PLANT ANNUAL COST DATA FOR SYSTEM DESIGN PURPOSES

Purpose:

The purpose of this Addendum is to supplement Section 218 with information required for considering telephone set transmitting amplifiers together with fine-gauge cable as an alternate to other methods of providing service initially, or when an exchange is to be expanded or upgraded.

General:

TE & CM-706, "Telephone Set Transmitting Amplifiers," discusses the technical aspects for this optional equipment.

Amplifiers should be considered as a design alternative to other means (such as voice frequency repeaters) for extending fine gauge cable facilities. In many instances, it will be found that the reduction in cable costs made possible will be considerably more than the cost of the amplifiers and the additional long-line adapters that may be required by the finer-gauge circuitry.

Where a significant reduction in initial costs can be achieved by using amplifiers, a corresponding savings in annual costs can also be expected. (See example.)

Additions:

In Table I, under "Station Equipment," add:

Type of Plant	Depreciation Rate %	Maintenance Annual Expense
Telephone Set Transmitting Amplifier	10	$1.00

3.03 Add the following "Illustrative Example."

3.037 EXHIBIT G - STUDY OF ECONOMICS OF USING TELEPHONE SET TRANSMITTING AMPLIFIERS TO MEET TRANSMISSION OBJECTIVES

3.0371 This is an example of a typical exchange plant design with and without utilizing amplifiers. The lead has been redesigned to approximately 2200 ohms to incorporate telephone amplifiers in those loops exceeding 1700 ohms.*

3.0372 The savings in first costs and annual charges are tabulated. In this case, mostly 22- and 24-gauge cables are compared. Where 19 gauge can be eliminated, even greater margins of savings should result.

3.0373 Redesigning the circuitry with increased resistance increases the number of long-line adapters. Their cost must be added to the cost of the amplifiers. The savings in cable more than offset these added expenses.

3.0374 In the example, long-line adapter requirements are estimated according to the number of circuits that will exceed 1325 ohms. If the amplifiers make a battery booster necessary, its cost should also be considered.

3.0375 It is assumed all service is two party, D66 is used and end sections are limited to 12KF; therefore, two amplifiers are used for each circuit exceeding 1700 ohms. Extension telephones would increase the total amplifiers needed.

3.0376 Usually, a portion of the five-year amplifier investment can be deferred because it is not necessary to purchase amplifiers until actually needed for station growth requirements.

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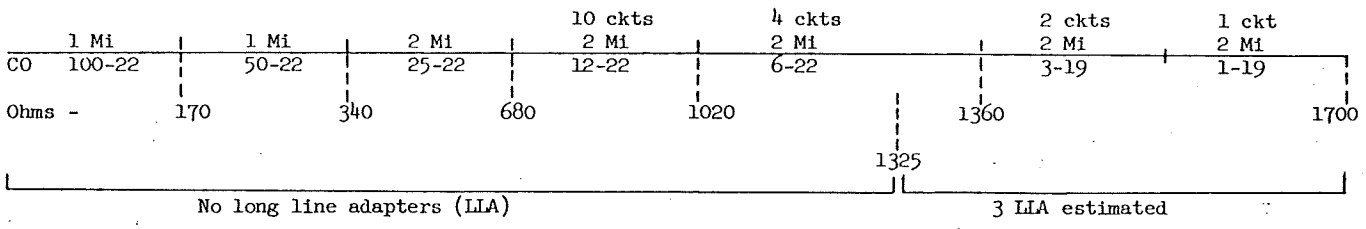
*Leads can be designed for various limits depending on the facilities and grades of subscriber service. (See TE & CM-706.)

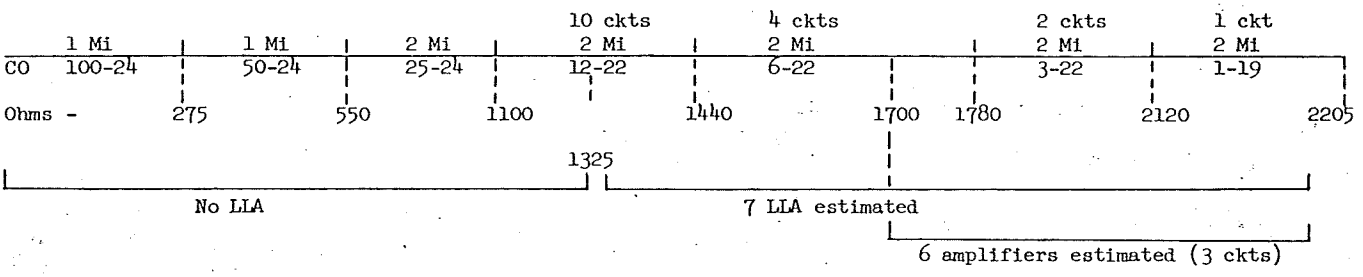
EXHIBIT G

STUDY OF ECONOMICS OF USING TELEPHONE SET TRANSMITTING AMPLIFIERS TO MEET TRANSMISSION OBJECTIVES

I. Design Without Amplifiers



II. Alternative Design Using Amplifiers



Notes:

1. Cable fills per TE & CM 210 - circuits shown are cumulative.
2. Assumed 2 amplifiers per circuit
3. Transmission requirements TE & CM-424 apply, except telephone set amplifiers used for loops over 1700 ohms rather than voice frequency repeaters. (See TE & CM-706 for specific loop limits.)
   a. LLA used beyond 1325 ohms.
   b. Load coil resistances neglected for simplicity

FIRST COST COMPARISON

Additional		
+ 4 LLA @ 125		= $+ 500
6 amplifiers @ 15		= + 90
		$+ 590
Reduced		
1 mile 100-22 to 100-24	$3820 − 3300 = 520 x 1	= - 520
1 mile 50-22 to 50-24	$2500 − 2050 = 450 x 1	= - 450
2 miles 25-22 to 25-24	$1680 − 1545 = 135 x 2	= - 270
2 miles 3-19 to 3-22	$ 900 − 730 = $ 170 x 2	= - 340
		$-1580
NET SAVINGS		= $ 990

ANNUAL CHARGE COMPARISON

Additional		
4 long line adapters		
Maintenance 4 x 12.50		$ 50.00
Depreciation $500 @ 5%		25.00
Return & tax 500 @ 5%		25.00
		$+100.00
6 telephone amplifiers		
Maintenance 6 x 1.00		$ 6.00
Depreciation $90 x 10%		9.00
Return & tax 90 x 5%		4.50
		$ +19.50
Reduced		
Depreciation on wire & cable - percentage of first cost difference		
100-22 to 100-24 $ 520		
50-22 to 50-24 450		
25-22 to 25-24 270		
$1240 @ 4% =	49.60	
3-19 to 3-22 340 @ 5% =	17.00	
		$ 66.60
Return and tax $1760 @ 5% =		88.00
		$ 154.60
Unchanged		
Maintenance rates on wire and cable		
NET SAVINGS $154.60 - 119.50 =		$ 35.10