PERFORMANCE REQUIREMENTS
NO. 2 ESS
ARRANGED WITH 2-WIRE FEATURES
GENERAL EQUIPMENT REQUIREMENTS
ELECTRONIC SWITCHING SYSTEMS

1. GENERAL

1.01 This section covers the performance requirements for No. 2 ESS offices arranged with 2-wire features. Installation tests shall be applied in accordance with Western Electric Handbook sections for this system.

1.02 This section is reissued to include changes in volume tests, the simulated commercial power failure test, computing and summarizing test results, and modifications and additions.

1.03 Reference shall be made to Section 800-630-180 covering general performance requirements for special information necessary to the proper application of the requirements listed herein. Also, refer to the proper section for requirements covering any of the individual circuits.

1.04 All circuits or functions not specifically covered by these requirements shall be correctly wired and shall operate in accordance with their respective circuit descriptions.

1.05 All programs applicable to the office not specifically covered by these requirements shall perform in accordance with their program descriptions for successful operation of each individual hardware-software interface.

1.06 An installation shall not be turned over to a telephone company unless all requirements of this section are met. These requirements may be waived or modified only with the concurrence of the WE area manager, the operating company district engineer, and the quality assurance center of BTL.

1.07 The No. 2 ESS equipment provided in a No. 2A ESS office shall meet the performance requirements outlined herein. All toll, common systems, power, and building environment equipment provided and installed by WE in a No. 2A ESS office shall function as specified in their individual performance requirements. Installation tests shall be applied in accordance with the applicable Western Electric Handbook sections.

2. DEFINITIONS

2.01 ***Functions:*** The functions are listed in the circuit description for a particular circuit.

2.02 ***Circuit Operation Tests:*** These tests verify the operation of the circuit or circuits on a frame and associated functions which cannot be tested by a single call. Where program means are available, they may be used in lieu of, or in addition to, other WE test equipment.

2.03 ***System Verification Tests:*** These tests verify the proper functioning of the hardware-software interfaces and prepare the office for subsequent tests.

2.04 ***Volume Tests:*** These tests detect trouble conditions that result when the traffic conditions are simulated by originating a large number of requests for service from lines, trunks, and other devices capable of input to the system.

2.05 ***Synchronization:*** Synchronization, when defining a state of the control complex, means that both processors are in step, executing the same sequence of instructions. Both input/output (I/O) units receive identical data from the peripheral

system and both call stores contain identical information. Only the active I/O unit is allowed to access the peripheral units. In addition, the maintenance center matches the information being written into the call stores.

3. CIRCUIT OPERATION TESTS

3.01 These tests are applied to check circuit functions that cannot be tested by a single call. Troubles disclosed shall be cleared as found and the circuit verified by a repeat test. These tests shall be applied and verified prior to the volume tests.

3.02 ***Unassigned Circuits:*** It is not necessary to test those circuit features which require installation of temporary cross-connections and/or associated translations. However, when a circuit is located on a frame, all cabled leads shall be verified.

3.03 Where program means are available to check the following circuits, they may be used in lieu of, or in addition to, other test equipment. Various tests may be combined into one operation provided the individual requirements are observed.

(a) Central Processor: Check all functions of each central processor. In performing these tests, use each order and its associated options at least once.

(b) Program Stores: Check all functions of each program store.

(c) Supplementary Call Store (where required): Check all functions of the supplementary call store, including its ability to communicate properly with its associated central processor.

(d) Six-Volt Converter: Check all functions of the 6-volt converter.

(e) Maintenance Center: Check all functions of the maintenance center, applicable to the office under test, including all office alarms.

(f) Peripheral System: Check all functions of the peripheral system including access to and from each peripheral frame via its associated buses from each processor.

(g) Emergency AC Power: Check that all equipment associated with the reserve ac power generator continues to function properly when commercial ac power is disconnected. Check that the circuits requiring protected ac power are properly connected to the protected reserve ac generator.

4. SYSTEM VERIFICATION TESTS

4.01 Verify hardware-software interfaces of the system program applicable to the office under test and for which translations and hardware were ordered by the operating company and installed by WE.

4.02 Among the program features that shall be verified are the following:

(a) Fault Recognition, Diagnosis, and Demand Exercises: Verify that the system is capable of performing and passing diagnostics on all units. If faults are detected, verify that the system response is correct. The performance of all demand exercises shall be verified by checking that the ability to initiate and execute the demand routine exercises via teletypewriter (TTY) or automatic initiated requests (eg, long term periodic exercise) is provided.

(b) Call Handling Program:

(1) Verify the compatibility of the hardware and the program to recognize requests for service and to process calls originated from each line and/or trunk switch frame.

(2) Verify that calls can be terminated in each line and/or trunk switch frame.

(c) Service Features: Verify all service hardware-software interfaces peculiar to the office under test and for which translations and hardware were provided and hardware was installed.

(d) Office Alarm TTY Output Verification: Verify the TTY output messages associated with the office alarms.

(e) Tests of Emergency Action Facilities: Verify the ability of the emergency action circuitry and its hardware-software interface to function as designed.

(f) Trunk and Service Circuit Tests: Diagnose all trunk and service circuits for which diagnostic programs are available. Test all of the trunks and service circuits for which there are no diagnostics available.

(g) Trunk Test Panel Verification: Verify the interfaces of the trunk test panel with the program, and all of the supplementary trunk test panels, where provided.

(h) Maintenance Center Tests: Verify the compatibility between the program, the maintenance center lamps, switches, and features.

(i) Service Order and Recent Change Tests: Verify the service order and recent change hardware-software interface associated with the maintenance and service order TTYs, if provided, proving that the translations can be updated.

