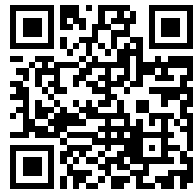

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TM 11-5009

DEPARTMENT TECHNICAL MANUAL

TUNING EQUIPMENT

IE-37



DEPARTMENT

JULY 1947



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TM 11-5009

WAR DEPARTMENT TECHNICAL MANUAL

TUNING EQUIPMENT

IE-37



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WAR DEPARTMENT TECHNICAL MANUAL
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TUNING
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WAR DEPARTMENT

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JULY 1947

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WAR DEPARTMENT

Washington 25, D. C., 17 July 1947

TM 11-5009, Tuning Equipment IE-37, is published for the information and guidance of all concerned.

[AG 300.7 (5 Jun 47)]

BY ORDER OF THE SECRETARY OF WAR:

OFFICIAL:

EDWARD F. WITSELL

Major General

The Adjutant General

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For explanation of distribution formula, see TM 38-405.

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DESTRUCTION NOTICE

WHY— To prevent the enemy from using or salvaging this equipment for his benefit.

WHEN— When ordered by your commander.

- HOW—**
1. Smash—Use sledges, axes, handaxes, pickaxes, hammers, crowbars, heavy tools.
 2. Cut—Use axes, handaxes, machetes.
 3. Burn—Use gasoline, kerosene, oil, flame throwers, incendiary grenades.
 4. Explosives—Use firearms, grenades, TNT.
 5. Disposal—Bury in slit trenches, fox holes, other holes. Throw in streams. Scatter.

USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT

- WHAT—**
1. Smash—Case CH-312 and Adapter M-416 and all small parts of Tuning Equipment IE-37.
 2. Cut—Wires, phone cords, rubber gaskets.
 3. Burn—Terminal boards, Bag BG-197, and technical manuals.
 4. Bend—Case CH-312.
 5. Bury or scatter—All of the above materials after destroying.

DESTROY EVERYTHING



HEADSET HS-32



SPRING CLAMP



ATTENUATOR M-415



SCREWDRIVER



TECHNICAL MANUAL TM-5009



ADAPTER M-416



CASE CH-312



CANVAS BAG BG-197

Figure 1. Tuning Equipment II-37.

PART ONE

INTRODUCTION

Section I. DESCRIPTION OF TUNING EQUIPMENT IE-37

1. General

Tuning Equipment IE-37 is provided for the use of lower echelon maintenance personnel in tuning Radio Set SCR-536-(*). This meterless tuning equipment is used to align the receiver and transmitter circuits of the radio set. Pin jacks are provided so that voltage measurements of internally contained batteries can be made under load conditions.

Note. Official nomenclature followed by (*) is used to indicate all models of the radio set included in this technical manual. Thus, Radio Set SCR-536-(*) refers to Radio Sets SCR-536-A, B, C, D, E, and F. Radio Receiver and Transmitter BC-611-(*) is a component of Radio Set SCR-536-(*).

2. Application

Tuning Equipment IE-37 (fig. 1) provides all the necessary facilities for the peaking of Radio Set SCR-536-(*) when the set is detuned. The tuning equipment also provides complete facilities, with the exception of coils and crystals for allocated frequency channels, for the tuning of the receiver and transmitter circuits of Radio Set SCR-536-(*) during the process of frequency channel changing (presetting). This equipment also duplicates all the functions of Test Equipment IE-17-A, B, C, D, E, and F, except for the measurement of the receiver and transmitter crystal activity and measurement of the radio set radio-frequency (r-f) output. For information on Test Equipment IE-17-(), see TM 11-311 and TM 11-235.

3. Technical Characteristics

a. Tuning Equipment IE-37 is used in conjunction with two Radio Sets SCR-536-(*), each equipped with coils and crystals of the same frequency. During the tuning operation, Case CH-312 temporarily replaces the housing of the radio set being peaked or preset. Hereafter, the set to be tuned will be referred to as *set A*. The Radio Set SCR-536-(*) used as a signal test source and receiver of test signals will be referred to as *set B*.

b. Adapter M-416 (part of Tuning Equipment IE-37) replaces the bottom cover of the second radio set being used as a signal test source and receiver of test signals (*set B*).

c. Case CH-312 and Adapter M-416 both have feedback capacitors which cause the radio sets to provide a modulated signal output from the

radio set being used as a transmitter during peaking or presetting operations.

d. Attenuation of the signal output from the radio set being used as a test transmitter during tuning operations is provided by attaching Attenuator M-415 to the above set and adjusting the length of the antenna.

4. Table of Components

Quantity	Component	Dimensions (inches)				Weight (lb.)	Volume (cu. ft.)
		Height	Width	Depth	Length		
1	Adapter M-416	1.5	3.375	4.00		0.4	0.012
1	Attenuator M-415		0.875		6.00	0.1	0.01
1	Bag BG-197	14.0	6.00	5.5		1.5	0.28
1	Case CH-312	13.5	3.0	4.50		2.00	0.15
1	Headset HS-32	1.25	3.50	3.25		0.25	0.01
1	Screwdriver		0.625	0.625	5.50	0.07	
1	Spring clamp	0.625	3.375	3.375		0.07	
2	Technical manuals		5.5		8.5		

Note. This list is for general information only. See the appropriate publications for information pertaining to the requisition of spare parts.

