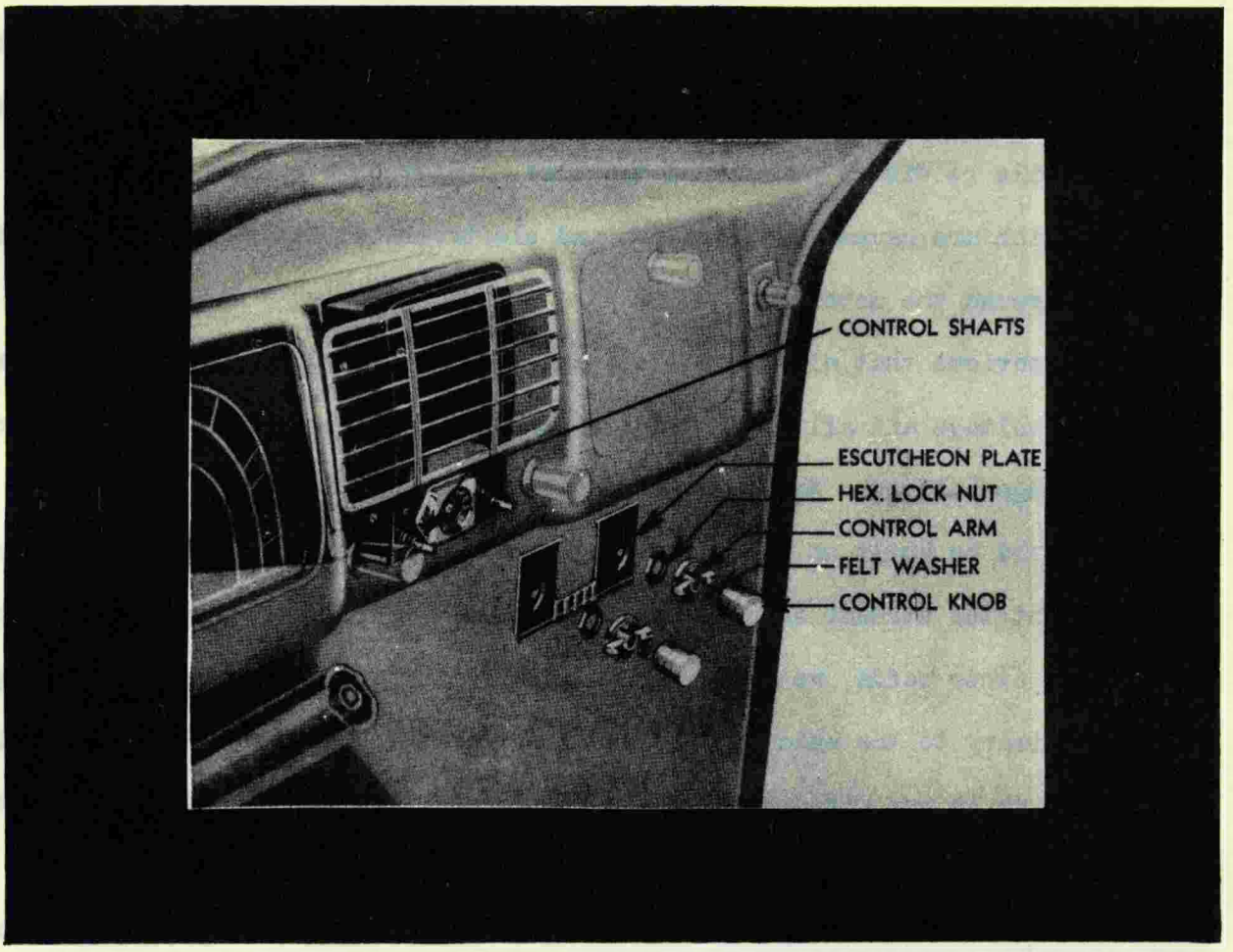


LESSON
47 R

AUTOMOBILE RECEIVERS

RADIO-TELEVISION TRAINING SCHOOL, INC. ★ LOS ANGELES ★ ESTABLISHED 1922

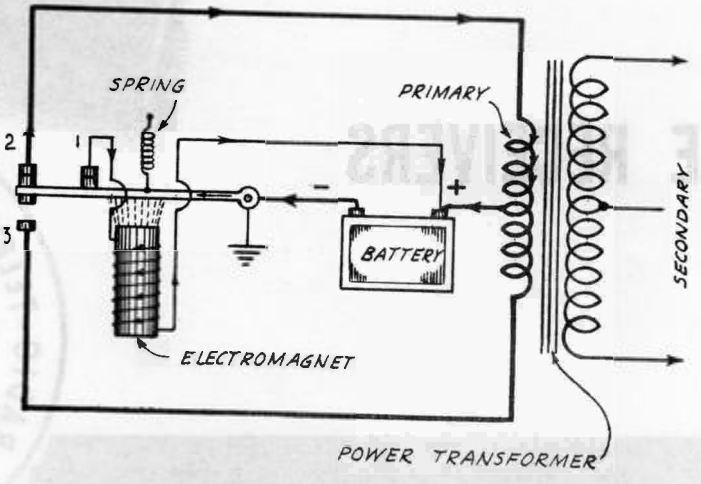
RADIO-TELEVISION TRAINING SCHOOL, INC.
5100 SOUTH VERMONT AVENUE • LOS ANGELES 37, CALIFORNIA, U. S. A.

AUTOMOBILE RECEIVERS

The radio receiver is considered standard equipment in all automobiles at the present time. The ills that effect the common household radio also effect the automobile receiver, plus added troubles. Automobile radios develope troubles which are caused by vibration and electrostatic fields, which are built up in and around the motor.

It is obvious that all the voltage and current needed to supply the plate and screen voltage and all the biasing voltages can not be had from an ordinary 6-volt storage battery. Ways and means had to be devised through which these voltages could be built up to operate the receiver effectively and efficiently. At this point the student should have learned that a transformer is an AC operated device. In other words, we have to have a pulsating voltage to transfer energy from the primary to the secondary of the transformer. Therefore, an automobile receiver which is run directly from a battery supplying DC voltage cannot operate a transformer to build up the voltage needed. The device used is known as a vibrator. There are two types of vibrators: one called the synchronous, and one called the non-synchronous vibrator.

VIBRATORS



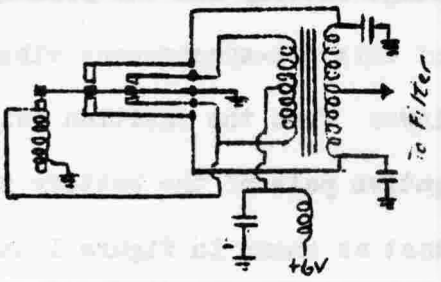
THE NON-SYNCHRONOUS VIBRATOR

