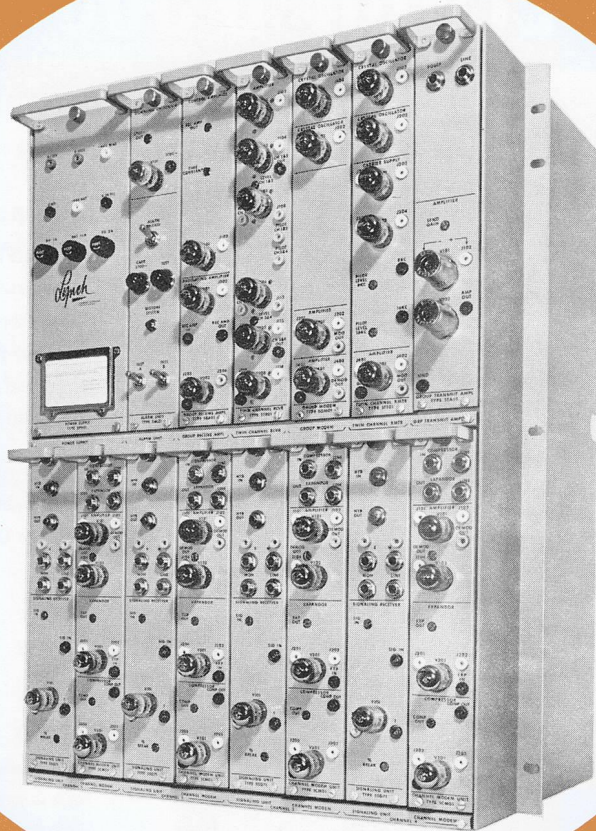


LYNCH

B-500

"O"-type CARRIER
TELEPHONE SYSTEMS

B-510



Lynch now introduces the B-500/B-510 "O"-type series . . . enabling you to coordinate with the most widely accepted standard in the telephone industry . . . the "O" frequency allocation for short to medium haul circuits — and in addition — to gain the economies and convenience of the latest advances in packaging design and simplicity of installation.

B-500

B-500 uses low level, frequency-shift out of band signaling with several signaling options available. It is better adapted to speech-plus applications because of its wider bandwidth — it has greater range of regulation (than W.E. Co. "O" or B-510) thus assures circuit reliability under extreme weather conditions.

B-510

B-510 offers telephone companies an ideal system for short to medium haul trunks. It includes On-off signaling, alarm facilities and frequency response identical to that of the W.E. Co., "O"—a B-510 terminal installed at one end of a circuit operates perfectly with W.E. Co's., "O" terminal at the other end of the same circuit. B-510 offers utmost flexibility for system rearrangements and for use on your end of Bell System connecting circuits.

The 16-channel Lynch B-500 and B-510 have been explicitly designed to coordinate with the Western Electric "O" both in frequency assignment and operating levels. The use of the B-500 or B-510 avoids the complications that may be encountered by using non-coordinating equipment.

Exclusive features which facilitate lineup and maintenance to a degree never before available in an "O"-type carrier are now included in the Lynch systems. As in the W.E. Co. "O", the B-500/B-510 make fullest use of the frequency spectrum, incorporate automatic regulation and automatic channel synchronization.

The New B-500/B-510 terminals are designed as a complete "package", are "human engineered" to achieve greatest simplification for the man who will install and maintain them.

Complete system testing and pre-set adjustments at factory make it possible for equipment to be cut into service on the same day it is received.

B-500/B-510-type equipment introduces the unique Lynch "Book-shelf" construction which permits units to be changed just as readily—and as swiftly—as removing and replacing a book.



LYNCH COMMUNICATION SYSTEMS INC.

