# TYPE ACCEPTANCE PROGRAM FOR ELECTRONIC TELEPHONES USED IN COMPUTERIZED TELEPHONE SYSTEMS

**TSG STANDARD 4**

**MARCH 1990**

## PREFACE

This standard was prepared by the Telephone Security Group (TSG). The charter members of the TSG are: Department of the Air Force, Department of the Army, Central Intelligence Agency, Defense Intelligence Agency, Department of Energy, Federal Bureau of Investigation, Department of the Navy, National Security Agency, US Secret Service, and Department of State.

The TSG is the primary technical and policy resource in the US Intelligence Community for all aspects of the technical surveillance countermeasures (TSCM) program involving telephone systems. The TSG standards contain guidance for providing on-hook security to telephone systems in areas where sensitive government information is discussed. Implementation of TSG standards neither prevents the application of more stringent requirements nor satisfies the requirements of other security programs such as TEMPEST, COMSEC, or OPSEC.

TSG Standard 1 is an introduction to telephone security that provides general information about the TSG standards.

## PART 1

## INTRODUCTION

**A4.1. Purpose.** TSG Standard 4 specifies the design and construction criteria, the application procedures, the manufacturer's testing requirements, and the documentation necessary for TSG type-acceptance of electronic telephones used in computerized telephone systems (CTS).

**A4.2. Application.** TSG Standard 4 may be referenced or included in US Government-sponsored procurement specifications to define TSG type-accepted telephones. This standard may be made available to telephone manufacturers who are responding to US Government requirements for TSG type-accepted telephones.

**A4.3. Definitions.** Words and terms that are defined in the glossary for Standard 4 are printed in italics. The definitions in this glossary are for use with this standard only. They are provided to ensure a precise, unambiguous meaning for terms used to describe TSG requirements. Many of the terms used have no related meaning in any other context. Where terms are involved that are employed by the telephone industry, the usages given are intended to be consistent with most common industry practices. Usage, however, can vary significantly from company to company, and this glossary is not a definitive study of all the ways in which these terms may be used. It is important in using TSG Standard 4 that these terms not be given any more or any less meaning than is specified here.

**A4.4. TSG Type-Acceptance Program.**

A4.4.1. The TSG is a part of the omnibus program dedicated to assuring the audio security of all sensitive discussion areas maintained directly by these agencies or by companies under contract to them. The specific purpose of TSG is to develop and coordinate measures for the prevention, detection, and correction of on-hook audio from telephone equipment. In pursuing this objective, TSG endeavors to assure that, for any situation, the cognizant authorities in each agency will always be in a position to select and adapt the most appropriate means to effectively and economically obtain the necessary level of security.

A4.4.2. TSG recognizes that not all situations require the same level of security. A measure that is completely proper and sufficient for some applications could be inadequate for other applications; however, the appropriate level of security for any specific application may generally be achieved with a selected combination of several measures. The cumulative effect of properly selected complementary measures (which would have been deficient individually) can be used to produce the desired result. Accordingly, every telephone-related security problem of which TSG is made aware is examined in detail so the government may be provided with the greatest possible diversity of approaches for its correction.

A4.4.3. A viable and important approach for telephone security, which has long been employed by the US Government is the concept of the type-accepted telephone. This is a telephone instrument, which, by virtue of its design and construction, has the following properties:

A4.4.3.1. The telephone cannot be caused to produce audio when it is in the idle state except by intrusive physical modifications within the telephone set itself.

A4.4.3.2. The telephone is not tractable to the implementation of intrusive modifications.

A4.4.3.3. Electrical and physical inspection can readily determine if an intrusive modification has been placed within the telephone and if the design/construction security measures are operating properly.

A4.4.4. TSG Standard 3 specifies the design and construction criteria for the TSG type-acceptance of telephones that are compatible with the traditional nonproprietary central office interface of the public switched telephone network (PSTN). A fundamental requirement of the basic TSG type-accepted telephone defined by TSG Standard 3 is that all external wirelines entering the telephone are disconnected from all internal circuitry (except the annunciator) when the telephone is in the idle state. Many proprietary CTS electronic telephones, even when they are in the idle state, need power continuously from the CTS and need to exchange information with it on a regular basis. Therefore, they cannot support the requirement for total physical disconnect from the external wirelines. The TSG type-acceptance requirements to be applied for this type of CTS electronic telephone are provided here in TSG Standard 4, rather than in TSG Standard 3.

A4.4.5. Without type-accepted telephones, telephone installations can be considered a priori secure only if the telephones are isolated or disconnected from all unprotected wires. This is achieved by means of supplementary isolator or disconnect devices placed on the wires or by using a CTS specially configured to conform with TSG Standard 2.

A4.4.6. On-hook telephone security based on isolation or disconnect methods cannot be universally applied to CTS electronic telephones.
A4.4.6.1. Most of these telephones are not compatible with conventional isolator/disconnect devices that are designed for the normal central office interface.
A4.4.6.2. As the result of system characteristics or operational constraints, some installations, and some telephones in particular, physically cannot be made to conform with the TSG Standard 2. Also, in many cases the cost of applying the TSG Standard 2 is not commensurate with the number of telephones that must be protected. Even though there may only be a few specific telephones in the installation that require on-hook security, the entire system would have to comply with the standard.
A4.4.7. The type-acceptance of CTS electronic telephones that have been demonstrated to incorporate intrinsic on-hook audio security provides a means to assure the security of an installation when isolation/disconnect measures (supplementary devices and/or the TSG installation guidelines) are either physically incompatible or economically infeasible. Neither method, the type-acceptance program nor the application of isolation/disconnect measures, is regarded as being better than the other. They are both equally acceptable alternative methods for obtaining audio security. There will be situations where either the isolation/disconnect approach or the type-accepted telephones will be the preferred method.
A4.4.8. The following elements of the TSG telephone type-acceptance program are essential.
A4.4.8.1. The design and construction specifications that describe the conditions under which telephones are considered to be:
A4.4.8.1.1. Physically incapable (by reason of design and construction) of producing microphonic audio on any wires leaving the instrument while it is in the idle state.
A4.4.8.1.2. Capable of being individually subjected to routine, on-site physical and electrical inspections that will adequately and expeditiously determine if the protective measures remain effective and if any intrusive audio surveillance modifications have been installed.
A4.4.8.2. The standardized evaluation and qualification conditions that are used to determine each type-acceptance class.
A4.4.8.3. The requirements for documentation and sureties to be provided to a member agency of the TSG. These must properly demonstrate and guarantee that a particular model telephone does conform to all required criteria. Any telephone model whose design and construction is shown by adequate documentation, backed by the necessary surety, to conform to the required criteria will be type-accepted by the TSG and approved for installation and use without any requirement for additional isolation or disconnect measures.
A4.4.8.4. The type-acceptance application process.
A4.4.8.5. Limited requirements on product stability. These are applied, for the most part, only to those components of the type-accepted telephone that are used to implement mandatory security features. The manufacturer is largely free to change all nonrelated areas without affecting its type-acceptance status.
A4.4.8.6. Labeling requirements for type-accepted telephones.
A4.4.8.7. Guidelines for use by participating agencies of the US Government to enable them to identify and select telephones suitable for use in sensitive discussion areas.
A4.4.9. Type-acceptance programs are mutually beneficial to the government and to the telephone industry. The TSG design and construction standards for type-acceptance are provided both to government agencies and to qualified members of the industry. The identification of the type-accepted telephone models allows government agencies (who are concerned about on-hook telephone security) to exclude from consideration for procurement all telephones that are not acceptable; the TSG type-acceptance standards may be included directly in telephone procurement specifications. Manufacturers who wish to compete in this market can readily determine if their products are acceptable and, if not, what modifications are necessary to make them acceptable. Also, the type-acceptance procedure clearly defines what portions of the telephone can be subsequently altered by the manufacturer without affecting its type-accepted status. Changes of this sort can be made at the discretion of the manufacturer without involvement of the government.
A4.4.10. In order that maximum flexibility is provided to produce the most economical, fully effective security program for every individual application, TSG has developed standards for multiple categories of type-accepted electronic telephones.
A4.4.11. It is the intent of these standards that all telephones that receive a TSG type-acceptance are, at the very least, determined to be physically incapable (by reason of design and construction, without the need for individual electrical testing) of producing any microphonic audio on any wires leaving the instrument while it is in the idle state. It is expected that many commercial instruments now being marketed will qualify under this minimal criterion with little or no need for special modifications at additional cost.

