

**NUMERICAL INDEX — DIVISION 304
TRANSMISSION DATA**

1. GENERAL

- 1.01** This section provides an index of System-issued sections in Division 304.
- 1.02** A bullet (•) indicates an item that has been added or changed since the previous issue of the index.
- 1.03** A square (□) indicates a canceled item. Information relating to the cancellation, if necessary, will be shown in a note following the item. Canceled items and related notes will be deleted upon reissue of the index.
- 1.04** "Add" is the abbreviation for Addendum, and "App" is the abbreviation for Appendix.

2. LAYERS

- 2.01** This division is arranged in layers as follows:
- 304-0 Index, General Information and Computation Aids
- 1 Open Wire, Multiple Wire and Cable Data
 - 2 Equipment Data
 - 3 Insertion Loss, Reflection Loss, Circuit Junction Loss, and Transducer Loss Data
 - 4 Return Loss Data
 - 5 Crosstalk Data
 - 6 Systems Data

304-0 INDEX, GENERAL INFORMATION AND COMPUTATION AIDS

Section Number	Issue	Subject
• 304-000-000	21	Numerical Index — Division 304 — Transmission Data
304-001-100	2	Transmission Losses Introduced by Reflection Effects
304-005) Computation Aids 304-010)		
304-005-100	1	Relation Between dB and Power Ratio — Gains
304-006-100	1	Relation Between dB and Voltage or Current Ratio — Gains
304-007-100	1	Combination of Two Quantities in Decibels
304-008-100	1	Reflection Losses — Decibels
304-008-101	1	Alignment Chart for Reflection Losses — Decibels
304-009-100	1	Charts for Evaluation of Complex Quantities
304-010-100	1	Sampling — Table of Random Decimal Digits

**304-015) Charts for Determination of Input Impedance of
304-022) Cables**

Input Impedance of Non-Loaded Cable with any Termination

304-015-100	2	General
-------------	---	---------

Section Number	Issue	Subject
304-016-100	1	19 Gauge — ANB, DNB
304-017-100	1	19 Gauge — CNB, ENB
304-018-100	1	22 Gauge ASA, BSA, CSA
304-019-100	1	24 Gauge ASM, CSM
304-020-100	1	24 Gauge DSM
304-021-100	1	26 Gauge BST

Input Impedance of Loaded and Non-Loaded Cable — Arbitrary Lengths and Gauges

304-022-100	1	Determination of Input Impedance of Loaded and Non-Loaded Lines of Arbitrary Lengths and Terminations
-------------	---	---

304-1 OPEN WIRE, MULTIPLE WIRE AND CABLE DATA

**304-100) Open Wire Transmission Data
304-106)**

Add 304-100-100	4	
304-100-100	1	Transmission Characteristics of Open Wire Circuits

Open Wire Losses at 1000 Cycles

304-101-100	3	Dry Weather Loss at 68° F
-------------	---	---------------------------

Open Wire Losses at Carrier Frequencies

304-102-100	4	Wet Weather Loss
304-102-101	2	Wet Weather Losses — 155 to 410 Kilocycles — Copper or Copper-Steel Wire
304-102-102	2	Dry Weather Losses
304-102-103	2	Dry Weather Losses — 155 to 410 Kilocycles — Copper or Copper-Steel Wire

Open Wire Impedance, Attenuation and Phase

304-105-100	1	104, 128 and 165 mil Copper — 12" Spacing — S and P
304-105-101	1	104, 128 and 165 mil Copper — 6" and 8" Spacing — S
304-105-102	2	80, 104-128 and 165 mil Copper-Steel (40%) — 12" Spacing — S and P
304-105-103	2	80, 104, 128 and 165 mil Copper-Steel (40%) — 8" Spacing — S and P
304-105-104	1	104 and 128 mil Copper-Steel (30%) — 8" and 12" Spacing — Side Circuits

NOTICE

Not for use or disclosure outside the Bell System except under written agreement

SECTION 304-000-000

Section Number	Issue	Subject
304-105-105	1	80 mil Copper, 109 and 134 mil Steel — 12" Spacing S and P

