BELL SYSTEM PRACTICES
Outside Plant Construction and Maintenance

SECTION G73.320.1
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AT&T Co Standard

PRESSURE TESTING
RECORDS AND MAINTENANCE SUMMARY PERIODIC CHARGING SYSTEM

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1. GENERAL

1.01 This section replaces Issue 1 and describes the record forms used in connection with gas pressure work on cables maintained by the periodic charging system.

1.02 These records provide the following for each gas section.

(a) A means of determining the normal loss in gas pressure per month.

(b) A record of individual gas sections which are in need of further maintenance work. Obtained from the normal gas loss per month.

(c) A record of the average pressure on a given date, from which the approximate date for the next recharging can be established.

(d) A history of all contactor alarms.

(e) A history of all gas leaks found.

(f) The amount of gas used in the maintenance of the gas section when required.

(g) The results of routine contactor tests.

1.03 This section has been rewritten—

(a) To revise and arrange the forms for longer sections and for circular gas sections.

(b) To adapt the routine to allowable pressure losses per month which are set individually for each gas section.

(c) To provide for correcting measurements for barometric pressure and for difference in elevation.

(d) To discontinue the use of Form E-2909, Heading Strip, inasmuch as the Form E-1016 carries the same information.

1.04 The following forms are provided:

(a) Form E-1016—Gas Pressure Section Record

(b) Form E-2910—Gas Pressure History Record

(c) Form E-2911—Summary of Gas Pressure Section Results

1.05 Form E-2910 can also be employed for recording pressure testing data taken in maintaining pressure in reels of cable held as emergency stock.

2. FORM E-1016—GAS PRESSURE SECTION RECORD

2.01 This form provides a **graphic record** of the gas section layout, together with the cable names, valve and plug locations, aerial, underground, or buried cable distances, elevations of valves above sea level, and unit pneumatic resistances, etc., when specified. Tabulated cumulative distances are shown and space is provided for inserting basic data on plug section, pressures, etc., used in the normal maintenance procedures. For long plug sections such as in coaxial cables, where there is insufficient room for reproducing the section on one form, a second sheet shall be used, but the tabulated data at the top of the form need not be shown on the second or succeeding pages. This form need be prepared only once for a given plug section, unless the layout is changed.

2.02 Basic data for a given gas section are entered in the proper spaces at the top of Form E-1016 as follows:

(a) **Normal Pressure**—Enter the nominal pressure at 60° F. and 30″ barometric pressure established for the particular gas section, i.e., 9 pounds for underground or buried and 6 pounds for aerial cable.

(b) **Recharge To**—Enter the pressure at which regulators will be set for charging the cable, one pound above pressures indicated in (a). (Section G73.305.1)

(c) **When Average Pressure Reaches**—Enter the average pressure at 60° F. and 30″ barometric pressure at which the section should be recharged. (Section G73.310.2)

(d) **Alarm Pressure**—Enter the desired pressure at which the contactor should operate at 60°F. and 30″ barometric pressure, i.e., generally 6 pounds for underground and buried cable and 3 pounds for aerial cable. (Section G73.310.1)

(e) **Allowable Pressure Loss per Month**—Enter here the value which has been set as indicating that a greater loss per month for this section would warrant investigation. (Section G73.310.2)

(f) **Number of Cubic Feet to Raise Pressure One Pound at 60° F.**—Enter the number of cubic feet of gas required to raise pressure in gas section one pound at 60° F. (K).

(g) **Cable, Alarm Pair, Talk Pair**—Enter the name of the cable and the gas section number. Alarm pair and talk pair refer to the cable pair numbers assigned for contactor alarm and talk circuit. Information shown at the left applies to cable for which data are included in Columns 1 to 4 and that on the right for Columns 6 to 9.

