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SECTION 9. SOUND AND TECHNICAL EQUIPMENT

9A. LISTENING EQUIPMENT

During the course of certain investigations, it sometimes becomes desirable to listen to conversations carried on by suspects or others without disclosing to them the fact that they are overheard. When such conversations are carried on within a room or enclosure, it is possible to make use of a concealed microphone, placed within the room under observation, from which a pair of wires may be led to an amplifier and associated sound reproducing equipment, located in a convenient hideout, some distance away from the room under investigation. Two types of amplifiers are supplied by the bureau for this, one known as the Detectaphone and the other as the Lafayette amplifier. Two models of Detectaphones are available, namely the older model PA-173 and the new PA-180 Briefcase Detectaphone.

9B. DETECTAPHONE

On each occasion requiring the use of the Detectaphone, a thorough check should be made of the set before its final installation is made. The round drycells which serve as "A" batteries should read not less than 1 volt with the volume control completely on; new cells should read 1.5 volts and between 30 and 35 amperes. The large "B" batteries should read between 36 and 45 volts, although satisfactory operation may occasionally be obtained with voltages as low as 30. The small "C" battery when new should test 3 volts and should be replaced when the reading is less than 2.5 volts. The "A" batteries will need the most frequent replacing. After ascertaining that the batteries are in satisfactory condition and that the tubes light up when the volume control is turned on, the microphone should be connected to the amplifier input terminals. The headphones are then connected to the output terminals and the volume control advanced until the tubes light up and reception is obtained.

In placing a microphone in a room to be occupied by a suspect, there are several points which should be kept in mind in order to obtain the most satisfactory operation. In the first place, concealment of the microphone within a readily movable object such as a small table or chair should be avoided, inasmuch as such concealment is very likely to result in subsequent disclosure or breaking of the small wires leading from the microphone. Because the microphone can be affected only by the sound which actually strikes it, a point of concealment should be chosen which is exposed as much as possible to the open air of the room. For instance, a cold air register would be a much more satisfactory place for concealment than a desk drawer or bookcase.

In placing the wire leading from a microphone to an amplifier, care should be taken that at all points where connections are made, the insulation has been thoroughly scraped from the wire and the bright metal is exposed. It is absolutely essential that all connections be bright and clean, for otherwise, noisy operation or even failure to operate may be expected; in addition, the two wires should not be permitted to touch each other at any point where the insulation has been removed, as such contact results in absolute lack of response from the microphone;

the breaking of either wire at any point along the line has the same effect, so far as microphone response is concerned, and therefore must be avoided.

In connection with the size of the wire which may be used, it should be stated that when using the carbon or dynamic type microphones the larger the wire, the longer it may be made and still give satisfactory operation. For distances of 25 to 50 feet, very fine wire may be used without serious loss of response. In general, however, the shortest line and the largest wire consistent with satisfactory concealment and ease of handling should be used.

It should be emphasized that installation of a Detectaphone for actual use should be started in sufficient time, prior to occupation of the room, to allow the hook-up to be tested and any necessary changes made or defects in the set-up corrected.

The Field has been supplied with carbon microphones which are placed in series with a battery for operation. An electric current flows through the microphone and the latter serves as a variable unit to oppose this current, depending upon the pressure applied to the carbon granules (or globules) placed between two carbon (or metal) surfaces. These two surfaces act as the two contacts to which the two connecting wires are fastened. In addition, one surface serves to hold the small carbon particles and is fixed with respect to the case, while the other surface is the diaphragm which vibrates and varies the pressure on the carbon particles according to the sound waves impressed against it. This vibration, and resultant change in current opposition, causes the electric current to vary in direct accordance with the sound waves. This weak electric current is amplified or strengthened by the vacuum tubes in the amplifier proper.

If a carbon microphone is horizontal or more than 45° with the vertical, the carbon particles do not make contact with the upper surface (diaphragm or cup) and no electric current will flow in the "broken" circuit. In other words, the microphone will cease to function and no sounds can be transmitted. If the small cover of a carbon microphone is loosened or removed the small carbon particles will fall out of their cup and be lost entirely or spilled into the outside shell of the microphone. In either case the material used to make the contact between the two sides of the electric circuit is lost and the microphone is rendered more or less inoperative, depending upon the amount of carbon particles spilled.

