

**OFFICE RESPONSIBILITIES  
AND OPERATING PROCEDURES  
FOR CIRCUITS ASSOCIATED WITH CPE  
TELETYPEWRITER SWITCHING SYSTEMS**

<b>CONTENTS</b>	<b>PAGE</b>	<b>CONTENTS</b>	<b>PAGE</b>
1. GENERAL . . . . .	1	A. 81D1 (Simplified) Equipped Circuits . . . . .	13
2. TYPE OF CPE SWITCHERS . . . . .	1	B. 83B Equipped Circuits . . . . .	13
3. TYPES OF FACILITIES AND STATION ARRANGEMENTS . . . . .	2	14. PATCHING CIRCUITS FOR REASONS OTHER THAN TROUBLE . . . . .	14
4. STANDARD TELCO INTERFACE SPECIFICATIONS . . . . .	3	15. ASSOCIATED SECTIONS . . . . .	14
5. INTERFACE QUESTIONNAIRE . . . . .	3		
6. TESTROOM TESTING APPARATUS . . . . .	4	1. GENERAL	
7. ORGANIZING TO ESTABLISH A NEW SERVICE . . . . .	4	1.01 This section outlines office responsibilities and testroom operating procedures required in connection with the installation and maintenance of teletypewriter and low-speed data circuits associated with customer provided teletypewriter and data switching systems.	
8. CONTROL AND SERVING TESTROOM RESPONSIBILITIES . . . . .	5	1.02 The objective of this section is to provide information and procedures common to a number of different systems. Separate sections cover features, formats, and procedures that are specific to certain systems or individual customers.	
9. MAINTAINING SERVICES ON A DAY-TO-DAY BASIS . . . . .	5	1.03 The expression Customer Owned and Maintained (COAM) no longer applies. Customer Provided Equipment (CPE) or Customer Provided Terminal (CPT) are the new terminologies replacing COAM.	
10. HANDLING TROUBLE REPORTS . . . . .	5	2. TYPES OF CPE SWITCHERS	
11. TESTROOM PROCEDURES FOR CLEARING STATION TROUBLE . . . . .	6	2.01 Following is a list of some of the CPE switchers in service as of August 1, 1966, or planned for the future.	
A. 81D1 (Simplified) Equipped Outlying Stations . . . . .	6		
B. 83B Equipped Outlying Stations . . . . .	9		
12. RELEASE AND REMOVAL OF STATION FOR ROUTINE MAINTENANCE . . . . .	12		
13. TESTS FOLLOWING ROUTINE MAINTENANCE . . . . .	13		

**SECTION 312-011-501**

COMPANY	SWITCHER DESIGNATION
Remington Rand	UNIVAC 418
	“ 490
	“ 494
	“ 501
International Business Machines	IBM 360
	“ 7740
	“ 7750
Collins Radio Company	Collins C-8400
Minneapolis Honeywell	H-200
International Telephone & Telegraph Company	ADX-7300
General Electric Company	G. E. Data Net 30
Radio Corporation of America	RCA 301
	“ 3301
	“ 4103
	“ Spectra 70 Series
Philco Radio Corporation	PCP 150
Control Data Corporation	C-3200
	-8050

**2.02** The above list is not intended to be complete, but rather to indicate some of the types of systems to which this practice applies. New systems are constantly being developed and marketed. No attempt will be made to revise the above list as new systems go into service.

**3. TYPES OF FACILITIES AND STATION ARRANGEMENTS**

**3.01** Facilities available to customers having requirements for interconnecting stations to CPE switchers are included in the Inter-City Services manual and existing tariffs.

**3.02** Following is a list of the commonly provided TELCO station arrangements associated with CPE switchers:

- (a) 81-D-1 (Electronic, SOTUS and Simplified Station Control)
- (b) 83-B-1, 2, and 3 Selective Calling Systems

(c) 8-A-1 and 8-B-1 modified and standard Selective Calling Systems

(d) 1A and 1B Selective Calling Systems

(e) 85 and 86 Selective Calling Systems

**3.03** The 28-, 35-, and 37-type teletypewriter equipment is used or is contemplated on new systems.

**3.04** In some cases, the TELCO will furnish only the facilities that connect a CPE switcher to outlying stations. An example of this is where an IBM 1448 computer is provided as a switcher for stations equipped with IBM 1050 card punch units.

**3.05** Both full and half duplex circuit arrangements may be used for interconnection to a processor. Several variations of each arrangement are described as follows.

(a) **Half Duplex Circuit Arrangements**—Three applications of the conventional half duplex (equipped with 28ASRs and 83B or equivalent type outlying station control), nonsimultaneous, 2-way transmission circuit may be used.

(1) Intercircuit communication, transmitting through the processor both online and inter-line from the processor. This is the most widely used circuit arrangement.

(2) Transmission by an outlying station is directed into the processor only. In this application, the only transmissions to the line from the processor are processor generated instructions to the originator.

(3) Circuit on which the terminating equipment consists of 28RO page monitors and 83B (or equivalent) type of outlying station control unit. In this application, the line is used for outlying station receiving, transmission to the processor being limited to characters generated by the outlying station control unit.

**Note:** Either application described in 3.05(a), (2), and (3) above may be used, regardless of whether the other is present (or absent) in any quantity. For example, a line providing message input into the processor may be operated, although no output to that line from

the processor is provided. The term double half duplex has been coined to describe the use of both arrangements, when used together to provide full duplex circuit capabilities.

(b) **Full Duplex Circuit Arrangements**—Three applications of the conventional full duplex circuit may be used.

(1) Use of a simplified SOTUS unit on both multistation and single station lines. Circuit assurance, in that either traffic or a no-traffic response is transmitted to the processor, after initiation of the polling cycle, is provided.

(2) Use of an 81D1-type SOTUS unit on both multistation and single station lines. This provides the same features as the simplified SOTUS application, the primary difference being the cost of the control unit.

(3) The third application is a single station send and/or receive arrangement without polling or circuit assurance features. The processor has no control over its input circuit and no CDC is used to activate the receiver.

#### 4. STANDARD TELCO INTERFACE SPECIFICATIONS

**4.01** Standard interface specifications describing certain grades of facilities have been issued as system standard information. There are three interface specifications covering telegraph channels. They are as follows:

- (a) 30-Baud Private Line Channels, December, 1967.
- (b) 45, 55, 75, Baud Private Line Channels, December, 1967.
- (c) 150 Baud Private Line Channels, February, 1968.

