LOOP SIGNALING REPEATER LOOP-START ONLY/2-2 WIRE INTERMEDIATE REPEATER (L-L), J99343GC SD-7C050 ( ) INSTALLATION AND TESTING METALLIC FACILITY TERMINAL

CONTENTS PAGE

1. GENERAL

1.01 This section describes the installation and testing procedures for the Metallic Facility Terminal (MFT) Loop Signaling Repeater, Loop Start Only/2-2 Wire Intermediate Repeater (L-L), J99343GC.

1.02 When this section is reissued the reason for reissue will be given in this paragraph.

1.03 A detailed description of the J99343GC CFU is covered in Section 332-912-154.

2. CHARACTERISTICS

2.01 The J99343GC is a combined function unit (CFU) designed to provide gain and fixed equalization plus signaling enhancement on 2-wire loaded cable facilities. It is intended for intermediate applications, and interfaces loaded cable on both sides. Facility balance is achieved through a loaded cable canceler hybrid for each 2-wire interface. Cable gauge selection switches balance high capacitance or low capacitance H88 loaded cable. Line buildout capacitors (LBOC) are used on both sides to build out the loaded cable end section to the electrical equivalent of 6 kilofeet. The component layout in Fig. 1 shows these switches in detail.

2.02 Signaling enhancement provided by the J99343GC unit includes regeneration of 20 Hz ringing in one direction and the regeneration of loop closures and dial pulses in the other direction for loop start only circuits. The J99343GC unit has a TST/NOR switch which, when in the TST position, isolates the signaling section and provides power to the repeater section. This allows the CFU to be set up and tested transmission-wise without interference from the signaling section. The J99343GC unit also has a DRR switch that allows the unit to be compatible with the distinctive

