

**FIELD ASSISTANCE AND SUPPORT TEAM (FAST)
VOICE AND NONDATA SPECIAL SERVICES
TECHNICAL (VOITEC) SUPPORT**

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strated the need to establish teams of technical experts. These VOITEC Support personnel must have the knowledge and equipment to go beyond the capabilities of the normal installation and maintenance forces in solving complex communications problems. The existence and effective functioning of VOITEC Support is essential to maintaining high-quality service and in ensuring customer satisfaction.

1.04 For the purpose of this section, the term "field forces" refers to the installation, maintenance, and testing personnel, either Business Services or Network, and their supervision who are involved with the normal provision of voice and nondata special services. These persons may be located at central offices, test centers, carrier terminals, customer premises, or intermediate locations.

OBJECTIVES OF VOITEC SUPPORT

1.05 The primary objective of VOITEC Support is to improve our voice and nondata special service communications services by bringing service problems to the attention of technical experts through the use of FAST mandatory escalation procedures. The use of these procedures in conjunction with existing Bell System Practices can be an effective aid in reducing long service delays which cause extreme customer dissatisfaction. An initial step toward the objective of improving these services is to ensure that the installation and maintenance forces are trained properly and equipped to carry out their basic assignments.

1.06 A second objective of VOITEC Support is to aid in the coordination of interarea and inter-regional service problems by establishing definite procedures for obtaining technical assistance from distant locations. Following these procedures will help in promoting a teamwork approach to mutual problems and aid in providing a uniform grade of service.

1.07 A third objective of VOITEC Support is to provide interconnect vendor representatives with a contact for those technical questions regarding Bell System voice and nondata special services that are not routinely referable to other interconnection coordinators. Requests for these contacts may be originated by the Central Operations Group (COG). These types of contacts should be cultivated and could become invaluable when interfacing problems arise. Caution must be exercised when advising

on questions of a proprietary nature in dealing with persons outside the Bell System.

1.08 The voice and nondata special services of concern to VOITEC Support will include but not be limited to the following:

- All voice and nondata special services
- Designed private line services (eg, alarm circuits, telemetering circuits, telephoto circuits, voice grade radio tie lines)
- PBX tie lines and trunks
- Interconnect arrangements (Direct Distance Dialing [DDD] and private lines)
- Network access lines (Other Common Carrier [OCC] interface)
- Foreign exchange service
- Off-premises stations
- Wide Area Telephone Service (WATS)
- 800 service
- Customer premises, private line switching equipment (eg, SS-1)
- Mobile radio service
- Paging systems
- PICTUREPHONE® meeting service
- International Record Carrier services (eg, RCA Globecom, Western Union International).

2. VOITEC SUPPORT PERSONNEL

2.01 This section describes the typical qualifications, organization, responsibilities, and activities of VOITEC Support personnel.

A. Qualifications

2.02 To perform effectively, VOITEC Support personnel must be experienced or trained in the following subjects:

- Transmission and circuit design

- Customer premises, station apparatus, and terminal equipment
- Amplifiers and signaling equipment
- Customer premises, private line switching equipment
- Private line and DDD network structures
- Related test equipment
- Tariffed service offerings.

2.03 In addition to the above disciplines, VOITEC Support personnel should have a good appreciation for the following:

- Customer Provided Equipment (CPE) services
- Interconnect arrangements
- OCC services
- Interpositioning
- Mobile radio systems.

2.04 VOITEC Support personnel must have sufficient technical experience to communicate effectively with individuals and organizations both inside and outside the Bell System. Support personnel should also have a working knowledge of the Intercompany Services Coordination (ISC) plan and other administrative procedures and functions of FAST including DATEC, SOFTEC, and CSTEC.

B. Organization

2.05 The specific manner in which VOITEC Support is organized may vary in different locations; however, VOITEC Support designees who are part of the FAST organization should be assigned to Regional FAST Support Centers (RFSC) and to High Activity Locations (HAL).