These are now available as appendices 1, 2, and 3, respectively, to Section 312-011-101.

**4.02** The above specifications define the interface between each channel and a CPE. In addition, they define the power requirements and environment limitations for TELCO transmission equipment located on customer premises. They also define signal distortion and channel turn-around-time.

**4.03** For the benefit of customers and outside manufacturers not familiar with TELCO equipment and transmission capabilities, ideal and distorted five-level telegraph start-stop signals are described as well as the distortion that will be tolerated by TELCO and the limits that a customer will be expected to tolerate at the line of demarcation.

**4.04** The purpose of these specifications is to provide a complete and accurate source of information from which outside suppliers can develop their business machine interface requirements.

**4.05** It is planned to issue interface specifications to cover the following TELCO equipment:

- (a) 8A1 Data Selective Calling System (Half Duplex)
- (b) 8B1 Data Selective Calling System (Full Duplex)
- (c) 83-B-3 Selective Calling System (Serial and Parallel interface with business machines)

#### 5. INTERFACE QUESTIONNAIRE

**5.01** TELCO personnel and providers of business machine or switching equipment both need to have a good knowledge of the interface requirements of each other's facilities and equipment. Interface specifications provide this information. Where standard specifications are not available on either TELCO or CPE equipment, some other means must be used to provide it. Bell System Practices, customer's brochures, etc., will generally include sufficient information, but because it is not organized for this function, it is difficult to use without overlooking some items.

**5.02** Section 010-520-112 "Intercompany Services Coordination Plan," includes a questionnaire to ensure against overlooking certain items where customers do not provide interface specifications. It is used as a system service order worksheet.

**5.03** This questionnaire is to be completed by the ISC Control team, with the help of the customer or his supplier, at the time that an SSO work sheet is prepared for the service. Copies of the completed questionnaire will be forwarded to all plant offices involved.

## SECTION 312-011-501

**5.04** The Service Engineer in the controlling area will excerpt information from the questionnaire for transmittal to the plant offices involved in the form of an engineering supplement. Such information will include:

- (a) Code formats (Questionnaire Sect. H.1.)
- (b) Essence of interface characteristics (Questionnaire Sect. G.1.)

### 6. TESTROOM TESTING APPARATUS

**6.01** The type of distortion generating and measuring equipment that should be available for maintaining a specific service may be determined by the following guides and the use of judgement based on the facts at hand.

- (a) The number of services, of a similar baud rate and level, in the office.
- (b) The potential of trouble reports requiring the use of such equipment.
- (c) The type of test equipment now available.
- (d) Whether plans already made for providing test equipment will be adequate or not.

**6.02** Separate sections outline the types and description of test equipment available for maintaining specific services. The latest testroom version of the 911 Data Test Set is covered in Section 103-813-100. The test set has been redesigned for testroom installation and application. The sections that will describe this equipment are:

- (a) 103-813-102 911 E DISTORTION MEASURING SET
- (b) 103-813-103 911 F DISTORTION MEASURING SET
- (c) 103-813-104 911 G TEST SENTENCE GENERATOR
- (d) 103-813-105 911 J DATA SIGNAL DISTORTION SET

**6.03** It is the joint responsibility of the Plant and Engineering member of the ISC Project Team to determine test apparatus requirements. The engineer should forward these requirements

to the appropriate Plant Extension or Plant Design Engineering Group, with the objective of providing the necessary test equipment to start and maintain the service ordered.

### 7. ORGANIZING TO ESTABLISH A NEW SERVICE

**7.01** The ISC plan was developed to improve preservice coordination and cooperation in establishing new services. To ensure that all the steps necessary are taken in the proper time sequence, it is imperative that all concerned adhere closely to this plan.

**7.02** The following is a partial list of the many items that need to be investigated and followed through by the ISC team:

- (a) Ensure that interface specifications or equivalent information is available to the customer.
- (b) Arrange for a description of the service and distribute it to those requiring it.
- (c) Establish plant test, customer training, and service dates that are realistic and meet the requirements of all concerned.
- (d) Ensure that CPE and TELCO equipment and facilities are compatible.
- (e) Specify tests that will confirm compatibility.
- (f) Determine how this service differs from those already being handled at both the control office and the STCs involved.
- (g) Determine what test equipment is required to adequately maintain the service.

**Note:** Following are some of the items that should be considered:

- (1) Transmission measuring equipment
- (2) Signal generation equipment
- (3) Monitoring equipment
- (4) Selective calling test sets
- (5) Polling response failure equipment

- (6) Data quality monitoring equipment
  - (7) Telegraph Carrier Test Sets
  - (8) Trouble print-out monitoring apparatus
  - (9) Telegraph signal analysis center
  - (10) Brush recorder apparatus
- (h) Determine whether the STCs involved have sufficient information to determine their testing requirements.
  - (i) Determine how customer trouble reports are to be handled.
  - (j) Determine whether the customer has been given explicit instructions for reporting trouble and all testrooms involved made aware of these procedures.
  - (k) Determine whether the customer has adequate means for advising outlying stations of failures of the centralized switcher.

#### **8. CONTROL AND SERVING TESTROOM RESPONSIBILITIES**

- 8.01** Section 660-202-010 outlines control office responsibilities.
- 8.02** Section 660-207-010 outlines the action to be taken by control offices and STCs in administering customer priorities during abnormal service conditions.
- 8.03** Section 581-100-502 specifies the preservice testing procedure for the 83B type teletypewriter switching systems.

The above preservice testing section was prepared on the basis of TELCO providing the centralized switcher. However, tests should be made on the assumption that the customer or his supplier will perform similar tests on the centralized switcher.

- 8.04** The completion of the customer tests on the switcher should be coordinated with the TELCO individual circuit and overall system tests in a manner that will ensure compatibility between the switcher and TELCO facilities.

#### **9. MAINTAINING SERVICES ON A DAY-TO-DAY BASIS**

**9.01** The primary objective in starting a new service should be to ensure complete compatibility between the TELCO facilities and equipment and the CPE equipment. This can only be done by carefully planning each stage of the project prior to the service date. Adequate overall system tests verify the adequacy of such planning and indicate the probable reliability of the system.