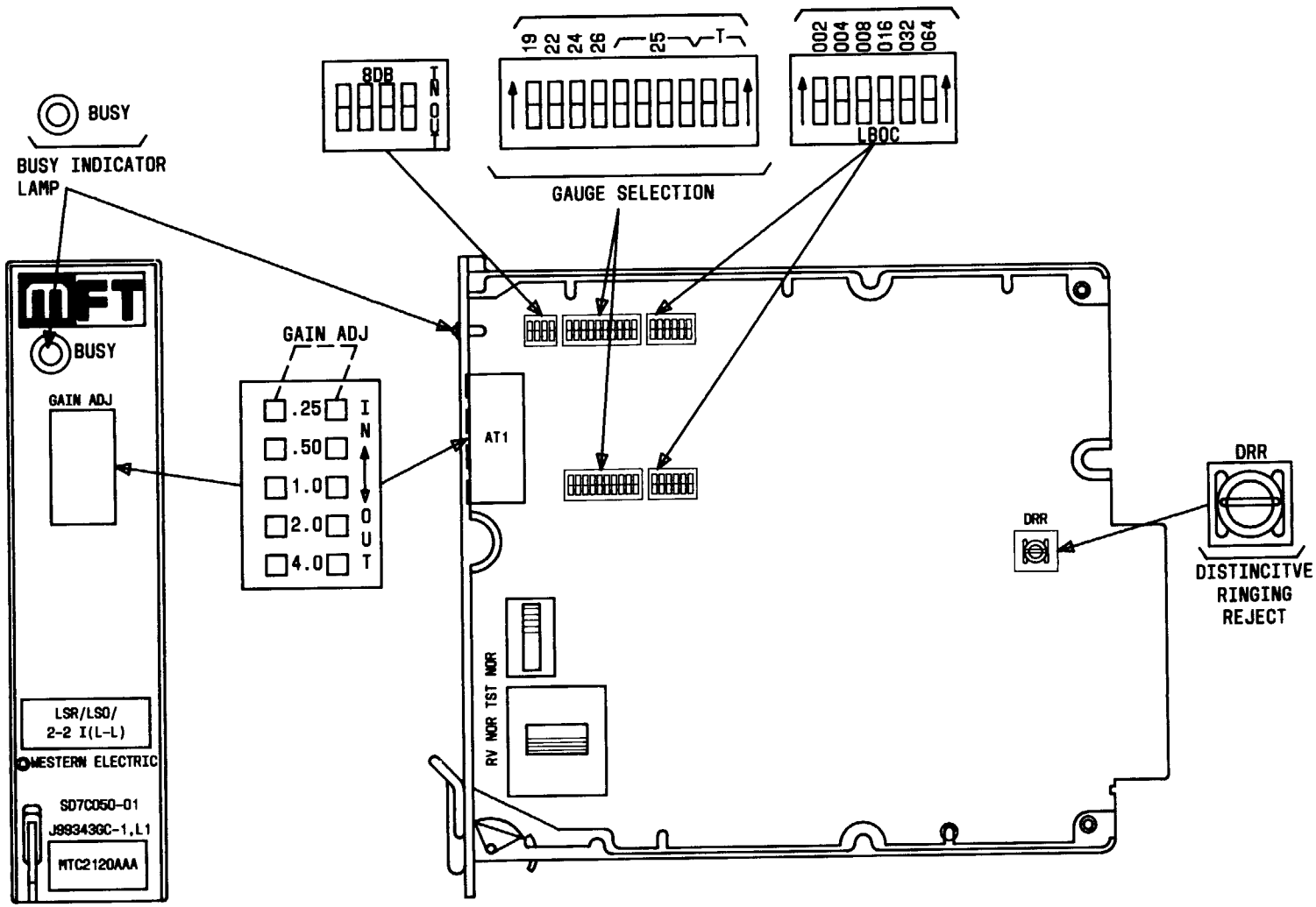


Fig. 1—Component Layout

ringing feature of the DIMENSION® PBV. (For more details, see Part 9 of the section.) Since the GC is a combined function unit (CFU) plug-in, A and B signaling leads are not needed.

2.03 The repeater section of the J99343GC is equivalent to the 2-2 wire intermediate repeater (L-L) J99343PH,L2. The signaling unit section is similar to the loop signaling repeater/loop start only (LSR/LSO), J99343AD, unit in functions but contains improvements in design and increased range capability. The basic description for the J99343PH, L2 holds true for the repeater section, but the description for the J99343AD is not valid for the signaling unit section for the above reasons.

3. APPLICATION GUIDELINES

3.01 The J99343GC unit is designed for use on loaded cable facilities. The following rules will aid in determining the type cable when standard loading is not used in the end section.

Rule 1: If the distance from the J99343GC to the first load coil (near-end section length), plus the length of any bridged taps in the near end section exceeds 8000 feet, or the facility does not contain any load coils, it is nonloaded.

Rule 2: If the near-end section length, plus the length of any bridged taps in the end section is less than 8000 feet, the facility is loaded.

Rule 3: At an intermediate location, if a facility on one side of the unit does not contain load coils and its 1 kHz loss is less than 1 dB, this is considered to be a terminal application.

3.02 The following paragraphs discuss the application of circuits which conform to trunk design objectives and normally result in adequate trunk performance. (This does not ensure that trunk objectives always will be met.)

3.03 Transmission levels of 2-wire circuits are limited by two factors: stability and crosstalk. Separate objectives are given for satisfactory stability and crosstalk performance, and both objectives must be met.

3.04 For stability considerations, the maximum allowable gain for the J99343GC unit is 12 dB. (This gain is not the maximum gain available with the J99343GC since it is capable of providing 15.75 dB of gain.) The 12-dB gain limit applies to all MFT 2-2 repeaters used in intermediate applications.

3.05 Crosstalk objectives determine the following level requirements with respect to the 0 transmission level point (TLP).

- Maximum Output Level +6 dB (TLP)
- Minimum Input Level -9 dB (TLP).

3.06 The levels in the previous two paragraphs are based on the assumption that the unit is located in a central office. The J99343GC is not recommended for installation at a customer location since hybrid balance is more difficult because there is generally less control on the cable plant. Also, the impedance of most PBXs is considered to be 600 ohms + 2.15 μF while the J99343GC is 900 + 2.15 μF.

3.07 Roll-off objectives at 400 and 2800 Hz for the J99343GC unit is given in Table A. It is recommended, but not required, that the roll-off at 400 and 2800 Hz for both lines and trunks be greater than the 1 kHz loss.

TABLE A

ATTENUATION DISTORTION ROLL-OFF OBJECTIVES, FOR VOICEGRADE SWITCHED SPECIAL SERVICES AND PBX CIRCUITS

CIRCUIT	ALLOWABLE DEVIATION FROM 1000-HZ LOSS	
	MEASURED AT 404 HZ (NOTE)	MEASURED AT 2804 HZ (NOTE)
Trunks	Within 3.0 dB more loss or 1.0 dB less loss	Within 4.5 dB more loss or 1.0 dB less loss
Lines	Within 5.0 dB more loss or 1.0 dB less loss	Within 7.5 dB more loss or 1.0 dB less loss

Note: Relative to 1004 Hz

3.08 When the following objectives are observed, the trunk requirements for roll-off usually are met. Since trunk requirements are more stringent than line requirements, these listed objectives will also guarantee that line requirements are met.

- Total 1-kHz loss of the A-side facility should not exceed 9 dB.
- Total 1-kHz loss of the B-side facility should not exceed 9 dB.
- Total 1-kHz loss of the facilities on both sides of the unit should not exceed 12 dB + ICL (inserted connection loss).
- The length of the near end sections on both sides of the unit should not exceed 6 kft.
- Load coil spacing should be between 5.7 and 6.3 kft.
- Far-end section length plus bridged tap lengths on both sides of the unit should not exceed 6 kft. In addition, both far-end sections must be approximately 3 kft to meet trunk objectives.

3.09 Application information is given in Section 332-912-154 for the J99343GC CFU. Figure 1 gives the pictoral drawing of the J99343GC unit, showing the location of all switches needed in the installation of the unit.