All components of Tuning Equipment IE-37 are contained in a canvas carrying Bag BG-197 which is supplied with a shoulder strap (fig. 1). All components, with the exception of Case CH-312, are stored in the pocket on the front portion of Bag BG-197.

a. CASE CH-312. Case CH-312 is dimensionally similar to the housing of Radio Set SCR-536-F and has holes providing access to tuning and alinement controls. The bottom cover is provided with two pin jacks marked A+ and B+ for measuring the battery voltages under load conditions. In addition, there is a phone jack for inserting Plug PL-55 of Headset HS-32.

b. ADAPTER M-416. Adapter M-416 is similar to the bottom cover of Case CH-312 except that the hinge ears are replaced with a metal clip, allowing the adapter to substitute temporarily for the regular bottom cover of a Radio Set SCR-536-(*) during test conditions. A small mica capacitor (22 micromicrofarad (mmf)) is connected between the microphone and receiver contact springs on the adapter. In the receive position of the press-to-talk switch, the capacitor shunts the primary of the receiver matching transformer and has negligible effect upon the audio frequencies of the signal being received. In the transmit position of the press-to-talk switch, the capacitor bypasses sufficient audio voltage from the output of the radio set modulator circuits to the input of the microphone amplifier to initiate and sustain oscillation at an audio frequency determined by the constants of the microphone amplifier circuit.

c. **ATTENUATOR M-415.** Attenuator M-415 is a short metal cylinder threaded at both ends. It is screwed to the threaded boss at the base of the antenna of set B to attenuate the signals received from and sent to set A from set B.

d. **HEADSET HS-32.** Headset HS-32 is provided to monitor the signal being received during the peaking and pretuning operation.

e. **SPRING CLAMP.** A metal spring clamp is provided to hold the press-to-talk switch of the radio set used as the test transmitter in the transmit position during tuning operations.

f. **TUNING ADJUSTMENT TOOLS.** A double-ended insulated screwdriver is included for making tuning adjustments.

5. Packaging Data

Tuning Equipment IE-37 when packed for domestic shipment (fig. 2) uses the container-barrier-container method of packing. The components of Tuning Equipment IE-37 are placed in the large compartment of Bag BG-197 with the carrying strap looped around the bottom of the bag and drawn tight. A bag of desiccant is placed in the small compartment of

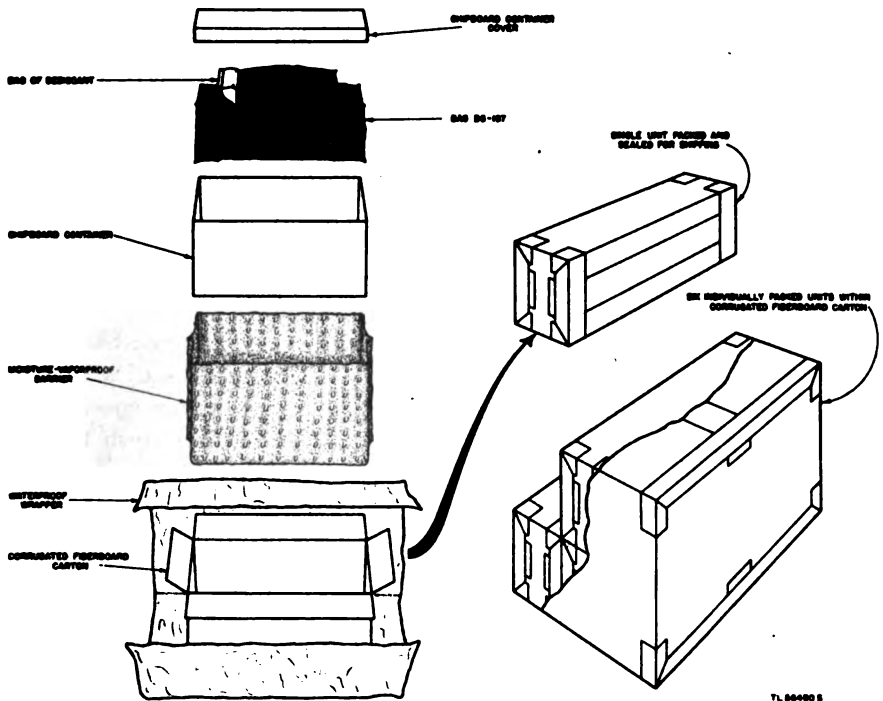


Figure 2. Domestic packaging of Tuning Equipment IE-37

Bag BG-197. The carrying bag is placed in a chipboard container which is protected by the successive layers of a moisture-vaporproof barrier, a corrugated fiberboard carton, and a waterproof wrapper. For domestic shipment, six of the individually packed units are placed in a sealed corrugated carton.

Section II. INSTALLATION AND ASSEMBLY OF TUNING EQUIPMENT IE-37

6. Unpacking and Checking

Be careful when unpacking the equipment. Avoid damaging the packing materials so that they can be used to repack the equipment when necessary. In unpacking the equipment, proceed according to the following steps:

- a. Open the outer carton.
- b. Remove the moistureproof protective covering.
- c. Open the inner carton and remove the equipment. Be careful not to damage the equipment when opening the inner carton.
- d. Visually inspect Tuning Equipment IE-37 for damage to components. Before placing the equipment in service, check the contacts on Adapter M-416 and on the bottom cover of Case CH-312. If it is necessary, clean the contacts.

7. Installation

Remove the batteries and chassis of the two Radio Receivers and Transmitters BC-611-(*) from their housings. Check the crystals, tank coils, and the antenna coils to see that both sets are equipped to operate on the same frequency channel. Both sets *must* be on the same channel. Unfasten the bottom cover of Case CH-312 and insert the chassis of set A. *Do not remove the plate current meter jumper.* Fasten the top cover of Case CH-312 in place using the knurled thumbscrew. Insert fresh Batteries BA-37 and BA-38 into the proper compartments of Case CH-312 and fasten the bottom cover by means of the fastening bolt. Replace set B in its own housing. Do not insert the microphone and earphone banana plugs into the receptacles. Push these plugs down into the space between the battery spacer and the set housing (except on Radio Set SCR-536-F). *Do not remove the plate current meter jumper.* Fasten the top cover and replace the batteries. Swing the bottom cover up and out of the way, and clip on Adapter M-416 in place of the bottom cover. Secure the adapter in place by latching the swivel bolt. Using the method described in paragraph 32, test the batteries of set B. If the batteries do not check up to

the load voltage specified, replace with new batteries. Check the press-to-talk switch of both Case CH-312 (set A) and set B for smooth operation.

8. Removal from Service

When the tuning equipment is not in service, be sure that there are no batteries left in Case CH-312. Store all components in Bag BG-197. When the equipment is to be stored, repack it in the original carton or in a suitable substitute. Seal the carton or container to keep out dust and excessive moisture.

PART TWO

OPERATING INSTRUCTIONS

Note. For information on destroying the equipment to prevent enemy use, see the destruction notice at the front of this manual.

Section III. CONTROLS AND THEIR USE

9. Controls and Their Use

Case CH-312 (fig. 3), into which the radio set to be adjusted is inserted, has holes which afford access to the various controls of the radio set. The holes are clearly labeled, indicating the function of the particular control lying immediately below the opening.