2.03 **Elevation (Ft.)—Columns 1 and 9**—Elevations should be determined and entered for contactor, routine valve and gas admission valve locations on a gas section unless level terrain makes such entries unnecessary. Column 1 has data for the cable shown on the top of the form directly above Columns 1 to 4 and Column 9 has data for the cable shown on the top of the form above Columns 6 to 9. See Fig. 1. For straight gas sections, Columns 6 to 9 will not be filled in. These elevations may be secured from known record data, if available, from highway prints or bench marks, topographic maps, county maps, etc. In rare instances it may be necessary to use a hand level to tie in a location with the nearest available established bench mark. A high degree of accuracy in establishing these elevations is not necessary, recording to the nearest 20 ft. being satisfactory. This does not apply to correction of pressure measurements in leak location using instruments to be read to .001-pound (refer to Sections G73.205.4 and G73.205.5) nor to measurements on cables charged with Sulphur Hexafluoride gas (SF6).

2.04 **Per Cent Resistance on Contactor Test—Columns 2 and 8**—These columns are ordinarily used by the test-board forces for recording data needed to determine the location of operated contactors.

2.05 **Cumulative Distance—Columns 3 and 7**—These columns are used to record, cumulatively, the distance from one end of the plug section to the other end, in steps corresponding with the location of manholes, poles, or markers, shown in Columns 4 and 6, for the particular cable or cables comprising the gas section.

2.06 Distances between any two points can be secured by subtraction, for example, if it is desired to find the distance between the contactor terminals at poles 270 and 134 for the A cable, the cumulative distance opposite pole 134 is subtracted from the cumulative distance opposite pole 270 (46,212′ — 28,753′) and the distance between these contactor terminals is found to be 17,459′.

2.07 **Location—Columns 4 and 6**—These columns are used to record the manhole, pole, marker, vault, etc., at which the various pieces of gas pressure equipment shown in Column 5 are located. Column 4 records data for the cable shown above Columns 1 to 4 and Column 6 for the cable shown above Columns 6 to 9. In straight gas sections, Columns 6 to 9 will not be filled in. The first and last entries indicate the geographic names at the start and end of the plug section, thus in Fig. 1, the plug section shown for the Alpha-Beta A cable extends from Alpha (first entry) to Alpha KS (last entry). Abbreviations used are:

Manhole—MH
Pole—P
Marker—MKR

and these abbreviations are entered only once, all subsequent entries being taken as being the same until a change occurs, when a new abbreviation is entered. Thus the form shows MH 3, followed by MH 7, 12, 17 and 20 with no MH abbreviations shown, then cable becomes aerial as indicated at P 4 and followed by poles 25, 47, etc., with no P designations shown.

2.08 **Diagram—Column 5**—This column provides space for showing the diagram of the cable or cables comprising the gas section, together with any branch cables or laterals. Where branch cables are long, and contain gas pressure equipment, they should be shown on a supplemental sheet, with a reference notation on the main gas section sheet. The data shown on the left-hand line are associated with the cable for which information is included in Columns 1 to 4 and the data shown on the right-hand line are associated with the cable for which information is included in Columns 6 to 9.

(a) **Abbreviations**

Valve-Plug-Valve—VPV
By-pass—BP
Valve—V
Contactor Terminal and Valve—CTV
Contactor and Valve—CV
Routine Reading Valve—RV
Gas Admission Valve—GAV

(b) **Permissible Delay Time**—The figures associated with contactor terminal or contactor (70) represent the permissible delay time in hours after operation of a contactor before the expiration of which the leak must be cleared or gas added to protect service. This implies that the gas section will be adequately protected against moisture entrance into the cable under normal circumstances for a period of 70 hours after contactor operation; during this period the leak can be located and cleared, or if not cleared by the end of the 70 hours, it may be necessary to add gas to raise the cable pressure to a safe level.

(c) **Unit Pneumatic Resistance** (r = ——). If specified, the unit pneumatic resistance for each cable is shown. This value holds for the section of cable indicated by subsequent series until the cable changes make-up, etc., at which point a new value of r = —— is placed on the form, which then applies until the end of the plug section is reached, or until the cable changes to one with a different unit pneumatic resistance. (Section G73.016.1)

2.09 **Data at Bottom of Form E-1016**—At the bottom of Form E-1016 may be shown information as follows:

(a) Cable maintained as an aerial, underground or buried gas plug section.