4. ADJUSTMENT OF LINE BUILD-OUT CAPACITORS

4.01 The LBOC is used to build out the adjacent cable end section to an electrical equivalent of 6 kilofeet. This build-out is required to allow the cable gauge selection switch to match the cable impedance.

4.02 The LBOC settings of the J99343GC unit are controlled by six rocker switches on the printed wiring board (see Fig. 1). The rocker switches are labeled 002, 004, 008, 016, 032, and 064. These label designations represent three-place-decimal capacitance values in microfarads (eg, 0.002 μF). The maximum capacitance available with the LBOC is 0.126 μF. The rocker switch is operated by depressing it in the direction the arrow is pointing.

4.03 For convenience, the value of capacitance required for end sections from 1 to 5 kilofeet in length are listed in Table B. The values listed in the table are the total capacitance values required and represent the sum of any combination of rockers that equal the value in the table. For example, a near end section of 1.0 kft of 19-gauge high capacitance cable requires 0.080 μF. Therefore, rocker switches 016 and 064 should be operated to supply 0.080 μF of capacitance.

4.04 For end-section lengths not listed in Table B, the required capacitance value can be calculated. Two formulas are given for calculation of the capacitance value required, one for high-capacitance (0.083 μF/mile) cable (19, 22, 24, 26 gauge) and one for low-capacitance (0.064 μF/mile) Metropolitan Area Trunk (MAT) cable (25 gauge).

- High-Capacitance

$$C = 0.016\ (6-N)$$

- Low-Capacitance (MAT)

$$C = .002 + 0.0122\ (6-N)$$

Where: C is the value of capacitance in microfarads.
N is the length of the near end section in kilofeet.

5. ADJUSTMENT OF BALANCING NETWORK

5.01 The following procedures cover the manual adjustments for the cable gauge selection of the J99343GC CFU. These manual adjustments are used when facility make-up is unknown. When the facility make-up is known these procedures are not needed.

5.02 The correct cable gauge is selected by the eight rockers, four labeled 19, 22, 24, 26 and four rockers labeled collectively 25 on the GAUGE switch (see Fig. 1). For a facility where the facility make-up is known, simply operate the rocker switch labeled with the gauge of facility (operate four switches for 25 gauge). For a mixed gauge facility, the predominant gauge of the facility adjacent to the unit determines the cable gauge setting. Only one gauge setting should be selected for each application.

5.03 The procedures in Charts 1 and 2 require successive measurement of echo return loss (ERL), singing return loss-low frequency (SRL-LO), and singing return loss—high frequency (SRL-HI). The three return loss measurements are maximized by changing the cable gauge switches and observing the change in the measurements.

TABLE B

LBOC SETTINGS (CANCELER HYBRID-TYPE REPEATERS)

END-SECTION LENGTH (FEET)	CAPACITANCE VALUE HI-CAP	SWITCHES OPERATED TO "ON"	CAPACITANCE VALUE MAT	SWITCHES OPERATED TO "ON"
1450 — 1549	.072	.008 + .064	.058	.002+.016+.008+.032
1550 — 1649	.070	.002+.004+.064	.056	.008+.016+.032
1650 — 1749	.068	.004 + .064	.054	.002+.016+.004+.032
1750 — 1849	.068	.004 + .064	.054	.002+.016+.004+.032
1850 — 1949	.066	.002 + .064	.052	.004+.016+.032
1950 — 2049	.064	.064	.052	.004+.016+.032
2050 — 2149	.062	.002+.016+.008+.004+.032	.050	.002+.016+.032
2150 — 2249	.060	.004+.016+.008+.032	.048	.016+.032
2250 — 2349	.060	.004+.016+.008+.032	.048	.016+.032
2350 — 2449	.058	.002+.016+.008+.032	.046	.002+.008+.004+.032
2450 — 2549	.056	.008+.016+.032	.046	.002+.008+.004+.032
2550 — 2649	.054	.002+.016+.004+.032	.044	.004+.008+.032
2650 — 2749	.052	.004+.016+.032	.042	.002+.008—.032
2750 — 2849	.052	.004+.016+.032	.042	.002+.008+.032
2850 — 2949	.050	.002+.016+.032	.040	.008+.032
2950 — 3049	.048	.016 + .032	.040	.008+.032
3050 — 3149	.046	.002+.008+.004+.032	.038	.002+.004+.032
3150 — 3249	.044	.004+.008+.032	.036	.004+.032
3250 — 3349	.044	.004+.008+.032	.036	.004+.032
3350 — 3449	.042	.002+.008+.032	.034	.002+.032
3450 — 3549	.040	.008 + .032	.034	.002+.032
3550 — 3649	.038	.002+.004+.032	.032	.032
3650 — 3749	.036	.004 + .032	.030	.002+.008+.004+.016
3750 — 3849	.036	.004 + .032	.030	.002+.008+.004+.016
3850 — 3949	.034	.022 + .032	.028	.004+.008+.016
3950 — 4049	.032	.032	.026	.002+.008+.016
4050 — 4149	.030	.002+.008+.004+.016	.026	.002+.008+.016
4150 — 4249	.030	.002+.008+.004+.002	.024	.008+.016
4250 — 4349	.028	.004+.008+.016	.024	.008+.016
4350 — 4449	.026	.002+.008+.016	.022	.002+.004+.016
4450 — 4549	.024	.008 + .016	.020	.004+.016