Section IV. OPERATION

10. Preparation for Tuning of Receiver Circuits (Fig. 4)

a. Insert Plug PL-55 of Headset HS-32 into the PHONE jack of Case CH-312 (set A).

b. Extend the antenna of set A to full length and leave it fully extended throughout the entire tuning operation.

c. Screw the antenna cover of set B on the mounting stud. Extend the lower section of the antenna of set B about 6 inches; then slide Attenuator M-415 over the antenna and screw it in place.

d. Hold the press-to-talk switch of set B depressed (transmit condition) and slip the spring clamp in place over the switch. The spring clamp will keep the press-to-talk switch in the transmit position.

e. Put on the headset and listen for a signal from set B. The modulated tone produced by different sets used as a signal source may vary considerably in pitch; this difference in tone has no effect upon the alignment adjustments. If no signal is heard, decrease the distance between the sets or extend the antenna of set B to its full length until a signal is heard. This may be necessary if set A is very badly misaligned. Once a signal is heard, reduce the length of the antenna of set B and increase the separation of the two sets until the signal is at its lowest audible level. The final tuning adjustments should be made with the sets separated approximately 3 feet and the antenna of set B extended only the required length necessary to operate the on-off switch to the on position.

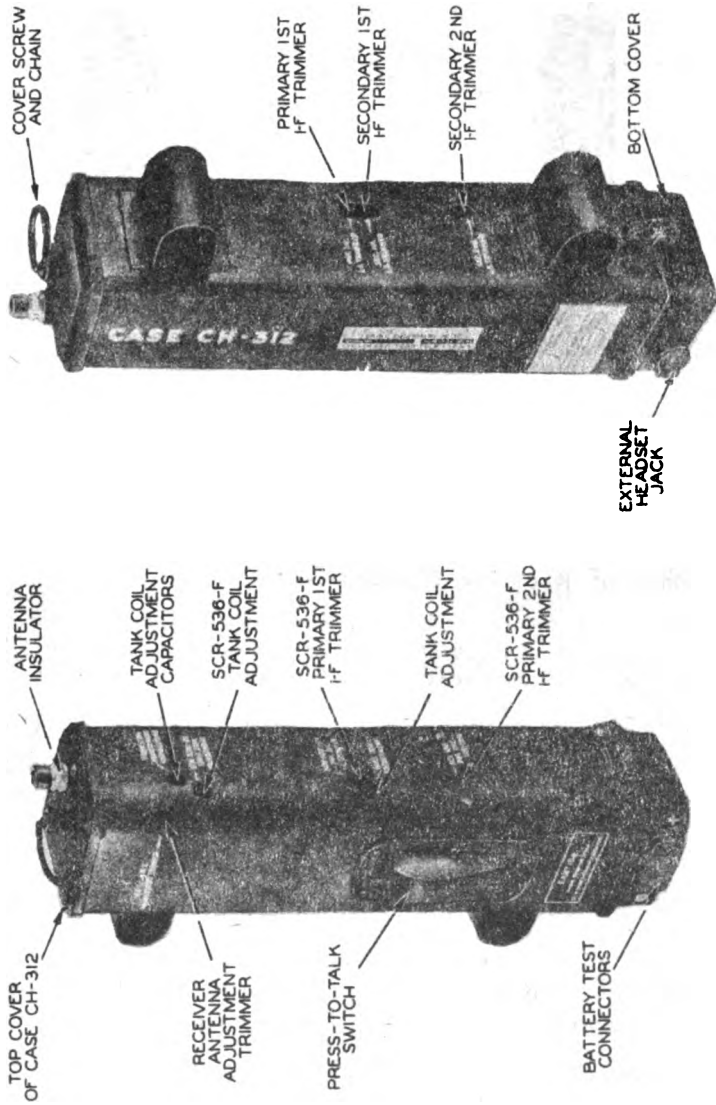


Figure 3. Case CH-312.

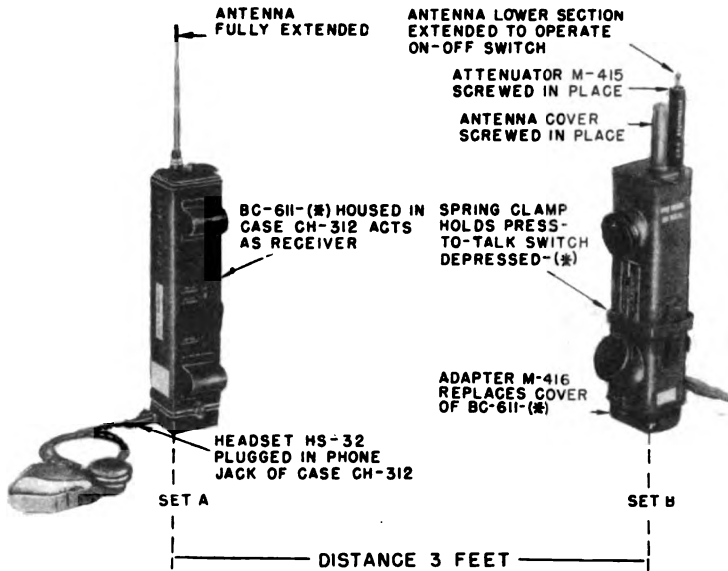


Figure 4. Preparation for tuning of receiver circuits.

II. Tuning of Receiver Circuits

Note. It is not necessary to align the intermediate-frequency (i-f) transformers each time Radio Set SCR-536-(*) is preset to a different frequency. If the i-f stages are peaked, only the receiver antenna adjustment needs tuning.

All adjustment positions are labeled on Case CH-312 (fig. 3). Using the narrow blade of the double-ended screwdriver, make the adjustments in the order listed below. Tune for maximum signal on each adjustment as heard in the headset. Reduce the signal strength by shortening the antenna of set B as required.

