

**“PICTUREPHONE®” SERVICE**  
**BASEBAND VIDEO TRANSMISSION**  
**INITIAL SERVICE (PHASE 0)**  
**CABLE EQUALIZERS**  
**VIDEO LOOP FACILITY TROUBLE LOCATION**

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1. GENERAL . . . . .	1	1.01 This section contains procedures for isolating sources of transmission trouble on video loop facilities from a central office, a PBX, or a wideband remote switch. This information is duplicated in Section 340-200-502. (Section 340-200-506 contains trouble locating procedures for PBX trunk facilities, WBRs links, and inter-office facilities).
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CHART 3 — DC FAULT LOCATING TESTS (Tests for Locating Open Circuits on Simplex Powered Loops) . . . . .	15	1.03 The charts are arranged in the order in which the procedures are to be performed, unless a specific step indicates that charts or steps should be omitted.
CHART 4 — TESTS USING THE JIC150L FAULT LOCATING TEST SET . . . . .	16	1.04 The following abbreviations are used in this section:
CHART 5 — GROSS FAULT LOCATING USING THE JIC150K CABLE EQUALIZER TEST SET . . . . .	18	CE — Cable Equalizer
CHART 6 — PARTIAL FAULT LOCATING TESTS . . . . .	27	CETS — Cable Equalizer Test Set
CHART 7 — LOCATION OF TROUBLE FOUND BY LOOP CIRCUIT ORDER TESTS . . . . .	35	CO — Central Office
5. REFERENCES . . . . .	43	COCE — Central Office Cable Equalizer
		FALTS — Fault Locating Test Set
		ICE — Intermediate Cable Equalizer

## SECTION 518-800-512

KTS — Key Telephone System

KTSCE — Key Telephone System Cable Equalizer

MDF — Main Distributing Frame

PBX — Private Branch Exchange

PBXCE — PBX Cable Equalizer

SSCE — Station Set Cable Equalizer (used for single line station equipment *only*)

RSUCE — Remote Switch Unit Cable Equalizer

VSS — Video Supervision Signal

WBRs — Wideband Remote Switch

WBDF — Wideband Distributing Frame

in this section should be followed to locate a trouble and should end by performing Steps 2 and 3 of Chart 1 to ensure that no other trouble exists in the loop.

*Note:* If a 15A local test desk is not available, tests usually performed by the 15A are to be done at the mobile video test bay in the central office.

**2.03** In the following procedures, the direction of transmission from the central office to the station will be called the *control* direction. The direction of transmission from the station to the central office will be defined as the *common* direction.

**2.04** *When a new cable equalizer is installed, the loop must be realigned if the equalizer is adjustable (unless instructions indicate otherwise). Make sure the proper screw switches have been set and proper networks (if any) have been installed.*

**2.05** *To protect cable equalizers when performing tests not covered in this procedure, do not connect any voltage to the line other than that found at the probes of the volt-ohm-milliammeter without removing all cable equalizers from that section of cable.* Tests on cable pairs alone (with all equalizers and 874A build-out pads removed) can be made in two ways:

## 2. OVERALL TEST PROCEDURE

### GENERAL

**2.01** The procedures begin when the local test center receives a trouble report associated with a video loop. Trouble reports originate from three sources:

- (a) The customer who calls the test center to report trouble.
- (b) The switching machine which prints a trouble ticket when one of its automatic tests fails.
- (c) The local test center which may test video loops for acceptable transmission characteristics.

Trouble reports originated by the customer and switching machine are treated the same and require no special consideration. Trouble reports originated by the test center require special charts which are included in this section.

**2.02** Initial testing is done from the local test center (15A test desk) with possible assistance from the 23A test board or master test frame and personnel in the CO. The procedures

- (a) Directly on the cable section in question using portable test equipment which can be taken into the field. (A cable section is defined here as the section of cable between two equalizer locations). The cable pair is ready for testing after all equalizers and build-out pads have been removed from both ends of the section of cable to be tested.

- (b) From the local test desk using a 2-wire MDF test trunk or from the equalizer bay at the CO, WBRs, or PBX. For this method of testing, dc continuity to the section of cable suspected to be in trouble must be provided. The cable pair is prepared for testing by removing all equalizers and build-out pads (874A networks) on the part of the loop to be tested and replacing them with 874C networks which provide a direct through connection. With 874C through-connection networks replacing all

equalizers and networks which were removed, dc continuity is provided for tests on the cable.

**Caution:** *When an equalizer is removed for locating trouble, make sure that no potentiometer settings are disturbed.*

**2.06** If a piece of equipment in the video loop is replaced with a new unit in an attempt to find the source of trouble and the trouble still exists after such replacement, the *original* unit should be put back in place and the new unit returned to spare service.

**2.07** If a piece of equipment has already been replaced with a new unit once, omit any steps requiring it to be replaced again.

#### CONTINUITY TEST

**2.08** Occasionally a step in the Trouble Locating Charts will call for additional test that say: "Perform any additional continuity tests that can be made at the CO, WBRs, or PBX." These continuity tests should be made *before* maintenance personnel are dispatched to a remote location.

**2.09** Continuity tests may be made by one of the following methods:

- (a) With an ohmmeter.
- (b) With a "buzzer" (81A test set) or transistorized oscillator powered by two 1-1/2 volt dry cells used to put tones on a pair of wires and a lineman's handset which is used to listen for the tones at various points along the pair. The 81A test set is described in Section 105-240-100.
- (c) By use of the main distributing frame (MDF) test trunk for video lines. By this method ac (300 Hz to 4 kHz) continuity can be checked from the local test desk, through the video switch, through the equalizers, and through the MDF to the cable pair leaving the CO.

**2.10** Connections for continuity checks between cable equalizers and cable pairs leaving the CO on MDF are as follows:

EQUALIZERS	MDF
OUTGOING COCE, RSUCE (Simplex Pwr) Pin 3	OUTGOING Tip
OUTGOING COCE, RSUCE (Simplex Pwr) Pin 4	OUTGOING Ring
OUTGOING PBX, WBRs (Local Pwr) Line In jack Tip	OUTGOING Tip
OUTGOING PBX, WBRs (Local Pwr) Line In jack Ring	OUTGOING Ring
INCOMING Equalizer Pin 20	INCOMING Tip
INCOMING Equalizer Pin 17	INCOMING Ring

#### USING THE CETS

**2.11** When aligning cable equalizers using the CETS, consider alignment to have failed if the CETS meter indicator cannot be brought within the yellow region on meter face for one or more of the CETS test frequencies.

**2.12** When the CETS is used, the rules listed should be followed when making connections to equalizers or cable pairs.

**Rule 1:** For signals that are to be put *into the test points on a cable equalizer from the CETS*, connection should always be made between the TP1-TP3 output on the CETS and test points TP1-TP3 on the equalizer. Screw switch SW1 on the equalizer *must be open*. When connections are removed, make sure that SW1 is closed. Signals will not pass through a cable equalizer unless its screw switch SW1 is closed.

**Rule 2:** For signals that are to be put directly *into a cable pair from the CETS*, connections should always be made between the BALANCED OUTPUT of the CETS and the cable pair. For this connection, the CETS terminates one end of the cable pair. Bridging connections are not allowed for this type of connection; therefore, cable preceding the point where the signal is inserted should be disconnected by means of screw switches as found in the SSCE

or special jacks as provided in the cable equalizer bays J1C150A-J1C150E. The jacks disconnect the preceding cable when a plug is inserted into the jack.

**Rule 3:** For signals coming from the test points on a cable equalizer into the CETS, connection should always be made between the TP1-TP2 test points on the equalizer and the TP1-TP2 INPUT on the CETS. The IMPEDANCE switch on the CETS should be set to NORMAL and screw switch SW1 on the equalizer should be closed.

**Rule 4:** For signals coming into the CETS directly from a cable pair which the CETS is terminating, connection should always be made between the cable pair and the TP1-TP2 INPUT on the CETS. The IMPEDANCE switch on the CETS should be set to LOW (100 ohms).

**Rule 5:** For signals coming directly from a cable pair which the CETS is bridging, connection should always be made between the cable pair and the TP1-TP2 INPUT on the CETS. The IMPEDANCE switch on the CETS should be set to NORMAL.

**2.13** Occasionally Sections 518-800-505 and 518-800-501 are mentioned in the trouble locating charts. These sections are used to investigate both gross and partial faults when one of the following conditions exists (Fig. 1):

- (a) Short loop KTS lines where one 607A and one 606A equalizer and one 877A or 877B network plus the connecting cable and KTS equipment are involved.
- (b) Long loop KTS lines where two 607A, one 606A equalizer, and one 939B SSCE plus the connecting cable and KTS equipment are included.
- (c) Single line stations where the equipment in the service unit and display units are involved.

### 3. APPARATUS

- 1 — KS-14510, L1 Volt-Ohm-Milliammeter
- 1 — HP6217A Power Supply (48±0.1 volts; ungrounded outputs)
- 2 — 874C Networks (through-connection card)
- 1 — JIC150L Fault Location Test Set
- 1 — JIC150K Cable Equalizer Test Set (one required at each test location)

**Note:** Spare cable equalizers may be needed for each unit in the loop.

### 4. TROUBLE LOCATING CHARTS

**Caution:** Before proceeding with Chart 1, READ Part 2 (Overall Test Procedure) of this section.

#### CHART 1 — PRELIMINARY TESTS

**4.01** Chart 1 attempts to narrow the number of possible locations on a loop at which a reported trouble can exist. This is accomplished by making tests from the local test center with a small amount of assistance from personnel in the CO, at the WBRs, or at the PBX equipment location.

**4.02** The tests of this chart should be performed before any tests of the other charts.

**4.03** The information listed in the possible trouble column of this chart should be noted carefully. This information can be used to reduce the number of steps required to find a trouble. For example, if the possible trouble is indicated to be in the *common* side of the loop, ensuing test involving the *control* side of the loop may be omitted.

CHART 1

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO
1	Where did trouble report originate?	Customer reported.		Step 2
		Trouble ticket from switching machine		Step 2
		Loop circuit order tests performed by local test center indicate trouble.		Chart 7
2	If a WBRs or PBX is included in the video circuit to be tested, the 15A local test desk should choose a trunk between the WBRs or PBX and the CO which is known to have acceptable transmission characteristics and place all test calls to the troubled loop on this trunk.	PBX or WBRs is included in video circuit.	This step will eliminate the possibility of trouble being on a PBX or WBRs trunk.	Step 3
		No PBX or WBRs in video circuit.		Step 3
3	15A local test desk or wideband mobile test bay places a video call to the station reported in trouble. The picture on the display unit is monitored.	No picture at subscriber set or at test desk.	Control side of loop or equipment common to both sides of loop. Ask subscriber if service unit power cord is unplugged.	Step 4
		Subscriber set receives no picture; test desk receives normal picture.	Station side of KTSCE (or SSCE) in control side of loop. The subscriber set was turned on which indicates the signal reached the VSS detector.	Section 518-800-505 or 518-800-501
		Subscriber set receives satisfactory picture; test desk receives no picture.	Common side of loop (from station to CO).	Step 11
		Poor picture at test desk and at subscriber set.	Equipment common to both sides of loop.	Step 4
		Poor picture at subscriber set. Picture OK at test desk.	Control side of loop. (Equipment common to both sides of loop is <i>NOT</i> involved.)	Step 4

CHART 1 (Cont)

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO
3 (cont)		Poor picture at test desk. Picture OK at subscriber set.	Common side of loop.	Step 11
		Picture OK at test desk and at station.	Wideband switch in CO, WBRs, or PBX switch.	
			Video trunk (interoffice, PBX, or WBRs). Check video transmission on PBX and WBRs trunks available to troubled line. Question customer to find whether trouble occurred on inter- or intraoffice call. Check video transmission on called party's line if trouble occurred only on that call (repeat the procedure in this section). Check interoffice trunks or intraoffice trunk circuits which could have been used during a call on which trouble occurred.	Section 340-200-506
			On subscriber's other video line (if any). Repeat this step for other line.	REPEAT Step 3
Customer sees normal picture; test desk sees loopback picture.	Trouble in KTS (or station set) equipment.	Section 518-800-505 or 518-800-501		
4	At the local test desk make a loopback call on the affected line. The picture on the test desk display unit is monitored.	Loopback picture normal.	KTSCE (or SSCE) or on station side of KTSCE (or SSCE).	Section 518-800-505 or 518-800-501
		No or abnormal loopback.		Step 5
5	Place patch on PBX, WBRs, or CO (if no PBX or WBRs in circuit) cable equalizer bay from X OUT to X IN (NET OUT to NET IN on PBX) of affected loop. At the master test frame or test desk make a loopback call.	No or abnormal loopback.	In WBRs, PBX, or CO (if no WBRs or PBX) video switch or in cable between switch and equalizer jacks.	PBX
				WBRs

CHART 1 (Cont)

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO																		
5 (cont)	<i>Note:</i> If patch is made at CO, loopback picture will be degraded slightly because an unequalized length of cable unavoidably inserted by the above patch.		At PBX and WBRS, check wiring between X IN and X OUT for WBRS (NET IN and NET OUT for PBX) jacks on equalizer bay and WBDF or switch.	CO — Step 6																		
		Loopback picture normal.		Step 9																		
6	Check the 874A line build-out networks in the line in trouble for the correct screw switch settings.	Screw switches improperly set.	Adjust screw switches to proper settings. Trouble may be cleared.	STOP																		
		Screw switch settings OK.		Step 7																		
7	Replace the 874A network(s) in question with new unit(s) on which the screw switches have been properly set. Repeat only the PROCEDURE column in Step 4, Chart 1.	Loopback picture normal.	Trouble may be cleared.	STOP																		
		No or abnormal loopback.	Trouble in cable between jacks on equalizer bay and WBDF or in video switch.	Step 8																		
8	Check the wiring between the jacks on the equalizer bay and the 874A networks and between the 874A networks and the WBDF. Connections for these tests are given below.  <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: left;">JACK or WBDF</th> <th style="text-align: left;">874A NETWORK</th> </tr> </thead> <tbody> <tr> <td>JACK X IN Tip</td> <td>Pin 20</td> </tr> <tr> <td>    X IN Ring</td> <td>Pin 17</td> </tr> <tr> <td>    X OUT Tip</td> <td>Pin 3</td> </tr> <tr> <td>    X OUT Ring</td> <td>Pin 4</td> </tr> <tr> <td>WBDF Tip</td> <td>Pin 20</td> </tr> <tr> <td>    Ring from SW</td> <td>Pin 17</td> </tr> <tr> <td>    Tip to SW</td> <td>Pin 3</td> </tr> <tr> <td>    Ring</td> <td>Pin 4</td> </tr> </tbody> </table>	JACK or WBDF	874A NETWORK	JACK X IN Tip	Pin 20	X IN Ring	Pin 17	X OUT Tip	Pin 3	X OUT Ring	Pin 4	WBDF Tip	Pin 20	Ring from SW	Pin 17	Tip to SW	Pin 3	Ring	Pin 4	Trouble found in wiring.		STOP
		JACK or WBDF	874A NETWORK																			
		JACK X IN Tip	Pin 20																			
X IN Ring	Pin 17																					
X OUT Tip	Pin 3																					
X OUT Ring	Pin 4																					
WBDF Tip	Pin 20																					
Ring from SW	Pin 17																					
Tip to SW	Pin 3																					
Ring	Pin 4																					
No trouble found.	Trouble in wideband switching equipment.																					
			If the loopback picture of Chart 1, Step 4 indicated a partial fault which is only slightly noticeable, the effect of the patch in Step 5 (see Note of Step 5) may have been taken to be an abnormal loopback when, actually, the loopback picture was normal for this step. In this case, the trouble may be in the loop.	Go back to the step performed before Step 6 (Chart 1, Step 5 or 13 or Chart 6, Step 4) and assume normal loopback picture.																		
9	Remove the patch on the cable equalizer bay.			Step 10																		
10	Replace the outgoing (control) RSUCE (937C) or COCE (937A) (if no WBRS is in loop) with a spare. Align new RSUCE (937C). (See Section 340-200-501.) At the master test frame or local test desk make a loopback call on the affected loop.	Loopback picture normal.	Trouble cleared.	Step 2 — confirm that trouble is cleared.																		
		No or normal loopback picture.	Control side of loop between KTSCE (or SSCE) and PBX or outgoing RSUCE	Step 15																		

