

INSTRUCTION MANUAL

MODEL TRC-15A

REMOTE CONTROL SYSTEM

MOSELEY ASSOCIATES, INC.
Santa Barbara Research Park
111 Castilian Drive
Goleta, California 93017

Revised
July 1975

(805) 968-9621

TRC-15A INSTRUCTION MANUAL

TABLE OF CONTENTS

	Page
I. INTRODUCTION	1
II. SPECIFICATIONS	1
III. UNPACKING	3
IV. INSTALLATION	3
A. General Information	3
B. Wireless FM	4
C. Wireless AM	8
D. Equipment Location	8
E. Studio-Transmitter Interconnections	10
F. Metering	15
G. Control	19
V. OPERATION	22
VI. CIRCUIT DESCRIPTION	23
A. Control Generator	23
B. Control Demodulator	27
C. Audible Metering Generator	29
D. Subaudible Metering Generator	31
E. Audible Metering Demodulator	33
F. Subaudible Metering Demodulator	35
G. Subcarrier Generator	37
H. Subcarrier Demodulator	39
VII. ADJUSTMENT	39
A. Routine	39
B. Internal	40
C. Control Generator	40
D. Control Demodulator	40
E. Audible Metering Generator	41
F. Subaudible Metering Generator	42
G. Audible Metering Demodulator	42
H. Subaudible Metering Demodulator	42
I. Subcarrier Generator	42
J. Subcarrier Demodulator	43
VIII. MAINTENANCE AND REPAIR	44

INSTRUCTION MANUAL
MODEL TRC-15A
REMOTE CONTROL SYSTEM

I. INTRODUCTION

The Model TRC-15A Remote Control System was designed specifically to remotely control FM and standard broadcast transmitters. A total of 15 metering channels and 15 bi-directional (on/off, raise/lower, etc.) control functions are provided by the system. Interconnection between studio and transmitter requires only a single full-time, two-way, voice-grade wire line or radio link. The environment in which the equipment normally functions and the operator using it have both been carefully considered. Excellent performance has been achieved by careful design, and available options make the TRC-15A a versatile remote control system.

The standard TRC-15A uses a telephone line interconnection between the studio and transmitter sites. This system is defined by referring to it as the TRC-15AW. When options are installed to enable sub-carrier or other wireless techniques to be used, it is referred to as the TRC-15AR.

II. SPECIFICATIONS

Number of metering channels	15 (selected one at a time)
Metering system input	Approximately 1 VDC for full-scale studio-meter deflection; nominal 20K resistive floating input, insulated for 350 VDC
Calibration controls	Multiturn potentiometers
Calibration voltage source	Internal Zener diode
Metering system stability	With weekly transmitter-unit checks and daily studio-unit checks, better than 1% exclusive of operator setting or reading error
Control System	
Number of channels	15 On/Raise and 15 Off/Lower, isolated
Control output ratings	1 ampere maximum, 120 VAC maximum

Telephone line studio-transmitter interconnection (TRC-15AW)	
Telephone line impedance	600 Ω
Telephone line levels	0 dBm, adjustable
Control tone frequency	300 Hz to 375 Hz
Metering tone frequency	800 Hz to 1200 Hz
Allowable line loss	30 dB (with 0 dBm send levels)
Radio link studio-transmitter interconnection (TRC-15AR)	
Radio link impedances	2000 Ω nominal
Radio link levels	1.5 volts peak-to-peak
Control subcarrier frequencies	26 kHz typical for monaural STL. 110 kHz typical for composite stereo STL.
Metering tone frequency	20 Hz to 30 Hz
Metering tone level	Adjustable up to 6 volts peak-to-peak behind 600 Ω
Metering subcarrier (option)	67 kHz typical, 41 kHz alternate
Semiconductor devices	All silicon diodes, integrated circuits, and JEDEC-registered transistors
Operating temperature range	-30°C to +60°C
Power requirements (each end)	120/240 VAC, 50-60 Hz, 20 watts
19 inch vertical rack space	5 $\frac{1}{4}$ inches, each end
Domestic shipping weight	60 pounds

III. UNPACKING

The TRC-15A units should be carefully unpacked and inspected for any shipping damage. Keep all packing material in case a claim is to be made against the carrier for damages. Should this inspection reveal any damage, immediately file a claim with the carrier.

