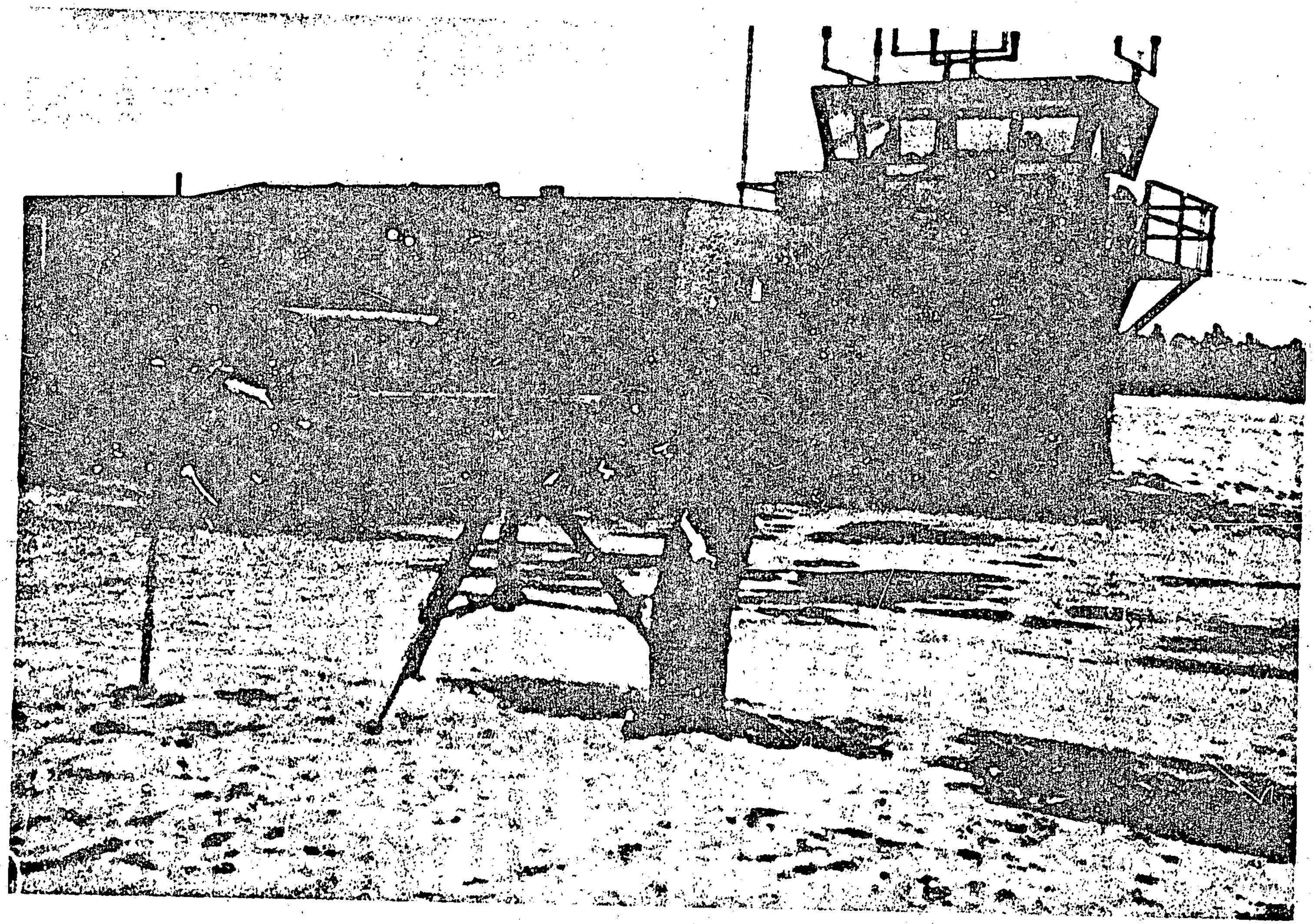


Figure 2-31. AN/TVS-4 Night Observation Device, Long Range Used for Protection of Airfield.

The goggles were issued to NYSP Special Weapons Assault Team (SWAT) and to the conventional zone patrol vehicles assigned to the perimeter posts at the Olympic Village. NOD/LRs were used at the Adirondack Regional Airport, Saranac Lake, for the protection of Commercial, Military, and Government aircraft parked overnight.

SYSTEM DESCRIPTION

The purpose of these equipments was to enhance the overall protection and surveillance capabilities under extremely low light level conditions. At the airport complex, lighting from a security point of view in the Remain-Overnight (RON) parking area was quite poor. Furthermore, there were neither time nor funds available to permit construction of an adequate security lighting system for an event of such relatively short duration, and for which there would be no on-going need or use in the post-Olympic period.

The purpose of the night observation goggles at the Olympic Village was two-fold. First, their availability for instant deployment in the event of the failure of the Village's perimeter lighting system and second, to enhance the reaction capabilities of the NYSP SWAT when operating in the deeply wooded area surrounding the Village, if night operations became necessary. Training sessions with the AN/PVS-5A goggles provided a marked advantage for those personnel using the goggles.

Although the Village's perimeter defense zone was quite adequately illuminated for both Closed Circuit Television (CCTV) and/or unaided eyesight, one significant flaw existed; without the goggles the Village would have been much more vulnerable to a terrorist attack. This counter-intrusion "flaw" was in the perimeter lighting system.