- a. Adjust the SEC. 2ND I. F. TRIMMER (secondary of 2d i-f transformer).
- b. Adjust the SCR-536-(F) PRI. 2ND I. F. TRIMMER (primary of 2d i-f transformer of Radio Set SCR-536-F only).
- c. Peak the SEC. 1ST I. F. TRIMMER (secondary of 1st i-f transformer).
- d. Peak the PRI. 1ST I. F. TRIMMER (primary of 1st i-f transformer).
- e. Peak the SCR-536-(F) PRI. 1ST I. F. TRIMMER (primary of 1st i-f transformer in SCR-536-F only).

f. Repeat the procedure of steps *a*, *b*, *c*, *d*, and *e* above in order to secure maximum output.

g. Grasp the case with one hand and adjust the REC. ANT. ADJUSTMENT TRIMMER (receiver antenna adjustment trimmer) for maximum signal in the headset.

Caution: Be careful not to force the screw by turning it too far or the threads may be stripped. This is a broad adjustment.

If a maximum signal output is not reached between the limits of the screw adjustment, replace the antenna coil. Be sure that the r-f signal from set B is not overloading the receiver of set A.

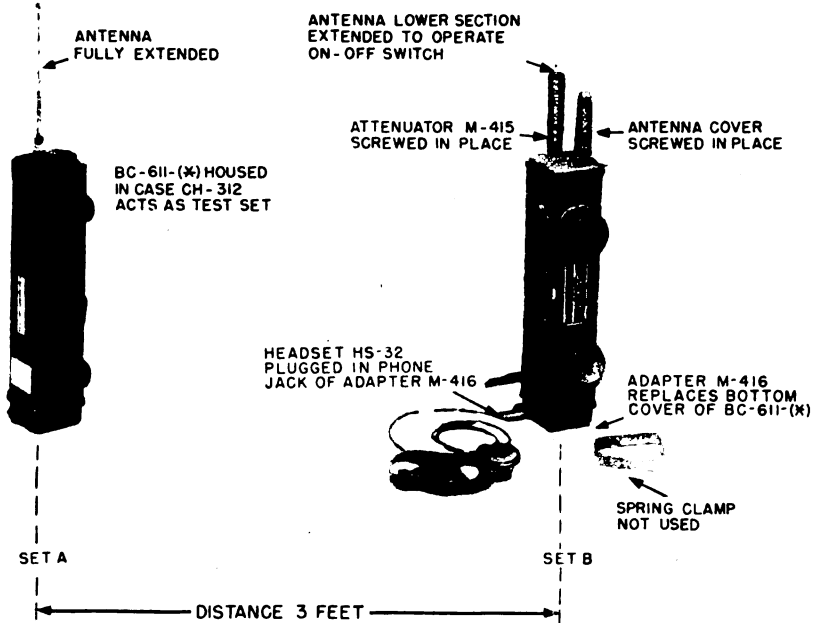


Figure 5. Preparation for tuning of transmitter circuits.

12. Tuning of Transmitter Circuits (Fig. 5)

a. Remove Plug PL-55 of the headset from set A and insert it into the PHONE jack on Adapter M-416 of set B.

b. Leave the antenna of set A fully extended.

c. Remove the spring clamp from the press-to-talk switch of set B. The clamp is not to be used during the transmitter alinement.

d. Hold the press-to-talk switch of set A in the transmit position (switch depressed) and slip the spring clamp in place over the switch. Put on the headset. A signal from set A should be heard. If no signal is heard, as in the case of a badly misaligned set, either move the sets closer

together or extend the antenna of set B so that a signal can be heard. In any event, tuning adjustments should be made with a minimum of signal.

e. Depress the press-to-talk switch and adjust the set A TANK COIL ADJUSTMENT CAPACITORS (for Radio Set SCR-536-A, B, C, D, and E models), or the set A SCR-536-F TANK COIL ADJUSTMENT (for Radio Set SCR-536-F model only) for maximum signal in the headset.

Caution: Be careful not to force or turn this adjustment too far; the screw is bakelite, and the threads may be stripped easily.

f. Set A is now completely aligned. Remove the set from Case CH-312 and place it in its own housing.

Note. Upon completion of the tuning operation, replace all components of Tuning Equipment IE-37 in the canvas carrying Bag BG-197. Never leave batteries in Case CH-312 when the equipment is not in use.

PART THREE

MAINTENANCE INSTRUCTIONS

Section V. PREVENTIVE MAINTENANCE TECHNIQUES

13. Meaning and Importance of Preventive Maintenance

a. Preventive maintenance (PM) means making systematic checks and adjustments at regular intervals to keep the equipment operating at top efficiency. It is not the same as trouble shooting and repair. The purpose of PM is to *prevent* break-downs and, therefore, the need for repair. On the other hand, the purpose of trouble shooting and repair is to locate and *correct existing defects*.

b. The importance of PM cannot be overemphasized. Failure and inefficient operation of one piece of equipment may cause the failure of the entire tuning equipment. Therefore, keep the equipment in excellent operating condition at all times.

14. Description of Preventive Maintenance Techniques

a. GENERAL. (1) Many of the parts used in Tuning Equipment IE-37 require routine PM in addition to careful handling, which is normally accorded even the most rugged radio equipment. Hit-or-miss maintenance techniques cannot be used. This section of the manual gives specific instructions and serves as a guide for maintenance personnel. The standard lettering system for the six basic operations is as follows:

F—Feel.*
I—Inspect.
T—Tighten.
C—Clean.
A—Adjust.
L—Lubricate.*

(2) The Feel and Inspect operations show whether any further work is needed. The kind of maintenance necessary is determined by field conditions. For example, transportation of the equipment from one operating site to another subjects it to rough handling, dust accumulation, and possible corrosion of exposed surfaces and parts due to changes in humidity and climate. Without frequent inspections and the necessary tightening

* The Feel and Lubricate operations do not apply to Tuning Equipment IE-37.

and cleaning operations, equipment will not be dependable and may break down when it is most needed.

b. INSPECT. Careful inspection of the equipment for evidences of minor troubles and the correction of these troubles will prevent major break-downs. Become thoroughly familiar with the normal appearance and functioning of the equipment. Inspect it for the following conditions:

(1) Bulging or leaking batteries which may lead to corrosion of Case CH-312; and oxidation of metal contact surfaces.

(2) Improper placement of microphone and earphone plugs; they should be placed in the space between the battery spacer and the set housing.

(3) Lack of cleanliness; see that recesses of Case CH-312 and Adapter M-416 are free of accumulations of dirt and excessive moisture, especially between connecting terminals, and that there are no signs of fungus growth or mildew.