CHART 1 (Cont)

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO
10 (cont)	<i>Note:</i> Omit this step for non-simplex powered WBRs loops and all PBX loops. Go to Step 15.		or COCE or equipment common to both sides of loop.	
11	Ask customer to press "monitor" button on PICTURE-PHONE control pad.	Customer sees <b>NO</b> or poor picture.	Trouble in display unit.	Section 518-800-505 or 518-800-501
		Customer sees normal picture.		Step 12
12	At the test desk make a loopback call on the affected line. The picture on the test desk display unit is monitored.	Loopback picture normal.	KTSCE (or SSCE) or on station side of KTSCE (or SSCE) in common side of loop.	Section 518-800-505 or 518-800-501
		No or abnormal loopback picture.	Common side of loop not including section between KTSCE (or SSCE) and display unit.	Step 13
13	Place patch on PBX or WBRs or CO (if no PBX or WBRs in circuit) cable equalizer bay from X OUT to X IN (NET OUT to NET IN on PBX) of affected loop. At the master test frame or test desk make a loopback call. (See Note of Step 5.)	No or abnormal loopback picture.	In WBRs, PBX, or CO (if no WBRs or PBX) video switch or in cable between switch and equalizer jacks.  At PBX and WBRs, check wiring between X IN and X OUT for WBRs (NET IN and NET OUT on PBX) for jacks on equalizer bay and WBDF or switch.	PBX
				WBRs
		CO — Step 6		
		Loopback picture normal.	Common side of loop between KTSCE (or SSCE) and incoming PBXCE, RSUCE, or COCE inclusive.	Step 14
14	Remove the patch on cable equalizer bay.			Step 15
15	Recall the results of Step 3.	No picture in either or both directions.		Step 16
		Poor picture in either or both directions.		Step 17
16	Does loop in question have simplex powering?	Yes	Test loop for possible simplex powering failures.	Chart 2
		No	Proceed with FALTS tests.	Chart 4

CHART 1 (Cont)

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO
17	Perform standard loop circuit order tests as described in the 341 division.	One or more of these test fails.		Chart 7
		No tests fail.		Chart 6

#### CHART 2 — TESTS FOR LOOPS WHICH ARE SIMPLEX POWERED

**4.04** Intermediate cable equalizers powered from the central office or the wideband remote switch require simplex current fed to the line. Only the top two shelves (5 and 6) in the J1C150A bay and the top two shelves (3 and 4) in the J1C150C and J1C150D bays are equipped to supply the simplex current to intermediate cable equalizers. This mode of operation requires the use of a 168A current regulator for each 2-way loop.

**4.05** In addition, +130, -130, and -48 volt power (depending upon loop resistance and the number of intermediate cable equalizers) must be supplied to the bay. This power is sup-

plied to the 150A and 150D bays from the CO battery. Plus and minus 130 volts are supplied to the 150C bay from two KS-15898 rectifiers. In this mode, the outgoing cable equalizer in the central office (937A) or at the wideband remote switch (937C), and the intermediate cable equalizers (937B and 937C) are powered from the simplex current. The incoming (937B) cable equalizers, however, are powered from -24 volt local supply. Figure 2 illustrates power transmission for simplex powering cable equalizers.

**Note 1:** When a STOP instruction is indicated in the GO TO column, return to Step 2 of Chart 1.

**Note 2:** If all equalizers in the loop in question are locally powered, proceed to Chart 1.

CHART 2

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO
1	Check the current regulator (168A) associated with the troubled loop for overcurrent alarm indication (Fig. 3).	OK		Step 2
		Overcurrent alarm present.	Current regulator; replace with new unit.	Step 2
2	Connect voltmeter to TP1 (+) and TP2 (-) on associated current regulator. Voltage should be $3.14 \pm 0.15$ volts.  <i>Caution: +130 volts dc to ground may appear at these test points.</i>	Test passes.		Step 7
		Voltage too high. Screw switches properly set on 168A regulator.	Malfunction in current regulator.	Step 4
		Voltage too low. Screw switches properly set on 168A regulator.	Malfunction in current regulator, +130, -130, or -48 volt supply, or open circuit on line.	Step 3

CHART 2 (Cont)

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO								
2 (cont)			<i>Note:</i> If loop is sufficiently long, the trouble may be due to an improper setting of the 168A regulator screw switches. If this trouble is suspected, adjust the 168A regulator screw switches to the next longer loop length (SD-1C346-01, Sheet D3) and repeat this step. <i>If test passes</i> , trouble may be cleared. <i>If test fails</i> , reset screw switches to their original settings and go to Step 3.									
3	Measure the voltages between the following pins on the current regulator connector:  <table border="0"> <tr> <td style="text-align: center;">PIN TO PIN</td> <td style="text-align: center;">VOLTAGE</td> </tr> <tr> <td>15 to 8 (grd)</td> <td>+115 to +140</td> </tr> <tr> <td>2 to 8 (grd)</td> <td>-42 to -53</td> </tr> <tr> <td>1 to 8 (grd)</td> <td>-115 to -140</td> </tr> </table>	PIN TO PIN	VOLTAGE	15 to 8 (grd)	+115 to +140	2 to 8 (grd)	-42 to -53	1 to 8 (grd)	-115 to -140	Test passes.		Step 4
		PIN TO PIN	VOLTAGE									
15 to 8 (grd)	+115 to +140											
2 to 8 (grd)	-42 to -53											
1 to 8 (grd)	-115 to -140											
Test fails.	Trouble in the +130, -130, or -48 volt power supply. Repair or replace.	STOP										
4	Replace current regulator with new unit (make sure proper screw switches are closed). Repeat only the PROCEDURE column in Step 2.	Test passes.	Trouble may be cleared.	STOP								
		Test fails.	Circuit is open in powered loop.	Step 5								
5	Measure voltage on outgoing COCE (937A) or RSUCE (937C) between pin 10 (+) and pin 13 (-). Should be $14.6 \pm 0.7$ volts.  <i>Caution: High voltage to ground may appear at these points.</i>	Test passes.	Check to make certain that procedure was followed correctly up to this point.	Chart 3								
		Test fails.		Step 6								
6	Replace outgoing COCE (937A) or RSUCE (937C) with new unit. Repeat only the PROCEDURE column in Step 5. <i>Note:</i> Omit this step if outgoing COCE or RSUCE has already been replaced once before during this procedure.	Test passes.	Trouble may be cleared.	STOP								
		Test fails.	Current too low in outgoing equalizer. Circuit is open in powered loop.	Chart 3								
7	Check voltage on outgoing COCE (937A) or RSUCE (937C) between pin 5 (+) and pin 13 (-). Should be $18.2 \pm 0.6$ volts.  <i>Caution: High voltage to ground may appear at these points.</i>	Test passes.	Consider powering OK and continue with FALTS tests.	Chart 4								
		Test fails.		Step 8								

CHART 2 (Cont)

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO
8	Replace outgoing COCE (937A) or RSUCE (937C) with a new unit. Realign RSUCE (937C). (See Section 340-200-501.) Repeat only the PROCEDURE column in Step 7.	Test passes.	Trouble may be cleared.	STOP
		Test fails.	There is a short to ground in the loop.	Step 9
<b>POWER SHORT IN LOOP</b>				
9	Remove outgoing COCE (937A) or RSUCE (937C) and incoming COCE or RSUCE (937B). Connect negative probe on ohmmeter to ground (voltage at positive probe of ohmmeter must be positive with respect to ground). Connect positive probe on ohmmeter to pin 17 on incoming COCE or RSUCE connector in bay. Measure dc resistance to ground. Should be greater than 1.8 k $\Omega$ if 1 ICE is in loop; 3.8 k $\Omega$ if 2 ICE; 5.4 k $\Omega$ if 3 ICE. Repeat for pin 20 on incoming COCE or RSUCE connector.	Test passes.		Step 15
		Test fails; 1,2, or 3 ICEs in loop. Resistance less than 1.8 k $\Omega$ .	Short may be in common side of loop between CO and first ICE. Dispatch personnel to first ICE location.	Step 10
		Test fails; 2 or 3 ICEs in loop. Resistance between 1.8 k $\Omega$ and 3.6 k $\Omega$ .	Short may be in common side of loop between first ICE and second ICE. Dispatch personnel to second ICE location.	Step 10
		Test fails; 3 ICEs in loop. Resistance between 3.6 k $\Omega$ and 5.4 k $\Omega$ .	Short may be in common side of loop between second ICE and third ICE. Dispatch personnel to third ICE location.	Step 10
10	At the ICE location, remove the common ICE (937B). Repeat only the PROCEDURE column of Step 9. <i>DC resistance to ground should be greater than 10 k<math>\Omega</math>.</i>	Test passes.	Trouble is in common ICE at present location.	Step 14
		Test fails. No ICEs between present location and CO or WBRs.	Trouble is in cable in the common side of loop between CO and first ICE.	Step 13
		Test fails. One or more ICEs between present location and CO or WBRs.	Short to ground in common side of loop between CO or WBRs and present location but not in ICE at this location.	Step 11
11	At the next ICE location closer to CO or WBRs, remove the common ICE. Repeat only the PROCEDURE column of Step 9. <i>DC resistance to ground should be greater than 10 k<math>\Omega</math>.</i>	Test passes.	Trouble in common ICE at present location or in line between present location and ICE location next farthest away from CO or WBRs.	Step 12

CHART 2 (Cont)

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO
11 (cont)		Test fails. No ICEs between present location and CO or WBRs.	Trouble in cable in common side of loop between CO or WBRs and first ICE.	Step 13
		Test fails. ICE between present location and CO or WBRs.	Short to ground in common side of loop between CO or WBRs and present location but not in ICE at this location.	REPEAT Step 11
12	Ensure that the common COCE and ICEs terminating the section of line in question are removed and then test the section of line in question for shorts to ground.	Trouble found.		STOP
		No trouble found.	Trouble in common ICE.	Step 14
13	Ensure that the incoming COCE or RSUCE and common ICEs are removed and then test the section of line in question for shorts to ground.		These test should locate the trouble.	STOP
14	Replace common ICE (937B) with a new unit. Realign loop.		This step should clear the trouble.	STOP
15	Ensure that outgoing and incoming COCE or RSUCE are removed. Connect positive probe on ohmmeter to ground (voltage at negative probe of ohmmeter must be negative with respect to ground). Connect negative probe on ohmmeter to pin 3 on outgoing COCE or RSUCE connector in bay. Measure dc resistance to ground. Should be greater than 1.8 k $\Omega$ if 1 ICE is in loop; 3.6 k $\Omega$ if 2 ICE; 5.4 k $\Omega$ if 3 ICE. Repeat for pin 4 on outgoing COCE or RSUCE connector.	Test passes.	Trouble is probably in control or common power loop-back ICE, in power loop-back path, or in incoming COCE or RSUCE.	Step 21
		Test fails; 1, 2, or 3 ICEs in loop. Resistance less than 1.8 k $\Omega$ .	Short may be in control side of loop between CO and first ICE. Dispatch personnel to first ICE location.	Step 16
		Test fails; 2 or 3 ICEs in loop. Resistance between 1.8 k $\Omega$ and 3.6 k $\Omega$ .	Short may be in control side of loop between first ICE and second ICE. Dispatch personnel to second ICE location.	Step 16

CHART 2 (Cont)

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO
15 (cont)		Test fails; 3 ICEs in loop. Resistance between 3.6 k $\Omega$ and 5.4 k $\Omega$ .	Short may be in control side of loop between second ICE and third ICE. Dispatch personnel to third ICE location.	Step 16
16	At the ICE location, remove the control ICE (937C). Repeat only the PROCEDURE column of Step 15. <i>DC resistance to ground should be greater than 10 k<math>\Omega</math>.</i>	Test passes.	Trouble is in control ICE at present location.	Step 20
		Test fails. No ICEs between present location and CO or WBRs.	Trouble is in cable in the control side of loop between CO and first ICE.	Step 19
		Test fails. One or more ICEs between present location and CO or WBRs.	Short to ground in control side of loop between CO or WBRs and present location but not in ICE at this location.	Step 17
17	At the next ICE location closer to CO or WBRs, remove the control ICE. Repeat only the PROCEDURE column of Step 15. <i>DC resistance to ground should be greater than 10 k<math>\Omega</math>.</i>	Test passes.	Trouble in control ICE at present location and ICE location next farthest away from CO or WBRs.	Step 18
		Test fails. No ICEs between present location and CO or WBRs.	Trouble in cable in control side of loop between CO or WBRs and first ICE.	Step 19
		Test fails. ICE between present location and CO or WBRs.	Short to ground in control side of loop between CO or WBRs and present location but not in ICE at this location.	REPEAT Step 17
18	Ensure that the control COCE and ICEs terminating the section of line in question are removed and then test the section of line in question for shorts to ground.	Trouble found.		STOP
		No trouble found.	Trouble in control ICE.	Step 20
19	Ensure that the outgoing COCE or RSUCE and control ICE are removed, and then test the section of line in question for shorts to ground.		These tests should locate the trouble.	STOP
20	Replace the control ICE (937C) with a new unit. Realign loop.		This step should clear the trouble.	STOP

CHART 2 (Cont)

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO
21	Replace incoming COCE or RSUCE (937B) with a new unit. Place all units back in position so loop is being powered normally. Repeat only the PROCEDURE column of Step 7.	Test passes.	Trouble may be cleared; re-align loop.	STOP
		Test fails.	Trouble probably is in control or common power loopback ICE or in power loopback path. Dispatch personnel to power loopback ICE location.	Step 22
22	Repeat only the PROCEDURE column of Step 10. If the trouble is not located, repeat only the PROCEDURE column in Step 16.	Test passes.		Step 23
		Step 10 — Fails		Proceed to Step 11 or 13 as indicated in Step 10.
		Step 16 — Fails		Proceed to Step 17 or 19 as indicated in Step 16.
23	Remove common and control power loopback ICE. Check dc resistance of power loopback path to ground. (Pin 7 on control ICE connector; pin 13 on common ICE connector). Impedance to ground should be greater than 20 k $\Omega$ .	Test passes.		Step 24
		Test fails.	Find trouble and repair.	STOP
24	Replace control ICE with new unit. Place all units back in position so loop is being powered normally. Repeat only the PROCEDURE column of Step 7.	Test passes.	Trouble may be cleared. Re-align loop.	STOP
		Test fails.	Trouble may be in common ICE.	Step 25
25	Replace control ICE with original unit. Replace common ICE with new unit. Ensure that power is applied to loop. Repeat only the PROCEDURE column of Step 7.	Test passes.	Trouble may be cleared. Re-align loop.	STOP
		Test fails.	More thorough tests must be performed that are not covered by BSPs.	SD-1C346-01 CD-1C346-01

**CHART 3—DC FAULT LOCATING TESTS (Tests for Locating Open Circuits on Simplex Powered Loops) (Fig. 4)**

**4.06** If the simplex power flowing in the video pairs is interrupted, it is possible to localize the failure to a particular section by use of the dc fault locating network. The network consists of a normally reversed biased diode in series with a resistor (CR2 and R72 on equalizer 937C).