A4.4.12. Most telephone installations by the member agencies of TSG will require more than the minimum level of security. Compliance with specific criteria concerning the security methodology can produce eligibility for a higher security classification; the highest classification being Class 1. While it is not expected that many telephones now being commercially produced will inherently meet the criteria for the higher classifications, the great majority of models now on the market can probably be economically modified (in production quantities) to do so. The establishment of realistic type-acceptance standards for the higher security classifications will result in the closing of a large portion of the government telephone market to all products that do not qualify for the higher security classifications. It is anticipated that a significant number of manufacturers will recognize that it is to their commercial advantage to produce modified versions of their various telephone models that will qualify for high-classification type-acceptance.
A4.4.13. The numerical classes rate the telephones on the basis of idle-state security only. In-use security considerations are of importance in some situations, and manufacturers may wish to indicate special virtues of their products that are applicable to those situations. A system of optional alphabetical suffixes may be appended to the typeacceptance class number to indicate the following:

**A4.4.13.1. Suffix A.** The handset requires a push-to-talk operation for the transmitter element and either a push-tolisten operation or an isolation amplifier for the receiver element. Only handset operation is available with this unit; any other functions that employ microphonic activity (such as headset, hands-free answering units, speakerphones, or speaker-microphones) are not possible. Except for the handset transmitter element, the telephone contains no microphones.

**A4.4.13.2. Suffix B.** Only handset operation is available with this unit; any other functions that employ microphonic activity (such as headset, hands-free answering units, speakerphones, or speaker-microphones) are not possible. Except for the handset transmitter element, the telephone contains no microphones.

**A4.4.13.3. Suffix C.** Either handset or headset operation is available with this unit; any other functions that employ microphonic activity (such as hands-free answering units, speakerphones, or speaker-microphones) are not possible. Except for the handset or headset transmitter element, the telephone contains no microphones.

## PART 2

**PROCEDURE FOR OBTAINING AND MAINTAINING TSG TYPE-ACCEPTANCE**

A4.5. Type-acceptance procedures cannot be applied effectively to any telephone without the full cooperation of the manufacturer. The type-acceptance concept involves the manufacturer on a continuing basis, to include but not be limited to the following:

A4.5.1. Design of the original telephone.

A4.5.2. Design of modifications, if necessary, to comply with the type-acceptance requirements.

A4.5.3. Testing the candidate telephone to establish that it does perform in accordance with the type-acceptance criteria.

A4.5.4. Documentation of all claims relating to the type-acceptance requirements.

A4.5.5. Technical information to support the development of field inspection procedures.

A4.5.6. Continued production of the type-accepted version in support of systems purchased by the government or by a government contractor.

A4.6. When a manufacturer applies for and receives type-acceptance, it is for the specific configuration described in the application documentation. TSG assigns a type-acceptance number to this configuration. This number cannot be used on any alternative configuration that involves a change in any portion of the telephone that has been designated a critical subassembly for the type-acceptance class in question. The type-acceptance may be revoked at any time it becomes apparent that the telephone is not providing adequate idle-state audio security.

**A4.7. Initial Contact.**

A4.7.1. A manufacturer responding to a specific procurement requirement (whether a direct request or a public announcement) of an agency of the US Government submits the application for type-acceptance to that agency.

A4.7.2. A manufacturer wishing to obtain type-acceptance to gain entry into the portion of the government market affected by the type-acceptance program can apply to any TSG participating agency.

**A4.8. Procedure.**

**A4.8.1. Ascertain the type-acceptance class(es) required**, if appropriate.

**A4.8.2. Evaluate the proposed products** to determine the degree of compliance with the criteria for the class intended.

**A4.8.3. Develop and implement any modifications** necessary to meet the requisite criteria. Documentation of the proposed modifications may be submitted to the agency in question for preliminary evaluation before actual implementation.

[Preliminary approval of the approach, based on the documentation submitted, means only that no obvious deficiencies are in evidence. Actual type-acceptance requires that the modified telephone be fully tested in accordance with the requirements for the type-acceptance class in question. There is no assurance that an approach that has received preliminary approval will pass these tests.]

**A4.8.4. Perform all required tests** on an actual modified telephone that is exactly like the production unit.

**A4.8.5. Submit the following documentation** to the agency performing the type-acceptance evaluation. Documents identified as containing proprietary information will be used to evaluate and confirm the necessary conditions only. All proprietary information will be treated with strict confidentiality.

[The format used here to list the required documentation is for convenience in presentation and to facilitate application. The manufacturer is encouraged to use existing manuals, drawings, brochures, or other publications that may be available. It is not necessary to extract and repeat specific information in order to meet the documentation requirements in each of the categories listed below. It will be sufficient to state where the information can be found in the publications provided.]

**A4.8.5.1. Letter of application**, signed by an authorized company official, containing the following:

A4.8.5.1.1. Identification of product - manufacturer, product line, and models involved. Include whatever additional descriptive information is necessary to eliminate all possibility of ambiguity or confusion with any other product.
A4.8.5.1.2. The class number for which application is being made.
A4.8.5.1.3. Certification that the product meets the criteria for that class, and that it may be opened for visual and electrical inspection (to verify that it conforms to all type-acceptance criteria) at any time without invalidating the normal product warranties.
A4.8.5.1.4. Point of contact for inquiries - name, title, address, telephone number.