**304-110) Multiple Wire Transmission Data
304-112)**

Primary and Secondary Constants

304-110-100	2	B Rural Distribution Wire — Primary
304-110-101	2	B Rural Distribution Wire — Secondary
304-111-100	1	B Urban Wire — Primary
304-111-101	1	B Urban Wire — Secondary
304-112-100	1	C Rural Wire — Primary
304-112-101	1	C Rural Wire — Secondary
304-113-100	1	D Underground Wire

**304-120) Cable Transmission Data
304-177)**

304-120-100	1	Transmission Characteristics of Non-Loaded Toll and Toll Entrance Cable Pairs
-------------	---	---

Cable Data

Primary and Secondary Constants

304-130-100	2	16 Gauge NH-TH — Primary
304-130-101	2	16 Gauge TH — Secondary
304-131-100	3	19 Gauge ANB, DNB, GNB Primary
304-131-101	3	19 Gauge ANB, DNB, GNB Secondary
304-131-102	1	19 Gauge ANB, DNB — Hyperbolic Functions of Propagation Constants
304-132-100	3	Primary Constants of Nonloaded Cable — 19 Gauge CNB, ENB, FNB
304-132-101	3	Secondary Constants of Nonloaded Cable — 19 Gauge CNB, ENB, FNB
304-132-102	1	19 Gauge CNB, ENB, Hyperbolic Functions of Propagation Constants
304-133-100	3	Primary Constants of Non-Loaded Cable — 22 Gauge ASA, BSA, CSA, DSA, ESA
304-133-101	3	Secondary Constants of Non-Loaded Cable — 22 Gauge ASA, BSA, CSA
304-133-102	1	22 Gauge ASA, BSA, CSA — Hyperbolic Functions of Propagation Constants
304-134-100	2	24 Gauge ASM, CSM — Primary
304-134-101	2	24 Gauge ASM, CSM — Secondary
304-134-102	1	24 Gauge ASM, CSM — Hyperbolic Functions of Propagation Constants
304-135-100	3	24 Gauge DSM — Primary
304-135-101	3	24 Gauge DSM — Secondary

Section Number	Issue	Subject
304-135-102	1	24 Gauge DSM — Hyperbolic Functions of Propagation Constants

304-136-100	2	26 Gauge AST — Primary
304-136-101	2	26 Gauge AST — Secondary
304-136-102	1	26 Gauge AST — Hyperbolic Functions of Propagation Constants
304-137-100	3	26 Gauge BST — Primary
304-137-101	3	26 Gauge BST — Secondary
304-137-102	1	26 Gauge BST — Hyperbolic Functions of Propagation Constants

Secondary Constants of Loaded Cable

304-140-100	2	19 Gauge DNB — B88 Loading
304-140-101	2	19 Gauge DNB — D88 Loading
304-140-102	2	19 Gauge DNB — H44 Loading
304-140-103	2	19 Gauge DNB — H88 Loading
304-141-100	2	19 Gauge CNB, ENB, FNB — B88 Loading
304-141-101	2	19 Gauge CNB, ENB, FNB — B135 Loading
304-141-102	2	19 Gauge CNB, ENB, FNB — D88 Loading
304-141-103	2	19 Gauge CNB, ENB, FNB — H44 Loading
304-141-104	2	19 Gauge CNB, ENB, FNB — H88 Loading
304-142-100	2	22 Gauge ASA, BSA, CSA, DSA, ESA — B88 Loading
304-142-102	2	22 Gauge ASA, BSA, CSA, DSA, ESA — D88 Loading
304-142-103	2	22 Gauge ASA, BSA, CSA, DSA, ESA — H44 Loading
304-142-104	2	22 Gauge ASA, BSA, CSA, DSA, ESA — H88 Loading
304-143-100	1	24 Gauge ASM, CSM — B88 Loading
304-143-101	1	24 Gauge ASM, CSM — H44 Loading
304-143-102	1	24 Gauge ASM, CSM — H88 Loading
304-144-100	2	24 Gauge DSM — B88 Loading
304-144-101	2	24 Gauge DSM — D88 Loading
304-144-102	2	24 Gauge DSM — H44 Loading
304-144-103	2	24 Gauge DSM — H88 Loading
304-145-100	1	26 Gauge AST — H88 Loading
304-146-100	2	26 Gauge BST — H88 Loading

Section Number	Issue	Subject
Cable Impedance Data		
Input Impedance of Non-Loaded Cable With Short-Circuit and Open-Circuit Termination		