(b) Circular or straight gas section.

(c) Over-all length of plug section, expressed in thousands of feet and in miles.

(d) Type of contactors and contactor terminals used.

(e) Any other pertinent data of value in maintaining the gas section.

2.10 **Additional Data**—If desired, the form may be expanded to show the location of splices, F type flanges, valves selected as routine charging points, and all known additional valves which may have been added, particularly on underground and buried cables.

FORM E-1016

GAS PRESSURE SECTION RECORD

NORMAL PRESSURE 6 RECHARGE TO 7 | WHEN AVERAGE PRESSURE REACHES 4 ALARM PRESSURE 3 | ALLOWABLE PRESSURE LOSS PER MONTH 0.58 | NUMBER OF CUBIC FEET TO RAISE PRESSURE ONE POUND AT 60°F 173

SHEET NO. 1
DATE
REVISED

CABLE Alpha-Beta A (Gas Section No.1) ALARM PAIR 46 TALK PAIR 45

CABLE Alpha-Beta B (Gas Section No.1) ALARM PAIR 29 TALK PAIR —

ELEVATION (FT.) (1)	% RES. ON CONTACTOR TEST (2)	CUMULATIVE DISTANCE (3)	LOCATION (4)	DIAGRAM (5)	LOCATION (6)	CUMULATIVE DISTANCE (7)	% RES. ON CONTACTOR TEST (8)	ELEVATION (FT.) (9)
		4*	ALPHA	VPV — VPV	ALPHA	4*		
		0	A-VAULT	R = 2.9 — R = 1.64	A-VAULT	0		
		1,755	MH 3	V — V	MH 3	1,755		
2040	0.44	3,512	7	CTV 70 70 CV	7	3,512	0.44	2040
2030	99.56	6,018	12	RV — RV	12	6,018	99.56	2030
2030		8,759	17	GAV — GAV	17	8,759		2030
		10,505	20		20	10,505		
2030	1.42	11,258	P 4	CTV 70 70 CV	P 4	11,258	1.42	2030
	98.58	14,268	25	V — V	25	14,268	98.58	
		17,250	47	V — V	47	17,250		
		20,012	68	V — V	68	20,012		
		23,017	90	V — V	90	23,017		
2025		26,008	113	GAV-RV — GAV-RV	113	26,008		2025
2025	3.63	28,753	134	CTV 70 CV	134	28,753	3.63	2025
	96.37	31,753	156	V — V	156	31,753	96.37	
		35,750	179	V — V	179	35,750		
		37,514	200	V — V	200	37,514		
		40,410	223	V — V	223	40,410		
2075		43,445	247	GAV-RV — GAV-RV	247	43,445		2075
2075	5.83	46,212	270	CTV 70 70 CV	270	46,202	5.83	2075
	94.17	49,235	295	V — V	295	49,235	94.17	
		52,248	318	V — V	318	52,248		
		54,994	340	V — V	340	54,994		
		57,989	363	V — V	363	57,989		
2030		60,975	388	GAV-RV — GAV-RV	388	60,975		2030
2030	8.04	63,738	410	CTV 70 70 CV	410	63,738	8.04	2030
	91.96	66,741	435	V — V	458	69,749		
		69,749	458	V — V	458	69,749		
		72,487	481	V — V	481	72,487		
		75,493	505	V — V	505	75,493		
2020		78,548	529	GAV-RV — GAV-RV	529	78,548		2020
2020	10.26	81,246	553	CTV 70 70 CV	553	81,246	10.26	2020
	89.74	84,253	576	V — V	576	84,253	89.74	
DELTA BRANCH CA.			579	P — 4' P	579	DELTA BRANCH CA.		
			579	8' — P	579	Y - D LINE		
				— 9'R=2.14	579			
		87,247	600	V — V	600	87,247		
		90,000	622	BP	622	90,000		
		52*	ALPHA KS	VPV — VPV	ALPHA KS	52*		

AERIAL CABLE - CIRCULAR GAS SECTION LENGTH 180,000 FT. - 34.1 MI.