2.06 The number of VOITEC Support personnel is strongly influenced by the quantity, geographical dispersion, and complexity of voice and nondata special services in the operating area. There should be a minimum of one management Regional VOITEC designee at the RFSC for each Region. Addi-

tional RFSC VOITEC and HAL VOITEC personnel shall be assigned as needed per recommendations of the FAST Regional Headquarters. The designees must be able to travel to outlying points whenever necessary to carry out VOITEC responsibilities.

C. Responsibilities

2.07 The responsibilities of VOITEC Support personnel fall into two general categories: *fundamental responsibilities* and *continuing responsibilities*. The fundamental responsibilities apply directly to the main objective of VOITEC Support which is the technical backup of the field forces. Items that fall into this category demand immediate attention when they arise. The continuing responsibilities apply indirectly to the primary objective of VOITEC Support and should be performed between fundamental case occurrences or during a particular case when they apply.

Fundamental Responsibilities

2.08 Telephone and On-Site Technical Field Assistance: VOITEC Support personnel from an RFSC provide initial support. When outside support is necessary, HAL VOITEC Support personnel will be required to go to customer locations, central offices, test centers, and intermediate locations when necessary to identify and resolve voice and nondata special service problems. The Support personnel should coordinate their efforts at these locations with the local work groups according to normal administrative procedures. When assistance is needed outside their assigned territories, VOITEC Support personnel should coordinate their activities through the RFSC with the VOITEC Support people at the distant locations.

2.09 Technical Counsel: VOITEC personnel will provide advice on questions of a technical nature relating to voice and nondata special service communications. These questions may come from inside or outside of the Bell System and may concern any of the following:

- Advice on trouble analysis and testing procedures (ie, what test to make, what to do first, second, etc)
- Specific options on transmission or customer terminal equipment
- Compatibility between CPE and Bell System equipment in accordance with current interconnection guidelines

- Tariff compliance of services with CPE terminals
- Advice on the technical feasibility of complex customer services.

Caution: *Discretion must be followed when advising on questions of a technical nature when the person(s) receiving this advice are outside of the Bell System. Questions of a proprietary nature should be referred to the local General Trade Products or Independent Company Relations contacts.*

2.10 Policy Counsel: The VOITEC Support personnel will assist the field forces in interpreting Bell System technical responsibilities in voice and nondata special service communications. Some of the items of concern may be the following:

- Technical responsibilities outlined in the tariffs
- Technical reference requirements
- Maintenance philosophy on CPE and telephone services
- Activities at the interface of interconnection arrangements
- Performance expectations of Bell System-provided equipment, facilities, and services.

It is not intended that VOITEC, in providing technical counsel or policy counsel, would preclude or in any way change the responsibility of other organizations (eg, Engineering or Marketing) to provide advice on such matters, but rather to supplement the efforts of those organizations.

2.11 Supplemental Training of Field Forces:

VOITEC Support personnel will supplement the formal training of the field forces through telephone and on-site contacts on difficult service problems. The use of sophisticated test equipment and methods should be demonstrated and explained where practical. This training can be of great benefit to both the field forces and Support personnel by sharing knowledge gained during problem investigations.

Continuing Responsibilities

2.12 Quality Control: Quality control is a major continuing responsibility of VOITEC Support personnel. As a result of VOITEC Support personnel involvement in a variety of service problems, they are in an excellent position to identify areas where improvement is needed and refer them to the responsible organizations. Items of concern should include the following:

- Test equipment shortages, updating, and maintenance
- Poor service order documentation
- Recommendation of improvements in administrative procedures
- Feedback on initial service planning and installation problems to the groups originally responsible
- Technical recommendations for service improvements
- Recommendations to AT&T on System equipment design or Bell System Practice (BSP) improvements.

