

# PORTABLE PERFECTION IN RECORDING

## *RCA OR-1 Equipment Does a Real Job*

By W. L. LYNDON

RCA Manufacturing Co., Inc.

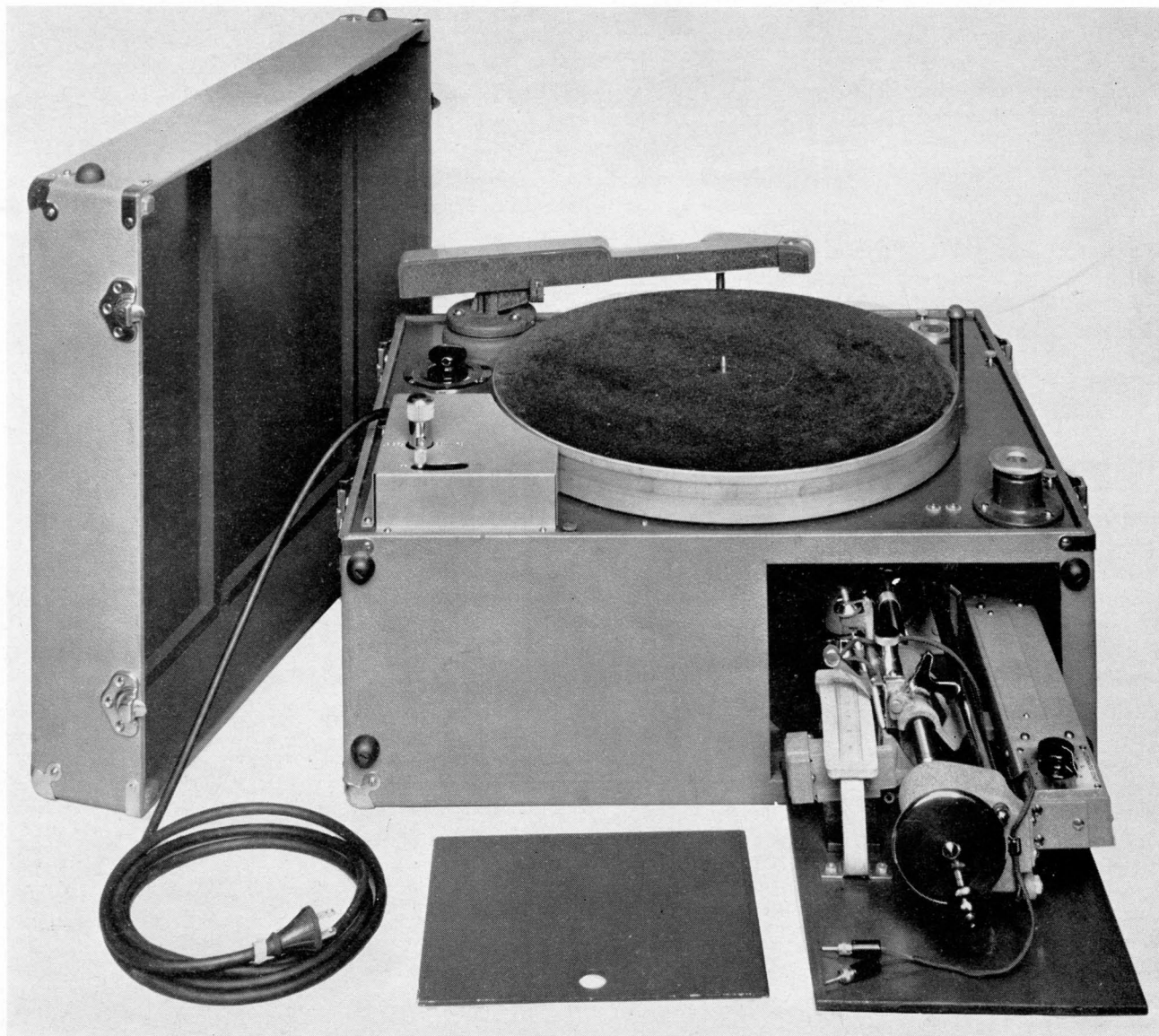
Courtesy of A-T-E Journal

THERE was a time during the growth of broadcasting when practically all programs originated from the studio or from the same building in which the studio and transmitter were located. This condition, however, did not exist for long as it was soon realized that many of the important events which had excellent broadcast value could not be brought into the studio. Such items as sports

