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Television Sound Receiver
Instability in Apparatus
A Small Recording Studio
SMALL RECORDING STUDIO

Part I — Microphone, Recorder, Turntable and Pickup

It is entirely feasible to equip a recording studio without the expenditure of a small fortune. When we reduce the prospective studio to its bare essentials, we find that we need the necessary equipment to make and play back a good recording or transcription. These essentials would be, in the order of their importance:

1. A 16-inch dual-speed motor and turntable assembly.
2. Rugged leadscrew assembly, preferably of the overhead type, and a good cutting head.
3. High-fidelity, low-distortion amplifier with adequate power capabilities not only for recording, but also for playback.
4. High quality playback pickup.
5. Playback speaker system, preferably of the dual-speaker type.
6. One or more high-quality microphones and an acoustically treated room for the actual recording.
7. A second turntable and playback pickup for re-recording and dubbing purposes.

8. An all-wave AM receiver and an FM receiver are desirable.

It is assumed that adequate space is already available, preferably with three rooms. The recording equipment should preferably be placed in a room by itself, to insulate the recording artist from the distraction of watching the business of making a record and to ensure that the attendant noises will not mar the recording.

The second space consists of the actual studio. It should contain several microphone outlets to reduce the possibility of a slip-up over the cord. A piano is a must, if musical recording is contemplated. The studio should be partially lined with absorbent material. One end of the studio might be so lined and the other end left reflective. This would provide a versatile arrangement where the acoustics of a large hall or outdoors may be simulated.

The third space is the reception and waiting room. There has to be a space where the clerical business of a recording studio can be conducted without interfering with either the recordist or the artist. It would be highly desirable to provide a receptionist or secretary to meet customers.

We are, in this article, primarily concerned with the equipment necessary to make a good recording.

For this we must first have a turntable and motor assembly. The selection of this item deserves our deepest consideration. It is possible to cut corners nearly everywhere else, but we cannot turn out good recordings with a poor turntable. It must neither introduce wow (which is a change of speed within one revolution) nor slow down under the pressure of the cutting head. Both of these deficiencies will be noticeable to even the most uncritical customer. Wow is greatly reduced in a turntable that has great mass. Sixteen-inch tables usually are made of cast iron and weigh from twenty to fifty pounds. The drive motor should have adequate power, so as not to slow under the load of the cutter, and should have a continuous-duty rating of at least 1/30 horsepower.

![Diagram](image-url)

Fig. 1. Left—Velocity microphone and typical field pattern. Right—Cardioid field pattern with representative microphone of this type. Top photo—Non-directional sound cell microphone; bottom—standard dynamic type.

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The headfeed assembly which is to drive the recording head across the record should be rugged and without play of any kind. The overhead type is usually preferable. There are many cutting heads to choose from. They range from six dollars to several hundred. There can be no doubt that when cost is a factor, the crystal type will provide the best results. It is equally certain that the finer magnetic types will provide the very best quality.

The next most important item is our amplifier. It should be of the highest quality you can afford. In the interest of economy, it might be well to construct your own.

The amplifier should provide several channels feeding a stage containing high- and low-frequency compensation, which, in turn, feed an output stage capable of at least ten or fifteen watts at a maximum of two percent distortion. Switching should be provided for several recording characteristics. Means should also be provided to monitor the output of the amplifier. An a.c. voltmeter, with a flat frequency response and plainly marked as to the maximum level that may be safely applied to the record, should be permanently connected to the amplifier's output. Also, it is desirable to provide audible monitoring by headphones or speaker.

A suitable playback pickup must be provided. Again, there are many choices. The crystal types provide the best performance when cost is a prime factor. The magnetic and dynamic types cost much more, but can have wider range and lower distortion. In the interest of simplicity of compensation, it is desirable to use the same type of cutter head and playback pickup. It is significant that the average user of 10- and 12-inch records will use a crystal pickup, whereas the user of 16-inch transcriptions usually uses a magnetic or dynamic type. There is a profound difference in

Fig. 2—The author's recording amplifier. A standard type may be used, with slight modifications, for recording purposes.

Heart of the recording assembly. Sturdiness and freedom from any play are important here.
Confidentially Speaking

BE CONFIDENT WITH
A MICROPHONE BY TURNER

Whether it's a general purpose unit for voice and music, or a unit for a specialized application you'll always be confident of accurate pickup and faithful reproduction when your microphone is a Turner. Turner Microphones are proving their superiority in design and manufacture to new users every day.

Illustrated is the Turner Model 33—a high fidelity all purpose microphone that combines high output with smooth response over a wide frequency range. Its matched acoustic design results in crisp, clear speech reproduction...music is full and round with tonal qualities faithfully retained. Furnished in a choice of high quality crystal or rugged dynamic circuits. It is recommended for studio recording, remote control broadcast, orchestra pickups, paging, dispatching and call systems, public address and communications work.