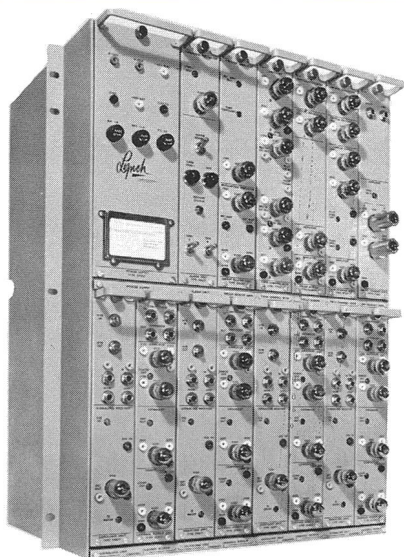
695 BRYANT ST. SAN FRANCISCO 7, CALIFORNIA

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"Designers and manufacturers of telephone, data transmission and control equipment"

LYNCH B-500 "O" type

**CARRIER
TELEPHONE
SYSTEMS**



PACKAGED SYSTEMS

Both B-510 and B-500 four channel systems are complete "packages." All plug-in units, including power supply, necessary for a four channel system are contained within one cabinet. Only accessories required are line filter assembly and network panel. Signaling options may be changed by plugging in the appropriate signaling unit without need for change in strapping or external connections.

AVAILABLE FREQUENCY ALLOCATIONS

Both B-500 and B-510 systems are available in standard "O" frequency allocations:

OA	2-36 kcs.
OB	40-76 kcs.
OC	80-116 kcs.
OD	120-156 kcs.

RAPID LOW COST INSTALLATION

The design of the B-500 system is such that rapid low cost installation is possible. Actually all that is required in a B-500 installation is to bolt the cabinet to the relay rack, make power and office wiring connections and plug in the various individual units that make up the desired system.

No test stand is required for lineup! All adjustments and measurements can be made on front panel without unplugging units.

External connections are made to receptacle terminals on rear of cabinet.

CIRCUIT LENGTH

B-500 and B-510 are essentially short or medium haul systems. Total recommended electrical length (with repeaters) under wet weather conditions, 200 db for OC and OD, 175 db for OA, 280 db for OB.

SIGNALING OPTIONS

B-500: E&M dial, convertible E&M dial or AC Ringdown, E&M dial with speech-plus, convertible E&M dial or AC Ringdown with speech-plus, no signaling. Speech-plus application permits addition of three channels of telegraph plus a voice circuit on each channel.

B-510: E&M dial, E&M dial with A&B leads (600 or 900 ohms)*, convertible E&M dial or AC Ringdown.

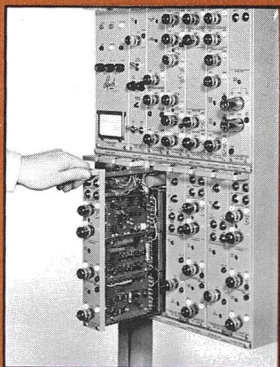
*Note: Signaling option providing E&M and A&B leads has built-in coil hybrids.

SIGNALING

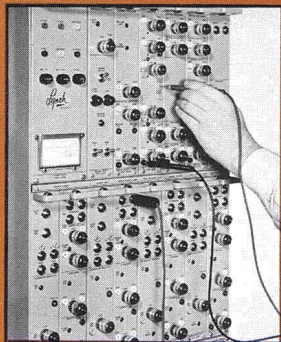
B-500: stable, frequency shift signaling. $\pm 10\%$ change in B+ results in only $\pm 1\frac{1}{2}\%$ change in mark-space ratio. $\pm 10\%$ change in AC line voltage causes only $\pm 1\%$ change in mark-space ratio . . . less subject to noise interference.

B-510: ON-OFF, uses highly reliable one-tube circuit with simplified lineup procedure.

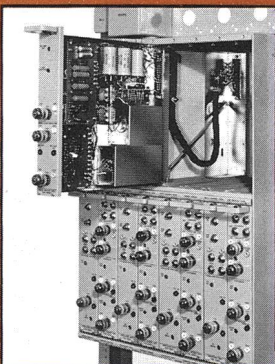
Lynch Book-shelf construction permits units to be changed as readily—and swiftly—as the removal or replacement of a book.



All adjustments and measurements can be made on front panel without unplugging units.



View of the Extension Plug in operation. This accessory is designed to provide full accessibility to chassis interior while unit is in operation.



B-500/B-510

SIMPLIFIED MAINTENANCE

Many exclusive maintenance features are built-in. For example, test points allow bridging lineup without interrupting system service. Built-in telephone jacks furnish all the facilities usually provided by an external jack panel.

