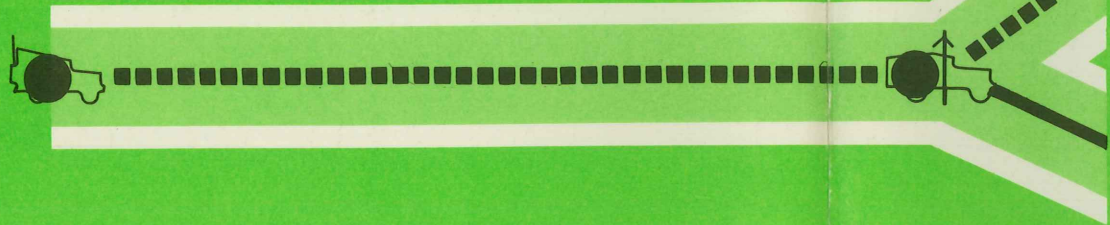


TC 24-3

*RWI
IS
NOT
SECURE!*



*INSTALLATION
AND
OPERATION
TIPS*

USER'S GUIDE

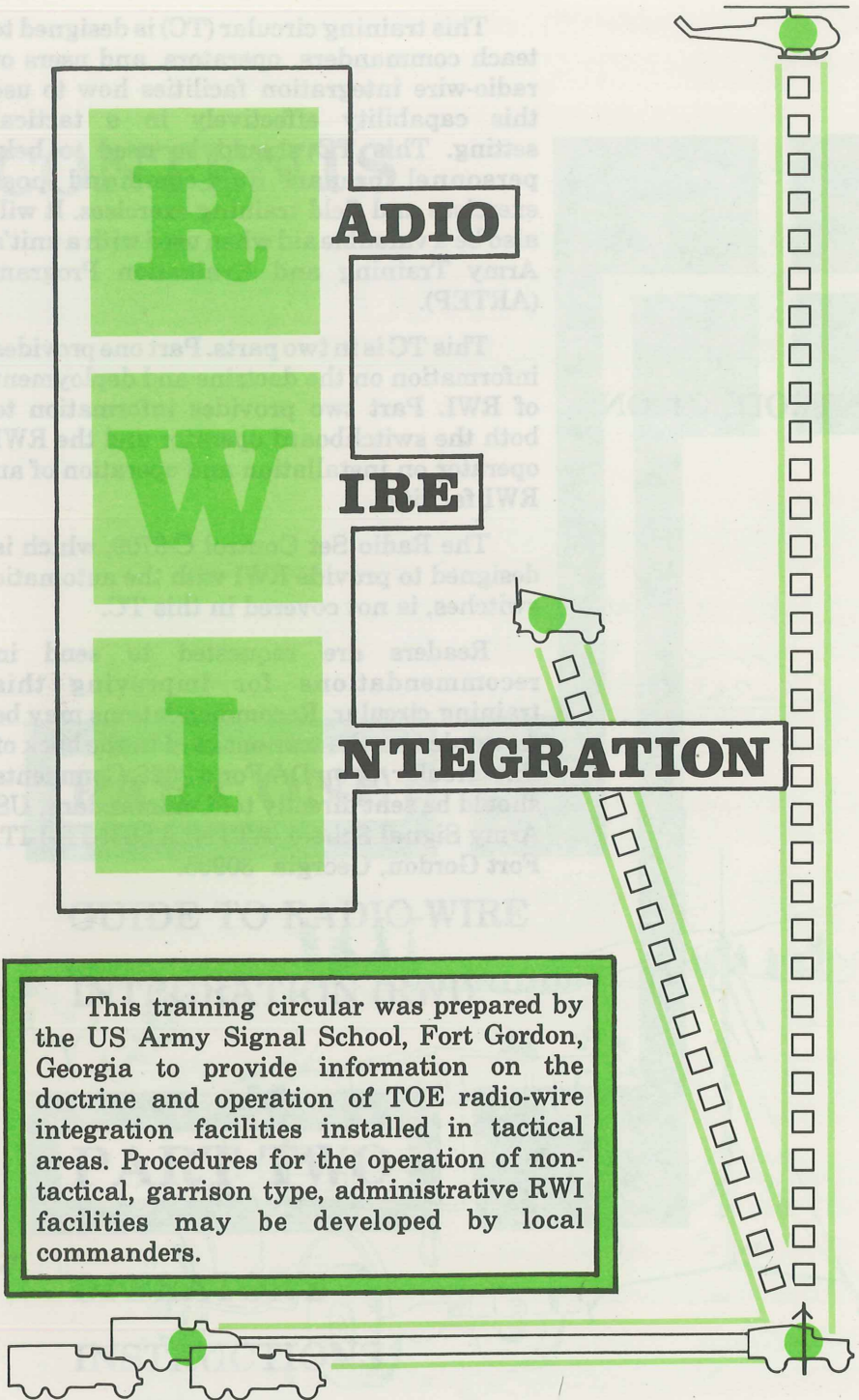


RADIO

WIRE

INTEGRATION

This training circular was prepared by the US Army Signal School, Fort Gordon, Georgia to provide information on the doctrine and operation of TOE radio-wire integration facilities installed in tactical areas. Procedures for the operation of non-tactical, garrison type, administrative RWI facilities may be developed by local commanders.



INTRODUCTION

This training circular (TC) is designed to teach commanders, operators, and users of radio-wire integration facilities how to use this capability effectively in a tactical setting. This TC should be used to help personnel prepare for command post exercises and field training exercises. It will also be a valuable aid when used with a unit's Army Training and Evaluation Program (ARTEP).

This TC is in two parts. Part one provides information on the doctrine and deployment of RWI. Part two provides information to both the switchboard operator and the RWI operator on installation and operation of an RWI facility.

The Radio Set Control C-6709, which is designed to provide RWI with the automatic switches, is not covered in this TC.

Readers are requested to send in recommendations for improving this training circular. Recommendations may be forwarded on the tear-out card in the back of this circular, or on DA Form 2028. Comments should be sent directly to: Commandant, US Army Signal School, ATTN: ATSN-TD-LIT, Fort Gordon, Georgia 30905.



CONTENTS

PART ONE

GUIDE TO RADIO-WIRE INTEGRATION (RWI)

PART TWO

OPERATOR'S INSTRUCTIONS

This training circular (TC) is designed to teach commanders, operators, and crew of radio wire integration facilities how to use this training circular. This circular is intended for personnel who are assigned to the Army Training and Evaluation Program (ARTEP).

This TC is in two parts. Part one provides information on the doctrine and deployment of RWI. Part two provides information on both the wire operator and the RWI operator and installation and operation of an

ATTENTION

The pronoun "he" as used in this publication refers to both male and female personnel. When the publication is revised, appropriate changes will be made to encompass both male and female personnel.

PART ONE

Page

6	WHAT RWI DOES
8	WHEN RWI IS USED
8	WHO USES RWI
8	LOCATION OF RWI FACILITIES
10	RWI AT DIFFERENT LEVELS
11	FREQUENCIES & CALL SIGNS
12	RETRANSMISSION
12	EQUIPMENT
18	ANTENNAS
18	RESTRICTIONS

PART ONE

GUIDE TO RADIO-WIRE INTEGRATION (RWI)

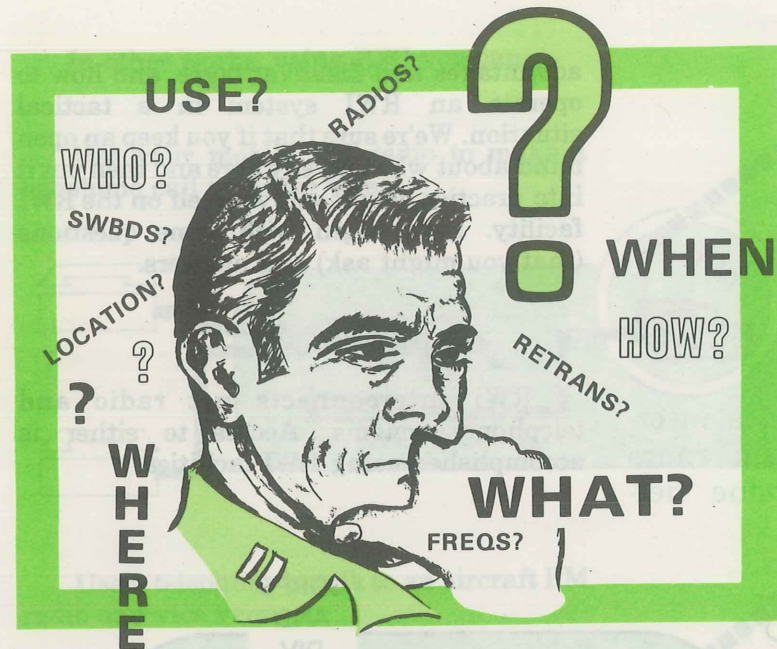
For the Commander

To carry out his command and control responsibilities, a tactical unit commander must have all authorized means of communications readily available. His principal means of command and control are the tactical radio and telephone networks. And although each of these networks is a distinct, specialized means of communications it is possible—and often required—to interconnect or interface them. This interface capability is provided by radio-wire integration (RWI) equipment.

Now even though command awareness of RWI is evident, so is the fact that RWI facilities are often not used. Why? Well, for several reasons:

- Some commanders and their unit communications personnel still do not know enough about the RWI capability.
- Because of the lack of technical expertise in the unit, commanders do not have confidence in available RWI facilities.
- Commanders refuse to entrust vital command and control communications to a (RWI) system in which they do not have confidence.

Why are RWI facilities often not used? Here are some facts.



In simple terms, some commanders would rather ignore the at-hand RWI facility and “hunt down” a radio to talk to another radio or a telephone to talk to another telephone. This hunting trip is inconvenient, time-consuming, and unnecessary because the RWI capability does exist; it works efficiently (when properly installed, operated, and maintained); and it provides commanders with a facility that interconnects radio and wire systems. Furthermore, it extends near real-time command and control to combat units that are highly mobile, widely dispersed, and may have no other means of contact.

Now we’ve already stated that, in many cases, RWI is not being used. We’ve also indicated that this is due largely to the lack of technical expertise. Still, we know that commanders need the capability that RWI provides.

In one way, the purpose of this TC is to “sell” you on RWI. The discussion that follows explains RWI and covers its uses, its

RWI capability does exist, and does work when properly installed, properly operated, and properly maintained.

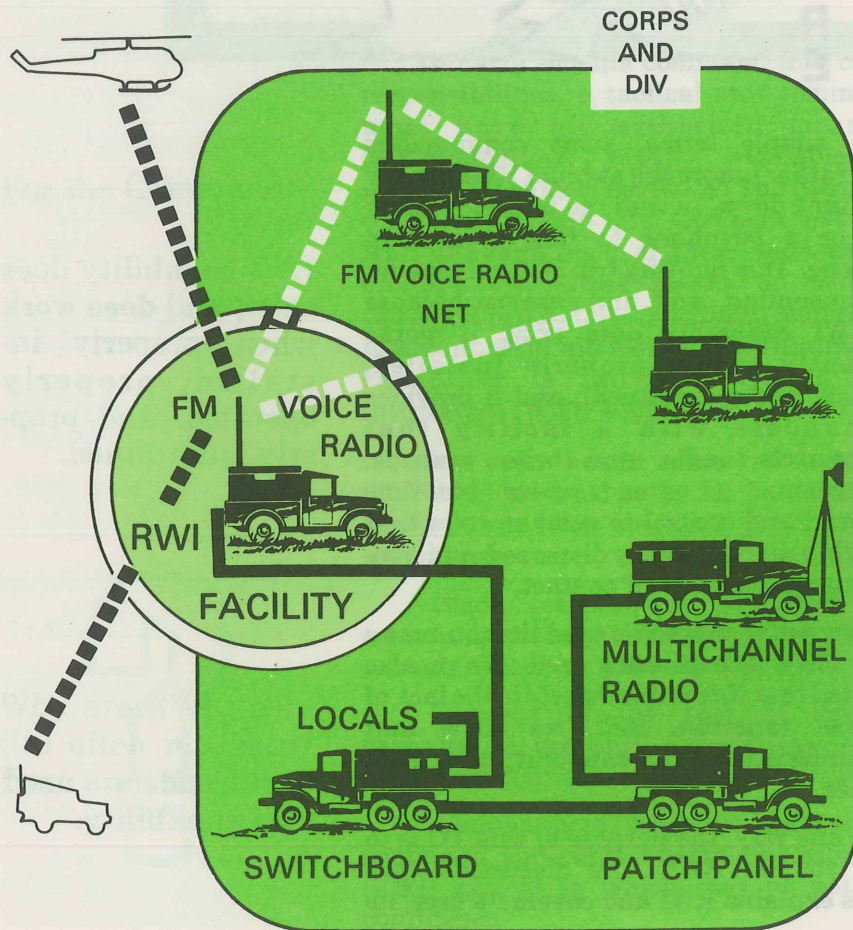
Commanders need RWI capability.

advantages and disadvantages, and how to operate an RWI system in a tactical situation. We're sure that if you keep an open mind about what we say here and then put it into practice, you'll sell yourself on the RWI facility. Let's begin with some questions (that you might ask) and answers.

What does RWI do?

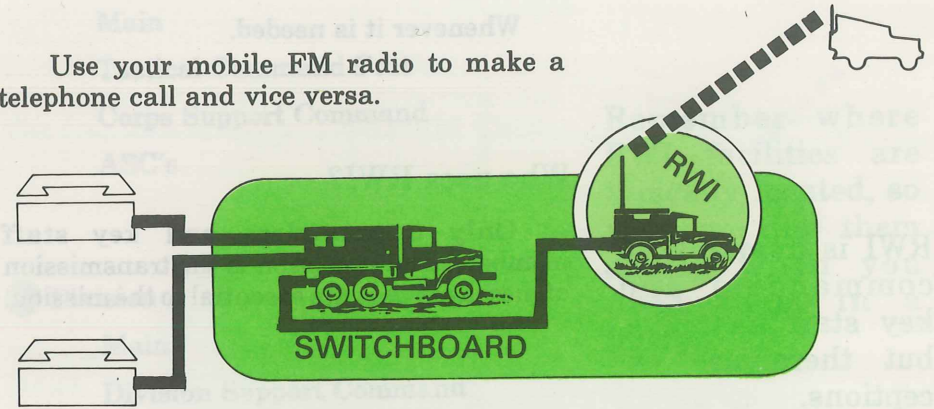
RWI interconnects net radio and telephone systems. Access to either is accomplished using RWI facilities.

