Alinco SR4 / SR4-D
Technical Instruction Manual
Multi-Mode Super Repeater Controller

(Pages 60 and 74 are blank, and do not appear in this document.)

CQ CQ CQ repeater user!

After looking for a digital copy of this manual, it seems that no one online has a copy, and everyone is looking for it. Our club would simply not have been able to make our repeater work without this manual.

I checked with Alinco's website and found nothing. I attempted to locate an archive. Nothing. I hope they will post one as the digitizing of this manual is in no way intended to intrude on any copyright holding.

In the meantime I hope this information will assist rightful equipment owners to properly configure and utilize their repeater system.

Top Tips

1. **Read the manual. Some Elmers don't actually know what they are doing, or simply forgot.**
2. **Just because you reset it, doesn't mean that it's actually operationally turned on. Keying on frequency and entering DTMF tone "01" will turn it on. (See page 61)**
3. **To record a station ID key up and enter "32" to clear the old ID. Key again and enter "30", and then un-key. You should hear a string of cheerful tones. Key again and voice record your ID. Un-key. The message should play back.**
4. **A quick beep is a positive acknowledgment (success). A long beep is a negative acknowledgment (failure)**

Best speed to your success and 73

ALINCO

SR4 / SR4 - D

TECHNICAL INSTRUCTION MANUAL

VERSION 1

MULTI-MODE
SUPER REPEATER CONTROLLER

SR4 / SR4-D

INSTRUCTION MANUAL

VERSION 1

OCTOBER 5, 1992

INTRODUCTION

The SR4 is a fully self-contained, microprocessor based, remote programmable controller, capable of controlling one or two radio transceivers in Simplex Repeater, Split Simplex Repeater, Duplex Repeater Controller, Voice Mail, and Voice IDer modes separately or simultaneously.

There is no duplexer required for simplex modes.

The SR4 is a controller; the user is required to connect it to a radio(s) to make it into a complete repeater.

HOW TO USE THIS MANUAL

This manual is written in three parts; one part is a QUICK SET-UP SECTION, another part is an in depth TECHNICAL SECTION, and there is also a **"SINGLE PAGE FAST SET-UP" that will get you and your SR4/SR4-D into operation, right out of the box without making any adjustments or settings.** The quick set-up section has enough information to get you going, and get the SR4/SR4-D in operation. To fully exercise the SR4/SR4-D, you must read the technical section as well, because it contains the full set of remote DTMF commands required to configure the SR4/SR4-D for your applications, as well as containing information for VOICE MAIL and VOICE IDer operations. To start we highly recommend that you read through the entire manual before operating the SR4, because there is information that is covered in the quick set-up section that is not covered in the technical section. However, there is some information in the technical section and the quick set-up section which is duplicated for user convenience.

In this manual there are many sections, parts, paragraphs, and sentences that are repeated in many places. This manual may explain one topic many different ways to minimize the possibility of misinterpretation.

SR4 VERSIONS

The SR4 is available in two versions, the SR4 and the SR4-D.

SR4

The SR4 can control only one radio, while the SR4-D can control two radios. These radios are called "radio 1" and "radio 2". The only repeater function the SR4 has is simplex repeat. It will store and forward your audio messages with a delay as long as the length of your message. When the user keys their radio and speaks, the SR4 records the audio. When the user un-keys their radio, the SR4 plays back the audio it just recorded, for all other radio operators to hear. The user that transmitted the message will also hear them-self back. VOICE MAIL and VOICE IDer are included.

SR4-D

The SR4-D can control one or two radios simultaneously. The SR4-D has all the capabilities of the SR4. The only addition the SR4-D has, is that it can operate in "REAL TIME" mode. The SR4-D can operate as a FULL DUPLEX REPEATER CONTROLLER. This SR4-D has all possible capabilities offered by ALINCO. The user may remotely configure the SR4-D for duplex or simplex operation by sending DTMF configuration commands. When the SR4-D is operating in full duplex mode all the audio being received by the radio you have designated to be the receiver will be simultaneously transmitted by the radio you have designated to be the transmitter. The SR4-D can operate in duplex mode as well as in simplex mode at the same time. You can set the SR4-D in duplex mode and set either one, or both radios in simplex repeat mode as well. You can communicate with radio operators on your own band with one of the radios operating in simplex repeater mode, and at the same time, you can full duplex repeat to other radio operators on another band. VOICE MAIL and VOICE IDer are included.