**9.02** Prior to the actual service date, plans should be formulated for maintenance of the system on a day-to-day basis. Such plans should include:

- (a) Means of determining when chronic cases of trouble are present
- (b) The method to be used to analyze all trouble cases being experienced
- (c) Meetings with the customer or his representative to ensure that the analysis methods are effective
- (d) Methods of keeping close liaison between the control office and STCs.

#### **10. HANDLING TROUBLE REPORTS**

**10.01** Because of the manner of interconnection of Bell System facilities with CPE through interface arrangements at processor locations, it is essential that a uniform system of trouble reporting and restoration be implemented. It will be necessary to isolate troubles at processor locations to either Bell System facilities and/or equipment, or to the customer's processor equipment.

**10.02** Outlying stations will report all cases of trouble directly to their STCs. Local STC telephone numbers should be adequately posted at each outlying point.

**10.03** If a trouble condition on a loop or at a station cannot be immediately cleared (and the trouble condition is affecting service adversely), the STC should remove the loop(s) from the main circuit and notify personnel at the control office, who shall in turn notify personnel at the serving processor location.

## SECTION 312-011-501

**10.04** STCs should keep the reporting station advised of restoration progress on extended outages involving TELCO facilities or equipment troubles.

**10.05** All STCs should be familiar with message formats as an aid in handling circuit troubles involving message contents.

**10.06** Loop switchboards are generally provided on full duplex or multiloop outlying stations to facilitate trouble locating procedures. Means for effectively isolating circuit troubles (either loop switchboards or their equivalent) should be provided at all processor locations. TELCO is responsible for making sufficient tests to determine in which direction from the interface the source of trouble lies.

**10.07** The DQM-8- Data Quality Monitor as covered in Section 103-819-100 or SCI-6 Signal Condition Indicator, should prove useful at some processor locations in assisting testrooms in the isolation of circuit troubles. At large processors serving many circuits, it may not be practical to request assistance from the customer in reading the indications. They may, however be more appropriate as a maintenance help at individual stations. Quality monitors or signal condition indicators should generally be provided in the following situations:

- (a) Where the customer loop includes 128, 130, or other types of subsets
- (b) Where the customer loop includes 43-type carrier terminal equipment in an outlying central office, which may at times be unattended or is not a telegraph testroom.

Reference may be made to the section covering the applicable monitor for information on distortion threshold settings.

**10.08** Circuit polling devices may originate either in processor equipment or from a control station at an outlying point. It appears that circuit layout card information best directs testroom forces to the proper location of circuit polling equipment.

**10.09** Testroom procedures for reporting and clearing troubles are outlined in Charts 1, 2, and 3. These charts do not cover all of the situations that may evolve from a trouble report

and are in no sense a substitute for knowledge of the circuit and judgement in clearing cases of trouble, but they may be used as a ready reference.

## 11. TESTROOM PROCEDURES FOR CLEARING STATION TROUBLE

### A. 81D1 (Simplified) Equipped Outlying Stations

**11.01** Before any station is removed from the circuit for investigation of a trouble report, various appropriate tests outlined in Charts 1, 2, and 3 should be made. If a station trouble is indicated, proceed as outlined below.

### 11.02 *Release and Removal of Station from Service:*

(a) If the nature of the trouble is such that it is interfering seriously with handling business, notify the customer that it is necessary to remove his station from the circuit. Notify the control office to have the processor location arrange to have traffic intercepted and/or polling stopped for all machines served by the affected station control unit. If the trouble is not seriously affecting traffic but requires the removal of the station for test, notify the customer that his station will be taken off the circuit as soon as convenient. Request the control office to have the processor location intercept traffic and/or suspend polling to all machines served by the affected station control unit as soon as traffic is cleared.

(b) When the control office advises that a station may be removed from the circuit, have the customer remove any tape from the transmitter of the sending teletypewriter. If the customer's send and/or receive loops can be removed without interrupting the main circuit, do so and terminate the loop(s) in a test circuit. If removal of the loop(s) will cause interruption to the main circuit, request the control office to have transmission stopped until proper termination can be accomplished. Loop(s) should be terminated so as to include any loop repeaters in the portion of the served drop to be tested. On TLT circuits, compensating resistances should be added to the main circuit to replace any removed loops and/or repeaters.

**11.03 Transmission Troubles:**

- (a) Obtain a release and remove the station from the circuit as covered in 11.02.
- (b) Using a signal generator, test tape, or position monitor keyboard, send the proper CDC or TSC to select the machine to be tested.
- (c) Make transmission tests in the usual manner. Test limits can be found in Section 312-009-100.
- (d) If station trouble is indicated, send a telephone employee to repair it, advising him of the results of the tests.
- (e) If service can be furnished on a limited basis while the telephone employee is enroute and, if the customer so desires, notify the control office and restore the station to the circuit as covered in 11.06. When the telephone employee arrives and the station must again be removed, obtain a release as covered in 11.02.
- (f) When station repairs have been completed, make sufficient tests to verify that the trouble has been cleared.
- (g) When all test requirements have been met, have the telephone employee see that no tape remains in the transmitter, that all switches are normal, and that no alarms are indicated. Restore the station to service as covered in 11.06.

**11.04 Switching Function Troubles (Transmitting):**

- (a) Obtain a release and terminate as covered in 11.02.
- (b) Have the customer prepare a test tape and place it in the transmitter of the sending teletypewriter. Operate the priority key if test is to include a priority start pattern.
- (c) Patch the output of the transmitter start test circuit or a signal generator into the test circuit to which the customer's receive loop is connected. Make certain that the station receives the same type of signals it receives normally from the circuit. With the position monitor teletypewriter, send FIGS H LTRS to

make certain the station controller is in an activated condition.

- (d) Patch a position monitoring teletypewriter to the test circuit in which the customer's send loop is connected.
- (e) Using the transmitter start test circuit or a signal generator, send the proper TSC test tape to the station. If the test circuit is used, insert the proper tape so that the BLANK in the TSC is over the sensing pins. Operate the D key on the test circuit panel to condition the test circuit for 81D1 application. Momentary operation of the A1 key at the test position (or the A key on the test equipment panel) causes one complete TSC to be transmitted. The test tape at the station should be picked up and received at the testroom on the customer's send loop.
- (f) Remove the tape from the station transmitter. Send the proper TSC for the station and observe that the "H" response is received at the testroom on the customer's send loop.
- (g) If the transmitter starts and stops properly on several repeated attempts, consider the possibility of circuit trouble, equipment trouble at the processor location, or a came clear condition.
- (h) If the transmitter fails to start and stop properly, send a telephone employee to the station, notifying him of test results.
- (i) If the customer desires some degree of service while the telephone employee is enroute, notify the control office and restore the loop(s) to the circuit as covered in 11.06.
- (j) When the telephone employee reaches the station, he will request such tests from the STC as may be required. Trouble may be caused by any of the following:
  - (1) Poor transmission—This may have been evident if tests under 11.03 were made.
  - (2) Apparatus or control circuit trouble—The station control unit tolerance may be checked by sending the RY test signal. Always send FIGS H LTRS to activate the control unit before sending RYs.

