# CROSS-OFFICE NOISE TESTING METHODS

# GENERAL DESCRIPTION

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## 1. GENERAL

**1.01** This section describes a method for measuring noise in any local switching machine. Several sample noise studies made with this method are analyzed in Part 4. For more detailed information on noise characteristics, refer to Section 331-100-100.

**1.02** Studies have shown that various combinations of wear, fatigue, erosion, corrosion, and dirt in switching machine talking-path contacts will produce noise. The type and amount of noise so produced will often vary greatly with changes in current through these contacts. Sampling tests provide an evaluation of the amount of noise being generated by these conditions.

**1.03** Section 331-700-110, Selecting a Sample, describes the kind of lines to select for testing, the number of test calls to make, and the conditions under which the selected lines are to be used.

**1.04** Section 331-700-130, Test Equipment, describes a test set that permits noise measurement at two levels of loop current. Two of the test sets are required to make noise measurements. One of the test sets is connected to a line terminal, and the other to a call number terminal in the same machine. When a number is dialed from the line circuit and an intramachine call completed, noise can be measured at either end of the call at two levels of loop current.

**1.05** Detailed instructions for the method to use in each type of equipment, are covered in these sections:

| SECTION | TITLE |
|---|---|
| 331-700-501 | Step-By-Step |
| 331-700-502 | Panel Offices |
| 331-700-503 | No. 1 Crossbar Offices |
| 331-700-504 | No. 5 Crossbar Offices |
| 331-700-505 | No. 1 ESS Offices |

## 2. CENTRAL OFFICE NOISE CHARACTERISTICS

**2.01** The noise objective for subscriber lines is established at 20 dBrnc as measured at the station terminals. Noise generated in the serving central office should be low enough that it has little or no effect on the noise levels measured at the station terminal. In order to keep the central office noise at a low level, the central office equipment must be properly engineered and adequately maintained.

**2.02** There are three basic sources of noise in central office equipment that contribute noise to a connection. These are:

(a) Battery supply noise

(b) Noise due to equipment

(c) Cross-office noise

Battery supplies contribute noise to a connection through the office when the supplies are in trouble, or when the filters are defective, inadequate, or missing. Battery supply troubles effectively raise the average noise level measured on cross-office connections.

**2.03** Noise due to equipment imbalance occurs when the imbalanced equipment is connected to a plant facility which has longitudinal noise present. The equipment imbalanced affects only the lines connected, but the noise may be objectionable on any connection involving those lines.

**2.04** Cross-office noise is the net sum of all noise sources on a connection between any two line appearances. Since the outside plant facilities are disconnected for such a measurement, cross-office noise, as measured, is not influenced by equipment imbalance, but is influenced by excessive battery noise. Other potential sources of noise are step-by-step selectors, crossbar switches, panel multiple banks and brushes, panel sequence switches, panel commutators, rotary selectors, and relay contacts. When such contact pairs are allowed to become pitted, corroded, dirty, or when the contact pressure becomes excessively light, because of contact wear or maladjustment, they tend to introduce series imbalance into the transmission path and may also begin to function as a microphone to reproduce vibration and mechanical noise from the surrounding structure. The series imbalance introduced into the transmission path increases its susceptibility to noise from other central office noise sources. Negative impedance repeaters, tone generators, ringing equipment, power supplies, and relay contacts opening and closing reactive loads can produce interfering tones and other noise that can enter the cross office transmission path via either, or both, magnetic and electrostatic inductive couplings. The resultant noise levels in the disturbed circuits may, at times, rise to objectionable levels.

**2.05** Dial equipment includes many sliding contacts in the commutators and sequence switches. Unlike relays, where the make or break tends to be quick and clean, sliding contacts break and make relatively slowly. Insulating materials bridge the open sliding contacts. These tend to foul. This coupled with the slow make and break characteristic, tends to produce extended arcing at contacts. Insufficient contact pressure on the panel multiple brush fingers tends to allow generation of microphonic noise. The fairly large inductances in the sequence switch and vertical drive clutch magnets may generate large current and voltage transients. Further, the balance of the earlier supervisory relays and talking battery supply components was not good. Finally, a large majority of the contacts in panel offices, particularly in the transmission path, are of metals that tend to corrode. All of these conditions contribute to the poor noise performance of the Panel Switching System. Also, panel utilizes revertive pulsing for transferring called number information from originating to terminating equipment. This, may contribute to the cross-office noise in panel and No. 1 crossbar offices.