SINGLE PAGE FAST SET-UP INSTRUCTIONS INTRODUCTION

This section consists of only one page. If you already have a working knowledge of two way radios and or repeaters and you don't like reading instruction manuals, this section is for you.

QUICK SET-UP INSTRUCTIONS INTRODUCTION

The quick set-up section will help you get the SR4/SR4-D into operation very quickly and will provide more information than the single page fast set-up section. The quick set-up instructions will not cover full duplex operation, you must reference the technical instruction section for that information.

The quick set-up only covers the SR4, however, if you have an SR4-D, you can use the quick set-up section as well. To do so, just follow the quick set-up instructions with your SR4-D. The only difference will be that, you will not exercise the SR4-D's "radio 2". Once you understand how the SR4 works, you can use the technical section to fully exercise the SR4-D. The quick set-up section does not cover connecting the SR4/SR4-D to your radio with connections that you wire yourself, such as with the un-terminated adapter. If you intend to use the un-terminated adapter and do the wire connections with the radio yourself, you will need to refer to the radio connection instructions in the technical section of this manual. The quick set-up section only covers radio connection using the pre-wired Alinco mobile cable supplied with the SR4/SR4-D and/or using the Alinco SR4/SR4-D adapters for other manufacturers' radios.

TECHNICAL INSTRUCTIONS INTRODUCTION

The technical instructions will go through in depth information for the SR4 and the SR4-D. The technical instructions will cover all hardwire connections with radios and hardwire control lines. It will contain the information needed to remotely control the SR4/SR4-D with DTMF tones.

TERM DEFINITIONS

These terms are used in this manual. Most of these terms are generic, they are common known terms in radio electronics. Some of these terms will only apply to the SR4/SR4-D products.

RADIO(S)	One or multiple radios.
USER(S)	Any radio operator.
CTCSS	Continuous Tone Coded Squelch System.
DCTCSS	Digital Continues Tone Coded Squelch System.
RX	Receive
TX	Transmit
IDer	Station Identifier.
ID	Identification, Identify.
DTMF	Dual Tone Multi Frequency, Telephone dial tones.
ENCODE	Used during transmission (EXAMPLE: Encode CTCSS tone.)
DECODE	Used during receive (EXAMPLE: Decode CTCSS tone.)
LED	Light Emitting Diode, a display device. The SR4 has 5 LED's on the front of the case, used for: PTT, DTMF, IDer, SR, and COR.
DC	Direct current.
HARDWIRE	A wire is used to send information to the SR4. A physical connection.
POT	Variable resistor, used for adjusting audio or DC levels, etc...
VOICE MAIL	A device used to store a message that can be retrieved at a later time.
COR	Carrier operated relay
COS	Carrier operated squelch
AUX	Auxiliary
CLEAR	Erase
DRAM	Dynamic Random Access Memory Chip
FORCED	To cause a function to occur before it's regular time.
POST	after an event
ENFORCE	Maintain = don't change, lock
GND	Ground
DWG	Drawing
R1	Radio 1
R2	Radio 2
POS	Position; refers to the 12 position DIP-SWITCH. "S3"
LSB	Least Significant Bit
MSB	Most Significant Bit
TURN	One complete rotation

SINGLE PAGE FAST SET-UP REQUIREMENTS

This section will only exercise the simplex repeat function of the SR4/SR4-D.

ITEMS NEEDED:
1. 12 volt regulated power supply @ 160 ma. min.
2. One radio to connect to the SR4/SR4-D.
3. One radio for the user to test with.

INSTRUCTIONS ON NEXT PAGE

PROCEDURE

You must establish communication between the radio that is connected to the SR4/SR4-D and the user radio before proceeding (make sure that when you transmit to the SR4/SR4-D radio, it can hear you, and visa-versa).