2.13 Monitor Training Requirements and Effectiveness:

VOITEC Support personnel's frequent contact with interdepartmental activities involved with voice and nondata special service offers an excellent opportunity to monitor training needs and effects. Some items to monitor may include:

- Repeated field force difficulty with similar problems
- Excessive times to complete BSP tests before escalating service problems
- Misunderstandings by sales force or customers of complex service operation, capabilities, or limitations.

Support personnel should document any training deficiencies and recommend improvements to the appropriate training organization.

Availability

2.14 VOITEC Support personnel must always ensure that someone is accessible to assist on

service problems during working hours. After-hours assistance requests should be handled through normal off-hour administrative channels. The Support personnel should not be so encumbered by non-VOITEC duties that they are not available to the field when needed for technical support activities.

D. Recording VOITEC Support Activities

2.15 All case activities of VOITEC Support should be recorded on the RFSC Case Notes (Form BS-1289) outlined in the FAST Operations Guide. Field forces should be informed of the information VOITEC Support personnel require when called for assistance.

2.16 Documentation, such as the RFSC Case Notes with an outline of the problem and its solution, is an invaluable aid in appraising service efforts and VOITEC Support effectiveness. Nonescalated cases of telephone advice on field questions and assistance on another VOITEC Support team's service problems should also be documented on the FAST Activity Notes form since much time could be involved.

2.17 Each RFSC and HAL VOITEC Support person will maintain an individual active file of Case Reports.

2.18 Activity Summary Reports will be generated by the Technical Support Management System (TSMS). These reports can display activities on a HAL, Regional, Corporate, or FAST discipline (eg, VOITEC) basis.

2.19 Particular voice and nondata special service problem solutions may be of interest to VOITEC Support personnel in other RFSCs. These VOITEC Cases should be entered into the Computer Assisted Technical Support/Data Base (CATS/DB) system for transmission to the RFSCs and to AT&T FAST Headquarters. If they are of systemwide interest, AT&T will use this information to generate Technical Advisories.

E. Job Aids

Interregional Communications

2.20 There is frequent need for intraregional and interregional communications among VOITEC Support and other FAST personnel. To en-

courage this communication, CATS/DB contains the names, telephone numbers, and addresses of FAST Support personnel throughout the Bell System. CATS/DB is a data bank of stored information that assists in complex problem solving. It contains Technical Advisories, Flashes, and other technical inputs concerning known trouble conditions and their remedies.

Supportive Documentation

2.21 To keep adequately informed, VOITEC Support personnel will require an up-to-date file of reference information in two general categories: information from Bell System sources and information from non-Bell System sources.

2.22 *Information from Bell System Sources:* Some useful Bell System documents that cover voice and nondata special service-related material are as follows:

- Bell System Practices on voice and nondata special services terminal equipment, private-line channels, interconnection devices, program services, Private Branch Exchange (PBX) tie lines, Foreign Exchange (FX), and Off-Premises Exchange (OPX) services, etc
- Bell System Technical References on voice communications, radio and transmission engineering, attestation programs, conformance programs, and direct electrical connection of voiceband terminal equipment - available from Western Electric (WE), Indianapolis.
- FCC Registration Program Installation and Repair Practices and Procedures.

In addition to the above items, VOITEC Support personnel must have ready access to engineering letters (ELs), AT&T System Letters, schematic drawings (SDs), circuit descriptions (CDs), Task Oriented Practices (TOPS), etc.

2.23 *Information from non-Bell System Sources:* Some worthwhile references available from outside the Bell System include the following:

- Publications by various vendors on their equipment and its operation - available from vendors or Bell System Purchased Products Division (BSPPD)

VOITEC Support for advice or assistance. FAST Headquarters, with the aid of BTL, WE, and other General Department Groups, will provide assistance as soon as possible.

Report into CATS/DB as normally sent to FAST Headquarters except that the word ESCALATE will be entered into the STATUS field.