**A4.8.5.2. Summary of product offering**, including manufacturer's sales and/or technical literature for the product.

**A4.8.5.3. Summary of test results**, explaining basis for asserting that the proposed telephone meets the appropriate type-acceptance criteria.

**A4.8.5.4. Functional description**, containing the following:
A4.8.5.4.1. Operation of telephone.
A4.8.5.4.2. Appearance.
A4.8.5.4.3. Installation requirements.
A4.8.5.4.4. Operations manual.
A4.8.5.4.5. Identification of all systems with which the telephone is compatible.
A4.8.5.4.6. Features, options, and auxiliary units available with the version being evaluated. Options available on the standard commercial model may, at the manufacturer's discretion, be excluded from the version being submitted for type-acceptance.

**A4.8.5.5. Electrical description**, containing the following:
A4.8.5.5.1. Theory of operation, including description of connection to CTS and any other external connections.
A4.8.5.5.2. Block diagrams, including complete descriptions of signals between functional blocks.
A4.8.5.5.3. Schematic diagrams and circuit descriptions.
A4.8.5.5.4. Component listing.
A4.8.5.5.5. Installation/maintenance manual.

**A4.8.5.6. Detailed security evaluation** - must include all features, options, and auxiliary units included in paragraph A4.8.5.4.6. All applicable criteria are applied to the basic telephone and to the composite formed when the auxiliary units are attached and operational.
A4.8.5.6.1. Provide component layout diagrams, including location and function of test points.
A4.8.5.6.2. Provide circuit descriptions and diagrams of all audio circuits, focal subassemblies, and critical subassemblies.
A4.8.5.6.3. Identify all components (manufacturer and model number) added to implement positive security measures.
A4.8.5.6.4. Document all software/firmware involved in the implementation of the positive security measures.
A4.8.5.6.5. Cite each applicable type-acceptance criterion by its paragraph number in part 3 of this standard (the paragraph numbers themselves indicate if the criterion being addressed is in the annex specific to the class for which application is being made). Show how the proposed telephone complies with the criterion.

**A4.8.5.7. Laboratory test report**, containing the following:
A4.8.5.7.1. Abstract.
A4.8.5.7.2. Objectives of tests.
A4.8.5.7.3. List of test equipment used.
A4.8.5.7.4. Test equipment configuration used for each test.
A4.8.5.7.5. Test data and conclusions.

**A4.8.5.8. Support documentation for field tests and inspections** - to be distributed to field inspection teams for use during on-site testing. The information provided for this purpose should be nonproprietary.
A4.8.5.8.1. Component layout diagrams, including location and function of test points.
A4.8.5.8.2. Instructions for assembly and disassembly of the telephone.
A4.8.5.8.3. Photographs showing the appearance of all circuit boards and assemblies.

**A4.8.5.9. Supplementary information** requested by the government in order to complete the evaluation of the application.

**A4.9. Marketing of Type-Accepted Telephones.**

A4.9.1. Telephones being marketed to agencies or departments of the US Government as TSG type-accepted telephones must be permanently marked to show the TSG type-acceptance number and either a serial number or the month and year of manufacture.

A4.9.2. Regardless of the agency to which the initial application was made, once a TSG type-acceptance number is assigned to a telephone, it will be recognized as a type-accepted item by all the member agencies of the TSG without need for further evaluation.

## PART 3

## DESIGN AND CONSTRUCTION SPECIFICATIONS

**Preliminary Note:** The general approach and those requirements that are applicable to all type-acceptance classes are presented here. Specific requirements for individual type-acceptance classes are provided in a separate dedicated annex for each class.

### A4.10. Introduction.

A4.10.1. The standards are used to determine qualification for type-acceptance in one of several numerically designated security classes applied to CTS type-accepted electronic telephones. Class 1 has the highest security. Increasing numerical values indicate decreasing security classifications.

A4.10.2. The primary intent of these standards is to ensure that no signals containing microphonic information (produced due to the microphonic behavior of any component part or device in the telephone) can leave the telephone unless it is in the in-use state.

A4.10.3. The telephone must be demonstrably physically incapable of producing any microphonic audio on any wires leaving the instrument while it is not in use.

A4.10.4. Regardless of which state the telephone is in (in-use, idle, programming, etc.), no change (temporary or permanent) in any of the security features required for its type-acceptance class (except those for the annunciator) can result from any acoustic or electromagnetic signals, or from action by the parent system, or from signals on any of the station mounting cord wires or power supply wires. The security features are independent of the voltages (or absence thereof) on any of the wires.

A4.10.5. The higher security type-acceptance classes (lowest class numbers) require that positive security measures that interfere with the normal in-use functions be employed for operationally inactive transducers. In these cases, provision must, of course, be made so that with the exception of the annunciator when the telephone is in the in-use state, and at no other time, these measures are suspended. The suspension of nonannucicator positive security measures required for the intended type-acceptance class, however, must never be able to occur without a manual action by the user that is unequivocally associated with placing the telephone in the in-use state (e.g., lifting the handset or activating a speakerphone switch). The CTS must not be able to have any affect on the state of the positive security measures. The security measures are completely controlled at the telephone. The security measures must all restore to full effect when the user performs any normal telephone operation intended to terminate the in-use state.

A4.10.6. TSG has concluded that in most cases the objectives of this program are best achieved by using metalliccontact disconnect devices (switches and relays). It is recognized that the modern telephone industry often regards these devices as obsolete technology. Their requirement here, however, does not derive merely from their functional performance but also from physical and electrical characteristics that make that performance readily confirmable by electrical and physical inspection. It is emphasized, therefore, that whenever the type-acceptance standards specifically designate metallic-contact disconnect devices, functionally equivalent operational alternatives employing more modern technologies will not be acceptable. The metallic-contact disconnect devices used to isolate and short the various transducers and handset functions may be switches located in the handset mounting that are operated directly by placing and removing the handset, or they may be relays that are controlled by whatever form of hookswitch is used.

### A4.11. Operational Limitations.

A4.11.1. The telephone must not be capable of cordless operation. Wireline connections between the telephone and the CTS are needed for the telephone to function. All communications and information interchange among the telephone, its component parts, auxiliary units, and the CTS must be on physical wirelines.

A4.11.2. There must not be any hands-free answering capability. A manual action on the part of the user is necessary to initiate, answer, join, or maintain a call. The telephone can be in the in-use state only if:

A4.11.2.1. The handset is physically removed from the handset mounting, or

A4.11.2.2. A manual speakerphone or headset switch is activated, or

A4.11.2.3. An auxiliary unit is manually activated.

A4.11.3. Some telephones may require additional action by the user (such as pressing a line select key) to be in the in-use state; this is entirely acceptable.

A4.11.4. The telephone is immediately restored to and remains in the idle state if:

A4.11.4.1. All auxiliary units are manually deactivated, and

A4.11.4.2. All headset and speakerphone switches are turned off, and
A4.11.4.3. The handset is positioned in the handset mounting.
A4.11.5. When a call is terminated, all required idle-state security measures automatically and immediately become effective.
A4.11.6. Positive security measures cannot include any software-dependent or firmware-dependent functions.