## 3. MEASUREMENT OF CROSS-OFFICE NOISE

**3.01** Cross-office noise is controlled largely through adequate equipment maintenance. The nature of the noise sources is such that excessive noise occurs on random connections rather than on all connections. When the random occurrences become too frequent, they may seriously affect the grade of service experienced by users.

**3.02** Cross-office noise troubles can be identified by sampling measurements. The results can be used to direct corrective maintenance programs.

**3.03** The requirements are based on a 2-stage sampling plan. If 20 different cross-office connections are selected at random and measured, an office is considered to be fully satisfactory if no measurements exceed the following values:

All except panel—18 dBrnc
Panel—24 dBrnc

**3.04** An office is considered unsatisfactory if four or more measurements exceed the above requirements, or if any measurement exceeds the following values:

All except panel—22 dBrnc
Panel—28 dBrnc

**3.05** If 1, 2, or 3 measurements exceed the requirements of 3.03 but not those of 3.04 than 20 more measurements must be made, and the requirements of 3.03 and 3.04 then apply to all 40 measurements.

**3.06** The noise requirements listed and described in 3.01 through 3.05 are for steady-state noise. Noise of this character is usually described

by customers as "hum", "buzz", "growl", crackling", "frying sounds," or just simply "noise". Another often reported category "clicks", "pops" or "bangs in the ear" is believed to be the most objectionable type of noise.

**3.07** When making cross-office noise measurements, "clicks and bangs" appear on the noise meter as large needle excursions. These excursions are observed and an average value determined. This average peak value is entered on the study form in the column when the steady reading is recorded.

**3.08** In addition to the steady-state requirements listed above the following average peak limits apply:

All except panel—26 dBrnc
Panel—32 dBrnc

**3.09** An office is considered unsatisfactory if four or more average peak measurements exceed the above requirements, of if any measurement exceeds the following values:

All except panel—30 dBrnc
Panel—36 dBrnc

**3.10** If 1, 2, or 3 measurements exceed the requirements of 3.08 but not those of 3.09, then 20 more measurements must be made and the requirements of 3.08 and 3.09 applied to all 40 measurements.

## 4. ANALYSIS OF RESULTS

**4.01** Exhibit A is a study made in a SXS office with poor noise results. The principle customer complaint had been "clicks and bangs". The data in columns ***E*** and ***G*** support this complaint. When examining these sample studies, it must be remembered that the peak readings are ***average*** values of the peak, and that the noise meter (3A) was damped. Without damping, an occasional peak above 65 dBrnc was found.

**4.02** Exhibit B is a study made in an old SXS office. There was very little change in noise with changes in loop current. The equipment in this office was dirty. However, there was almost no corrosion on the switch bank terminals, in or outside the wiper track area. This office, unlike the office in Exhibit A, is in a rural area that is free of industrial air pollution. This sample also shows the importance of making noise measurements during busy periods. The noise level dropped with the calling rate during lunch period.

**4.03** Exhibit C is a study made in an old panel office. The equipment was clean and in good mechanical condition. The older frames have bronze switch cams and the newer frames silver cams. Notice that the lower readings did not change much with loop current changes and that the higher ones did. Several of the test calls were traced. All of the low readings, up to 7 dB, were in talking paths with all bronze switch cams. The higher readings were in paths that contained at least two silver cams. The bronze cams were not corroded. The silver cams varied from slightly to lightly corroded depending upon age and proximity to air duct openings. Although this office was acceptable at time of testing, it should be watched. Very little is known about the time required for corrosion to produce the noise levels shown in Exhibit D.