Note: When replacing a 2-2 wire MFT repeater containing a trandformer hybrid(s) interfacing loaded cable with a 2-2 MFT repeater containing a canceler(s), the LBOC balue of the replaced repeater will be reduced by 0.008 μF when LBOC settings are used with high-capacitance loaded cable and .006 μF when used with low-capacitance H88 MAT cable. For example: a 2-2 MFT repeater having an LBOC value of 0.080 with a transformer hybrid interfacing with high-capacitance loaded cable is being replaced with a 2-2 MFT repeater with canceler. The new LBOC value used with the canceler will be 0.072 μF.

5.04 The equipment required for these procedures is as follows:

- J99343TB test extender
- Return loss measuring set (RLMS), KS-20501, L3 or equivalent (reference Section 103-106-115)
- Circuit Layout Record (CLR if available).

5.05 The procedures in Chart 1 are for the initial setup of test equipment. This procedure should be conducted with 900-ohm test equipment. The procedures in Chart 2 are to determine manually the cable gauge setting when the make-up of the facility is unknown. Figure 2 shows the equipment test configuration used to determine the optimum gauge setting for an unknown cable facility for the J99343GC unit.

CHART 1

INITIAL TESTS USED IN DETERMINING GAUGE SETTING

STEP	PROCEDURE
1	Terminate far end of circuit in its normal impedance. If far end is a switch or PBX, a compromise network (600 or 900 ohms + 2.15 μF) should be used. If the far end terminates in a telephone set, use a 4066H network to simulate the teleset (Section 332-852-108).
2	Insert the CFU into the slot on the side of the J99343TB test extender.
3	Plug the cable extender card of the J99343TB into the mounting slot.
4	Set the J99343GC switch options as follows: (a) If B-side is to be adjusted, remove A-side LBOC (depress rocker switches opposite to direction arrow is pointing). If the A-side is to be adjusted, remove B-side LBOC settings. (b) TST/NOR switch to TST position.

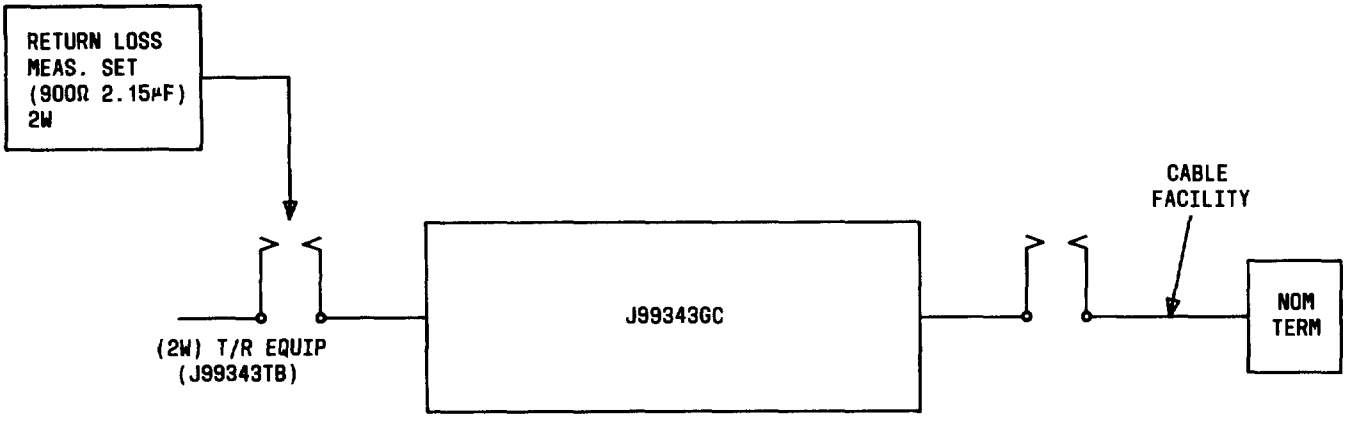


Fig. 2—Test Configuration For Determining Gauge Setting

CHART 1 (Contd)

STEP	PROCEDURE

(c) Set gain switches to approximately midrange. This is done to improve the sensitivity of the measurements; the gain settings are not critical.

Note 1: LBOC settings must be set prior to adjusting the gauge settings.