(k) After the trouble has been cleared, make sufficient tests to verify that both send and receive sides of the station operate properly. Restore the station to the circuit as covered in 11.06. Monitor both the send and receive sides until a satisfactory transmission has been observed on the circuit.

**11.05 Switching Function Troubles (Receiving):**

(a) Obtain a release and terminate the customer's send and receive loops as covered in 11.02.

(b) Patch the output of the transmitter start test circuit or a signal generator to the customer's receive loop of the station to be tested. Make certain that the station receives the same type of signals it normally receives from the circuit. Send one or more of the following tests as required, using the proper format. If the transmitter start test circuit is used, the D key should be straight out (TD free-running-starting and stopping it from the testboard position).

(c) To test for failure to connect, disconnect, or deactivate, or for errors or extraneous characters at the beginning of a message, send a test tape similar to that shown on Chart 4. This contains a test for connect and disconnect on both false and valid codes. If this test is used, a station in satisfactory condition would print:

A

ALARM

B

C

D

E

F

These characters should appear along the left hand margin only. If the station should connect on an invalid code, one of the numerals at the beginning of the test would appear (1, 2, 3, etc.). If one of the letter test characters fails

to appear, there is evidence of a failure to connect on a valid code.

(d) To test for failure to blind a receiving machine during a transmitter start pattern or for errors or extraneous characters occurring at the time, send transmitter start patterns to the station while it is connected. Nothing should print on the receive machine. Send LTRS LTRS to make sure that the machine unblinds.

(e) It will be necessary to prepare special test formats for any tests other than those outlined above. Supplemental tests may be sent by keyboard from a position monitoring teletypewriter. However, in most cases where the foregoing tests will not suffice, it will probably be desirable to dispatch a telephone employee to the station before making special tests.

(f) If the station apparatus does not function properly on any one of the foregoing tests, send a telephone employee to the station, notifying him of the test results.

(g) If the customer desires some degree of service while the telephone employee is enroute, notify the control office and restore the loop(s) to the circuit as covered in 11.06.

(h) When the telephone employee reaches the station, he will request such tests from the STC as may be required. Trouble may be caused by any of the following:

(1) Poor transmission—This may have been evident if tests under 11.03 were made.

(2) Apparatus or control circuit trouble—The station control unit tolerance may be checked by sending the RY test signal. Always send FIGS H LTRS to activate the control unit before sending RYs.

(i) After the trouble has been cleared, make sufficient tests to verify that both send and receive sides of the station operate properly. Restore the station to the circuit as covered in 11.06. Monitor both the send and receive sides until satisfactory transmission has been observed on the circuit.

**11.06 Restoring a Station to Service:**

- (a) Place the SOTUS or station control unit in the activate condition by transmitting FIGS H LTRS from a position monitor teletypewriter. Restore the customer's send and receive loops to the circuit. Remove any compensating resistances used. If practicable, wait for the A side of the circuit to go idle before restoring the receive loop, to avoid picking up a partial message.
- (b) Notify the circuit control office that the trouble has been cleared (or cleared out) and the station has been restored to the circuit.
- (c) Notify the local customer that his station has been restored to service and to discard any extraneous copy he may have received on the RO. If the station has no tape to transmit, have the customer prepare a short test message addressed to his own station and insert it in the transmitter so that the testboard may observe the start of transmission.

**B. 83B Equipped Outlying Stations**

**11.07** Before any station is removed from the circuit to investigate a trouble report, various appropriate tests outlined in Charts 1, 2, and 3 should be made. If a station trouble is indicated, proceed as outlined below.

**11.08 Release and Removal of Station from Service:**

- (a) If the nature of the trouble is such that it is interfering seriously with handling business, notify the customer that it is necessary to remove his station from the circuit. Notify personnel at the control office, who should in turn advise personnel at the processor location. If means are provided at the processor location to have traffic intercepted and/or polling suspended to the station, the processor location should do so immediately. If the trouble is not seriously interfering with traffic but requires removal of the station for test, notify the customer that his station will be taken off the circuit as soon as convenient. Request the control office to have the processor location intercept traffic and/or suspend polling to the station as soon as traffic is cleared.

- (b) When the control office advises that the station may be removed from the circuit, have the customer remove any tape from the transmitter. If the customer's loop can be removed without interrupting the main circuit, do so and terminate the loop in a test circuit. If removal of the loop will cause interruption to the main circuit, request the control office to have transmission stopped until proper termination can be accomplished. The loop should be terminated so as to include any loop repeaters in the portion of the served drop to be tested. On TLT circuits, compensating resistances should be added to the main circuit to replace any removed loops and/or repeaters.

**11.09** The following paragraph outline testing procedures for various troubles. Although reference is repeatedly made to the use of a position monitor teletypewriter when making station equipment tests, testrooms should avail themselves of automatic test equipment, when available, because various timing characteristics may be required to successfully effect selective operations. It is recognized, however that a position monitor teletypewriter may prove more effective when testing troubles involving a single operation or operations which may not be conveniently programmed into an automatic device.

**11.10 Transmitting Troubles:**

- (a) Unable to Transmit Automatically
  - (1) Remove the station from the circuit as covered in 11.08.
  - (2) Request the customer to insert a tape in the transmitter.
  - (3) Using a position monitor teletypewriter, send the station TSC once or twice, depending upon priority arrangements.

**Note:** At stations arranged for priority operation (PR key operation) send the TSC twice, if the key is operated. Send the TSC once if the key has not been operated or has been disabled by a wiring change.

  - (4) If the station transmitter starts properly, consider the possibility of circuit trouble, equipment trouble at the processor location, or a came clear condition.

(5) If the transmitter fails to start, send a telephone employee to the station, notifying him of test results.