Perimeter lighting was provided by an arrangement of mast mounted High Pressure Sodium Vapor (HPSV) lamps. A pre-operational inspection of the lamp system by Analytics' personnel showed: (1) they were not connected to the Village's 500-KVA emergency backup power system, and (2) these type of lamps require a minimum of 7-9 minutes to achieve full illumination capability, i.e., to come to full operating temperature, even in the event of a very brief, momentary power outage. The nature of the power grid feeding the Village, its length, relative isolation, etc., made it quite susceptible to sabotage. Had the Village been temporarily blacked out, emergency power would have taken over and conventional services restored within 5-6 seconds. However, the perimeter lights would not have been restored at all because they were in the load shedding scheme, or they would have been restored to full illumination in 7 to 9 minutes if not "load shed." Analytics arranged to transfer the mast-mounted HPSV lamps electrical feeders to that load which was automatically assumed by the emergency back-up power system. Other details on the various perimeter lighting arrangements were covered earlier in the discussion of Closed Circuit Television.

With this situation prevailing, it was essential that the NOD goggles be immediately available to the troopers assigned to each patrol zone post in and around the Village.

Materiel Description

a. AN/PVS-5A Night Vision Goggles. The goggles (Figure 2-29) are a self-contained, night vision viewing system. They provide the user with improved night vision capabilities using available starlight and moonlight.

The goggles can be used with or without standard battle helmet or aviator helmet and provide capabilities for reading, performing manual tasks, patrolling, medical aid, construction work, or mobile equipment operation. They can be employed for driving, walking, air support and surveillance. An auxiliary infrared light source provides added illumination for close-up work.

One (1) Battery BA-1567/U is required for the operation of the equipment. General technical characteristics of the goggles include:

Magnification	None
Battery Voltage	2.7V DC
Illumination	Cloudy starlight to bright moonlight
Field of View (FOV)	40°
Battery Life	12 hours at 70°F (21°C)
Operational Temp. Range	-65°F - 125°F (154°C - 52°C)

Approximately two hours of instruction and two hours of practical, user-oriented demonstrations for this equipment were given to NYSP troopers by representatives of the US Army New Equipment Training Team, Fort Monmouth, NJ. Battery logistic support was provided by the US Army Logistics Command's Tobyhanna Army Depot.

Training was realistically conducted and there was a very high degree of interest in the night vision devices. The night vision goggles are troop-oriented devices and thus are simple to use and to maintain. Additional information was provided with each set of goggles via Operator's Manual TM 11-5855-238-10.

Only one maintenance action was required during the 30-day period of operation. The ON/OFF/IR rotary switch knob fell off one set of goggles. It was replaced with a substitute knob from the local Radio Shack store. The substitute knob was modified to withstand the torque necessary to actuate the switch by fabricating a shim plate to reduce the diameter of the knob hole down to the small size required by the AN/PVS-5A.

Operation of the equipment was satisfactory in every aspect. The most frequently repeated comment pertained to the apparent suitability of the goggles for conventional police type stake-out, surveillance and investigatory actions.

b. AN/TVS-4A Night Vision Sight. The "NOD/LR" (Night Observation Device, Long Range) is a tripod mounted night observation device. It is a transportable, battery-powered, electro-optical instrument for passive visual observation of distant targets at night. The NOD/LR uses natural light (moon or star light) of the night sky for target illumination. Because it is a passive device it offers freedom from possible enemy interception. The NOD/LRs employed at the Saranac Lake Airport (i.e., Adarondack Region Air Terminal) had been modified by incorporating a 600 mm lens in lieu of that which is normally supplied with the equipment.

General characteristics of the NOD/LR are as follows:

Nomenclature:	Night Vision Sight, Tripod Mounted, AN/TVS-4A
NSN:	5855-00-760-3870
Publication:	TM 11-5855-237-13 (Department of Army)
Focus:	50 meters to infinity
FOV:	8° (with original optics)
Battery:	6.75 V, Mercury, 1 each
Temp Range:	-65°F to +125°F

CRISIS TELEPHONE SYSTEMS

Typically, terrorists seizing hostages seek to establish communications with a variety of outside sources, primarily the media and the authorities. To permit continuous and unimpeded flow of information between crisis managers and terrorists, it is absoluately essential that control of the communications channels be in the hands of the negotiators and not in the hands of either the terrorists or the news media.

In the Olympic Village, a variety of communication facilities would have been available if a residence hall had been successfully seized. The facilities included the phone system (Dynatel), trunk lines (NYBTCo), and portable radios (NYSP, team radios, etc.). Additional details concerning the control of radio transmissions were discussed earlier under the COAT-TAILS system this part of Section II will deal more specifically with the control of telephone lines.

CRISIS MANAGEMENT PHONE

The purpose of the crisis phone (Figure 2-32) is to enable management/negotiator teams to seize and control all telephone communications into or out of the hostage/terrorist locale.