5 Set switches on J99343TB test extender as follows:

(a) For adjustment of B-side

A-side	B-side
600/900 to 900	600/900 to 900
2W/4W to 2W	2W/4W to 2W

(b) For adjustment of A-side

A-side	B-side
600/900 to 900	600/900 to 900
2W/4W to 2W	2W/4W to 2W

Note 2: The COMP NET IN/OUT has no effect on a canceler hybrid circuit.

6 To present a 900-ohm + 2.15 μF impedance, depress both T switches in direction arrow is pointing (see Note 3).

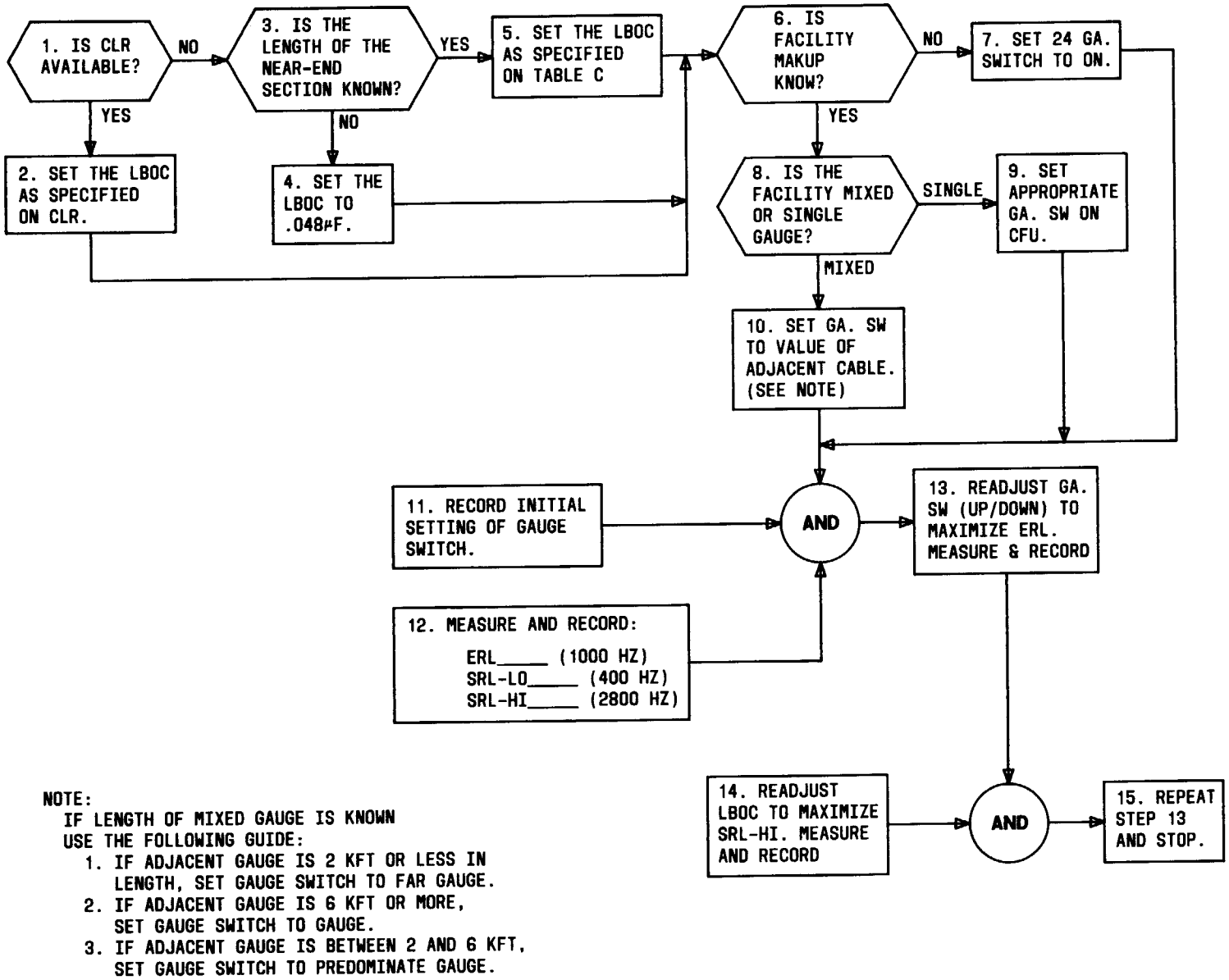
Note 3: Before adjusting any cable gauge switches, record the present setting. It must be remembered that after setting the gauge switches on one side, the opposite side gauge switches must be reset (T switches switched out and gauge switches set to facility requirements).

7 Set RLMS to 900-ohm, 2-wire, and switch in internal network (900-ohms + 2.15 μF).

8 Connect the TRMT jack (2-wire) of the RLMS to A-side 2W EQUIP jack on J99343TB test extender to set the B-side network or the B-side 2W EQUIP jack to set the A-side.

9 To determine gauge setting go to Chart 2.

Note: After completing manual setting of gauge switches, all T switches must be operated off (depress in opposite direction arrow is pointing). Reset gauge switches per Note 3, Chart 1.