RWI provides interface between radio and telephone networks.

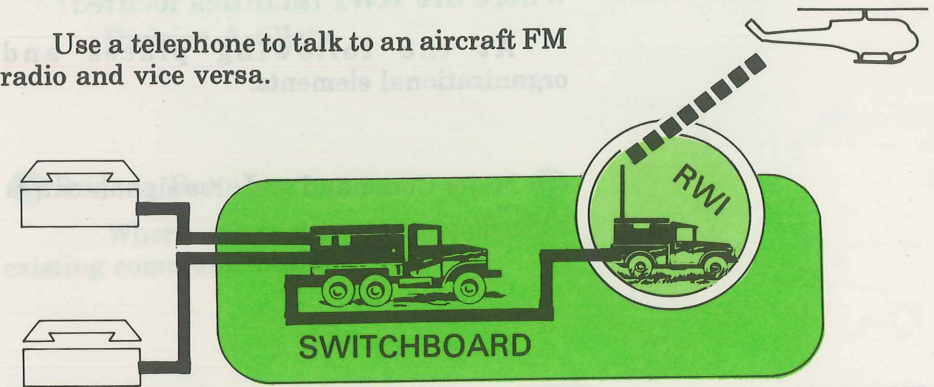


In other works, using RWI you can:

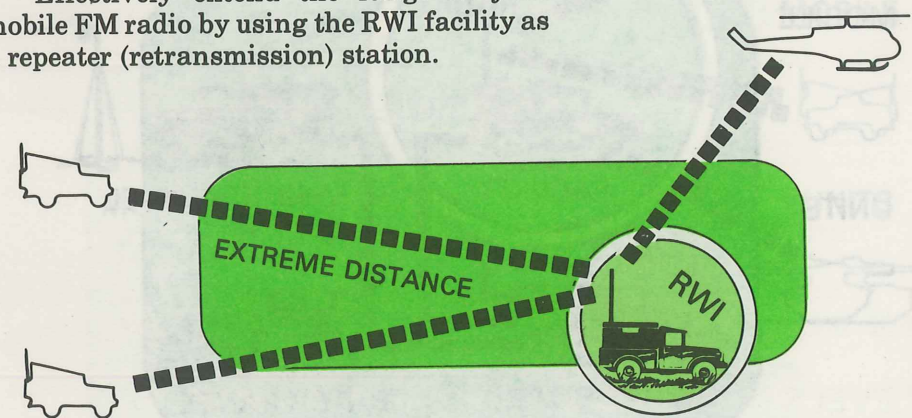
Use your mobile FM radio to make a telephone call and vice versa.



Use a telephone to talk to an aircraft FM radio and vice versa.



Effectively extend the range of your mobile FM radio by using the RWI facility as a repeater (retransmission) station.



When is RWI used?

Whenever it is needed.

Who uses RWI?

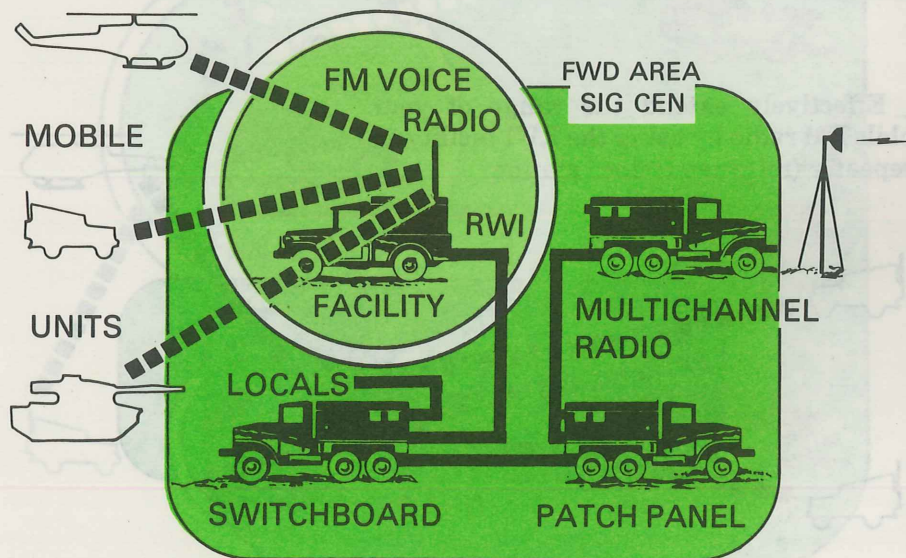
Only commanders and key staff members. The exception is the transmission of messages that are essential to the mission.

RWI is available to commanders and key staff members, but there are exceptions.

Where are RWI facilities located?

At the following places and organizational elements:

- Major Command and area signal centers (ASC's)



- Corps

Main
Tactical Command Post
Corps Support Command
ASC's

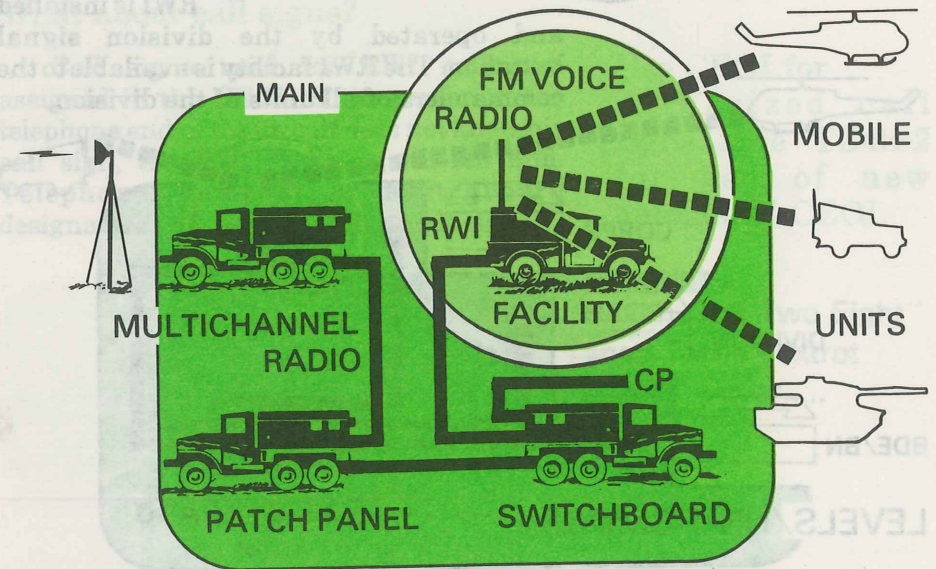
- Division

Main
Division Support Command
ASC's
Division Artillery

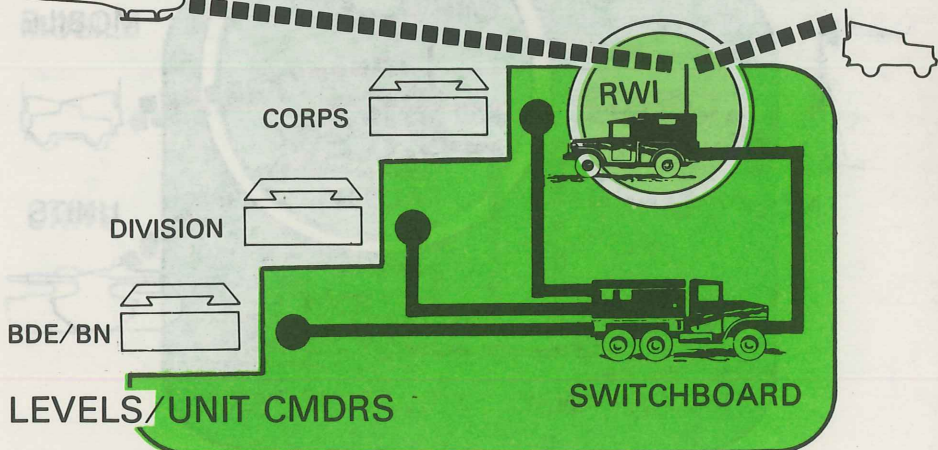
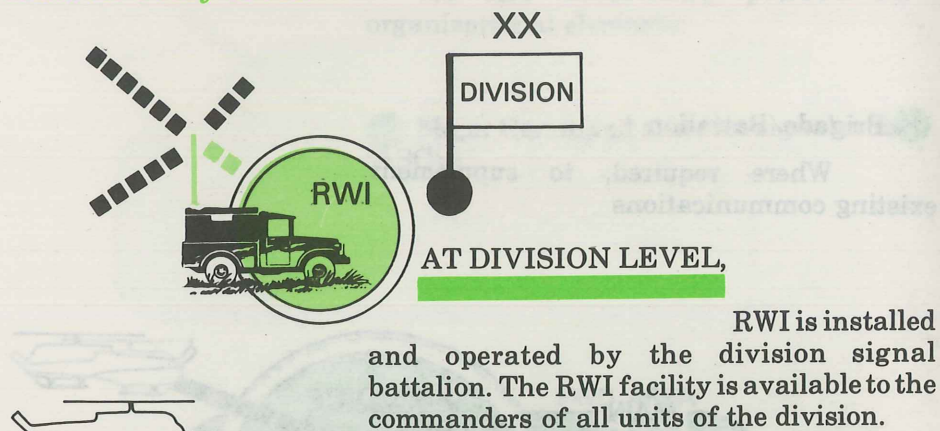
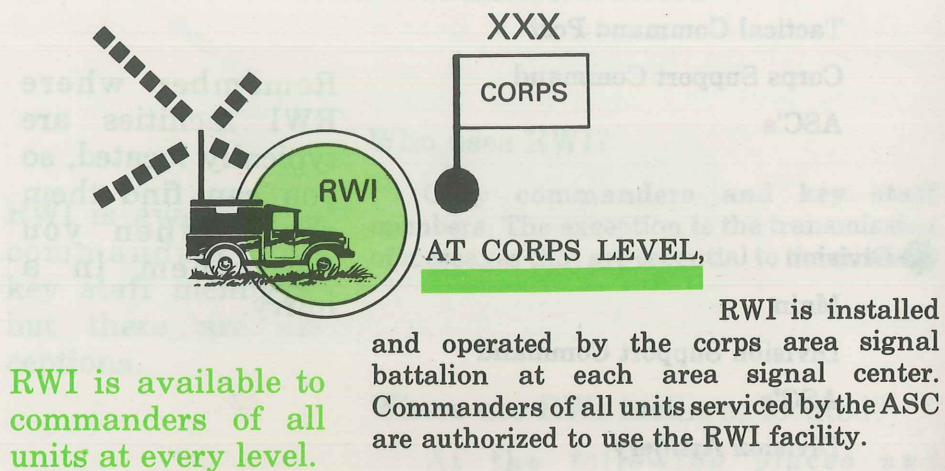
- Brigade/Battalion

Where required, to supplement existing communications

Remember where RWI facilities are typically located, so you can find them easily when you need them in a hurry.

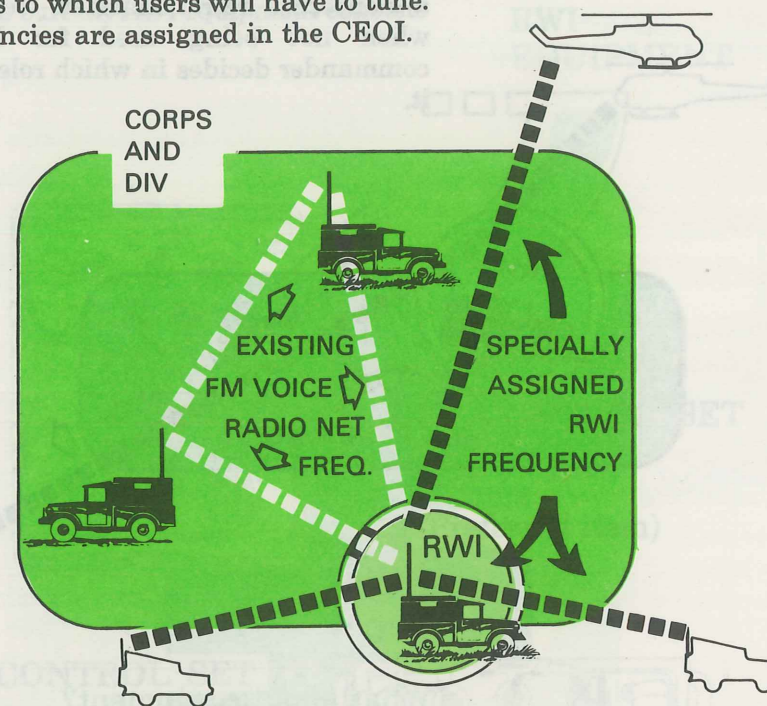


How is RWI used at different levels?



On what frequency does RWI operate?

RWI operates on specially assigned frequencies to which users will have to tune. The frequencies are assigned in the CEOI.



What about call signs?