To ensure priority of line seizure, every Village telephone line was clearly identified at the system's Main Distribution Frame (MDF) in the telephone switching center adjacent to the security control center. Thus, within a few minutes after learning of a terrorist threat, all local or trunk lines going to a particular building, or portion thereof, could and would have been opened. This would prevent the media, curiosity seekers, or any other unauthorized source from calling into the residence hall. It would also limit to 1 or 2 the number of lines the terrorists could use to establish contact. The crisis phone set would have replaced the switch as the termination point for the

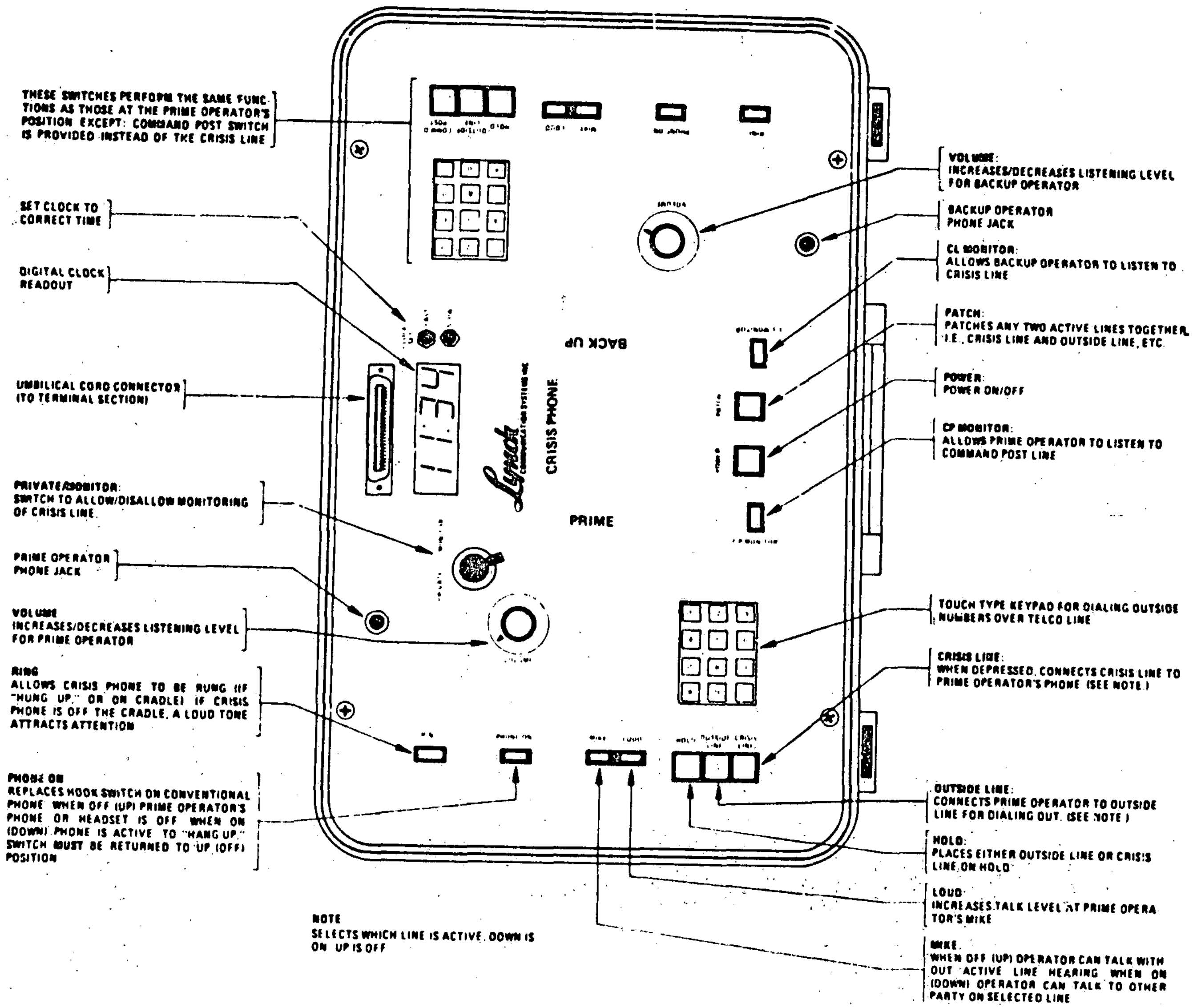


Figure 2-32. Details of Crisis Phone Management Equipment.

line(s) which would have been retained for negotiation purposes. The second line of the crisis phone would have been employed to "patch" into the circuit a third party such as local translators, chef d'missions, psycho-linguists, etc., for consultation purposes. At the two places where it was planned to set-up and conduct negotiations, preterminated local loops and trunk lines were covertly installed, these were concealed in the false ceilings immediately next to the US Postal Facility so that the main lobby and its commanding view of the Village's courtyard would have been the hostage/terrorist negotiation command-point. A second such facility was available at Troop B Headquarters, Ray Brook, N.Y., approximately 1.5 miles away.

The crisis phone provided for a variety of other local features; for example, a third appearance on the system permitted monitoring and tape recording. Automatic time-out equipment silenced the tape recording so that a conversation between the terrorist and, for example, an attorney could be conducted while the client/lawyer privileged confidentiality was being maintained. The crisis phone also permitted central office dial pulse/tone emulation; it afforded local battery current for the operation of auxiliary audio amplifiers and various acoustical couplers.

LAYOUT AND INSTALLATION

Actual technical set-up and operation of the equipment was, by plan, limited to the two locally assigned NYSP "wire men". Close, careful coordination and liaison was maintained between these individuals and representatives of the DoD Physical Security Team via portable radios and access to local telephone company installers so that the crisis kit could be quickly set up, and the process of opening lines and isolating selected areas within the Village undertaken. Possible system interconnections arrangements are shown in Figure 2-33.