1. Un-box the SR4/SR4-D.
2. Locate the SR4/SR4-D cable (supplied). There are three cables, two have colored sleeves and one has no colored sleeve and no termination. Using the cable that **does not** have a colored sleeve (**GRAY COLOR NEAR THE DB25 CONNECTOR**), strip the jacket off of the cable. Then strip the RED and BLACK wires.
3. Connect the RED wire to +12VDC on the power supply.
4. Connect the BLACK wire to the GROUND on the power supply.
5. Connect the BARE drain wire to GROUND on the power supply.
6. Locate the cable that has the BLACK sleeving near the DB25, and plug it into your Alinco mobile radio.

If you are not using an Alinco mobile radio. You will need to use the Alinco SR4/SR4-D adapters to interface with other manufacturers radios. HAND HELD and MOBILE adapters are available.

7. Locate the 1 foot patch cord (included). Plug the patch cord into the jack located on the cable that you plugged into the radio.
8. Plug the other end of the 1 foot patch cord into the external speaker jack located at the back of your radio.
9. **CLOSE THE SQUELCH ON THE RADIO CONNECTED TO THE SR4/SR4-D.**
10. If you are using a hand held radio set the volume at half level (50%). If you are using a mobile radio set the volume at quarter level (25%). EXPERIMENT WITH DIFFERENT LEVELS FOR OPTIMUM AUDIO QUALITY.
11. Turn the user radio on.
12. Turn the SR4/SR4-D radio on.
13. Turn the SR4/SR4-D on.

When you key the user radio the "COR" LED will light on the front of the SR4/SR4-D. When you un-key it will go off.

14. Key the user radio and speak into the user radio. When you un-key the SR4/SR4-D will key its' radio and repeat your message over the air. You will hear your message repeated back to you.

Providing the factory "DTMF IN" audio level setting is satisfactory for your radio, you may proceed to the REMOTE DTMF PROGRAMMING section.

If the SINGLE PAGE SET-UP INSTRUCTIONS did not get your SR4/SR4-D into operation, you should then read the other two sections.

QUICK SET-UP INSTRUCTIONS

The following quick set-up instructions fully apply to the SR4 and partially apply to the SR4-D. The portion of the SR4-D that is not covered in the quick set-up instructions are the audio level adjustments for full duplex, and full duplex operating information. Radio 2 connections and adjustments are not covered.

SR4

If you have an SR4, this section will fully apply, because the SR4 can only control one radio (radio 1).

SR4-D

If you have an SR4-D, this section will partially apply. Because, the SR4-D can control two radios (radio 1 and radio 2), therefore, the quick set-up section will apply to the SR4-D if only one radio is used (radio 1). The SR4-D will be treated as if it was an SR4. The only difference is that radio 2 will not be referenced or be used in this section.

CARRIER DETECTION

The RV2 carrier detection board detects the presence of a carrier by detecting the presence of audio at the speaker output of it's radio. The RV2 (RX VOX) board is the method of carrier detection for the SR4. One RV2 carrier detection board is included with the SR4. Two RV2 carrier detection boards are included with the SR4-D. The SR4 comes with one RV2 board because it can only control one radio. The SR4-D comes with two RV2 boards because it can control one or two radios.

The RV2 carrier detection boards plug in, on top of the SR4/SR4-D board. Each carrier detection board has its own special place to plug in with respect to each radio.

The SR4/SR4-D has the ability to support an internal CTCSS decoder. The SR4/SR4-D'S internal CTCSS decoder will only need to be used for very specific applications because if you wish to use CTCSS, you can use a radio that has a built-in CTCSS decoder. If you wish to use CTCSS, and if the radio you are using does not have a CTCSS decoder installed, you can have one installed by a qualified technician. With the CTCSS board installed in the SR4/SR4-D you can only use discriminator audio, which in most cases is a very difficult point to connect to in your radio. If you require the use of the SR4/SR4-D internal CTCSS decoder board you can contact ALINCO ELECTRONICS.

The SR4/SR4-D has the ability of accepting a HARDWIRE COR input

for carrier detection. To be able to use HARDWIRE COR input, a special carrier detection board will need to be used. This board is for very specific applications. If you require the use of this board you can contact ALINCO ELECTRONICS.

If you are using the SR4, you can only use "radio 1" (R1), because, the SR4 can only control radio 1. The SR4's RV2 plugs in board position 1 "BOARD 1", because that is where the RV2 for radio 1 plugs in.