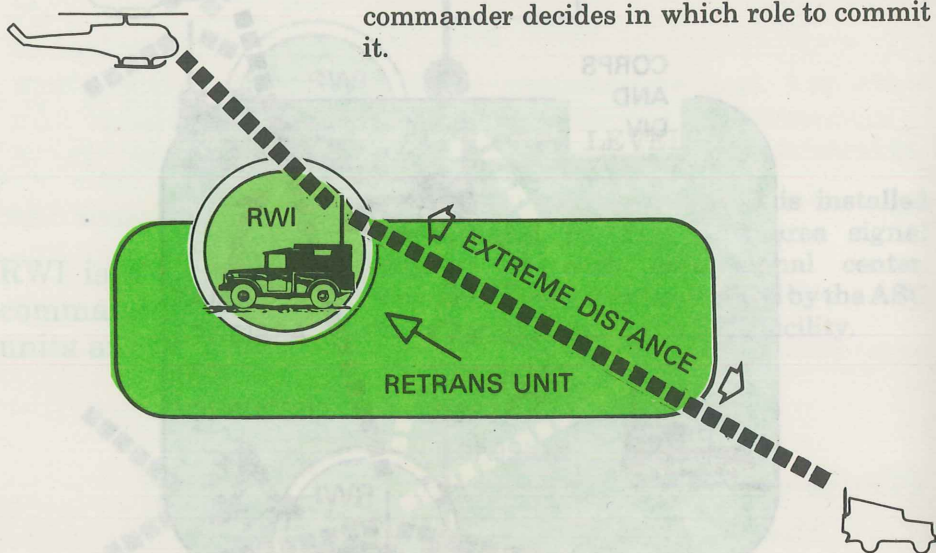
Call signs used for RWI calls are assigned in the CEOI. If the person at the telephone end of the circuit does not know his call sign, the RWI operator will tell him. Telephone numbers or switchboard designators will not be used as call signs.

Use CEOI for authorized call signs. See TC-24-2 for use of new automated CEOI.



How about retransmission?

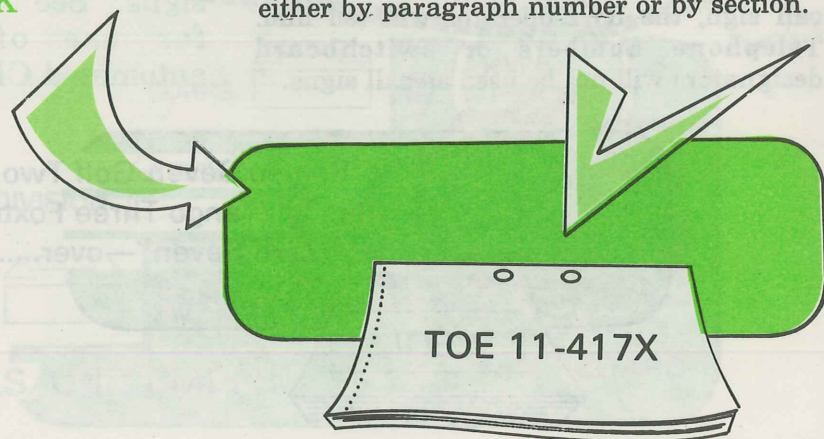
Most RWI facilities use Radio Set AN/VRC-49. This lets the RWI rig be used as a nonsecure retransmission (repeater) set when not being used for RWI. The commander decides in which role to commit it.



What about equipment?

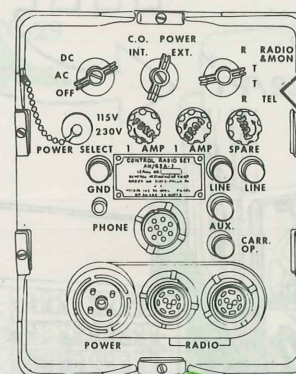
CHECK YOUR TOE. Equipment authorized for RWI varies based on the unit's mission. However, equipment authorized is normally designated as RWI equipment either by paragraph number or by section.

CHECK YOUR TOE!



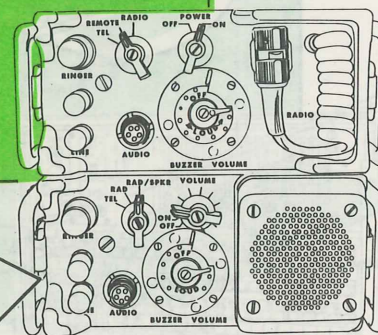
Well, we've already said that equipment will vary based on the unit's mission—but if we're talking only about RWI equipment, it can't vary much except in quantity. Why? Because the current RWI equipment consists of:

CURRENT RWI EQUIPMENT



RADIO CONTROL SET AN/GSA-7 (Preferred item)

RADIO CONTROL SET AN/GRA-39 (Substitute item)



Many configurations are possible.

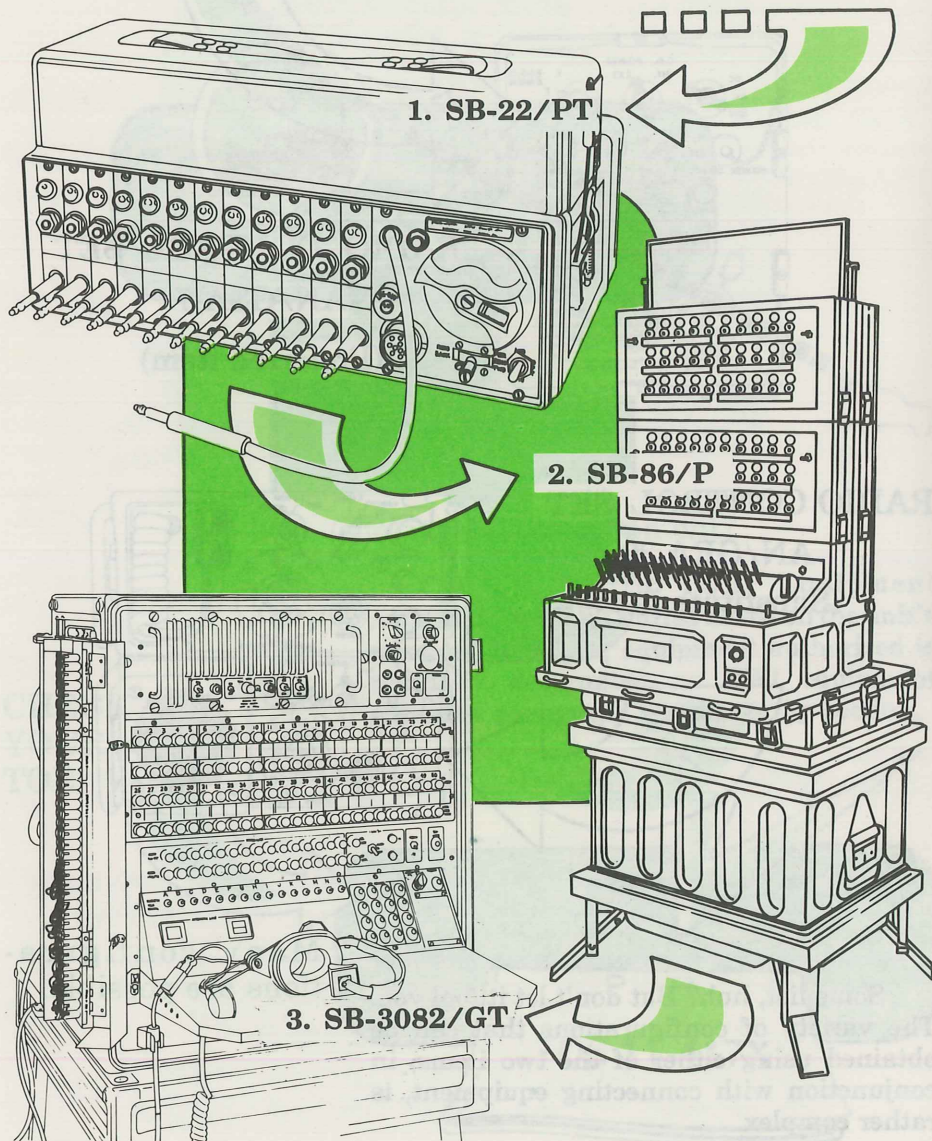
Some list, huh? But don't let it fool you. The variety of configurations that can be obtained using either of the two items, in conjunction with connecting equipment, is rather complex.

For example, RWI facilities must connect to switchboards. This connection provides the access to the telephone network.

Telephone system and radio equipment now being used with RWI equipment are -

RWI facilities MUST connect to switchboards!

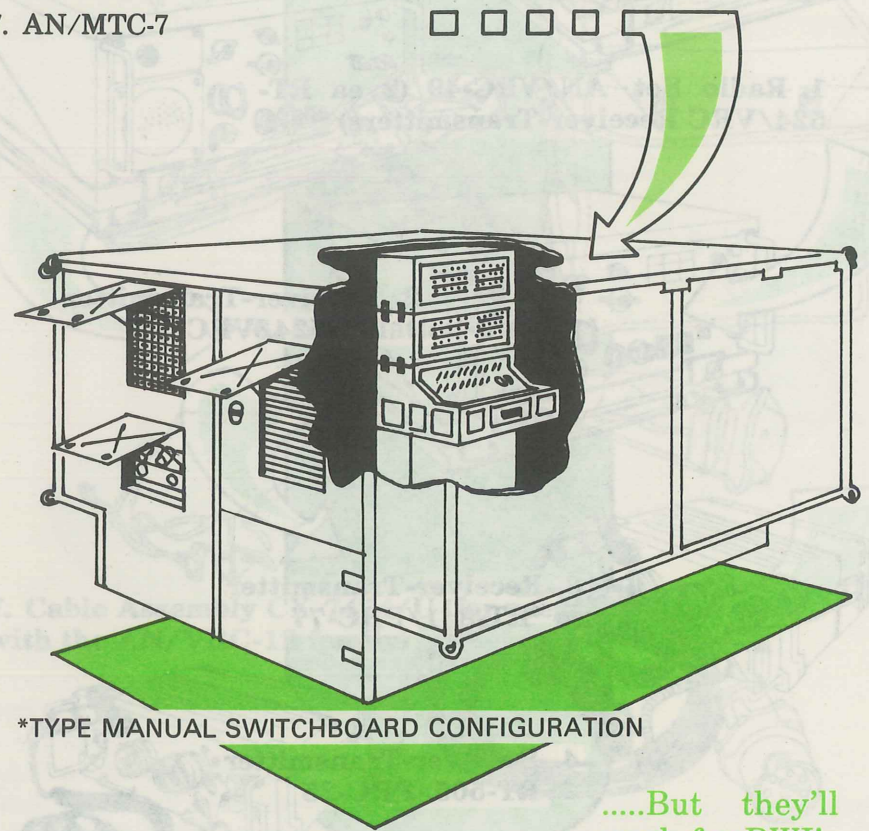
MANUAL SWITCHBOARDS



MANUAL SWITCHBOARD CONFIGURATIONS

1. AN/TTC-1
2. AN/MTC-3
3. AN/MGC-9
4. AN/TTC-35
5. AN/TTC-23
6. AN/TTC-29
7. AN/MTC-7

There are many switchboard configurations....

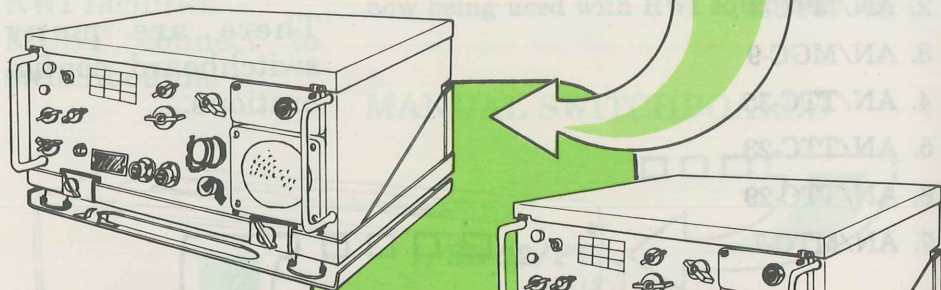


AUTOMATIC SWITCHES

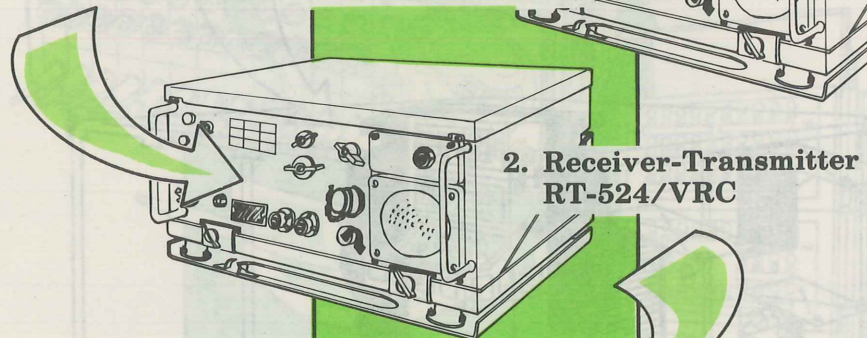
1. AN/TTC-25 (300- and 600- line)
2. AN/TTC-38 (300- and 600- line)

RADIO EQUIPMENT

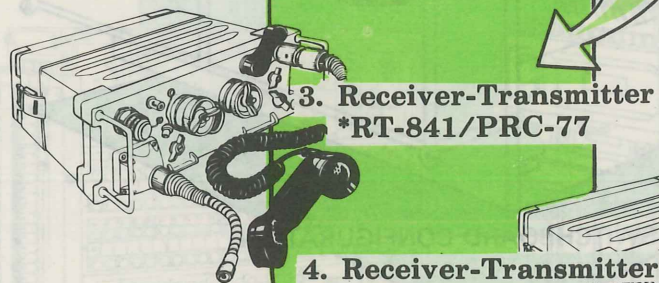
What else? Well, there's



1. Radio Set AN/VRC-49 (2 ea RT-524/VRC Receiver-Transmitters)



2. Receiver-Transmitter RT-524/VRC



3. Receiver-Transmitter *RT-841/PRC-77



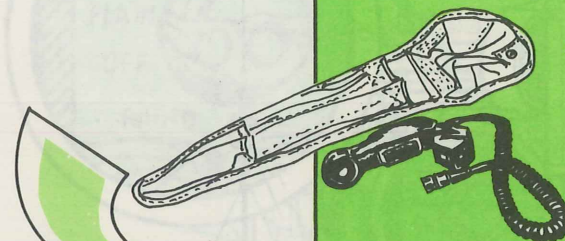
4. Receiver-Transmitter RT-505/PRC-25

* Identical to PRC-25 except it is fully transistorized, can provide secure voice, and has improved retrans capability.