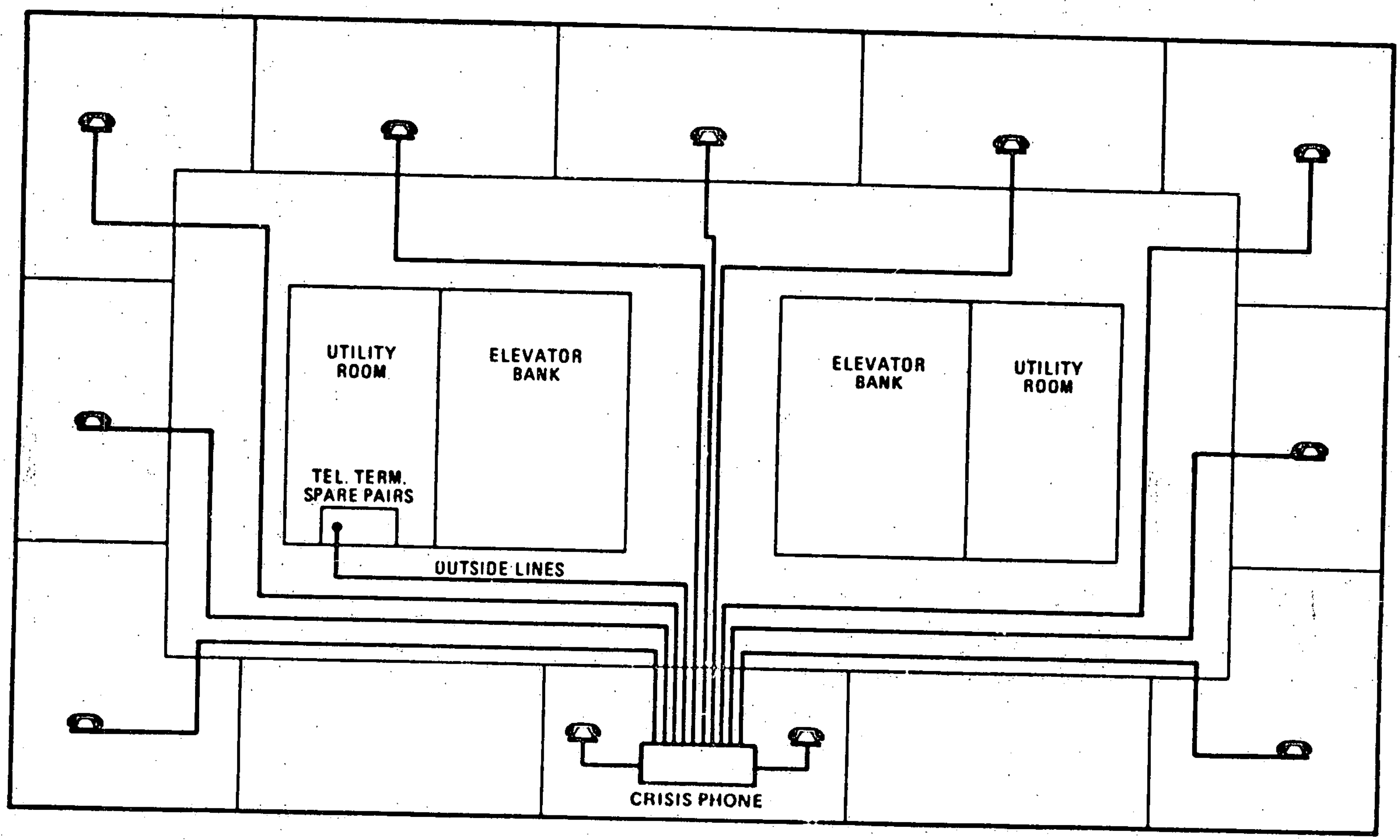


Figure 2-33. Witness or Dignitary Protection – Hotel/Motel.

Cross training the close technical liaison maintained between local NYSP command and technical personnel permitted very rapid, efficient deployment of this equipment.

OTHER COMMUNICATION SERVICES

Analytics furnished several communication subsystems which were required to meet physical security technical and administrative operations at the 1980 Winter Olympic Village and contiguous areas. These subsystems included (1) portable, mobile and fixed-base VHF and low band communications equipments, (2) emergency telephone system (ETS) service, (3) "Class A" commercial telephone service, and (4) automatic ringdown line trunk service.

In retrospect, the one most persistent bottleneck which developed and impeded the effective flow of information was the over-utilization of the established telephone facilities at both the Army Field Office and at the Village's Command and Control Center..

REQUIRED LEVELS OF SERVICE

The four communication subsystems outlined above were intended to serve a variety of different functions; some were solely for the benefit of the New York State Police (NYSP) and others were for the benefit of both the NYSP and the various DoD elements serving the physical security mission.

a. Automatic Ring Down Lines. A five node system was installed in accordance with NYBTCo prevailing tariffs. Nodes included (1) Village Security Control Center, (2) NYSP Office Trailer at the Village, (3) Troop "B" Headquarters Communications Desk, (4) Troop "B" Crisis Management Center, and (5) Commander's Office, Building D, Olympic Village. Ringdown line operations cause all other phones in the loop to automatically commence ringing, without prior dialing or manual signalling, when any one instrument goes into an "off-hook" state. To prevent ringing from impeding the conversation in progress when one or more instruments are answered, the ringing is transferred to a blinking "beehive" light installed in the dial plate of each instrument in the network.

b. Emergency Telephone System (ETS) Service. Throughout Europe, Asia and in many communities in the United States, ease of access to public safety and/or emergency services is provided through the use of a simple, easy-to-remember telephone number. The United States "standard" is 911. Local programming and software configurations precluded the use of this number within the Olympic Villages's (Bureau of Prisons) telephone system, so the alternative number "111" was employed.