The non-synchronous vibrator as used with a storage battery of an automobile is connected in series with the storage battery and the primary winding of the power transformer. The operation of this non-synchronous vibrator according to the electron flow should be as follows: When the ignition switch is turned on, current begins to flow from the negative pole of the battery to the armature, which is suspended between the contact as shown in figure 1 and 2 in the diagram of the vibrator. Current will flow to contact 1 and 2 and at the same time through the electro-magnet. At the same time there will be an electron flow through contact 2 and the upper half of the primary of the back transformer will be energized. This in turn will energize the secondary of the transformer and in turn will energize the receiver. As the electro-magnetic core becomes sufficiently magnetized, it will break the contact for 1 and 2, because of the fact that its magnetism will pull the armature down. This will make the armature have contact at point 3, and at the same time short the electro-magnet used and the operation begins all over again. When the armature makes contact at No. 3 this will energize the bottom half of the primary of the transformer, and in turn will transfer energy to the bottom half of the secondary of the transformer, and this will again allow the current to flow to each component part. In other words these pulsations that take place which occur through the making and breaking of contact through the armature have an AC component, or it chops the DC up to have the same component. It is true that the plates of the tubes will not operate on AC, but must have a steady DC pressure upon them. This is provided through the use of a rectifier tube. The filter system attached to the rectifier tube operates the same as it does in any other radio circuit.