E. Escalated Case Report

3.14 VOITEC Support personnel should pursue problems unresolved by initial consultation or on-the-job assistance by a search of the CATS/DB Technical Advisory (TA) file and the Escalated Case Report (ECR) file. Search of these files will determine if a similar problem has been previously solved or escalated. If this search does not resolve the problem, the RFSC will escalate to a Subject Matter Expert (SME) for a referral, solution, or testing plan, and enter a Case Report of the problem into CATS/DB.

3.15 This Case Report will list the problem and the action taken. The RFSC will enter the Case

3.16 Upon receipt of the Case Report, FAST Headquarters will prepare the ECR and enter it into the CATS/DB ECR file. Questions on ECRs should be referred to FAST Headquarters and not to originating RFSCs.

3.17 After an RFSC has resolved a problem that has been escalated, the RFSC will submit another Case Report into CATS/DB with reference to the ECR number. Then FAST Headquarters will convert all this information into a TA as necessary and delete the ECR from CATS/DB. Figure 1 is a flow-chart of ECR procedures.

- (b) The service does not meet Bell System specifications, and the problem source cannot be identified.
- (c) The service has generated three or more similar trouble reports in 30 days.

C. Technical Escalation Timing

3.08 Technical escalation will only work successfully if a time limit for required actions is established and observed. Meeting the time limit will require local procedures to keep field supervision informed of the status and expected disposition of voice and nondata special service problems.

3.09 The following time limits for escalation are intended as a Bell System objective:

- (a) When a service meets Bell System specifications but fails to meet the customer's performance expectations, **escalate immediately**. Referral to Marketing for discussion with customer may be appropriate (paragraph 3.10).
- (b) When a service does not meet Bell System test requirements and the problem source cannot be identified, **escalate within 4 hours** of the discovery of the problem (paragraph 3.11).
- (c) When three similar trouble reports on the same service are received within 30 days and have been closed out as "test ok," "came clear," "found ok," "no trouble found," etc, **escalate immediately** after the third report is closed out (paragraph 3.12).

3.10 Situations, such as in paragraph 3.09 (a), may occur at installation when the customer attempts to use the service for the first time or on a repair visit. **Do not optimize parameters when test results are clearly within limits.**

Note: The test results must be available when escalating to VOITEC Support personnel.

3.11 In the case of paragraph 3.09 (b), the **within 4 hours** limit means that escalation can occur before 4 hours but must not exceed this if a resolution of the problem is not in sight. These hours are usually considered to be working hours but could be continuous hours in the case of a severe voice or nondata service problem.

3.12 The requirement for escalation in paragraph 3.09 (c) may be difficult to administer without

the aid of local maintenance groups. A local procedure involving the customer trouble record center should be implemented to assist in this area.

D. Escalation Procedures

3.13 The following is a step-by-step description of the activities resulting from a case of technical escalation.

(a) Field force supervisors must request technical assistance to the first level of VOITEC Support in the RFSC by escalating through the Customer Service Support Office (CSSO) or Maintenance Operation Control Center (MOCC).

(b) The Regional VOITEC Support personnel will render initial assistance by telephone. Some stubborn cases may not be cleared quickly by phone consultation and will require travel to the problem location. VOITEC Support must arrange to provide **on-the-job assistance after 4 hours** have expired from the time they were first consulted if resolution of the problem is not in sight. This procedure gives the field forces up to 8 hours of trouble investigation; 4 hours without and 4 hours with technical consultation by phone. Standard contingency travel arrangements should be planned in advance to all parts of the territory covered by the VOITEC Support personnel.

(c) After **8 hours of on-site assistance** by the HAL VOITEC Support personnel, the designee must contact the Regional Headquarters for additional technical support if resolution of the problem is still not imminent.

(d) Requests from HAL Support personnel to Regional Headquarters VOITEC Support personnel for information and documentation must be honored either verbally or with the actual material within 2 hours from the time the request was initiated.