NOTE:
IF LENGTH OF MIXED GAUGE IS KNOWN
USE THE FOLLOWING GUIDE:

1. IF ADJACENT GAUGE IS 2 KFT OR LESS IN LENGTH, SET GAUGE SWITCH TO FAR GAUGE.
2. IF ADJACENT GAUGE IS 6 KFT OR MORE, SET GAUGE SWITCH TO GAUGE.
3. IF ADJACENT GAUGE IS BETWEEN 2 AND 6 KFT, SET GAUGE SWITCH TO PREDOMINATE GAUGE.

Chart 2—Procedure for Optimum GA.SW. Setting of Canceler Circuit

6. GAIN ADJUSTMENT

6.01 Adjustable flat gain and fixed equalization is provided by the J99343GC unit. The flat gain of the J99343GC's amplifiers is adjusted simultaneously in both directions of transmission by GAIN ADJ switches on the front panel and a set of four switches (labeled 8 dB) on the printed wiring board. The amplifiers are adjustable in .25 dB steps with a degree of accuracy to allow the gain to be set directly from the CLR. Manual adjustment procedures used to set the gain and output level for 309-type amplifiers are not required.

7. STABILITY TESTS

7.01 After the J99343GC has been installed and lined up, stability tests may be used as an indicator of circuit performance. Two types of stability tests can be made: (1) talk state, which is made with nominal termination on both ends of the circuit, and (2) idle state, which is made with all switching and signaling equipment in the circuit in the idle (open circuit) condition. Table C compares actual and nominal terminations for use in stability tests.

TABLE C

COMPARISON OF ACTUAL vs NOMINAL TERMINATIONS

ACTUAL TERMINATION	NOMINAL TERMINATION
Central Office (switch) 600 ohms PBX (switch	900 ohms + 2.15 μF 600 ohms + 2.15 μF
900 ohm PBX (switch)	900 ohms + 2.15 μF
Station Set (Telephone)	Off-hook station set with loop current or 4066H network

7.02 The following equipment is required for stability tests:

- J99343TB test extender
- High impedance monitoring device (1014A handset or equivalent in MON position or a high impedance meter).

7.03 It is assumed that the J99343GC has been adjusted to its final settings and all options are set as specified on the CLR. Idle state stability tests are outlined in Chart 3, and an example test setup is shown in Fig. 3.

CHART 3

STABILITY TESTS

STEP	PROCEDURE
1	Remove unit under test from its shelf location.
2	Insert unit into test extender and connect test extender into mounting slot.
3	Set TST/NOR switch to TST position.

CHART 3 (Contd)

STEP	PROCEDURE

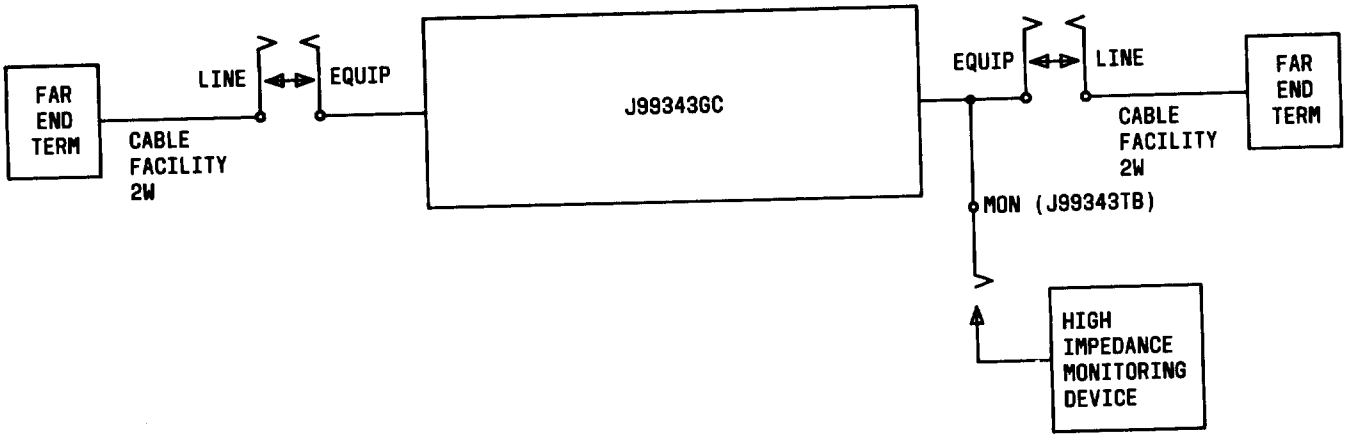


Fig. 3—Typical Configuration for Stability Tests

4 Set switches on test extender as follows:

A-side	B-side
2W/4W to 2W	2W/4W to 2W
600/900 to 900	600/900 to 900

5 Connect the high impedance monitoring device to the monitor (MON) jack on the B-side of the test extender.

6 Monitor the unit for singing using the high impedance monitoring device with the following combinations of terminations:

Note: With the monitoring device connected as shown in Fig. 3, no sound other than battery noise should be audible.