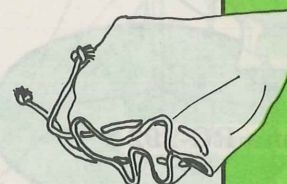
and



5. Telephone Set TA-312/PT



6. Installation Kits

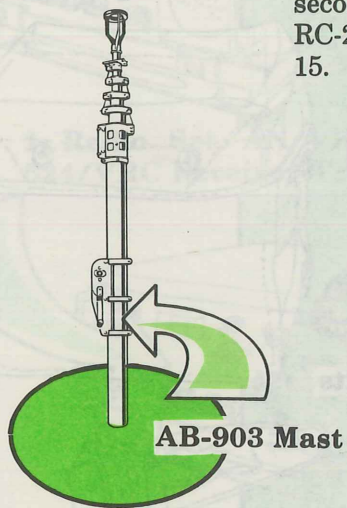


7. Cable Assembly CX-7474/U (for use with the AN/VRC-12 family)



NOTE: RWI using the AN/PRC-77 or AN/PRC-25 in a vehicular configuration is similar to RWI using the RT-524 receiver-transmitter. The operating instructions in Part Two are based on an RWI system using the RT-524. See TM 11-5820-498-12 for more information on the other radio sets.

Antenna choice depends on terrain and mission.



AB-903 Mast



Antenna RC-292

Is a special antenna required?

The choice of antennas is yours—but it depends on the terrain and the mission. The best antenna for distance on all frequencies is an AB-903 mast used with the vehicular antenna. This raises the vehicular whip and makes it an elevated ground plane. (See Part Two of this TC information on cables and TM 11-5985-263-15 for more on the mast.) The second choice of antennas is the Antenna RC-292 which is covered in TM 11-5820-348-15.

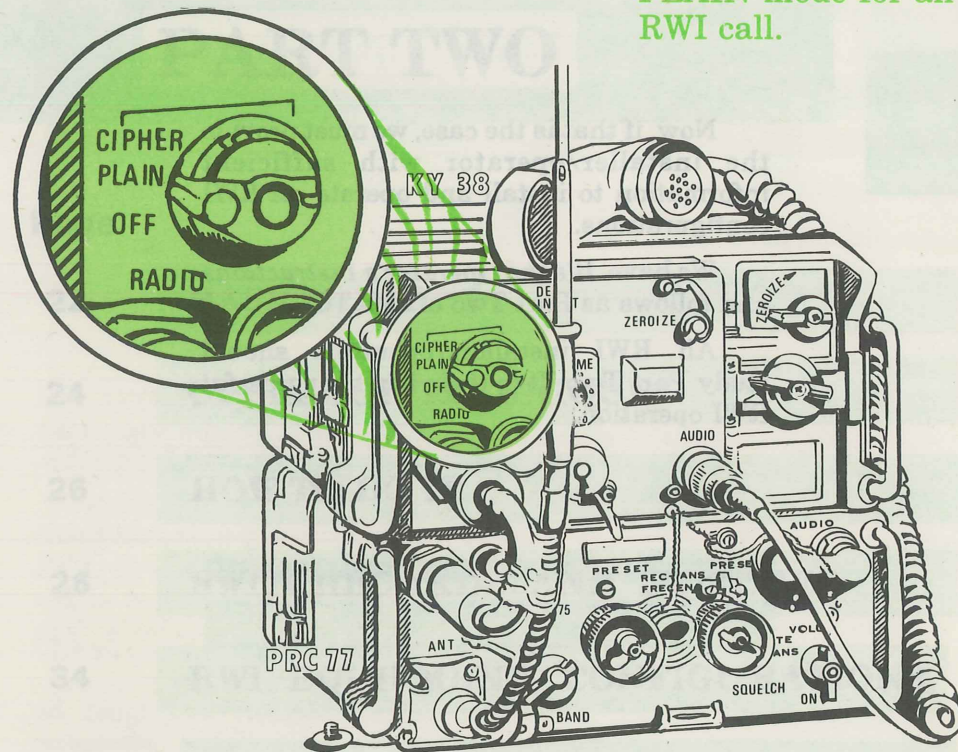
Are there restrictions on using RWI?

Yes. RWI is *not secure*. Security devices are not used to secure RWI communications. Why? Because it might give the user a false sense of security by making him think that the entire circuit is secure when, in fact, the wire line portion is *not secure*. Users of RWI must be aware of the added security risk that the wire line adds. The enemy will associate call signs with unit or telephone numbers on the wire line. Long local trunk lines where the possibility of hostile wire tapping exists must be used with caution.

RWI IS NOT SECURE!

The RWI station can call a radio station that has a KY-38 installed, whether the KY-38 is in the plain or cipher mode. The RWI station cannot call a radio station with a KY-8 installed if the KY-8 is in the cipher mode. A station with either type of security equipment can call the RWI station by switching to the plain mode.

Mobile subscriber's KY-8 must be in **PLAIN** mode for an RWI call.



Are there other problems with RWI?

Yes there are. Mainly, these problems stem from reasons already stated on page 4. However, if we examine the problems, we usually find that all of them revolve around technical expertise and training. With increased technical ability and training, the problems become smaller and smaller. So then, it appears that if sufficient information is made available to the installer/operator, problems for the most part are reduced to practically zero.

Technical expertise and training can reduce problems to practically zero.

Now, if that is the case, we must provide the installer/operator with sufficient information to install and operate *all* RWI configurations.

We have. It's the *Operator's Instructions* and follows as Part Two of this TC.

All RWI installers/operators should study Part Two. It is their key to successful RWI operation.

PART TWO

Page

22	BASICS OF RWI
24	OPERATOR TECHNIQUES
26	HOW TO DO IT
26	SWITCHBOARDS AND SWITCHES
34	RWI EQUIPMENT, CONFIGURATIONS, HOOKUPS AND PROCEDURES
34	HOOKUP USING THE AN/GSA- 7
40	TESTING THE SYSTEM
46	HOOKUP USING THE AN/GRA-39
52	TESTING THE SYSTEM

PART TWO

OPERATOR'S INSTRUCTIONS

The effectiveness of your commander's RWI is your responsibility.....

.....therefore, you have got to get yourself together and keep yourself together on all aspects of RWI.

The Basics of RWI

OK — So you are the RWI operator and it's your responsibility to see that your commander has the best RWI possible. Right?

Now, that means that you should know all there is to know about RWI: how the RWI facilities hook up; how it's handled at the switchboard; and, what procedures you should use.

As the RWI operator, you must be familiar with all equipment that operates or interfaces with RWI equipment. This includes:

- Switchboards
- Radios
- RWI controls
- Additional equipment (handsets, headsets, cables, etc)

Why? Well to state it simply, not everyone is familiar with RWI hookups. The somewhat limited use of RWI tends to prevent the development of any real expertise



in the setup and use of the system. Therefore, as the RWI operator, it is *your* responsibility to know all you can about it. You must be a *professional*. You must know how manual switchboards and automatic switches connect to the RWI equipment.

So, let's talk first about the basics of RWI, and then we'll go into "*How to do it.*" Knowing the basics makes the job easier and provides some general rules which are—

- Know your job.
- Know your equipment.
- Know your procedures.

Your job is to install, operate, and maintain an RWI facility that will connect the radio system and the telephone system. Why? Because there are times when the commander and certain key personnel of the command elements must have access to both the telephone and the tactical radio systems through the RWI facility. This provides your boss with a more flexible means of command and control.

Knowing the basics of RWI makes the job easier.

RWI provides flexibility in command and control.

Anyone may use RWI for mission essential messages.

THESE OPERATOR TECHNIQUES WILL HELP:

Use radio procedures when talking to another radio set operator. (This could be the "Old Man" himself!)

Insure that users know that RWI communications are *not* secure.

Insure that the telephone user follows radiotelephone procedures.

Advise telephone users to *ring off* when finished. (Manual telephone systems on'y.)

Key the transmitter for the telephone user if he can't key it. This is necessary when you have an SB-3082 or one of the new automatic switches in the circuit. It also happens if the call is passed over any multiplex equipment. Key the transmitter for the telephone subscriber to talk by squeezing the push-to-talk switch on your headset or handset. When the telephone user says "over," you release the switch so the telephone user can listen. Don't try to key the transmitter with the mike connected to the transmitter. It won't work. It has to be the handset of the TA-312 or the handset of the RWI equipment.

We said key personnel, right? Well, this means only the commander and certain staff members. No one else with one exception: any message essential to the accomplishment of the mission may be transmitted. This means that anyone may use the system. But remember, the message must be mission essential! Otherwise, only the commander and the key staff members will use the RWI system.

Of course, your job requires more than just running the system. As the RWI operator, you also—

Now, since you want to know everything about RWI and since you want to have the best RWI possible, you do all you can to make it "best"—right? That means good range for one thing. How can this be done?

The best way is to get an AB-903 mast and mount your vehicular whip on top of it. TM 11-5985-263-15 shows you how. You also need a longer CX-4722 control cable and a longer coax cable. Try NSN 5995-00-985-7880 for the control cable and NSN 5995-00-985-7882 for the coax.

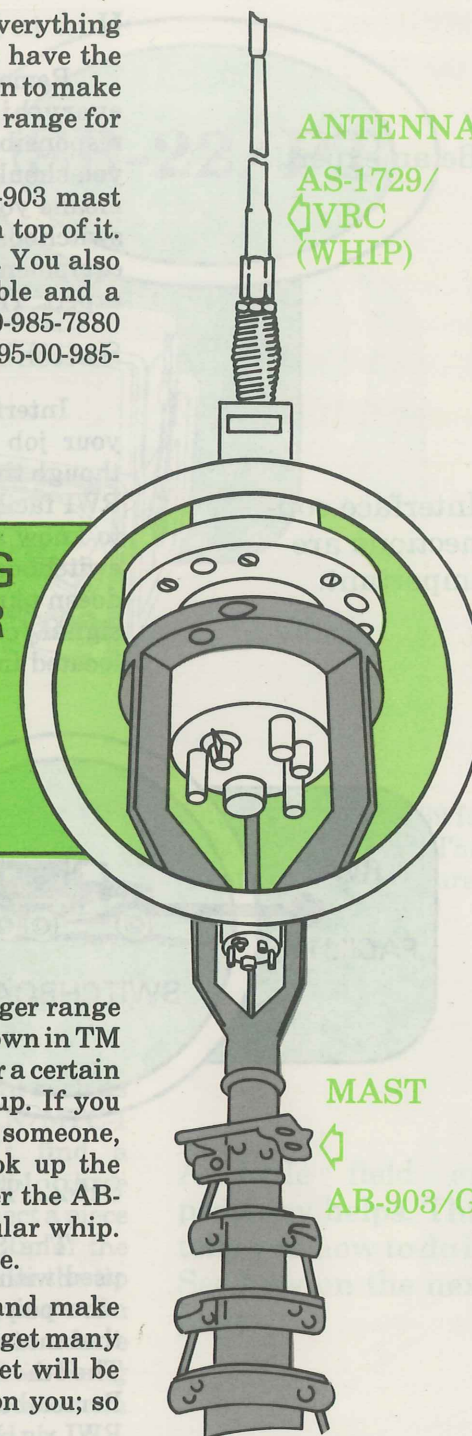
MOUNTING VEHICULAR WHIP ON TOP OF MAST AB-903/G

The second best way to get longer range is to use the RC-292. Put it up as shown in TM 11-5820-348-15. The RC-292 is set for a certain frequency band before you put it up. If you have to go outside that band to call someone, unhook the RC-292 coax and hook up the whip coax. If you don't have either the AB-903 or the RC-292, use your vehicular whip. You just won't have as much range.

Now get ready for business and make yourself comfortable. You may not get many calls but chances are those you get will be critical. The "Old Man" depends on you; so give him your best shot!

ANTENNA AS-1729/ VRC (WHIP)

MAST AB-903/G



Be an expert!

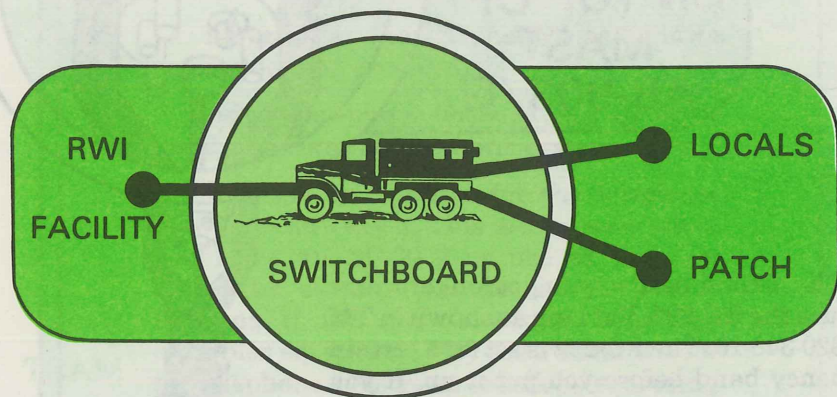
Interface connections are important.

How to Do It

Remember, we said you had to know everything about RWI. It is your responsibility; and, if anything goes wrong, you should be able to find the problem. That means you must know what happens at the switchboards, automatic switches, RWI equipment, and at the radio site. So be an expert. The following pages tell you how.

Switchboards and Switches

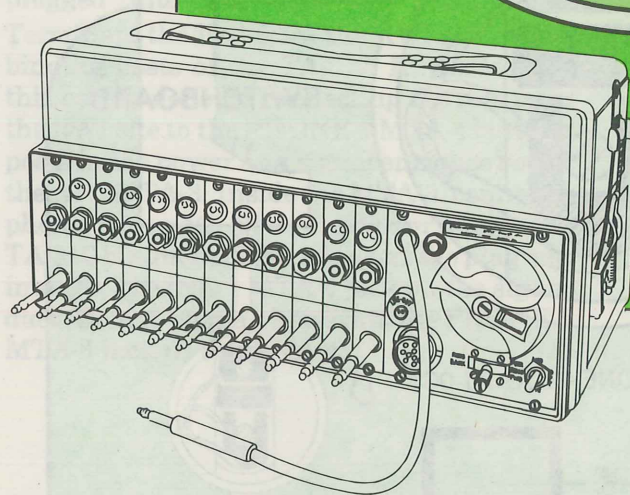
Interface connections are important. It's your job to be sure they are *right*. Even though the unit switchboard is not part of the RWI facility, you, as the RWI operator, need to know a little about it so you can tell the switchboard operator what to do in case he doesn't know. We're talking about the unit or signal center board, not a switchboard located in the RWI rig.