ALARM FACILITIES

B-500 has a standard alarm unit in all terminal and repeater equipment. This not only provides a visual alarm and facilities for audible alarm but also disconnects and then makes busy, all dial circuits. The alarm unit also provides loop test facilities with remote restore functions.

B-510: Alarm facilities and nomenclature coordinates fully with W. E. Co. "O" system.

REGULATION

Both B-500 and B-510 have automatic regulation providing for compensation of line transmission variations. Terminals are equipped with both group and twin channel regulators. (See operating characteristics).

AUTOMATIC CHANNEL SYNCHRONIZATION

Both B-500 and B-510 terminals are automatically synchronized. Channel synchronization will not be affected regardless of the number of intermediate repeaters.

COMPANDORS

Compandors are built into the channel modems for noise and cross-talk suppression. The voice circuit between the compressor or expander and modulator or demodulator is accessible for application of telegraph channels.

REPEATERS

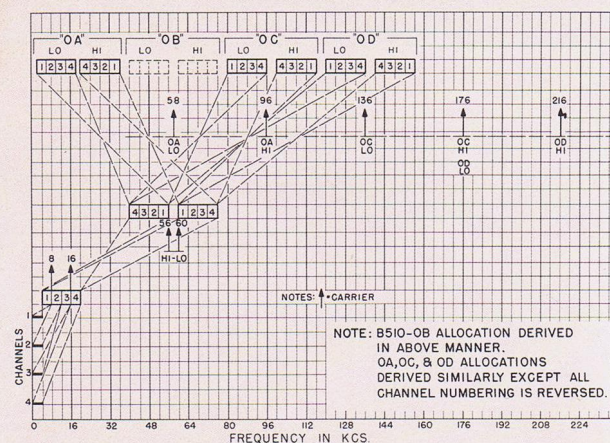
Repeaters for B-510 and B-500 are identical. Repeaters for the OB, OC and OD systems operate on a frequency inverting (frogging), basis to minimize feedback around a repeater and to assist in compensating for line slope characteristics. Straight-through repeaters are used for the OA system permitting coordination with other carrier systems operating in the carrier spectrum below 35 kcs.

BOOK SHELF CONSTRUCTION

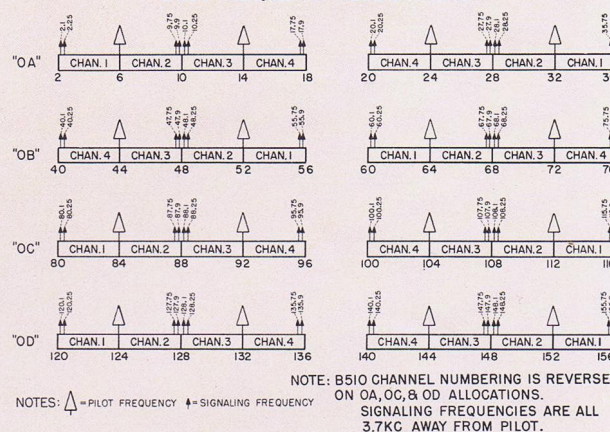
The unique Lynch Book Shelf construction permits units to be changed just as readily . . . as swiftly . . . as the removal or replacement of a book. Positive electrical connection to removable units is assured by a sturdy, multi-contact pressure strip assembly with extra-surface keyways and gold plated beryllium copper contacts. Sure . . . positive. No bent contact pins.

For further application and ordering information request the Lynch B-500 Equipment Characteristics Bulletin.