If you are using the SR4-D, you will still only use "radio 1" to simplify the set-up. In this section of the manual you will be treating the SR4-D as if it were an SR4. To use two radios, refer to the technical instructions. This section of the manual will only exercise the one radio simplex repeater function of the SR4/SR4-D.

INITIAL SETTINGS AND ADJUSTMENTS

Remove the cover of the SR4.

SR4 DIP-SWITCH SETTINGS

Set "S3" to the following settings. 12 position dip-switch.

pos 1 = 1 = down	DRAM capacity	(The combination of the two
pos 2 = 1 = down	DRAM capacity	switches selects 4 DRAM chips)
pos 3 = 1 = down	Radio 1 accept remote configuration,	**ON**
pos 4 = 1 = down	Radio 2 accept remote configuration,	**ON**
pos 5 = 1 = down	Radio 1 acknowledge enable,	**ON**
pos 6 = 1 = down	Radio 2 acknowledge enable,	**ON**
pos 7 = 1 = down	Radio 1 RX forced on at power up,	**ON**
pos 8 = 1 = down	Radio 2 RX forced on at power up,	**ON**
pos 9 = 0 = up	Radio 1 lock current RX configuration,	**OFF**
pos 10 = 0 = up	Radio 2 lock current RX configuration,	**OFF**
pos 11 = 1 = down	3 minute PTT TIME OUT timer,	**ON**
pos 12 = 0 = up	Post Record Rewind,	**OFF**

INITIAL SR4 POT ADJUSTMENTS

The SR4/SR4-D has two types of POTs. One type is a multi-turn, the other type is a single turn. You will need to be able to adjust these POTs to their approximate center (half level).

SINGLE TURN POTS

To adjust the single turn POTs to their approximate center position. Turn the adjusting screw fully to the right then fully to the left, and approximate the center position. The single

trim POTs sit flat on the board.

MULTI-TURN POTS

To adjust the multi-turn POTs to their approximate center position, turn the adjusting screw 30 turns counterclockwise. Then turn the adjusting screw 15 turns clockwise to the approximate center (half level) position. The multi-turn POTs stand vertical on the board.

SR4 POT IDENTIFICATION

The following SR4 POTs will be used in the quick set-up section of this manual.

R1 = AUDIO IN (SPK) MULTI-TURN
R12 = AUDIO OUT (MIC) MULTI-TURN
R13 = DTMF AUDIO IN SINGLE TURN
R34 = DTMF AUDIO OUT SINGLE TURN

INITIAL SR4 POT ADJUSTMENTS

Adjust R34 to approximately the center position (half level)
Adjust R13 to approximately the center position (half level)
Adjust R3 to the fully clockwise position (minimum)
Adjust R32 to the fully clockwise position (minimum)

POWER SUPPLY CONNECTIONS

The SR4 and SR4-D come with one standard cable that will work with both versions. This same cable can be used for one radio or dual radio operation. This cable has three cables going into one DB25 connector. Only one out of the three cables is unterminated, that one is the power supply cable.

The three cables are identified by colored sleeving near the DB25 connector. The power cable has no sleeving by the connector; therefore, its color by the connector is the same color as the rest of the cable, which is GRAY. The radio cables have color coded sleeving by the connector.

CABLE 1 = RADIO 1 ..... BLACK (near the connector)
CABLE 2 = RADIO 2 ..... WHITE (near the connector)
CABLE 3 = POWER SUPPLY ..... GRAY (near the connector)

1. Locate the power cable.
2. Strip the jacket off of the cable to expose the wires.
3. Connect the RED wire to +12VDC. (@ 160 ma.)
4. Connect the BLACK wire to GROUND.
5. Connect the DRAIN (bare, shield) wire to GROUND.

Leave the following wires open. Do not connect them anywhere.

The quick set-up section in this manual does not use them, for information on them you must refer to the technical instructions.

GREEN ..... not connected (not used in this section)
BLUE ..... not connected (not used in this section)
WHITE ..... not connected (not used in this section)
BROWN ..... not connected (not used in this section)
ORANGE ..... not connected (not used in this section)

SYSTEM RESET

The system reset re-loads the factory programming into the SR4/SR4-D's remote programmable non-volatile user configuration memory. You are required to execute a system reset to assure that the quick set-up will work properly.