THE SYNCHRONOUS VIBRATOR

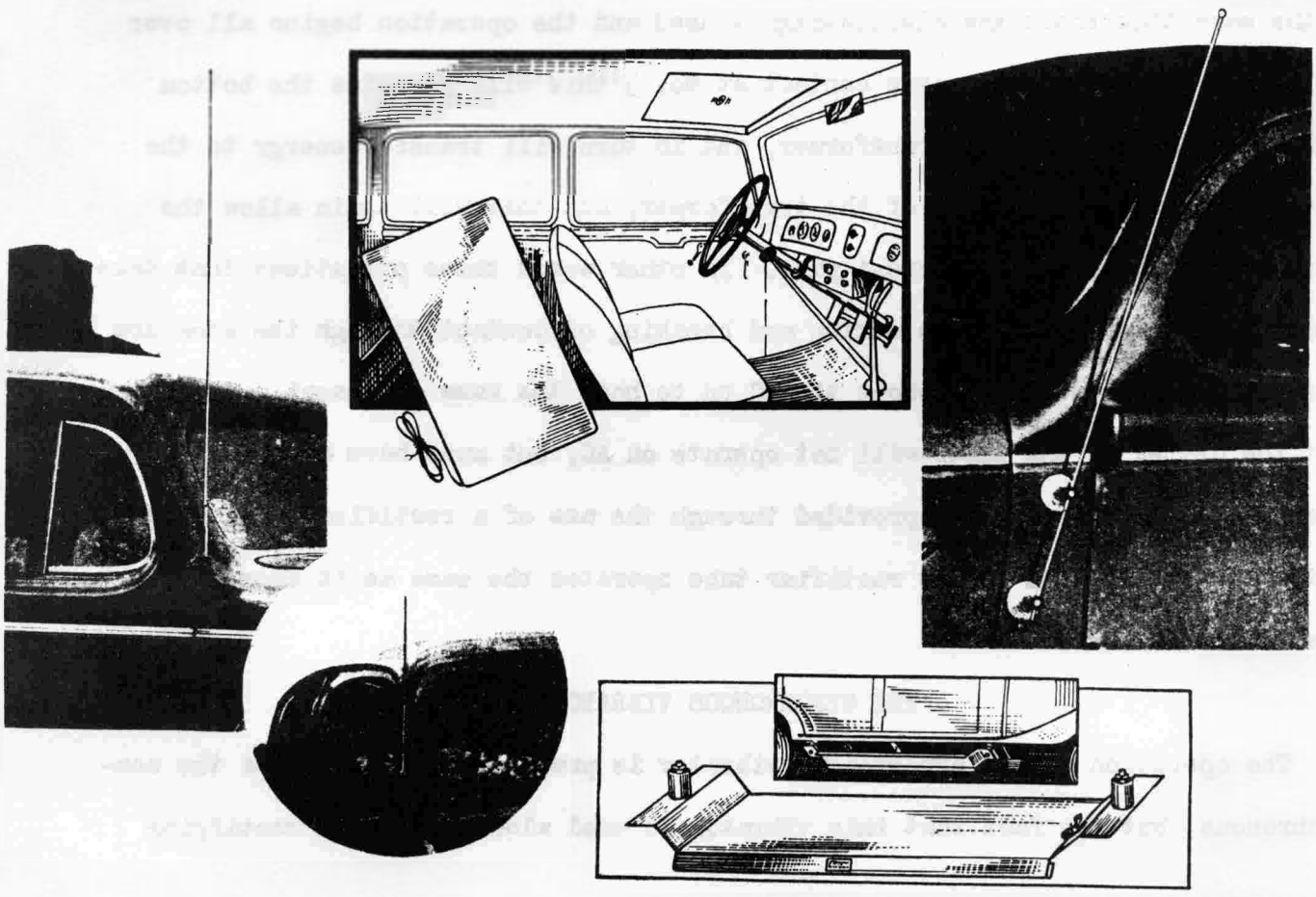
The operation of the synchronous vibrator is practically the same as the non-synchronous, but the fact that this vibrator is used alone without a rectifying

tube. This vibrator has the advantage of chopping up the DC into an AC component and giving the effect of the full-wave rectifier by itself.