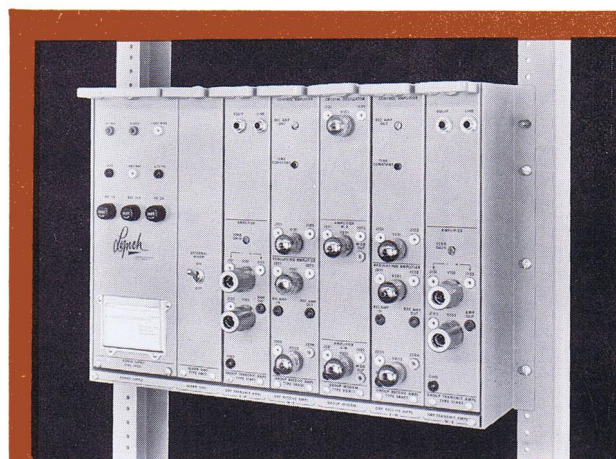
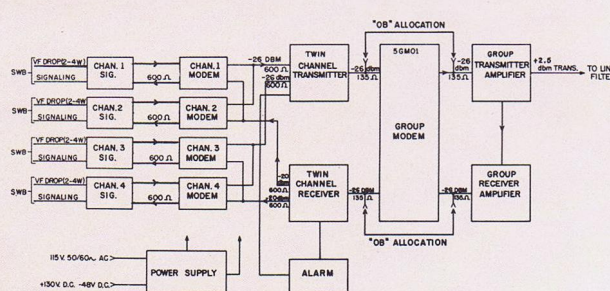
B-500 MODULATION PLAN



B-500 FREQUENCY ALLOCATIONS



B-500/B-510 SYSTEM BLOCK DIAGRAM



B-500/B-510 REPEATER

SPECIFICATIONS

TERMINALS

DERIVED CHANNEL FREQUENCY RESPONSE:
(Single frequency measurement)

VOICE FREQUENCY LEVELS:
(600 ohm balanced)

OPERATING LINE FREQUENCIES:

CARRIER TRANSMIT LEVEL:

GAIN, EACH DIRECTION:

CARRIER LINE IMPEDANCE:

REGULATION:

SIGNALING UNITS:

POWER REQUIREMENTS:

TUBES:

MOUNTING:

FINISH:

B-500 and B-510 SYSTEMS

B-500: +1, -3 db from 300 to 3200 cps referred to 0 db 1000 cps test tone.
B-510: +2, -6 db from 300 to 2900 cps referred to 0 db 1000 cps test tone.
(B-510 coordinates with W.E. Co. Type "O". Response determined in part by W.E. Co. end.)

4-wire: -16 dbm transmitter input.
+7 dbm receiver output.
2-wire: 0 dbm transmitter input.
+1 dbm receiver output.

NOTE: Receive level adjustable to other levels to meet operating requirements.

OA: 2 to 36 kilocycles.
OB: 40 to 76 kilocycles.
OC: 80 to 116 kilocycles.
OD: 120 to 156 kilocycles.

	B-500	B-510
Each pilot	+6 dbm	+6 dbm
Message level	+2.5 dbm	+2.5 dbm
Signaling level	-13 dbm	0 dbm

B-500: 40 db (recommended wet weather loss) with regulation to 65 db
B-510: 40 db (recommended wet weather loss) with regulation to 50 db
NOTE: Span pads included in receiver circuit permit operation on shorter loops.

OA: 600 ohms unbalanced.
OB, OC, OD: 135 ohms unbalanced.

B-500: $\pm \frac{1}{2}$, -1 db change in V-F output for 5 db decrease thru
20 db increase in carrier line length.
B-510: $\pm \frac{1}{2}$, -2 db change in V-F output for 5 db decrease thru
20 db increase in carrier line length.

B-500:	B-510:
E&M Dial.	E&M Dial.
Convertible AC Ringdown or Dial	E&M and A&B Dial.
E&M Dial with Speech Plus	Convertible AC Ringdown or Dial.
Convertible AC Ringdown or Dial with Speech Plus.	
No Signaling.	

a) 115V AC, 170 watts or,
b) 130V DC, 0.35 amp.
- 48V DC, 2.50 amps.

AC power: Types 5654, 5670, OC3 or 407A, 408A, OC3.
Battery: Types 407A, 408A, OC3.

Complete 4-channel system is contained within single cabinet
mounting in a 19" relay rack. Occupies 24½" (14 rack spaces) of vertical height.

Lynch Telephone Gray.

REPEATERS

POWER REQUIREMENTS: a) 115V AC, 50 watts or,
b) 130V DC, 0.150 amp.
- 48V DC, 0.60 amp.

CARRIER TRANSMIT LEVEL: Same as terminal transmit level.