(e) Problems referred to Regional Headquarters VOITEC Support personnel which remain unresolved may require additional technical support. Regional Headquarters Support will usually contact BTL, Teletype Corporation (TTY), WE, or others who are to provide technical assistance on the problem as soon as possible.

(f) Additionally, Regional Headquarters VOITEC Support may contact FAST Headquarters

- Technical reference material on test equipment manufactured by outside vendors — available from vendors or BSPPD.

A good working relationship should be developed between VOITEC Support personnel and voice service vendors. Contacts should be made periodically to discuss mutual technical problems and to exchange information related to current voice and nondata special services and equipment. Caution should be exercised to refrain from discussing proprietary information with people outside the Bell System.

3. CASE ESCALATION

3.01 Formal and uniform escalation procedures are necessary to bring the proper resources to bear on voice and nondata special service problems. Complex problems encountered by the field forces, such as incompatibility between equipment and the customer's method of operation or poor performance due to an unusual transmission impairment, often require expert assistance for a fast resolution of the problem. To improve the installation and maintenance of voice and nondata special services and to help avoid long service outages and customer complaints, the field forces must be provided with rapid access to technical personnel who can assist in resolving these problems.

3.02 There are two basic kinds of escalation for voice and nondata special service problem cases: administrative and technical. These two types of escalation and the conditions under which they apply are outlined below.

A. Administrative Escalation

3.03 Administrative escalation is the normal organizational technique for resolving problems and is fairly well defined in most companies. This procedure refers problem cases through the chain of command successively higher until a supervisory level is reached that can resolve the problems on an intra or interdepartmental basis. This type of escalation is effective in dealing with administrative problems but is not always the most effective method of rapidly resolving difficult technical problems.

3.04 Administrative escalation is appropriate and effective in dealing with the following kinds of voice special service problems:

- Basic deficiencies in planned customer service

- Service order deficiencies - Orders late, incomplete, too many supplements, etc
- System design - Physical equipment layout, circuit design deficiencies, normal equipment option assignment, known interface incompatibilities
- Field personnel availability
- Component availability and supply
- Inadequate test equipment - Quantity, quality, availability
- Difficulty in coordinating personnel for end-to-end testing
- Customer training deficiencies.

B. Technical Escalation

3.05 Technical escalation is the direct referral of voice and nondata service problems to VOITEC Support personnel by field force supervisors and subsequent referral by FAST Support personnel to higher levels of technical assistance as required. These technical escalation procedures are intended to supplement existing administrative procedures and standard Bell System Practices by assisting the normal work groups in fulfilling their responsibilities, but not supplanting them.

3.06 There are two levels of VOITEC Technical Support available for assisting field forces on voice and nondata special service problems:

- (1) The first level of technical support is from RFSC or HAL Support personnel. This support is initially by telephone. On-site assistance is provided by the HAL group which serves the customer location.
- (2) Second-level support is through Regional Headquarters to AT&T General Departments, Teletype Corporation, Bell Telephone Laboratories (BTL), WE, or the manufacturer of general trade products.

3.07 Technical escalation of voice and nondata special service problems is appropriate under the following conditions:

- (a) The service meets Bell System specifications, but does not meet the customer's performance expectations.