**A4.12. Telephone Security and Inspection Support Measures.**

**A4.12.1. Electrical Requirements.**
A4.12.1.1. In implementing the design standards, the telephone is to be treated as an ensemble of electrical and electronic subassemblies, some of which contain microphonic components. Evaluation with respect to security principles and the implementation of security measures are then to be confined to those subassemblies (the handset for example) that actually contain the microphonic components rather than to the entire telephone. A microphonic component, by definition, produces electrical signals in response to audio acoustic signals. Defining a subassembly for the component sets the idle-state limits allowed for its microphonic signals; they are not permitted outside of the defined subassembly. No microphonic signals may extend to the boundary points of the containing subassembly, and these points, therefore, become the cardinal points for the application of positive security measures and security testing.
A4.12.1.2. A designated subassembly may, in principle, be as large as the entire telephone (excluding external wires and transmission media) or as small as a single component. Every subassembly is connected either directly or indirectly (via other internal subassemblies) to wires or transmission media that leave the telephone.
A4.12.1.3. All means by which signals may be coupled between the internal subassemblies and to external wires and media are of concern. These include, but are not limited to, direct metallic connections, electric field coupling, magnetic field coupling, electro-optics, powerline modulations, and modulated radio-frequency (conducted and/or radiated).
A4.12.1.4. Subassemblies that contain transducers or other potential microphonic components are termed focal subassemblies.
A4.12.1.5. Subassemblies that are not focal subassemblies but that contain components that are essential to the operation of positive security functions are termed critical subassemblies. Any electrical paths or circuitry used to convey in-use state control signals from the manually actuated component (e.g., hookswitch, headset switch, speakerphone switch) to the components that implement the positive security measures are included in the critical subassemblies.
A4.12.1.6. The description of the telephone as an ensemble of subassemblies is for convenience in specifying, applying, describing, and evaluating the protective measures. Limits are placed on the scopes of the focal and the critical subassemblies in the individual specific standards for the various type-acceptance classes. Some type-acceptance classes are much more restrictive with regard to what is allowed in these subassemblies than are others. The analysis of the telephone into internal subassemblies is performed by the submitting manufacturer or his marketing agent. The analysis must allow all audio transducers and their attendant protective measures to be precisely identified and explained. For the most part, this theoretical division of the telephone into subassemblies will follow natural functional divisions inherent in the instrument (such as handset, ringer, or dial), but this need not be the case, and any arbitrary boundaries may be used providing that:
A4.12.1.6.1. They do not violate the specific requirements for the intended type-acceptance class.
A4.12.1.6.2. They do not divide any elemental component packages. Any item such as a switch, transformer, relay, integrated circuit, or multicomponent package (which cannot be readily opened for maintenance on the individual components) must be placed entirely in a single subassembly.
A4.12.1.6.3. All connections to a subassembly are by means of metallic conductors only. Any use of any other coupling mechanisms must be contained wholly within a single subassembly. It is recognized that fortuitous coupling between physically separate components that have no significance with respect to the operational performance of the telephone can be expected to occur. Maximum allowable fortuitous coupling between focal subassemblies and any other part of the telephone or external wiring will be specified for all classes of type-accepted telephone. As long as these couplings do not exceed the allowable limits, they need not be taken into account when assigning subassembly boundaries.
A4.12.1.6.4. Any components employed as positive security measures to prevent unwanted signals from being transmitted on the metallic conductors crossing the boundary of a focal subassembly are included within that focal subassembly.
A4.12.1.7. Components or devices included in focal subassemblies as positive security measures must be tested and shown to be non-microphonic. The open-circuit pressure response level must be measured across every pair-wise

combination of connections to the component/device. In the range 200 Hz to 8 kHz, the microphonic response must be less than 1 $mV_{rms}$ for a sound pressure level of 2 Pa.
A4.12.1.8. A distinction is recognized between the original focal subassembly and the resultant focal subassembly produced when positive security measures have been included. Primary connectors are the conductors that connect to the original focal subassembly and that must be retained in the resultant, protected configuration for proper operation of the telephone. The term ancillary connector is used to describe any metallic conductors not present in the original subassembly that must cross the boundaries of the resultant subassembly specifically to support the positive security measures.
A4.12.1.9. Except for annunciators, critical subassemblies must not include components that receive, process, or in any way act on electrical signals or instructions that originate outside the telephone-auxiliary unit composite.
A4.12.1.10. All transducers, except the annunciator, are operationally inactive, except when the telephone is in the in-use state. The annunciator transducer is operationally inactive except when an incoming call is being announced.
A4.12.1.11. The open-circuit microphonic pressure response level for unpowered transducers (regardless of whether they are functionally transmit or receive elements) must be less than 30 mV/Pa over the frequency range 200 Hz to 8 kHz.
A4.12.1.12. A visual indication is to be provided whenever any of the protective measures other than those for the annunciator is not in effect.
A4.12.1.12.1. If the protective measures are disabled because the handset was removed from the handset mounting no further visual indication is necessary.
A4.12.1.12.2. If there are ways by which the user can cause the telephone to be in the in-use state without lifting the handset, such as with a speakerphone, the telephone must be fitted with a lamp indicator that will unambiguously show when the protective measures have been disabled. This lamp must respond to all activities that disable the protective measures while the handset is in the handset mounting; there is no need for it to respond to the lifting of the handset, but there is also no objection to its doing so.

**A4.12.2. Mechanical Requirements.**
A4.12.2.1. The construction of the telephone set must provide (at any time before, during, or after installation) a means for the physical inspection of all security measures to ensure they are functioning properly. All security functions must be verifiable by physical inspection and/or electrical measurement.
A4.12.2.2. The telephone must be capable of repeated disassembly without physical damage or deterioration occurring.
A4.12.2.3. All connections and coupling mechanisms (intentional or fortuitous) that cross the boundaries of the focal assemblies must be identified.
A4.12.2.4. If a type-acceptance class requires test points (e.g., to permit the electrical verification of security protective conditions), these test points must be placed so they can be safely accessed while the telephone is operational. The location of the test points must be such that they can be accessed without danger of touching any other component or wiring. Under no circumstances shall the security-related test points be accessible without the telephone case being opened.
A4.12.2.5. All transducers not specifically allowed must be physically removed from the telephone set, not merely disconnected. Depending on class/suffix, this may include, but is not limited to, speakers for voice announcements, speakerphones, and built-in microphones.
A4.12.2.6. The construction of the telephone must preclude any possibility that internal components or wiring can obstruct the operation of any switch or device used to provide or control the physical protective measures.
A4.12.2.7. Any use of multiple hookswitch plungers will be fully redundant. Depressing any one alone will fully operate all the idle-state protective measures.