GAIN, EACH DIRECTION: OB, OC, OD: 40 db (recommended wet weather loss) with regulation
to 50db.
OA: (LO Group Transmit) 25 db (recommended wet weather loss)
with regulation to 35 db.
OA: (HI Group Transmit) 35 db (recommended wet weather loss)
with regulation to 45 db.

NOTE: Span pads included in receiver circuit permit operation on shorter loops.

REGULATION: $\pm \frac{1}{2}$, -2 db change in repeater output for 5 db decrease
thru 20 db increase in carrier line length.



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LYNCH COMMUNICATION SYSTEMS INC.

695 BRYANT ST. SAN FRANCISCO 7, CALIFORNIA • EXBROOK 7-1471, AREA CODE - 415



PURCHASE SPECIFICATIONS FOR "O" TYPE CARRIER EQUIPMENT
TO MEET W. E. "O" TYPE CARRIER PERFORMANCE SPECIFICATIONS FOR END-TO-END OPERATION

GENERAL:

The carrier equipment shall be of the single sideband, suppressed carrier, group transmission type intended for operation over a single pair of wires or cable pair. Each group shall consist of four, two-way voice circuits equipped with built-in, out-of-band, on-off type signaling.

The carrier equipment shall be completely pre-wired, factory tested and adjusted as a system prior to shipment. Only the external voice frequency signaling, power and high frequency connections shall be made in the field. Equipment furnished shall contain the necessary power supplies, hybrid and line panels to provide for operation of each group independent of any other auxiliary equipment for high quality voice transmission. All equipment, except the network panel, shall be mounted in a single metal cabinet.

I GENERAL SYSTEM CHARACTERISTICS

- A. Line Frequency assignments and levels shall be compatible with Western Electric "O" type carrier equipment.
- B. Group Transmission - Each direction of a group shall not exceed 16 kc in bandwidth.
- C. Number of Channels per group shall not be less than four.
- D. Number of Groups shall not be less than four as follows:
 - 1. OA (2-38 kc)
 - 2. OB (40-76 kc)
 - 3. OC (80-116 kc)
 - 4. OD (120-156 kc)
- E. All channels shall be fully synchronized.
- F. All channels shall be compandored.
- G. Equipment shall work end-to-end with Western Electric "O" type equipment.
- H. Ovens for purposes of stabilizing oscillator supplies shall not be used.

II SYSTEM PERFORMANCE

- A. Channel Bandwidth - Compandored
300 to 2900 cps at the 3 db points.
- B. Level Stability - Compandored
+1/2, -2 for +5 to -20 HF line change.
- C. System Gain
Group OB, OC and OD: 50 db.
Group OA, low frequency: 40 db.
- D. Equipment Noise (Idle channel)
Group OB, OC, OD: Shall not exceed 20 dba @ zero level point, 1000 cps zero reference.
Group OA: Shall not exceed 30 dba @ zero level point, 1000 cps zero reference.

III EQUIPMENT CHARACTERISTICS

- A. Signaling
 - 1. Each channel to include out-of-band, amplitude controlled signaling.
 - *2. The transmitting signaling lead ("M" lead) will control a relay in the carrier equipment. Minimum relay resistance will be 1400 ohms.
 - 3. The signaling output relay will be of a mercury-wetted contact type.
 - *4. Signal options as described here shall be furnished as a portion of the carrier terminal and NOT as accessory shelves.
 - 5. Signaling options shall include: E & M Dial; E & M and A & B Dial; Convertible AC Ring-down or Dial.
- B. Terminations
 - 1. Voice frequency hybrids shall be provided with provisions for adding either a compromise or a precision balance network.
 - 2. Hybrids shall be either 600 or 900 ohms with 2 mfd in series for two-wire application; or 900 ohms with A & B leads.
 - 3. Variable bridged "T" carbon attenuators shall be provided in both the voice frequency transmit and receive circuits.