(4) Looseness, by testing any connection or mounting which appears to be loose.

c. TIGHTEN, CLEAN, AND ADJUST. These operations are self-explanatory. Specific procedures to be followed in performing them are given in paragraphs 16 through 21.

Caution: Screws, nuts, and bolts should not be tightened carelessly. Fittings tightened beyond the pressure for which they were designed will be damaged or broken. Whenever a loose connection is tightened, apply moistureproofing and fungiproofing varnish again with a small brush (sec. VIII).

Section VI. ITEMIZED PREVENTIVE MAINTENANCE

15. Preventive Maintenance Tools and Materials

The following tools and materials will be needed in performing preventive maintenance:

Knife TL-29

No. 0000 sandpaper

Crocus cloth

Clean lint-free cloth

Toothbrush

SOLVENT, Dry Cleaning (SD)

Note. Gasoline will not be used as a cleaning fluid for any purpose. Solvent (SD) is available as a cleaning fluid through established supply channels.

16. Item 1, Adapter M-416

a. INSPECT. (1) Check the adapter for dirt, scratches, dents, or other damage, internally, externally, and under the jack covers.

(2) Check the jack covers for correct operation and seating.

(3) Check the jacks to see that they are clean and undamaged.

(4) Look for breakage or damage to the mounting clip and the bolt ears.

(5) Check the contacts in the internal portion of the adapter to insure that they are bright and clean, and that the spring contacts are in working order.

(6) Make sure that the moistureproofing and fungiproofing treatment is intact and that moisture or microscopic plant life is not present.

b. TIGHTEN. (1) Carefully tighten any loose screws.

(2) If the moisture seal gaskets have become loose, reseal them with Permatex (Permatex, Aviation Type, Signal Corps stock No. 6G1514).

c. CLEAN. (1) Remove any caked mud with a small brush. Remove any grease or oil with solvent (SD).

(2) Wipe the phenolic board clean.

17. Item 2, Attenuator M-415

a. INSPECT. Internally and externally, check the attenuator for dirt, scratches, dents, crossed threads, or other damage.

b. CLEAN. Remove any caked mud with a small brush. Remove any grease or oil with solvent (SD).

18. Item 3, Bag BG-197

a. INSPECT. (1) Externally, check the bag for dirt, tears, open seams or other damage; internally, check the large pouch and the pocket for the same items.

(2) Make sure that the bag and strap are dry and that microscopic plant life is not present.

(3) Check the snap fasteners and the loops.

(4) Check the carrying strap for broken stitching and for damage.

(5) Check the snaps.

b. CLEAN. Remove caked mud by brushing or rubbing. Remove any grease or oil with solvent (SD).

19. Item 4, Case CH-312

a. INSPECT. (1) Check the case housing, the bottom cover, and the top cover, both internally and externally, for dirt, scratches, dents, or other damage.

(2) Check the internal chassis guides to see that they are unobstructed.

(3) Check the press-to-talk switch for signs of looseness.

(4) Look for breaks or weaknesses in the switch cover.

(5) Check the contacts in the internal portion of the bottom cover to insure that they are bright and clean, and that the spring contacts are in working order.

(6) Check the jacks to see that they are clean and undamaged, and that the covers seat correctly.

(7) Check the antenna insulator and see that it is clean internally and externally and that it is undamaged.

(8) Check the A battery guide; see that the contact is clean and that the guide is securely fastened to the top cover.

(9) Check the B battery spring for looseness.

(10) Check the cover screw and chain for looseness and damage.

(11) See that the top and bottom covers fit the housing properly.

(12) Make sure that the moistureproofing and fungiproofing treatment is intact and that moisture or microscopic life is not present.

b. TIGHTEN. (1) Carefully tighten any loose screws.

(2) If the moisture seal gaskets or the switch cover become loose, reseal them with Permatex.

c. CLEAN. (1) Remove any caked mud with a small brush. Remove any grease or oil with solvent (SD).

(2) Remove any corrosion or dullness from the contacts in the bottom cover.

(3) Wipe the phenolic board in the bottom cover clean.

20. Item 5, Headset HS-32

a. INSPECT. (1) Check for dirt, abrasion, or other damage to the receivers, head band, cord, and plug.

(2) Check the S-hook and clamp fastening the cord to the receiver.

(3) Check the plug and see that the contacting surfaces are clean and bright.

b. TIGHTEN. (1) Carefully tighten all loose screws.

(2) See that the plug cover and the receiver cover are tight.

c. CLEAN. Remove any caked mud with a small brush. Remove any grease or oil with solvent (SD).

21. Item 6, Screwdriver and Spring Clamp

a. INSPECT. (1) Check for dirt, scratches, dents, or other damage.

(2) Look for worn screwdriver blades.

b. CLEAN. Remove caked mud with a brush. Remove grease and oil with solvent (SD).

22. Preventive Maintenance Check List

The following check list is a summary of the preventive maintenance operations to be performed on Test Equipment IE-37. The time intervals shown on the check list may be reduced at any time by the local com-

mander. For best performance of the equipment, perform operations at least as frequently as called for in the check list. Operations are indicated by the letters of the word FITCAL. For example, if the letters ITCA appear in the *operations* column, the item to be treated must be inspected (I), tightened (T), cleaned (C), and adjusted (A).

Item No.	Operations	Item	When performed			
			Before operation	After operation	Monthly	Semi-annually
1.	ITC	Adapter M-416	X	X		
2	IC	Attenuator M-415	X	X		
3	IC	Bag BG-197	X	X		
4	ITC	Case CH-312	X	X		
5	ITC	Headset HS-32	X	X		
6	IC	Screwdriver and spring clamp	X	X		

Note. X denotes when operations are to be performed.

F	I	T	C	A	L
Feel*	Inspect	Tighten	Clean	Adjust	Lubricate*

* The Feel and Lubricate items do not apply to Tuning Equipment IE-37.

Section VII. LUBRICATION

23. Lubrication

Lubrication is not required in the maintenance of Tuning Equipment IE-37.