**4.04** Exhibit D is a study made in a relatively new panel office. Upon inspection of the equipment much dirt, many worn switch springs, and heavily corroded silver switch cams, were found. These last two conditions were usually in combination. Notice the wide ranges, 30 dB within column ***D*** and 37 dB in column ***G.*** Note also that there were large changes in ***both*** directions with change in loop current. In one case (test call #8) the noise dropped 24 dB. The direction of change is believed to be determined by the nature of the corrosion product on the contact surfaces. This sample illustrates the importance of measuring noise at more than one level of loop current. Several of the test call measurements, #16 and #17 for example, would have been acceptable if made at only one level of current.

**4.05** Exhibit E is a study made in a No. 5 crossbar office. This study is included to show the level of noise to be expected in modern equipment in good condition. The −10 readings mean noise ***at least*** 10 dB below 0 dBrnc. The 3A noise measuring set, that was used in these studies, will not reliably measure noise below −10 dBrnc. The same noise level and range of variation found in No. 5 crossbar offices should be expected in ESS

offices. Higher noise levels in No. 5 crossbar and ESS offices can be caused by talking battery filter component deterioration or contact wear and corrosion.

**4.06** Exhibit F shows parts of the studies made in both marker groups in a No. 1 crossbar office. The omitted parts did not differ with the data shown. The range up to 5.0 dBrnc shown in the older group, should be expected in No. 1 crossbar offices. Noise levels above this indicate filter and/or contact deterioration. The district frame talking battery filters in the newer frames were incompletely wired. Nearly raw signal battery was being used for talking. This exhibit illustrates the importance of a correctly selected sample within a switching machine. This filter condition escaped notice because the noise-test jacks are permanently associated with two of the older line-link frames that do not have access to the newer district frames.

FORM E-5969
(10 69)
SEC. 331-700-500

## CROSS OFFICE
## NOISE TEST DATA

CITY NOISETOWN BUILDING 100 MAIN ST OFFICE 525-526
DATE 10-25-69 TYPE EQUIP. 5XS TESTER G.H F.A.R.
SW. RM. TEMP. 76 °F REL. HUMIDITY 32 % WIRE CHIEF NO. 525-XXXX
DIAL TONE 72 dBrnc 1 MW 88.5 dBrnc QUIET TERM. 19-23 dBrnc

| CALLING LINE | CABLE PAIR | CALLED NUMBER | MEAS. NOISE-dBrnc | | | |
|---|---|---|---|---|---|---|
| | | | LONG | | SHORT | |
| | | | STEADY | PEAK | STEADY | PEAK |
| A | B | C | D | E | F | G |
| 1. 12-56 | | 525- 2714 | 14 | 16 | 18 | 20 |
| 2. 16-97 | | 2173 | 14 | 27 | 22 | 30 |
| 3. 9-41 | | 2558 | 15 | 37 | 19 | 39 |
| 4. 13-72 | | 9814 | 15 | 32 | 21 | 40 |
| 5. 7-93 | | 8015 | 16 | 20 | 19 | 29 |
| 6. 8-81 | | 8251 | 22 | 34 | 24 | 36 |
| 7. 5-81 | | 9165 | 19 | 23 | 21 | 26 |
| 8. 6-23 | | 8475 | 20 | 28 | 21 | 33 |
| 9. 3-104 | | 7953 | 17 | 19 | 20 | 32 |
| 10. 4-108 | | 526- 7870 | 19 | 26 | 21 | 26 |
| 11. 4-123 | | 7651 | 19 | 30 | 22 | 32 |
| 12. 1-75 | | 7343 | 19 | 26 | 21 | 28 |
| 13. 17-161 | | 7242 | 19 | 37 | 21 | 33 |
| 14. 2-83 | | 8361 | 19 | 38 | 22 | 40 |
| 15. 10-183 | | 8748 | 23 | 32 | 25 | 27 |
| 16. 9-41 | | 8624 | 23 | 25 | 25 | 33 |
| 17. 11-61 | | 6705 | 22 | 25 | 25 | 27 |
| 18. 12-51 | | 9899 | 17 | 22 | 21 | 27 |
| 19. 13-186 | | 9087 | 17 | 25 | 21 | 28 |
| 20. 15-15 | | 8991 | 17 | 32 | 22 | 47 |

NO. OF CONN. EXCEEDING 18 dBrnc (STEADY): 19
NO. OF CONN. EXCEEDING 22 dBrnc (STEADY): 4
NO. OF CONN. EXCEEDING 26 dBrnc (PEAK): 17
NO. OF CONN. EXCEEDING 30 dBrnc (PEAK): 10
NOTES: HEAVY CORROSION - MANY WORN WIPERS
KNOWN POOR NOISE RESULTS.

