ANALYSIS OF TOLL OPEN WIRE TROUBLES BY DETAILED TROUBLE CAUSE

1. GENERAL

1.01 This section covers the procedure for making an analysis of the cause of toll open wire troubles in greater detail than that afforded by the trouble classifications in the summaries of toll open wire troubles.

1.02 This type of analysis may be desirable for one or more trouble classifications when the trouble rates for those classifications are high or have an upward trend; or may also be found useful when applied on a random sampling basis in those classifications for which the overall trouble rate appears to be at a satisfactory level.

1.03 Such an analysis of troubles should disclose whether the troubles in classifications under study are due to one or more outstanding causes, and should assist in determining the maintenance procedures which would be most productive in reducing the trouble occurrences.

2. PROCEDURE FOR MAKING THE ANALYSIS

2.01 In selecting the trouble classifications for study, preference should be given to those which have increasing or high trouble rates. The sub-classifications for use in a breakdown of these trouble classifications should be chosen with a view toward bringing out any conditions which are peculiar to the locality in which the study is made. For this reason a prearranged list of sub-classifications may not be best suited to every type of study. However, where local conditions are not known prior to initiating the study, or where the results for several maintenance areas are desired on a uniform basis, the breakdown suggested on Form E-2290, described in Part 3 of this section, may be found useful.

2.02 In the following procedures, the discussion of the use of sub-classifications which appear on Form E-2290 applies also to the use of other sub-classifications which may be selected locally. The sub-classifications shown on Form E-2290, are numbered in a manner which will not interfere with the procedure for making the normal monthly or quarterly trouble summaries for the maintenance area. Sub-classifications assigned locally should be similarly arranged.

2.03 When classifying a case of trouble which is chargeable to one of the classifications selected for study, enter on the trouble log sheet the code number which has been assigned to the sub-classification of the trouble. Troubles should be recorded in this manner until a sufficient sample has been taken to give a representative distribution of the causes of trouble.

2.04 Before summarizing the results of the study, consideration should be given as to whether an analysis of the "cases of trouble" or "wire troubles" would be more suitable for portraying the desired results. An analysis on the basis of cases of trouble will reflect the relative frequency of occurrence of each type of trouble for which repair trips are made, and for which preventive inspections are scheduled; however, it does not reflect the service reactions which may result from the cases of trouble. When an analysis is desired which more nearly reflects the circuit interruptions, one should be used which is based on wire troubles.

2.05 No form is provided for summarizing the results for this type of analysis. A tabulating sheet having a sufficient number of lines and columns will be found convenient for this purpose. The lines should be numbered in accordance with the main classification numbers, leaving several blank lines for the trouble data entries. The columns should be lettered to correspond with the sub-classification letters. If the analysis is being made on the basis of cases of trouble, enter a stroke or tally mark in the proper line and column for each case of trouble, or if the analysis is being made on the basis of wire troubles enter a stroke or tally mark for each wire trouble. A typical summary sheet is illustrated in Fig. 1.

3. TROUBLE CLASSIFICATION FORM

3.01 Form E-2290, Toll Open Wire Trouble Classifications, furnishes in convenient form for testboard use a list of the general trouble classifications. It also furnishes a suggested breakdown of these classifications by cause or location of trouble for use in the type of analysis described in Part 2 of this section.

3.02 The use of this form when classifying troubles should assist in readily choosing

CASES OF TROUBLE YEARS 1967-68

CODE	A	B	C	D	E	F	G	H				X	
121		1	11 11	1	111	1							
			11 1										
123	1111		11 11	11 111								1	
			11 11										
			11 11										
			11 11										
			1										

Fig. 1

the proper code number, as most of the major causes of trouble in each classification are listed.

3.03 The sub-classifications are not described here as they are listed on Form E-2290 in such a manner that they appear to be self-explanatory. It will be noted that where all of the causes of trouble under a detailed classification are not listed, the "All Other" classification is coded "X" in order to leave space for such additional sub-classifications as may be needed.

3.04 A copy of Form E-2290 is attached as a part of this section. Additional copies of this form are available on requisition in the usual manner.

Attached:

Form E-2290

PRINTED IN U.S.A.

FORM E-2290
(11-60)

TOLL OPEN WIRE TROUBLE CLASSIFICATIONS

ELEMENTS

110 - ELEMENTS

101 ICE OR SNOW
- 101-A Trees
- 101-X All other

102 VIOLENT WIND
- 102-A Trees
- 102-X All other

Note: Classify the trouble as due to "trees" in Codes 101 and 102 when it is evident that there would have been only minor plant damage except for the ice-laden or wind blown trees.