**A4.13. Manufacturing Restrictions.** Once a telephone is type-accepted, design or construction changes are permitted unless they affect some aspect of the criteria required for its type-acceptance class. Any design or construction change in the designated focal subassemblies or critical subassemblies automatically cancels the type-acceptance status.

**A4.14. Electrical Test Requirements.**

**A4.14.1. Sound Pressure Response Tests.**
A4.14.1.1. The pressure response level measurements are to determine if there is excessive coupling of microphonically produced signals from the focal subassemblies to conductors in their vicinity or to the external wires. Acoustic energy is

projected at the microphonic element at a specified sound pressure level; ground-referenced and differential voltage measurements are performed at the conductors of interest.

**A4.14.1.2. Acceptance Criteria.** For sound pressure levels of 2 Pa:
A4.14.1.2.1. The pressure response voltages due to fortuitous coupling from the focal subassemblies must not exceed 30 $mV_{rms}$ at any point inside the telephone. All conductors and components located within 1 cm of the subassembly must be tested.
A4.14.1.2.2. The pressure response voltages must not exceed 1 $mV_{rms}$ on any external wiring. All conductors leaving the telephone must be tested.
A4.14.1.2.3. The open-circuit sound pressure response voltage must not exceed 60 $mV_{rms}$ for any transducer included in the telephone-auxiliary unit composite.
A4.14.1.2.4. The open-circuit sound pressure response voltage must not exceed 1 $mV_{rms}$, for any component used to implement the positive security measure.

**A4.14.1.3. Test Conditions.**
A4.14.1.3.1. The sensitivity of the test instrumentation and the environmental noise conditions throughout the specified frequency range must permit the detection and accurate measurement of any signal from a 100,000-ohm (or less) source with an open circuit voltage at least one-tenth the maximum allowed level. The net loading impedance of the test instrumentation must be equal to or greater than 100,000 ohms at the point of connection to the conductors being tested.
A4.14.1.3.2. Both online and offline tests are required for the focal subassemblies. Online tests are performed in the idle state with the telephone connected to the CTS in the normal manner. For the offline tests, the telephone is completely disconnected from the CTS. In both cases, all contacts used for positive security measures are in their normal condition (normal-open are open, normal-closed are closed).

**A4.14.1.4. Acoustic Signals.**
A4.14.1.4.1. The sound pressure levels of the test signals are not less than 2 Pa for all tests. Tests on internal points are conducted at 1 kHz. All other tests are conducted over the frequency range 100 Hz to 15 kHz; either continuously or at intervals not to exceed one-half octave below 400 Hz and one-third octave above 400 Hz. The test frequency may be modulated to facilitate recognition during recovery but the rms value must not be less than 2 Pa for at least 50 percent of the modulation cycle.
A4.14.1.4.2. Testing of more than one transducer at a time is allowed as long as the sound pressure level at each transducer being considered is at least 2 Pa. In any event every transducer in the telephone-auxiliary unit composite must be tested either in combination with other transducers or in a separate test run.

**A4.14.1.5. Signal Recovery.**
A4.14.1.5.1. Internal Points. Identify every conductor that either extends to within 1 cm of the focal subassembly or is connected to a component that extends to within 1 cm of the focal subassembly. For all electrical signals produced as the result of coupling from the focal subassembly, measure the ground-referenced voltage at each of these conductors and the differential voltage for all pair-wise combinations of these conductors; the voltages measured must not exceed the limits provided above.
A4.14.1.5.2. External Wiring. The external wiring that must be tested consists of the conductors (wires) in the station mounting cord and in any other external electrical connection to the telephone (not handset, headset, or auxiliary unit cords). Measure the electrical signals produced as the result of pressure response from the 2 Pa sound source. Both ground-referenced voltages and differential pair-wise voltages must be measured for each of these conductors. Every conductor must be tested individually against ground and in pair-wise combination with every other conductor. The pressure response voltages must not exceed the limits stipulated above.

**A4.14.2. Contact Capacitance Test.** This test need not be performed if the manufacturer of the component in question has specified for it a minimum performance that meets or exceeds these criteria.
A4.14.2.1. All normal-open metallic contact pairs used for positive security measures must be measured (installed or not installed at the manufacturer's option) to confirm compliance with the criteria for maximum capacitance. The test instrumentation must be capable of detecting and accurately measuring capacitances one-tenth the specified maximum value.

**A4.14.2.2. Acceptance Criterion.** The capacitance across the normal-open contacts must be lower than 7 pF.

**A4.14.3. Contact Resistance Tests.** These tests need not be performed if the manufacturer of the component in question has specified for it a minimum performance that meets or exceeds these criteria.
A4.14.3.1. All normal-closed metallic contact pairs used for positive security measures must be measured (installed in the telephone) to confirm compliance with the criteria for maximum closed resistance. The test instrumentation must be capable of detecting and accurately measuring resistances one-tenth the specified maximum value.
A4.14.3.2. All normal-open metallic contact pairs used for positive security measures must be measured (installed or not installed in the telephone at the manufacturer's option) to confirm compliance with the criteria for minimum open resistance. The test instrumentation must be capable of detecting and accurately measuring resistances 10 times the specified minimum value.

**A4.14.3.3. Acceptance Criteria.** The closed resistance of normal-closed contacts must be lower than 150 mW.
A4.14.3.4. The open resistance across normal-open contacts must exceed 100 MW.

## PART 3 (ANNEX 1)

## SUPPLEMENTARY DESIGN AND CONSTRUCTION SPECIFICATIONS TYPE-ACCEPTANCE CLASS 1

**Preliminary Note:** This annex to part 3 of TSG Standard 4 describes the specific supplementary requirements for TSG type-acceptance Class 1. The general type-acceptance approach and those requirements that are applicable to all the type-acceptance classes were presented in part 3 itself.

**A4.15.1. Operational/Physical Limitations.**
A4.15.1.1. There is no voice annunciator capability when the telephone is in the idle state; voice annunciation over a secondary voice path is permitted if the telephone is already in the in-use state.
A4.15.1.1.1. When the telephone is in the idle state:

No audio signals originating outside the telephone can be annunciated directly by any element in the telephone.

Externally generated incoming ring signals or instructions may only activate a ring signal generator located in the telephone itself.

Audible annunciation of an incoming call is accomplished with the internally generated signals that occur when the appropriate incoming ring instruction/signal is received by the telephone.

A4.15.1.1.2. Incoming audio may be routed to the receiver element in the handset or to a speaker in an auxiliary unit or in the main body of the telephone set when, and only when, the telephone is in the in-use state. This audio may be for the existing call, for local intercom, or to annunciate another call.