Fig. 1—Exhibit A

FORM E-5969
(10-69)
SEC. 331-700-500

## CROSS OFFICE
## NOISE TEST DATA

CITY MYTOWN BUILDING 101 MAIN ST OFFICE 234-235
DATE 10-26-69 TYPE EQUIP. SXS TESTER A.B. F.A.R.
SW. RM. TEMP. 81 °F REL. HUMIDITY 46 % WIRE CHIEF NO. 234-XXXX
DIAL TONE 69 dBrnc 1 MW 89 dBrnc QUIET TERM. -7-1 dBrnc

| CALLING LINE | CABLE PAIR | CALLED NUMBER | MEAS. NOISE-dBrnc | | | |
|---|---|---|---|---|---|---|
| | | | LONG | | SHORT | |
| | | | STEADY | PEAK | STEADY | PEAK |
| A | B | C | D | E | F | G |
| 1. 9-84 | | 234- 4339 | 0 | 17 | 0 | 22 |
| 2. 12-92 | | 4497 | 0 | 14 | 0 | 13 |
| 3. 13-117 | | 5958 | -5 | 13 | 0 | 19 |
| 4. 14-11 | | 7412 | -7 | 12 | -7 | 16 |
| 5. 15-64 | | 7939 | 0 | 12 | 0 | 12 |
| 6. 16-40 | | 9030 | 2 | 19 | 2 | 10 |
| 7. 19-85 | | 0506 | 0 | 14 | 2 | 16 |
| 8. 18-84 | | 0325 | 2 | 17 | 2 | 13 |
| 9. 17-42 | | 2944 | 0 | 20 | 0 | 17 |
| 10. 7-142 | | 235- 7671 | 0 | 16 | 0 | 13 |
| 11. 20-105 | | 1947 | 3 | 13 | 4 | 10 |
| 12. 21-52 | | 2081 | 0 | 10 | 0 | 12 |
| 13. 22-127 | | 2129 | 10 | 17 | 5 | 13 |
| 14. 23-65 | DURING LUNCH PERIOD | 3514 | -8 | 15 | -4 | 14 |
| 15. 24-48 | | 5079 | -6 | 12 | -5 | 12 |
| 16. 11-134 | | 3555 | -8 | 12 | -5 | 14 |
| 17. 25-42 | | 9940 | -10 | 11 | -7 | 14 |
| 18. 26-48 | | 8978 | -10 | 11 | -10 | 15 |
| 19. 27-11 | | 2544 | -10 | 13 | -10 | 14 |
| 20. 30 96 | | 3561 | -8 | 11 | -10 | 13 |

NO. OF CONN. EXCEEDING 18 dBrnc (STEADY): 0
NO. OF CONN. EXCEEDING 22 dBrnc (STEADY): 0
NO. OF CONN. EXCEEDING 26 dBrnc (PEAK): 0
NO. OF CONN. EXCEEDING 30 dBrnc (PEAK): 0
NOTES: GENERAL CLEANING IN PROGRESS - GOOD MAINTENANCE EVIDENT.