**4.07** After the incoming and outgoing COCE or RSUCE is removed and replaced with 874C through-connection networks, 48 volts is applied in a manner to cause direct current to flow in the direction opposite to that of the simplex loop powering current. The reverse current across the two video pairs at an equalizer causes the

diode to conduct current from one video pair to the other through the resistor. The amount of loop current flowing gives an indication of the number of bridging resistors and hence, the number of "good" sections by counting toward the station set from the central office.

**4.08** *The dc fault locating test is effective only if both wires in a pair are open. If only one of a pair is open, simplex current can still flow and no open circuit will be detected by this procedure.*

**4.09** The procedures of Chart 3 assumes that the dc fault locating tests are performed at the cable equalizer bay in the CO.

*Note:* Test for locating open circuits does not apply if ICEs are locally powered.

**CHART 3**

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO
1	Remove the COCE 937A and 937B (or RSUCE 937B and 937C) of the associated loop in trouble.			Step 2
2	Insert through-connection cards (874C) in place of the COCE or RSUCE to provide a through connection to the equalizer jacks.			Step 3
3	Connect a $48 \pm 0.1$ Vdc supply and a milliammeter in series with the equalizer jacks. Ensure the positive side of the $48 \pm 0.1$ Vdc supply is connected to the LINE IN jack and the negative side to the EQ OUT jack (Fig. 4). Adjust supply to $48 \pm 0.1$ Vdc after above connections are made (use a volt-ohm-milliammeter for this adjustment).			Step 4
4	Observe the milliammeter.	0 mA	First section of loop or first ICE. Check continuity of loop from equalizer bay to MDF and from MDF to outgoing cable pair [leaving CO or WBR location (2.09 and 2.10)].	Location and repair

CHART 3 (Cont)

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO
4 (cont)		6-8 mA	Loop containing one ICE — power loopback or first ICE.	Location and repair
			Loop containing more than one ICE — second section of loop or first or second ICE.	Location and repair
		11-13 mA	Loop containing two ICEs — power loopback or second ICE.	Location and repair
			Loop containing three ICEs — third section of loop or second or third ICE.	Location and repair
		14-20 mA	Loop containing three ICEs — power loopback or third ICE.	Location and repair
		More than 30 mA	No break.	Step 5
5	Remove the through-connection cards (874C), milliammeter, and 48-Vdc supply.			Step 6
6	Reinsert the COCE 937A and 937B (or RSUCE 937B and 937C) of the associated loop in trouble.			Chart 2, Step 7

CHART 4—TESTS USING THE JIC150L FAULT LOCATING TEST SET

**4.10** Cable equalizers can be provided with an ac fault locating network which can be used to detect and localize gross failures between the switch side of the COCE or RSUCE (simplex powered) in the serving central office on the wideband remote switch and the last ICE in the transmission path.

**4.11** A part of the fault locating circuit (twin-T network) is contained on a small board which screws onto the 937A, 937C, or 937E equalizers. The 937C should not be equipped for fault locating when used on the test lines from the master test frame, test desk, or test board. The twin-T networks are located as follows: 876A (570 Hz) in the serving central office or at the wideband remote switch; 876B (690 Hz) in the first ICE from CO or WBRs; 876C (810 Hz) in the second ICE from CO or WBRs; and 876D

(930 Hz) in the third ICE or farthest ICE from CO or WBRs.

**4.12** Locally powered cable equalizers at the WBRs and all cable equalizers at a PBX equipment location have no provision for fault locating.

**4.13** The procedures of Chart 4 assumes that a gross failure has occurred in the PICTUREPHONE loop. It is characterized by symptoms of *NO* picture in either or both directions of transmission. For cases where there is poor picture transmission in either or both directions refer to Chart 1.

**Note:** Before placing the fault location test set (Fig. 5) in service, press the BAT CHK button and observe meter to verify the condition of the test set battery. If the meter indicates in the fail region, replace the battery. The procedure for replacing the battery is in Section 103-935-100.

CHART 4

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO
1	<p>Connect the FALTS input plug to the incoming (common) EQ OUT jack of the loop to be tested and the output plug of the FALTS to the outgoing (control) LINE IN (STA L IN for PBX) jack of the same loop.</p> <p><i>Note:</i> If FALTS tests are made from local test desk, connect FALTS output to outgoing video pair and FALTS input to incoming video pair.</p>			Step 2
2	<p>Rotate the selector switch on the FALTS to the COCE position and make a FALTS test.</p> <p><i>Note:</i> Omit this test for locally powered loops terminating on a WBRs and for all PBX loops. Go to Step 3.</p>	Test passes.		Step 3
		Test fails.	The outgoing or incoming COCE or RSUCE (simplex powered) may have failed. Ensure the twin-T network in the outgoing COCE (937A) or RSUCE (937C) is 876A.	Chart 5, Step 1
3	<p>Rotate the selector switch on the FALTS to the ICE 1 position and make a FALTS test.</p> <p><i>Note:</i> FALTS test for ICE positions may be omitted depending upon the makeup of the loop.</p>	Test passes.		Step 4
		Test fails.	The control or common half of the first ICE or the cable between the CO, WBRs, or PBX, and the first ICE may be defective. Ensure the twin-T network in ICE 1 control half (937C) is 876B.	Chart 5, Step 10
4	<p>Rotate the selector switch on the FALTS to the ICE 2 position and make a FALTS test.</p>	Test passes.		Step 5
		Test fails.	The control or common half of the 2nd ICE or the cable between the 1st and 2nd ICE may be defective. Dispatch personnel to 2nd ICE location. Ensure the twin-T network in control half of ICE 2 (937C) is 876C.	Chart 5, Step 13
5	<p>Rotate the selector switch on the FALTS to the ICE 3 position and make a FALTS test.</p>	Test passes.		Step 6
		Test fails.	The control or common half of the 3rd ICE or the cable between the 2nd and 3rd ICE may be defective. Dispatch personnel to 3rd ICE location. Ensure the twin-T network in control half of ICE 3 (937C) is 876D.	Chart 5, Step 13

CHART 4 (Cont)

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO
6	Rotate the selector switch on the FALTS to the LOOPBACK position and make a FALTS test.	Test passes.	Trouble in single line station set or on station side of KTS loopback (2.13).	Section 518-800-505 or 518-800-501
			Trouble on loop is a partial fault (poor picture).	Chart 6, Step 2
		Test fails. Station set terminates loop.	SSCE or the station set may be defective.	Section 518-800-505  <i>Note:</i> Perform the tests in the above section before preceding to Chart 5, Step 31
			There may be trouble in the cable between the station set and the last ICE (or COCE, RSUCE, or PBX if there is no ICE). If there is no ICE in loop, perform any additional continuity test (2.09 and 2.10). Dispatch personnel to station set location.	Chart 5, Step 31
		Test fails, KTS terminates loop.	The control or common KTSCE may be defective or there may be trouble in the cable between the KTSCE and the last ICE (or COCE, RSUCE, or PBX if there is no ICE).	Chart 5, Step 31
7	Remove the FALTS from cable equalizer jack field.			

**CHART 5—GROSS FAULT LOCATING USING THE JIC150K CABLE EQUALIZER TEST SET**

**4.14** The procedure of Chart 5 assumes that a gross failure has occurred in the video loop. A gross fault is characterized by symptoms of *NO* picture in either or both directions of transmission. For cases where there is poor picture transmission in either or both directions refer to Chart 1.

**4.15** Chart 5 is entered according to the results of FALTS tests made in Chart 4. The tests in Chart 4 should be performed before those in Chart 5.

*Note:* When a STOP instruction is indicated in the GO TO column, return to Step 2 of Chart 1.

CHART 5

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO
<b>Step 2 of Chart 4 Fails</b>				
1	Perform the battery check and calibration of the CETS (Fig. 6). Calibration of the CETS is found in Section 103-930-100.			Step 2
2	Place the CETS switches as follows: POWER — ON MODE — F1 EQUALIZER ALIGN — AUX IMPEDANCE — NORMAL			Step 3
3	Connect CETS balanced output to the outgoing COCE or RSUCE (simplex powered) LINE IN jacks on CE jack field and connect CETS input to outgoing COCE or RSUCE (simplex powered) jacks TP1-TP2. CETS null indicator should be off scale to the right.  <i>Note:</i> Omit this step at PBX locations and for locally powered RSUCEs. Go to Step 5.	Test passes.		Step 4
		Test fails.	Outgoing COCE or RSUCE is defective. Replace with new unit. Trouble should be cleared.	Step 7
4	Remove CETS connections made in Step 3.			Step 5
5	Open switch SW1 on incoming COCE, PBXCE, or RSUCE (937B) and connect CETS unbalanced output (TP1-TP3) to incoming COCE, PBXCE, or RSUCE jacks TP1-TP3. Set CETS impedance switch to LOW and connect CETS input to incoming COCE, PBXCE, or RSUCE EQ OUT jacks on CE jack field. Ensure all CETS settings <i>except</i> the impedance switch are the same as in Step 2. Note the position of CETS null indicator.	Test passes. CETS indicator is in yellow null region.		Step 6
		Test fails. CETS indicator is outside of PASS region.	Incoming COCE, PBXCE, or RSUCE is defective. Replace with new unit. Re-align loop.	Step 7
6	Close switch SW1 on incoming COCE, PBXCE, or RSUCE and remove connections made in Step 5. Turn CETS off.			Step 8

CHART 5 (Cont)

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO
7	If trouble still exists after the replacement of the incoming or outgoing COCE, PBXCE, or RSUCE check the continuity of the connections between the CE jack field and the cable equalizers in question.	Test passes.	Further tests must be performed.	Chart 1
		Test fails.	Find defective wiring or connections and repair.	STOP
8	Replace outgoing COCE (937A), or RSUCE (simplex powered) (937C) with a new unit. Realign RSUCE using Section 340-200-501. Repeat only the PROCEDURE column in Steps 1 and 2 of Chart 4.	FALTS test passes for COCE.	Trouble should be cleared.	STOP
		FALTS test fails for COCE.	Incoming COCE, or RSUCE (simplex powered) is defective.	Step 9
9	Replace new outgoing (control) COCE (937A) or RSUCE (937C) with original unit. Replace incoming COCE or RSUCE (937B) with new unit. Realign common half of loop.		Trouble may be cleared.	STOP
<b>Step 3, 4, or 5 of Chart 4 Fails</b>				
10	Does a locally powered RSUCE or a PBXCE terminate the loop?	Yes	Perform any additional continuity tests that can be made at the CO, WBRs, or PBX (2.09 and 2.10).	Step 11
		No	Dispatch personnel to first ICE location.	Step 13
11	Check the continuity of the connections between the CE jack field and the incoming PBXCE or RSUCE in question. (EQ OUT Tip to pin 3, EQ OUT Ring to pin 4). If 874C through-connection card is used in place of the outgoing RSUCE, check continuity of connections between jack field and this card. (LINE IN Tip to pin 20, LINE IN Ring to pin 17) (At PBX STA L IN instead of LINE IN).	Continuity OK.		Step 12
		No continuity.	Find trouble and repair.	STOP
12	Replace incoming RSUCE or PBXCE (937B) with a new unit. Set the potentiometers on the unit to the same position as	FALTS test passes.	Trouble may be cleared. Realign loop.	STOP
		FALTS test fails.	Trouble may be in loop between PBX or WBRs and	Step 13

CHART 5 (Cont)

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO
12 (cont)	those on the old unit. Perform FALTS test for 1st ICE. (Chart 4, Steps 1 and 3)		1st ICE or in 1st ICE (common or control half). Perform any additional continuity tests that can be made at the CO, WBRs, or PBX (2.09 and 2.10). Dispatch personnel to 1st ICE location.	
13	At the ICE location, ensure that the proper twin-T network is installed. If ICE is powered locally, check power supply for control and common ICE ( $24 \pm 2$ volts).  <i>Note:</i> Steps 13 through 30 may be repeated if more than one ICE is in the loop.			Step 14
14	Prepare CETS at <i>both</i> COCE, RSUCE, or PBXCE and ICE locations as follows: MODE — F1 EQUALIZER ALIGN — AUX IMPEDANCE — NORMAL POWER — ON			Step 15
15	Connect CETS at COCE, RSUCE, or PBXCE and ICE locations as shown in Fig. 7. Read positions of CETS null indicator at both locations.  <i>Note:</i> If this test passes but CETS meter indicator lies outside of yellow region, the loop in question should be realigned after trouble is found.	Test passes. CETS indicator lies within outermost lines on meter scale.	Trouble is in output stage of control ICE or in input stage or equalizer stage of common ICE.	Step 27
		Test fails at COCE, RSUCE, or PBXCE location.	Common ICE or common cable pair between common ICE and next equalizer location toward CO, WBRs, or PBX may be defective.	Step 20
		Test fails at ICE location.	Control ICE or control cable pair between control ICE and next equalizer location toward CO, WBRs, or PBX may be defective.	Step 16
16	Attempt to align the control ICE at F1 only. (See Section 340-200-501 for alignment instructions.)	Alignment is successful.	Trouble may be cleared. Re-align control half of loop.	STOP
		Alignment fails.	Control ICE may be defective.	Step 17

