INFORMATION BULLETIN

ATLAS-TITAN
RADAR
SURVEILLANCE
SECURITY
SYSTEM
AN/TPS-39

SYLVANIA ELECTRONIC SYSTEMS
Government Systems Management
for GENERAL TELEPHONE & ELECTRONICS

SYLVANIA ELECTRONIC SYSTEMS—WEST
MOUNTAIN VIEW, CALIFORNIA
INFORMATION BULLETIN

INTRUSION DETECTION SYSTEM

AN/TPS-39(V)

RADAR SURVEILLANCE EQUIPMENT

SYLVANIA ELECTRONIC SYSTEMS
Government Systems Management

for GENERAL TELEPHONE & ELECTRONICS

Sylvania Electronic Systems - West
Mountain View, California

64M125
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INTRODUCTION

This bulletin describes the Radar Surveillance System, AN/TPS-39(V), bistatic radar developed by Sylvania to detect intrusions at United States missile sites. The systems operate unattended, require minimal maintenance and support personnel. In addition, tests made in compliance with military specifications show that the equipment will perform satisfactorily under severe environmental conditions, has a demonstrated Mean Time Between Failure of 23,700 hours, and a Mean Time To Repair of less than 30 minutes.

The three operating surveillance systems utilized at Atlas and Titan bases, V2, V4, and V5, are shown in Figures 1 and 2. However, it should be noted that the equipment is highly versatile and may be adapted with little effort to provide surveillance over almost any given area and/or volume. In addition, such application would not necessitate modification to the peculiar maintenance equipment utilized for installation and maintenance of the prime mission equipment.

The capabilities of the AN/TPS-39(V) systems, and their associated maintenance equipment coupled with their high degree of versatility indicate that the equipment could be utilized to provide security surveillance for multiple purposes. Some possible uses are:

1. Protection of warehouses – inside and outside,
2. Protection of building entrances or other portal areas,
3. Elevator shafts or silo areas,
4. Antenna farms, aircraft disbursal areas,
5. Backup to existing guard force in a quasi-perimeter configuration.

The basic Radar Surveillance System is the AN/TPS-39(V)2 depicted in the upper left corner of Figure 1. It consists of the following building blocks: two mounting posts and mounting bracketry, a receiver, a transmitter, two antennas, a

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Figure 1. Radar Surveillance Systems
Figure 2. Typical Installation of Radar Surveillance Systems
control and readout device ( annunciator ) and its associated emergency battery power supply. This system will detect intrusions into an area of approximately 100 feet in diameter. At any given installation, the surveillance function is accomplished by a combination of the basic building blocks arranged in a configuration best suited to meet the particular requirements of the area to be protected. With these building blocks, different configurations can be constructed to provide surveillance and detect intrusions into almost any given area or volume.

The equipment used to install and maintain the AN/TPS-39(V) systems is shown in Figures 3, 4, and 5. The Wavemeter and Portable Fault Locator function provide the capability to isolate malfunction to a major replaceable unit. The Radar Test Set Group, Figure 5, provides the capability to isolate the malfunction within a replaceable unit to the component level.

This equipment can be operated by nonskilled personnel. Installation and maintenance can be accomplished by average military radio maintenance personnel.

Figure 3. Wavemeter, FR-172/TPM-18
(Carried in top section of AN/TPM-18 case)
Figure 4. Radar Test Set, AN/TPM-18 (Portable Fault Locator)

Detailed checkout and maintenance of the AN/TPS-39(V) systems are performed with the more sophisticated item of test equipment shown below -- the Radar Test Set AN/TPM-19.

Figure 5. Radar Test Set Group, AN/TPM-19
The transmitter-antenna group (Figure 7) establishes an RF field which covers the protected area or volume. A disturbance of this field by a moving intruder modulates the microwave frequency and energy received at the antenna-receiver group (Figure 8). The processed signal from the receiver is transmitted via cable to the alarm annunciator which is shown in the center of Figure 1. The alarm is indicated simultaneously by both visual and audible alarms which are displayed and sounded within the alarm annunciator.