**A4.15.2. Telephone Security and Inspection Support Measures.**
A4.15.2.1. Except as specified below, focal subassemblies cannot include any components other than the transducers or microphonic elements themselves and the components used to implement the positive security measures.
A4.15.2.1.1. Wires and printed circuit conductors may be included if they connect directly to a transducer and are operationally necessary. Wires in the cord connecting an external member (e.g., handset, headset, auxiliary unit) to the main body of the telephone must meet this criterion to be included in a focal subassembly.
A4.15.2.1.2. Components connected directly across the terminals of the transducers may be included if the transducers in question are located in a member external to the main body of the telephone, and the positive security measures are located within the main body itself.
A4.15.2.1.3. Some transducers are contained in sealed packages that also contain other components. Electret microphone-based transmitter elements are typically constructed in this way. For purposes of assigning the focal subassembly, sealed packages that do not permit direct access to the actual transducer may be treated as if the entire package were the transducer.
A4.15.2.2. The following positive security measures are applied at the boundaries of each focal subassembly. These protective measures must be in effect whenever the transducers contained within the subassembly are operationally inactive. Unless the proper control signal (manual in-use action or incoming ring signal) is received, the operationally inactive measures remain in effect.
A4.15.2.2.1. Normal-open metallic-contact disconnect devices (switches or relays) completely disconnect all intrinsic connectors of the focal subassembly. The initial breakdown voltage rating for the device must be at least 1.5 kV. The resistance across the open contacts must exceed 100 MW. The capacitance across the open contacts must be less than 7 pF.
A4.15.2.2.2. Normal-closed metallic contacts across the intrinsic connectors of the focal subassembly (on the subassembly side of the disconnected conductor) short all the intrinsic connectors together. The shorted conductors are disconnected from the rest of the telephone by the normal-open contacts cited above. The closed contacts must have a resistance less than 150 mW and be either 5 percent gold alloy or gold clad. The opening and closing of these shorting contacts must occur with no voltages across them.
A4.15.2.3. When the telephone is in the idle state, power is removed from all components operationally used to amplify in-use state transmit signals.
A4.15.2.4. Test points that permit the electrical verification of all security protective conditions are included. At a minimum, these test points must provide electrical access to the following:

A4.15.2.4.1. Every metallic contact used as a protective measure.
A4.15.2.4.2. Every terminal of every transducer.
A4.15.2.4.3. All audio amplifier input signals, output signals, and power feeds.
A4.15.2.4.4. All wires leaving the telephone.
A4.15.2.4.5. A means to synchronize test equipment with the exchange of data to and from the CTS. For many systems, these exchanges occur in discrete blocks with a readily discernible transition from an idle condition (at which time there is no electrical signal on the data line other than, possibly, DC) to the data transfer. In these cases the test points on the data lines, A4.15.2.4.4. above, are sufficient. If synchronization to the start of the basic data block cannot be obtained from the data lines without interpretation of the digital data stream, a specific test point that will provide it must be available inside the telephone.

## PART 3 (ANNEX 2)

## SUPPLEMENTARY DESIGN AND CONSTRUCTION SPECIFICATIONS TYPE-ACCEPTANCE CLASS 2

**Preliminary Note:** This annex to part 3 of TSG Standard 4 describes the specific supplementary requirements for TSG type-acceptance Class 2. The general type-acceptance approach and those requirements that are applicable to all the type-acceptance classes were presented in part 3 itself.

**A4.16.1. Operational/Physical Limitations.** There is no voice annunciator capability when the telephone is in the idle state; voice annunciation over a secondary voice path is permitted if the telephone is already in the in-use state.
A4.16.1.1. When the telephone is in the idle state:
A4.16.1.1.1. No audio signals originating outside the telephone can be annunciated directly by any element in the telephone.
A4.16.1.1.2. Externally generated incoming ring signals or instructions may only activate a ring signal generator located in the telephone itself.
A4.16.1.1.3. Audible annunciation of an incoming call is accomplished with the internally generated signals that occur when the appropriate incoming ring instruction/signal is received by the telephone.
A4.16.1.2. Incoming audio may be routed to the receiver element in the handset or to a speaker in an auxiliary unit or in the main body of the telephone set when, and only when, the telephone is in the in-use state. This audio may be either for the existing call, for local intercom, or to annunciate another call.

**A4.16.2. Telephone Security and Inspection Support Measures.**
A4.16.2.1. If transducers are contained in a unit that is located outside the main body of the telephone (such as a handset or auxiliary unit), that unit may, in its entirety (together with the cord connecting it to the main body and the positive security measures located within the main body), be used as a focal subassembly. For functions wholly contained within the main body of the telephone, focal subassemblies are limited to the transducers, the components used as positive security measures, and the wires connecting these components to the transducers.
A4.16.2.2. Some transducers are contained in sealed packages that also contain other components. Electret microphone-based transmitter elements are typically constructed in this way. For purposes of assigning the focal subassembly, sealed packages that do not permit direct access to the actual transducer may be treated as if the entire package were the transducer.
A4.16.2.3. The following positive security measures are applied at the boundaries of each focal subassembly. These protective measures must be in effect whenever the transducers contained within the subassembly are operationally inactive. Unless the proper control signal (manual in-use action or incoming ring signal) is received, the operationally inactive measures remain in effect.
A4.16.2.3.1. Normal-open metallic-contact disconnect devices (switches or relays) completely disconnect all intrinsic connectors of the focal subassembly. The initial breakdown voltage rating for the device must be at least 1.5 kV. The resistance across the open contacts must exceed 100 MW. The capacitance across the open contacts must be less than 7 pF.
A4.16.2.3.2. Normal-closed metallic contacts across the intrinsic connectors of the focal subassembly (on the subassembly side of the disconnected conductor) short all the intrinsic connectors together. The shorted conductors are disconnected from the rest of the telephone by the normal-open contacts cited above. The closed contacts must have a resistance less than 150 mW and be either 5 percent gold alloy or gold clad. The opening and closing of these shorting contacts must occur with no voltages across them.
A4.16.2.4. Test points that permit the electrical verification of all security protective conditions are included. At a minimum, these test points must provide electrical access to the following:
A4.16.2.4.1. Every metallic contact used as a protective measure.
A4.16.2.4.2. All wires leaving the telephone.
A4.16.2.4.3. A means to synchronize test equipment with the exchange of data to and from the CTS. For many systems, these exchanges occur in discrete blocks with a readily discernible transition from an idle condition (at which time there is no electrical signal on the data line other than, possibly, DC) to the data transfer. In these cases, the test points on the data lines, a4.16..2.4.2. above, are sufficient. If synchronization to the start of the basic data block cannot be obtained from the data lines without interpretation of the digital data stream, a specific test point that will provide it must be available inside the telephone.

## PART 3 (ANNEX 3)

## SUPPLEMENTARY DESIGN AND CONSTRUCTION SPECIFICATIONS TYPE-ACCEPTANCE CLASS 3

**Preliminary Note:** This annex to part 3 of TSG Standard 4 describes the specific supplementary requirements for TSG type-acceptance Class 3. The general type-acceptance approach and those requirements that are applicable to all the type-acceptance classes were presented in part 3 itself.

**A4.17.1. Operational/Physical Limitations.** [Nothing additional is required for this class. All specifications for this section are provided in part 3 of this standard.]