Section VIII. WEATHERPROOFING OF EQUIPMENT

24. General

a. When equipment is operated in highly humid climates, excessive failure of parts and decreased operating efficiency are usually caused by the accumulated effects of moisture, rather than by inferior parts. Rapid temperature changes accompanied by fog, rain, dew, or high humidity, promote such failures.

b. The effects of moisture on capacitors, terminal boards, and insulating strips can be recognized in the form of corrosion, low-insulation resistance, and flash-overs. Moisture also accelerates fungus growth which increases these effects.

c. Winterization and dustproofing are not required for Tuning Equipment IE-37.

25. Reducing Failures

a. A moistureproofing and fungiproofing treatment has been devised which, if properly applied, provides a reasonable degree of protection. The treatment consists of applying a film of moisture- and fungi-resistant varnish to all susceptible parts of the equipment. This film provides a nonwetting surface. Equipments which have been treated have been marked with the letters MFP and the date of treatment. Equipments not marked should be examined, and if treatment has not been applied, return the equipments to third or higher echelon units for treatment.

b. TB SIG 13 contains a detailed description of this treatment.

c. Re-treatment may be required after a period of use. Need for this re-treatment is indicated by excessive failures or by the effects listed in paragraph 24b.

26. Treating Tuning Equipment IE-37

Use the procedure outlined in TB SIG 13 to moistureproof and fungiproof Tuning Equipment IE-37.

27. Treating Equipment After Repairs

If the coating of protective varnish has been punctured or broken during repair and if complete treatment is not needed to reseal the equipment, brush-coat the affected part. Be sure the break is completely sealed.

PART FOUR
AUXILIARY EQUIPMENT

(Not used.)

PART FIVE

REPAIR INSTRUCTIONS

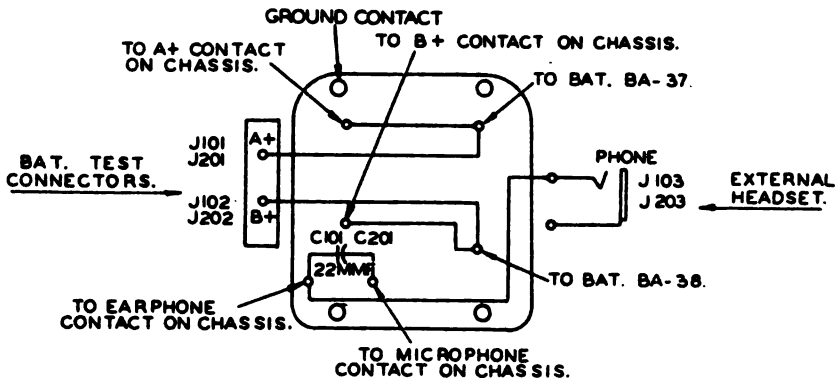
Section IX. TROUBLE-SHOOTING PROCEDURES

28. General

Tuning Equipment IE-37 is essentially a mechanical tool for the rapid alinement and presetting of Radio Receiver SCR-536-(*). The trouble-shooting procedure described in this section is limited to Tuning Equipment IE-37, and any radio set used with this equipment must be capable of operating satisfactorily when correctly tuned. For trouble shooting and repairs of Radio Set SCR-536-(*), see TM 11-235.

29. Trouble Shooting

Obtain two Radio Sets SCR-536-(*), known to be in perfect operating condition and with crystals and coils for operating on the same frequency channel. Test these two sets by operating them as described in paragraph 10 in two-way radio communication. If the sets fail to operate satisfactorily, remove the chassis of the set from Case CH-312, remove



—|— IS SYMBOL FOR FIXED CAPACITOR.
 MMF - MICRO-MICROFARADS.
 BAT. = BATTERY.
 CHASSIS REFERS TO RADIO RECEIVERS
 AND TRANSMITTERS BC-611(a).

VIEW FROM UNDERSIDE OF BOARD.
 WIRING FOR CASE CH-312 (100
 SERIES NUMBERS) AND ADAPTER
 M-416 (200 SERIES NUMBERS) IS
 IDENTICAL.

TL 56441S

Figure 6. Schematic diagram of bottom cover of Case CH-312 and Adapter M-416.

Adapter M-416 from the other radio set, and check the following:

- a. Test the circuit continuity of the bottom cover of Case CH-312 and of Adapter M-416 (fig. 6).
- b. Test for grounded circuits in the bottom cover of Case CH-312 and in Adapter M-416.
- c. Test Headset HS-32 for continuity and listen for a click when making or breaking contact.

30. Trouble Shooting, Starting Procedure Analysis

STEP 1. Prepare two Radio Sets SCR-536-(*) for use as described in paragraph 10.

NORMAL INDICATION: Modulation tone is heard in headset.

<i>Abnormal indication</i>	<i>Probable location of fault</i>
No sound in headset.	Defective phone jack in Case CH-312. Dirty spring and battery contacts in Case CH-312.
Receiver noise but no modulation tone in headset.	Defective feedback capacitor in Adapter M-416. Dirty spring and battery contacts in Adapter M-416. Bottom cover assembly not clamped securely.

STEP 2. Prepare two Radio Sets SCR-536-(*) for use as described in paragraph 12.

NORMAL INDICATION: Modulation tone is heard in headset.

<i>Abnormal indication</i>	<i>Probable location of fault</i>
No sound in headset.	Defective phone jack in Adapter M-416. Dirty spring and battery contacts in Adapter M-416.
Receiver noise but no modulation tone in headset.	Defective feedback capacitor in Case CH-312. Dirty spring and battery contacts in Case CH-312. Adapter M-416 not clamped securely.

Section X. BATTERY TESTING

31. Battery Testing, Using Case CH-312

The batteries of Radio Set SCR-536-(*), Battery BA-37 and Battery BA-38, are tested under load conditions with the set operating as a transmitter. A suitable voltmeter, capable of measuring 1.5 volts direct current (dc) and 70 to 105 volts dc, may be used to test the batteries.