CHART 5 (Cont)

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO
17	Replace control ICE with new unit. Attempt to align new control ICE at F1 only.	Alignment is successful.	Trouble may be cleared. Re-align control half of loop.	STOP
		Alignment fails.	Trouble is in control equalizer at next equalizer location toward CO, WBRs, or PBX or in the cable between.	Step 18
18	At the next equalizer location toward the CO, WBRs, or PBX replace control (outgoing) equalizer on loop in question with a new unit. If this equalizer is an ICE or RSUCE (937C) align it (using Section 340-200-501) for F1 only. Attempt to align ICE at location of Step 17 at F1 only.  <i>Note:</i> Omit this step if it involves a PBX or locally powered WBRs location. Go to Step 19.	Alignment is successful.	Trouble may be cleared. Re-align control half of loop.	STOP
		Alignment fails.	Trouble is in the cable connecting the ICE in Step 17 to the control (outgoing) equalizer of this step.	Step 19
19	Remove the equalizers from the troubled section of loop and test this section of cable for continuity and shorts.		This step should locate the trouble.	STOP
20	Remove the common ICE and replace with a new unit. Repeat only the PROCEDURE column in Steps 14 and 15. (See Note of Step 15.)	Test passes. CETS indicator lies within outermost lines on meter scale.	Trouble may be cleared. Re-align common half of loop.	STOP
		Test fails at COCE, RSUCE, or PBXCE location.	Trouble is in common equalizer (937B) at next equalizer location toward CO, WBRs, or PBX or in cable between.	Step 21
21	Replace the new common ICE used in Step 20 with the original unit.		Trouble is <i>not</i> in common ICE at this location.	Step 22
22	Repeat only the PROCEDURE column in Step 14.			Step 23
23	Connect CETS at the locations shown in Fig. 8. Attempt to align the equalizer at location B at F1 only.	Alignment is successful.	Trouble may be cleared.	STOP
		Alignment fails.	Trouble in equalizer at location B or in cable between location A and B.	Step 24

CHART 5 (Cont)

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO
24	Remove the 937B equalizer at location B and replace with new unit. Repeat only the PROCEDURE column in Steps 22 and 23.	Alignment is successful.	Trouble may be cleared.	STOP
		Alignment fails.	Trouble is in the cable between location A and location B.	Step 25
25	Remove the equalizers on this section of loop in question and test the cable for continuity and shorts.		This step should locate trouble.	Step 26
26	Remove all CETS connections and turn CETS off. Check to ensure that all SW1 switches on all cable equalizers are in closed positions.			STOP
27	Remove control ICE and replace with a new unit. Align the control ICE for F1 only. (See Section 340-200-501.)			Step 28
28	Close common ICE (937B) switch SW1 and remove CETS connections.			Step 29
29	Perform FALTS test (Chart 4) for ICE location of Step 27.	FALTS test passes.	Trouble may be cleared.	STOP
		FALTS test fails.	Trouble is in common ICE.	Step 30
30	Replace common ICE (937B) with new unit. Align the common ICE (Section 340-200-501).		This step should clear trouble. Realign loop.	STOP
<b>Step 6 of Chart 4 Fails</b>				
31	At the KTSCE or station set location, check power supply voltage. At KTSCE (606A or 607A) in question, voltage should be 18 to 26 volts between pin A3 (GRD) and pin A18 (-). At SSCE (937A or B) voltage should be 21 to 24 volts between pin 5 (GRD) and pin 7 (-).	Test passes.	Powering OK.	Step 32
		Test fails.	Check associated power supply and wiring.	STOP
32	Set CETS at COCE, RSUCE or PBXCE and KTSCE (or single line SSCE) locations as follows: MODE — F1 EQUALIZER ALIGN — AUX IMPEDANCE — NORMAL POWER — ON			Step 33

CHART 5 (Cont)

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO
33	Connect CETS at COCE, RSUCE or PBXCE and at KTSCE (or single line SSCE) as shown in Fig. 9. Read position of CETS null indicator at both locations. (See Note of Step 15.)	Test passes. CETS indicator lies within outermost lines on meter scale.	Trouble in loopback circuitry.	Step 50
		Test fails at COCE, RSUCE, or PBXCE location.	Common (606A) KTSCE (or 939A SSCE) may be defective or common side of loop between KTSCE (or SSCE) and last ICE (or COCE, RSUCE, or PBXCE if no ICE in loop) may be defective.	Step 42
		Test fails at KTSCE (or SSCE) location.	The control KTSCE (607A) (or SSCE 939A) may be defective or trouble may be in the loop between KTSCE (or SSCE) and last ICE (or COCE, RSUCE, or PBXCE if no ICE in loop).	Step 34
34	Remove control KTSCE 607A (or SSCE 939A) and replace with a new unit.			Step 35
35	Attempt to align the new control KTSCE (or SSCE) at F1 only.	Alignment is successful.	Trouble may be cleared. Re-align control half of loop.	STOP
		Alignment fails. ICE in loop.	Put original control KTSCE (or SSCE) back in place. Trouble may be in the control ICE immediately preceding KTSCE (or SSCE) or in loop between control ICE and KTSCE (or SSCE). Make all continuity tests on control loop pair that are possible at KTS (or station set) location. Dispatch personnel to ICE location immediately preceding KTSCE (or SSCE) location.	Step 38
		Alignment fails. No ICE in loop.	Put original control KTSCE (or SSCE) back in place. Trouble may be in control (outgoing) COCE or RSUCE (simplex powered) or in control half of loop	Step 36

CHART 5 (Cont)

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO
35 (cont)			between the CO, WBRS, or PBX and the KTSCE (or SSCE).	
36	Replace the outgoing (control) COCE (937A) or RSUCE (937C) (simplex powered) with new unit. Align RSUCE (937C) using Section 340-200-501. Repeat only the PROCEDURE column in Steps 32 and 33. (See Note in Step 15.)  <i>Note:</i> Omit this step for locally powered RSUCEs and all PBXCEs. Go to Step 37.	Test passes. CETS indicator lies within outer-most lines on meter scale.	Trouble may be cleared.	STOP
		Test fails at KTSCE (or SSCE) location.	Trouble is in cable in control half of loop between outgoing COCE or RSUCE and the control KTSCE (or SSCE).	Step 37
37	Remove outgoing COCE or RSUCE (if any) and control KTSCE (or SSCE) and have local test center test cable pair (2.05).		This step should locate trouble.	STOP
38	At the ICE location, if ICE is powered locally, check power supply voltage. Voltage should be $24 \pm 2$ volts.			Step 39
39	(a) <i>At ICE and KTSCE (or SSCE) location:</i> Set CETS as described in Step 32.  (b) <i>At ICE location:</i> Open control ICE switch SW1 and connect CETS TP1-TP3 output terminals to control ICE TP1-TP3. Connect CETS TP1-TP2 input terminals to common ICE TP1-TP2.  (c) <i>At KTSCE (or SSCE) location:</i> Connect CETS as shown in Fig. 9. Ensure that common KTSCE switch SW1 is open (or SSCE switches S2T and S2R).  (d) <i>At both locations:</i> Read position of CETS null indicator.	Test passes. CETS indicator lies within yellow region.		Step 14
		Test fails at ICE location.	Trouble is in common ICE or in cable between the ICE and KTSCE (or SSCE).	Step 48
		Test fails at KTSCE (or SSCE) location.	Trouble is in last control ICE or in cable between the last control ICE and KTSCE (or SSCE).	Step 40
40	Remove control ICE and replace with a new unit. Repeat only the PROCEDURE column in Step 39.	Test passes. CETS indicator lies within yellow region.	Trouble may be cleared. Re-align control half of loop.	STOP

CHART 5 (Cont)

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO
40 (cont)		Test fails at KTSCE (or SSCE) location.	Trouble is in cable between ICE and KTSCE (or SSCE).	Step 41
41	Remove control ICE and KTSCE (or SSCE) and test cable pair for continuity, shorts, and opens.		This step should locate trouble.	STOP
42	Replace common KTSCE (606A) or SSCE (939A) with new unit. Align SSCE (939A) at F1 only. Repeat only the PROCEDURE column in Steps 32 and 33.	Test passes.	Trouble may be cleared. Re-align control half of loop if it contains SSCE.	STOP
		Test fails at COCE, RSUCE, or PBXCE location.	Trouble may be in cable between common KTSCE (or SSCE) and last ICE (or COCE, RSUCE, or PBXCE if no ICE) or in last common ICE (or incoming COCE, RSUCE, or PBXCE if no ICE).	Step 43
43	Is there an ICE in the loop?	Yes	Trouble is in last common ICE or in cable between last common ICE and KTSCE (or SSCE). Make all continuity tests on common half of loop that are possible at KTS (or station set) location. Dispatch personnel to ICE location immediately preceding KTSCE (or SSCE) location.	Step 47
		No	Trouble is in incoming COCE, RSUCE, or PBXCE or in cable in common side of loop between incoming COCE, RSUCE, or PBXCE and common KTSCE (or SSCE).	Step 44
44	Remove incoming COCE, RSUCE, or PBXCE and replace with a new unit.			Step 45
45	Attempt to align new incoming (common) COCE, RSUCE, or PBXCE at F1 only. (See Section 340-200-501.)	Alignment is successful.	Trouble may be cleared. Re-align common half of loop.	STOP
		Alignment fails.	Trouble in cable between common (incoming) COCE, RSUCE, or PBXCE and KTSCE (or SSCE).	Step 46

CHART 5 (Cont)

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO
46	Remove incoming COCE, RSUCE, or PBXCE and common KTSCE (or SSCE) and have local test desk test the cable pair (2.05).		This step should locate trouble.	STOP
47	At the ICE location, if the ICE is powered locally, check power supply voltage. Voltage should be $24 \pm 2$ volts.			Step 39
48	Remove common ICE and replace with a new unit. Attempt to align loop at F1 only between common KTSCE 606A (or SSCE 939A) and last common ICE 937B (Section 340-200-501).	Alignment is successful.	Trouble may be cleared. Re-align common half of loop.	STOP
		Alignment fails.	Trouble is in cable between KTSCE (or SSCE) and ICE.	Step 49
49	Remove common ICE and KTSCE (or SSCE) and test the cable pair for continuity, shorts and opens.		This step should locate trouble.	STOP
50	(a) Replace common KTSCE 606A or SSCE 939A with a new unit. Align SSCE at F1 only. (b) Remove all CETS connections and ensure that all equalizer switches SW1 (S2T and S2R on SSCE) are closed. (c) Perform FALTS test for KTS or station loopback as described in Steps 1 and 6 of Chart 4.	FALTS test passes.	Trouble may be cleared. Re-align control side of loop if it contains a SSCE.	STOP
		FALTS test fails.	Trouble is in KTS or in 1A service unit.	Section 518-800-505 or 518-800-501

**CHART 6—PARTIAL FAULT LOCATING TESTS**

**4.16** The partial fault is characterized by poor picture transmission and is usually more difficult to locate than a gross fault. In certain cases partial faults can be located by using gross fault location procedures outlined in Chart 5. In other cases gross fault tests will indicate no trouble even though trouble obviously exists. In these cases partial fault locating procedures must be used.

**4.17** Partial fault locating tests should locate troubles such as: over-equalized or under-equalized section of cable; serious unbalances; overall losses in signal level.

**4.18** As in Chart 5, only one trouble is assumed to occur at any one time. Multiple troubles should be investigated by repeating the procedures until all problems are found and cleared. When a customer complains of only slight impair-

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ment in picture resolution, the loop should be re-aligned using the procedures of Section 340-200-501.

**4.19** The approach used for partial fault trouble location is a modified loop alignment procedure. The loop in trouble is aligned a sec-

tion at a time. After each loop section is aligned, tests are made to see if trouble still exists. This continues until the trouble is found. An effort is made to locate the trouble from the central office and then from the customer's end of the loop before dispatching personnel to intermediate equalizer locations.