Special attention must be taken in the installation of vibrator systems, because when the armature of the vibrator makes contact there is a heavy surge of current. Buffer condensers should be used both in the primary and secondary winding of the transformer to prevent sparking, and to prevent hum and noise. Also RF chokes are used to prevent the RF from returning to the battery and also used to prevent burning out the vibrator, that is, its contacts.

AUTOMOBILE ANTENNAS



The most important requirement of an automobile antenna is that it have good signal pick-up and not be directional in its response. Because if it were directional it would only have a tendancy to pick-up signals coming from certain directions while it may not pick-up signals coming from any other. There are different types of antennas used in automobiles, because an antenna placed in an automobile is limited to its height, and they must be shielded from the metal parts of the cars body and must have the requirements of a fixed house antenna. Automobile radio antennas are mounted under the car between the axles or under the running board, outside the car, or on the roof, or on the back. Automobile receivers are generally built only to receive on the broadcast band and are made very sensitive to simplify pick-up problems.

PHILCO RADIO

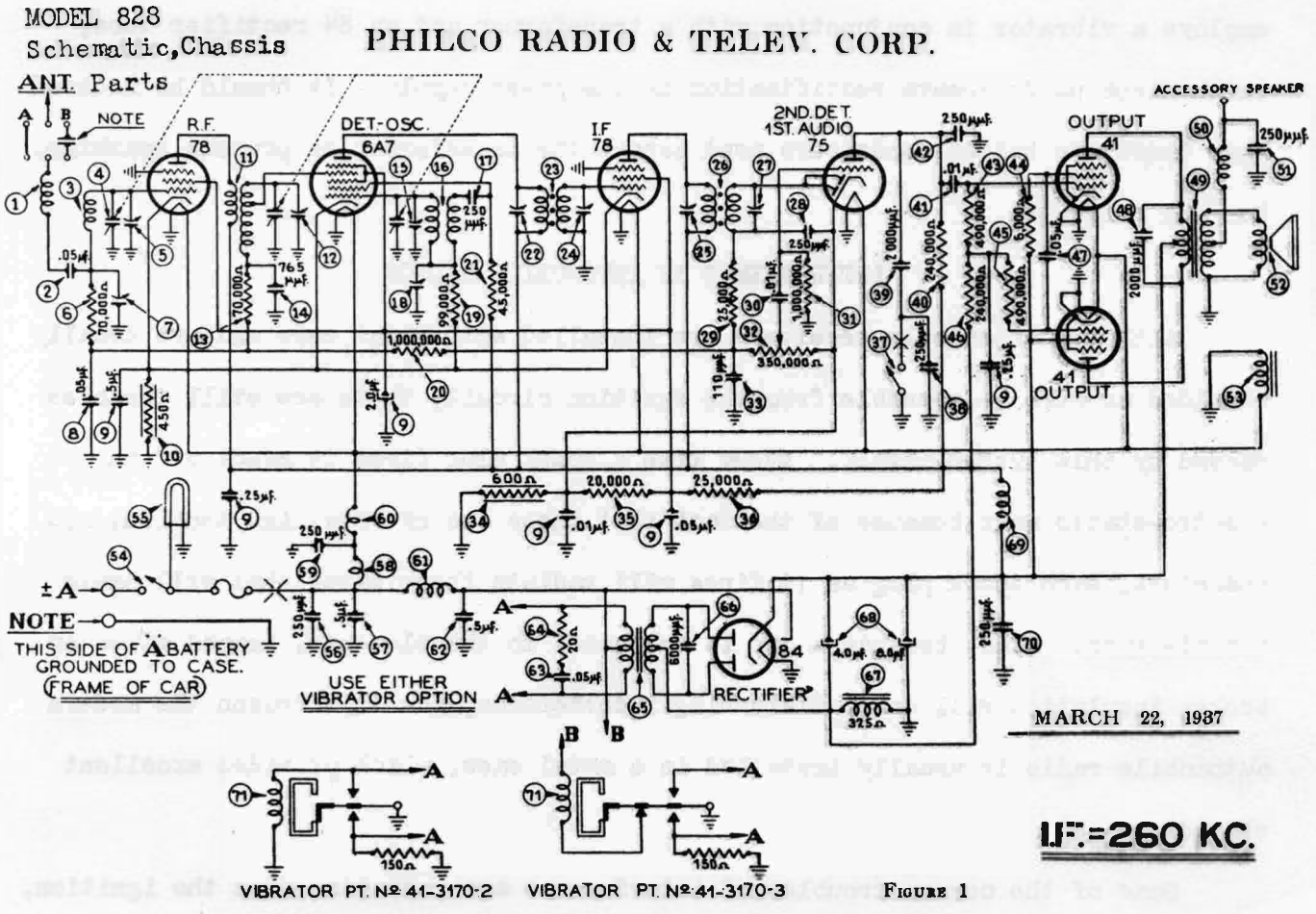


FIGURE 1

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Here is a typical automobile receiver using a vibrator in its power supply. You will notice that on this particular model is used an RF section which is a type 78 tube, and you will also notice all the different arrangements of the grounding of the suppressor grid of this tube. One some of the RF tubes you have studied, the suppressor grid is connected directly to the cathode internally in the tube, however, in this particular case, it is grounded externally. This RF tube is transformer coupled to the detector oscillator which is 6A7, coupled through a loose coupled IF transformer to another 78 tube, which is the IF amplifier, and again the student should take notice that the RF and IF tubes are the same. The 78 tube is transformer coupled through the IF output, which is close coupled to the second detector, (a dudiode triode), from which also the automatic volume control is taken off, and lastly, we have two number 41 outputs pentode connected in cascade to the loud speaker transformer. The power supply employs a vibrator in conjunction with a transformer and an 84 rectifier tube, which gives us full-wave rectification in the power supply. It should be noticed that there are buffer condensers used across the transformer to prevent sparking, hum and noise.

INTERFERENCE IN AUTOMOBILE RADIOS