**A4.17.2. Telephone Security and Inspection Support Measures.**

A4.17.2.1. If transducers are contained in a unit that is located outside the main body of the telephone (such as a handset or auxiliary unit), that unit may, in its entirety (together with the cord connecting it to the main body and the positive security measures located within the main body), be used as a focal subassembly. For functions wholly contained within the main body of the telephone, focal subassemblies are limited to the transducers, the components used as positive security measures, and the wires connecting these components to the transducers.

A4.17.2.2. Some transducers are contained in sealed packages that also contain other components. Electret microphone-based transmitter elements are typically constructed in this way. For purposes of assigning the focal subassembly, sealed packages that do not permit direct access to the actual transducer may be treated as if the entire package were the transducer.

A4.17.2.3. The following positive security measures must be applied at the boundaries of each non-annunciator focal subassembly and are optional for annunciator focal subassemblies. If the annunciator subassemblies use these measures, the alternative conditions in section 3(3).2.4, below, may be ignored. All protective measures must be in effect whenever the transducers contained within the subassembly are operationally inactive. Unless the proper control signal (manual in-use action or incoming ring signal) is received, the operationally inactive measures remain in effect.

A4.17.2.3.1. Normal-open metallic-contact disconnect devices (switches or relays) completely disconnect all intrinsic connectors of the focal subassembly. The initial breakdown voltage rating for the device must be at least 1.5 kV. The resistance across the open contacts must exceed 100 MW. The capacitance across the open contacts must be less than 7 pF.

A4.17.2.3.2. Normal-closed metallic contacts across the intrinsic connectors of the focal subassembly (on the subassembly side of the disconnected conductor) short all the intrinsic connectors together. The shorted conductors are disconnected from the rest of the telephone by the normal-open contacts cited above. The closed contacts must have a resistance less than 150 mW and be either 5 percent gold alloy or gold clad. The opening and closing of these shorting contacts must occur with no voltages across them.

A4.17.2.4. If the positive security measures stipulated in section 3(3).2.3 are not applied to the annunciator focal subassembly, the annunciator must be a two-terminal ringer that is operated by DC. For any transducer or sealed ringer package used without the protective measures of section 3(3).2.3, the microphonic response to a 2 Pa sound pressure level must be less than 1 $mV_{rms}$ over the frequency range 100 Hz to 15 kHz.

A4.17.2.5. Test points that permit the electrical verification of all security protective conditions are included. At a minimum, these test points must provide electrical access to the following:

A4.17.2.5.1. Every metallic contact used as a protective measure.

A4.17.2.5.2. All terminals on the annunciator transducer or ringer package.

A4.17.2.5.3. All wires leaving the telephone.

A4.17.2.5.4. A means to synchronize test equipment with the exchange of data to and from the CTS. For many systems, these exchanges occur in discrete blocks with a readily discernible transition from an idle condition (at which time there is no electrical signal on the data line other than, possibly, DC) to the data transfer. In these cases the test points on the data lines, A4.17.2.5.3. above, are sufficient. If synchronization to the start of the basic data block cannot be obtained from the data lines without interpretation of the digital data stream, a specific test point that will provide it must be available inside the telephone.

## GLOSSARY

Preliminary Note: The definitions in this glossary are for use with the TSG standards only. They are provided to ensure a precise, unambiguous meaning for terms used to describe TSG requirements. Many of the terms used have no related meaning in any other context. Where terms are involved that are employed by the telephone industry, the usages given are intended to be consistent with most common industry practices. Usage, however, can vary significantly from company to company, and this glossary is not a definitive study of all the ways in which these terms may be used. It is important in using the TSG standards, that these terms not be given any more or any less meaning than is specified here.

ANNUNCIATOR -- A device for producing an audible signal to announce an incoming call.

AUDIBLE SIGNAL -- A sound that is specifically emitted by the telephone to be audible anywhere in its immediate vicinity.

AUXILIARY UNIT -- A device connected to the telephone by means other than the station mounting cord or the handset cord.

BUILT-IN MICROPHONE -- A microphone located in the body of the telephone rather than in the handset.

CORD -- A flexible assembly of individually insulated electrical wires enclosed in a common insulating jacket and fitted with terminating connectors, used to provide the electrical connections between two separate, distinct units or component parts.

CRITICAL SUBASSEMBLY -- Any subassembly that is not a focal subassembly, but that contains components essential to the operation of positive security functions.

CTS (COMPUTERIZED TELEPHONE SYSTEM) -- A generic term used to describe any telephone system that uses centralized stored program computer technology to provide switched telephone networking features and services. Referred to commercially by such terms as computerized private branch exchange (CPBX), private branch exchange (PBX), private automatic branch exchange (PABX), electronic private automatic branch exchange (EPABX), computerized branch exchange (CBX), computerized key telephone systems (CKTS), hybrid key systems, business communications systems, and office communications systems.

CTS ELECTRONIC TELEPHONES -- Telephone sets expressly designed to operate with specific CTS to obtain the various features and services offered by those CTS. These telephones are not compatible with normal central office service and cannot be connected directly to standard central office lines.

DISCONNECT -- A device that (1) inserts a break at some point in the normal hardwire conduction path that exists between a telephone and its telecommunications medium, and (2) only when the telephone is in the in-use state, establishes a temporary metallic connection across that break.

FOCAL SUBASSEMBLY -- Any subassembly that contains transducers or other potentially microphonic components.

HANDS-FREE ANSWERING -- A feature available on some telephones and telephone systems that, when certain types of incoming calls occur, either automatically places the telephone in the in-use state or allows the user, without any manual action, to initiate the in-use state by means of a voice-activated switch.

HANDSET -- A combined telephone earpiece (containing a receiver element) and mouthpiece (containing a transmitter element) mounted on a handle.

HANDSET CORD -- A flexible assembly of individually insulated electrical wires enclosed in a common insulating jacket and fitted with terminating connectors, used to provide the electrical connections between the handset and the main body of the telephone.

HANDSET MOUNTING -- The receptacle, bracket, cradle, or other support specifically provided on the main body of the telephone to hold the handset when it is not in use. The handset mounting is fitted with a means to detect whether or not the handset is in place in (or on) the handset mounting.

HEADSET -- A combined telephone earpiece (containing a receiver element) and mouthpiece (containing a transmitter element) assembly to be worn on the user's head.

HOOKSWITCH -- The device employed to determine if the handset is, or is not, in place in (or on) the handset mounting is termed the hookswitch regardless of how it operates. In some cases the hookswitch will not involve any sort of mechanical switch and/or break any incoming current loop.

HOUSE CABLING -- The wiring and associated frames that provide the electrical connections between the computercontrolled
telephone system and the individual blocks or jacks for each telephone's station mounting cord.

IDLE STATE (VOICE TERMINAL) -- A voice terminal is in the idle state whenever it is not in the in-use state (see below).

IN-USE STATE (VOICE TERMINAL) -- A voice terminal is in the in-use state if it is communicating to its network system which a user is either initiating or actively engaged in communications via a temporary switched connection set up by that network system.