**CHART 6**

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO
1	The tests in Charts 2, 4, and possibly Chart 5 should be followed before beginning this Chart. Follow Charts 2, 4, and 5 as if the trouble were a gross fault. Go to Chart 1, Step 16.	Charts 2,4, and 5 tests find trouble.	Trouble may be cleared.	STOP
		Charts 2,4, and 5 tests find <i>NO</i> trouble.	Procedure in following steps must be used.	Step 2
2	Recall the results of Chart 1, Step 3 (call to customer).  <i>Note:</i> If Chart 1, Step 3 has not been performed, do it now.	Poor picture at subscriber set. Picture OK at test desk.	Trouble is in control side of loop. Make tests for equipment in control side of loop only.	Step 3
		Picture OK at subscriber set. Poor picture at test desk.	Trouble is in common side of loop. Make tests for equipment in common side of loop only.	Step 3
		Poor picture in both directions.	Trouble in equipment common to both loops. Possible powering at an ICE (if locally powered), KTSCE, or station set. Other troubles may be in cable, KTS, or station loopback circuits, or display unit.	Step 3
3	Recall the results of Chart 1, Step 4 or Step 12 (station loopback tests).  <i>Note:</i> If Step 4 or Step 12 of Chart 1 has not been performed, do it now.	Normal loopback picture is received.	Trouble is on station side of loopback.	Section 518-800-505 or 518-800-501
		Same poor loopback picture as observed in Step 2 (or worse) is seen.	Trouble is on CO, WBRs, or PBX side of loopback, or in loopback circuit.	Step 4
4	Recall the results of Chart 1, Step 5 or Step 13.  <i>Note 1:</i> If Step 5 or Step 13 of Chart 1 has not been performed, do it now.	Abnormal loopback picture.	In WBRs, PBX, or CO (if no WBRs or PBX) video switch or in cable between switch and equalizer jacks. <i>At PBX and WBRs:</i> Check wiring between X IN and	PBX
				WBRs

CHART 6 (Cont)

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO										
4 (cont)	<i>Note 2:</i> Omit this step if loop circuit order tests are being performed in place of video loopback tests. Go to Step 5.		X OUT at WBRS (NET IN and NET OUT at PBX) jacks on equalizer bay and WBDF or switch.	CO — Chart 1, Step 6										
		Loopback picture normal.		Step 5										
5	Check the continuity of the connections between the jacks on the CO, WBRS, or PBX equalizer bay and the COCEs, RSUCEs, or PBXCE on the loop in trouble. The connections between jacks and equalizers are as follows:  <table border="0"> <tr> <td><b>JACKS</b></td> <td><b>EQUALIZERS</b></td> </tr> <tr> <td>EQ OUT Tip</td> <td>Incoming Pin 3</td> </tr> <tr> <td>EQ OUT Ring</td> <td>Incoming Pin 4</td> </tr> <tr> <td>LINE IN Tip</td> <td>Outgoing Pin 20</td> </tr> <tr> <td>LINE IN Ring</td> <td>Outgoing Pin 17</td> </tr> </table> <i>Note:</i> No outgoing equalizer is provided on locally powered WBRS loops or on all PBX loops. Continuity to outgoing equalizers should be omitted in this case. (At PBX STA L IN instead of LINE IN at WBRS)	<b>JACKS</b>	<b>EQUALIZERS</b>	EQ OUT Tip	Incoming Pin 3	EQ OUT Ring	Incoming Pin 4	LINE IN Tip	Outgoing Pin 20	LINE IN Ring	Outgoing Pin 17	Continuity checks fail.	Find wiring trouble and correct.	STOP
		<b>JACKS</b>	<b>EQUALIZERS</b>											
EQ OUT Tip	Incoming Pin 3													
EQ OUT Ring	Incoming Pin 4													
LINE IN Tip	Outgoing Pin 20													
LINE IN Ring	Outgoing Pin 17													
Continuity checks OK.		Step 6												
6	Replace outgoing (control) COCE (937A) or RSUCE (937C) (simplex powered) with a new unit. Align RSUCE using Section 340-200-501. Have local test desk perform loopback call on line.  <i>Note:</i> Omit this step for locally powered WBRS loops and all PBX loops. Go to Step 7.	Loopback picture OK.	Trouble is cleared.	STOP										
		Same poor loopback picture received.	Trouble in incoming (common) COCE, RSUCE, or PBXCE in office cable, or in outside plant. Put original outgoing equalizer back in place.	Step 7										
7	Replace incoming (common) COCE, RSUCE, or PBXCE (937B) with a new unit. Adjust the potentiometers F1-F6 on the new unit to the same position as those on the original unit. Have local test desk perform loopback call on line.	Loopback picture OK.	Trouble may be cleared. Realign common half of loop.	STOP										
		Same poor loopback picture received.	Trouble in office cable or outside plant. Put original incoming equalizer back in place.	Step 8										

CHART 6 (Cont)

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO																											
8	Does loop terminate at CO, WBRs, or PBX?	CO		Step 10																											
		WBRs or PBX Normal video loopback calls are used to test loop.		Step 13																											
		Loop circuit order tests are being performed in place of video loopback calls.		Step 9																											
9	Check wiring between X OUT and X IN at WBRs (NET OUT and NET IN at PBX) jacks on equalizer bay and PBX or WBRs switch for opens, shorts, and bridged taps.  <i>Note:</i> Perform this test <i>only</i> if loop circuit order tests are being performed in place of normal video loopback calls.	Trouble found in wiring.		STOP																											
		No trouble found.	Trouble in office cable or outside plant. Perform any additional continuity test that can be made.	Step 13																											
			Trouble may possibly be in PBX or WBRs switch but this is less likely than the above suggested trouble.	PBX WBRs																											
10	Check the 874A line build-out networks in the line in trouble for the correct screw switch settings.	Screw switches improperly set.	Adjust screw switches to proper settings. Trouble may be cleared.	STOP																											
		Screw switch settings OK.		Step 11																											
11	Replace the 874A network(s) in question with new unit(s) on which the screw switches have been properly set. Have the local test desk perform loopback call on line.	Loopback picture normal.	Trouble may be cleared.	STOP																											
		No or abnormal loopback.	Trouble in office cable or in outside plant.	Step 12																											
12	Check the wiring between the jacks on the equalizer bay and the 874A networks and between the 874A networks and the wideband distributing frame (WBDF). Connections for these tests are as follows:  <table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;"><b>JACK or WBDF</b></td> <td style="width: 30%;"></td> <td style="width: 30%;"><b>874A NETWORK</b></td> </tr> <tr> <td>JACK</td> <td>X IN Tip</td> <td>Pin 20</td> </tr> <tr> <td></td> <td>X IN Ring</td> <td>Pin 17</td> </tr> <tr> <td></td> <td>X OUT Tip</td> <td>Pin 3</td> </tr> <tr> <td></td> <td>X OUT Ring</td> <td>Pin 4</td> </tr> <tr> <td>WBDF</td> <td>Tip from SW</td> <td>Pin 20</td> </tr> <tr> <td></td> <td>Ring from SW</td> <td>Pin 17</td> </tr> <tr> <td></td> <td>Ring</td> <td>Pin 3</td> </tr> <tr> <td></td> <td>Tip to SW</td> <td>Pin 4</td> </tr> </table>	<b>JACK or WBDF</b>		<b>874A NETWORK</b>	JACK	X IN Tip	Pin 20		X IN Ring	Pin 17		X OUT Tip	Pin 3		X OUT Ring	Pin 4	WBDF	Tip from SW	Pin 20		Ring from SW	Pin 17		Ring	Pin 3		Tip to SW	Pin 4	Trouble found in wiring.		STOP
		<b>JACK or WBDF</b>		<b>874A NETWORK</b>																											
JACK	X IN Tip	Pin 20																													
	X IN Ring	Pin 17																													
	X OUT Tip	Pin 3																													
	X OUT Ring	Pin 4																													
WBDF	Tip from SW	Pin 20																													
	Ring from SW	Pin 17																													
	Ring	Pin 3																													
	Tip to SW	Pin 4																													
		No trouble found.	Trouble in office cable or outside plant. Perform any additional continuity test that can be made.  Trouble may possibly be in CO video switch but this is less likely than the above suggested trouble.	Step 13																											

CHART 6 (Cont)

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO
13	Dispatch personnel to KTSCE (or single line SSCE) location. Check power supply voltages. Should be 18 to 26 volts at KTSCE (606A or 607A) pin A3 (GRD) and pin A18 (-). Should be 21 to 24 volts at SSCE (939A) pin 5 (GRD) and pin 7 (-).	Test passes.		Step 14
		Test fails.	Check power supply and wiring. For KTSCE and SSCE use Section 518-800-505 or 518-800-501.	STOP
14	Recall the results of Steps 2 and 3.  <i>Note:</i> If poor picture is observed in both subscriber and test desk locations, perform all tests beginning with both Step 15 and Step 30. (Steps beginning with 15 and 30 can be performed simultaneously).	Picture through KTS, or station loopback is OK.	Trouble in KTS or station set.	Section 518-800-505 or 518-800-501
		Poor picture at subscriber location and poor picture through loopback.	Trouble in control KTSCE (or single line SSCE) or in a control ICE or in connecting cable. Repeat only those steps applying to the control side of loop.	Step 30
		Poor picture at test desk location and poor picture through loopback.	Trouble in SSCE (937A), in common KTSCE, ICE, or incoming COCE, RSUCE, or PBXCE or in connecting cable. Repeat only those steps applying to the common side of loop.	Step 15
15	Replace common KTSCE (606A) or SSCE (939A) with new unit. Set potentiometers F1-F6 on the SSCE (939A) to the same position as those on the original unit.  <i>For KTSCE location:</i> Have local test desk perform loopback call on line.  <i>For 939A SSCE location:</i> Place a video call to the local test desk and have test desk evaluate the picture it receives.	Normal picture is received.	Trouble may be cleared. Realign control half of loop if it contains a 939A SSCE.	STOP
		Same poor picture as observed in Step 14 is seen.	Trouble in common ICE or incoming COCE, RSUCE, or PBXCE or in connecting cable. Put original equalizer back in place.	Step 16
16	Are there ICEs in the loop?	Yes	Trouble in a common ICE or in cable. Make all continuity tests on common loop pair that are possible at KTS or station set location.	Step 19

CHART 6 (Cont)

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO
16 (cont)		No	Trouble is in incoming COCE, RSUCE, or PBXCE or in between incoming COCE, RSUCE, or PBXCE and the KTSCE (or station set).	Step 17
17	Carefully remove incoming (common) COCE, RSUCE, or PBXCE (937B) making sure that no potentiometer settings are disturbed. Replace it with a new unit. Attempt to align incoming (common) COCE, RSUCE, or PBXCE using Section 340-200-501.	Alignment successful.	Have local test desk make a loopback call on line to determine if trouble has been cleared. If OK	STOP
			If trouble still exists	Step 18
		Alignment fails.	Trouble in cable between incoming (common) COCE, RSUCE, or PBXCE and the common KTSCE (or station set).	Step 18
18	Remove incoming COCE, RSUCE, or PBXCE and common KTSCE (or SSCE) and have local test center test cable pair for continuity, opens, shorts, bridged taps, loading coils, build-out capacitors, and water in the cable (2.05).		This step should locate trouble.	STOP
19	Dispatch personnel to last ICE location for further tests.			Step 20
20	If ICE is powered locally, check power supply voltage between pins 6 (GRD) and 11 (-) on common and control ICE (937B and 937C). Voltage should be $24 \pm 2$ volts.	Test passes or not powered locally.		Step 21
		Test fails.	Trouble in power supply or wiring. Repair or replace.	STOP
21	Carefully remove common ICE making sure no potentiometer settings are disturbed. Replace with a new unit. Attempt to align common ICE using Section 340-200-501.	Alignment successful.	Trouble may be cleared or may exist between common ICE and succeeding cable equalizers.	Step 23
		Alignment fails.	Trouble in cable between common ICE and preceding cable equalizer.	Step 22
22	Remove common ICE and preceding cable equalizer and test cable pair for continuity, opens, shorts, bridged taps, loading coils, build-out capacitors, and water in the cable.		This step should locate trouble.	STOP

CHART 6 (Cont)

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO
23	Have local test center make a loopback call to line in trouble.	Loopback picture normal.	Trouble may be cleared. Realign common half of loop.	STOP
		Poor loopback picture received.	Trouble may exist between ICE at present location and succeeding cable equalizers.	Step 24
24	Are there any ICEs between present ICE location and CO, WBRs, or PBX?	Yes		Step 25
		No		Step 26
25	Dispatch personnel to next ICE location closer to CO, WBRs, or PBX.			Step 20
26	Replace incoming (common) COCE, RSUCE, or PBXCE with a new unit. Attempt to align incoming equalizer using Section 340-200-501.	Alignment successful.	Trouble may be cleared or may be in cable.	Step 27
		Alignment fails.	Trouble in cable between common ICE and incoming COCE, RSUCE, or PBXCE.	Step 29
27	Have local test desk make loopback call to line in trouble.	Loopback picture normal.	Trouble may be cleared.	STOP
		Poor loopback picture received.	Trouble in common cable pair between CO, WBRs, or PBX and the KTSCE (or SSCE).	Step 28
28	Remove all equalizers in common half of loop and test all sections of the common cable pair between the CO, WBRs, or PBX and the KTS (or station set) for continuity, opens, shorts, bridged taps, loading coils, build-out capacitors, and water in the cable (2.05).		This step should clear trouble.	STOP
29	Remove common ICE and incoming COCE, RSUCE, or PBXCE and have local test center test cable pair for continuity, shorts, opens, bridged taps, loading coils, build-out capacitors, and water in the cable (2.05).		This step should locate trouble.	STOP
30	Carefully remove control KTSCE (607A) (or SSCE 939A) making sure that no potentiometer settings are disturbed. Replace it with a new unit. At-	Alignment successful.	Have local test desk make a loopback call on line in trouble to determine if trouble has been cleared. If OK	STOP

CHART 6 (Cont)

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO
30 (cont)	tempt to align control KTSCE (or SSCE) using Section 340-200-501.		If trouble still exists	Step 31
		Alignment fails.	Trouble in a control ICE or in cable between CO, WBRs, or PBX and the control KTSCE (or SSCE). Put original control KTSCE (or SSCE) back in place.	Step 31
31	Are there ICEs in the loop?	Yes	Trouble in a control ICE or in cable. Make all continuity tests on control loop pair that are possible at KTS (or station set) location.	Step 33
		No	Trouble is in cable between CO, WBRs, or PBX and KTSCE (or SSCE).	Step 32
32	Remove all equalizers in control half of loop and have local test center test the cable pair for continuity, shorts, opens, bridged taps, loading coils, etc (2.05).		This step should locate trouble.	STOP
33	Dispatch personnel to first ICE location for further tests.			Step 34
34	If ICE is powered locally, check power supply voltage between pins 5 (GRD) and 11 (-) on control and common ICE (937C and 937B). Voltage should be $24 \pm 2$ volts.	Test passes or not powered locally.		Step 35
		Test fails.	Trouble in power supply or wiring. Repair or replace.	STOP
35	Carefully remove control ICE making sure that no potentiometer settings are disturbed. Replace it with a new unit. Attempt to align control ICE using Section 340-200-501.	Alignment successful.	Trouble may be cleared or may exist between control ICE and succeeding cable equalizers.	Step 37
		Alignment fails.	Trouble in cable between preceding cable equalizer and control ICE.	Step 36
36	Remove preceding cable equalizer and control ICE and test the cable pair for continuity, opens, shorts, bridged taps, etc (2.05).		This step should locate and clear trouble.	STOP

CHART 6 (Cont)

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO
37	Have local test center make loopback call to line in trouble.	Loopback picture normal.	Trouble may be cleared. Re-align control half of loop.	STOP
		Poor loopback picture received.	Trouble may exist between ICE at present location and succeeding cable equalizers.	Step 38
38	Are there ICEs between present ICE location and KTS (or station set)?	Yes		Step 39
		No		Step 40
39	Dispatch personnel to next ICE location closer to KTS (or station set).			Step 34
40	Attempt to align control KTSCE (or SSCE) using Section 518-800-510.	Alignment successful.	Trouble may be cleared or may be in cable.	Step 41
		Alignment fails.	Trouble in cable between last control ICE and control KTSCE (or SSCE).	Step 43
41	Have local test desk make loopback call to line in trouble.	Loopback picture normal.	Trouble may be cleared.	STOP
		Poor loopback picture received.	Trouble in control half of cable pair between CO, WBRs, or PBX and the KTSCE (or SSCE).	Step 42
42	Remove all equalizers in control half of loop and test all sections of the control cable pair between the CO, WBRs, or PBX and the KTS (or station set) for continuity, opens, shorts, bridged taps, loading coils, build-out capacitors, and water in the cable (2.05).		This step should locate trouble.	STOP
43	Remove last control ICE and control KTSCE (or SSCE) and test the cable pair for continuity, shorts, opens, bridged taps, loading coils, build-out capacitors, and water in the cable (2.05).		This step should locate and clear trouble.	STOP

CHART 7 — LOCATION OF TROUBLE FOUND BY LOOP CIRCUIT ORDER TESTS

**4.20** Chart 7 is entered as a result of failure of one or more loop circuit order test. These tests are described in sections in the 341 divi-

sion. Included in the section are tests for: (a) envelope of allowed frequency deviation, (b) flat gain level, (c) overload, (d) random noise, (e) impulse noise, (f) single frequency interference, (g) 60-Hz power hum, and (h) tilt. Loop circuit

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order tests may be performed by the local test desk or by the mobile video test bay in the CO.