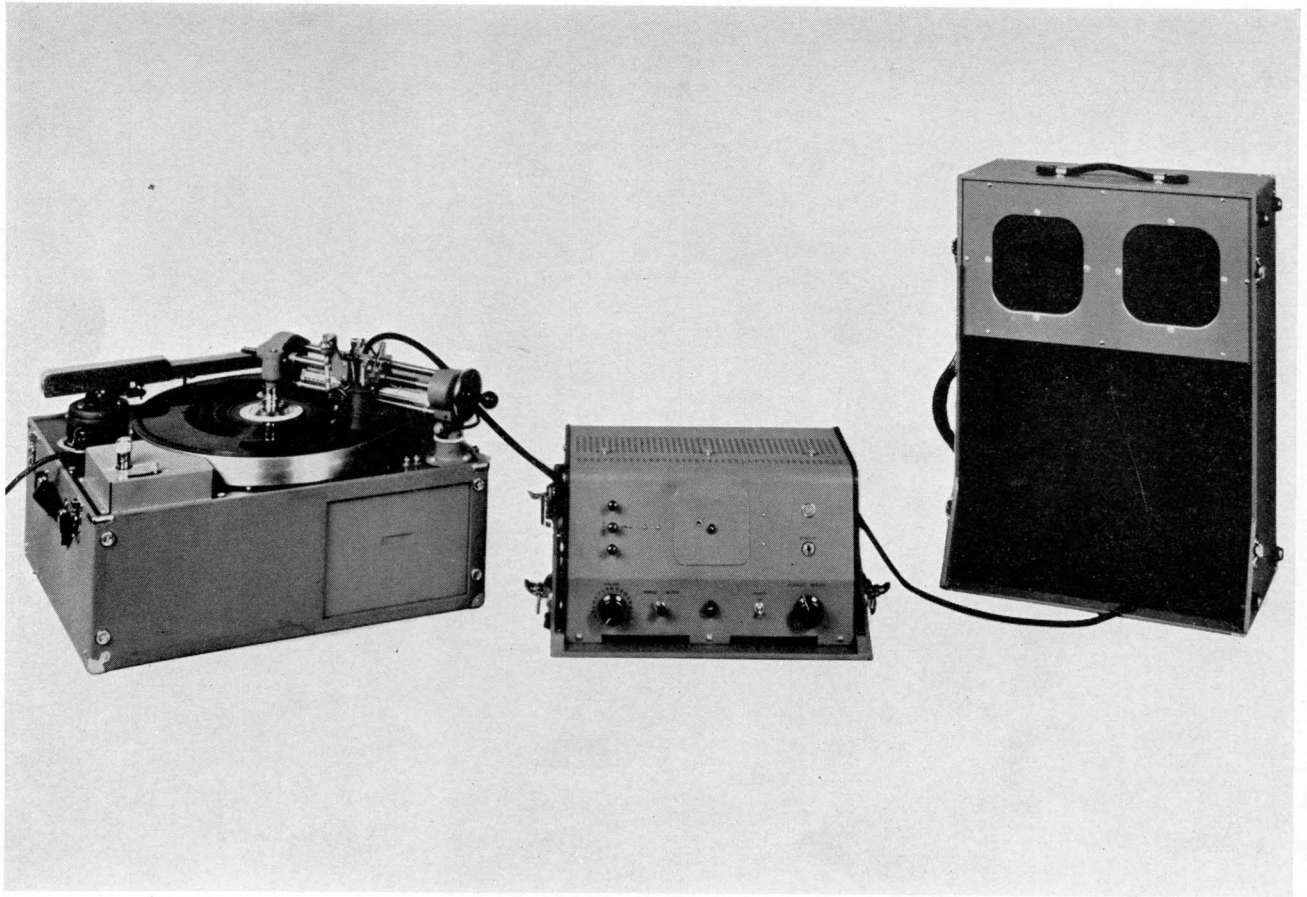
events, dedicatory programs and religious meetings had considerable appeal and, therefore, added a new phase to the system of broadcasting. The demand for handling such remote programs ultimately resulted in the development of remote pickup equipment which, in addition to providing quality comparable to that of a studio channel, also had to be reliable, rugged, easy to set up and operate and be portable in

nature. Remote facilities have so expanded that today many a so-called remote job involves a technical layout of equipment that exceeds that required for the most elaborate studio pickup.

The art of making instantaneous recordings has gone through the same cycle of progress. It was started purely as a studio adventure in which the recording apparatus was set up in the control room and recordings made of



Showing the compact design of the Recording Unit for the OR-1.



The three basic units in the RCA OR-1 Equipment.

a local studio show or a network program. Such an adjunct to broadcasting was immediately exploited by the advertising and sales departments of many of the stations, which resulted in the demand for equipment that could be brought to the spot to make instantaneous recording, as well as to reproduce transcribed programs for prospective clients.