(j) Single Card Writer Verification: Verify the proper functioning of the single card writer.

(k) Automatic Line Insulation Test Verification: Verify the automatic line insulation test functions.

(l) Plant and Traffic Measurement Tests: Verify the ability to make changes in the timetable or traffic schedules via the traffic TTY. Verify the ability to score plant and traffic registers.

(m) Cutover Features Verification: Verify the cutover features for offices where the cutover program is to be used.

(n) System Initialization and Program Interrupt Control Facilities: Verify that the hardware-software interface on system interrupts operates as designed.

(o) Translation Verification: Verify translation information necessary to test equipment installed by WE. Verify those translations required for trunks and service circuits and selected test lines.

(p) Automatic Messge Accounting (AMA) Verification: Verify that proper billing information entries are being made on the AMA tape.

5. VOLUME TESTS

5.01 These tests check the ability of the office to perform as an active central office, and therefore, they must be run within 2 weeks of turnover. The tests must be run on the generic program issue that will be used for cutover and with translation modules necessary for program compatibility. All hardware CNs required for the program issue being used must be installed prior to the tests. The telephone company must be notified at least 12 hours prior to the start of the test. Each control unit shall be active for approximately half the required test interval running in synchronism with the standby control unit.

5.02 ***Idle System Test:*** With no traffic, test the ability of the control complex to stay in synchronization. This test shall run for 8 continuous hours without circuit failure, major alarms, or loss of synchronization. During this 8-hour period, 24-hour periodic exercises and hourly routines shall be performed. All detection tests and all TTYs will be active during this period; all maintenance printouts that occur must be investigated and accounted for; all troubles must be cleared. If the control complex loses synchronization or circuit failure occurs in the periphery, the trouble printout should be examined, the proper action taken, and the idle system test repeated.

5.03 ***Standard Volume Tests:*** These tests simulate actual traffic and have the objective of providing an efficient method of revealing hardware and wiring faults and translation errors. The simulated traffic shall resemble the real customer traffic as nearly as possible. The number of mishandled calls (eg, calls left high and dry, calls wrongly routed) should not exceed 1 in 10,000. The allowable troubles, which indicate some malfunction but do not definitely indicate a failure to complete, shall not exceed 5 in 10,000 calls. The integrated volume tests shall run for a continuous 24-hour period during which the number of call trouble printouts cannot exceed these performance requirements and the control complex shall not lose synchronization. No major alarms are permitted. The system ability to process the offered volume, when a fault is placed in any unit and the affected unit is removed from service with automatic diagnostics being performed, shall be verified.

5.04 ***Engineering Busy-Hour Load Test:*** Verify that the system will handle the engineered

busy-hour load for offices of unprecedented size or type and where agreement has been reached between the BTL and WE PECC that such action is necessary.

6. SIMULATED COMMERCIAL POWER FAILURE TEST

6.01 This test shall be conducted under voltage and temperature conditions that simulate the occurrence of a commercial power failure. It shall be performed prior to the integrated volume test but with the same load conditions. The system shall meet the same criteria as required under normal voltage and temperature conditions.

6.02 This test consists of turning off the air cooling and circulation equipment serving the office. If this equipment is common to systems other than the one being tested, then the air circulation vents in the office under test must be blocked. The use of auxiliary heating and/or temporary construction to physically isolate the office from other active offices may be used at the option of the telephone company with the telephone company bearing the additional cost. This test must run for a period of 4 hours. If at any time during the test the aisle ambient temperature (measured 5 feet above the floor along the aisle center line) reaches the No. 2 ESS limit of 120°F, the office shall be cooled sufficiently to prevent exceeding the 120°F limit. The test shall, in any case, continue. If this occurs, the total time period of 4 hours of testing must be met.

6.03 The reduced voltage part of the test must cover a period of at least 2 hours. The voltage at the +24 volt distribution bus of power distributing (PD) frames shall be less than 23.5 volts for the test period. At the −48 volt distribution bus of PD, the voltage shall be less than −47 volts. At no time shall the voltage be allowed to drop below the ESS emergency limits of +21.75 and −43.75 volts as measured at the PD frames. WE shall be responsible for recharging the batteries after the low-voltage tests are completed.

6.04 The test shall verify that all duplicated subsystems are capable of operating properly when any one of the duplicated units is removed from service. Each control unit will be on-line one-half of the time.

6.05 The test shall also demonstrate the ability of the system to recover from a stable and recent clear initialization at a time when the voltages are as near as practicable to the ESS lower limits.

7. COMPUTING AND SUMMARIZING TEST RESULTS

7.01 At the conclusion of testing, the results shall be recorded and it shall be determined that the performance requirements have been met. The failure of any test according to the criteria for that test requires that the test be restarted from the beginning. The telephone company must be notified at least 4 hours prior to restart time. All associated plant and traffic measurements and TTY printouts during the volume tests shall be analyzed and preserved for any further review.

7.02 At the conclusion of the tests, the test results shall be reviewed with the operating company representative. The telephone company must keep all associated plant and traffic measurements and TTY printouts and test results produced by the volume tests for a period of time of 30 days after cutover of that office.

8. MODIFICATIONS AND ADDITIONS

8.01 Prior to the start of installation of an addition, WE shall submit to the operating company representative a method of procedure for installation and test of the circuits and/or programs used to modify an office or to add to it.

8.02 All circuits and programs shall meet the requirements specified in 2. and 3.

8.03 When circuits and/or programs are modified, operation tests shall be applied to ensure satisfactory operation of all functions affected by the modification.

8.04 If the addition and/or modification is extensive enough to include a shutdown of the office, then the office must be treated as a new office and must pass all the tests of this section.