Bright red, highly visible stickers with a bilingual (English and French) message, "In Case Of Emergency - 111" were printed and placed on every Village telephone extension. They were not placed on any telephone instrument not associated with the internal telephone system. Public telephones in the Lake Placid/Saranac Lake service area were provided with 911 ETS through a prior arrangement between NYSP and NYBTCo; therefore the desirability of having ETS uniformly available was apparent, especially in the case of non-English speaking personnel, for calling police, medical or fire emergency services from any telephone within the complex.

Several calls of a 30-day period were received and routinely responded to by the troopers on duty.

c. "Class A" Commercial Telephone Service. Two such facilities, one provided by DoD and the other by the NYSP, were most frequently employed. A third arrangement, using the Village's telephone system to access an outside link for local or operator-assisted (credit card or collect calls), was sporadically available. Access protocols, changed frequently and without prior notice, made the system difficult to use by security personnel.

The first "Class A" line under discussion was provided through an arrangement between Analytics and NYBTCo. This was on prevailing tariffs and a special approved Olympics installation charge. This arrangement provided for on DDD/DID * telephone number and directory listing.

GRADES OF SERVICE

Statistics for telephone Grades of Service (GOS), Probability of Busy (P_b) for single line and trunk line service are well known; they are based most typically on Erlang B traffic calculations. Over utilization of the single line caused two queues to form; i.e., an out-calling queue and an in-calling queue. The former always found the telephone set occupied and the latter always received a busy signal. There were no local pay telephones to help alleviate the peak hour out-calling load and so service remained overloaded throughout the games. Planning for comparable future operations must recognize the insatiable demands for home offices, home headquarters, higher commands, etc., to be continuously briefed and updated, and expanded telephone capacity should be provided.

* Direct Distance Dialing/Direct Inward Dialing

CENTREX

The second system, the NYSP Dimension 3000 *, had local Off Premise Extensions (OPE) installed out of Troop B Headquarters. One such extension was at the NYSP command center at the Olympic Village. This extension, was the primary means whereby DoD personnel at the Field Office Trailer (FOT) complex would attempt to access co-workers at the Olympic Village (from the FOT to OV, dial the Centrex DID number and hope for no busy signal). From the OV to the FOT (or other outside calls), callers would hope that there was a dial tone, dial 9th level outside line access code (78), obtain a second dial tone; dial the desired number and again hope that it was not busy.

Several alternative and improved arrangements could have been implemented. For example, an extension of the Dimension 3000* service to the FOT as an OPE restricted level of service; this would have speeded up interfacility (FOT/OV) calls because the restriction would have prevented the OPE from being used to access any other than a NYSP extension which would have channeled its utility into the intended function. A second "Class A" circuit could have been installed; one for call-in, the other for outgoing call service. Instruments for the "incoming call only" service should have no dial pads to prevent them from being misused.

BASE STATION AND PORTABLE RADIOS

The implementation of radio communication links requires considerable lead time in obtaining clear or shared radio channels.

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* Register Service Mark, AT&T Co.

Present frequency allocation plans do not appear to permit quick reaction capabilities. Although the introduction of both military and civilian field radios with full synthesizer capabilities will serve to alleviate the problem of obtaining on-frequency crystals for future operations, there is still a need for an enhanced quick reaction capability in the event of a densely packed electromagnetic environment.

Since no clear channel assignment was made for any overt or covert communication system through DoD/IRAC, it was decided to employ channels licensed to other New York State law enforcement authorities. This was done with their understanding, knowledge and tacit permission. As a result, two General Electric radios belonging to Project Manager Firefinder/REMBASS were modified to operate on frequencies on 155.370 and 155.475 MHz; the former for coordination with NYSP, the other for semi-dedicated, police oriented sensor implant communications.

Three Motorola MX-350 2-channel, 5-watt portable radios, Nicad batteries, battery chargers, remote speaker/microphones, and heliax ("rubber duck") antennas were procured for support of the sensor implant teams and local controllers. These were used in conjunction with AN/PRC-77 radios; the military radio was used during the early on-site installation phase and the commercial radios later towards the start of the games. The AN/PRC-77 radio sets were furnished through the assistance of US Army's Signal Engineering Agency (CONUS), Ft. Ritchie, Md.

In addition, a Motorola 50-watt base station was loaned through the cooperation of the Onondage County Sheriff's Department, Syracuse, N.Y. To prevent harmful EMI, the unit was detuned to approximately 1-watt output into a unity gain antenna, mounted approximately 40' AAT. A remote consolette, with 200' of 4-conductor cable, permitted actual operation of the base station from places remote to the actual transceiver.

COMMAND AND CONTROL COMMUNICATIONS

The Motorola base station was installed in one of the residential trailers; its antenna was mounted on a 40' wooden utility pole. The relative height of the base station's antenna and its 0.5 Watt ERP power output, provided sufficient gain to establish successful 2-way communications with sensor implant teams. The remote consolette was retained at the base station, however, sufficient 4-wire cable was provided permitting the consolette to be relocated to either of the office trailers if so desired.

Battery charger units were simply plugged into convenient wall outlets.

Communications via FM radio from the Olympic Village was originally conducted with the AN/PRC-77 radio operating at about 45.0 MHz. Its power, characteristics of low band propagation, and antenna height permitted reliable contact with the implant teams and with other personnel, for example, radar installers, working around the perimeters of the village.