The Detectaphone unit includes one amplifier; one small crystal microphone with a grilled face to plant in a room for sound pick-up; one extremely sensitive crystal wall microphone to enable pick-up of conversations in adjacent rooms; two boosters for use with extension lines; and one set of crystal headphones.

One booster may have a metal cap over the terminal posts; it must be removed and then replaced when fastening leads to terminals. The connection leads are of shielded wire, with the end of the shield wire serving as the ground lead in all cases. In connecting the headphones it makes no difference which wire connects to the ground terminal post. The knurled bakelite knob on the amplifier box is the switch and volume control. Turning the knob to the right, in a clockwise direction, increases volume. Be sure the switch is off when amplifier is not in use

The best results with Western Electric Dynamic microphones or Sound Power microphones will be obtained with shielded twisted pair wire, but generally ordinary twisted pair wire will be satisfactory and more easily disguised.

9C. BRIEFCASE DETECTAPHONE

The Briefcase Detectaphone is a new improvement over the original Detectaphone and is presently being obtained by the Bureau to meet the need of new amplifiers for dictograph systems. It is a small compact unit mounted in a briefcase for disguise and convenient portability. The unit is about one-half the weight of the Detectaphone and has a higher volume output. Batteries can be tested by switches and a self-contained meter without removal from the amplifier case. All external connections to the unit are made by using plugs fitting into extension jacks mounted in the amplifier case.

All microphones capable of use with the Detectaphone can be used with the Briefcase Detectaphone. Three jacks are provided for using three crystal microphones simultaneously and a single jack is provided for all other types of Bureau microphones. However, an external battery is still needed in series with a carbon microphone to provide power.

Special batteries are needed for the Briefcase Detectaphones and care must be exercised in maintaining an adequate stock for emergency use. Ray-O-Vac P3A30, Eveready 733, Burgess W30P1, or General V30AAA may be used for the 45-volt batteries and General 2L1 may be used for the 1½-volt batteries. The Briefcase Detectaphones recently received by the Bureau bearing the name "Clarion" use one Eveready 742 battery for the 1½-volt "A" power and two Eveready Mini-max 455 for the 45-volt "B" batteries.

9D. RADIO DECOY PACKAGE KITS

Eight complete decoy package kits are presently available for use on extortion and similar cases. The kit consists of a decoy package, an auxiliary beat oscillator, antenna, spare tubes, batteries, and operating instructions.

The decoy package itself is essentially a small, entirely self-contained radio transmitter. The radio wave which it transmits is a continuous unmodulated signal and therefore cannot be received on Bureau automobile receivers or similar equipment without the use of the auxiliary oscillator which is furnished as part of the accompanying kit.

In operation, the properly wrapped decoy package is deposited according to instructions. The car receiver, in conjunction with the beat oscillator, picks up the signal which is heard as a constant "beat" note or squeal in the receiver. The approach of a person or animal within 6 to 12 inches of the decoy will result in a marked change of pitch of the beat note and contact with the decoy will cause the note to disappear completely. The disappeaance of signal indicates that the decoy has been touched or picked up.

Satisfactory operation of the decoy and oscillator unit over a radius of approximately .4 to .6 mile has been secured in practical operating conditions using standard Bureau automobile receivers. Large buildings and operation in congested downtown areas will necessairly decrease the operating radius.

9E. RADIO TRANSMITTERS AND RECEIVERS

The Bureau has available several types of radio transmitters for investigative use. The small briefcase transmitters, six of which are available, are useful from the disguise standpoint and are capable of transmitting over a radius of several blocks in downtown areas. For greater coverage, a higher powered portable unit capable of operation from 110-volt a.c. or 6-volt d.c. sources is available. Two high power transmitting stations disguised in trucks are also available, giving a greater coverage and greater flexibility of operation. All of the above-mentioned equipment is so designed as to be able to transmit