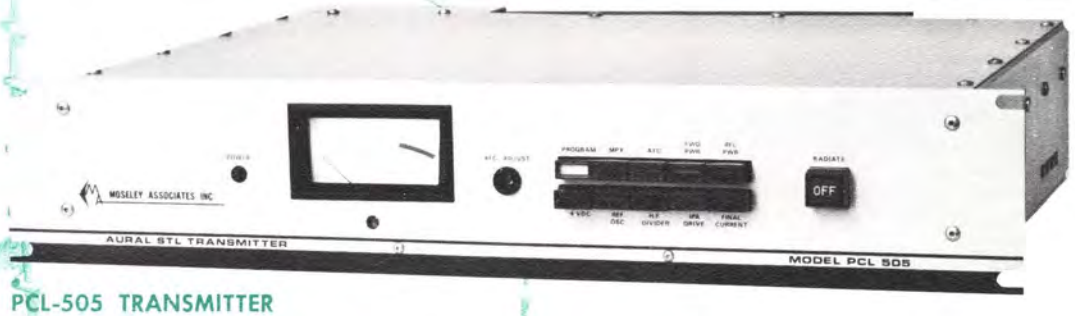
# AURAL
# STUDIO-TRANSMITTER LINKS
## MODELS PCL-505 AND PCL-505/C

BULLETIN 250C

**true modular construction**
**compact and serviceable**
**outstanding performance**




PCL-505 TRANSMITTER

The **Model PCL-505 Studio-Transmitter Link** provides a high-quality audio channel between a broadcast studio and a remote transmitter site. Alternatively, the PCL-505 provides for studio-to-studio, intercity, network, and similar program audio feeds. As the acknowledged leader in the aural STL field, the Moseley Associates PCL-505 provides the unique combination of basic time-proven techniques with the most modern solid-state devices and circuitry. Designed for continuous service, the PCL-505 operates in accordance with the requirements of the Federal Communications Commission as well as licensing bodies of most other countries.


PCL-505 RECEIVER

FOR—
148-174 MHz
215-240 MHz
300-330 MHz
450-470 MHz
890-960 MHz

PROVIDES STL, INTERCITY, AND
SIMILAR CONTINUOUS DUTY SERVICE

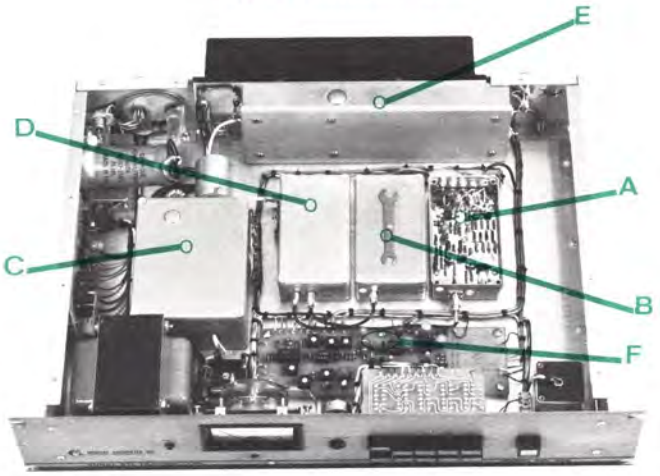


# MOSELEY ASSOCIATES, INC.

A FLOW GENERAL COMPANY

# THE PCL-505 FROM THE INSIDE . . .

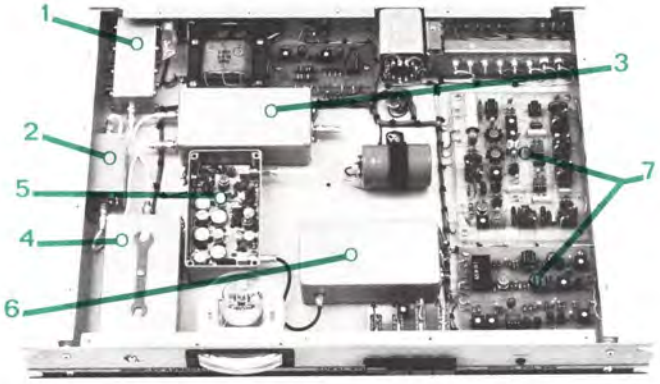
## TRANSMITTER




Interior view, PCL-505 Transmitter (monaural) for 890-960 MHz. Fully shielded modules are used for all RF circuitry. This modular construction simplifies maintenance and repair while assuring extremely stable operation. Coaxial cables are used for all RF interconnections between modules. Modules and their placement differ slightly for lower operating frequencies. The modules and major components shown above are:

- A—Frequency-Modulated Oscillator. The cover has been removed from this module to show interior construction.
- B—RF Divider. The wrench mounted in the module cover is for the miniature RF connectors used throughout the transmitter.
- C—Automatic Frequency Control (AFC) Comparator/Crystal-Controlled Reference Oscillator
- D—RF Multiplier
- E—On-Frequency RF Power Amplifier
- F—Program-Multiplex Input Circuitry/Metering Amplifiers

## RECEIVER




Interior View, PCL-505 Receiver (monaural), for 890-960 MHz. An active RF preamplifier is used for all versions of the PCL-505 and PCL-505/C Receiver. This, combined with carefully designed I.F. amplifier stages, provides maximum sensitivity. As with the companion transmitter, the PCL-505 Receiver uses true modular construction. Module configuration different for lower operating frequencies. The modules shown above are:

- 1—Preselector. Used for UHF versions. VHF versions have preselector incorporated with preamplifier.
- 2—Preamplifier
- 3—Balanced Mixer/First I.F. Amplifier
- 4—Local Oscillator. The wrench mounted in the module cover is for the miniature RF connectors used throughout the receiver.
- 5—Converter/Second I.F. Amplifier. The cover has been removed from this module to show interior construction.
- 6—FM Demodulator
- 7—Muting Amplifier/Program and Multiplex Amplifiers

Of all modulation schemes, only **true direct frequency modulation** offers the most superior sound possible. Direct FM, as found in the PCL-505 STL, assures uniformly flat frequency response over a wider range with very low distortion. Do not settle for less in your STL when all major FM broadcast transmitting manufacturers utilize direct FM, and Moseley Associates was the first to utilize direct FM in an aural STL.

Rear view of PCL-505 Transmitter. Shown is the VHF monaural version. *Program and RF connections are at the left. Power and remote connectors are at the right.* The remote connector enables use of an extension control and metering panel or automatic transfer equipment when standby operation is desired.

Micro-strip techniques are used where applicable in the PCL-505 Transmitter and Receiver. Shown is a module from the PCL-505 Receiver.

# WHO SHOULD USE THE PCL-505 --

Any broadcaster who is desirous of long-term savings resulting from the elimination of leased telephone circuits can **INCREASE PROFITS** by the use of the Model PCL-505 STL. As a bonus, **COMPLETE** control of station facilities rests with station personnel. Adjustments and repairs can be accomplished when needed — immediately if necessary — and not at the convenience of a third party. Additionally — the response, distortion, noise and transient characteristics of a well-designed STL are superior to even the best of telephone circuits. For further returns on such an investment for profits, broadcast remote control equipment can be added.

**FOR STEREO FM — ONLY the MOSELEY PCL-505 offers the broadcaster a choice of using either a single or dual STL to transmit stereo programming.**
**HERE THEY ARE . . .**
**DUAL STL — Two Model PCL-505 STL's can be operated in one 500 kHz channel assignment in full compliance with FCC Rule 74.502 to provide the L and R program channels. This technique was pioneered and developed by Moseley Associates, Inc. When two separate STL systems are used, there is no measurable amount of cross talk between channels. The dual system has the capability for transmission of remote control and SCA multiplex subcarriers.**
**SINGLE STL — Another Moseley "first" makes it possible to transmit a composite stereo waveform, including a 67 kHz subcarrier, over the PCL-505/C Composite STL. This achievement is mainly attributable to the use of true direct FM — rather than phase modulation — in the transmitter, and a phase linear I.F. amplifier in the receiver. The field-proven PCL-505/C is of an advanced design that allows faithful transmission of the complete FM composite stereophonic waveform from a studio location to a remote FM broadcast transmitter. With only one basic RF link, this differs from the dual configuration employing two aural STL systems for the left and right channels. With the PCL-505/C, the stereo generator is located in the studio away from strong RF fields. Additionally, all audio processing equipment is at the studio. A 67 kHz SCA subcarrier generator may also be located at the studio if there is no need to add additional information (such as telemetry information for a remote control system) to the SCA channel at the transmitter site. The output of the PCL-505/C Receiver is designed to feed the wideband input of a direct FM exciter. Additionally, two subcarriers may be relayed by the Composite STL. As with the PCL-505, this capability allows for remote control and additional programming to be fed to the transmitter site.**

# A CLOSER LOOK . . .

**TRANSMITTER —**
The PCL-505 transmitter uses time-proven direct FM modulation. A carefully engineered automatic frequency control (AFC) system assures outstanding frequency stability. A block diagram of the PCL-505 Transmitter can be found on the rear of this bulletin.