**Fig. 2—Exhibit B**

FORM E-5969
(10 69)
SEC. 331-700-500

## CROSS OFFICE
## NOISE TEST DATA

CITY YOUR TOWN BUILDING 102 MAIN ST. OFFICE 345-346-347
DATE 10-27-69 TYPE EQUIP. PAN-GEO TESTER C.D. FAR.
SW. RM. TEMP. 74 °F REL. HUMIDITY 65 % WIRE CHIEF NO. 345-XXXX
DIAL TONE 70 dBrnc 1 MW 90.5 dBrnc QUIET TERM. 7 13 dBrnc

| CALLING LINE | CABLE PAIR | CALLED NUMBER | MEAS. NOISE-dBrnc | | | |
|---|---|---|---|---|---|---|
| | | | LONG | | SHORT | |
| | | | STEADY | PEAK | STEADY | PEAK |
| A | B | C | D | E | F | G |
| 1. 49-22 | 7-902 | 345-6501 | 5 | 11 | 5 | 11 |
| 2. 26-204 | 21-516 | 346-4202 | 5 | 11 | 6 | 12 |
| 3. 46-70 | 2-107 | 5365 | 5 | 10 | 2 | 8 |
| 4. 31-108 | 9-282 | 347-0428 | 10 | 16 | 10 | 21 |
| 5. 37-374 | 9-461 | 3559 | 12 | 20 | 3 | 7 |
| 6. 02-318 | 21-863 | 345-5615 | 4 | 10 | 4 | 10 |
| 7. 11-64 | 33-1063 | 346-8513 | 13 | 20 | 16 | 20 |
| 8. 10-292 | 2-407 | 345-4162 | 14 | 16 | 12 | 15 |
| 9. 104-383 | 31-273 | 346-6473 | 14 | 17 | 10 | 14 |
| 10. 17-126 | SPARES | 2202 | 13 | 16 | 18 | 22 |
| 11. 12-214 | ↓ | 1209 | 4 | 11 | 4 | 11 |
| 12. 3-76 | | 345-0466 | 18 | 20 | 15 | 18 |
| 13. 7-256 | | 1772 | 11 | 14 | 10 | 14 |
| 14. 14-101 | | 1877 | 6 | 11 | 6 | 10 |
| 15. 21-03 | | 347-4321 | 9 | 16 | 9 | 17 |
| 16. 48-255 | | 4627 | 6 | 12 | 6 | 12 |
| 17. 33-73 | | 0271 | 15 | 19 | 12 | 20 |
| 18. 27-341 | | 7462 | 11 | 16 | 10 | 14 |
| 19. 23-27 | | 1021 | 7 | 12 | 7 | 10 |
| 20. 19-214 | | 5636 | 11 | 16 | 9 | 15 |

NO. OF CONN. EXCEEDING 24 dBrnc (STEADY): 0
NO. OF CONN. EXCEEDING 28 dBrnc (STEADY): 0
NO. OF CONN. EXCEEDING 32 dBrnc (PEAK): 0
NO. OF CONN. EXCEEDING 36 dBrnc (PEAK): 0

VERY CLEAN EQUIPMENT!

NOTES: GOOD MAINTENANCE EVIDENT. REF. IMW TO SUPERVISOR.

Fig. 3—Exhibit C

FORM E-5969
(10-69)
SEC. 331-700-500

## CROSS OFFICE
## NOISE TEST DATA

CITY HISTOWN BUILDING 103 MAIN ST. OFFICE 456-457-458
DATE 10-28-69 TYPE EQUIP. PAN-BCO TESTER E.F. F.A.R.
SW. RM. TEMP. 74 °F REL. HUMIDITY 42 % WIRE CHIEF NO. 456-XXXX
DIAL TONE 76 dBrnc 1 MW 87.5 dBrnc QUIET TERM. 27-37 dBrnc