ALL CONTACTORS - TYPE C ALL TERMINALS - TYPE ES 626452

3. FORM E-2910—GAS PRESSURE HISTORY RECORD

3.01 This form is used for recording the day-to-day performance of each gas section. Inspection of the records affords an indication of the condition of the gas section from a trouble standpoint, contactor operation, etc. Also it provides data upon which to base the scheduling of future work, such as charging, leak location, checking contactors, normal pressure maintenance, etc. The data on this form are also used in making up the summary reports.

3.02 Space is available on a single sheet for recording data for gas sections 8 to 12 miles in length. In long straight sections or circular sections, two or more sheets are used; Columns 22 to 27 may be cut out of all sheets except the last, so that the summary data are available to view regardless of the number of sheets used. Separate sheets (or groups of sheets) are used for each cable of a circular gas section, or straight section made up of several cables; only one summary is prepared for such sections (Columns 22-27 inclusive), placed last so that it can be seen when looking at any of the detail sheets comprising the section. As an example, if a circular section is composed of the A and B cables, the sheets for the A cable will all have the summary columns cut off. Cut off all of summary columns on B cable sheets except the last sheet and file them under the sheets for the A cable. The summary sheet for the circular gas section is then visible regardless of which sheet of A or B cable is being observed.

3.03 **Cable—Gas Section No.**—Enter in these spaces the name of the cable and the serial number of the gas section (corresponding to the entries in the similar spaces on Form E-1016).

3.04 **Date—Column 1**—This column provides space for recording the date on which an item of work is performed. The year should be entered on the first line of each new sheet of the record, and thereafter at the beginning of each calendar year's record. When a summary is made covering a quarterly or other period, underline in heavy pencil the last entry for the period. This underline should preferably extend across all columns and will serve to separate the entries on the form into summary periods.

3.05 **Records of Gas Pressure Maintenance Work—Columns 2 to 21**—These columns are provided for recording the history of work operations performed in the pressure maintenance of the gas section. One column should be prepared for recording the work at each valve or contactor location at which gas maintenance work is normally performed leaving

two spaces between each column. Space is not provided for all valve points; only those which are normally used, such as those at routine reading valve points, normal charging points, etc., should be listed. The upper space at the top of each column is for indicating the type of equipment at that point, and the lower space is for indicating the pole, manhole, or marker number. The abbreviations given at the top of the forms under the heading "Legend—Gas Pressure Equipment" should be used for entries in these two spaces.

3.06 Typical items which should be recorded in those columns, together with the manner of recording them, follows. Abbreviations for use in connection with these entries are shown in the top of the form under the heading "Legend—Gas Maintenance Work" (the figures shown in connection with these abbreviations are typical; for entries in these spaces, the actual figures should be used).

(a) **Contactor Operations**—Place an X in the column of the contactor which operated. All operations should be recorded; also the cause of the operation should be determined and recorded. Encircle the X which indicates a contactor operation due to cause 4, 5 or 6 below, since these are excluded for summary purposes. Some of the common causes of contactor operation are:

(1) New leaks.

(2) Contactor out of adjustment.

(3) Normal loss of pressure.

(4) Sheath opening in connection with maintenance or construction work.

(5) Second operation of a contactor which previously cleared out, or which had been released by adding gas even though no leak was found.

(6) Second or succeeding contactors operating because of the same trouble which caused the first operation.