103 LIGHTNING
- 103-A Pole split or broken
- 103-B Crossarm split or broken
- 103-C Wire burned or broken
- 103-D Lightning struck nearby tree
- 103-E Lightning struck other object
- 103-X All other (except protector operation)

104 FLOOD
- 104-A High back-water
- 104-B Washout
- 104-X All other

105 FIRE, LANDSLIDE, SNOWSLIDE & EARTHQUAKE
- 105-A Building fire
- 105-B Gas filling station fire
- 105-C Other burning structure
- 105-D Vehicle burning under line
- 105-E Forest, brush or grass fire
- 105-F Waste oil fire
- 105-G Other fire
- 105-H Snowslide
- 105-I Landslide
- 105-J Earthquake
- 105-X All other

EXTRANEOUS CAUSES

120 - WORKMEN

111 BELL EMPLOYEE
- 111-A Maintenance employee of this Company
- 111-B Construction employee of this Company
- 111-C Contractor for this Company
- 111-D Maintenance employee of other Bell Company
- 111-E Construction employee of other Bell Company
- 111-F Contractor for other Bell Company
- 111-X Other Bell System employee

112 ROAD WORK (Including Blasting)
- 112-A Wire broken
- 112-B Insulator broken
- 112-C Pole, guy, or crossarm damaged
- 112-D Pole, guy, or anchor graded out
- 112-X All other

118 OTHER WORKMEN
- 118-A Employee of other tel. or tel. co. working on joint line
- 118-B Employee of other tel. or tel. co. working on other line
- 118-C Employee of power or light co. working on joint line
- 118-D Employee of power or light co. working on other line
- 118-X Other workmen

EXTRANEOUS CAUSES

130 - TREES, BRUSH, AND DEBRIS

121 TREES OR BRUSH
- 121-A Tree cut by Bell employee
- 121-B Limb cut by Bell employee
- 121-C Tree cut by other workman
- 121-D Limb cut by other workman
- 121-E Tree broken
- 121-F Limb broken
- 121-G Tree uprooted
- 121-H Tree growing into line
- 121-I Brush or weed growing into line
- 121-J Vine
- 121-X All other

123 DEBRIS
- 123-A Scrap telephone wire
- 123-B Bird nest
- 123-C Other scrap wire
- 123-D Other metallic objects
- 123-E Kite or kite string
- 123-F Fish line
- 123-G Twigs
- 123-H Moss
- 123-X All other

140 - OTHER EXTRANEOUS CAUSES

131 OTHER COMPANY'S WIRE ON JOINT LINE
- 131-A Other telephone or telegraph company's wire
- 131-B Other tel. or tel. company's crossarm, bracket, or pin
- 131-C Power or light wire
- 131-D Power or light company's crossarm, bracket, or pin
- 131-X All other

132 POLE OR WIRE OF SEPARATE LINE
- 132-A Another line of this Company
- 132-B Other tel. or tel. line crossing over this line
- 132-C Other tel. or tel. line crossing under this line
- 132-D Other tel. or tel. line over-building this line
- 132-E Other tel. or tel. line under-building this line
- 132-F Power or light line crossing over this line
- 132-G Power or light line crossing under this line
- 132-H Power or light line over-building this line
- 132-I Power or light line under-building this line
- 132-X All other

133 POWER INDUCTION
- 133-A Power transmission line
- 133-B Power or light distribution line
- 133-C Series street lighting circuit
- 133-D Railway trolley or feeder - d-c
- 133-E Railway trolley or feeder - a-c
- 133-F Railway signal circuit
- 133-G Secondary induction
- 133-X All other

134 VEHICLE OR MACHINERY (Other Than Aircraft)

(134-A to 134-F - striking pole, stub, or guy)
- 134-A At turn or curve in highway
- 134-B At highway crossroads
- 134-C At highway crossing of private right-of-way
- 134-D At other place along highway
- 134-E On railroad right-of-way
- 134-F On other private right-of-way

(134-G to 134-K - passing under the line)
- 134-G At railroad crossing
- 134-H At highway crossing
- 134-I At driveway, gate, or private lane
- 134-J At other place along highway
- 134-K At other place along private right-of-way
- 134-X All other

136 BULLET OR GUN SHOT
- 136-A Urban or suburban community
- 136-B Rural community - along highway or at highway crossing
- 136-C Rural community - along private right-of-way

138 MISCELLANEOUS EXTRANEOUS CAUSES
- 138-A Wire theft
- 138-B Other intentional interference
- 138-C Building construction
- 138-D Aircraft striking line
- 138-E Other accidental interference
- 138-X All other