**4.21** If more than one loop circuit order test has failed, choose the test which has failed most severely and follow the procedure for locating this trouble alone. Repeat this procedure if trouble still exists after the first trouble investigated is cleared.

**4.22** The general approach to trouble locating in Chart 7 is to first determine which loop circuit order test(s) has failed. The procedure of Chart 6 is then followed until the particular trouble is cleared.

**4.23** If a step in Chart 7 directs the tester to Chart 6, it must be determined whether or not the trouble can be seen on the line under test in the video loopback picture. If the trouble causes visible impairment in the loopback picture, the

tester may follow Chart 6 without any modification. If there is no visible impairment in the picture or the impairment is very slight, the following changes in Chart 6 should be made:

- (a) Perform the loop circuit order test which failed to meet the requirements in place of all video loopback and regular calls to the line in trouble.
- (b) Omit Step 7 and go to Step 13. Omit Step 4 and go to Step 5.
- (c) In Step 15 align SSCE using Section 518-800-510 instead of "positioning" the potentiometers.
- (d) Assume poor picture in both directions of transmission if the trouble cannot be localized to the control or common half of the loop.

**CHART 7**

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO
1	Recall the results of the loop circuit order tests.	No ac continuity between control and common pair through station loopback or all signals looped back by station set or KTS return to testing location more than 20 dB too low.	These symptoms qualify the trouble as being a gross fault.	Step 2
		Loop gain or loss outside envelope of allowed frequency deviation.		Step 3
		Flat gain level (at 1 kHz) outside of allowed range.		Step 3
		Overload condition present.		Step 4
		Random noise exceeds requirement.		Step 5

CHART 7 (Cont)

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO
1 (cont)		Impulse noise exceeds requirement.		Step 6
		Single frequency interference or 60-Hz power line hum exceeds requirement.		Step 7
		Tilt requirements are not met.		Step 8
2	Assume that trouble is a gross fault (no picture in one or both directions).	This chart was entered from Chart 1, Step 17.	Check to make certain that all transmission tests were performed properly and that the proper connections were made.	Chart 1, Step 16
		This chart was entered from Chart 1, Step 1.		Chart 1, Step 2
3	Observe the results of tests on loop gain at all test frequencies from 1 kHz to 1 MHz (4.23).	Loop gain exceeds requirements only slightly (less than $\pm 0.5$ dB at 1 kHz, $\pm 1$ dB at 1 MHz) for one or more test frequencies.	Loop is probably poorly aligned. Realign the loop.	Section 518-800-510
		Loop gain exceeds requirements by more than $\pm 0.5$ dB at 1 kHz, $\pm 1.0$ dB at 1 MHz for one or more test frequencies.	Look for partial fault.	Chart 6 (4.23)
		Loop gain meets requirements at 1, 23, 70, 200, 500, and 900 kHz but exceeds them by more than $\pm 2$ dB at other frequencies.	Trouble may be a bridged tap on the loop in question. Test all sections of the loop for bridged taps. If none are found, continue with these procedures.	Chart 6 (4.23)

CHART 7 (Cont)

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO
3 (cont)		Flat gain (at 1 kHz) is 6 dB $\pm 1.25$ dB <b>LOW</b> .	Trouble may be either the tip or ring side of the line <b>open</b> somewhere in the loop. Check all sections of the loop in trouble for open tip or ring, or go to Chart 6. Go to Chart 6 if no trouble is found.	Chart 6 (4.23)
4	Overload — loop does not meet the requirements for maximum signal level without overloading.	Overload condition present.	Trouble is most likely in an equalizer and not in the cable.	Chart 6 (4.23)
5	Random noise	Random noise exceeds requirement.	Trouble may be in equalizers or cable.	Step 9
6	Impulse noise	Impulse noise exceeds requirement.	Impulse noise is created mainly by equipment in the CO, WBRs, or PBX. The trouble is, therefore, probably in the cable or equalizers within the CO, WBRs, or PBX. Check for tip and ring opens and shorts to ground. Also check to balance of the cable pair.	Step 9
7	Single Frequency Interference or 60-Hz power line hum	Single frequency interference or 60-Hz power line hum exceeds requirements.	Trouble may be due to defective equalizers, tip or ring open or shorted to ground somewhere in loop, poorly balanced cable pairs, or close proximity of interfering source to cable pair.	Step 9
8	Tilt	Tilt requirements are not met.	Trouble is most likely in an equalizer in the loop in trouble.	Chart 6 (4.23)
9	At the CO, WBRs, or PBX: (a) If the loop is <b>locally powered</b> , check the power supply voltages for both dc voltages and noise on both outgoing (if any) and incoming equalizers in the loop in trouble. Voltage should be $24 \pm 2$ volts between equalizer pin 6 (GRD) and pin 11 (-).	Trouble found in the power supply.	Locate and repair.	STOP
		Power supply OK.		Step 10

CHART 7 (Cont)

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO
9 (cont)	<p>(b) If loop is <i>simplex powered</i>, check power on incoming equalizer as in (a) above. Check simplex power by following the procedure of Chart 2.</p> <p><b>Note:</b> When checking power supply for dc voltage, also check the supply output for noise and interference using an ac electronic voltmeter. Noise should be less than 200 millivolts. If the noise or interference is greater than 200 millivolts, look for trouble in the power supply.</p>			
10	<p>At the CO, WBRS, or PBX, replace both outgoing (control) (if any) and incoming (common) equalizer on line in trouble with new units. If an equalizer is adjustable, set potentiometers to the same position as on original unit.</p>			Step 11
11	<p>Have the 15A test desk monitor noise or interference (depending upon whether Step 5, 6, or 7 has failed) <i>during the time that this step and Steps 12-14 are being performed.</i></p> <p><b>Note:</b> Noise and interference measurements are made by setting up a loopback call to the station in trouble from the 15A test desk. The outgoing line from the test desk is terminated with a resistive load (100 ohms) and noise and interference are measured at incoming pair.</p>	Noise or interference within requirements.	Trouble may be cleared. Realign loop using 518-800-510.	STOP
		Noise or interference exceeds requirements.	Put original equalizer back in place. The trouble is <i>not</i> in equalizer.	Step 12
12	<p>(a) For all CO and simplex powered WBRS equalizers, open screw switch SW1 on the outgoing (control) equalizer.</p> <p>(b) For all PBX, and locally powered WBRS loops, place a 100-ohm resistor across tip and ring at the LINE IN jack at WBRS <i>or</i> STA L IN jack at PBX.</p>	Noise or interference within requirements.	Trouble in control side of loop in preceding cable, jacks, build-out pads (if any) or in switch.	Chart 6, Step 5, 8, 9, 10, 11, and 12.
		Noise or interference exceeds requirements.		Step 13

CHART 7 (Cont)

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO
13	Close screw switch SW1 <i>or</i> remove the 100-ohm load.			Step 14
14	At the CO, PBX, or WBRs equalizer bay, open screw switch SW1 on the incoming (common) 937B equalizer.	Noise or interference within requirements.	Trouble in loop toward customer. Make any additional tests that can be made on both incoming and outgoing pair up to where it leaves CO, WBRs, or PBX location. (See 2.08, 2.09, and 2.10.)	Step 15
		Noise or interference exceeds requirements.	Trouble in common side of loop in succeeding cable, jacks, build-out pads (if any) or in switch.	Chart 6, Step 5, 8, 9, 10, 11, and 12.
15	Close screw switch SW1 opened in Step 14. Dispatch personnel to KTS or single line station location.			Step 16
16	At KTS or single line station location, perform PROCEDURE only of Chart 6, Step 13. (See Note Step 9, Chart 7.)	Power supply OK.		Step 17
		Trouble in power supply.	Check power supply and wiring for KTSCE (or SSCE). Use Section 518-800-505 or 518-800-501.	STOP
17	(a) <i>At KTS location:</i> Replace both control and common equalizers 607A and 606A on line in trouble with new unit.  (b) <i>At single line station location:</i> Replace 939A SSCE with a new unit.  <i>Note:</i> Set the potentiometers on control KTSCE 607A or SSCE 939A to same position as on original units.			Step 18
18	Have the 15A test desk monitor noise or interference (depending upon whether Step 5, 6, or 7 has failed) <i>during the time that this step and Steps 19-20 are being performed.</i>  <i>Note:</i> Noise and interference measurements are made by setting up a loopback call to the	Noise or interference within requirements.	Trouble may be cleared. Realign loop using 518-800-510.	STOP
		Noise or interference exceeds requirements.	Put original equalizer back in place. The trouble is <i>not</i> in equalizer.	Step 19

CHART 7 (Cont)

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO
18 (cont)	station in trouble from the 15A test desk. The outgoing line from the test desk is terminated with a resistive load (100 ohms) and noise and interference are measured at incoming pair.			
19	(a) At KTS location open screw switch SW1 on common 606A equalizer.	Noise or interference within requirements — KTS location.	Trouble in control half of loop or in KTS loopback circuit.	Step 20
	(b) At single line station open screw S2T and S2R on 1A service unit connector board. Place 100-ohm resistor across test points TO and RO.	Noise or interference within requirements — SSCE location.	Trouble in control half of loop. Perform tests only on equipment in control half of loop.	Step 21
	<i>Note:</i> Close screw switches and remove resistive load at completion of this step.	Noise or interference exceeds requirements.	Trouble in common half of loop. Perform only those tests on equipment in common half of loop.	Step 21
20	Open screw switch SW1 on control 607A KTSCE. <i>Note:</i> Close SW1 after completion of this step.	Noise or interference within requirements.	Trouble in control half of loop. Perform tests only on equalizer in control half of loop.	Step 21
		Noise or interference exceeds requirements.	Trouble in KTS loopback circuit. Find trouble and repair.	STOP
21	Does loop contain ICEs?	Yes		Step 23
		No	Trouble in cable.	Step 22
22	Remove all equalizers on section of cable believed to be in trouble and test the cable pair (2.05).			STOP
23	Dispatch personnel to first ICE location. If ICE is locally powered, perform the PROCEDURE only of Chart 6, Step 20. (See Note Step 9, Chart 7.)	Power OK or not powered locally.		Step 24
		Trouble in power supply.	Locate and repair.	STOP
24	At ICE location replace control 937C or common 937B ICE depending upon the side of the loop the trouble is in. Set the potentiometers on the new equalizer to same position as on original unit.			Step 25

CHART 7 (Cont)

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO
25	<p>Have the 15A test desk monitor noise or interference (depending upon whether Step 5, 6, or 7 has failed) <i>during the time that this step and Step 26 are being performed.</i></p> <p><i>Note:</i> Noise and interference measurements are made by setting up a loopback call to the station in trouble from the 15A test desk. The outgoing line from the test desk is terminated with a resistive load (100 ohms) and noise and interference are measured at incoming pair.</p>	Noise or interference within requirements.	Trouble may be cleared. Realign loop using 518-800-510.	STOP
		Noise or interference exceeds requirements.	Put original equalizer back in place. The trouble is <i>not</i> in equalizer.	Step 26
26	<p>At ICE location open screw switch SW1 on common or control equalizer depending upon where trouble is.</p>	Trouble on control pair — Noise or interference within requirement.	Trouble in control cable section preceding this equalizer.	Step 22
		Trouble on control pair — Noise or interference exceeds requirements.	Trouble in control loop succeeding this equalizer.	Step 27
		Trouble on common pair — Noise or interference within requirement.	Trouble in common loop preceding this equalizer.	Step 27
		Trouble on common pair — Noise or interference exceeds requirements.	Trouble in common cable section succeeding this equalizer.	Step 22
27	<p>Are there ICEs between present location and customer location?</p>	Yes	Dispatch personnel to next ICE location closer to customer. If ICE is powered locally, perform PROCEDURE of Chart 6 Step 20. (See Note Step 9, Chart 7.)	Step 24
		No		Step 28

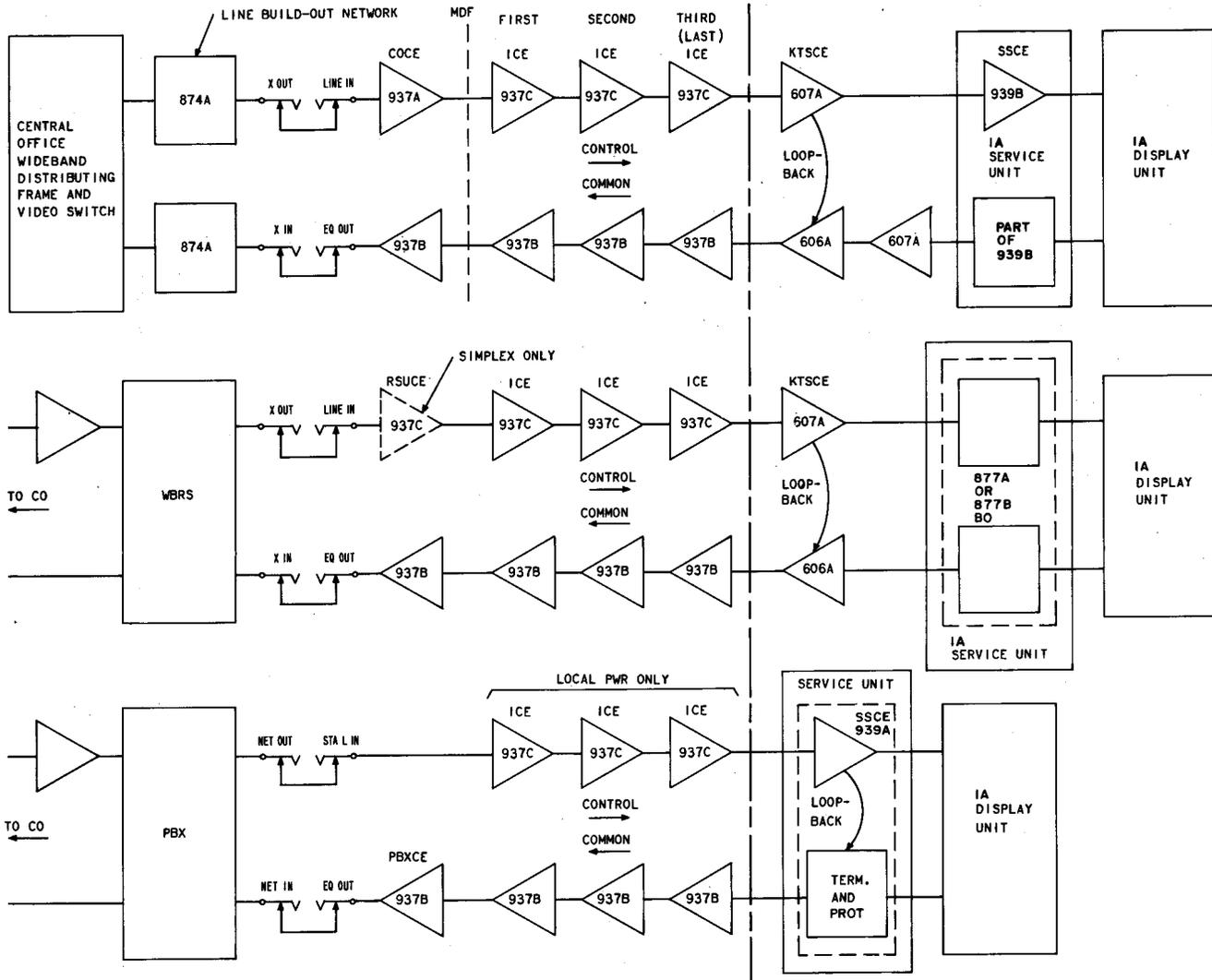
CHART 7 (Cont)