(b) **Check of Contactors**—The pressure at which a contactor operates should be shown above the pressure at which it released; for example, 6.1/6.3 would indicate 6.1 pounds operate and 6.3 pounds release pressures. If either the limits for operation or the difference between operate and release pressures are not met, and adjustments are made, the new values should be recorded on the next line; for example, the original values may be shown as 7.1/7.5 and the adjusted value on the next line as 5.9/6.1. Show briefly the work done to adjust the contactor. The values of pressure recorded should be actual readings not adjusted for temperature or barometric pressure. The

temperature and barometric pressure at which the check was made should, however, be shown in an adjacent column.

(c) **Adding Gas**—When it is desired to record the amount of gas used, in the column assigned to the valve where the tank was placed, enter the letter T and the number of cubic feet of gas in the tank. When the tank is removed, enter the letter R and the number of cubic feet of gas remaining in the tank. A note should be made on the same line used for indicating the placing of the tank, to show the reason for adding the gas. The amount of gas should be recorded to the nearest ten cubic feet. In circular gas sections where gas is admitted to two cables from one valve location, the letters T and R should be shown on the sheets for both cables, but the amount of gas in the tank when placed and when removed should be shown only on the sheet for the one cable; for example, on the sheet for the B cable, which is filed under the sheet for the A cable as covered in Paragraph 3.02. In cases where the valve at which the gas is added is not shown at the top of the form, the entry should be made under the nearest valve point normally used, and a notation should be made showing the actual location.

(d) **Routine Readings**—The results of routine readings, made for the purpose of determining rate of loss, should be entered in the column under the pole, marker, or manhole number at which they are made. The pressures recorded should be actual readings, and the temperatures and barometric pressures at which they were made should be shown in an adjacent column; for example, 50°/29.71 would indicate that the pressure measurement was made when the thermometer read 50°F., and the barometer read 29.71 inches. Pressure readings made to locate a leak should not be recorded on this form.

3.07 **Trouble Log Reference Number—Column 21**—Whenever work is started on the location of a gas leak, the serial number assigned to Form E-1101 used by the test room to record the log of the case should be entered in this column. This same number should be entered in this column each time thereafter that entries are made in Columns 2 to 20 in connection with this same gas leak.

3.08 **Leaks Found—Column 22**—Enter in this column the number of leaks found for each contactor operation recorded in Columns 2 to 20 (see Paragraph 3.06) for summary purposes and the number of other leaks found in connection with normal cable maintenance work. Count one leak found at each place where a leak is cleared. If two or more leaks are

corrected by placing one lead sleeve or by replacing any continous length of cable, count only one leak found.

Routine Maintenance Data

3.09 **Average Pressure 60°F./30"—Column 23**—When routine readings are taken and the average pressure for the gas section is determined, enter the pressure corrected to 60°F., and normal (30 inches) barometric pressure in this column, computing it to the nearest tenth (0.1) of a pound. Entries of average pressures should not be made in this column unless readings are made at all routine reading valve points and these readings used in obtaining the average. (Section G73.205.2)

3.10 **Normal Loss per Month—Column 24**—Enter in this column the latest record of the normal pressure loss per month.

3.11 **Estimated Date to Recharge—Column 25**—Enter in this column the aproximate date on which the average pressure in the gas section is expected to reach the lower pressure limit established for the section, as shown on Form E-1016.

Cubic Feet of Gas Used (When Such Data Are Required Locally)

3.12 When more than one sheet is used to record the history of a gas section, such as would occur in the case of a circular gas pressure section or a long straight section, the total amount of gas added in the section on any one occasion should be recorded on one sheet as outlined in Paragraph 3.06(c).

3.13 **Normal Use—Column 26**—Enter the number of cubic feet of gas used in connection with the normal maintenance of gas pressure in the section . This figure should be shown to the nearest ten cubic feet. Normal use of gas includes that used for routine charging in order to maintain the pressure, and that used in connection with restoring the normal pressure either before or after the clearance of a gas leak. Where a cable cutover is necessary to clear the leak see Column 27 and Paragraph 3.14.