(b) Unable to Transmit Manually

- (1) Remove the station from the circuit as covered in 11.08.
- (2) Have the customer operate the KS button on his control panel. The BID lamp should light.
- (3) Using a position monitoring teletypewriter, send the station TSC once or twice, depending upon priority arrangements. An LTRS character should be received from the station control circuit.
- (4) An audible signal should operate and the SEND lamp should light at the station. Have the customer operate the AG key to the AGD position to silence the alarm. The customer should now begin keyboard transmission.
- (5) If the keyboard functions properly and transmission appears satisfactory, consider the possibility of a came clear condition.
- (6) If the station fails to function correctly in this manner, trouble exists and a telephone employee should be dispatched.

(c) Transmission Unreadable

- (1) Remove the station from the circuit as covered in 11.08.
- (2) Request the customer to insert a tape in the transmitter.
- (3) Using a position monitor teletypewriter, send the station TSC once or twice depending upon priority arrangements. The transmitter will start upon receipt of the second TSC and transmit the first letter of the addressee CDC and stop. A letter "V" answer-back should be received in response to the first TSC transmitted.
- (4) Transmit a letter "V" from the STC. The station transmitter should resume sending. Make a transmission measurement at the testroom and observe monitor copy. High

distortion and/or errors in copy indicates possible trouble in the station transmitter.

**Note:** If the "V" answerback is not received after a CDC, the station transmitter will not restart. The station alarm lamp (AL) will light and the buzzer will sound. Tape should be reinserted so that CDCs will be sent and the alarm release (AR) key operated to restart the transmitter.

- (5) If the transmission appears satisfactory, consider the possibility of a came clear condition.
- (6) If transmission appears unsatisfactory check the operation of repeater equipment and, if necessary, dispatch a telephone employee, notifying him of test results.

(d) If the tests covered in 11.10 (a) or (b) or (c) indicate transmitting trouble, advise the customer that the station is being connected to the circuit for receiving messages only. Transmit the end of message code (EOM) before connecting station to the circuit.

(e) Notify the control office that your customer's station is connected to the circuit for receiving messages only. The control office should so advise the processor location.

**11.11 Receiving Troubles:** The condition of an 83 station (select or nonselect) should depend upon the circuit condition (traffic or polling).

Polling—EOM code FIGS H LTRS etc. select condition.

Traffic—EOA code CRLF—nonselect condition.

This conditions the machine in the same manner as it conditions other stations connected to the circuit. If a station is returned to the circuit in the select condition with traffic on the circuit and if the CDC or TSC is contained in the message being sent, a "V" or message will cause garbled copy. Also, if the CDC is received, the station will copy the remainder of the message. (This can cause considerable confusion at times when the message was not intended for the station.) If the station is placed in the nonselect condition and returned to the circuit during polling in a light traffic period, no response will be received from

the station until the EOM code appears on the circuit.

(a) Receiving Machine Not Being Connected

- (1) Remove the station from the circuit as covered in 11.08.
- (2) Using a position monitor teletypewriter, transmit the EOM and the CDC for the station, pausing to verify receipt of the letter "V" answer-back. If no answer is received, the receive machine is not being connected, and trouble exists.
- (3) If the receive machine functions properly, consider the possibility of incorrect or incomplete message addressing, or a came clear condition.
- (4) If trouble is indicated, dispatch a telephone employee notifying him of test results.

(b) Receiving Machine Being Connected on an Invalid Code

- (1) Remove the station from the circuit as covered in 11.08.
- (2) Using a position monitor teletypewriter, transmit an invalid code (CDC). No "V" answer-back should be received and the receive machine should not connect. Send the station CDC; "V" answer-back should be received. Send CR LF LTRS, station CDC; no "V" answer-back should be received. (Most troubles of this type are caused by the station failing to lock-out on the EOA code.)
- (3) If the receive machine functions properly, consider the possibility of a came clear condition.
- (4) If the receive machine connects (indicated by the receipt of a "V" answer-back at the STC), dispatch a telephone employee notifying him of test results.

(c) Receiving Machine Not Being Disconnected

- (1) Remove the station from the circuit as covered in 11.08.

(2) Using a position monitor teletypewriter, transmit the CDC for the station, pausing to verify receipt of the letter "V" answer-back; at this time the receive machine should be connected.

(3) Transmit EOM code (disconnect); receive machine should disconnect from the circuit.

(4) If the machine disconnects properly, consider the possibility of nonreceipt of the disconnect code or a came clear condition.

(5) If the machine does not disconnect properly, dispatch a telephone employee notifying him of the test results.

(d) Receiving Machine Printing Errors

(1) Remove the station from the circuit as covered in 11.08.

(2) Using a position monitor teletypewriter, transmit the station CDC (pausing for a "V" answer-back), followed by CR LF LTRS (lockout code). The machine should now be connected to the circuit.

(3) Transmit switched bias test per Section 570-006-500.

(4) If the receive machine prints within the prescribed limits, consider circuit trouble or a came clear condition.

(5) If receiving machine trouble is indicated, dispatch a telephone employee, notifying him of test results.

(e) If the tests covered in 11.11 (a), (b), (c), or (d) indicate receiving trouble, advise the customer that the station is being connected to the circuit for manual transmission only. Transmit EOM code followed by V CR LF LTRS before restoring the station to the circuit.

(f) Notify the control office that your customer's station is connected to the circuit for manual transmission only. The control office should so advise the processor location.

**11.12** When the telephone employee reports that any troubles outlined in 11.10 or 11.11 have been cleared, make appropriate tests to verify.

## SECTION 312-011-501

After verification that the station is functioning properly and all keys are normal, restore the station to the circuit. Remove any compensating resistances used. Notify the customer that the station has been restored to normal service. Notify the control office that the station has been restored to service, giving details of the trouble condition.

### 12. RELEASE AND REMOVAL OF STATION FOR ROUTINE MAINTENANCE

**12.01** Releases for routine maintenance may be obtained in one of two ways, via the serving testroom or by having the local customer send a service message to the processor location. In some instances the combination of both these methods may be used. However, under no circumstances should telephone employee obtain a release by either method without the knowledge of the serving testroom.