It is recommended that the front panels be pulled forward for a brief superficial inspection. Be sure the various printed circuit boards are secure, the integrated circuits and transistors are seated in their sockets, and that the fuse-holders are installed. The rear door of the transmitter unit should be swung down and the relays and fuses confirmed as being in place.

IV. INSTALLATION

A. General Information

IT IS HIGHLY RECOMMENDED THAT NO CONNECTIONS BE MADE TO THE TRC-15A UNTIL THE BASIC CONCEPTS OF HOW THE SYSTEM OPERATES ARE UNDERSTOOD BY THE INSTALLING PERSONNEL. These concepts, as well as installation suggestions and comments, are explained in the next few pages of this manual.

Bear in mind that if the two units are interconnected with a telephone line, the system is a TRC-15AW, or if wireless (subcarrier) interconnections are used, the system is a TRC-15AR.

Connections which will be required at the studio unit are to the power source and either the telephone line (for the TRC-15AW) or the STL/radio equipment (for the TRC-15AR). At the transmitter site these same connections will be required in addition to connections to the control and metering circuits. The control and metering connections should not be made until the studio and transmitter units of the TRC-15A have been interconnected and confirmed as working alone.

The studio unit of the TRC-15A sends control signals in the region of 300 Hz to the transmitter site. In the wire-line TRC-15AW system these signals are sent to the transmitter via a telephone line. In the radio TRC-15AR system the signals are sent via a subcarrier on a radio link. The transmitter unit returns metering signals to the studio unit. These signals are in the region of 800 Hz to 1200 Hz in the case of the wire-line TRC-15AW, or they are in the region of 20 Hz to 30 Hz in the case of the radio TRC-15AR system.

The wire-line system is illustrated in block diagram form in Figure 1, and the elementary radio system is illustrated in Figure 2.

B. Wireless FM

If the telephone line interconnection is not used, the control signals are sent to the transmitter site by using subcarrier techniques. As shown in Figure 2, the control generator at the studio frequency-modulates a subcarrier generator. The output of this subcarrier generator is then applied to the multiplex or subcarrier input of an STL (microwave) transmitter. In this manner, the control signals "ride piggyback" on the STL going to the transmitter site. This subcarrier generator is a standard addition to the studio unit of the TRC-15AR for wireless operation.

At the transmitter site the subcarrier output from the STL receiver is applied to a subcarrier demodulator located in the TRC-15AR transmitter unit. The output from this demodulator is a replica of the control signal which originated at the studio. This signal is then internally applied to the control demodulator in the TRC-15AR as in the basic system. The subcarrier demodulator at the transmitter site is a standard addition to the transmitter unit of the TRC-15AR for wireless operation.

In a similar manner, the metering signals may be returned from the transmitter to the studio by using a subcarrier. As shown in Figure 3, the metering generator frequency-modulates a subcarrier generator at the transmitter site. This subcarrier generator is usually a part of the main FM transmitter. As with the control signals, the metering signal now rides piggyback on the broadcast carrier in the form of an SCA signal which is then received at the studio. Here the subcarrier is extracted and demodulated by an SCA receiver. The output of this receiver or SCA demodulator is a replica of the metering signal generated at the transmitter site.