3.14 **Abnormal Use—Column 27**—Enter the number of cubic feet used for abnormal purposes in connection with the maintenance of gas pressure in the section. This does not include the amount of gas used in maintaining pressure in connection with work done by the construction forces, such as loading or unloading complements, rearranging load coils, etc. Abnormal use of gas will include all gas used for maintenance purposes except that as shown under normal use in Paragraph

3.13. Some of the common causes of abnormal usage are as follows:

(a) Maintaining gas pressure as a precautionary measure during the cutover of a section of cable and restoring the pressure to the value which existed throughout the gas section before the cutover.

(b) Restoring the pressure to the value which existed throughout the gas section, after intentional sheath openings (as a result of cable work) have reduced the pressure. Examples of such openings are those necessary when replacing load coils, clearing conductor trouble not associated with a gas leak, etc.

(c) Drying out wet cable conductors.

GAS PRESSURE HISTORY RECORD

FORM E-2910

CABLE ALPHA-BETA

GAS SECTION NO. 1

SHEET NO. 2

LEGEND-GAS PRESSURE EQUIPMENT

V = VALVE
RV = ROUTINE READING VALVE POINT
GAV = VALVE POINT NORMALLY USED FOR GAS ADMITTANCE
C = CONTACTOR
P = POLE
M = MANHOLE, MKR. = MARKER

LEGEND-GAS MAINTENANCE WORK

X = CONTACTOR OPERATION
(X) = CONTACTOR OPERATION EXCLUDED FROM SUMMARY
T = TANK CONNECTED. SHOW AMOUNT OF GAS IN TANK
R = TANK REMOVED. SHOW GAS REMAINING IN TANK
(50°) = TEMPERATURE SHOW THERMOMETER READING
4.3/4.4 = CONTACTOR OPERATING AND RELEASE PRESSURES
50°/29.71 = TEMPERATURE (°F) AND BAROMETRIC PRESSURE (INCHES OF MERCURY)

DATE	RECORD OF GAS MAINTENANCE WORK																				TROUBLE LOG REFER'CE NUMBER	LEAKS FOUND	ROUTINE MAINTENANCE			CUBIC FEET OF GAS USED	
			GAV RV P247			C P270				GAV RV P388			C P410			GAV RV P529			C P553				AVG. PRESS-URE 60°F	NORMAL LOSS PER MONTH	EST. DATE TO RECH'G	NORMAL USE	AB-NORMAL USE
1952	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
3-12				(57/30.20)		26/28				(55/30.20)		27/28				(50/30.20)		26/27								
																									150	
																					1					
5-8												P 435	T 1/2 110		Cut to Coil		Aux Ld. P 438									110
6-21			T 210						T 180						T 170											
6-25			R 100						R 70						R 70										550	
7-23	(75/29.48)	7.16				(75/29.48)	7.17					(75/29.48)	7.15									6.3				
8-2	(82/30.42)	6.71				(81/30.42)	6.69					(81/30.42)	6.67									6.0	.75	Oct 24		
																					1					
10-23			T 200						T 150						T 160											
10-29			R 90						R 50						R 50										540	
																										900
12-18									T 200			X	Bullet Hole		P 395						12.7	1				
12-21									R 120																80	
1953 2-15			T 160						T 150						T 180											
2-18			R 50						R 40						R 70										560	

Cut out columns 22 to 27 on all except last sheet. Show summary on last sheet.

3.15 Whenever construction work such as a reloading project, involves sheath openings over a period of 14 days or more, it may be desirable to discontinue recording data on Form E-2910. When this occurs the Form E-2910 shall

be marked "Turned over to (Name) on (Date) for rearrangement" and "Received from (Name) on (Date) after rearrangement." This procedure does not relieve the regular maintenance forces of responsibility for insuring adequate cable pressure to protect service.

4. FORM E-2911—SUMMARY OF GAS PRESSURE SECTION RESULTS

4.01 This form provides a summary of the gas pressure maintenance results for the gas sections assigned to a cableman, district or division, as desired.