**MODEL 33X CRYSTAL**
- Response: Flat within ±5 db from 50-10,000 cycles.
- Output Level: 52 db below 1 volt/dyne/sq. cm.
- Impedance: High impedance.
- Crystal: High quality moisture sealed crystal.
- Stand Coupler: Standard 5/8"-27 thread.
- Cable: 20 ft. removable cable set.

**MODEL 33 DYNAMIC**
- Response: Flat within ±5 db from 40-10,000 cycles.
- Output Level: 52 db below 1 volt/dyne/sq. cm.
- Impedance: 50 ohms/250 ohms/500 ohms/high impedance.
- Magnetic core: Heavy duty dynamic cartridge.
- Stand Coupler: Standard 5/8"-27 thread.
- Cable: 20 ft. removable cable set.

**THE TURNER COMPANY**
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TURN TO TURNER FOR THE FINEST IN ELECTRONIC EQUIPMENT

**WHY NOT?**

Why not have the telephone companies devise a telephone that can be used from a distance of two or more feet away? This would make it unnecessary to hold a receiver in your hand. It would enable a woman to chat and do some mending at the same time.

ELIZABETH REHM,
St. Albans, N. Y.

(Your idea has merit and if there is a sufficient demand for such a device the telephone people will provide it. We were interested enough to interview one of the telephone technical officials who expressed this view too. For the record, loud-speaking telephones are not a novelty. Indeed, Alexander Graham Bell, himself, in the late 70's used a loud-speaking telephone to demonstrate the telephone. There were many other loud-speaking 'phones in the past—but this was before the day of amplifiers. In the above suggestion if you want to talk back this would mean an amplifier device. Then the phone could be laid on the table and a conversation could be held several feet away from the phone. Technically, the idea is quite feasible.—Editor)

Why not design a crystal phone pickup with a universal transformer to match the most commonly used line impedances? It can serve a dual purpose as it can be so mounted as to provide a counterbalance for the tone arm.

P.W. JOHN R. SIMPSON,
Miami, Fla.

Why not have all autos equipped with a small 1- or 2-tube receiver that delivers its output to a relay which could be used to control the speed of the car. Signals from small transmitters located at busy intersections, schools and railroad crossings, etc. would be used to actuate the control relay.

JOS. P. BROOKS,
Vallejo, Calif.

Why not have headphones with a good flexible rubber cord? Cloth covered cords kink, fray and short. Rubber cords wear well, seldom kink and are easily cleaned.

PAUL WEIENBACH,
Cleveland, Ohio

(They were specified in most Army equipment.—Editor)

Why not have radios with built-in line filters? This would eliminate the filters that sometimes have to be inserted between the outlet and the receiver.

TROY BLAND,
Gilmer, Texas

Why not offer an efficient presel construction as optional equipment on the better class of home receivers? DX and short wave fans should be willing to pay a premium for top performance.

OTTO WOOLLEY,
Colo. Springs, Colo.
Electronics is also playing an ever-increasing part in both jet-propelled and glide missiles.

February, 1948, saw the first practical test of glide bombs (an ordinary bomb fitted with wing surfaces) against a target in warfare; 88 B-17's launched 110 GB-1 glide bombs over Cologne.

Colonel Harvey T. Alness and his 7th Bomb Group used this bomb during the spring of 1945 to knock out the Japanese supply railroad running between Burma and Siam.

Another electronic missile, designated Felix, had a heat-sensitive electronic unit located in its nose, which by electrical impulses operating on the tail surfaces guided the missile in its free fall to a target that was emitting heat—such as a steel mill or a blast furnace.

The Ason bomb, an improvement over the Ason, was controllable by electrical impulses both in azimuth and range. It had a gyro stabilizer which kept it from turning in the air during the period of fall. The tail unit had four elevators or rudders which permitted this double control.

One of the latest developments in free-falling missiles, the standard 1,000-pound bomb known as Roc is fitted with a television scanner in its nose. The ground area that the bomb scans during its free fall is televised back to the bomb-releasing plane, thereby en-
Famous Collins Autotune Transmitter

This is the well-known unit used in Army and Navy planes that features automatic loading tuning of any of its 11 front-panel preselected frequencies up to 2,840 Kc., as well as manual tuning at any time. The transmitter operates on voice, CW, and MCD on all frequencies. This beautifully designed unit uses an 813 final, and push-pull 811A as modulator, measures 24½x14½x11, and weighs 70 lbs. Estimated average power output is 110 watts. Price including dynamotor is $185.00. Write for literature describing any units you with more information on.