In recording equipment there are several factors, such as fidelity of recording and playback facilities, slippage, "wow" content, background rumble and scratch level, that do not enter into regular broadcast remote pickup requirements. Such items as slippage, "wows" and background rumble are of a mechanical nature and certain basic principles of mechanical design must be followed in order to insure satisfactory performance. If 16" records are to be used for recording or reproducing this will have a direct bearing on the ultimate overall size of the equipment. This also determines to a great extent the weight of the equipment,

since in order to arrive at the overall performance, the turntable platter must have the correct flywheel effect, especially when rim type of drive is employed. Ample driving torque is required, which more or less determines the size of the motor to be used. Reliable means of transmitting power from the motor to the turntable platter must also be used. We must also consider the background noise which may result from the motor, and, therefore, shock mounting and means of acoustically isolating the motor from the turntable platter is necessary. Equipment used to demonstrate recorded programs must have a good frequency characteristic with low distortion and it should be capable of satisfactorily reproducing records made by different manufacturers. Some such type records are lateral cut while others are vertical recordings. Instantaneous recording blanks are coated with a soft material and it is highly advantageous to use a light weight pickup which considerably in-

creases the playing life of this type of record.

It was with these main considerations in mind that the OR-1 was developed and designed so that good quality in both recording and reproducing might be obtained and still have equipment that could be considered portable.

The RCA Type OR-1 Portable Recording and Reproducing Equipment consists of three basic items; namely, the MI-11211 Portable Turntable and Reproducer, MI-4877-A (Type 72-C) Recorder and the MI-11212 Amplifier and Speaker Assembly.

The equipment is housed in two carrying cases covered in umber gray leatherette with reinforced corners. Handles are provided on each unit so that they may be conveniently carried by two persons when so desired. Provisions have been made for carrying and storing the 72-C Recorder in the portable turntable case. The above three items are basic units required for recording and to this may be added a num-

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ber of accessories which are listed here.

**MI-11211 Portable Turntable**

The MI-11211 Portable Turntable consists of a 16" turntable platter with its associated drive and reproducer mechanism. The turntable is rim driven by a high quality synchronous motor. A unique feature is the use of two simultaneously operated rubber tired driver wheels between the motor and the turntable rim. These two wheels provide a positive means of power transmission and the actual slippage is held to considerably less than 1%. In order to prevent flats from developing on the driving wheels the "on-off" switch, in addition to disconnecting the power, also releases both drive wheels in the "off" position. The driver wheel employs a special rubber which is capable of providing quiet operation and long service. The motor drive assembly is shock mounted from the turntable platter in order to eliminate motor rumble from being transmitted to the turntable platter. Associated with the "on-off" power switch is a speed change mechanism which allows a rapid and positive change from 33 1/3 to 78 R.P.M. This speed change is made by turning a single knob. The combination of motor and driving method provides a "wow" factor of less than .5 of 1%.

Located on top of the motor board are two pin jacks which provide a terminus for the recording head audio supply. There is also a five conductor receptacle which is used to connect the output of the pickup and the recording head to the amplifier. A ten foot power cable with plug is provided and is arranged so that it may be stored within the unit when the equipment is not in use. A power fuse is located near the "on-off" switch and a spare fuse is mounted on the recorder saddle assembly. All equipment is mounted on a common motor board which will permit it to be removed from its cabinet and installed in a recording table if so

desired. A compartment is provided in the carrying case for storing the 72-C attachment when it is not in use. An opening is provided in one end of the cabinet over which is located a slide door. This door can only be opened after the turntable lid has been removed. A saddle is provided for holding the 72-C Recorder and sufficient straps are furnished so that when the mechanism is slid into place, there is no danger of its becoming loose or damaged during transit.

One outstanding feature of this turntable is the fact that it employs the new RCA MI-4875-B High Fidelity Combination Pickup Head with tone arm. This pickup is equipped with a permanent polished diamond stylus, has a very flexible armature and is capable of reproducing from either vertical or lateral cut records. It has a frequency range of from 30 to 10,000 cycles and the weight of the head on the record is only one ounce. Special compensating filters are provided for the pickup and are selected by means of a rotary switch mounted on the motorboard. Four lateral positions permit proper reproduction of all standard home and lateral transcription records. Two vertical position provide the correct response for new and used vertical transcriptions.