4.02 The information to be recorded on this form is taken from Form E-1016 and Form E-2910, and is prepared separately for aerial, underground and buried cable.

4.03 Space is provided at the top of the form to indicate the type of cable (aerial, underground, or buried), the name of the District or location for which the summary is prepared, and the summary period which the data cover. A suggested symbol is also shown for indicating a circular section.

4.04 **Name of Cable—Column 1**—Enter the name of the cable.

4.05 **Gas Section—Assigned Number—Column 2**—Enter the serial number assigned to the gas section for which data are shown in Columns 3 to 16 of the same cable.

4.06 **Gas Section—Length (Thousands of Feet or Mile)—Column 3**—Enter the length of the gas section to the nearest tenth of a thousand feet or mile.

4.07 **Pressure Contactors — Number in Gas Section — Column 4**—Enter, from the record contained on Form E-1016, the number of contactors (including contactor-terminals) in the gas section.

4.08 **Pressure Contactors — Number Tested — Column 5** — Enter the number of contactors on which routine tests were made during the summary period. This is obtained from Columns 2 to 20 of Form E-2910 for the gas section.

4.09 **Pressure Contactors—Number not Meeting Limits—Column 6**—Enter the number of pressure contactors which did not meet the test limits. This is obtained from Columns 2 to 20 of Form E-2910 for the gas section.

4.10 **Pressure Contactors—Operated—Total—Column 7**—Enter the total number of contactor operations recorded on Form E-2910 (Columns 2 to 20) for this gas section, except those contactor operations which are encircled of the following general types:

(a) Caused by intentional opening of the sheath.

(b) Second or succeeding contactors operating because of the same trouble causing the first operation.

(c) Second operation of a contactor which previously cleared out, or which had been released by adding gas even though no leak was involved.

4.11 **Pressure Contactors—Operated—No Leak Involved—Column 8**—Enter the number of contactor operations (within the definition given in Paragraph 4.10) in which no leak was involved. This will include cases of contactor operation resulting from:

(a) Contactors out of adjustment.

(b) Normal loss of pressure.

(c) Temperature characteristics of old type contactors.

(d) Incorrect computation of the normal pressure loss or an error in the determination of a recharging date.

4.12 **Leaks Found—After Contactor Operation—Column 9**—Enter the number of leaks found during the quarter which caused contactor operation during or preceding the quarter (within the definition given in Paragraph 4.10). Count one leak if two or more defects are corrected by one lead sleeve, or by replacing any continuous length of cable.

4.13 **Leaks Found—All Other—Column 10**—Enter from the data contained in Columns 2 to 20 of Form E-2910, the number of leaks found during the quarter but not reported in Column 9.

4.14 **Leaks Found — Total — Column 11** — Enter the total number of leaks found. This figure will be the sum of the figures appearing in Columns 9 and 10.

4.15 **Rate of Loss—Date Last Determined—Column 12**—Enter the date that the rate of loss was last determined for the particular section involved.

4.16 **Rate of Loss—Pressure Loss per Month (Pounds—Column 13)**—Enter the latest value of the normal pressure loss per month for the gas section. This figure will be the last entry shown in Column 24 of Form E-2910 for the gas section, and may be carried over from a previous summary period, **not exceeding one year.** This space should be left blank

when it is known that new leaks have developed in the gas section (as indicated by over-all gradient, etc.), and the new normal pressure loss for the section has not, as yet, been determined. Where a leak has been cleared, which is definitely known to have occurred after the normal loss has been determined, for example, caused by a bullet, lightning, etc., the latest normal loss figure may be used, provided, of course, such figure has been determined within a year previous to clearance of the leak.

4.17 **Allowable Pressure Loss per Month—Column 14**—The allowable pressure loss per month shall be determined for inclusion in this report. Items on Form E-2911 described by Paragraphs 4.18 through 4.25 are provided for those areas desiring such data for study or control purposes.