- a. Insert a Radio Receiver and Transmitter BC-611-(*) chassis which is known to be in good operating condition in Case CH-312. Extend the antenna to full length.

b. Insert the batteries to be checked in Case CH-312. Latch the bottom cover and place the spring clamp over the press-to-talk switch.

c. Select a voltage range suitable for measurement of 1.5 volts dc and insert the positive voltmeter lead in the pin jack marked A+ (bottom cover of Case CH-312). Touch the negative voltmeter lead to the set case, selecting a point that will allow a good electrical contact (bottom cover hinge screw). Normal readings are between 1.35 and 1.50 volts dc for Battery BA-37. If the voltage is less than 1.25 volts, replace the battery.

d. Select a voltmeter range suitable for measurement of 70 to 105 volts dc. Insert the positive voltmeter lead in the pin jack marked B+. Touch the negative lead to the set case. Normal readings for Battery BA-38 are between 75 and 103.5 volts. If the voltage is below 70 volts, replace the battery.

Note. If it is necessary to replace either of the batteries in the radio set, replace both batteries at the same time. Batteries which are near the lower voltage limit may be used but they will reduce the over-all performance of the set.

32. Battery Testing, Using Adapter M-416

a. Open the bottom cover of a Radio Set SCR-536-(*) and swing it clear so that Adapter M-416 can be attached. Latch the adapter and hold the press-to-talk switch depressed using the spring clamp.

b. Follow the procedure described in paragraph 31c for testing Battery BA-37.

c. Follow the procedure of paragraph 31d for testing Battery BA-38. Observe the note at the close of paragraph 31.

Section XI. REPAIRS

33. Replacement of Press-to-talk Switch

a. Remove the six screws holding the escutcheon plate around the press-to-talk switch. (The same screws must be used when the plate is replaced because the wrong screws might block the guides and make it impossible to insert the chassis.)

b. Remove the rubber cover of the press-to-talk switch. This cover is cemented and must be carefully worked loose. Use a knife blade, taking care not to tear or cut the cover.

c. Separate the long and short levers which form the bridge and fold them back.

d. Remove the two screws holding the levers and remove the levers.

e. Replace the parts in reverse order.

f. Cement the rubber cover, using Permatex; replace the escutcheon, using the original screws.

g. Test the switch by inserting a Radio Receiver and Transmitter BC-611-(*) chassis.

34. Replacement of Terminal Board (Case CH-312 Bottom Cover or Adapter M-416)

- a.* Remove the spring contact stud.
- b.* Remove the three screws near the corners.
- c.* Clean the fungiproofing varnish from the soldered terminals of the three jacks.
- d.* Unsolder and disconnect the wires from the jacks.
- e.* Replace the parts and solder the connection.
- f.* Apply the moistureproofing and fungiproofing treatment outlined in paragraph 26 or 27, whichever is applicable.
- g.* Replace the three mounting screws and the spring contact stud.

35. Unsatisfactory Equipment Report

a. WD AGO FORM 468 (UNSATISFACTORY EQUIPMENT REPORT) FOR EQUIPMENT USED BY ARMY GROUND FORCES AND TECHNICAL SERVICES. WD AGO Form 468 will be filled out and forwarded through channels to the Office of the Chief Signal Officer, Washington 25, D. C., when trouble occurs more often than is normal, as determined by qualified repair personnel.

b. AAF FORM 54 (UNSATISFACTORY REPORT) FOR EQUIPMENT USED BY ARMY AIR FORCES. AAF Form 54 will be filled out and forwarded to Commanding General, Air Matériel Command, Wright Field, Dayton, Ohio, in accordance with AAF Regulation 15-54, when trouble occurs more often than is normal, as determined by qualified repair personnel.

APPENDIX I

IDENTIFICATION TABLE OF REPLACEABLE PARTS FOR TUNING EQUIPMENT IE-37

The following information was compiled on 21 May 1947. The appropriate pamphlets of the War Department Supply Catalog for Tuning Equipment IE-37 are:

Organizational and Higher Echelon Spare Parts:

SIG 7 & 8-CH-312 (when published).

SIG 7 & 8-M-416 (when published).

For an index of available Catalog pamphlets, see the latest issue of War Department Supply Catalog SIG 1 & 2.

Ref symbol	Component		Name and description of part	Function of part	Signal Corps stock No.
	Case CH-312	Adapter M-416			
	*	*	ADAPTER M-416: connector; 5 compression spring contact, 2 insert cont; approx 4 $\frac{1}{8}$ " lg x 3 $\frac{1}{4}$ " wd x 1 $\frac{1}{8}$ " h over-all; includes bottom cover for Radio Set SCR-536 w/jack pl, phenolic pl w/gnd cont.	Microphone and earphone cont, battery cont and feedback capacitor.	2Z299-416
	*	*	CASE CH-312: aluminum alloy; empty; 19 $\frac{1}{8}$ " lg x 3 $\frac{3}{4}$ " wd x 5 $\frac{1}{8}$ " d over-all; 3 compartment interior w/2 slotted guide rails.	Holds Radio Receiver and Transmitter BC-611 chassis, Batteries BA-37 and BA-38.	2Z2599-312
	*	*	BOARD, terminal: 5 compression spring cont, 2 insert cont; w/brass silver pl term.; laminated phenolic board; 2 $\frac{3}{4}$ " lg x 2 $\frac{1}{2}$ " wd x 1" thk over-all; 1 JAN type No. CM20B220K capacitor mtd on under side; Parker Engineering Products Co No. 114A15.	Connects Radio Receiver and Transmitter BC-611 to Adapter M-416.	2Z9407-86
	*	*	BOLT, spade: steel, chrome pl; No. 8-32; 7 $\frac{1}{8}$ " lg over-all; 3 $\frac{1}{2}$ " diam spade hole; includes No. 8-32 knurled steel thumb-nut 5 $\frac{1}{8}$ " diam x 3 $\frac{1}{2}$ " lg over-all.	Bottom cover fastener.	6L390-8E
C101 C201	*	*	CAPACITOR, fixed: mica; 22 mmf \pm 10%; 500 vdcw; max body dimen 3 $\frac{1}{8}$ " lg x 1 $\frac{1}{8}$ " wd x 3 $\frac{1}{2}$ " thk; JAN type No. CM20B220K.	Audio feedback.	3K2022021
J101 J201	*	*	CONNECTOR, receptacle: single round female cont; straight; approx 1 $\frac{1}{8}$ " lg x 1 $\frac{1}{8}$ " diam over-all; 1 $\frac{1}{8}$ " diam x 1 $\frac{1}{4}$ " thk round black plastic head; Amer Rad Hdwe No. 138-Black.	A + pin jack.	2Z5531.3