| CALLING LINE | CABLE PAIR | CALLED NUMBER | MEAS. NOISE-dBrnc | | | |
|---|---|---|---|---|---|---|
| | | | LONG | | SHORT | |
| | | | STEADY | PEAK | STEADY | PEAK |
| A | B | C | D | E | F | G |
| 1. 8-213 | | 456-6483 | 21 | 24 | 27 | 34 |
| 2. 9-212 | | 3469 | 22 | 25 | 26 | 29 |
| 3. 10-22 | | 6392 | 19 | 23 | 23 | 25 |
| 4. 12-94 | | 5168 | 21 | 23 | 21 | 24 |
| 5. 11-60 | | 3387 | 25 | 30 | 19 | 22 |
| 6. 40-67 | | 7593 | 40 | 44 | 26 | 35 |
| 7. 7-15 | | 0425 | 18 | 21 | 16 | 19 |
| 8. 16-370 | | 1270 | 44 | 48 | 20 | 24 |
| 9. 17-256 | | 457-0237 | 20 | 30 | 19 | 25 |
| 10. 15-179 | | 0324 | 25 | 30 | 35 | 38 |
| 11. 27-269 | | 1186 | 19 | 21 | 19 | 21 |
| 12. 19-311 | | 4068 | 25 | 27 | 21 | 24 |
| 13. 20-30 | | 1211 | 22 | 24 | 25 | 29 |
| 14. 23-330 | | 2312 | 42 | 44 | 40 | 43 |
| 15. 24-262 | | 458-6377 | 47 | 51 | 52 | 56 |
| 16. 22-53 | | 3517 | 34 | 37 | 22 | 26 |
| 17. 32-50 | | 4468 | 22 | 25 | 41 | 45 |
| 18. 34-124 | | 8594 | 26 | 30 | 22 | 24 |
| 19. 29-293 | | 6498 | 17 | 23 | 23 | 25 |
| 20. 35-295 | | 9442 | 22 | 25 | 22 | 27 |

NO. OF CONN. EXCEEDING 24 dBrnc (STEADY): 13
NO. OF CONN. EXCEEDING 28 dBrnc (STEADY): 7
NO. OF CONN. EXCEEDING 32 dBrnc (PEAK): 8
NO. OF CONN. EXCEEDING 36 dBrnc (PEAK): 7
NOTES: CORRODED CAMS - WORN SS SPRINGS. VERY DIRTY EQUIPMENT.

REF. 1 MW to SUPERVISOR.

**Fig. 4—Exhibit D**

FORM E-5969
(10-69)
SEC. 331-700-500

## CROSS OFFICE
## NOISE TEST DATA

CITY QUIETOWN BUILDING 104 MAIN ST. OFFICE 567-568
DATE 10-29-69 TYPE EQUIP. 5XB TESTER I.J. FAR
SW. RM. TEMP. 81 °F REL. HUMIDITY 27 % WIRE CHIEF NO. 567-XXXX
DIAL TONE 70.5 dBrnc 1 MW 90.2 dBrnc QUIET TERM. -10-4 dBrnc

| CALLING LINE | CABLE PAIR | CALLED NUMBER | MEAS. NOISE-dBrnc | | | |
|---|---|---|---|---|---|---|
| | | | LONG | | SHORT | |
| | | | STEADY | PEAK | STEADY | PEAK |
| A | B | C | D | E | F | G |
| 1. 25-0-6-01 | | 567-8021 | -10 | -7 | -10 | -8 |
| 2. 24-4-1-00 | | 2723 | -10 | -6 | -10 | -6 |
| 3. 18-0-9-01 | | 1041 | -10 | -7 | -10 | -8 |
| 4. 21-2-8-01 | | 6732 | -10 | -1 | -10 | -6 |
| 5. 17-2-5-03 | | 1521 | -10 | -4 | -10 | -7 |
| 6. 19-1-4-02 | | 7040 | -10 | -6 | -10 | -7 |
| 7. 24-3-4-01 | | 2926 | -10 | -4 | -9 | -6 |
| 8. 20-3-6-03 | | 1796 | -10 | -6 | -10 | -8 |
| 9. 19-3-5-02 | | 2272 | -10 | -5 | -8 | -7 |
| 10. 18-2-7-01 | | 568-0040 | -10 | -6 | -10 | -5 |
| 11. 16-1-4-03 | | 9938 | -10 | -9 | -10 | -4 |
| 12. 12-0-8-02 | | 7116 | -10 | -5 | -10 | -6 |
| 13. 14-1-7-01 | | 2724 | -10 | -6 | -10 | -6 |
| 14. 11-2-2-01 | | 6371 | -10 | -6 | -10 | -4 |
| 15. 10-0-5-02 | | 5296 | -10 | -5 | -10 | -5 |
| 16. 07-3-0-01 | | 1792 | -8 | -6 | -10 | -5 |
| 17. 03 1-3-02 | | 6204 | -10 | -5 | -10 | -6 |
| 18. 08-2-7-02 | | 0121 | -10 | -6 | -8 | -6 |
| 19. 02-3-2-03 | | 3607 | -10 | -5 | -10 | -5 |
| 20. 01-0-1-01 | | 7847 | -10 | -4 | -10 | -6 |