Although automobile receivers are installed with great care and are usually shielded as much as possible from the ignition circuit, there are still troubles caused by this system itself. Every time a spark plug fires it sends off an electro-static wave because of the fact that these are of very high tension, and therefore, each spark plug as it fires will radiate these waves that will cause interference. Also, because a car is subjected to the elements, frayed wires or broken insulation will cause disturbing interference, for this reason the modern automobile radio is usually installed in a metal case, which provides excellent shielding.

Some of the common troubles of interference are radiation from the ignition,

wheel and tire static, and outside sources such as; power lines, radiation from the spark plug cables, and sparking at the horn will cause a great deal of interference, also the light wiring and windshield wiper. A fan or a heater will also cause a great deal of interference. Wheel static caused by loose break lining rivets contacting the brake drum can be recognized by an intermitting rasping and clicking noise in the receiver. For the suppression of ignition interference in automobile radio sets we do the following:

1. Apply suppressors to spark plugs and distributor, and condenser to generator.
2. Re-route primary wire from coil to distributor, keeping it as far as possible away from high tension wire.
3. Connect Dome Lite Filter to dome light wire at point where it enters front corner post.
4. Shield high tension wire if coil is mounted on instrument panel.
5. Shield antenna lead-in wire from radio set to top of front corner post. Ground shield at both ends.
6. Shield primary wire from coil to distributor.
7. Connect a .002 to .006 high grade mica condenser directly across the primary breaker points of the distributor.
8. Bond the upper metal parts of the car body to one another and return a heavy copper bond from these points down to the bulkhead of the car. (This is usually necessary in cars using composite wood and metal body construction).
9. Bond where necessary all control rods and pipes passing through the bulkhead.
10. Shield head of coil when mounted on instrument panel.
11. Cover floor boards of car with copper screening.
12. Adjust spark plug points to approximately .028 of an inch.
13. Clean and adjust primary distributor breaking points.
14. In cars having rubber motor mountings connect heavy bond from grounded side of battery directly to frame of car.
15. Connect a 150 to 1-mfd. condenser from hot primary side of ignition coil to ground.
16. If ignition coil is mounted on driver's side of bulkhead move it to the motor compartment side using the same holes for mounting.

17. Clean ignition system wiring. Clean and brighten all connections. Replace any high tension wiring having imperfect insulation.

