NSTISSAM TEMPEST 2/95A
3 February 2000

AMENDMENT TO ADVISORY MEMORANDUM

TEMPEST 2/95

RED/BLACK INSTALLATION GUIDANCE

THIS DOCUMENT PROVIDES MINIMUM STANDARDS. FURTHER IMPLEMENTATION MAY BE REQUIRED BY YOUR DEPARMENT OR AGENCY

NATIONAL MANAGER

FOREWORD

1. NSTISSAM TEMPEST 2/95, RED/BLACK Installation Guidance has been amended to clarify the recommendations for installation which are presented in Recommendations A through I. Please replace pages 17, 18, 19, 20, 21, 22, 27, 28, 41, and 42 in your current document with the enclosed and destroy the replaced pages. These minor changes have been approved by the TEMPEST Advisory Group.

2. Representatives of the National Security Telecommunications and Information Systems Security Committee (NSTISSC) may obtain additional copies of this instruction from the Secretariat at the address listed below.

MICHAEL V. HAYDEN
Lieutenant General, USAF

NSTISSC Secretariat [redacted] • National Security Agency • 9800 Savage Road STE 6716 • Ft Meade MD 20755-6716

[redacted]

(b) (3)-P.L. 86-36

RECOMMENDATION D

Installing NSTISSAM TEMPEST/1-92 (Level I), Zone A RED Equipment In a TEMPEST Zone B Facility

(If not TEMPEST zoned, inspectable space greater than 20 meters but less than 100 meters.)

1. A separation of 50 centimeters should be maintained between any RED processor and:

   a. BLACK wire lines that exit the inspectable space or are connected to an RF transmitter.
   b. BLACK power lines.

Note: *If the separation cannot be maintained, the CTTA must conduct a review to determine whether filters or other countermeasures should be recommended. For existing facilities, the CTTA may request TEMPEST tests be performed to assist in development of the recommendations.*

2. A separation of 5 centimeters should be maintained between any RED wire line and:

   a. BLACK wire lines that exit the inspectable space or are connected to an RF transmitter.
   b. BLACK power lines.

Notes:

1. Separation distance should be increased to 15 centimeters for parallel runs over 30 meters.

2. RED and BLACK wire lines should not use a common distribution vehicle.

3. RED and BLACK optical fiber lines may use a common distribution vehicle providing that: RED and BLACK optical fiber lines are not mixed within a multifiber cable; when a BLACK optical fiber cable is used in a RED distribution vehicle, there should be an opaque dielectric sheath covering each fiber and there should be no metallic stiffeners or metallic sheath in the BLACK optical fiber cable. When a RED optical fiber cable is used in a BLACK distribution vehicle, in addition to the above, the RED optical fiber cable must be separated from the BLACK distribution vehicle at the point where the BLACK distribution vehicle exits the inspectable space. If the RED optical fiber cable exits the inspectable space, it must be provided appropriate protection (encryption, protected distribution systems [PDS]).

3. Shielded Cables. RED processors meeting the requirements of NSTISSAM TEMPEST/1-92 (Levels I, II, or III) must use optical or shielded wire cables if specified as part of the manufacturer's installation specification, or if specified for compliance with TEMPEST certification.

RECOMMENDATION E

Installing NSTISSAM TEMPEST/1-92 (Level II), Zone B RED Equipment in a TEMPEST Zone B Facility

(If not TEMPEST zoned, inspectable space greater than 20 meters but less than 100 meters.)

1. A separation of 50 centimeters should be maintained between any RED processor and BLACK equipment (including administrative support equipment.)

2. A separation of one meter should be maintained between any RED processor and:

   a. BLACK wire lines that exit the inspectable space or are connected to an RF transmitter.

   b. BLACK power lines.

Note: *If the separation cannot be maintained, the CTTA must conduct a review to determine whether filters or other countermeasures should be recommended. For existing facilities, the CTTA may request TEMPEST tests be performed to assist in development of the recommendations.*

3. A separation of 5 centimeters should be maintained between any RED wire line and:

   a. BLACK wire lines that exit the inspectable space or are connected to an RF transmitter
   b. BLACK power lines.