An extremely stable frequency-modulated oscillator accepts both program and multiplex inputs. This low-noise oscillator is frequency modulated with varactor diodes. The operating frequency of the oscillators varies depending upon the STL band employed. For 950 MHz, the oscillator operates at one-twelfth the operating frequency, approximately 78 MHz. An RF frequency divider employing extremely high-speed integrated circuits divides the output of this oscillator to approximately 1200 Hz.

This divided output is then compared to the output of the crystal-controlled reference oscillator, and the resulting error voltage is used to phase lock the frequency-modulated oscillator to the crystal. A true proportional oven is utilized in the reference oscillator. This, combined with the extremely low comparison frequency, results in outstanding frequency stability.

The phase-locked output of the frequency-modulated oscillator is then multiplied and amplified. The multiplication factor is determined by the desired RF operating range for the system. As an example, for 950 MHz operation, the 78 MHz output of the frequency-modulated oscillator is multiplied to the desired operating frequency. All versions of the PCL-505, including the 890-960 MHz systems, use on-frequency RF power amplifiers. The PCL-505 Series is the world's first STL to use an active solid-state amplifier in the 890-960 MHz spectrum. This is followed by a directional coupler providing a true indication of forward and reflected powers.

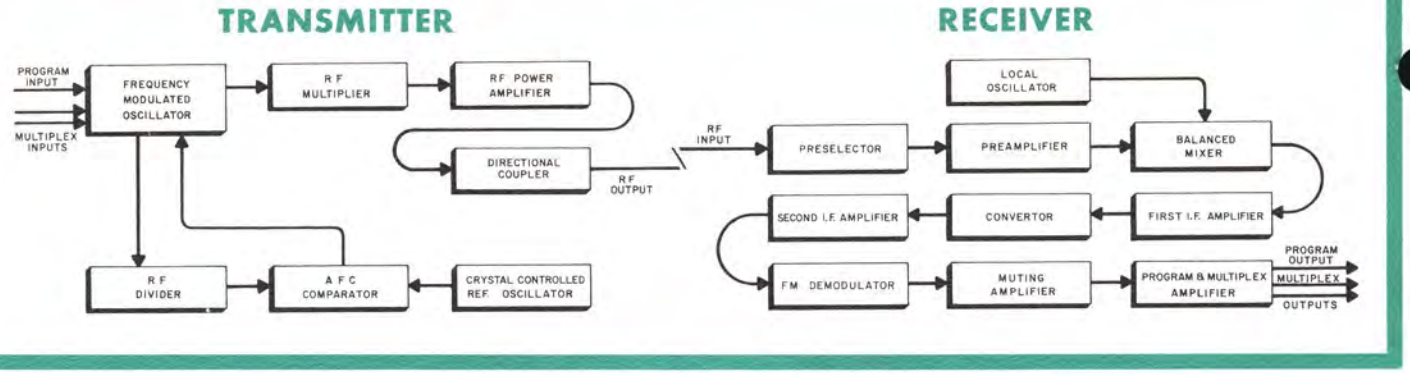
For the monaural PCL-505, an input audio filter removes unwanted program components above 16 kHz. This effectively reduces the cross talk (in all multiplex channels) which may be caused by spurious high-frequency noise in the program line. The composite PCL-505/C has a wideband input allowing for the acceptance of not only the composite stereo waveform, but also a 67 kHz SCA channel, as mentioned above. A remote connector on the STL transmitter allows remote operation as well as use with automatic transfer panels when a hot-standby unit is desired.

**RECEIVER —**
The PCL-505 Receiver is classified as a double-conversion, crystal-controlled, superheterodyne type. The input RF signal is passed through a preselector. For the UHF versions (890-960 MHz), the unique 4-stage stripline filter is employed.

An on-frequency preamplifier follows the preselector. Inclusion of an active, low-noise preamplifier is a Moseley first for 950 MHz aural studio-transmitter links. The output of the preamplifier is applied to a balanced mixer whose output, in turn, is applied to the first I.F. amplifier. A second converter is then utilized for feeding the second I.F. amplifier. The second I.F. amplifier exhibits excellent selectivity and linear phase characteristics. These characteristics enable superior performance and contribute to the outstanding success of the composite STL. A ratio detector affords better rejection of impulse noise. A muting amplifier contains all-electronic muting as well as metering points and DC amplifiers for driving a front-panel meter. Additionally, a carrier-operated relay is provided for external uses, such as automatic transfer to standby equipment.