304-150-100	1	19 Gauge CNB
-------------	---	--------------

304-151-100	1	22 Gauge CSA
-------------	---	--------------

304-152-100	1	24 Gauge DSM
-------------	---	--------------

Input Impedance of Loaded Cable with Short-Circuit and Open-Circuit Termination		
--	--	--

304-153-100	1	22 Gauge CSA — H44 Loading
-------------	---	----------------------------

304-153-101	1	22 Gauge CSA — H88 Loading
-------------	---	----------------------------

Attenuation of Miscellaneous Cables at 1000 HZ		
---	--	--

304-160-100	4	Outside Plant Cable and Paired Conductor Facilities
-------------	---	---

304-161-100	1	Toll Cable Facilities with Common Types of Loading
-------------	---	--

304-161-101	1	Toll Cable Facilities with Unusual Types of Loading
-------------	---	---

304-162-100	1	Exchange Type Cables in Toll Circuits
-------------	---	---------------------------------------

304-163-100	1	Entrance and Intermediate Cables
-------------	---	----------------------------------

304-164-100	1	Non-Loaded Facilities — From Length and Resistance
-------------	---	--

Cable Losses at Carrier Frequencies		
--	--	--

304-165-100	1	Entrance Cables
-------------	---	-----------------

304-166-100	1	K Carrier Cables
-------------	---	------------------

304-167-100	2	16 ga. Toll Cable
-------------	---	-------------------

304-167-101	2	16 ga. NH Cable
-------------	---	-----------------

304-168-100	2	19 ga. Toll Cable
-------------	---	-------------------

304-168-101	2	19 ga. DNB Cable
-------------	---	------------------

304-168-102	2	19 ga. CNB or ENB Cable
-------------	---	-------------------------

304-168-103	2	19 ga. PIC Cable
-------------	---	------------------

304-168-104	1	19 ga. PIC Cable
-------------	---	------------------

304-169-100	2	22 ga. ANA Cable
-------------	---	------------------

304-169-101	3	22 ga. CSA Cable
-------------	---	------------------

304-169-102	1	22 ga. PIC Cable
-------------	---	------------------

304-170-100	2	24 ga. CSM Cable
-------------	---	------------------

304-170-101	2	24 ga. DSM Cable
-------------	---	------------------

304-171-100	1	Cable Loss at 772 Kilocycles for Engineering T1 Carrier Systems
-------------	---	---

304-172-100	1	Frequency-Attenuation Characteristics — W.E.Co. CA-1878 Cable (Polyethylene Jacketed, Single, .375" Coaxial)
-------------	---	--

Section Number	Issue	Subject
Quadded Cable Impedance Attenuation and Phase Data		

304-175-100	1	19, 16, 13 and 10 ga. Cable (.062 uf/mil) Non-Loaded Cable
-------------	---	--

304-175-102	1	19 and 16 Gauge H-86-32 Loaded Cable
-------------	---	--------------------------------------

304-175-103	1	19 Gauge H-88-50 Loaded Cable
-------------	---	-------------------------------

304-175-104	1	19 Gauge B-88-50 Loaded Cable
-------------	---	-------------------------------

304-175-105	1	19 and 16 Gauge 44-25 Loaded Cable
-------------	---	------------------------------------

304-176-100	1	Transmission Characteristics Polyethylene Insulated Video Pairs — 16 PSV and 16 PEV
-------------	---	---

304-2 EQUIPMENT DATA		
-----------------------------	--	--

304-200 Graphical Determination of Input Impedance of Repeating Coil With Any Terminating Impedance		
--	--	--

304-200-100	1	General
-------------	---	---------

304-200-101	1	94E Coil
-------------	---	----------

304-200-102	1	94F Coil
-------------	---	----------

304-201-100	1	120C Coil
-------------	---	-----------

304-201-101	1	120D Coil
-------------	---	-----------

304-201-102	1	120E Coil
-------------	---	-----------

304-201-103	1	120CS Coil
-------------	---	------------

304-201-104	1	120DS Coil
-------------	---	------------

Equipment Losses at 1000 Cycles		
--	--	--

304-203-100	1	Composite Sets
-------------	---	----------------

304-204-100	2	Repeating Coils — General
-------------	---	---------------------------

304-204-101	1	4-Wire Repeating Coils and Associated Equipment
-------------	---	---