The PROG button is used for system reset. The SR4/SR4-D has two PROG buttons, one is located **inside** the SR4/SR4-D case, in front of the HEAT SINK (near the power switch). The other PROG button is located on the DB25 housing on the SR4/SR4-D cable. These two PROG buttons perform the **exact same** function, it does not matter which one you use. If the case is closed and you do not intend to open it for any adjustments, you will most likely want to use the one on the cable, because it is outside of the case. (The two PROG switches, instead of one, is only for user convenience.)

HOW TO EXECUTE A SYSTEM RESET

1. Turn the power switch off.
2. Press and hold the **PROG.** switch.
3. Turn the power switch on.
4. Release the **PROG.** switch.

Now the SR4 has been reset, factory programming has been reloaded into its remote programmable configuration memory.

SELF TEST

Once the power supply requirements have been satisfied, without connecting a radio(s) to the SR4/SR4-D, run a self test. Before running a self test, execute a system reset.

HOW TO EXECUTE A SELF TEST

1. Make sure the power switch is turned off.
2. Plug the cable into the SR4/SR4-D's DB25 connector, located in the back of the case.
3. While monitoring LEDs on the front of the SR4/SR4-D case, turn the power switch on.

Before conducting a self test the power switch must remain off

for at least 20 seconds.

RESULT OF A SUCCESSFUL SELF TEST

When the power switch is turned on, the COR LED will come and remain on for about 1 second then go off. After the COR LED goes off the PTT LED will come on for the same duration then go off.

The "SR" LED will come on and stay on until the system is turned off by the user via DTMF commands, or the power switch is turned off. The "SR" LED acts as a system ON / OFF indicator.

RADIO CONNECTION OPTIONS

BEFORE PLUGGING ANYTHING INTO YOUR RADIO, FULLY READ THE RADIO CONNECTION PROCEDURES.

The SR4/SR4-D comes with a cable that plugs directly into any Alinco mobile radio. If you are using an Alinco mobile radio you can just plug the cable into the microphone jack, and the speaker jack if necessary (this will be explained later). The SR4/SR4-D cable replaces the microphone that is normally plugged into the microphone jack.

If you wish to use a HAND HELD radio, you will need to purchase an adapter that plugs into your SR4/SR4-D cable. The hand held adapter plugs directly into the eight pin female microphone plug on the end of the SR4/SR4-D, and the other end plugs directly into the microphone and speaker jacks on your radio. These jacks are normally supplied for a speaker-mic.

Contact your local Alinco dealer for SR4/SR4-D adapters for other manufactures hand held and mobile radios.

If you wish to connect the SR4/SR4-D to a radio for which we do not supply an adapter, there is an unterminated adapter available. The unterminated adapter plugs into the eight pin female SR4/SR4-D plug and supplies the user with unterminated color coded wires that may be connected to the radio by the user.

COMMON CONNECTIONS FOR ALL TYPES OF RADIOS

The SR4/SR4-D needs to make four connections with the radio. These four connections are: SPEAKER, MICROPHONE, PTT and GROUND.

The GROUND connection connects to the common ground of the radio.

The PTT connection connects to the PTT of the radio.

The MICROPHONE connection connects to the microphone input of the radio.

The **SPEAKER** connection requires a little more thought, because it must be SQUELCHED. Meaning when the radio is not receiving a signal there is no audio, hiss, or hum heard from the speaker of the radio. The only time audio will be heard, is in the presence of a carrier (carrier = another radio operator intentionally transmitting to the SR4/SR4-D's radio). In this manual the receiver audio is referred to as speaker audio, because the term "receiver audio" is a very ambiguous and generic term. It can mean discriminator, squelched, un-squelched, un-amplified, amplified, emphasized, or un-emphasized audio. However, the term "speaker audio" is more specific, it is understood that the audio heard from the speaker will be audible for the human ear without any electronic conditioning. The term "speaker audio" is very likely to be squelched audio, based on the conclusion that, the most commonly desired way of being on the receiving end of a two way radio communication conversation is only hearing audio when there is another radio operator speaking to you, and not hearing any audio from the speaker when they are not speaking to you.