STEP	PROCEDURE	VERIFICATION	POSSIBLE TROUBLE LOCATION AND FURTHER TEST	GO TO
28	Is trouble in control or common half of loop?	Control	Trouble in control section of cable between last ICE location and customer location.	Step 22
		Common	Trouble in common section of cable between last ICE location and customer location.	Step 22

**5. REFERENCES**

**5.01** The following provide additional information that may be required in connection with this section.

		340-200-100	Cable Equalizers — Description
		340-200-501	Cable Equalizer — Video Loop Alignment
		518-800-501	2C Video Telephone Station—Tests and Maintenance
		518-800-505	KTS (650A KSU and J53051A and B Bay) Maintenance
103-930-100	Cable Equalizer Test Set — Description and Operation	CD-1C346-01	Common Systems — Video Circuit — Circuit Description
103-935-100	Fault Location Test Set — Description and Operation	SD-1C346-01	Common Systems — Video Circuit — Schematic Diagram



NOTE:  
 THIS FIGURE IS INTENDED TO SHOW ALL EQUIPMENT  
 THAT CAN BE INCLUDED IN A LOOP. IT IS NOT  
 INTENDED TO REPRESENT A TYPICAL CASE.

Fig. 1 — Types of Loops Covered in Section

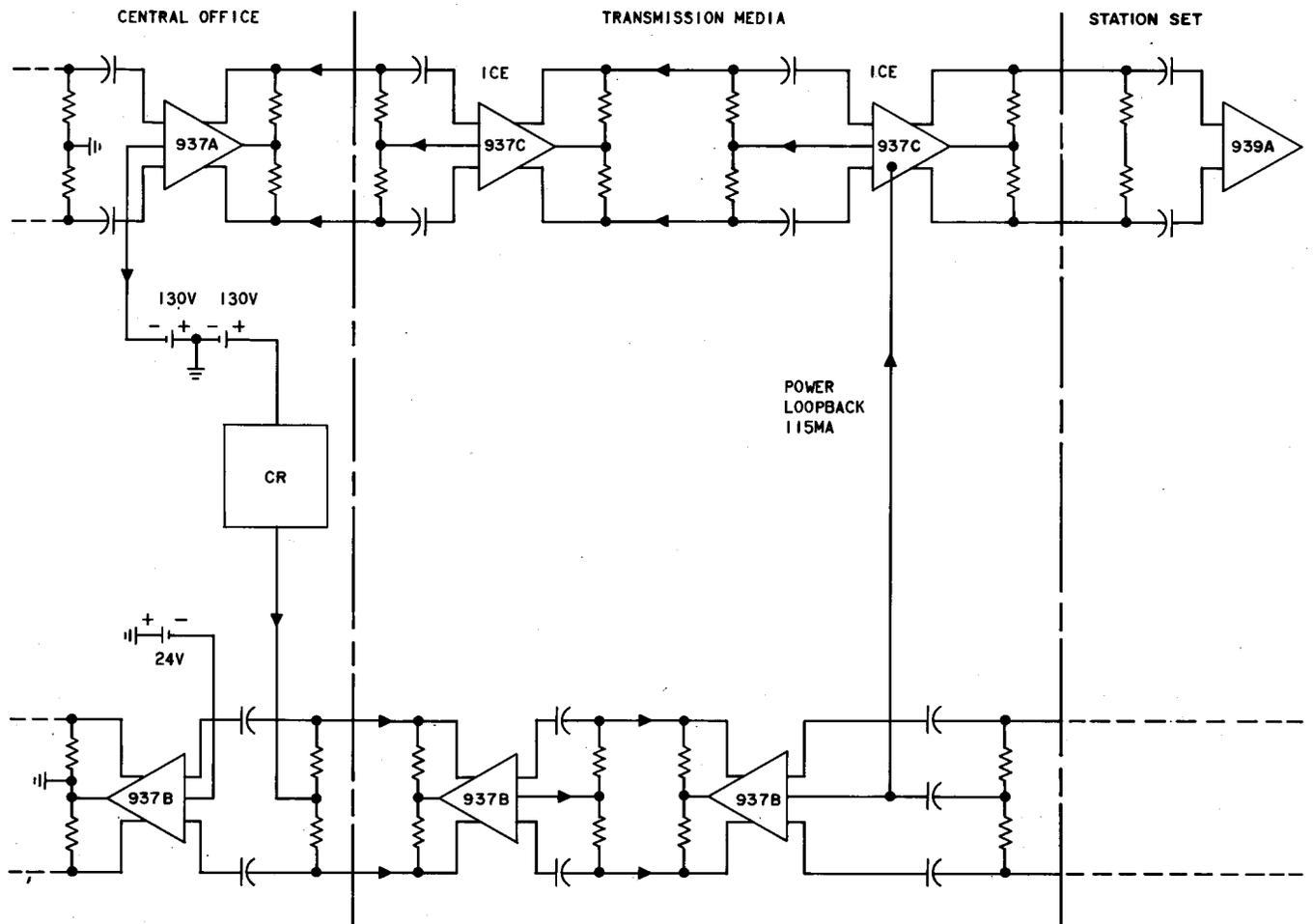
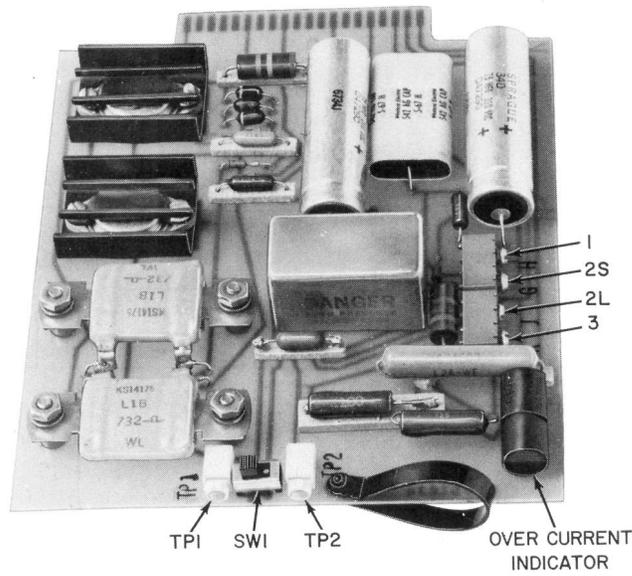
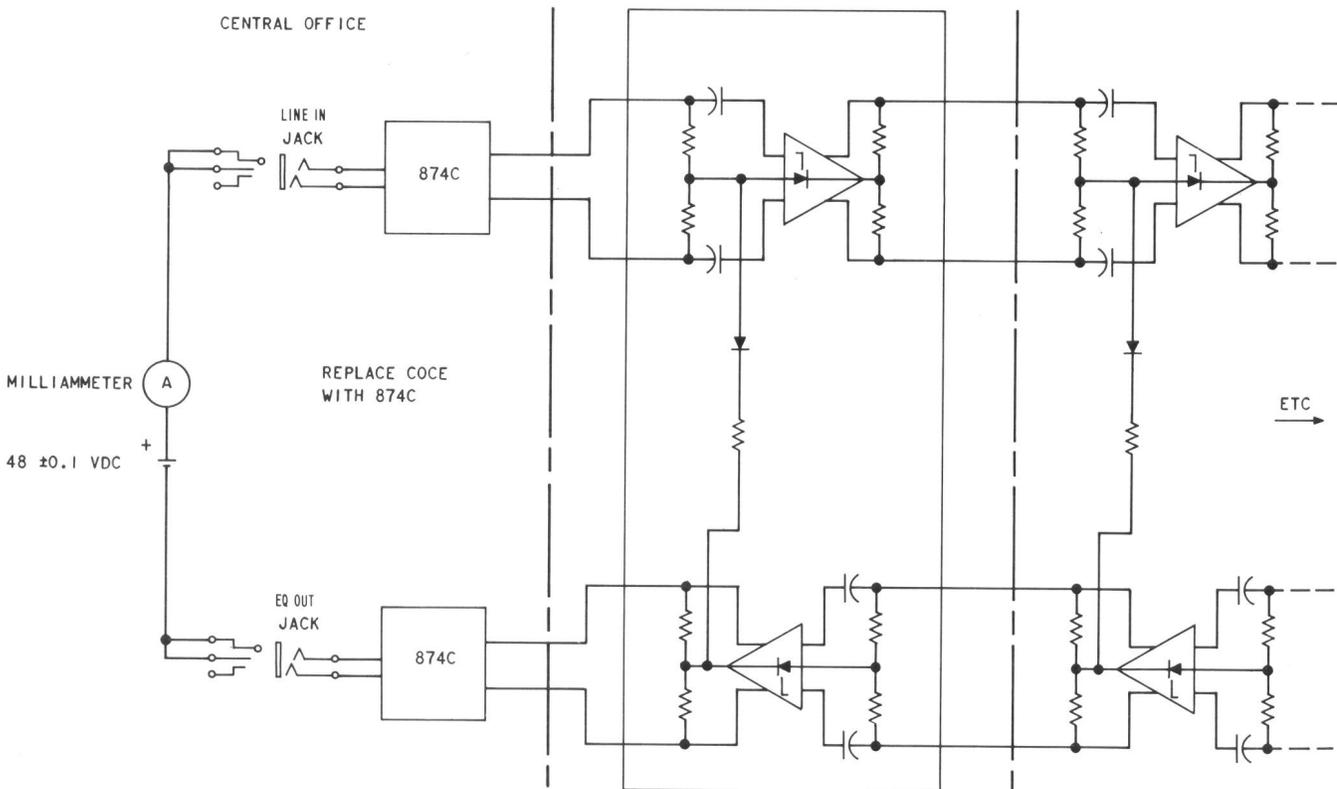