#### (a) Releases Obtained by the STC

- (1) Before going to the customer's office, the telephone employee may check with the serving testroom to ascertain if any abnormal conditions exist which may prevent the release of the equipment at the usual time.
- (2) When the telephone employee has reached the station and obtained from the customer the necessary authority for the release of the apparatus, he should advise the testroom that he is ready to proceed with the routine.
- (3) The STC should notify the circuit control office that a release has been obtained for routine maintenance work and request that the station be placed on "skip" (on 81D1 circuits). For 83B circuits the station should be placed on skip and a service message should be sent advising all other stations that the station being routined will be off the circuit until further notice.
- (4) The control office will arrange with the processor location to have the station placed on skip and will notify the STC when this has been done.
- (5) The STC should remove the customer's loop from the circuit and terminate it. On 81D1 equipped circuits, only the customer's

send loop should be removed from the circuit at this time, because all receiving functions may be utilized at the routined station.

- (6) The STC should notify the telephone employee that he may proceed with the routine.
- (7) On 81D1 equipped circuits, the telephone employee will request the STC to arrange in the same manner to have the station placed on "intercept," in addition to the skip condition, when he is ready to proceed with that part of the routine. The STC should comply.
- (8) Upon completion of the routine, make tests in accordance with Part 13.

#### (b) Releases Obtained by Service Message

- (1) This method, if agreed to by the customer, may reduce out-of-service time and save time of testroom and maintenance personnel. However, when delays are encountered in receiving replies to the service messages, requests should be made via the STC for assistance. This method is not applicable to sending only or receiving only locations. In all cases, the serving testroom should be kept informed, especially prior to requesting a release from the customer by this method.
- (2) On 83B equipped circuits, the telephone employee should request the customer to advise the processor location to place the station on skip, and also advise all other stations on the circuit that the station being routined will be off the circuit until further notice. No work should be performed until the request is acknowledged by the processor location in a return message.
- (3) On 81D1 equipped circuits, the telephone employee should request the customer to advise the processor location via service message to place the station on intercept. No work should be performed until an acknowledgement from the processor location is received.
- (4) 81D1 equipped stations should be removed from intercept in the same manner as placed on intercept when the work requiring the intercept condition has been completed.

(5) On 81D1 equipped circuits, the telephone employee should now request the customer to send a service message requesting that the station be placed on skip, giving an estimated length of time required to complete the work.

(6) When the work requiring skip has been completed, the telephone employee should request the customer to prepare a tape requesting that the station be taken off skip. The processor location will attempt to pick up this message at the end of the estimated interval given. When picked up by the processor location, receipt of this message should also be confirmed in a return message. In any case where the processor location is unable to pick up a message within a reasonable time after the scheduled time, the processor location will request the testroom to investigate the delay.

(7) Upon completion of the routine, the telephone employee should call the STC and make tests in accordance with Part 13.

### 13. TESTS FOLLOWING ROUTINE MAINTENANCE

#### A. 81D1 (Simplified) Equipped Circuits

**13.01** Make the following tests when requested by the telephone employee.

- (a) Receiving tolerance of station control unit, if station is so equipped.
- (b) Receiving tolerance of 28RO teletypewriters.
- (c) Receiving tolerance of typing reperforator, if provided.
- (d) Transmitter start feature and transmission from all transmitters, including those associated with the station control unit.
- (e) Connect and disconnect features of station control unit.
- (f) Receiving machine blinding on receipt of the transmitter start pattern, also unblinding on LTRS LTRS, following the transmitter start pattern.

(g) Operation of auxiliary features, such as line release delay, tape feed out, station alarms, etc.

**Note:** Test procedures are detailed in Part 11. When all of the above tests have been made and all requirements met, restore the station to service in accordance with 11.06.

#### B. 83B Equipped Circuits

**13.02** Make the following tests when requested by the telephone employee.

- (a) Receiving machine tolerance, including reperforators, after connecting on valid code and replying with a letter "V" answer-back.
- (b) Receiving machine connecting on valid individual, group, and broadcast codes and disconnecting on EOM code.
- (c) Receiving machine not sending "V" answer-back or connecting on invalid code.
- (d) Transmitter starting on receipt of regular (and priority if used); TSC, if tape has been inserted; stopping after each CDC to await a letter "V" answer-back; and turning off on EOM code at the end of the message.
- (e) Transmitter without tape responding with a letter "V" answer-back upon receipt of a TSC. Check distortion on "V" and adjust if necessary.
- (f) Transmitter not starting on an invalid TSC.
- (g) Sending transmitter stopping if line goes open, but restarting if AR button is pushed within 10 seconds after line comes closed.
- (h) Ability to send manually.
- (i) Operation of auxiliary features, such as station alarms, key operations, lamp operations, etc.

**Note:** Test procedures are detailed in Part 11. When all of the above tests have been made and all requirements met, restore the station to service in accordance with 11.12.

**14. PATCHING CIRCUITS FOR REASONS OTHER THAN TROUBLE**

**14.01** Patches for reasons other than trouble should be made on these circuits only when they are required in connection with special tests or circuit rearrangement work that cannot be conveniently deferred. Authorization should be obtained from the control office before proceeding with such a patch.

**14.02** After obtaining permission from the control office, proceed with the patch and advise the control office when completed.

**14.03** All offices involved should monitor the circuit to ascertain that transmission to and from points beyond the patched section or sections is satisfactory.