304-204-102	2	Hybrid Repeating Coils — 2-Wire Cable Circuits
-------------	---	--

304-204-103	1	V-1 Hybrid Repeating Coils — Open Wire
-------------	---	--

304-204-104	2	Hybrid Repeating Coils No. 4 Toll Switching System
-------------	---	--

304-205-100	4	4-Wire Terminating Sets
-------------	---	-------------------------

304-206-100	1	Combinations of Line Equipment for Open Wire
-------------	---	--

304-207-100	2	Signaling Equipment — Equipment Losses
-------------	---	--

304-208-100	1	Miscellaneous Equipment and Arrangements
-------------	---	--

304-209-100	2	Miscellaneous Carrier Equipment
-------------	---	---------------------------------

304-210-100	1	Special Equipment for Telephotograph Circuits
-------------	---	---

Equipment Losses at Carrier Frequencies		
--	--	--

304-220-100	2	Miscellaneous Line Equipment
-------------	---	------------------------------

SECTION 304-000-000

Section Number	Issue	Subject
Equivalent T-Networks for Equipment		
304-230-100	1	46, 62, 75, 91, and 93 Type Repeating Coils
304-230-101	1	Unity Ratio 94, 101 and 120 Type Repeating Coils
304-231-100	1	16A (14A) Autotransformer
304-231-101	1	16B (14B) Autotransformer
304-231-102	2	24A Autotransformer
304-231-103	1	D85697 Autotransformer
304-232-100	1	Terminal Composite Sets

304-3 INSERTION LOSS, REFLECTION LOSS, CIRCUIT JUNCTION LOSS, AND TRANSDUCER LOSS DATA

Insertion Loss at Voice Frequencies

304-300-100	1	Loss at 1000 Hz Due to Insertion of Short Lengths of Non-Loaded Quadded Cable in O.W. Circuits
304-300-101	1	Insertion Losses of Nonloaded Cable Pairs — 26 BST, 24 DSM, 22 CSA, 19 CNB and 19 DNB Gauges
304-300-102	1	Length — Resistance — Insertion Loss — Nonloaded High-Capacitance Cable Pairs
304-300-103	1	Insertion Loss of Office Cable, 0.5 to 3.5 kHz

Insertion Loss at Carrier Frequencies

304-301-100	1	Loss Due to Insertion of 13, 16 and 19 ga. Non-Loaded Cable in Open Wire Circuits
-------------	---	---

Reflection Loss at 1000 Cycles

304-302-100	1	Junction of Open Wire and Loaded Cable
304-303-100	1	Junction of Non-Loaded Cable with Other Facilities

Reflection and Junction Loss — Carrier Frequencies

304-304-100	1	772 KC — Junction Loss in DB for Engineering T1 Carrier Systems
-------------	---	---

Transducer Loss

304-305-100	1	Manual Calculation Methods
-------------	---	----------------------------

304-4 RETURN LOSS DATA

Repeater Section Return Loss and Singing Point

304-400-100	1	Toll Cable — Singing — (Nominal Values)
304-400-101	1	Toll Cable — Echo

Structural Return Losses

304-401-100	1	Toll Cable — Structural Return Loss and Singing Point
304-402-100	1	Open Wire — Structural Singing Point

Section Number	Issue	Subject
304-403-100	1	For Stability and Singing Margin Design Purposes Exchange Area Facilities
304-403-101	1	Adjustments for Short Lengths of Loaded Facility
304-404-100	1	Computed Structural Return Losses in the Echo Range — Exchange Area Facilities

Circuit Junction Return Loss

304-405-100	1	Loaded Entrance Cable Vs. 8" Copper Open Wire Sides
304-405-101	1	Loaded Entrance Cable Vs. 12" Copper Open Wire Sides
304-405-102	1	Loaded Entrance Cable Vs. 18" Copper Open Wire Sides
304-405-103	1	Loaded Entrance Cable Vs. Copper Open Wire Phantoms
304-406-100	1	Toll Cable Vs. Open Wire, Toll Cable Vs. Toll Cable, Open Wire Vs. Open Wire
304-407-100	1	Open Wire Vs. Open Wire (12" Sides) of Unusual Gauges and Material
304-408-100	1	Between Loaded Facilities
304-408-101	1	Between Loaded and Non-Loaded Facilities
304-408-102	1	Between Mixed Gauge Non-Loaded Facilities
304-408-103	1	Facility Losses at 68°F for Referring Return Loss in Computing Line Section Return Loss
304-408-104	1	Facility Losses Adjusted to Allow for Temperature Variations of Aerial Cable in Computing Line Section Return Loss
304-409-100	1	Chart for Obtaining the Reference Deviation of a Loading System
304-409-101	1	Typical Improvement in Structural Return Loss with Deviation Test Splicing — Exchange Area Facilities
304-410-100	1	Effect of Series Type Negative Impedance Repeater on Line Return Loss
304-410-101	1	Effect of Series Type Negative Impedance Repeater on Echo Return Loss