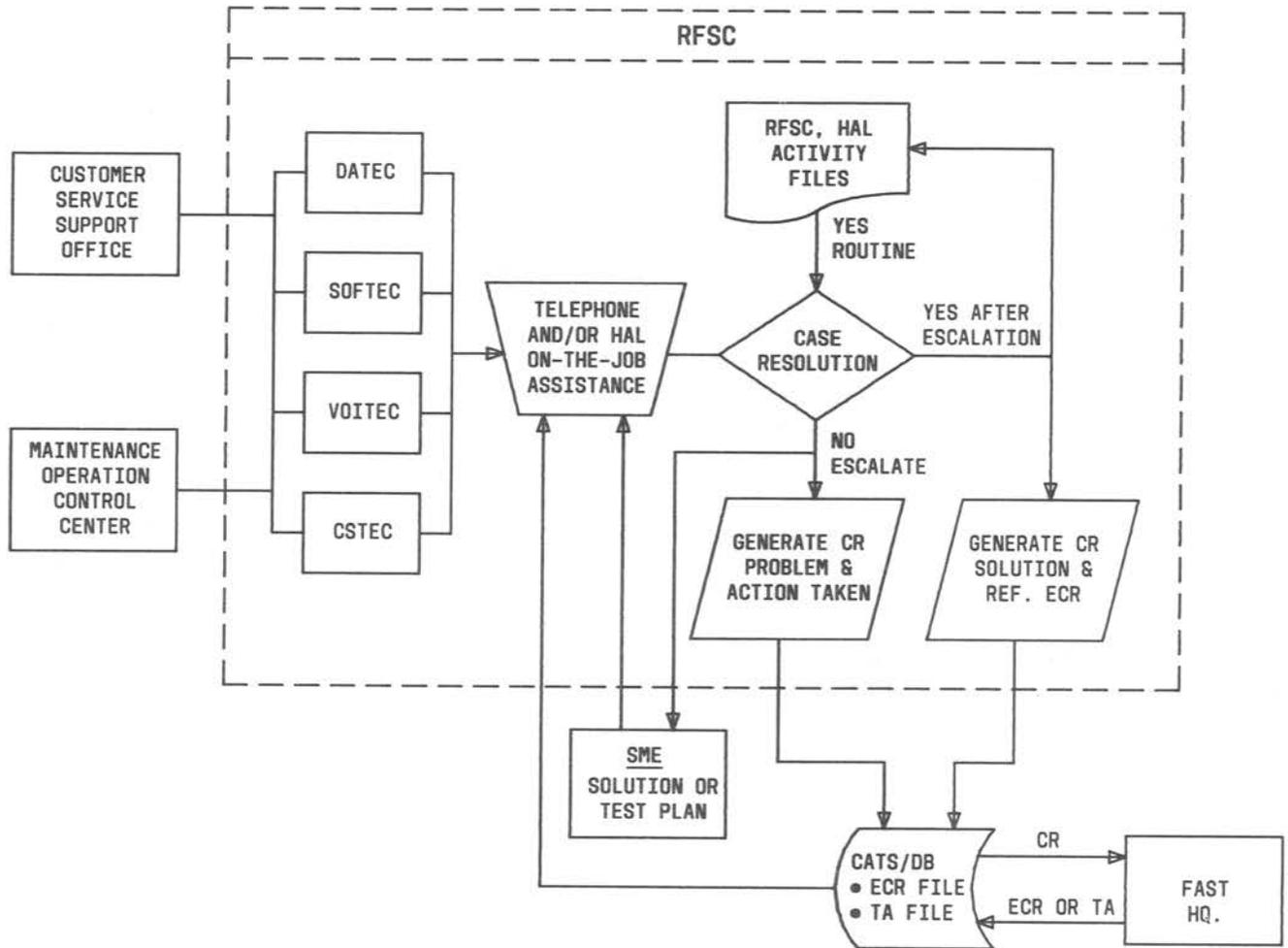


Fig. 1—Flowchart of Escalated Case Report Procedures

4. COORDINATION

4.01 This section discusses some of the coordination aspects involved with the FAST VOITEC Support effort. These coordination procedures are intended to supplement, not replace existing administrative and control office responsibilities and practices by efficiently bringing in the proper VOITEC Support assistance on complex voice and nondata technical problems.

4.02 There must be efficient coordination and cooperation among all the parties concerned with the provision of voice and nondata special services. This applies equally to both intra and interregional relationships. When more than one RFSC or HAL VOITEC Support team is involved in a particular problem, the team that resolves the problem should always provide feedback of the results to the other teams that have assisted.