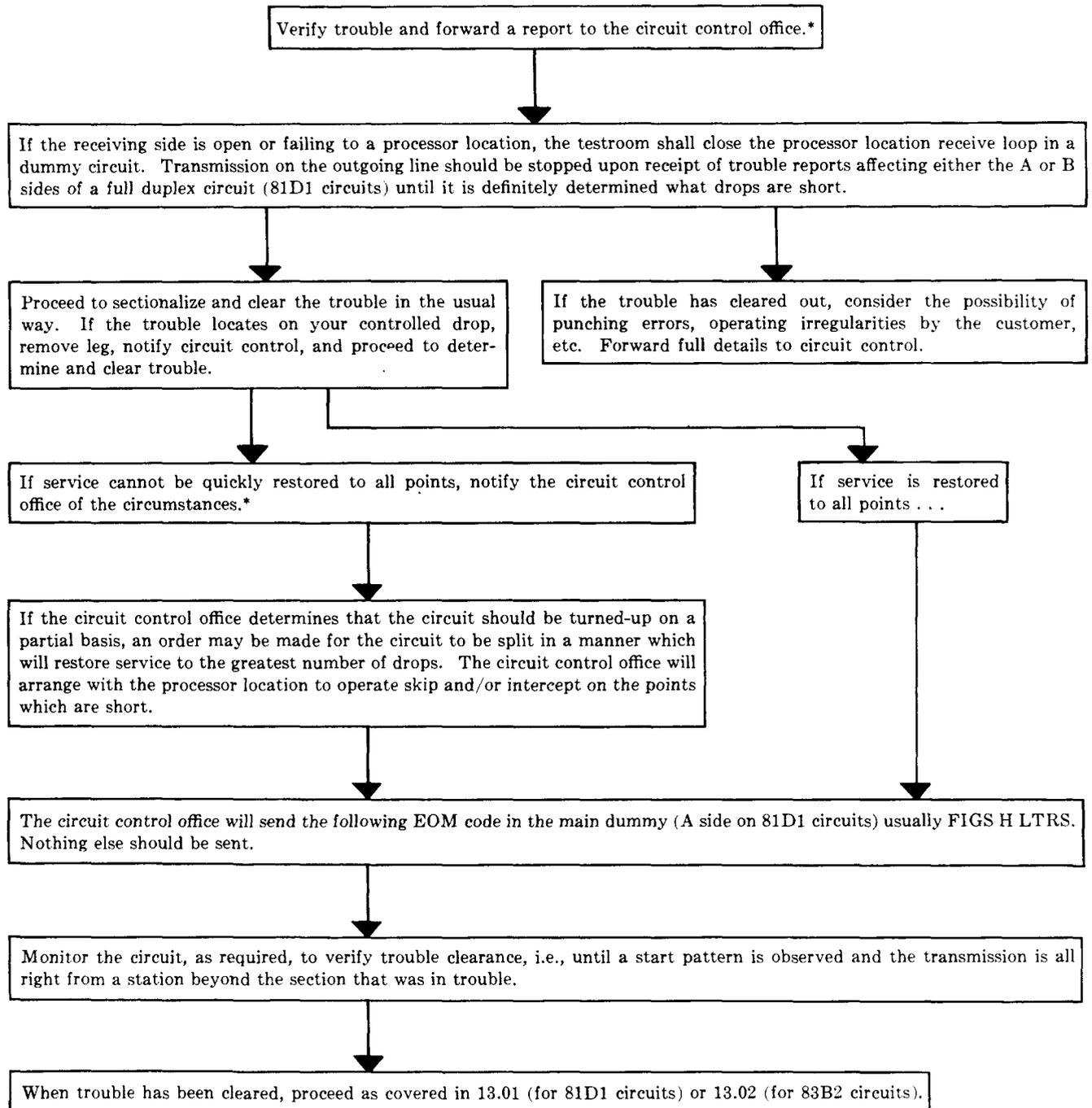
**15. ASSOCIATED SECTIONS**

**15.01** There are a number of sections that include procedures for maintaining networks, as

well as others that will apply to new CPE services as they are established. Reference may be made to the plant series index below for more detail.

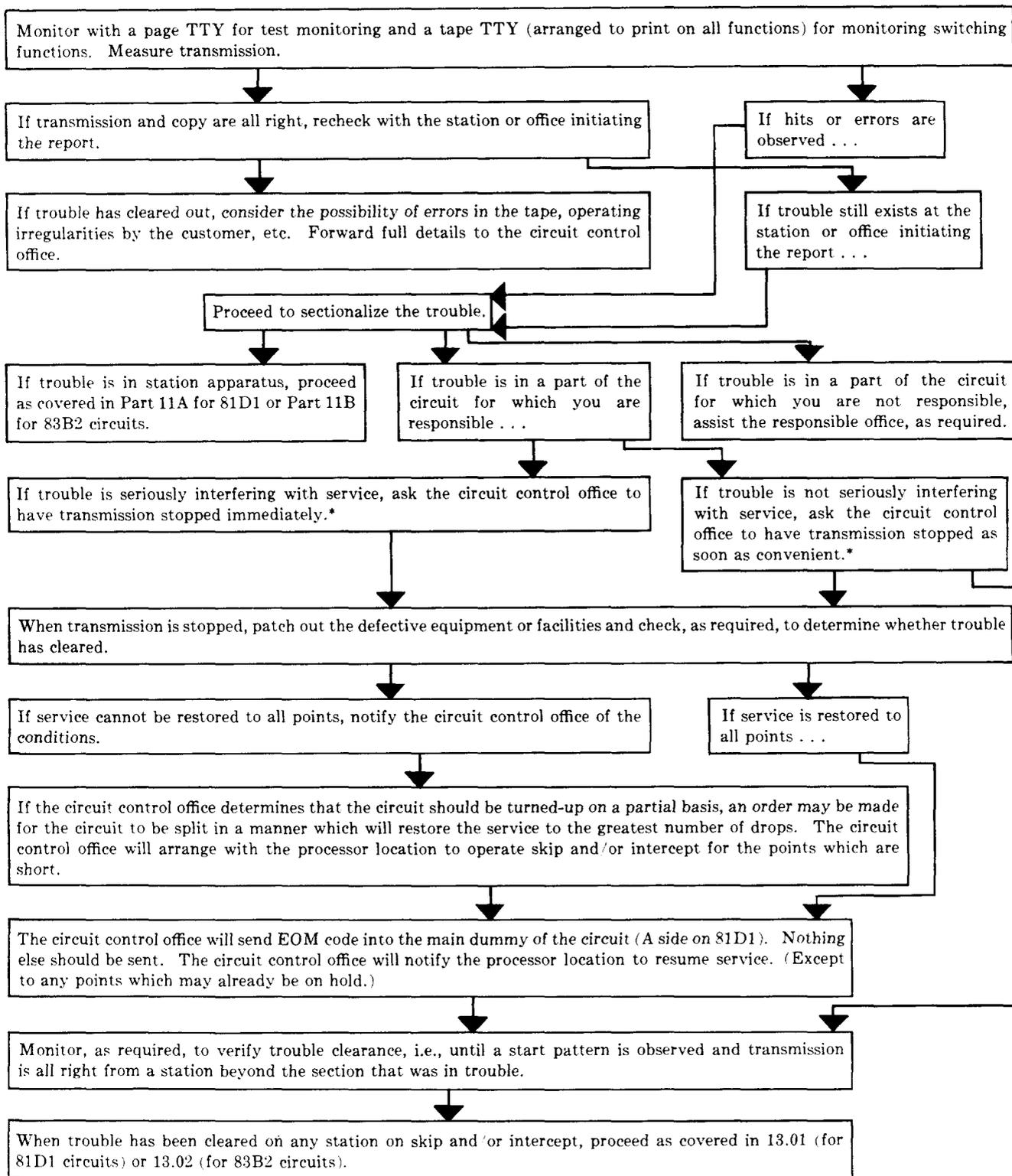
NUMBER GROUP CLASSIFICATION	CLASS OF MATERIAL
570-000-000 through 589-999-999	Teletypewriter and data systems 83-B, 8A1, etc.
024-000-000 through 179-999-999	Test equipment such as 911 series.
300-000-000 through 379-999-999	Transmission systems and test- ing.
660-000-000 through 669-999-999	Test center operation.