Intermediate Line Irregularity Return Loss

304-412-100	1	Loading Irregularity Return Losses
304-412-101	1	Excess or Deficient Loading Section Capacitance or Inductance
304-412-102	1	Computed Echo Return Loss Due to Loading Irregularities Exchange Area Facilities
304-414-100	1	Non-Loaded Cable in Open Wire
304-415-100	1	Loaded Intermediate Cable in Open Wire
304-416-100	1	Change in Type of Open Wire

Section Number	Issue	Subject	Section Number	Issue	Subject
Intermediate Equipment Return Loss			Crosstalk Couplings		
304-420-100	1	16A, 16B and D-85697 Autotransformers	304-501-100	1	Relation Between Coupling DBX and Crosstalk Units (CU)
304-421-101	1	24A Autotransformer and N.L. Cable	304-501-101	1	Relation Between Coupling in DBX and (CU)2 in Thousands
304-422-100	1	28B (30B) Filter	304-501-102	1	Relation Between Coupling in DBX, Number of Occurrences and CU2 in Thousands
304-423-100	1	36B and 34A Filters — 51A and 52A Filters	304-502-100	1	Effective Voice-Frequency Crosstalk Coupling in DBX — Near-End Bare-Line Coupling Between Quads — Short-Pair-Twist Quadded Cables Spliced as a Single Group
304-424-100	1	85C (86A) Filter	304-503-100	1	Typical Near-End Crosstalk Couplings (dbx) — Long Lengths — Exchange Facilities — Staggered Twist Construction — Voice Frequencies
304-425-100	1	102A Filter	304-504-100	1	Typical Pair-to-Pair Equal Level Far-End Crosstalk Coupling Losses at 165KC — 19 Gauge Toll Cables
304-426-100	1	121A Filter	304-505-100	2	Carrier Frequency Crosstalk — 13, 16 and 19 Gauge — Toll Entrance Cables
304-5 CROSSTALK DATA			304-506-100	1	Typical Pair-to-Pair Equal Level Far-End Cross-talk Coupling Losses at 165KC — Exchange Cables
Open Wire Crosstalk — Far End Type Unbalance Times Frequency — Real and Imaginary Components			304-510-100	1	Crosstalk Couplings — Coordination of Carrier Systems — Staggering Advantages
304-500-100	1	Data for Relative Types A/A to H/H and I/I to P/P	304-6 SYSTEMS DATA		
304-500-101	1	Data for Relative Types A/A to H/H and I/I to P/P	Network Data		
304-500-102	1	Data for Relative Types A/B to A/P	304-600-100	1	Regulating Networks
304-500-103	1	Data for Relative Types B/C to B/P	Via Net Loss Factors		
304-500-104	1	Data for Relative Types C/D to C/P	304-601-100	5	Via Net Loss Factors (VNLF)
304-500-105	1	Data for Relative Types D/E to D/P	Distortion Transmission Impairments — Terminating Traffic Frequency Allocations		
304-500-106	1	Data for Relative Types E/F to E/P	304-605-100	4	Open-Wire and Cable Carrier Telephone Systems
304-500-107	1	Data for Relative Types F/G to F/P	304-605-101	1	Coaxial Cable and Microwave Radio Systems
304-500-108	1	Data for Relative Types G/H to G/P	304-605-102	2	Carrier Telegraph Systems
304-500-109	1	Data for Relative Types H/I to H/P			
304-500-110	1	Data for Relative Types I/J to I/P and J/K to J/P			
304-500-111	1	Data for Relative Types K/L to K/P and L/M to L/P			
304-500-112	1	Data for Relative Types M/N to M/P, N/O to N/P and O/P			