Fig. 2 — Simplex Powering Example



**Note:** The 168A regulator for initial PICTUREPHONE service differs slightly from the one shown above.

**Fig. 3 — Current Regulator**



**Fig. 4 — Setup for DC Fault Location Test**

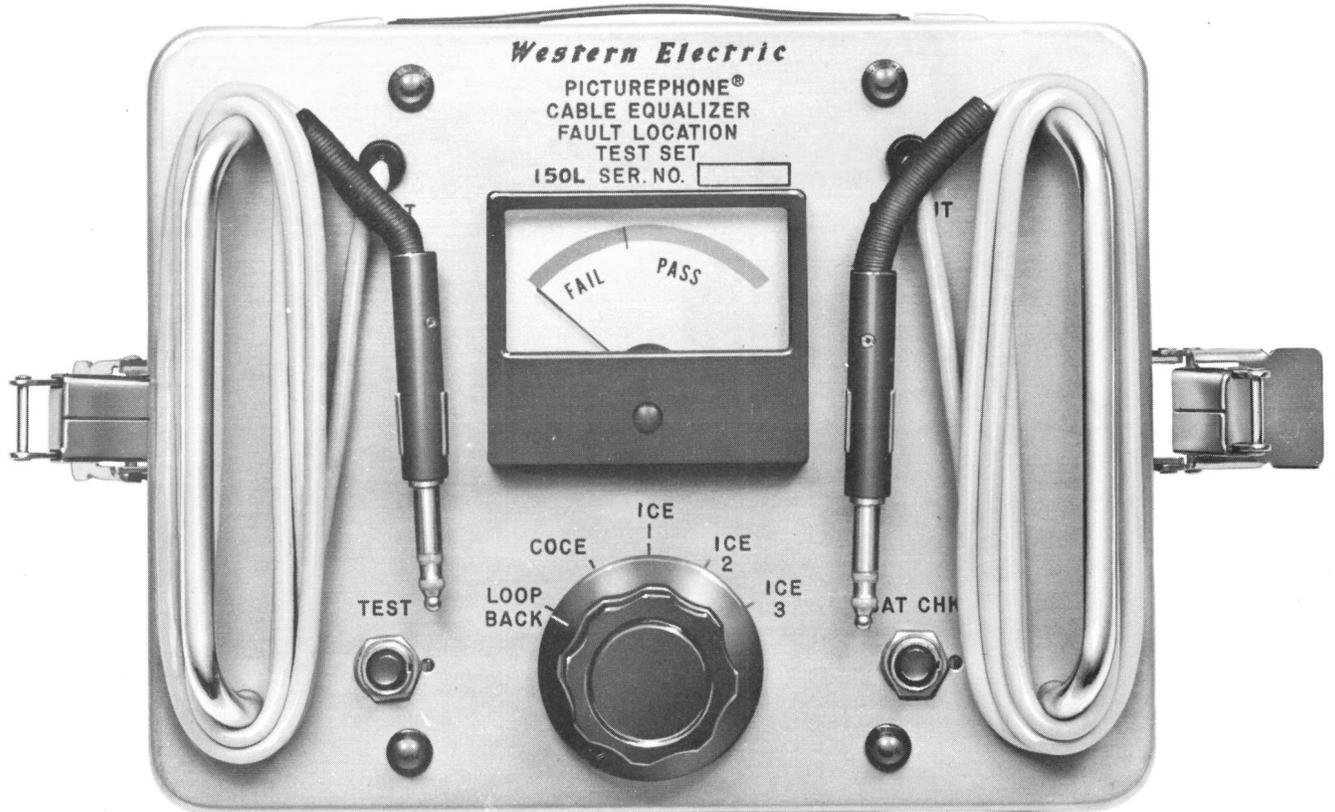


Fig. 5 — Fault Location Test Set

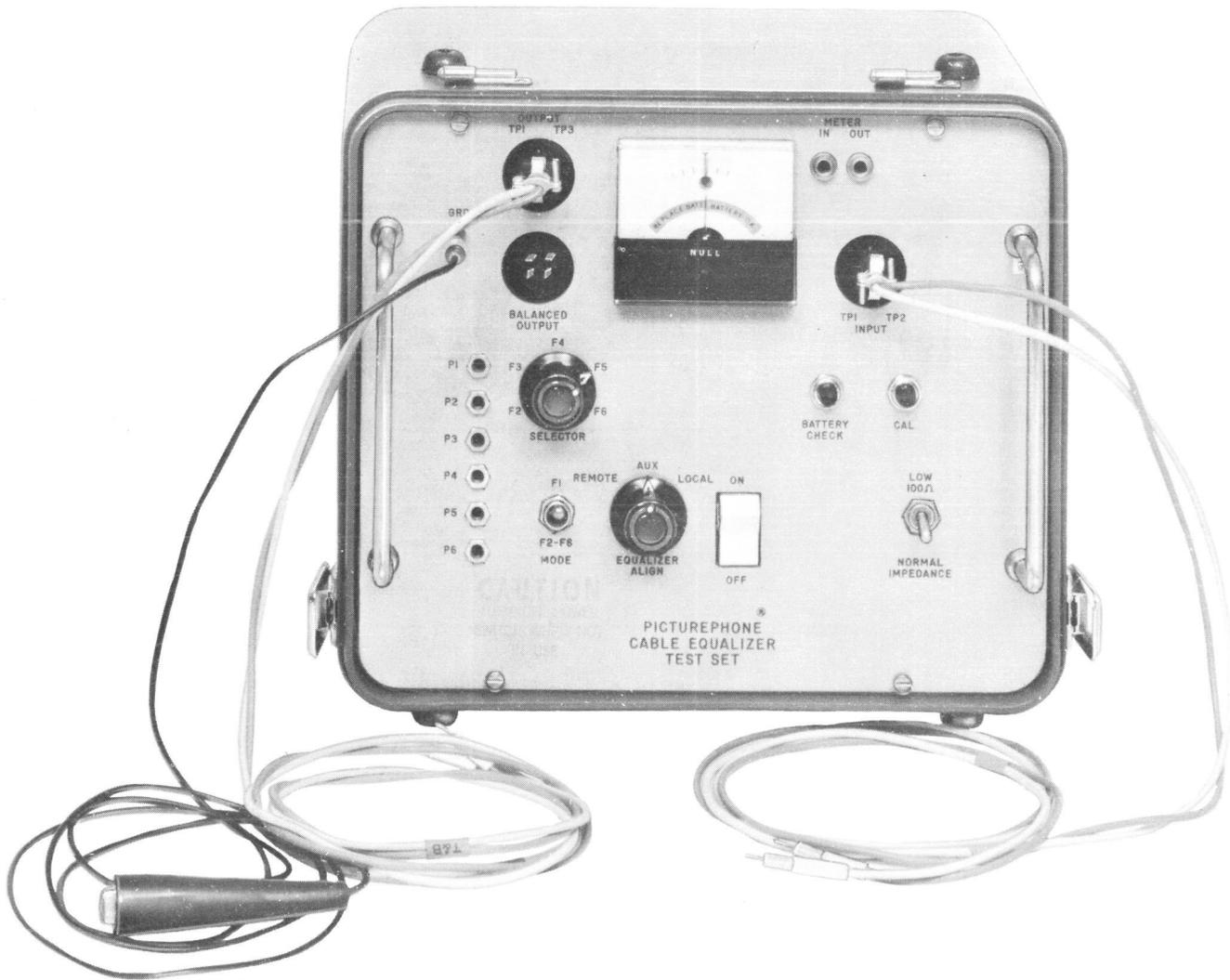


Fig. 6 — Cable Equalizer Test Set

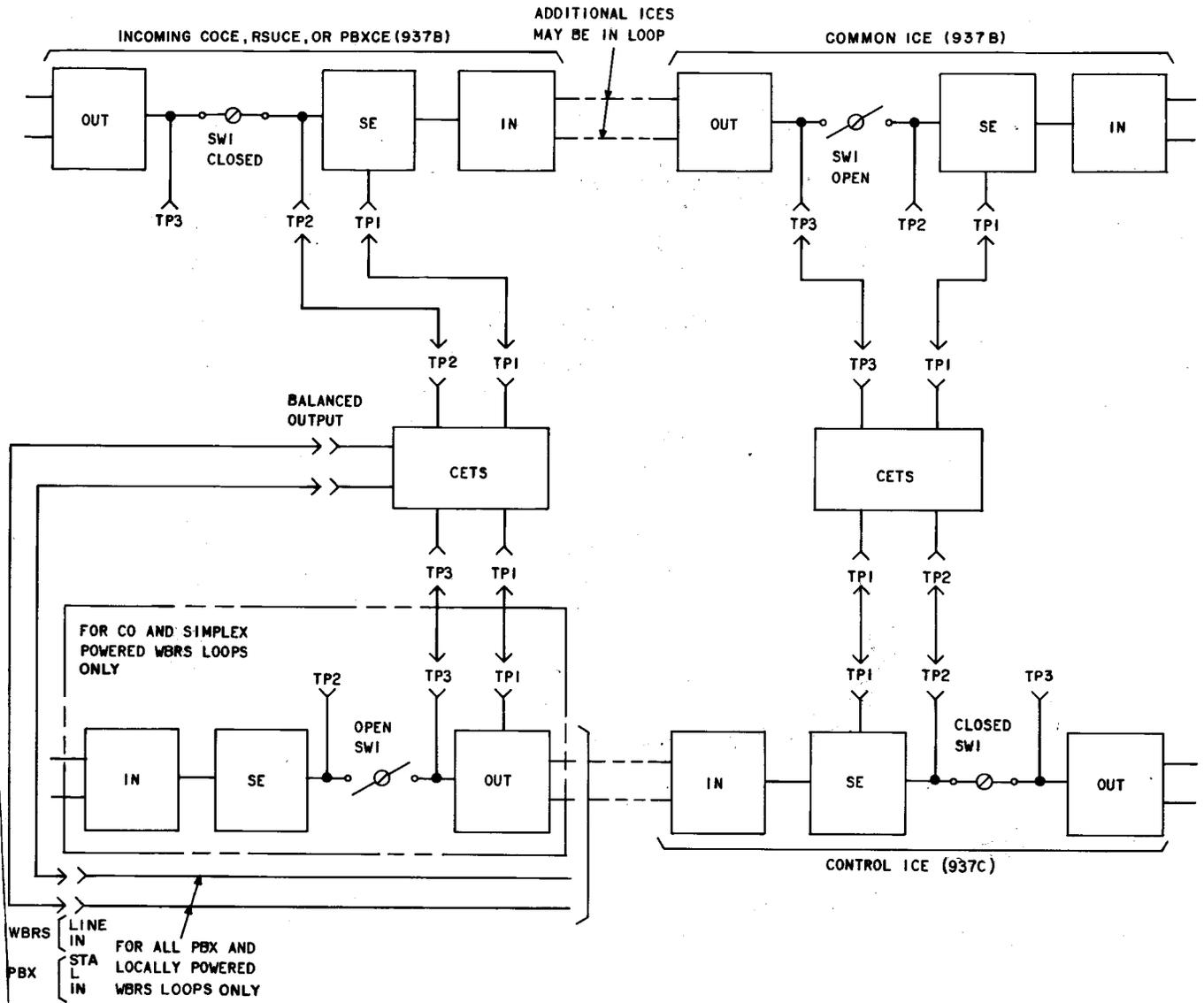


Fig. 7 — CETS Connections Between COCE, RSUCE, or PBXCE, and ICE

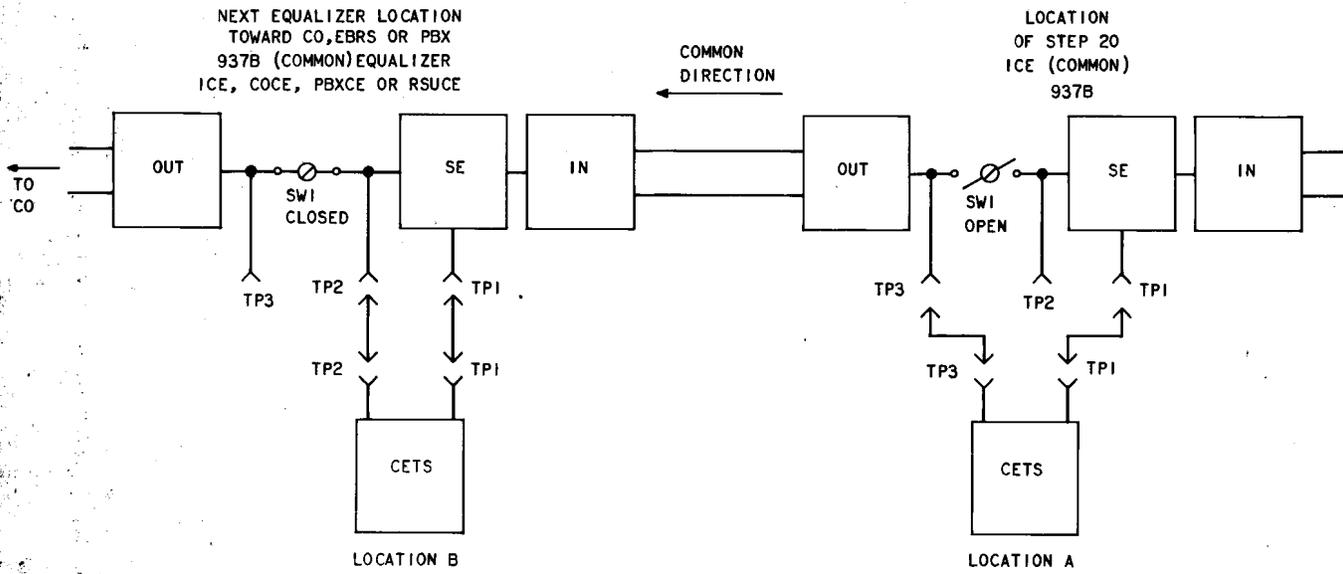
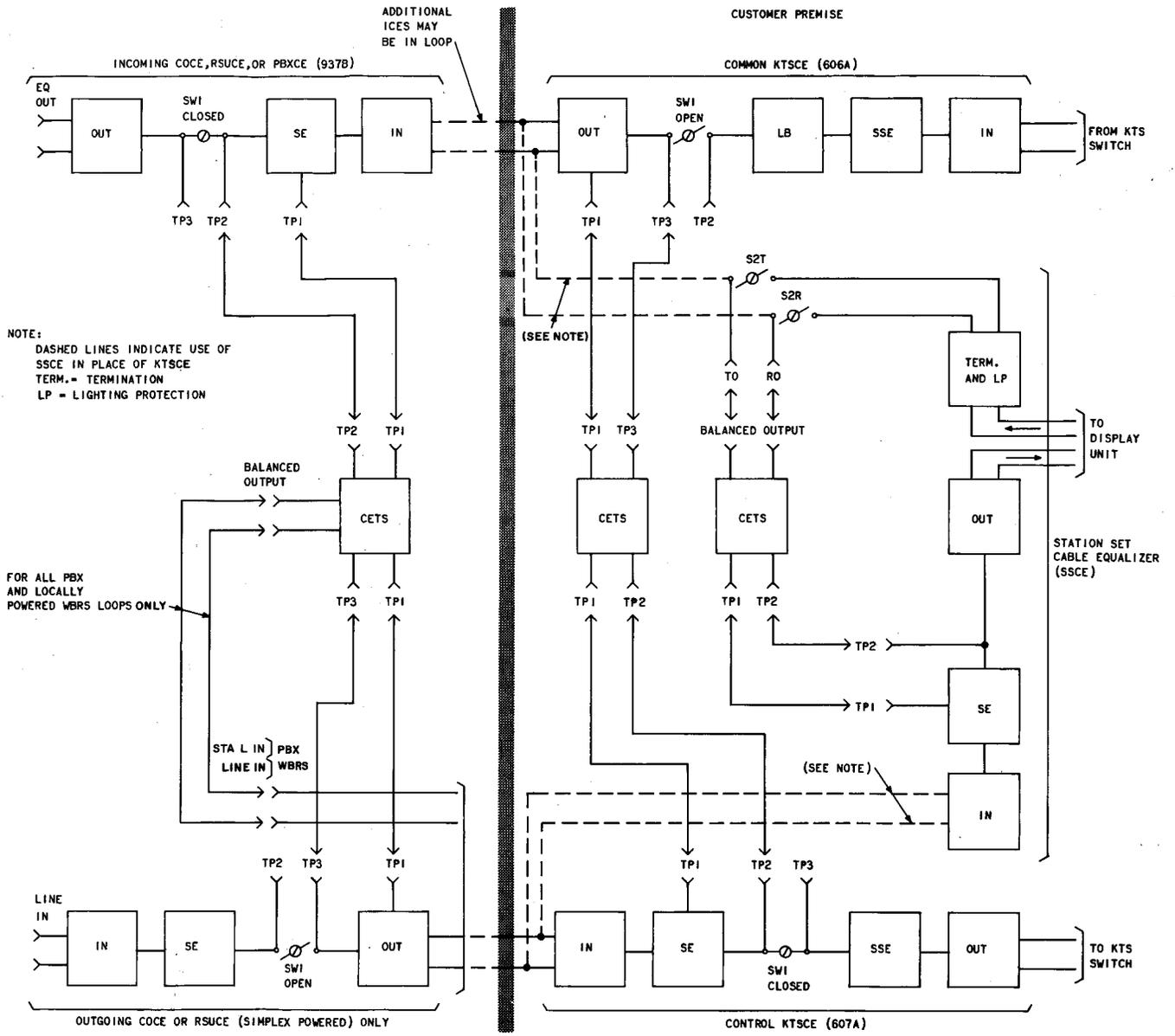


Fig. 8 — CETS Connections for Step 23, Chart 5



**Fig. 9 — CETS Connections Between COCE and KTSCE (or SSCE)**