4.18 **Ratio Actual Loss to Allowable—Column 15**—This ratio shall be determined by dividing the actual rate of loss in Column 13 by the allowable rate of loss in Column 14.

4.19 **Total at the Bottom of the Columns**—Enter in each of Columns 3 to 11, inclusive, the totals of the entries in that column.

4.20 **Per Cent (at Bottom of Form)**—Entries on this line are obtained by dividing the total shown on the TOTAL line in each column by the total in the column indicated, and multiplying the product by 100. This number should be rounded to the nearest per cent. These percentages would generally be shown only when such data are desired for study or control purposes.

FORM E-2911

SUMMARY OF GAS PRESSURE SECTION RESULTS

TYPE OF CABLE	AERIAL
DIV., DIST. OR STATION	NORTHERN
QUARTER YEAR ENDING	MARCH 31, 1953

NAME OF CABLE (INDICATES CIRCULAR SECTION)	GAS SECTION		PRESSURE CONTACTORS			CONTACTORS OPERATED		LEAKS FOUND			• ✓ RATE OF LOSS				REMARKS
	ASSIGNED NUMBER	LENGTH (MILES OR KILOFEET)	NUMBER IN GAS SECTION	NUMBER TESTED	NUMBER NOT MEETING LIMITS	TOTAL	LEAK NOT FOUND	AFTER CONTACTOR OPERATION	ALL OTHER LEAKS	TOTAL (COLS. 9-10)	DATE LAST DETERMINED	NORMAL PRESSURE LOSS PER MONTH	ALLOWABLE PRESSURE LOSS PER MONTH	RATIO 13÷14	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
ALPHA-BETA A	1	90.0	6	3							8- 3-52	.75	.58	1.29	
" " B)	1	90.0	6	3		2	1	1	1	2					
" " A	2	88.2	5	5	1						9-20-52	.45	.59	.76	
" " B)	2	88.2	5	5		1		1		1					
" " A	3	91.2	6	2					2	2	10-16-52	.32	.58	.55	
" " B)	3	91.2	6	2	1	1	1								
" " C	1	55.3	4	2							12- 3-52	.52	.76	.68	
" " C	2	53.8	3	2		1		1		1	3-11-53	1.85	.78	2.37	
" " C	3	54.2	4			1		1		1	3- 2-52	-	.78	-	LOSS TO BE DETERMINED NEXT MO.
" " C	4	56.4	4	2	1						6- 5-52	.23	.75	.31	
" " C	5	58.5	4	2	1	2		2	1	3	1- 3-53	1.52	.72	2.11	
" " D	1	278.2	17	10	1	2		2		2	12-10-52	.68	.45	1.51	
TOTALS		1095.2	70	38	6	10	2	8	4	12					
		PER CENT		COL. 5÷4 X100	COL. 6÷5 X100		COL. 8÷7 X100	COL. 9÷11 X100	COL. 10÷11 X100						
				54	16	100%	20	67	33	100%					

4.21 **Per Cent (Column 5)**—This represents the per cent of the contactors in the gas sections which were tested in the period covered by the summary.

4.22 **Per Cent (Column 6)**—This represents the per cent of the contactors tested which failed to meet the test limits.

4.23 **Per Cent (Column 8)**—This represents the per cent of the total contactors which operated on which no leak was involved.

4.24 **Per Cent (Column 9)**—This represents the per cent of the total leaks found (total of Column 11) on which the leak caused contactor operation (excluding certain types of intentional openings as described in Paragraph 4.11).

4.25 **Per Cent (Column 10)**—This represents the per cent of the total leaks found (total of Column 11) which were discovered by means other than contactor operation.

4.26 Form E-2911 may be used as a summary for showing the performance of a number of gas sections as indicated by the sample form, or it may be used as a running record for a particularly bad gas section which it is desired to keep under observation. When the latter use is made of this form the two lines at the bottom of the form will not be required. The sample form shows a number of cables on the same route for illustrative purposes only and does not necessarily reflect the amount of cable assigned to one maintenance section.