NO. OF CONN. EXCEEDING 18 dBrnc (STEADY): 0
NO. OF CONN. EXCEEDING 22 dBrnc (STEADY): 0
NO. OF CONN. EXCEEDING 26 dBrnc (PEAK): 0
NO. OF CONN. EXCEEDING 30 dBrnc (PEAK): 0
NOTES: NEW EQUIPMENT- REF. 1 MW TO WIRE CHIEF.

**Fig. 5—Exhibit E**

FORM E-5969
(10 '69)
SEC. 331-700-500

## CROSS OFFICE
## NOISE TEST DATA

CITY ERR TOWN | BUILDING 105 MAIN ST | OFFICE 265-6, 456-789
DATE 10-30-69 | TYPE EQUIP. 1XB | TESTER KL. FAR
SW. RM. TEMP. 81 °F | REL. HUMIDITY 27 % | WIRE CHIEF NO. 265-XXXX
DIAL TONE 71 dBrnc | 1 MW 89.3 dBrnc | QUIET TERM. -2 -2 dBrnc

| CALLING LINE | CABLE PAIR | CALLED NUMBER | MEAS. NOISE-dBrnc LONG STEADY | LONG PEAK | SHORT STEADY | SHORT PEAK |
|---|---|---|---|---|---|---|
| A | B | C | D | E | F | G |
| 1. 03-69 | OLD GROUP | 265 - 3999 | -4 | 3 | -4 | 2 |
| 2. 17-46 | ↓ | 4358 | -3 | 2 | -3 | 2 |
| 3. 21-07 | ↓ | 0090 | 0 | 5 | 0 | 4 |
| 4. 43-72 | | 8610 | -5 | 2 | 0 | 3 |
| 5. 31-64 | | 5940 | -4 | 2 | -4 | 3 |
| 6. 32-71 | | 3776 | -3 | 1 | -3 | 0 |
| 7. 16-63 | | 5518 | -4 | 1 | -3 | 3 |
| 8. 24-28 | | 2193 | 0 | 3 | 1 | 2 |
| 9. 37-63 | | 5392 | -2 | 2 | -2 | 1 |
| 10. 15-19 | | 4098 | 0 | 4 | 0 | 4 |
| 11. 91-27 | NEW GROUP | 456 - 1202 | 29 | 31 | 30 | 35 |
| 12. 92-56 | ↓ | 3814 | 30 | 34 | 32 | 35 |
| 13. 93-02 | ↓ | 3991 | 30 | 34 | 30 | 34 |
| 14. 107-32 | ↓ | 6094 | 30 | 34 | 30 | 33 |
| 15. 109-51 | | 3798 | 30 | 33 | 29 | 33 |
| 16. 111-56 | | 2842 | 30 | 33 | 30 | 32 |
| 17. 117-96 | | 3405 | 30 | 34 | 29 | 33 |
| 18. 126-72 | | 5207 | 30 | 34 | 29 | 32 |
| 19. 128-46 | | 2231 | 29 | 32 | 29 | 32 |
| 20. 131-22 | | 1110 | 30 | 33 | 29 | 33 |

| | OLD | NEW |
|---|---|---|
| NO. OF CONN. EXCEEDING 18 dBrnc (STEADY): | 0 | 11 |
| NO. OF CONN. EXCEEDING 22 dBrnc (STEADY): | 0 | 11 |
| NO. OF CONN. EXCEEDING 26 dBrnc (PEAK): | 0 | 11 |
| NO. OF CONN. EXCEEDING 30 dBrnc (PEAK): | 0 | 11 |

NOTES: WIRING ERROR - TALKING BATTERY FILTERS - DISTRICTS.
SAME ERROR IN ALL NEW FRAMES IN THIS OFFICE.

Fig. 6—Exhibit F