The cable supplied with the SR4/SR4-D has two ways to connect to the speaker audio of your mobile radio. (Hand held radio speaker audio connection will be discussed in further paragraphs) One way is through the microphone plug. If the radio has an operative squelched speaker output pin in the microphone jack, the SR4/SR4-D cable can use it. Some radios will have this feature and some will not.

If the radio does not have an active (active = functional) squelched speaker output pin in the microphone jack, or if it does and you do not want to use it, you may exercise the second option the SR4/SR4-D cable offers for speaker audio connection with the radio. There is a round black housing about 6 inches behind each of the two Alinco mobile radio plugs. In this housing there is an 1/8 inch mono jack. When a plug is inserted into this jack, the connection is broken (opened) between the SR4/SR4-D's speaker audio connection with the microphone plug. The center conductor of the plug is now the speaker audio connection for the SR4/SR4-D. There are two 1/8 inch mono plug patch cords supplied with each SR4/SR4-D. One patch cord will be used for each radio as needed. One end will plug into the jack in the black housing on the cable that is connected to the radio, and the other end will plug into the radio's external speaker output, most commonly located at the back of the radio. Now the SR4/SR4-D will use the speaker audio from the external speaker. If you are uncertain whether or not there is squelched speaker audio pin in your microphone plug, this method is a sure way for successful operation.

ONLY CERTAIN ALINCO RADIOS HAVE "SPEAKER AUDIO" AVAILABLE AT THE MICROPHONE PLUG (PIN 6). FOR SOME ALINCO RADIOS THAT DO NOT HAVE SPEAKER AUDIO AT THE MICROPHONE PLUG, PIN 6 MIGHT BE AN "NC" NO CONNECTION. **USE CAUTION, SOME ALINCO RADIOS MIGHT BE USING PIN 6 FOR A CONTROL INPUT. REFER TO THE MICROPHONE PINOUT FOR THIS INFORMATION WITH ALL ALINCO AND OTHER MANUFACTURERS' RADIOS.**

INFORMATION FOR HAND HELD RADIOS

This information applies to all hand held radios, regardless of the manufacturer. The easiest way to connect the SR4/SR4-D to a hand held radio is with an Alinco SR4/SR4-D adapter cable. One end of the adapter cable plugs directly into the SR4/SR4-D cable. The other end has two smaller cables that plug directly into the radio's microphone and speaker jacks, more commonly known as the "speaker-mic" jack.

RADIO CONNECTION PROCEDURES (WITH & WITHOUT ADAPTERS)

CONNECTING THE SR4/SR4-D TO AN ALINCO MOBILE RADIO

1. Select the SR4/SR4-D's RADIO 1 or RADIO 2 cable.
2. Unplug the microphone from the radio. (if applicable).
3. Plug the SR4/SR4-D cable into the microphone jack in the front of the radio. Use the patch cord for speaker audio if necessary.

CONNECTING THE SR4/SR4-D TO A MOBILE RADIO OTHER THAN AN ALINCO

1. Select the SR4/SR4-D's RADIO 1 or RADIO 2 cable.
2. Unplug the microphone from the radio. (if applicable).
3. Plug the matching end of the Alinco SR4/SR4-D adapter into the SR4/SR4-D cable.
4. Plug the other end of the adapter into the microphone jack at the front of the radio. Use the patch cord for speaker audio if necessary.

CONNECTING THE SR4/SR4-D TO ANY HAND HELD RADIO

1. Select the SR4/SR4-D's RADIO 1 or RADIO 2 cable.
2. Unplug the speaker-mic accessory from the radio (if applicable).
3. Plug the matching end of the Alinco SR4/SR4-D HAND HELD adapter into the SR4/SR4-D cable.
4. Insert the other two plugs on the other end of the adapter into the radios speaker and microphone jacks. Pay attention to the size of the plugs with relation to the size of the jacks on the radio. The size of the jacks determine if it is the microphone or speaker jack.

CARRIER DETECTION

One of the most important signals the SR4/SR4-D needs to receive from the radio to which it is connected, is a carrier signal. The SR4/SR4-D needs to know when its' radios are receiving carriers from radio operators in the field.