The hand-held Motorola radios (MX-350) also performed over the intended ranges once external antennas were installed. The lack of Line-of-Sight (LOS) and the amount of attenuation from the steel fabrication employed throughout the Village range limited all radios without external antennas. The MX-350 series is provided with an adapter cable which, when connected, disconnects the 1/8-wavelength helical ("rubber duck") antenna and transfers the RF output to a 50-ohm cable terminating in a PL-259 connector. This then can mate with standard Amphenol

UHF-series female plug. This plug is compatible with the PL-259/U connector employed on most commercial whip and mobile mount antennas. Range was considerably extended once building attenuation and LOS problems were resolved through the external antennas.

This arrangement is also ideal for use of HT-type radios in a mobile application. Considerable gain and system improvement is obtained when a 5/8-wavelength magnetically - or mechanically-mounted antenna is employed.

Mobile and portable operation however, was limited to the 2-channels used by the NYSP. No government band (162-174, 138-151, or 220 MHz) channels were available for tactical, technical or administrative operations by DoD although used by the FBI, Secret Service, Border Patrol, and other government agencies.

Antenna supporting structures for REMS receivers was from the 7th Signal Battalion, which furnished and erected AB-577 self-erecting antenna support system. General purpose communications antennas, AN/PPS-15 radomes, etc., were supported by a 65' Rohn Type 65G guyed tower. Installation of this tower was performed by Midstate Communications and Electronics of Utica (Oneida County Airport), New York. Figure 2-12 illustrates both the AB-577/tubular/guyed antenna support, and the Rohn triangular, lattice-constructed/guyed antenna tower. Considerable credit must be given to the personnel from Mid-State who performed and supervised the tower erection and radome installation in sub-freezing weather.

COMMUNICATION DISCIPLINES AND PROTOCOLS

Radio system protocol stressed compatibility with those practices employed by the New York State Police and other local law enforcement agencies. The call sign "Sandy *" (* = some number) was used to designate selective activities, i.e., implant, technical, management, etc.

No maintenance action was required on any communication device except for periodic battery charging of the HT-type radios. Periodic deep (virtually total) discharge is recommended to prevent Nicad batteries from developing "memories" and giving the appearance of a full charge when they are actually only partially charged.

ELECTRO-MAGNETIC COMPATABILITY (EMC) ANALYSIS

The Department of Defense agency playing the most important role in so far as the selection of clear operating channels for sensors and general purpose communications for the PO-PSE team was ECAC (Electromagnetic Compatibility Analysis Center) of Anapolis, Md.

Because of their relatively low output power (typicaly 4-watts) and limited Line-of-Sight (LOS) path clearances, sensors are far more susceptable to interference, receiver de-sensitization, or fluctuations in the sensor-to-monitor radio frequency propagation path then are, for example, high power conventional use or mobile stations also operating in the same band of 162-174 MHz.

ECAC has long supported pre-deployment phases of sensor Development and Operatinal testing (DT/OT) by performing a variety of terrain-oriented as well as mathematical analysis. In addition, the ECAC EDP (electronic data processing) file has data relating to all FCC (Federal Communication Commission) and IRAC (Inter Departmental Radio Advisory Committee) assignments. These are so arranged that searches can, for example, be made by frequency, bandwidths, latitude/longitude, or other pertinent technical parameters.

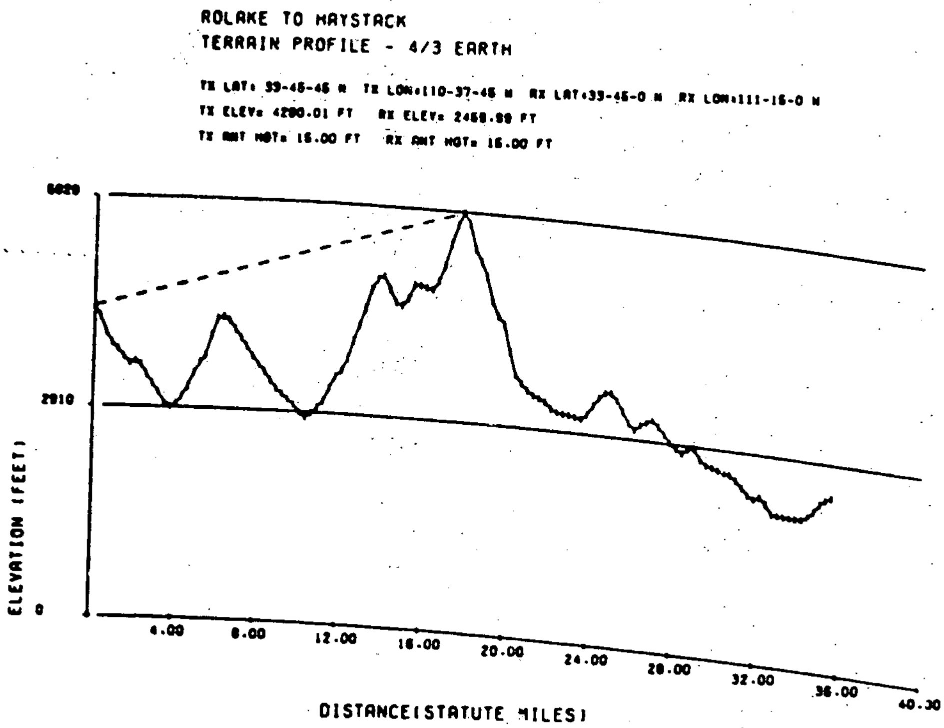
Based on assignments being made in sensor bands to other federal agencies, it was possible to have ECAC perform 3rd, 5th and 7th order Intermodulation Product (IMP) analysis to ascertain which channels in and around Ray Brook would cause sensor monitor sets either to become de-sensitized, or blocked-out because of a combination of emissions originating from other near-by, high power radio stations.