Notes:

1. Separation distance should be increased to 15 centimeters for parallel runs over 30 meters.

2. RED and BLACK wire lines should not use a common distribution vehicle.

3. RED and BLACK optical fiber lines may use a common distribution vehicle providing that: RED and BLACK optical fiber lines are not mixed within a multifiber cable; when a BLACK optical fiber cable is used in a RED distribution vehicle, there should be an opaque dielectric sheath covering each fiber and there should be no metallic stiffeners or metallic sheath in the BLACK optical fiber cable. Where a RED optical fiber cable is used in a BLACK distribution vehicle, in addition to the above, the, RED optical fiber cable must be separated from the BLACK distribution vehicle at the point where the BLACK distribution vehicle exits the inspectable space. If the RED optical fiber cable exits the inspectable space, it must be provided appropriate protection (encryption, protected distribution systems [PDS]).

4. Shielded Cables. RED processors meeting the requirements of NSTISSAM TEMPEST/1-92 (Levels I, II, or III) must use optical or shielded wire cables if specified as part of the manufacturer's installation specification, or if specified for compliance with TEMPEST certification.

5. Power lines should be contained within the inspectable space whenever the average power load is less than 100 kVA. If this is not possible, the CTTA must conduct a review to determine whether power line filters should be recommended. For existing facilities, the CTTA may request a TEMPEST test be performed to assist in arriving at the recommendations.

6. RED processors should not be powered from the same circuits as RF transmitters or BLACK equipment with signal lines that exit the inspectable space, except when either the RED equipment or the RF transmitters and BLACK equipment with signal lines that exit the inspectable space are equipped with powerline filters. RED processors should be separated from RF transmitters by a minimum of three meters.

RECOMMENDATION F

Installing NSTISSAM TEMPEST/1-92 (Level III), Zone C or all other RED equipment in a TEMPEST Zone B Facility
(If not TEMPEST zoned, inspectable space greater than 20 meters but less than 100 meters.)

Note: *These installations may create TEMPEST hazards. Contact your TEMPEST authority for specific guidance*

1. A separation of one meter should be maintained between any RED processor and:

   a. BLACK equipment (including administrative support equipment.)
   b. BLACK wire lines that exit the inspectable space or are connected to an RF transmitter.
   c. BLACK power lines.
   d. Fortuitous conductors that exit the inspectable space.

Note: *If the separation cannot be maintained the CTTA must conduct a review to determine whether fitters or other countermeasures should be recommended. For existing facilities, the CTTA may request TEMPEST tests be performed to assist in development of the recommendations.*

2. A separation of 5 centimeters should be maintained between any RED wire line and:

   a. BLACK wire lines that exit the inspectable space or are connected to an RF transmitter.
   b. BLACK power lines.

Notes:

1. Separation distance should be increased to 15 centimeters for parallel runs over 30 meters.

2. RED and BLACK wire lines should not use a common distribution vehicle.

3. RED and BLACK optical fiber lines may use a common distribution vehicle providing that: RED and BLACK optical fiber lines are not mixed within a multifiber cable; when a BLACK optical fiber cable is used in a RED distribution vehicle, there should be an opaque dielectric sheath covering each fiber and there should be no metallic stiffeners or metallic sheath in the BLACK optical fiber cable. Where a RED optical fiber cable is used in a BLACK distribution vehicle, in addition to the above, the, RED optical fiber cable must be separated from the BLACK distribution vehicle at the point where the BLACK distribution vehicle exits the inspectable space. If the RED optical fiber cable exits the inspectable space, it must be provided appropriate protection (encryption, protected distribution systems [PDS]).

3. Shielded Cables. RED processors meeting the requirements of NSTISSAM TEMPEST/1-92 (Levels I, II, or III) must use optical or shielded wire cables if specified as part of the manufacturer's installation specification, or if specified for compliance with TEMPEST certification.

4. Power lines should be contained within the inspectable space whenever the average power load is less than 100 kVA. If this is not possible, the CTTA must conduct a review to determine

whether power line filters should be recommended. For existing facilities, the CTTA may request a TEMPEST test be performed to assist in arriving at the recommendations.