Figure 7. Antenna-Transmitter Group

Figure 8. Antenna-Receiver Group

A picture of the equipment as installed on a Titan II missile complex is shown in Figure 9.
Figure 9. Titan II Missile Complex
Technical Description and Major Operating Characteristics

The basic capabilities and technical parameters of the AN/TPS-39(V) are listed below and meet, or exceed, the requirements of MIL-R-27146C for surveillance security systems.

A. System Capabilities

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Capabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walking Volumetric Coverage</td>
<td></td>
</tr>
<tr>
<td>(V)2 System</td>
<td>Nominal 100-foot circle, 15 feet high</td>
</tr>
<tr>
<td>(V)4 System</td>
<td>Nominal 130-foot circle, 15 feet high</td>
</tr>
<tr>
<td>(V)5 System</td>
<td>Triangular area with sides approximately 100 feet, 15 feet high</td>
</tr>
<tr>
<td>Walking Rate</td>
<td>15 inches/second</td>
</tr>
<tr>
<td>False Alarm Rate</td>
<td>Not more than one alarm per seven days for equivalent (V)2 system</td>
</tr>
<tr>
<td>Mean Time Between Failures</td>
<td>6,000 hours per equivalent (V)2 system required, 23,700 demonstrated</td>
</tr>
<tr>
<td>Mean Time to Repair</td>
<td>30 minutes to isolate and replace major components using peculiar maintenance equipment</td>
</tr>
<tr>
<td>Routine Maintenance</td>
<td>Approximately one hour every 90 days</td>
</tr>
<tr>
<td>Discrimination</td>
<td>With parameters comparable to operational sites, discrimination extends to about a 15-pound animal</td>
</tr>
<tr>
<td>Useful Work</td>
<td>Detection of digging by any method of positioning with hand tools, an 18-cubic-inch hole within a 30-minute time period</td>
</tr>
</tbody>
</table>

B. System Operating Parameters

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Capabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>1,703 - 1,803 Mc (adjustable)</td>
</tr>
<tr>
<td>Power Output</td>
<td>0.5 to 1.6 watts</td>
</tr>
<tr>
<td>Input Power</td>
<td>110 volts ac, 60 cps nominal</td>
</tr>
<tr>
<td>Emergency Standby Power</td>
<td>Internal batteries for two hours of emergency operation</td>
</tr>
</tbody>
</table>
### C. Environmental Criteria

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Humidity</td>
<td>Up to 98% relative</td>
</tr>
<tr>
<td>Barometric Pressure (Operating)</td>
<td>Sea level to 6000 feet</td>
</tr>
<tr>
<td>Wind Without Ice Load</td>
<td>Up to 75 knots</td>
</tr>
<tr>
<td>Wind With Ice Load</td>
<td>Up to 52 knots</td>
</tr>
<tr>
<td>Rain</td>
<td>Up to 5&quot; per hour</td>
</tr>
<tr>
<td>Snow</td>
<td>Up to 30&quot; measured vertically from ground level</td>
</tr>
<tr>
<td>Ice Load</td>
<td>1/2&quot; of glaze ice measured radially</td>
</tr>
<tr>
<td>Temperature</td>
<td></td>
</tr>
<tr>
<td>Outdoor Equipment</td>
<td>-40°F to +140°F</td>
</tr>
<tr>
<td>Indoor Equipment</td>
<td>+32°F to +123°F</td>
</tr>
</tbody>
</table>
REFERENCES

13. Sylvania Internal Memo, J. Bridges to L. Nelson, 25 May 1964
REFERENCES (Continued)

27. Simulated Snow Tests, Progress Review Minutes, Book II, April 1964.


Sylvania solicits any questions regarding this equipment or its applications. Requests, either verbal or written, for further information or performance verification, should be directed to:

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