4.03 *Interdepartmental Coordination:* The successful fulfillment of the FAST VOITEC Support responsibilities depends upon how well the Support personnel in turn are supported by other organizations within the Region. The FAST VOITEC designee must be able to freely contact and work with all other Regional organizations involved with voice and nondata special services and vice versa. The quality of a customer service is of utmost importance and the VOITEC Support personnel recommendations for improvement should be taken in that light.

4.04 *Coordination Between RFSCs:* VOITEC Support groups must coordinate their efforts with other RFSC groups to obtain assistance at work locations outside their Region. Situations arise where a voice or nondata special service problem is escalated at one location resulting from a problem which exists at the far end or where the same service problem is escalated at each location. In these cases, coordination is necessary to clear the problem and restore service to the customer. An example of this type of coordination follows:

Example: A special service voice circuit working as a tie line between two PBXs, one PBX in Region A and the other PBX in Region B, reports trouble. The trouble is escalated to VOITEC Support personnel in RFSC A. Investigation and testing shows the problem source to be in RFSC B. The RFSC A designee would consult with the RFSC B designee and relay test results and conclusions. The RFSC B designee

should confirm the findings and agree to assume the major investigation role for the resolution of the problem. The RFSC A designee will assist as needed and will await feedback from the RFSC B designee as to the solution of the problem.

4.05 There are two general rules for coordination which apply on interregional or interarea situations:

(a) In single escalation cases, the VOITEC Support Team will coordinate the problem investigation until either the case is resolved or until it is mutually agreed that a VOITEC team in another RFSC or HAL can more effectively handle the investigation coordination due to the problem source, main customer location, etc.

(b) In dual escalation cases, the initial reporting RFSC or HAL VOITEC Support team will coordinate the problem investigation with the assistance of the VOITEC team at the other RFSC or HAL until either the case is resolved or the problem cause is indicated to be within the other VOITEC team's territory and they agree to assume coordination.

4.06 *Coordination Between Network Technical Support (NTS) and RFSC:* NTS Field Support personnel must coordinate their efforts with RFSC Support personnel to obtain technical assistance at work locations outside their jurisdiction and vice versa. The coordination guidelines supplement normal control office procedures for difficult voice and nondata service problems.

4.07 The following general guidelines should be used for coordinating VOITEC Support activities involving NTS personnel.

(a) When a switched network voice service problem has been isolated by VOITEC Support personnel to a particular group of Long Lines facilities, the Network Control Office will assume the major investigative role, escalate to its NTS Support personnel, if necessary, and provide feedback of the problem resolution to the VOITEC Support personnel.

(b) When a voice service problem on a circuit involving Long Lines and Bell Operating Company (BOC) facilities is reported to the Control Office and their testing indicates that the problem

source is in a BOC's area of responsibility, escalation proceeds through the BOC NTS Support hierarchy with Long Lines NTS Support assistance, if necessary, until either the problem is resolved or its source is indicated elsewhere and the Long Lines Support personnel assume coordination.

(c) When a voice problem involving Long Lines and BOC facilities is reported to the Control Office and their testing indicates the problem source is in the Long Lines area of responsibility, escalation should proceed through the Long Lines NTS Support hierarchy, with BOC NTS Support assistance, if required, until the problem is resolved or its source is indicated elsewhere and that location's Support team could more efficiently handle coordination.

4.08 Coordination between Bell System and Independent Companies: Due to the traditional close-working relationship with Independent Telephone Companies, the coordination of VOITEC Support efforts on services partially provided by an Independent Company should be handled by the RFSC in whose Region the Independent Company operates. The coordination of voice and nondata special service problem investigations should proceed similar to paragraph 4.05 or paragraph 4.07, depending on the circuit configuration and according to the guidelines of the local Bell Independent Relations department. On some particularly complex service problems, the Independent Company may request or agree to assistance from the Regional VOITEC Support personnel. This also should be handled in accordance with local Bell Independent Relations procedures.