USER LIST

B510Telephone Companies

Albion Telephone Company
Atlantic Telephone
Big Ben Telephone Company
Blackfoot Telephone Coop.
Bremen Telephone Company
California Interstate Tel. Co.
Carolina Tel. & Tel. Company
Central Iowa Rural Telephone
Central Telephone
Central Tel. - North Carolina
Central Utah Telephone
Champaign County Telephone
Chibardun Telephone Coop.
Columbia Basin Telephone
Consolidated Telephone Co.
Cornhusker Telephone Company
Cuban Telephone Company
Dakota Coop. Telephone Co.
De Kalb Ogle Telephone Co.
Eastern Illinois Telephone Co.
Elloree Telephone Company
Emery Telephone Company
Fairview Telephone Company
General Telephone of Calif.
General Telephone of Illinois
General Tel. of the Northwest
Gold Leaf Telephone Company
Golden West Telephone Coop.
Gulf States Telephone Company
Home Telephone
Illinois Bell Telephone Company
Interbell Telephone Coop.
Inter Mountain Telephone Co.
Interstate Telephone Company
Intra State Telephone Company
Kamas-Woodland Telephone Coop.
Kentucky Telephone Company
Lincoln County Tel. & Tel. Co.
Manti Telephone Company
Marquette Adams Telephone Co.
McCook Coop. Telephone Co.
Mesick Telephone
Midland Telephone
Mid River Telephone Coop.
Midstate Telephone

Millington Telephone
Milltown Telephone
Moultrie Independent Tel. Co.
Mud Lake Telephone Corp.
Nemont Tel. Coop. Assoc.
New Mountain Telephone Co.
North Carolina Telephone
Northern Telephone Company
Northwestern Telephone Co.
Oregon-Washington Telephone Co.
Pagosa Springs Telephone
Peoples Telephone Coop.
Plains Corp. Tel. Association
Public Service Telephone Co.
Public Telephone Corp.
Range Telephone Coop.
Reservation Mutual Aid Tel. Co.
Rio Virgin Telephone Company
Rocksprings & Nueces Canyon Tel.
Silver Star Telephone Company
Skyline Telephone
South Central-Utah Tel. Assoc.
South Montana Telephone
Southern Nevada Telephone Co.
Thermal Belt Telephone
Three Rivers Telephone Assoc.
Tidewater Telephone
Texas-Midland Telephone
Treasure State Telephone
Triangle Telephone Coop. Assoc.
Utah-Wyoming Independent Tel. Co.
United Telephone & Telegraph
United Telephone - Alabama
United Telephone - Indiana
United Telephone - Iowa
United Telephone - Kansas
United Telephone - Nebraska
United Telephone - North Dakota
United Telephone - Missouri
United Telephone - Wisconsin
Webster Springs Telephone Co.
West Coast Telephone Company
West Mountain Telephone Co.
West River Mutual Aid Tel. Coop.
Wyoming Telephone Company

Power Utilities

California Pacific Utilities

Pacific Power & Light Co.

Hill County Electric Co.

Railroads

Great Northern Railroad Co.
Louisville & Nashville Railroad Co.