The ECAC topographic data base contains digitized terrain elevation data for all of the conterminous United States and many other areas of the world. The file is based on conventional latitudes and longitudes and is designed to accommodate data of variable density. Most of the data in the file was extracted from 1:250,000 scale topographic maps by the Defense Mapping Agency (DMA) and is stored in a 30" x 30" grid format. This provides a distance between data points of approximately 0.5 nautical miles, i.e., 30" intervals.

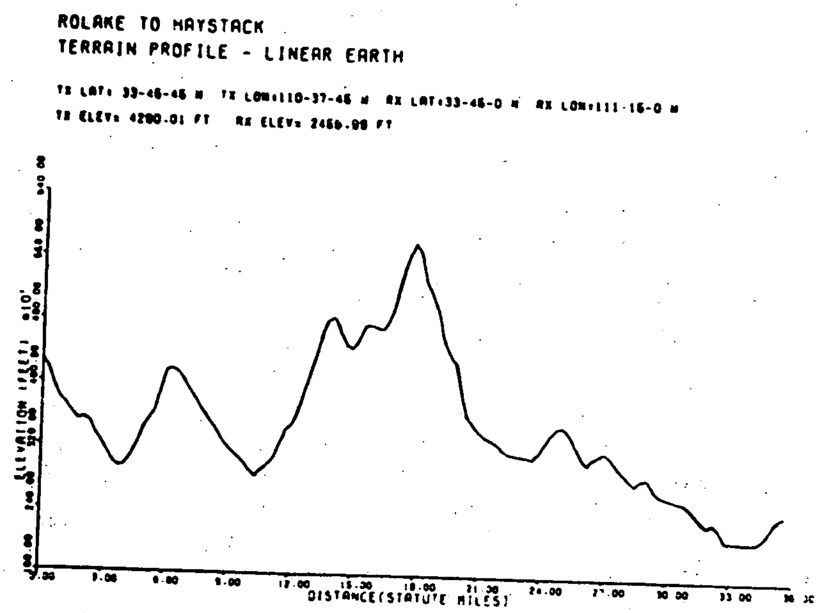
Figure 2-34-A and -B illustrate the use of the digitized topographic data base both for microwave systems planning and analysis as well as for simpler, less complex paths such as those employed with unattended ground sensors. The 4/3 earth (Figure 2-34-A) takes into account the differences between the radio horizon and the physical one, due to different refractions associated with microwave frequencies. The linear earth (Figure 2-34-B) is quite adequate for simple Line-of-Sight (LOS) work at the lower frequency bands of between 30 to about 800 MHz.

Calling this data out of the ECAC computer permits the designer to quickly look along many paths (sensor to monitor) and to quickly ascertain whether or not a repeater is required and where to optimally site it so as to provide maximum coverage of its sensor field.

Another tool used by the sensor test and development community which is also provided by ECAC is the Targe Acquisition Model (TAM).