When the metering signal is returned to the studio in this manner, it is customary to use the frequency range of 20 Hz to 30 Hz for the metering signal. In this way, program material such as background music may also be broadcast on the SCA subcarrier. It has been found in practice that there is little interaction between the two. This low-frequency metering signal, which is referred to as the subaudible metering signal, is usually adjusted to modulate the SCA subcarrier about 14 dB below program. Because it is in the low audio spectrum and because it modulates the subcarrier at a low level, it causes little degradation of the music service. By the same token, low-pass

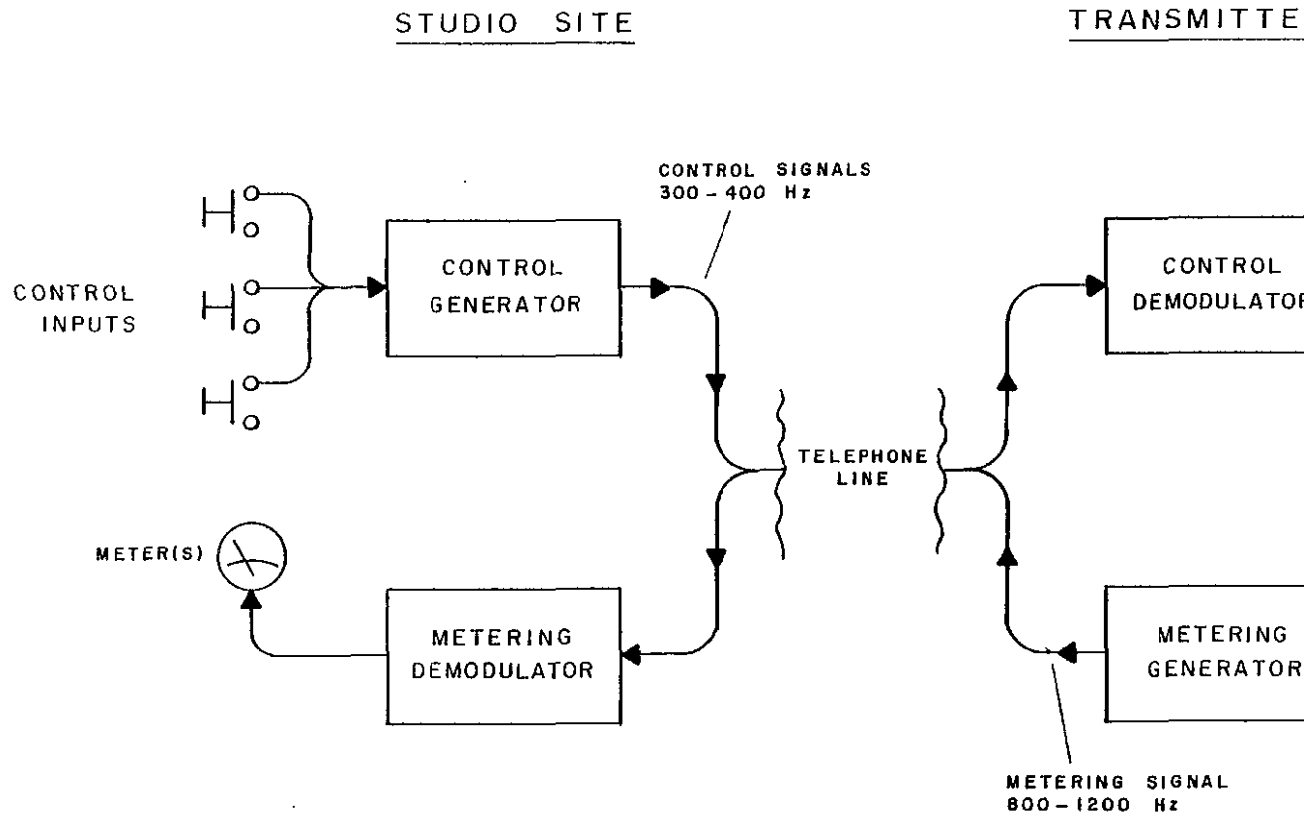


FIG. 1-BASIC TRC-15A REMOTE CONTROL SYSTEM EQUIPMENT ILLUSTRATED COMPRISES THE STANDARD WIRELINE SYSTEM (TRC-15AW)