ISOLATOR (ISOLATION) -- A device that (1) inserts a break at some point in the normal hardwire conduction path that exists between a telephone and its telecommunications medium, and (2) only when the telephone is in the in-use state, provides a temporary communications channel across that break without establishing an end-to-end metallic connection.

KEY TELEPHONE SYSTEM -- A system of telephones and connections to the public switched telephone network (PSTN) or to a private branch exchange (PBX) that provides the telephones with selective access to the PSTN or PBX connections by means of pickup keys located at or near the telephones.

MANUAL ACTION -- An action that requires that the user touch, move, lift, or otherwise manipulate by hand, some control or part of the telephone. An operation that is actuated by the user's voice does not qualify as a manual action.

MICROPHONE -- Any component among whose intended functions include performing as a transducer to produce an electrical analogue output from an audio-frequency sound pressure waveform input.

MICROPHONIC -- Any component, regardless of its intended functions, that exhibits transducer behavior to produce an electrical analogue output from an audio-frequency sound pressure waveform input is termed microphonic.

NETWORK SYSTEM -- An assembly of member terminals, control facilities, and intercommunication facilities that can establish and maintain a communications link between any two of the member terminals.

OFF-HOOK (TELEPHONE) -- A telephone in the in-use state.

ON-HOOK AUDIO SECURITY/ON-HOOK TELEPHONE AUDIO SECURITY -- The use of positive measures to protect on-hook telephones against passing room audio is known as on-hook audio security or on-hook telephone audio security.

ON-HOOK (TELEPHONE) -- A telephone in the idle state.

OPERATIONALLY INACTIVE TRANSDUCER -- A telephone has many functional states, e.g., in-use, idle, incoming ring, incoming voice announcement, off-hook, speakerphone, programming, etc. When the specific state of the telephone does not require a particular transducer to perform any action, that transducer is referred to as an operationally inactive transducer for the state in question.

PBX (PRIVATE BRANCH EXCHANGE) -- A PBX is a local switched telephone network that is itself a member of the PSTN, and which provides access to the PSTN for its member terminals.

PRESSURE RESPONSE LEVEL -- The pressure response level of a microphone is the ratio of voltage output to sound pressure level input.

PSTN (PUBLIC SWITCHED TELEPHONE NETWORK) -- The ordinary dial-up telephone system.

PUSH-TO-OPERATE HANDSET -- There are three forms of push-to-operate handsets:

1. A telephone handset equipped with separate push-to-activate momentary-contact switches, one for the transmitter element and one for the receiver element. Either switch when not activated shorts the leads to its respective transducer and completely disconnects the transducer from the station mounting cord wires.
2. A telephone handset equipped with a single push-to-activate momentary-contact switch. When the switch is not activated, the leads for both the transmitter element and the receiver element are shorted and are disconnected from the station mounting cord wires.
3. A telephone handset equipped with both a single push-to-activate momentary-contact switch and with an isolation amplifier that allows audio signals to travel from the station mounting cord to the receiver element but not from the receiver element to the station mounting cord. When the switch is not activated, the leads for the transmitter element are shorted together and are disconnected from the station mounting cord wires.

RECEIVER ELEMENT -- The speaker located in the handset or headset earpiece. This transducer converts audiofrequency electrical signals to acoustic signals that are audible when the earpiece is held against the user's ear.

RINGER -- An annunciator that cannot be used for voice calls, announcements, or paging. A ringer can only produce specific audible signals.

SPEAKER -- Any component among whose intended functions include performing as a transducer to produce a sound pressure analogue output from an input audio-frequency electrical waveform.

SPEAKER-MICROPHONE -- Any component whose intended functions include performing both as a microphone and as a speaker.

SPEAKERPHONE -- A feature that permits a telephone to be used without lifting the handset. A speakerphone may be physically incorporated into the telephone set or it may consist of one or more auxiliary units. A usable speakerphone contains a microphone, or microphone-amplifier combination, which is sensitive enough to pick up normal conversational speech levels at a distance of several feet and a speaker, or speaker-amplifier combination, which will transduce normal telephone signal levels to sound pressure levels that can be heard at a distance of several feet.

STATION MOUNTING CORD -- A flexible assembly of individually insulated electrical wires enclosed in a common insulating jacket and fitted with terminating connectors, used to provide the electrical connections between the main body of the telephone and the blocks or jacks that terminate the house cabling.

TELECOMMUNICATIONS MEDIUM -- A means of transporting electrical information from one communications terminal to another.

TELEPHONE -- A voice terminal that, regardless of whatever other functions it performs, is a member terminal of a telephone network and accomplishes all the incoming and outgoing signaling and voice interfacing necessary for operation in that network.

TELEPHONE NETWORK -- A network system that, regardless of whatever other functions it performs, provides temporary speech communications links between member voice terminals. The essential characteristics of a telephone network are (1) that it recognize when a member terminal is initiating a call (goes off-hook), (2) that it identify the terminal being called (number dialed), (3) that it annunciate the incoming call (rings the called terminal), and (4) that it maintain a voice grade communications channel between the calling and called terminals only for the duration of the call.

TRANSDUCER -- A component of the telephone that either converts electrical signals to acoustic signals or acoustic signals to electrical signals: includes microphones, ringers, speakers, and speaker-microphones.

TRANSMITTER ELEMENT -- The microphone located in the handset or headset mouthpiece. This transducer converts acoustic signals spoken directly into the mouthpiece to analogue audio-frequency electrical signals for transmission to the main body of the telephone.

TSG-APPROVED TELEPHONE -- TSG-approved status is awarded to telephones that have been technically evaluated by the government's Telephone Security Group and determined to meet all applicable on-hook telephone audio security criteria. A TSG-approved telephone provides all necessary security features as intrinsic properties of the telephone itself.

TYPE-ACCEPTED TELEPHONE -- A TSG-approved telephone model that the TSG has evaluated in response to a formal application by its manufacturer, and has been approved and awarded a TSG type-acceptance number. The TSG telephone type-acceptance program is the primary vehicle for evaluating commercial telephones for TSG approval. TSG has issued type-acceptance standards that specify the on-hook security design, construction, and performance characteristics required for various genres of telephones and type-acceptance classes.

UNCONTROLLED/UNPROTECTED LINE
UNCONTROLLED/UNPROTECTED TELECOMMUNICATIONS MEDIUM -- A telecommunications medium, such as a telephone wireline, that is not provided continuous positive physical protection against unauthorized, clandestine intercept of the information it is being used to convey.

VOICE TERMINAL -- A generic term used to describe any device that, regardless of whatever other functions it performs, provides an intentional transmit and/or receive interface between a human talker/listener and an electric or electronic communications system. All voice terminals contain transducers; a microphone is necessary if there is a transmit function and a speaker if there is a receive function. Telephones, speakerphones, and intercom sets are common examples of voice terminals.