Ref symbol	Component		Name and description of part	Function of part	Signal Corps stock No.
	Case CH-312	Adapter M-416			
J102 J202	*	*	CONNECTOR, receptacle: single round female cont; straight; approx $\frac{11}{16}$ " lg x $\frac{1}{8}$ " diam over-all; $\frac{1}{16}$ " diam x $\frac{1}{4}$ " thk round red plastic head; Amer Rad Hdwe No. 138-Red.	B + pin jack.	2Z5531.12
	*	*	CONTACT, case: bushing and compression spring type; includes bushing, compression spring, and eyelet; brass, silver pl; $\frac{5}{8}$ " diam x $\frac{5}{8}$ " lg over-all; hex. head; Parker Engineering Products Co No. 114A13.	Phone jack cover.	2Z3193-32
	*	*	COVER: dust; includes cover mtg bracket, neoprene sealing gasket, brass ring, and helical spring; steel; oval shape; $\frac{3}{16}$ " wd x $\frac{11}{16}$ " lg x $\frac{1}{4}$ " thk; stamped PHONE; Croname part No. A-21570A.	Phone jack cover.	2Z3401.14
	*	*	COVER: dust; bronze; rectangular w/round corners; $1\frac{5}{8}$ " lg x $\frac{7}{8}$ " wd x $\frac{1}{8}$ " thk; includes single neoprene gasket; Parker Engineering Products Co part/dwg No. 114A12.	For battery test connectors, A + and B +.	2Z3351-119
	*	*	COVER: molded neoprene; 4" lg x $1\frac{3}{4}$ " wd x $\frac{3}{4}$ " h over-all; Parker Engineering Products Co No. 114F2.	Waterproof cover for push-to-talk switch.	3Z8318/C1
	*	*	COVER: top; includes conical spring, spring spacer, strap, insulator, thumbscrew, chain, and neoprene gasket; aluminum; $3\frac{3}{4}$ " lg x $2\frac{1}{8}$ " wd x $7\frac{1}{8}$ " thk over-all; Parker Engineering Products Co No. 114E6.	For Case CH-312.	2Z3351-120
	*	*	FRAME: aluminum; 4" lg x $1\frac{1}{8}$ " wd; Parker Engineering Products Co No. 114E4.	Clamps push-to-talk switch cover.	2C5551C/F1

J103	*	* GASKET: molded sponge neoprene; 3½" lg x 3½" wd x ⅜" thk w/⅛" wall; Parker Engineering Products Co No. 114F12.	Seal for case to adapter and top cover to case.	2Z4868-367
J203	*	* INSULATOR, bushing: conical; polystyrene; 1" lg over-all x ⅝" diam; ⅜" lg brass shell one end; Parker Engineering Products Co No. 114A18.	For antenna.	3G1839-31
J203	*	* JACK JK-34: telephone; for 2 cond 0.250" diam plug; 1¼" lg x 1" wd x ¾" h; J1 cont arrangement.	Phone jack.	2Z5534
J203	*	* LEVER ASSEMBLY: includes sliding arm, lever link fulcrum link, spring, and pins; steel, nickel pl; 3⅞" lg x 1½" wd x ½" h over-all; Parker Engineering Products Co No. 114A15.	Operates switch for push-to-talk operation.	3Z9903K-3
J203	*	* SCREW, thumb: knurled thumb head; steel; No. 8-32; body ⅜" lg w/full lg thd; flat point; ⅜" lg x ½" diam knurled head; ¼" lg shoulder; includes 4" chain w/vinylite cover; Parker Engineering Products Co No. 114A21.	Holds Radio Receiver and Transmitter BC-611 chassis.	6L17108-16.1A
J203	*	* STUD: stainless steel; 1⅝" lg over-all x ⅜" diam; one end thd, No. 6-32, ⅜" lg and counterdrilled for staking; other end slotted; Parker Engineering Products Co No. 114S1.	Bottom cover hinge pin.	6L31139-5
TECHNICAL MANUAL TM 11-5009.				(Order through AGO channels)

APPENDIX II REFERENCES

1. Army Regulations

AR 380-5 Safeguarding Military Information.

2. Supply Publications

SIG 1 & 2 Introduction and Index (War Department Signal Supply Catalog).

SIG 5 Stock List of All Items.

SIG 6 Sets of Equipment.

SIG 7 & 8 Organizational and Higher Echelon Spare Parts.

SIG 10 Fixed Plant Maintenance Lists.

SB 11-6 Dry Battery Supply Data.

SB 11-76 Signal Corps Kit and Materials for Moisture- and Fungi-Resistant Treatment.

3. Technical Manuals on Auxiliary Equipment and Test Equipment

TM 11-235 Radio Sets SCR-536-A, -B, -C, -D, -E, and -F.

TM 11-311 Test Equipment IE-17-().

4. Painting and Preserving

TB SIG 13 Moistureproofing and Fungiproofing Signal Corps Equipment.

5. Packaging and Packing Instructions

a. JOINT-ARMY-NAVY PACKAGING SPECIFICATIONS.

JAN-D-169 Desiccants, Activated.

JAN-P-100 General Specification.

JAN-P-106 Boxes, Wood, Nailed.

JAN-P-116 Preservation, Methods of.

JAN-P-125 Barrier Material, Waterproof.

JAN-P-131 Barrier Material, Moisture-Vaporproof, Flexible.

b. U. S. ARMY SPECIFICATION.

100-2E Marking Shipments by Contractors (and Signal Corps Supplements thereto).

c. SIGNAL CORPS INSTRUCTIONS.

720-7 Standard Packaging.

726-15 Interior Marking.

6. Decontamination

TM 3-220 Decontamination.

7. Demolition

FM 5-25 Explosives and Demolitions.

8. Other Publications

TB SIG 66 Winter Maintenance of Signal Equipment.

TB SIG 72 Tropical Maintenance of Ground Signal Equipment.

TB SIG 75 Desert Maintenance of Ground Signal Equipment.

TG SIG 123 Preventive Maintenance Practices for Ground Signal Equipment.

9. Forms

WD AGO (Unsatisfactory Equipment Report).

Form 468

AAF Form 54 (Unsatisfactory Report).