4.09 Two of the voice and nondata special service problems that may arise should be handled as follows:

(a) When a problem develops on a service jointly provided by an Independent Company and a Bell System Region and testing indicates the problem source appears to be in a Bell System location, escalation and coordination of VOITEC Support efforts should be handled by the RFSC in whose Region the problem source is indicated.

(b) When a problem develops on a service jointly provided by an Independent Company and the Bell System Region and testing indicates the problem source appears to be in an Independent Com-

pany location, the local RFSC should handle coordination of VOITEC Support efforts with that Independent Company and agree to provide assistance, if necessary.

4.10 Coordination with Other Common Carriers (OCC): Coordination with OCCs should always be through the Trouble Reporting Control Office (TRCO) as outlined in the current issue of Section 471-200-001.

5. TEST EQUIPMENT

5.01 The complex nature of some voice and nondata communication services demands that the personnel involved with the installation and maintenance of these services be adequately equipped with the proper test equipment. This section provides recommendations for a basic set of test equipment for field use and additional transmission and specialized test equipment for VOITEC Support personnel.

A. Field Force Test Equipment

Basic Test Equipment

5.02 The field forces who install and maintain the special services listed in paragraph 1.08 must be equipped to perform the basic tests outlined in the BSPs on voice and nondata services. These same tests are usually made when a service problem arises for comparison to the most recently recorded test results. The parameters that may be measured are as follows:

- Signal level
- Message circuit noise
- Frequency response
- Loop current.

Note: Sections 660-215-500 and 311-100-501 list the tests and equipment needed to perform these tests and should prove helpful.

Accessible Test Equipment

5.03 Situations may arise during installation or maintenance testing of a particular type of service in which more than the basic tests have to be made. This could be true of the more complex voice

circuits. Test equipment that should be available to the field forces may be provided by the VOITEC Support group.

B. VOITEC Support Test Equipment

5.04 The test equipment needs of the HAL and RFSC VOITEC Support personnel falls into three categories as follows:

- Transmission test equipment
- Terminal test equipment
- Special test equipment.

Recommendations regarding particular types of test equipment will be made by System Letter and updated as required.

5.05 The equipment recommended in these categories could be used by one or more VOITEC Support groups, depending upon the size of the area, the number of special services within an area, and the need for support. The recommendations are designed to equip the support groups with adequate equipment usable on a wide variety of voice services. The equipment should be assigned to the VOITEC Support groups for use by themselves or in particular situations by the field forces.

Transmission Test Equipment

5.06 The transmission test equipment required for VOITEC Support groups is for testing voice circuits in carrier systems and/or metallic facilities to ensure compliance with overall circuit requirements. It gives VOITEC Support personnel the capability of testing the following transmission parameters:

- Loss
- Noise
- Frequency response
- Return loss
- Singing point margin
- Local channel impedance characteristics.

Terminal Test Equipment

5.07 It is often necessary to ensure that customer terminal equipment is interacting properly with the transmission facility or network switching equipment. The following types of tests are used at the demarcation point between our facilities and Bell System PBXs, Customer Provided Equipment (CPE) PBXs, or OCC facilities to test for proper operation of the circuit:

- Terminal or facility simulation tests
- Signaling tests.

Special Test Equipment

5.08 Occasionally, voice service problems will develop where standard tests will not uncover the source of the problem. Some special test equipment is necessary in these instances to provide the capability of duplicating the problem in a controlled environment. When this is done, the test facility should include the following:

- Artificial line
- Amplifier mountings with all available gain units
- Signaling mountings with all available signaling units
- Test extenders for amplifiers and signaling units
- Other acceptable standardized test equipment as required.

5.09 The special test equipment would be used on a small percentage of voice service problems and serves as a last resort when standard tests have not isolated the problem. The special test equipment should be obtained primarily for the VOITEC Support group's use, but it may be made available to other knowledgeable personnel when difficult voice problems arise.