SB-22/PT

The SB-22 is the simplest switchboard used with RWI. All you do is connect a field wire pair to the binding posts on the back that match the line pack selected for RWI use. The other end of the wires runs to the RWI rig. Remember, this switchboard is not in the RWI rig. It is the unit or area switchboard.

SB-22/PT



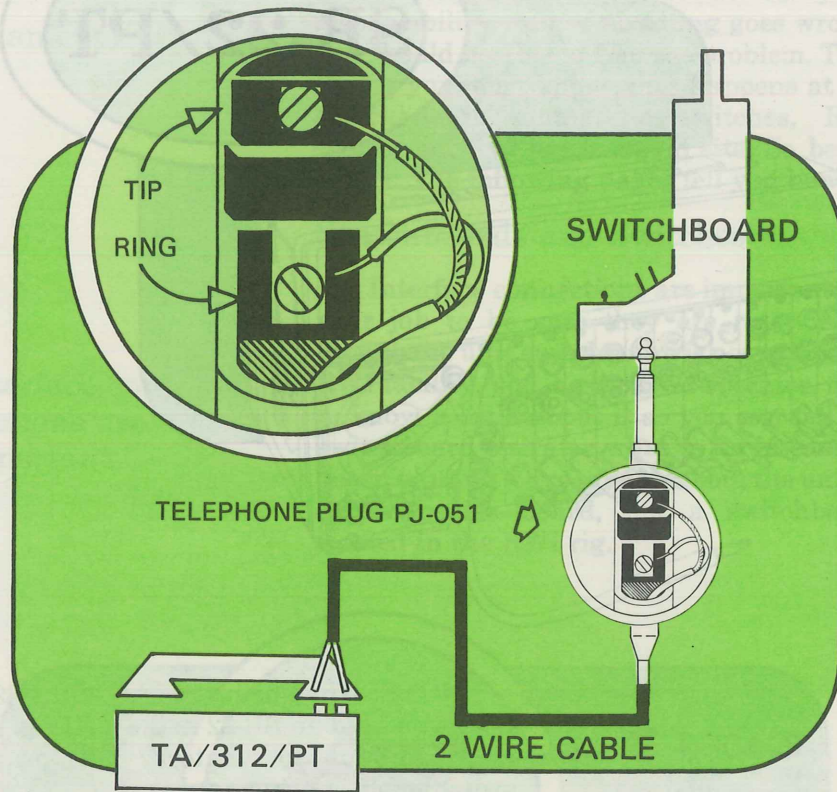
NOTE: When using the AN/GRA-39 for RWI, you need an SB-22 in the RWI rig. This is in addition to whatever unit or area switchboard is being used.

SB-86/P, AN/MTC-3, AN/MTC-1, AN/TTC-23, etc. Preparation

Take an extra switchboard cord such as the one on the SB-22, SB-86, or AN/MTC-1 type switchboard. If you can't find a switchboard cord, get a PJ-051 three conductor telephone plug and connect a piece of two-wire cable to the ring and tip of the plug. Connect the wires coming from the tip and ring of the plug to the binding posts of a TA-312 telephone. Set the telephone where the switchboard operator can reach it. Hang the plug where the switchboard operator can insert it into any jack on the board.

A little field expediency helps. This tells you how to do it. See how on the next page.

**HERE'S HOW
TO DO IT:**



SB-86/P Configurations.

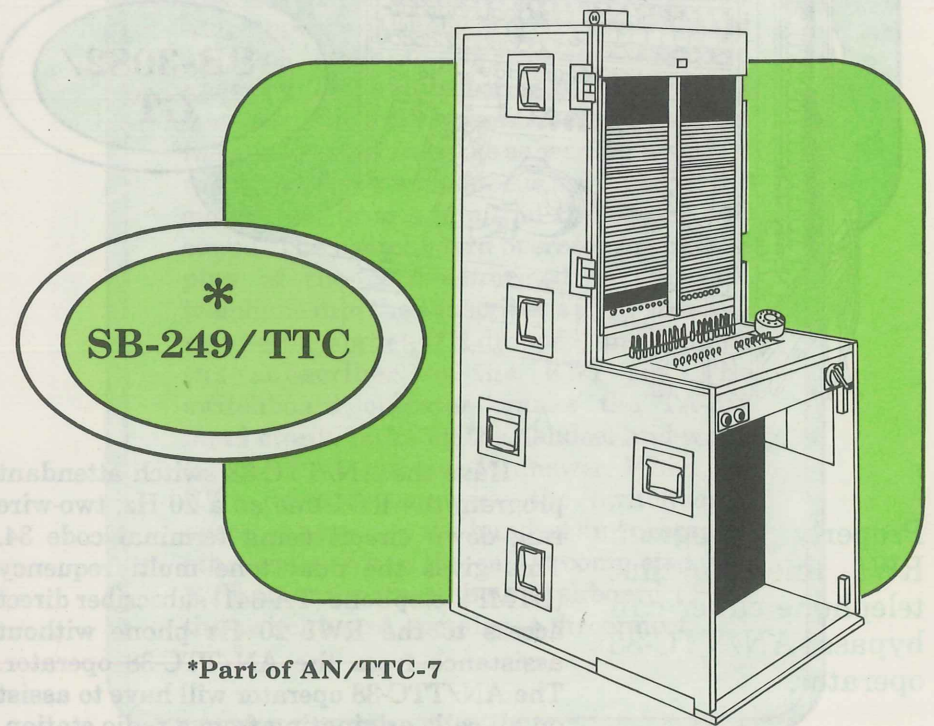
In a van with more than one SB-86/P such as the AN/MTC-3, set the TA-312 on top of one of the SB-86's. Hang the cable so that the plug end can be inserted into any jack on either switchboard. Terminate the line from the RWI site on the binding posts of the TA-312. In an AN/MTC-3, for example, this can be done by connecting the line from the RWI site to spare binding posts A in the signal entrance box. Inside the shelter, at the binding post and jack panel, connect binding posts A to the TA-312 located on top of the switchboard.

One or more SB-86/P's make up several different switchboard configurations.

AN/MTC-1 and AN/TTC-7 Configurations

In a van such as the AN/MTC-1, place the TA-312 on the table behind operator #1. Run the cable overhead from the TA-312 binding posts and hang it where it can be plugged into any jack on position #1. Terminate the line from the RWI site on the binding posts of the TA-312. In the MTC-1, this can be done by connecting the line from the RWI site to the PHONE 1 MTA-4 binding posts in the power and signal entrance box of the AN/MTA-3. Inside the MTA-3, connect a phone cable with a two-conductor plug to the TA-312 binding posts and insert the plug end into the PHONE 1 MTA-4 jack on the signal duct. Do not plug a phone into the PHONE 1 MTA-3 jack in the MTA-4.

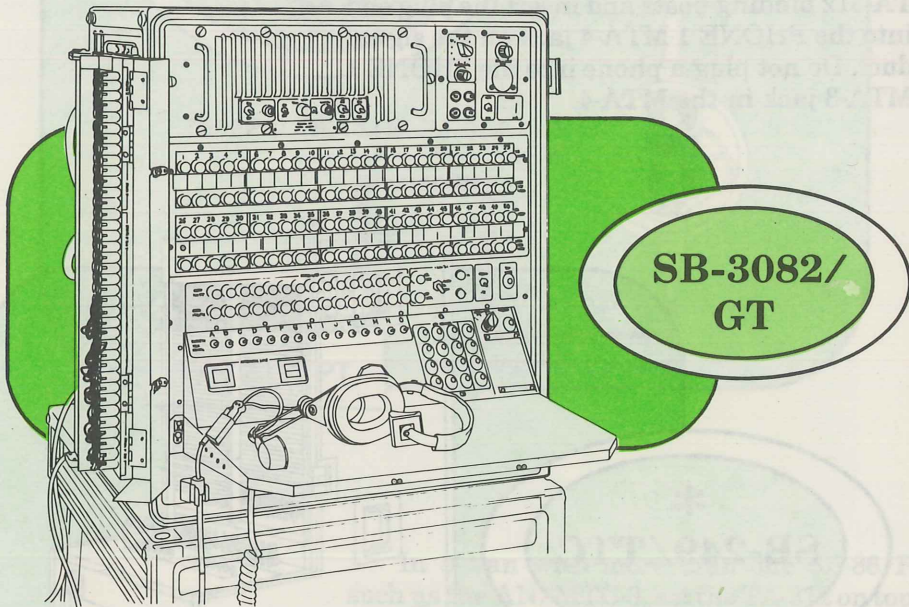
**HELPFUL
HINTS**



RWI operator **MUST** assist telephone subscriber when SB-3082/GT is used.

SB-3082/GT

Radio-wire integration is possible through the SB-3082; however, it won't work on a push-to-talk basis. This means that the RWI operator must assist in the call by using the push-to-talk switch on the RWI equipment handset to key the transmitter for the telephone subscriber. More about that later. For RWI with the SB-3082, connect the pair of wires from the RWI rig to one of the lines on the switchboard. Set the toggle switch on the RWI line to MAG. No special actions are required of the switchboard operator.



AN/TTC-38

Properly program RWI line so that telephone caller can bypass AN/TTC-38 operator.

Have the AN/TTC-38 switch attendant program the RWI line as a 20 Hz, two-wire ring down circuit using terminal code 34. This gives the dual tone multi-frequency (DTMF) telephone (TA-341) subscriber direct access to the RWI 20 Hz phone without assistance from the AN/TTC-38 operator. The AN/TTC-38 operator will have to assist on all calls originating from a radio station.

AN/TTC-25

Have the AN/TTC-25 switch attendant program the RWI line as a 20 Hz, two-wire ring down circuit using classmark 04. This gives the DTMF telephone (TA-341) subscriber direct access to the RWI 20 Hz phone without assistance from the AN/TTC-25 operator. The AN/TTC-25 operator will have to assist on all calls originating from a radio station.

Switch attendant must have program together.

SB-86/P Switchboard Operator Sequence of Events. (Subscriber Origination)

The subscriber signals the switchboard. A drop appears on the board. The switchboard operator plugs in an answer cord and answers. The subscriber asks for the RWI operator. The switchboard operator unplugs the answer cord from the subscriber's jack. If the subscriber's telephone is set for CBS, the signal will drop again and the buzzer will sound. The switchboard operator inserts the plug of the cord connected to the RWI telephone into the subscriber's jack. This will restore the signal, if it dropped, and connect the subscriber to the RWI rig. The switchboard operator cranks the TA-312 hand crank, picks up the handset and waits for the RWI operator to answer. When the RWI operator answers, the switchboard operator hangs up the handset and processes other calls. When the call is completed, the RWI operator rings the switchboard to tell the switchboard operator to disconnect.

**AN/MTC-1 and AN/TTC-7 Switchboard Operator Sequence of Events.
(Subscriber Origination)**

The subscriber signals the switchboard. A light appears on all 3 positions. A switchboard operator plugs in an answer cord and answers. The subscriber asks for RWI. If operator #2 or #3 answered the call he will tell operator #1 to pick up the RWI call on the #1 board. Operator #2 or #3 will unplug when operator #1 plugs in. Switchboard operator #1 plugs the telephone cord into the subscriber's jack, picks up the TA-312 handset, cranks the TA-312, and listens for the RWI operator to answer. Operator #1 must tell the other operators not to plug into the circuit which is being used for RWI. A busy test of the subscriber's jack on position #2 or #3 will not indicate busy, but if an operator plugs into the circuit, the RWI call will be interrupted. The line can be checked using the handset of the TA-312. At the end of the call the RWI operator signals the switchboard, and the TA-312 buzzer sounds. Operator #1 picks up the handset and the RWI operator tells him to disconnect.

**SB-86, AN/MTC-1, and AN/TTC-7 Sequence of Events.
(Radio Origination)**

The RWI operator signals the switchboard. The TA-312 at the switchboard buzzes. The switchboard operator picks up the TA-312 handset and answers. The RWI operator gives the switchboard operator the desired telephone number. The switchboard operator plugs the cord connected to the TA-312 into the desired subscriber's jack, cranks the TA-312, and listens for the subscriber to answer. The switchboard operator replaces the handset on the phone and continues to handle other calls. Operator #1 must tell the other operators not to plug into the telephone circuit which is receiving the RWI call. The RWI operator processes the call and rings the switchboard operator when the call is completed. The TA-312 at the switchboard rings; the switchboard operator picks up the handset and is told to unplug the TA-312 cord from the switchboard.

RWI Equipment, Configurations, Hookups, and Procedures

The following pages explain the connections for, and the operation of, RWI using the AN/GSA-7 and the AN/GRA-39. Use the AN/GRA-39 only if the AN/GSA-7 is not available.

NOTE:

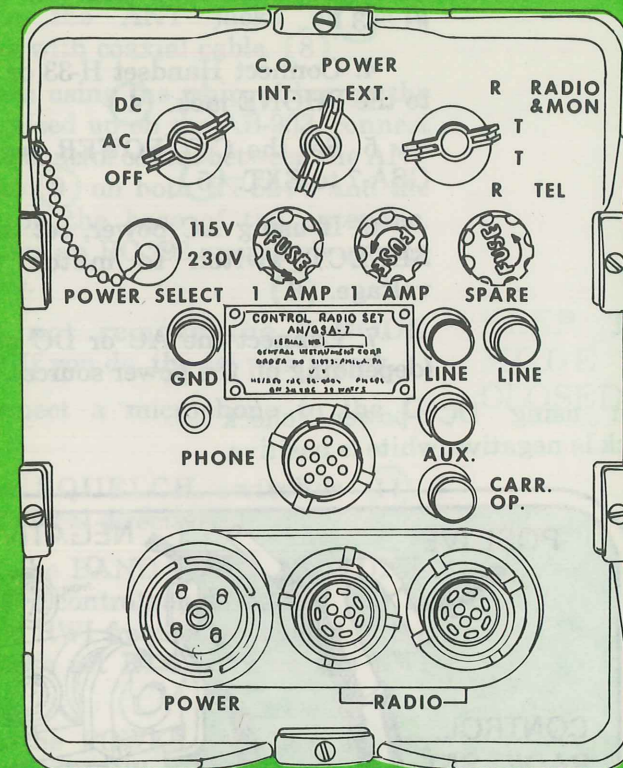
These instructions apply to an RWI system using the Radio Set, AN/VRC-49. If you have only one RT-524, the following change to these instructions will apply. For a call originating from a telephone, the RWI operator will tune his radio to the frequency of the desired station and instruct the radio station to tune to the RWI frequency. He will then return the RWI radio to the RWI frequency to complete the call.