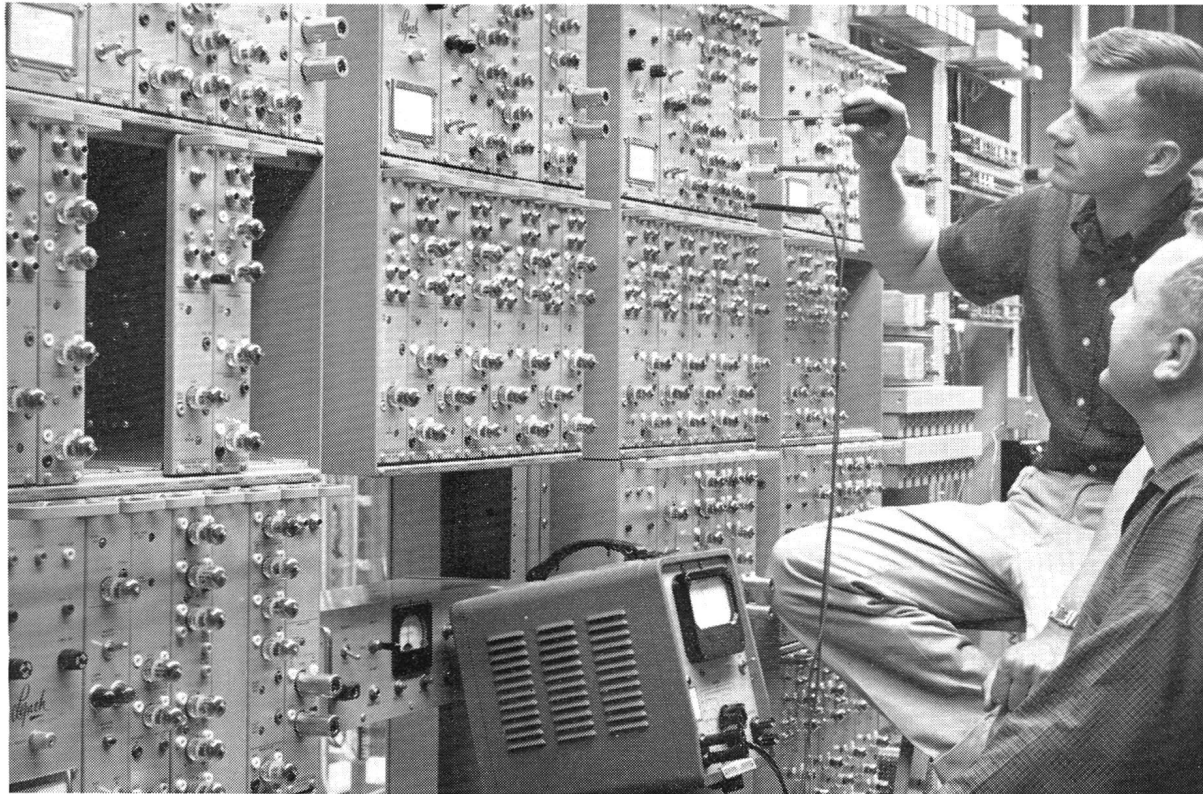
St. Louis Railroad Company

Missouri Pacific Railroad Co.
Pennsylvania Railroad Co.

Government, OEM & Miscellaneous

Bureau of Indian Affairs

PROJECT REPORT: UNITED TELEPHONE CO. Monroe, Wisconsin

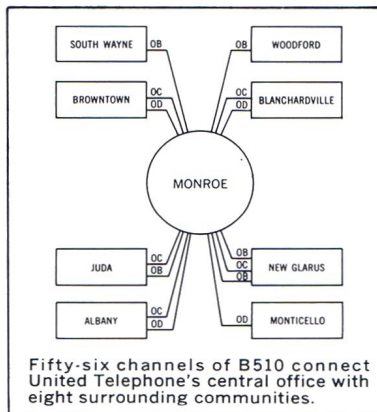


United Tel Engineer, Mr. John Schild pointing out a B510 feature to Engineer Ronald Grimm. Installation is at Monroe, Wisconsin.

6-year Reliability Record Chalked up for first Lynch "O" type Wire Line Carrier System

In 1958 one of the original Lynch B510 "O" Type Wire Line Carrier Systems was installed by United Telephone Company, Monroe, Wisconsin. Through six years of service, and all kinds of weather extremes, problems with United Tel's B510 equipment have been limited to a single tube failure. Today 56 channels of B510 are in use, providing toll circuits throughout the United Telephone Company System.

When delivery of the first gear was made, six years ago, all indicators, from good design techniques through extensive testing, made it possible for Lynch engineers to predict exceptional reliability for the B510. Now predicted reliability has



become proved reliability. This reliability is further assured because all B510 Systems are factory pre-tested before they leave the Lynch factory.

OPERATES ON AN END-TO-END BASIS WITH W. E. "O" TERMINALS. Lynch B510 is compatible with Western Electric "O" terminals, operating levels and frequencies. Toll quality circuits are assured because all B510's include regulation, channel synchronization & companders.

B510 units are self-contained, need no adjusting (just install and operate for immediate revenue)... save you money on installation and maintenance. Alarm facilities include automatic restore.

LYNCH TELEPHONE COMMUNICATION SYSTEMS

Complete carrier and microwave communication systems for transmission of voice, data and control information over microwave, cable and wire line.

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