**Technical Data on MI-11211**

**Power Required**—105-125 volts  
60 cycles (MI-11211)  
50 cycles (MI-11217)  
45 watts

**Turntable Diameter**—16 inches

**Turntable Speeds**—33 1/3 and 78 r.p.m.

**Controls Provided**

- (a) Motor Switch
- (b) Speed Change Control

**Slippage**—Less than 1%

**Regulation**—0.5% or better

**Pickup Output Level**—-64 db., below .001 milliwatt.

**Pickup Frequency Response**—50 to 10,000 cycles, within  $\pm 3$  db. for both vertical & lateral reproduction.

**Pickup Filter Load Impedance**—Output of pickup filter should be connected to the unloaded input transformer of an am-

plifier (flat response) designed for operation from a 250 ohm source.

**Physical Specifications**

Width 24"

Depth 21"

Height 12 3/8"

Weight approximately 56 lbs.

**Portable Amplifier and Speakers**

The MI-11212 Portable Amplifier and Speaker Assembly is the companion unit for the MI-11211 Portable Turntable. Its carrying case divides into two sections, one of which contains the amplifier and cables and the other two "accordion edged" loudspeakers enclosed in a sealed compartment. The carrying case is finished to match the MI-11211 Portable Turntable.

The amplifier utilizes five stages of amplification having an overall gain of 110 db. as measured from a 250 ohm source to a 15 ohm load. It has a rated power output of 12 watts with less than 3% rms. distortion at any frequency between 50 and 7,000 cycles. The frequency response is well within  $\pm 2$  db. from 30 to 15,000 cycles, using 1,000 cycles as a reference level, and for normal gain setting with input terminated, the noise level is -60 db. below a 2 watt output rating. The high quality performance, from the viewpoint of frequency response, distortion and background noise, is on a par with the excellent reproduction obtainable from the two-way combination reproducer head as employed on the MI-11211 Portable Turntable.

A complete single stage pre-amplifier with input and output transformers is included as part of this amplifier. This provides a 600 ohm link circuit after the preamplifier for the insertion of equalizers when desired. All recording equalizers have a certain insertion loss. Therefore, in order to compensate for large variations in gain, a fixed pad is connected into the circuit. When an equalizer is employed, this pad is removed and the equalizer connected into the circuit. This arrangement provides substantially the same overall gain from the amplifier.



All the amplifier components are mounted on a simple type of chassis construction and all components are arranged so that electrostatic and electromagnetic couplings will not be a factor to contend with in obtaining a low background noise level. The tubes and components are protected by an overall metal housing. The front part of this housing acts as a front panel for the amplifier on which is located three binding posts for bridging input circuit, cut-out for vu meter, head phone jack, power switch, fuse, play-back-record switch, step-by-step volume control and a "bridge-match" input switch. In the match position of the latter switch, the output of the microphone receptacle and the output of the pickup may be fed directly to the 250 ohm input of the amplifier. In the bridging position the three binding posts are connected to the 250 ohm input of the amplifier through a 20,000 to 250 ohm fixed "H" pad. This arrangement makes it possible to record or monitor program from a zero level bus.

The microphone receptacle is located on the left end of the cabinet. It requires an MI-4630-B Cannon Plug which is not furnished as part of this equipment.

Careful consideration has been given to providing a means for easy servicing of this amplifier. The lid of the amplifier shield is readily removable to permit changing of tubes. The complete amplifier may be removed from the case for servicing the components located on the underside of the chassis by removing five thumb screws. The chassis frame and the housing shields are perforated to provide adequate ventilation. The amplifier is mounted approximately one-half inch from the bottom of the case to insure an ample flow of air around the component parts.

A terminal board is located along the back of the amplifier. Associated with this board are three cables, each equipped with plugs. One of these is the connecting cable between the turntable and amplifier, another the AC power cable and the third the speaker cable. Sufficient space is

available between the back of the amplifier and the cabinet to house the cables when the equipment is not in use. Terminals are available to permit either the MI-4894 Automatic Equalizer or the MI-4916 Fixed Orthacoustic Filter to be connected into the circuit.

The two loudspeakers provided with this unit are mounted in a closed compartment in one-half of the amplifier case. These speakers are of the permanent magnet type, employing accordion edged cones. The use of two speakers permits a wide angle of distribution and mounting them in a closed cabinet provides proper loading for the speaker cones. The resultant overall acoustical response is essentially uniform from 60 to 7,000 cycles. For those who wish to obtain higher quality of reproduction the amplifier has sufficient undistorted power output to satisfactorily drive the RCA Type 64-B Monitoring Loudspeaker.