RWI Hookup Using the AN/GSA-7

Material you will need:

Radio Set Control AN/GSA-7
 Telephone Set TA-312
 Radio Set AN/VRC-49 or Receiver-Transmitter RT-524
 Handset H-33 or equivalent

Control, Radio Set AN/GSA-7

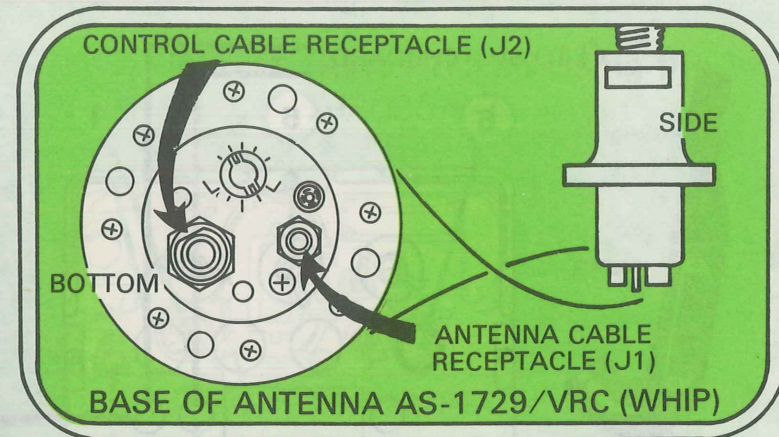
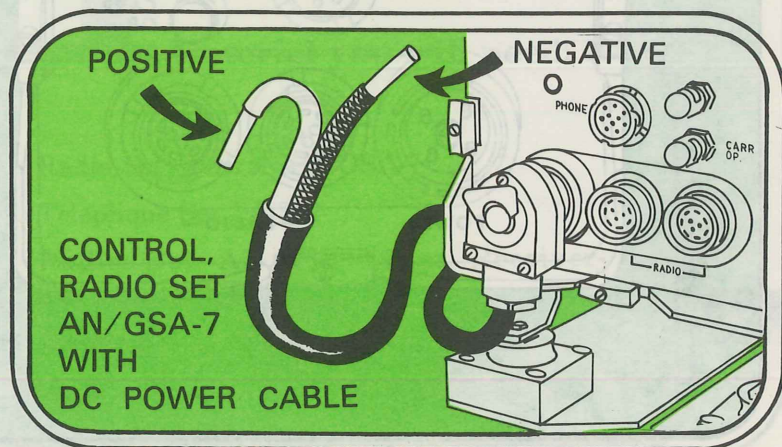


Here's how we do it:

NOTE: The circled numbers are keyed to figure 1.

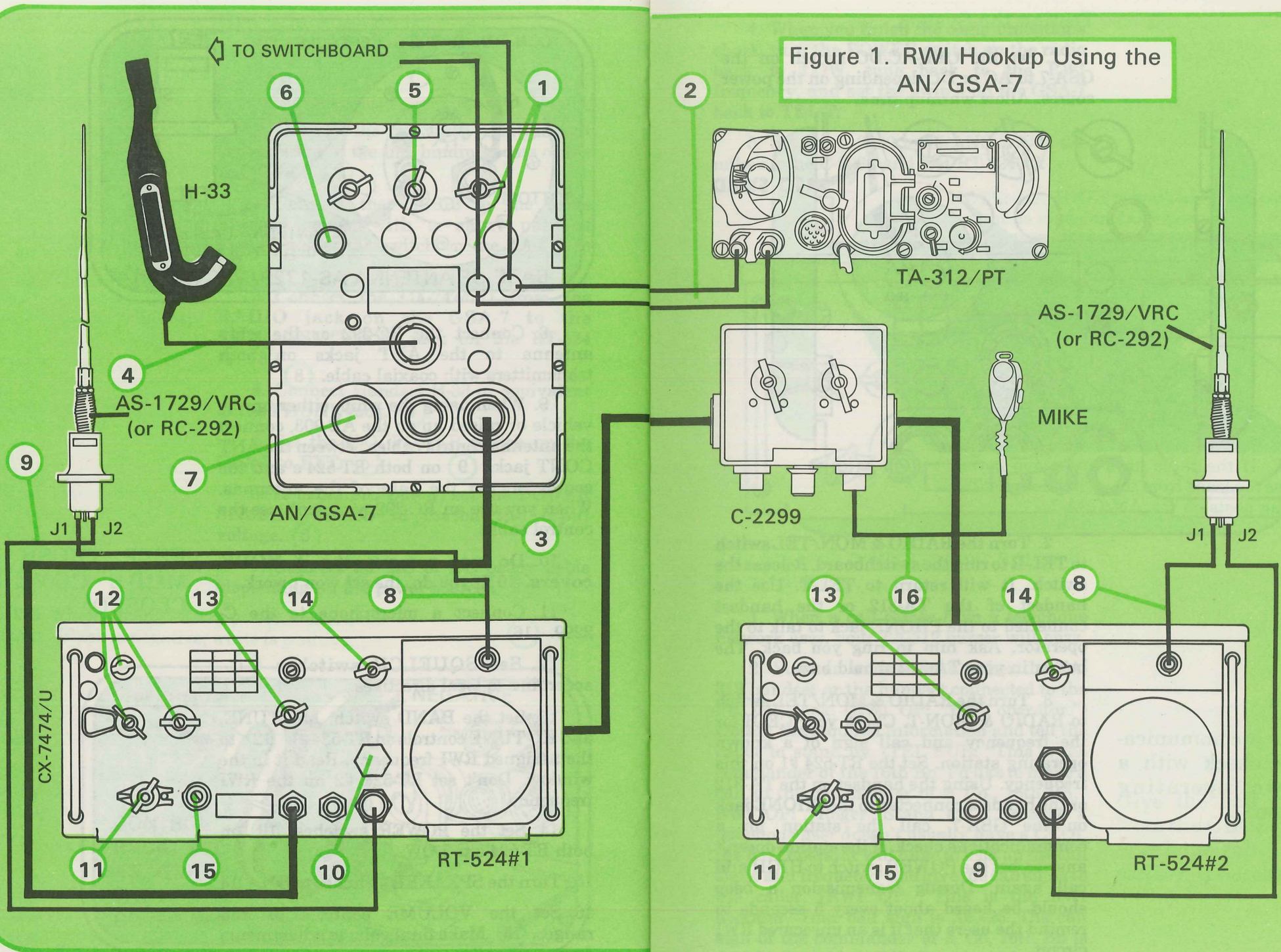
1. Connect the two wires from the unit switchboard to the line binding posts of the AN/GSA-7. ①
2. Connect the TA-312 to the same binding posts with a short pair of wires. ② Set the switch on the TA-312 to LB.
3. Connect the CX-7474/U from the RADIO jack on the GSA-7 to the RETRANSMIT RWI jack on the RT-524 #1. ③
4. Connect Handset H-33 or equivalent to the PHONE jack. ④
5. Set the C.O. POWER switch on the GSA-7 to EXT. ⑤
6. If using AC power, set the POWER SELECT switch to match the input voltage. ⑥
7. Connect the AC or DC power cable (depending on the power source). ⑦

NOTE: When using DC power, check polarity. Black is negative; white is positive.



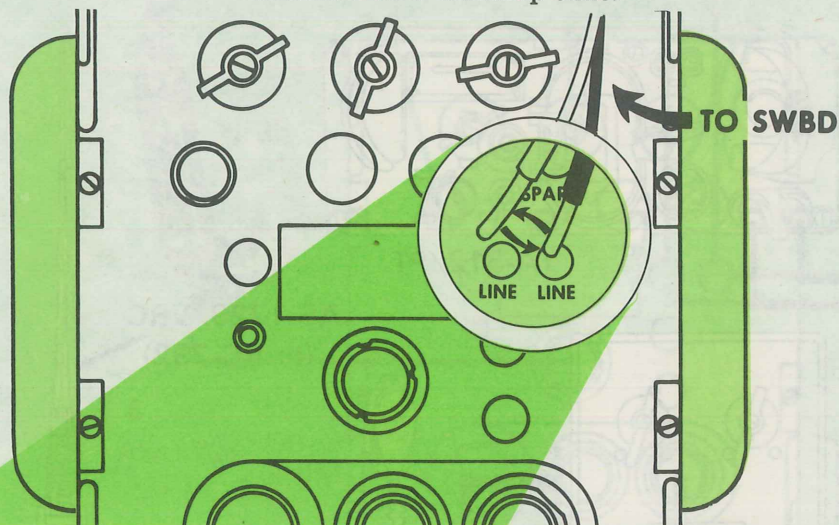
8. Connect the RC-292 or the whip antenna to the ANT jacks on both transmitters with coaxial cable. ⑧
9. When using the whip, either on the vehicle or raised up on the AB-903, connect the antenna control cables between the ANT CONT jacks ⑨ on both RT-524's and the connectors on the base of the antennas. When you use an RC-292, you don't use the control cable.
10. Do not remove the X-MODE covers. ⑩ If you do, the set won't work.
11. Connect a microphone to the C-2299. ⑪
12. Set SQUELCH switches ⑫ according to local directives.
13. Set the BAND switch, MC TUNE, and KC TUNE controls on RT-524 #1 ⑬ to the assigned RWI frequency. Read it in the window. Don't set RT-524 #2 on the RWI frequency.
14. Set the POWER switches ⑭ on both RT-524's to LOW.
15. Turn the SPEAKER switches to ON. ⑮
16. Set the VOLUME controls to mid range. ⑯ Make final volume adjustments during operation.

KEEP THOSE X-MODE COVERS CLOSED!



Testing the System

1. Set the OFF-AC-DC switch on the GSA-7 to AC or DC depending on the power source. Allow warmup time.



NOTE: If the radio keys and stays keyed, reverse the leads from the switchboard at the binding posts on the AN/GSA-7.

2. Turn the RADIO & MON/TEL switch to TEL-R to ring the switchboard. Release the switch. It will return to TEL-T. Use the handset of the TA-312 or the handset connected to the PHONE jack to talk to the operator. Ask him to ring you back. The buzzer in your TA-312 should buzz.

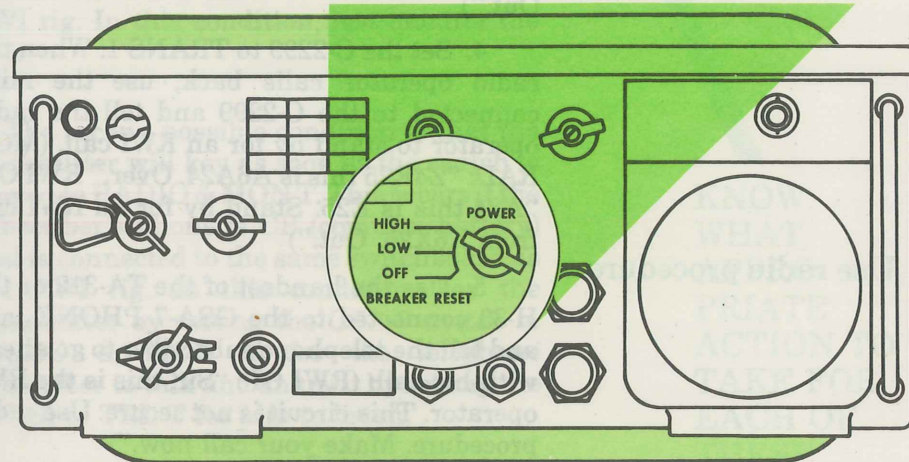
3. Turn the RADIO & MON/TEL switch to RADIO & MON-T. Check your CEOI for the frequency and call sign of a known operating station. Set the RT-524 #1 on this frequency. Using the handset on the TA-312 or the handset connected to the PHONE jack on the GSA-7, call the station for a communications check. If the station doesn't answer, set the POWER switch to HIGH and call again. During transmission a beep should be heard about every 5 seconds to remind the users that it is an unsecured RWI circuit.

Make a communications check with a known operating station.

4. When you finish the communications check, turn the POWER switch on the radio back to LOW, tune back to the RWI frequency, and set the switch on the GSA-7 back to TEL-T.

5. Set the C-2299 to TRANS 2. Use the mike on the C-2299 and test RT-524 #2.

NOTE: Use HIGH power only when contact cannot be made on LOW power.



You are now ready for your first call. Here's how:

1. When a call comes from a telephone network user, your TA-312 buzzer will buzz.

2. You can answer with either the TA-312 handset or the handset connected to the PHONE jack. (RWI OP: "RWI operator.") Obtain the required information and tell the caller to stand by. (TEL SUB: "This is the commander of the 16th Bn. I'd like to make a call to the commander of A Co., 16th Bn." RWI OP: "Roger. Stand by.") Because a telephone user doesn't usually have a CEOI, the RWI operator will have to look up the call signs and frequency and give the call signs to the caller. (RWI OP: "This is the RWI operator. Your call sign is X6X26. The call sign of the commander of A Co, 16th Bn is A6A24. Stand by while I contact him.")

Give the call signs from the CEOI to the telephone subscriber, if necessary.

C-2299 switch settings are important.

Use radio procedure.

3. Tune your RT-524 #2 to the desired party's frequency. Set the C-2299 switch to TRANS 2. Use the mike connected to the C-2299 and call the desired radio station. (RWI OP: "A6A24 this is Z4E25. Over.") When the radio operator answers, tell him to tune to the RWI frequency and call you back. (MOB OP: "E25 this is A24. Over." RWI OP: "A24 this is E25. Tune to my frequency and call me back. Over." MOB OP: "E25 this is A24. Roger. Out.")