5. RED processors should not be powered from the same circuits as RF transmitters or BLACK equipment with signal lines that exit the inspectable space, except when either the RED equipment or the RF transmitters and BLACK equipment with signal lines that exit the inspectable space are equipped with powerline filters. RED processors should be separated from RF transmitters by a minimum of three meters.

RECOMMENDATION I

Installing NSTISSAM TEMPEST/1-92 (Level III), Zone C or all other RED equipment in a TEMPEST Zone C Facility
(If not TEMPEST zoned, inspectable space greater than 100 meters.)

1. A separation of 50 centimeters should be maintained between any RED processor and BLACK equipment (including administrative support equipment.)

2. A separation of one meter should be maintained between any RED processor and:

   a. BLACK wire lines that exit the inspectable space or are connected to an RF transmitter.
   b. BLACK power lines connected to an RF transmitter.

Note: *If the separation cannot be maintained the CTTA must conduct a review to determine whether filters or other countermeasures should be recommended. For existing facilities, the CTTA may request TEMPEST tests be performed to assist in development of the recommendations.*

3. A separation of 5 centimeters should be maintained between any RED wire line and:

   a. BLACK wire lines that exit the inspectable space or are connected to an RF transmitter.
   b. BLACK power lines connected to an RF transmitter.

Notes:

1. Separation distance should be increased to 15 centimeters for parallel runs over 30 meters.

2. RED and BLACK wire lines should not use a common distribution vehicle.

3. RED and BLACK optical fiber lines may use a common distribution vehicle providing that: RED and BLACK optical fiber lines are not mixed within a multifiber cable; when a BLACK optical fiber cable is used in a RED distribution vehicle, there should be an opaque dielectric sheath covering each fiber and there should be no metallic stiffeners or metallic sheath in the BLACK optical fiber cable. Where a RED optical fiber cable is used in a BLACK distribution vehicle, in addition to the above, the, RED optical fiber cable must be separated from the BLACK distribution vehicle at the point where the BLACK distribution vehicle exits the inspectable space. If the RED optical fiber cable exits the inspectable space, it must be provided appropriate protection (encryption, protected distribution systems [PDS]).

4. Shielded Cables. RED processors meeting the requirements of NSTISSAM TEMPEST/1-92 (Levels I, II, or III) must use optical or shielded wire cables if specified as part of the manufacturer's installation specification, or if specified for compliance with TEMPEST certification.

5. Power lines should be contained within the inspectable space whenever the average power load is less than 100 kVA. If this is not possible, the CTTA must conduct a review to determine whether power line filters should be recommended. For existing facilities, the CTTA may request a TEMPEST test be performed to assist in arriving at the recommendations.

6. RED processors should not be powered from the same circuits as RF transmitters or BLACK equipment with signal lines that exit the inspectable space, except when either the RED equipment or the RF transmitters and BLACK equipment with signal lines that exit the inspectable space are equipped with powerline filters. RED processors should be separated from RF transmitters by a minimum of three meters.

conductors and could require isolation filtering and separation treatment similar to telephone and intercom systems.

4.9.4 Miscellaneous Fortuitous Conductors. Building utilities and other support elements can become fortuitous conductors due to the use of metallic materials. Heating, ventilating and air conditioning systems air ducts, water pipes and gas pipes can require protection depending on their proximity to RED equipment and their distribution into uncontrolled areas. If conductors are identified as likely fortuitous conductors of TEMPEST signals into uncontrolled areas, the normal treatment is to insert a nonconductive section in the plumbing or duct work at the boundary of the inspectable space of the RED equipment. It is important to follow NEC, OSHA and any local building and fire codes when isolating various conductors. Some metallic distribution facilities must be electrically bonded to the building structure or the fault protection subsystem. Some materials can be prohibited in utilities such as sprinkler systems or pressurized systems. Life safety and compliance with all applicable building codes are an overriding concern when considering isolation of fortuitous conductors. For this reason and also due to the quantity and variety of potential fortuitous conductors throughout a facility, isolation of such conductors should be accomplished when practical. There are often alternative procedures to avoid TEMPEST conduction problems with such fortuitous conductors via relocation of equipment, or specific grounding of the fortuitous conductor.