7 If the unit sings, check the following conditions for trouble:

- Unit's switches incorrectly set.
- Test connections are improper.
- Insertion loss has been incorrectly measured and is less than permissible.
- Make-up of facility is outside limits.

CHART 3 (Contd)

STEP	PROCEDURE		
		ORIGINATING END	TERMINATING END
	Circuit not equipped with idle-circuit terminations or repeater disabler (far-end)		
	(1)	900 (600) ohms	900 (600) ohms
	(2)	Open circuit	Open circuit
	(3)	Open circuit	Short circuit
	(4)	Short circuit	Open circuit
	(5)	Short circuit)	Short circuit
	Circuit equipped with idle-circuit terminations at both ends or repeater disabler (far-end)		
	(1)	900 (600) ohms	900 (600) ohms
	(2)*	Idle condition	Idle condition
	(3)	900 (600) ohms	Open circuit
	* For circuit with idle-circuit terminations		
	Circuit with idle-circuit terminations at one end		
	(1)	900 (600) ohms	900 (600) ohms
	(2)*	Idle condition	Idle condition
	(3)	900 (600) ohms	Open circuit
	* Either open circuit or with idle-circuit termination at end equipped with idle-circuit termination.		
8	Disconnect test extender from shelf and remove unit from test extender.		
9	Insert unit into mounting slot.		

8. CIRCUITS REQUIRING TERMINAL BALANCE

8.01 The J99343GC CFU in combination with 837-type or J99380 type impedance compensators may be used for circuits with terminal balance requirements. Prescription settings for 837-type or J99380 type impedance compensators used in conjunction with MFT equipment are found in Section 332-912-212 Prescription Settings—Procedures, and in Section 332-912-213 Prescription Settings—Tables. These prescription settings sections are for MFT 2-wire repeaters, but they also apply to the repeater section of the J99343GC unit.

8.02 If the cable make-ups are not found in tables in the prescription settings section (eg, bridge taps or more than two gauges), manual adjustment procedures must be used. Chart 4 gives the manual adjustment procedures for the J99343GC unit in conjunction with 837-type impedance compensators.

8.03 The equipment listed below will be needed to perform the manual adjustment for the J99343GC and 837-type or J99380 type networks:

- J99343TB test extender
- 900C termination connector (with 310 plug)
- Section 332-205-500 and 332-206-251 through 332-206-258 (837-type Impedance Compensators).

CHART 4

MANUAL ADJUSTMENT OF J99343GC AND 837A, B, E, F, G, OR J AND J99380AB, AC IMPEDANCE COMPENSATORS

STEP	PROCEDURE
1	Set the gauge switch of the J99343GC to the predominant gauge of the end-section adjacent to the J99343GC unit.
2	If the end-section length adjacent to the impedance compensator is known, find the initial settings in Sections 332-206-251 through 332-206-258.
3	If the end-section length adjacent to the 837 network is unknown, determine the initial settings by using the procedures in Section 332-205-500.
4	Remove unit under adjustment from its mounting slot.
5	Connect the J99343TB test extender to the mounting slot.
6	Set the switches on the J99343TB test extender as follows: A-side: 2W/4W to 2W; 600/900 to 900 B-side: 2W/4W to 2W; 600/900 to 900 *Note:* COMP NET IN/OUT on the test extender does not affect canceler hybrid units.
7	Insert 310 plug of 900C termination connector into the T1R1 2W EQUIP jack on the B-side of the test extender to terminate the cable facility in 900 ohms + 2.15 μF. This termination will permit positive identification of the 2-wire pair under adjustment at the impedance compensator (see Section 332-205-500).
8	Optimize the impedance compensator settings using the procedures in Section 332-205-500.

CHART 4 (Contd)

STEP	PROCEDURE
9	After obtaining satisfactory terminal balance on the drop side of the impedance compensator: (a) Remove the 310 plug of the 900C from the test extender (b) Insert the J99343GC into the test extender (c) Terminate the drop side of the impedance compensator in the proper impedance (600 or 900 ohms + 2.15 μF).
10	Optimize the gauge settings of the J99343GC using the procedures in Charts 1 and 2.
11	After setting cable gauge and LBOC to their proper value, set gain of J99343GC according to the CLR (see paragraph 3.11).
12	Insure that circuit requirements are met and touch up the 837 as necessary to improve the terminal balance.