The program amplifier for the monaural PCL-505 contains a 16 kHz low-pass filter to reject unwanted components. The amplifier sections are extremely low-noise, low-distortion type amplifiers. As noted for the transmitter, audio filtering differs with the PCL-505/C enabling the program output to accommodate the complete composite stereo waveform as well as a 67 kHz FM subcarrier.

# MODEL PCL-505 STUDIO-TRANSMITTER LINK




## SPECIFICATIONS

### SYSTEM

| | |
|---|---|
| **Frequency Range** | 148-174 MHz, 215-240 MHz, 300-330 MHz, 450-470 MHz, 890-960 MHz. Specify exact operating frequency. |
| **Transmission Characteristics** | |
| **Monaural (PCL-505)** | Frequency Response: ±0.4 dB, 30 Hz - 15 kHz; Distortion: Less than 0.4%, 30 Hz to 15 kHz; Signal-to-Noise Ratio: Better than 68 dB below 100% modulation. |
| **Composite (PCL-505/C)** | Baseband Frequency Response: ±0.3 dB, 30 Hz - 60 kHz; ±0.5 dB, 30 Hz - 75 kHz; Baseband Distortion (Harmonic and I.M.): Less than 0.4%, 30 Hz - 60 kHz; Signal-to-Noise Ratio: Demodulated L + R better than 68 dB below 100% modulation; Stereo Performance: Better than 0.7° and 0.07 dB main/subchannel disparities. |
| **Modulation Capability** | One program and two subcarrier channels. |

### TRANSMITTER

| | |
|---|---|
| **Type** | Direct FM |
| **RF Power Output** | |
| **890-960 MHz** | 7 watts maximum, 5 watts minimum |
| **148-470 MHz** | 15 watts maximum, 10 watts minimum<br>Above powers into 50Ω resistive load. Type N female connector. |
| **Frequency Stability** | Better than 0.0005% (−20°C to +60°C) |
| **Spurious and Harmonic Emission** | More than 60 dB below carrier |
| **Deviation** | |
| **Monaural (PCL-505)** | ±40 kHz for 100% modulation (890-960 MHz) |
| **Composite (PCL-505/C)** | ±60 kHz for 100% modulation (890-960 MHz)<br>Other deviations available on special order. |
| **Modulation Input** | |
| **Monaural (PCL-505)** | +10 dBm, 600Ω, balanced, floating, screw barrier strip connector. |
| **Composite (PCL-505/C)** | 3.5V p-p, 12,000Ω, unbalanced, Type BNC female connector. Other levels on special order. |
| **Multiplex** | 1.5V p-p, 2,000Ω, unbalanced, Type BNC female connector. Subcarrier spectrum:<br>Monaural (PCL-505): 22-85 kHz<br>Composite (PCL-505/C): 100-240 kHz |
| **Dimensions** | 8.9 cm (3.5") high, 48.4 cm (19") wide, 40.6 cm (16") deep |
| **Primary Power Source** | 120/240 VAC, ±10%, 50-60 Hz, 80 watts |

### RECEIVER

| | |
|---|---|
| **Type** | Superheterodyne, dual-conversion, crystal-controlled. |
| **RF Input** | 50Ω, Type N female connector. |
| **Sensitivity** | |
| **Monaural (PCL-505)** | Less than 20μV for 60 dB SNR |
| **Composite (PCL-505/C)** | Less than 125μV for 60 dB stereo demodulated (L or R) SNR |
| **Selectivity** | |
| **Monaural (PCL-505)** | 180 kHz, 3 dB I.F. Bandwidth<br>2.5 MHz, 80 dB I.F. Bandwidth |
| **Composite (PCL-505/C)** | 330 kHz, 3 dB I.F. Bandwidth<br>3 MHz, 80 dB I.F. Bandwidth |
| **Modulation Output** | |
| **Monaural (PCL-505)** | +10 dBM, 600Ω, balanced, floating, screw barrier strip connector. |
| **Composite (PCL-505/C)** | 3.5V p-p behind 220Ω, unbalanced, Type BNC female connector. Other levels on special order. |
| **Multiplex** | 1.5V p-p behind 100Ω, unbalanced, Type BNC female connector |
| **Dimensions** | 4.5 cm (1¾") high, 48.4 cm (19") wide, 34.9 cm (13¾") deep |
| **Primary Power Source** | 120/240 VAC, ±10%, 50-60 Hz, 12 watts |

Specifications subject to change without notice.

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Printed in U.S.A.

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