4. Set the C-2299 to TRANS 1. When the radio operator calls back, use the mike connected to the C-2299 and tell the radio operator to stand by for an RWI call. (MOB RAD: "Z4E25 this is A6A24. Over." RWI OP: "A24 this is E25. Stand by for an RWI call from X6X26. Out.")

5. Use the handset of the TA-312 or the H-33 connected to the GSA-7 PHONE jack and tell the telephone subscriber to go ahead with his call. (RWI OP: "Sir, this is the RWI operator. This circuit is not secure. Use radio procedure. Make your call now.")

6. Set the switch on the GSA-7 to RADIO & MON T.

7. Any one of three conditions will occur.

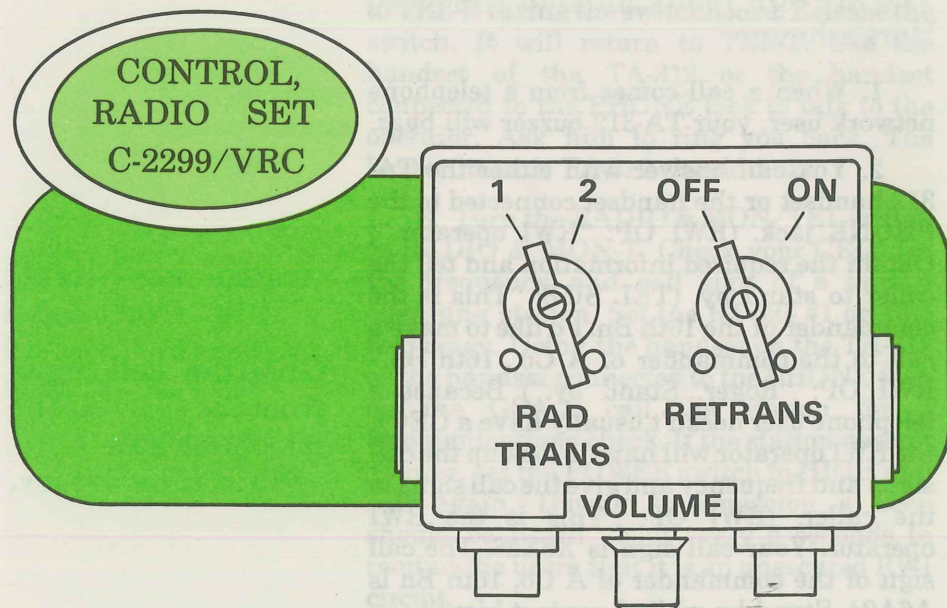
a. The telephone subscriber will be able to control the transmitter from his telephone set. This happens if the subscriber's telephone is set for LB (local battery) and is connected to the same switchboard as the RWI rig. In this condition, just monitor the call.

b. The second possible condition is that the transmitter will key as soon as the switch is moved to RADIO & MON T. This occurs if the subscriber's phone is CB (common battery) and is connected to the same switchboard as the RWI rig. In this condition, key the transmitter by setting the GSA-7 switch to RADIO & MON T for the telephone subscriber to talk and unkey it by setting the switch to TEL T for him to listen.

c. The third possible condition is that the subscriber will be unable to key the transmitter from his telephone set and it does not key when the GSA-7 is set to RADIO MON T. This occurs if the AN/TTC-25, AN/TTC-38 or SB-3082 switch is used or if the call comes over a multichannel system. In this condition, leave the GSA-7 switch in TEL T. Key the transmitter with the switch on the TA-312 handset or the handset connected to the PHONE jack for the telephone subscriber to talk. Unkey it when he listens.

KNOW WHAT APPROPRIATE ACTION TO TAKE FOR EACH OF THESE CONDITIONS:

NOTE: If you can find out beforehand what type telephone system is in your area (CB, LB, automatic switch) you should be able to tell beforehand how the transmitter is to be keyed.



8. Monitor the call. If feedback from the speaker causes erratic keying or squealing, turn off the speaker and monitor with the handset.

9. When the call is over, ring the switchboard operator and tell him to disconnect. Return the switch on the GSA-7 to TEL T.

Here is how a call originating at a radio set goes.

1. You'll hear the call from the speaker of RT-524 #1. (MOB RAD: "Z4E25 this is A6A24. Over.")

2. Answer the call using the mike on the C-2299. (RWI OP: "A24 this is E25. Over.")

3. Get the required information from the radio operator and tell him to stand by. (MOB RAD: "E25 this is A24. Request an RWI call to X6X26. Item 5D of CEOI. Over." RWI OP: "Roger. Wait. Out.")

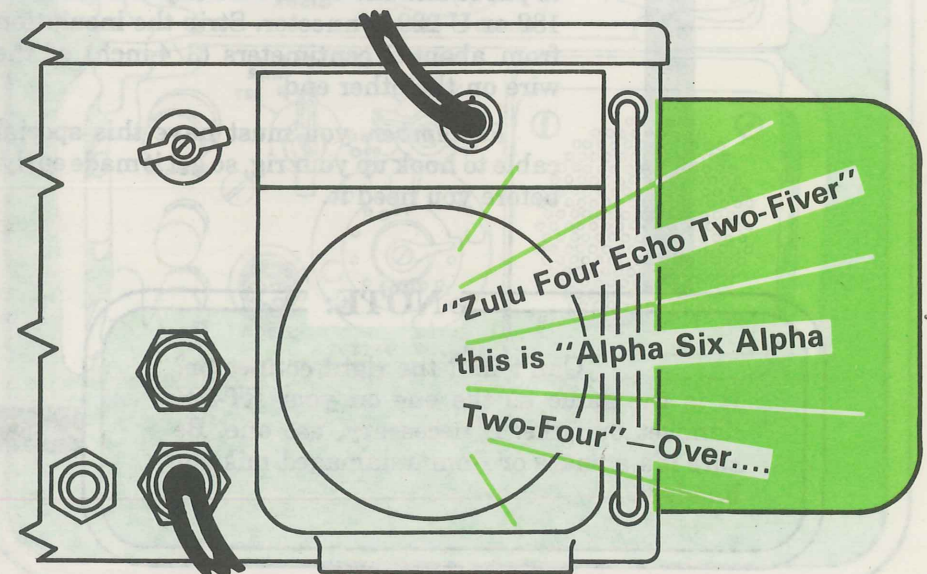
4. Look up the telephone number of the desired party. Pick up the TA-312 handset or the H-33. Turn the switch on the GSA-7 to TEL-R to ring the switchboard. When the switchboard operator answers give him the desired telephone number (RWI OP: "Give me Chatter 296.")

5. When the telephone is answered, get the desired party on the line (TEL SUB: "Headquarters, 16th Bn, Sgt Smith speaking. Sir." RWI OP: "This is the RWI operator. I have an RWI call for the commander of the 16th Bn." BN CDR: "LTC Smith." RWI OP: "This is the RWI operator. I have an RWI call for you from the commander of A Co, 16th Bn. Your call sign is X6X26. Use radio procedure. This circuit is not secure. Stand by.")

6. Pick up the mike and tell the radio operator to go ahead with the call. (RWI OP: "A24 this is E25. X6X26 is on the line. Go ahead with your call. Out.")

7. Switch the GSA-7 to RADIO & MON T. Refer to the previous sequence for differences in transmitter keying with common battery, local battery or automatic switches.

8. When the call is completed, return the GSA-7 switch to TEL T. Ring the switchboard to tell him to disconnect the call.



RWI Hookup Using the AN/GRA-39

Material you will need:

Radio Set Control Group AN/GRA-39.

Switchboard SB-22/PT

Radio Set AN/VRC-49 or Receiver-Transmitter RT-524

18 Batteries BA-30/U

Connector U-182/U or Connector U-229/U and 1 meter (about 3 feet) of two-wire cable.

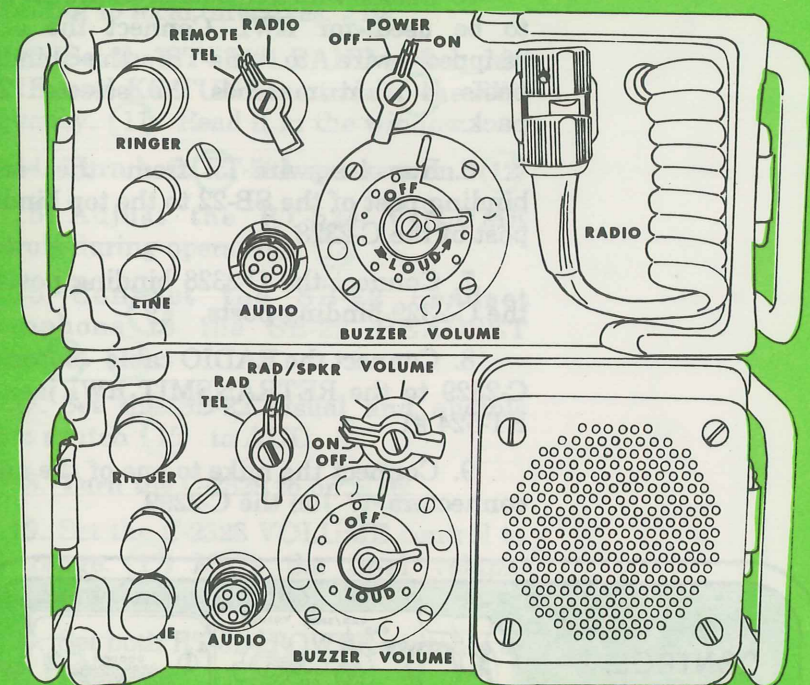
Have your repairman build a cable as follows: connect one wire of the 1-meter cable to pin A and the other wire to pin C of the U-182 or U-229 connector. Strip the insulation from about 2 centimeters (3/4-inch) of the wire on the other end.

Remember, you must have this special cable to hook up your rig, so get it made early, before you need it.

NOTE:

Can't find the right connector? It is the same as the one on your RT-524 handset or mike. If necessary, use one. Be sure it's a spare or from a damaged mike or handset.

Control Group, Radio Set AN/GRA-39

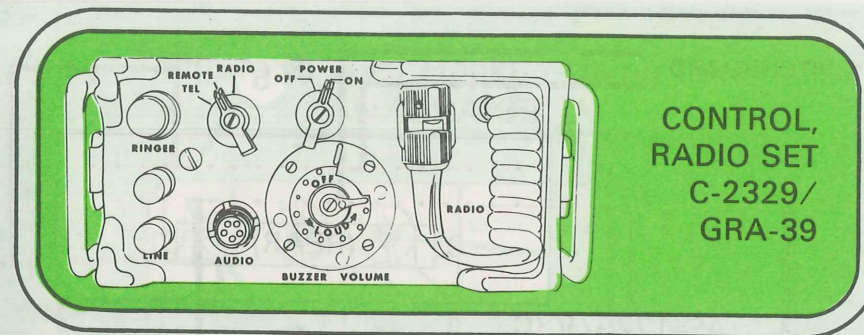
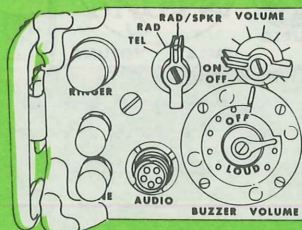


Now, here's the hookup:

NOTE: The circled numbers are keyed to figure 2.

1. Install BA-30's in the C-2328, C2329, and SB-22.
2. Connect the WD-1 from the unit or area switchboard to a pair of line binding posts on your RWI SB-22. **1**
3. Connect the connector of the two-wire cable (the one you had made up) to the AUDIO jack on the C-2328. **2**
4. Connect one of the stripped wires of your homemade cable to the bottom binding post of the C-2328. **3**
5. Decide which line pack on the SB-22 is to be used for RWI. Connect the other stripped wire **4** that matches the selected line pack.
6. Run a wire **5** from the other binding post of the SB-22 to the top binding post of the C-2328.
7. Connect the C-2328 binding posts to the C-2329 binding posts. **19**
8. Connect the RADIO cable **6** on the C-2329 to the RETRANSMIT RWI jack on RT-524 #1.
9. Connect the mike to one of the audio connectors **7** on the C-2299.