9. SIGNALING UNIT SECTION

A. Performance Information

9.01 The signaling section of the J99343GC CFU is a loop signaling repeater which functionally resembles the J99343AD LSR/LSO. It regenerates 20-Hz ringing in one direction and DC signals or dial pulses in the opposite direction. The J99343GC signaling unit section provides a 72-Vdc supply for supervisory range extension on the station-side loop. This supply is independent of the talk battery arrangement (48- or 72-Vdc) provided by the associated MFT shelf. The switching-side internal impedance is approximately 400 ohms. The J99343GC does not require build-out resistors (BOR) to limit current flow in short loops as do some LSR units. The reason for this is that the signaling unit section limits current on the station side to 42 mA maximum and on the switching side to 30 mA maximum.

B. Voltage Measurements

9.02 The DC-DC converter in the signaling unit section provides the floating station-side talk battery and a floating switching-side battery boost. A polarity guard on the switching-side line circuit allows proper operation of the signaling unit section regardless of the office battery polarity. Since these line circuits are floating, voltage measurements should be made across the appropriate 2-wire interface (T, R or T1, R1). Measurements made between one conductor and ground will be erroneous. In the idle state, the voltage measured across the station-side line circuit (terminals T1, R1 if the NOR RV switch is in the NOR position) is approximately 85 Vdc.

C. Distinctive Ringing Option

9.03 The distinctive ringing option is controlled by the DRR screw switch (Fig. 1). With the DRR switch down (turned in), all distinctive ringing patterns, such as those generated by the DIMENSION PBX, are converted to a 2-second interval. Ringing intervals shorter than 150 mS, such as the "ring-ping" signal from the DIMENSION PBX, will be ignored. With the DRR switch up (turned out) all input ringing signals, including "ring-ping", will be regenerated by the J99343GC unit.

D. Signaling Incompatibilities

9.04 The J99343GC signaling unit section is incompatible with some circuits due to the

floating talk battery on the station-side. Circuits monitoring idle or busy conditions with voltages referenced to ground (rather than with loop currents) will not function properly on the J99343GC station loop. Such circuits include the D3 2FXO (J98718BE), the D4 2FXO (J98726BE) and the D4 2FXO/GT (J98726SK), the A-side of the MFT LSR (J99343AF), and the line status indicators CPS-RDI. (See Section 332-912-154 for more detailed information on this compatibility problem.)

E. Range Information

9.05 Table D lists the maximum ringing ranges. Table E lists the maximum signaling ranges.

10. REFERENCES

10.01 The following is a list of references which provides additional information concerning the J99343GC:

332-910-100	(J99343)—MFT Description
332-910-101	MFT—Shelf, Frame, Power Panel, and Distributing Frame Arrangement—Description
332-910-102	Test Extender (J99343TB)—Description and Operation
332-910-180	MFT—General Applications
332-912-154	MFT—LSR LSO/2-2 Intermediate Repeater (L-L) J99343GC—Description
332-912-212	MFT—2-2 Repeaters Prescription Settings
801-406-160	MFT Equipment Design Requirements
SD-7C050-01	Common Systems, MFT Circuit Packs—Schematic Drawing
CD-7C050-01	Common Systems, MFT Circuit Packs—Circuit Description.

The appropriate Numerical Index section should be consulted to find the current issue to the section references listed and any addendum that may have been issued. Pertinent numerical indexes for the references listed are Sections 332-000-000, 801-000-000, and 851-000-000.

TABLE D

MAXIMUM RANGE FOR SUPERVISION AND DIAL PULSING FOR J99343GC

CIRCUIT BATTERY	RANGE BETWEEN			
	SWITCHING MACHINE AND LSR/LSO CFU*	2 LSR/LSO CFUs (16 mA LOOP CURRENT)	LSR/LSO CFU AND STATION	
			23 mA	36 mA
-42.5	CO or PBX limit minus 475 ohms	3200 Maximum	2350 Minus station Resistance	1300 Minus station Resistance
-48	CO or PBX limit minus 410 ohms	3770 Maximum	2760 Minus station resistance	1570 Minus station resistance
-52	CO or PBX limit minus 370 ohms	4100 Maximum	3100 Minus station resistance	1790 Minus station resistance

* Assumes switching machine provides a nominal -48 volts.

TABLE E

REGENERATED RINGING RANGE FOR J99343GC

RINGING LOAD	MAXIMUM CONDUCTOR LOOP RESISTANCE IN OHMS BETWEEN LSR/LSO CFU AND STATION SET OR PBX	
	STIFF NOTCH SETTING 50 V RMS AT RINGER (NOTE)	WEAK NOTCH SETTING 43 V RMS AT RINGER (NOTE)
1 C4A*	5220	6540
3 C4A*	2880	4050
3 C4A*	1820	2650
PBX Ringing Detector†	3600	
PBX Ringing Detector† and 1 C4A Ringer*	2300	3300
PBX Ringing Detector† and 2 C4A Ringers *	1750	2450

Note: Regenerated ranges assume a ringing source of 20 Hz, 84- to 88-volts AC RMS and a series 13L-type resistance lamp.

* Ringing ranges to station sets with C4A ringers assume a 0.5 μF series capacitor.

† Ringing ranges to PBXs are based on typical PBX relay ringing detectors.