a. 4/3 Earth



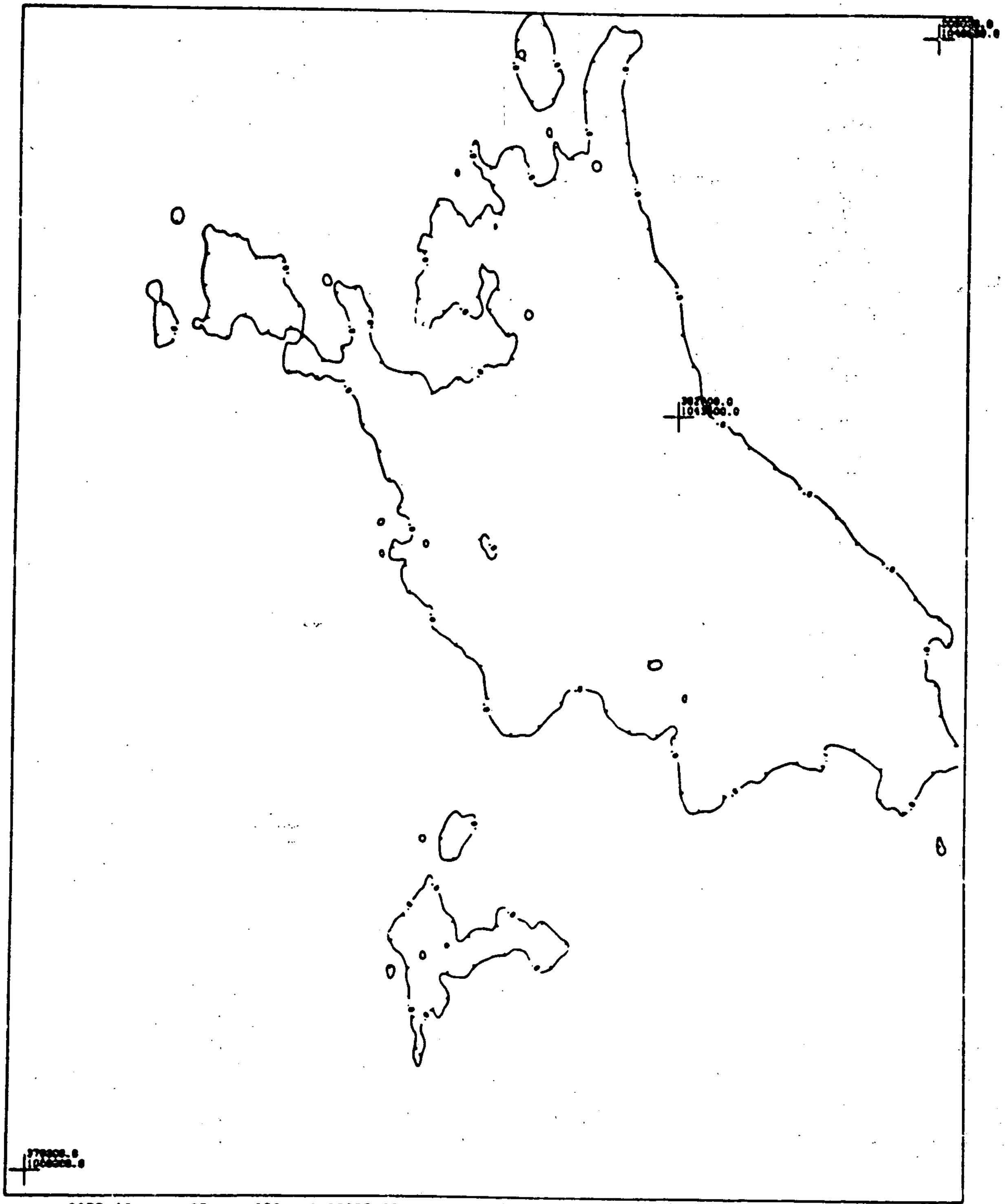
b. Linear Earth

Figure 2-34. Sample Terrain Profiles Derived from the Digitized Data Base.

This is a model which examines multiple profiles extracted in a radial pattern from a specified observation point to develop information about the radio or visual horizon. This is done by projecting a ray at the radio horizon (linear or 4/3 earth) from the sensor monitor's antenna to the specified altitude (e.g., sensor's transmitting antenna) then calculating the acquisition distance, as illustrated in Figure 2-34.

A step further from the TAM discussed above is the Path Loss/Line-of-Sight Model (PLLM). Whereas the TAM computes the first ling-of-sight point for a target approaching the site, the PLLM can be used to compute terrain shielding at each of a user-defined set of control points within an area of interest as illustrated in Figure 2-35. The output generated by the PLLM can then show regions within the area of interest that are shielded at the specified MSL (Mean Sea Level) or AGL (Average Ground Level) altitude from the site.

Another primary role played by ECAC during the conduct of the 1980 Winter Olympic Games had to do with high frequency (hf) (3.5., 7, 14 and 28 MHz) interference originating from the Village's temporary amateur radio station. Unfortunately, amateur and hobby radio equipment tend to be very rich in harmonic and spurious output frequencies; these then can "leak" into the sensitive "front ends" of monitor sets such as the AN/USQ-46A or the "COAT-TAILS" communications equipment causing much consternation to users and to personnel assigned physical system-level responsibilities. Fortunately, with the ECAC listings readily at hand, it was possible to quickly trace these sources of interface back to the local amateur station and point out to station operators the fact that they were interfering with other (vital) communication links. The local interference problem was never fully resolved, however, the ECAC listings were both necessary and used on a most frequent basis by DoD technical personnel.



SITE ID	QTY	UNITS	SURFACE ID	MAP RATIO	SCALE	PROJECTION
PUEBLO	DS	(FT)	2	500000	1.00	LAMBERT CONF

Figure 2-35. PLLM Contour Overlay Depicting Terrain Shielding, in Feet.

Full and early ECAC participation in future large-scale events will be virtually manditory if such events are taking place in urbanized as opposed to extreme rural areas. For example, the number of emitters in every band of interest from 30 to 980 MHz in the greater Los Angeles area will certainly involve extremely careful coordination, engineering standards, and high levels of discipline if "chaos in the airwaves" is not to take place.

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ATTN: Electronics Visual Systems Br (Mr. P. Roberts)
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1st Marine Division
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2nd Marine Division
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1 National Bureau of Standards
ATTN: Mr. Ray Moore
Gaithersburg, MD

1 National Bureau of Standards
Building 221,
Room B150
Washington, DC 20234
ATTN: Mr. L. Eliason

1 Dep artment of Energy
ATTN: OSS-Dep.Dir (Mr. C.L.Burch)
Germantown, MD 20545

4 Nuclear Regulatory Commission
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Albany, N.Y.

1 US Department of Justice
Drug Enforcement Administration (DEA)
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Chief, Tech.Dev.Sect.
2801 Merrilee Drive
Fairfax, VA 22031

1 US Secret Service
1800 G St. NW
ATTN: Mr. M.T. Casey
Washington, DC 20223

1 Department of Transportation
ATTN: Office of Inv.Sec, M-50 (Mr. W.Deeter)
Washington, DC 20590

1 US Customs Service
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McClean, VA 22101
ATTN: F.R.Colgan

1 US Immigration & Naturalization Service
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425 Eye Street NW
Washington, DC 20536

1 Federal Bureau of Investigation
ATTN: Asst Sec.Officer (J.Grigalus)
9th & Pennsylvania Ave. NW
Washington DC 20535

1 US Department of State
ATTN: Office of Security (Mr. C. Pelczynski)
Room 3800
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Washington, DC 20520

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Washington, DC 20534

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Office of the Superintendent
State Campus
Albany, NY 12226

1 Onondaga County Sheriff's Department
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Syracuse, NY 13202

2 ANALYTICS
SENCOM Division
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Tinton Falls, NJ 07724
ATTN: S. Curcie

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