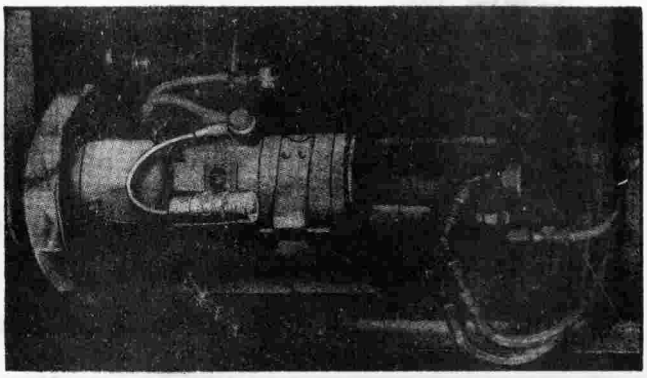
18. Ground metal sun visor and rain trough if necessary.

19. Make sure hood of car is well grounded. Clean hold-down hasps on both sides.

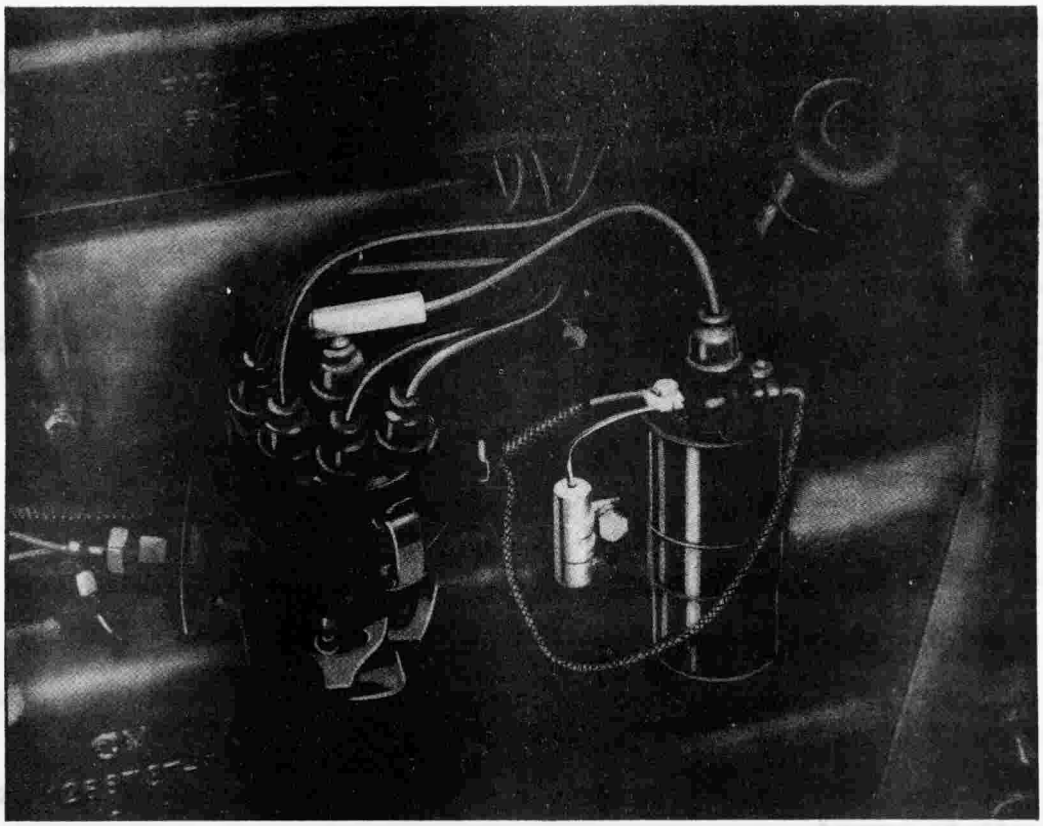
20. Ground instrument panel and steering column to bulkhead.

21. When under-car aerial is used connect a .50-mfd. condenser to tail and spot light wires.

STATIC COLLECTOR INSTALLED IN FRONT WHEEL DUST CAP



CONDENSER MOUNTED ON GENERATOR



COIL CONDENSER AND DISTRIBUTOR SUPPRESSOR INSTALLATION