CONTROL,
RADIO SET
C-2328/
GRA-39

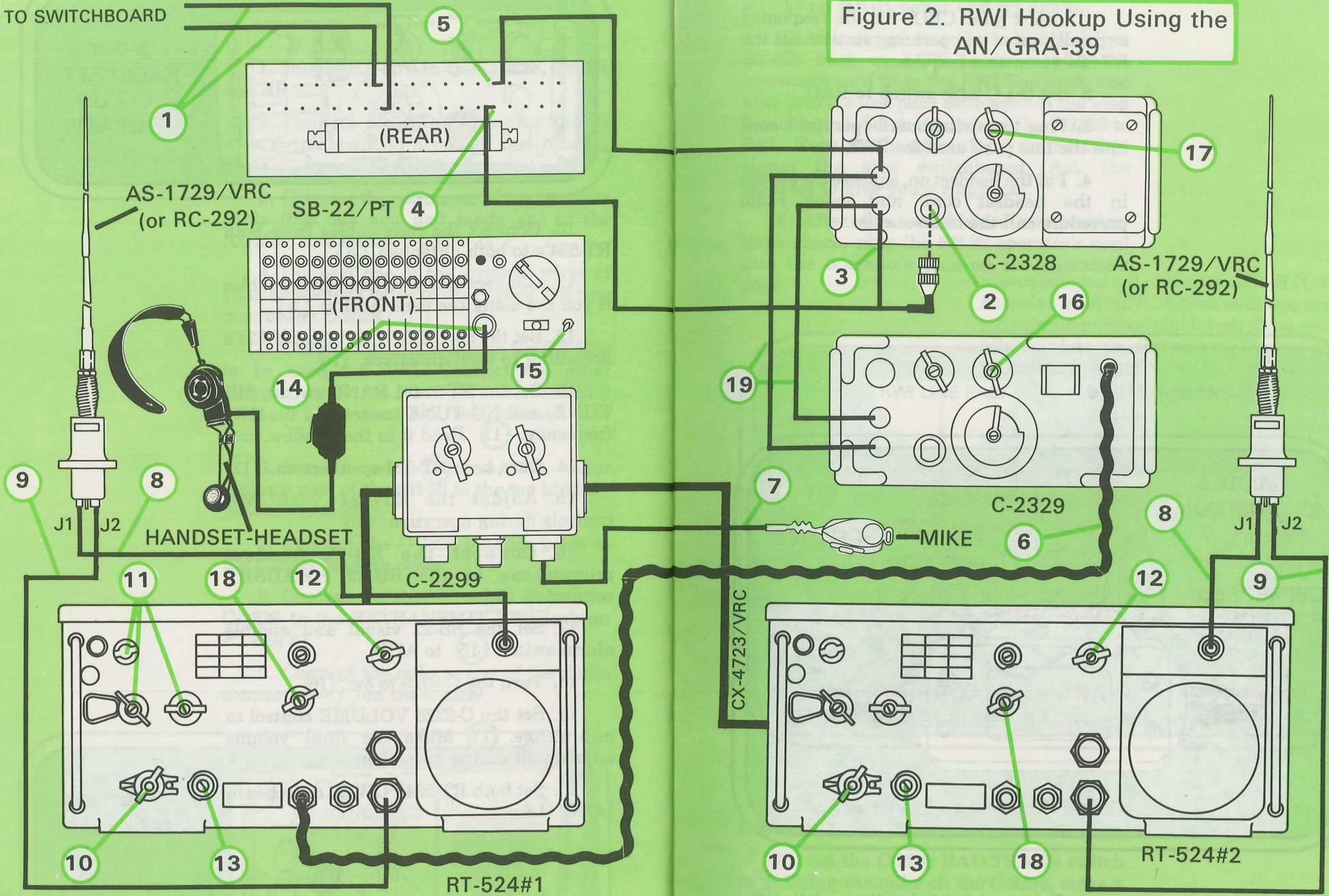


CONTROL,
RADIO SET
C-2329/
GRA-39

10. Connect the coax cables from both RT-524's to both antennas. **8**
11. Connect both antenna control cables if you are using the vehicle whip. **9**
12. Set the SQUELCH on both RT-524's according to local directives. **10**
13. Set the RT-524#1 BAND switch, MC TUNE, and KC TUNE controls to the RWI frequency. **11** Read it in the window.
14. Turn both RT-524 speakers on. **12**
15. Adjust the RT-524 VOLUME controls during operation. **13**
16. Connect the SB-22 headset microphone to the SB-22 HEADSET connector. **14**
17. Set the SB-22 visual and audible alarm switch **15** to AUD.
18. Turn the C-2329 to on. **16**
19. Set the C-2328 VOLUME control to mid range. **17** Make the final volume adjustment during operation.
20. Set both RT-524 POWER switches to LOW. **18**

NOTE: If the transmitter keys and stays keyed, reverse the two wires **4** and **5** connected to the RWI line pack on the back of the SB-22.

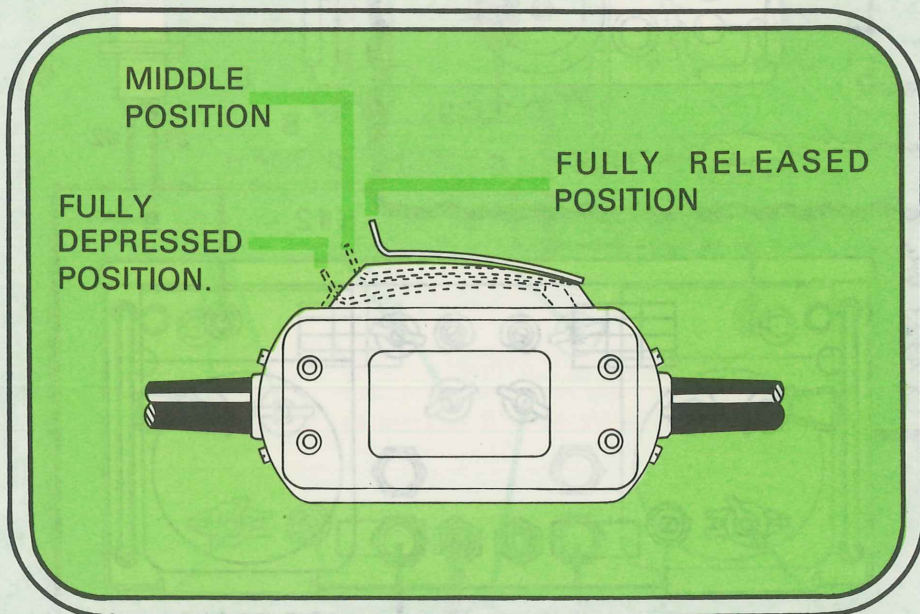
TO SWITCHBOARD



Testing the System

1. Check your CEOI for the frequency and call sign of an operating station. Set the RT-524 #1 on this frequency.
2. Set the C-2328 switch to RAD.
3. Plug the switchboard operator's cord into the line pack used for RWI.
4. Put the headset on, squeeze the switch in the headset cord, and using radio procedure call the radio station.

NOTE: The switch in the headset cord is a three-position switch. The fully released position is off, the middle position (in which it can be locked) permits talking, and the fully depressed position will key a transmitter connected to it.

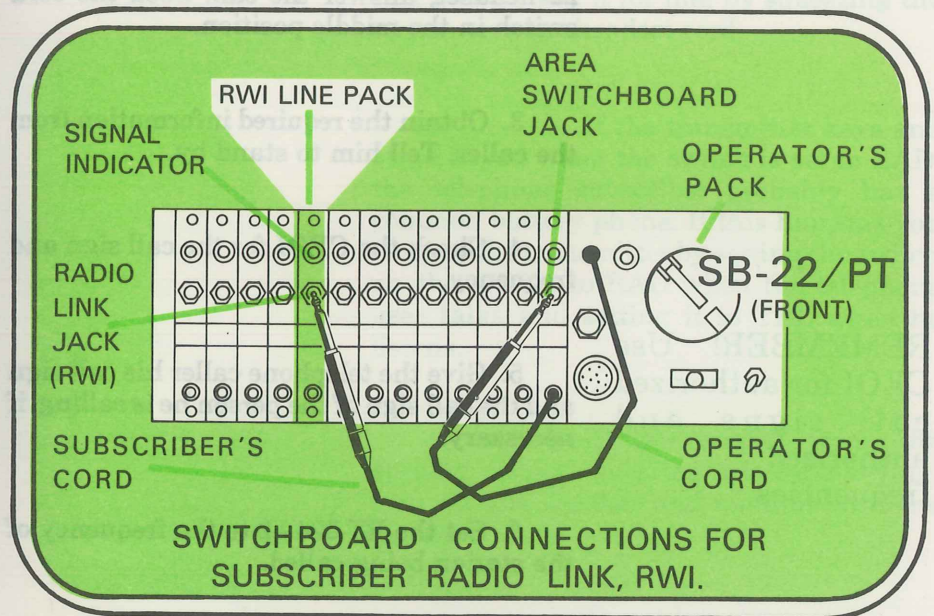


5. Release the switch to listen. Adjust the headset audio using the VOLUME control on the RT-524.

6. If the station does not answer, set the RT-524 on HIGH power and try again.

7. After completing the radio check, put RT-524 back on LOW power, unplug the operator's cord from the RWI line pack, and plug into the line pack connected to the area switchboard. Set the switch on the C-2328 to TEL. Turn the handcrank on the SB-22 to signal the area switchboard. Ask the operator to give you a ringback.

8. After the switchboard communications check, plug the SB-22 operator's cord into the operator's jack on the operator's pack.



9. Set the RT-524 #1 back on the RWI frequency.

10. Set the C-2299 RAD TRANS switch to 2. Using the mike on the C-2299, make a radio check with the same station. When you finish testing, set the C-2299 back on RT-524 #1 and wait for the action.

Processing a call using the GRA-39.
(Call originates from a telephone.
Refer to the GSA-7 sequence for
typical conversation.)

1. The drop on the line pack connected to the area switchboard will turn to white and the buzzer will sound.

2. Plug the operator's cord into the area switchboard line pack jack and, using the SB-22 headset, answer the call. Lock the cord switch in the middle position.

3. Obtain the required information from the caller. Tell him to stand by.

4. Check the CEOI for the call sign and frequency.

5. Give the telephone caller his call sign and the call sign of the person he is calling, if necessary.

6. Set the RT-524 #2 to the frequency of the station being called.

7. Set the C-2299 to TRANS 2. Use the mike on the C-2299 and call the radio station.

8. When the radio station answers, tell the radio operator to tune to the RWI frequency and to call back. Set the C-2299 to TRANS 1.

9. When the radio operator calls back, answer the call by using the mike on the C-2299 and tell him to stand by for an RWI call.

10. Plug the cord of the line pack connected to the area switchboard into the jack on the RWI line pack, and talking into the SB-22 headset-mike, tell the telephone subscriber to go ahead. Tell him to use radio procedure and inform him that the circuit is not secure.

NOTES: 1. If the telephone subscriber can't key the transmitter with his push-to-talk switch, key it for him by squeezing the switch on your headset cord.

2. If the transmitter keys and stays keyed when the switch is set to RAD, the telephone subscriber probably has a common battery phone. If this happens you can key the transmitter by setting the switch on the C-2328 to RAD when the telephone user talks and setting it to TEL when he listens.

3. If the sound from the speaker causes squealing or erratic keying, turn off the speaker and monitor with the headset.

11. Set the switch on the C-2328 to RAD. Monitor the call.

12. When the call is finished, unplug the RWI line pack cord, set the C-2328 switch to TEL, ring the switchboard, and tell him to disconnect his cords. Plug the SB-22 operator's cord into the jack on the operator's pack and wait for another call.

REMEMBER! Use CEOI for authorized call signs and authorized frequencies.

**Handling a call from a radio set user.
(Refer to the GSA-7 sequence for
typical conversation.)**

1. The call will be heard on the RT-524 #1 speaker.
2. With the switch on the C-2299 at position TRANS 1, answer the call using the mike connected to the C-2299. Get the required information from the radio operator. Tell him to stand by.
3. Plug the SB-22 operator's cord into the jack on the line pack connected to the area switchboard. Turn the crank on the SB-22.
4. When the area switchboard operator answers, use the SB-22 headset mike to tell him that you have an RWI call and give him the desired number.

NOTES: 1. If the telephone subscriber can't key the transmitter with his push-to-talk switch, key it for him by squeezing the switch on your headset cord.

2. If the sound from the speaker causes squealing or erratic keying, turn off the speaker and monitor with the headset.

3. If the transmitter keys and stays keyed when the switch is set to RAD, the telephone subscriber probably has a common battery phone. If this happens you can key the transmitter by setting the switch on the C-2328 to RAD when the telephone user talks and setting it to TEL when he listens.

5. When the desired party answers, tell him that the line is not secure, his assigned call sign, to use radio procedure, and to stand by.

6. Plug the cord from the area switchboard line pack into the RWI line pack jack.

7. Use the mike connected to the C-2299 and tell the radio operator to go ahead with his call. Set the switch on the C-2328 to RAD. Monitor the call.

8. When the call is completed, unplug the RWI cord, ring the switchboard operator, and tell him to disconnect.

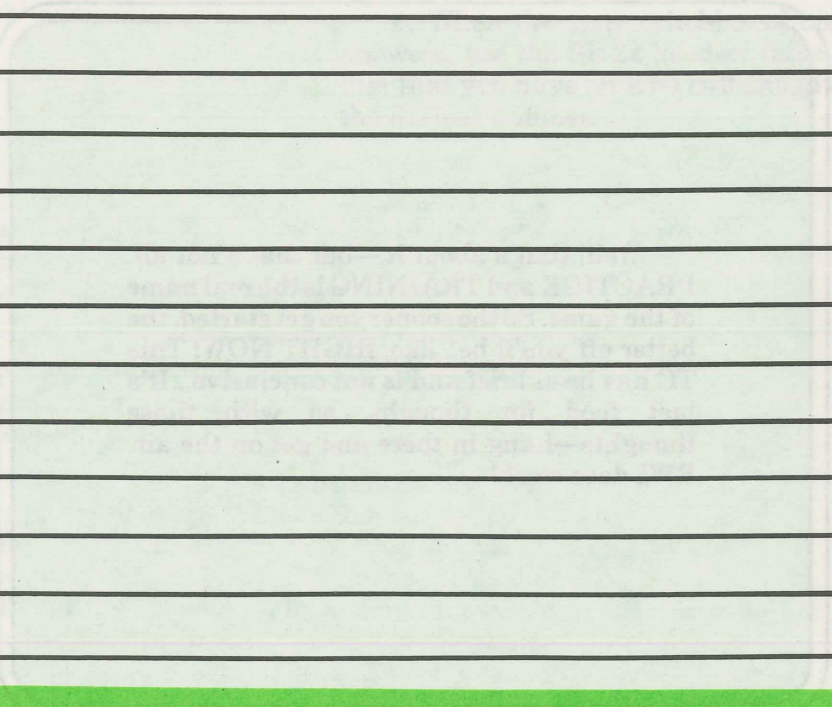
9. Plug the operator's cord into the jack on the operator's pack and wait for the next call.

Advise called party that RWI is not secure. Provide him with his call sign from CEOI if necessary.

Well, that's about it,—but that's not all. PRACTICE and TRAINING is the real name of the game. So the sooner you get started, the better off you'll be...like, RIGHT NOW! This TC has been brief and is not conclusive...It's just food for thought, so with those thoughts—hang in there and get on the air. RWI does work!

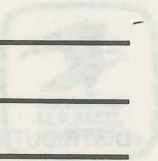
NOTES:

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COMMANDANT
US ARMY SIGNAL SCHOOL



TC 24-3
30 NOVEMBER 1976

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Chief of Staff

Official:

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DUTY STATION AUTOVON NUMBER

TC 24-3

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THANKS.

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*RWI
IS
NOT
SECURE!*