4.9.5 Radio Transmission or Reception Devices. Any device that transmits or receives a radio signal is a potential security risk in a facility processing NSI. The risk is higher for radio transmission devices and in facilities using non-TEMPEST equipment. Traditional station designs place radio communications (combat, net radio, microwave systems, etc.) away from the processing area. If not carefully controlled, other radio devices such as cellular telephones, cordless telephones, wireless local area networks (LANs) or portable satellite communications systems can be installed in a facility near RED equipment. Radio transmission equipment should be prohibited from all classified processing areas. If a mission requirement or space limitation demands that transmitters must be installed in classified processing areas, the separation requirements of Section 3 must be met. For such installations, a CTTA review is required to evaluate the risks of TEMPEST vulnerabilities. Reception devices such as radios, television receivers or receive-only pagers can be installed if authorized by cognizant security authorities and if installed with the separation requirements of Section 3.

4.9.6 Commercial Television System Installation. When commercial television systems are installed in secure areas, the CTTA should determine the countermeasures necessary to prevent a video cable entering the secure area from conducting comprising emanations out of the secure area. The countermeasures depend on the type of cable used to bring the signal into the secure area. If an optical fiber cable is used at the entry point to the secure area, no additional countermeasure is required. If a metallic cable is used at the entry point, it must be a shielded metallic cable and must use an amplifier/attenuator system that must be located at the point where the cable enters the secure area. Only an amplifier/attenuator system that provides one-way filtering should be used. An attenuator could be required if the amplified signal overdrives the television receiver. The attenuator will also provide additional reverse attenuation. The length of metallic cable penetrating the secure area must be kept to a minimum. The use of a VCR as an electronic filter is not allowed, since it does not provide proper filtering. If not installed properly, the VCR can amplify signals in both directions and not provide for one-way

filtering. If a control box is used, it should be collocated with the amplifier/attenuator system. If a VCR is used with this system, it cannot be used to play or record classified information (unless the incoming video cable is disconnected) and must be conspicuously marked advising of this restriction. Amplifiers that can amplify signals in both directions should not be used. Commercial television system equipment and cables should comply with separation guidance in Section 3.

4.10. Other Considerations

4.10.1 TEMPEST Zoning. TEMPEST Zoning is a countermeasure that takes advantage of free space propagation loss and the inherent shielding of a host facility. By profiling a structure's attenuation, TEMPEST Zoning can allow equipment operation with less fear of unauthorized intercept and without the added expense of TEMPEST approved equipment or global shielding. The concept profiles the facility into zones that have varying levels of protection. This is determined by developing attenuation plots of radiated signals in four test bands between 10 MHz and 1,000 MHz compared with reference measurements taken with antennas separated by 20 meters in an open field environment. The TEMPEST Zone profile data for a facility can then be used in conjunction with known TEMPEST zone characteristics of electronic equipment to enable selection and placement of equipment to contain radiated TEMPEST emanations within the predetermined secure areas of the facility. NSTISSAM TEMPEST/2-92 contains details for TEMPEST zoning of facilities.

4.10.2. Inspectable Space. The inspectable space can vary considerably from one facility location to another. It is important to understand the boundaries of the inspectable space surrounding a facility to properly apply RED/BLACK countermeasures. The site designated TEMPEST approval authorities should define and a CTTA should approve the boundary.

4.10.3. Facility Shielding. In certain instances, systems processing NSI are so large and complex that application of TEMPEST protective measures to the equipment can be impossible or exorbitantly expensive. In such cases, the entire facility can be shielded and power, signal and utility penetrations of the shield treated to block and remove conducted CE. This approach should be implemented only after a thorough cast comparison analysis of alternative security countermeasures. Obtain guidance from a CTTA to determine requirements and recommend methods for shielding. NSTISSAM TEMPEST/1-94 contains details on shielding.

4.10.4. TEMPEST Suppressed Equipment. TEMPEST equipment have been tested in accordance with NSTISSAM TEMPEST/1-92 and demonstrated to comply with conducted and electromagnetic radiation limits of Level I, Level II or Level III.