#### **Technical Data on MI-11211 Amplifier and Speakers**

**Power Required**—105-125 volts  
50/60 cycles  
120 watts

#### **Tubes**

5 RCA-1620  
2 RCA-1622  
1 RCA-5U4G

**Source Impedances**—250 and 20,000 ohms

**Gain**—250 ohm source to 15 ohm load—110 db. 20,000 (bridging 600 ohms) to 15 ohm load—30 db.

**Load Impedance**—7.5/15 ohms.

**Noise Level**— -61 db. below 1 watt output, with normal gain settings.

**Frequency Response of Amplifier**  
±2 db. (1000 cycle reference) from 30 to 15,000 cycles with 50 ohm source and 15 ohm load.

**Power Output**—12 watts with less than 3% total rms. distortion 50 to 7500 cycles.

#### **Physical Specifications**

Width 18½"  
Depth 23½"  
Height 14"  
Weight 63 lbs.

#### **72-C Recording Attachment**

The 72-C Recording Attachment has been designed for use with the 70-C Studio Turntable and MI-11211 Portable Turntable.

Almost every known device for assisting operators in producing highly satisfactory recordings has been included in the design of the 72-C. The efficient cutting head has a uniform response between 60 and 6000 cycles. An inertia type float stabilizer is employed which prevents flutter and vertical modulation on recordings.

A swivel mount casting is provided on the OR-1 which has a knurled thumb nut permitting ready adjustment for horizontal alignment. This recorder has a unique lowering device for the head which permits the operator to gently lower the cutter on to the record, thus avoiding styli breakage or deep cuts from sudden dropping. The angle of the stylus and the depth of cut may be conveniently adjusted even during operation. A spiraling hand wheel permits spacing between musical selections without breaking continuity of the groove. A timing scale is provided which gives an accurate indication of the remaining recording time. It is calibrated for both 33-1/3 and 78 r.p.m. The lead screw is precision machined and hand honed, thus insuring smooth operation and uniform spacing between recorded grooves.

A standard high quality magnetic cutting head is furnished with the equipment. It provides highly satisfactory reproduction between 60 and 6000 cycles. Where higher recording fidelity is required, the MI-4887 Recorder Head is recommended. The MI-4887 reproduces within ±2 db. from 50 to 10,000 cycles and permits recording with high levels without distortion.

#### **Specifications**

**Power Input**—3 watts

**Input Impedance**—15 ohms, nominal

**Frequency**—60 to 6000 cycles

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**WFBC**

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to all three consoles. It is possible, under normal conditions, to handle three programs or remotes at once. Four can be handled if facilities are pushed. The racks contain five line amplifiers—one being used to feed the Blue Ridge Network. Also found in the racks are: monitoring amplifiers and

the latest test equipment. Mounted on the wall above the center console is one of RCA's new high fidelity speakers.

The control room was designed and wired by Hubert Brown of WFBC's engineering department. All equipment was planned with thought of a possible future use of FM.

The managers office and cli-

ent's room each have one of the RCA high fidelity speakers and an 82-C amplifier with four programs—local, network, audition, or radio—available on push buttons.

B. T. Whitmore, manager, W. H. Clews, commercial manager, Jim Reid, program director, Clyde Etheridge, chief engineer, and Hubert Brown, chief audio engineer, form the staff of WFBC.



Program on the air from Studio A at WFBC.

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**Feed Screw Pitch**—112 lines per inch

**Recording Time**—15 minutes on 16" record at 33-1/3 r.p.m.

**Accessories for OR-1**

The following accessories are available for use with the OR-1 Recording equipment:

1. Spare input plug for MI-11211 Turntable, Stock #26126.
2. MI-11259 Tube Kit for MI-11212 Amplifier.
3. MI-11251 VU Meter Kit for MI-11212 Amplifier.
4. MI-4894/4913-2 Automatic Equalizer for 72-C.
5. MI-4916 Orthacoustic Recording Filter.
6. Microphone Plug MI-4630-B.
7. MI-4887 High Fidelity Recording Head for 72-C.
8. MI-4876 Outside-In Lead Screw for 72-C.
9. MI-4879-A Steel Recording Styli for 72-C.
10. MI-4878-B Sapphire Styli for 72-C.
11. MI-4842 Sapphire Recording Styli (70°) for 72-C.

**Lieutenant W. L. Garnett**

Shortly after the last issue of Broadcast News was distributed, we received word that Lieutenant W. L. Garnett had been killed in an automobile accident near Camp Dix.

Lieutenant Garnett, who was widely known among broadcast station engineers, was a member of the RCA engineering group, devoting most of his time to speech input equipment. He left RCA to enter the army and had only been in the service a few months prior to the accident.