**CHART 1**  
**REPORTS OF OPEN CIRCUIT, FAILING, UNUSABLE COPY, ETC.**



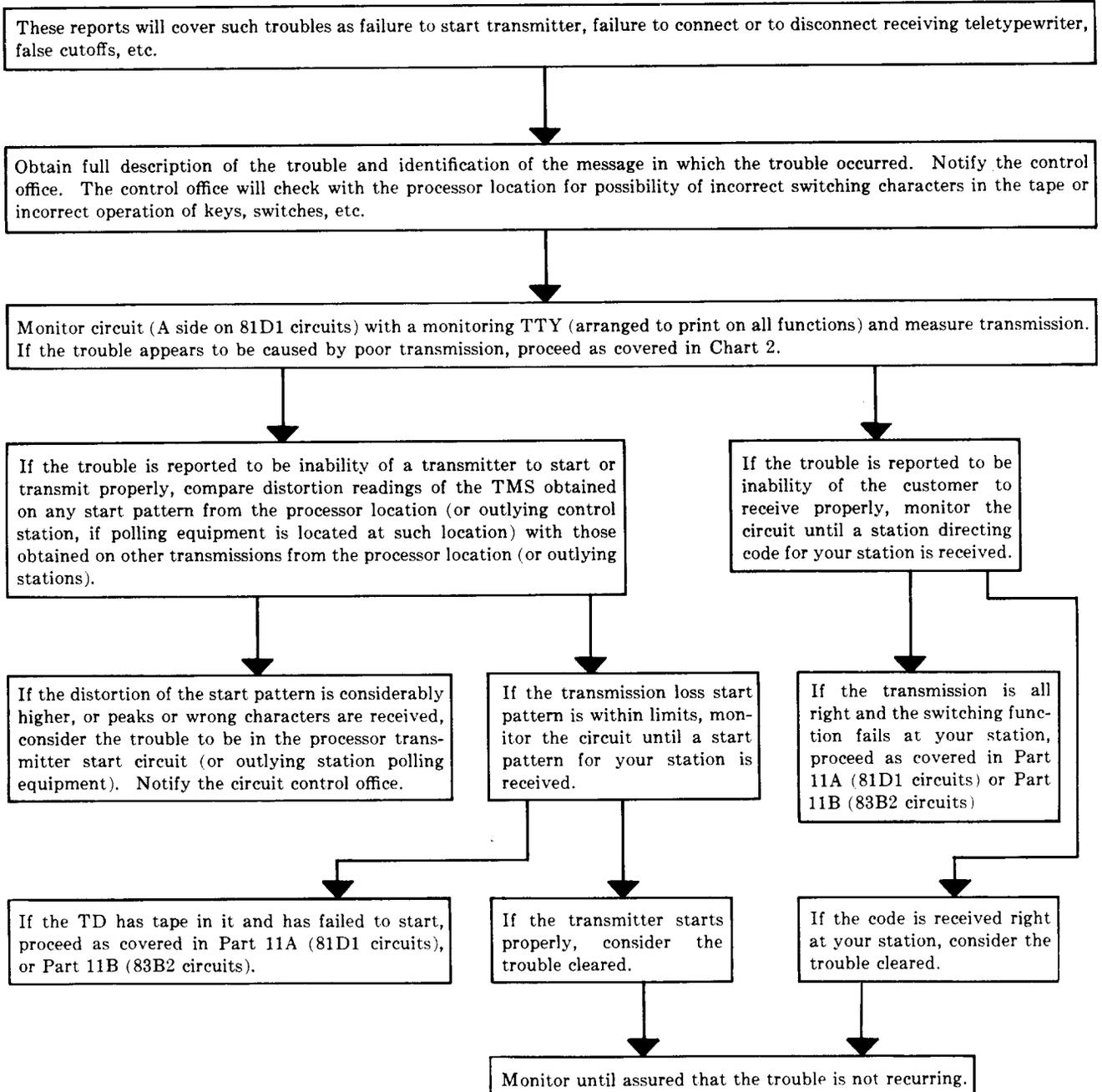
\* The circuit control office will forward these reports to the processor location.

**CHART 2**  
**REPORTS OF HITS OR ERRORS**



\* The circuit control office will forward these reports to the processor location.

**CHART 3**  
**REPORTS OF SWITCHING FUNCTION TROUBLES**



## CHART 4

RECEIVER TEST TAPE (FOR USE ON 81D1  
EQUIPPED OUTLYING STATIONS)

The following is a sample of characters perforated in a test tape for a station having an individual connect code of BP. Refer to Part 11 for the format of print as it would appear on a monitor TTY.

```

↑↑↑↑#↑BP↑<≡↑A↑#↑BN↑<≡↑↑↑<≡↑↑↑#↑GC↑<≡↑↑2<≡↑↑↑#↑
XR↑<≡↑↑3<≡↑↑↑#↑BA↑<≡↑↑4<≡↑↑↑#↑GD↑<≡↑↑5<≡↑↑↑#↑DJ↑<≡↑
↑6<≡↑↑↑#↑DX↑<≡↑↑7<≡↑↑↑#↑DY↑<≡↑↑8<≡↑↑↑#↑BP↑<≡↑ALARM↑#↑
BP↑<≡↑B↑#↑
BP↑<≡↑C↑#↑
BP↑<≡↑D↑#↑
BP↑<≡↑E↑#↑
BP↑<≡↑F↑#↑

```

Only the characters shown above should be perforated in the test tape. If the tape is spliced so that it is circular, mark the LTRS characters at the beginning of the test. The proper starting point for a test is with any one of these LTRS characters above the sensing pins of the test transmitter. Each test tape should contain the CDCs of the station it is to be used to test, plus codes for other stations on the same line. Numerals appear after the CDCs for other stations, and letters after CDCs for the station under test. If a numeral appears on the machine being tested, a trouble condition is indicated.