STRUCTURAL DEFECTS

STRUCTURAL DEFECTS

160 - SUPPORTING STRUCTURE

151 POLE, CROSSARM, OR GUY
- 151-A Pole or stub broken or kicked out
- 151-B Pole split, checked, or rotted - failing to support pole attachment
- 151-C Pole ground wire
- 151-D Crossarm defective (broken, checked, split, warped, or rotten)
- 151-E Transposition bracket
- 151-F Guy
- 151-G Anchor
- 151-X All other

152 PIN
- 152-A Wood pin broken
- 152-B Wood pin threads defective
- 152-C Wood pin pulled out
- 152-D Steel pin nut loose
- 152-E Wood cob for steel pin
- 152-F Bonding strap between pins
- 152-X All other

153 INSULATOR
- 153-A Loose or unscrewed (except due to defective pin)
- 153-B Broken - at point transposition bracket
- 153-C Broken - at other location
- 153-D Dirty (low insulation)
- 153-X All other

170 - WIRE STRUCTURE

161 LINE WIRE BROKEN WITHIN REACH OF POLE
- 161-A Broken at old tie location
- 161-B Broken at "neck" in line wire
- 161-C Corrosion or rust (deteriorated)
- 161-D Other nick, kink, or flaw
- 161-E Broken at twisted sleeve
- 161-F Broken at rolled sleeve
- 161-G Rolled sleeve pulled out
- 161-H Broken at hand joint
- 161-I Electrolysis
- 161-J Worn by tie wire
- 161-K Other break at insulator
- 161-L Nick at end of tie
- 161-X All other

162 LINE WIRE BROKEN - OTHER LOCATION
- 162-A Broken at old tie location
- 162-B Broken at "neck" in line wire
- 162-C Corrosion or rust (deteriorated)
- 162-D Other nick, kink, or flaw
- 162-E Broken at twisted sleeve
- 162-F Broken at rolled sleeve
- 162-G Rolled sleeve pulled out
- 162-H Broken at hand joint
- 162-X All other

163 LINE WIRE CONNECTION
- 163-A Twisted sleeve
- 163-B Rolled sleeve
- 163-C Hand joint
- 163-D Test connector
- 163-X All other

164 LINE WIRE SAG
- 164-A Slack creeps downgrade
- 164-B Span adjacent to close-spaced crossarms or pins
- 164-C In long span construction
- 164-D In phantom transposition
- 164-E In single transposition
- 164-F In other 12-inch spaced wire
- 164-G In other 8-inch spaced wire
- 164-H In other 6-inch spaced wire
- 164-X All other

STRUCTURAL DEFECTS

170 - WIRE STRUCTURE (Continued)

165 TIE WIRE
- 165-A Electrolysis
- 165-B Round tie broken - other cause
- 165-C Flat tie broken - other cause
- 165-D Tie wire missing
- 165-E Loose tie at head or back guyed pole
- 165-F Loose tie at other pole
- 165-X All other

166 BRIDLE WIRE, EMERGENCY CABLE OR WIRE
- 166-A Bridle wire connection to line wire
- 166-B Bridle wire connection to terminal, protector, or other pole mounted equipment
- 166-C Other bridle wire or bridle cable trouble
- 166-D Emergency cable
- 166-E Outside distributing wire used as emergency wire
- 166-X All other

168 OTHER WIRE AND POLE MOUNTED EQUIPMENT
- 168-A Incorrect or missing transposition
- 168-B Wires having span insulator - wrapped in span
- 168-C Other wires having proper sag - wrapped in span
- 168-D Other wire trouble
- 168-E Pole phantom, composite, or carrier transfer set
- 168-F Open wire load coil, case, or protector
- 168-G Power exposure protector (except protector operation)
- 168-H Other protector trouble (except protector operation)
- 168-I Drainage coils
- 168-J Type J carrier retardation coils
- 168-X Other pole mounted equipment

DISAPPEARING TROUBLE

182 DISAPPEARING TROUBLE
- 182-A Low insulation
- 182-B Foreign potential
- 182-C Ground
- 182-D Other cross
- 182-E Resistance unbalance
- 182-F Open
- 182-X All other

AUXILIARY DATA

191 PROTECTOR OPERATION
- 191-A Short-circuiting relay protector
- 191-B Auxiliary 10-mil protector
- 191-C Other protector at power exposure
- 191-X Other protector operation

192 WEATHER BOUND CARRIER WIRES
- 192-A Ice or glaze
- 192-B Wet snow
- 192-C Frost
- 192-D Fog

Note: Indicate the type of carrier system which fails by using the letter designation of the system type as a subscript to the code. Example: Code 192-AJ indicates that a type J system was weather bound due to ice or glaze.

193 STATIC OR EARTH CURRENT
- 193-A Static interference to grounded telegraph
- 193-B Static interference to carrier telephone or telegraph
- 193-C Static interference to voice-frequency telephone
- 193-D Earth currents
- 193-X All other (except protector operation)