CHECK THESE BARGAINS

WIRELESS RECORD CHANGERS—These are beauties—two-post, with featherweight plastic and chrome pick-up, plays 10" and 12" records interchanged through any radio without connection. Complete with your choice of blue featherette or walnut stained cabinet, priced at only $29.50.

D.C. POWER SUPPLIES—Operates from 110 V 60 Cycle, features perfect filtering for smooth output. Output 6 Volts—50 Amps; 12 Volts—10 Amps. Either 6 or 12 volts may be used at the same time. Made by one of America's foremost manufacturers. Priced at $85.00.

PUBLIC ADDRESS AMPLIFIERS—5 Watts peak output, complete with 5 tubes, separate controls for Microphone and Phono Inputs. 59.50 value for only $25.00.

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General Electric Company

BENDIX SCR-522

Very High Frequency Vortex Transmitter-Receivers—80 to 150 Mc. THIS JOB WAS RADIO-CONTROLled through an elaborate system of relays. MANUFACTURING the TRANSMITTERS was more difficult and required a factory setup. To MANUFACTURE the TRANSMITTERS, the company needed a special factory setup and the ability to manufacture the transmitter itself. This was not a simple task, as the company had to design and manufacture the transmitter specifically for this job. The transmitter was designed to operate at 80 to 150 Mc, requiring a specialized frequency for its operation. The transmitter was used for radio communication in various applications, including military use.

Six Band Communications Receiver

Featuring continuous coverage from 1500 Kc. to 18,000 Kc. on a direct reading dial with the finest vornier drive to be found on any radio at any price—extreme sensitivity with a high degree of stability—crystal filter and phasing control—ADF—antenna connection—transmit-receive relay—standard 6 volt tubes. Contains a plate supply dynamotor in compartment within the cabinet, the removal of which leaves plenty of room for installation of a 110V, 60 or 26 cycle supply. These new receivers, which make any civilian communications receiver priced under $200.00 look cheap and shabby by comparison, are only $145.00. Power supply ($50) and mechanical 3 position switch to full 110-Volt, 50-Cycle operation. Year cost $44.50.

BLD. ELECTRIC 150-WATT TRANSMITTERS...NOW ONLY $44.50

These units manufactured for the Army Air Forces during the war by General Electric are now available at a price every amateur can afford. They are the same high quality transmitter, complete with seven plug-in tuning units, antenna tuning unit, oscillator, detector, four tubes, and 110 volt transformer. They are available at a price of $2,000.00 each. These units are suitable for operation on 110 V, 60 cycle a.c. The transmitter discharges the 115-volt, 60-cycle transformer. Also, when properly connected, the transformer discharges the 115-volt, 60-cycle transformer. Also, when properly connected, they will operate at 115 volts, 60-cycle ac. They come with complete instructions and instruction booklet for conversion to 110V, 60-Cycle Operation.

Bendix Vortex Transmitter...

General Electric Co.

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sabling the bombardier to guide Roc to its target by means of radio impulses. Differing from all other free-falling missiles, Roc utilizes a circular airflow which can be tipped at different angles by radio impulses, thus changing the angle of fall.

In the field of radio-controlled jet-propelled missiles is the German V-2 rocket, which was used largely in the latter months of World War II in Europe for attacks on England, Belgium, and Holland. This missile has a complicated electronic control, there being a number of control units located at the mouth of the rocket engine which control the rocket's take-off and take-off and acceleration, and rudders located at the tail end of the rocket for stabilizing the rocket after the jet has ceased to function, which is 60 seconds after ignition.

There is no field of either free-falling devices or radio-controlled devices in which electronics does not play an ever-increasing and important part, and undoubtedly this will continue to hold in the future. Recently charged with the responsibility for all War Department, Investigation of guided missiles, the AAF is subjecting new developments in this field to exhaustive evaluation.

(Continued)
If Alexander Graham Bell could look at the microwave antenna in the illustration, how quickly his mind would go back to his own experiments, 67 years ago!

For in 1888 the inventor of the telephone had another new idea. Speech could be carried by electric wires, as Bell had demonstrated to the world. Could it be carried also by a light beam?

He got together apparatus—a telephone transmitter, a parabolic reflector, a selenium cell connected to headphones—and "threw" a voice across several hundred yards by waves of visible light, electromagnetic waves of high frequency.

Bell's early experiment with the parabolic antenna and the use of light beams as carriers was for many years only a scientific novelty. His idea was far ahead of its time.

Sixty years later communication by means of a beam of radiation was achieved in a new form—beamed microwave radio. It was developed by Bell Telephone Laboratories for military communication and found important use in the European theater. In the Bell System it is giving service between places on the mainland and nearby islands and soon such beams will be put to work in the radio relay.

In retrospect, Bell's experiment illustrates once again the inquiring spirit of the Bell System.

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