For the time being we will only speak about the SR4, because the SR4 can only control one radio (RADIO 1). The SR4/SR4-D uses an "RV2" carrier detection board to know if it's radio is receiving a carrier. This RV2 board is a special VOX board. The RV2 board plugs into the SR4/SR4-D into board position 1. When the board is plugged in, it taps in on the speaker audio line.

When the radio is operated in a closed squelch condition, the RV2 can tell when the radio is is receiving a carrier from a radio operator in the field. The RV2 detects changes in audio level at the speaker output. The RV2 has a user adjustable sensitivity (threshold) level. When the radio is not receiving a carrier the squelch is closed, however, there is a very small amount of audio, under normal operating conditions, nearly undetectable by the human ear. The RV2's threshold level is set higher than this level, so the RV2 will detect any audio above this pre-defined level. When the radio detects a carrier it's squelch opens and allows audio to pass to the speaker output. A by-product of the squelch opening is the presence of ambient noise. Under normal operating conditions this ambient noise in most cases is not noticeable by the human ear. However, the RV2 can detect it very easily, because it will exceed the threshold set by the user for the particular radio being used. With reference to FM radios, there must be a substantial difference between the ambient noise present during a no carrier situation, with the squelch open or closed, because if there was not, there would be no reason for having a squelch.

Once the RV2 detects the presence of a carrier, it tells the SR4/SR4-D board. The RV2 performs some other functions such as band pass filtering and supplying the SR4/SR4-D with HANG TIME and ATTACK DELAY features, that will be discussed in the technical section.

The SR4 can only control one radio, therefore, it only needs one RV2 board. The SR4-D can control two radios, therefore, it needs two RV2 boards, one for each radio.

CARRIER DETECTION BOARD ADJUSTMENTS

The following procedure will explain how to adjust the RV2 threshold level for the radio that you have connected to the SR4/SR4-D. All level adjustments will need to be changed and re-adjusted when you receive the SR4/SR4-D, however, the SR4/SR4-D is tested before you receive it. The factory test procedures involve adjusting all these levels to nominal settings that will most likely work for you right out of the box; therefore, you might not need to make any immediate adjustment to the RV2 board. Once the SR4/SR4-D is set-up it is good practice to go through the following procedure to ensure the level is really set where it should be. Just for test purposes it might not be necessary to adjust anything on the RV2.

The following POT adjustments apply only to the RV2 carrier detection board. **They do not apply to the SR4/SR4-D POTs.**

The following POTs are on the RV2 board, **they are not on the SR4/SR4-D board.**

RV2 POT IDENTIFICATION

R13 = ATTACK TIME ..... SINGLE TURN
R8 = HANG TIME ..... SINGLE TURN
R2 = SENSITIVITY LEVEL ..... SINGLE TURN

RV2 POT ADJUSTMENTS

1. The SR4 should be off at this time.
2. The RV2 board should be plugged in "BOARD POSITION 1".
3. Adjust R8 to approximately the center position (half level)
4. Adjust R13 to approximately the center position (half level)
5. Turn R2 fully counterclockwise.
6. Turn the SR4 on.
7. The SR4 will automatically conduct a self test.
8. When the SR4/SR4-D is complete with its self test, turn the SR4's radio on.
9. Make sure the SR4 radio's squelch is closed. (no audio at the speaker output)
10. Adjust the SR4 radio's volume to about 1/4 level. (25%)

    At this time the COR LED must be off.

Use another radio to transmit to the SR4, for testing and set-up, this radio will be called the USER RADIO or the USER. Before proceeding make sure the SR4/SR4-D's radio and the users radio can talk to one another.

Use caution with radiating large amounts of RF near the SR4/SR4-D, it may cause malfunction. For testing use all low power settings and if available, use dummy loads.

Once all adjustments have been made, the SR4/SR4-D, radio and power supply should be enclosed in a case all together. The only part that should be outside of the case should be the antenna and ground plane. This case is more commonly referred to as a repeater cabinet.

11. While monitoring the COR LED, key the user radio. Key the user radio with a "dead carrier", no audio, don't speak into the microphone. At this point if there is audio being transmitted from the user radio it will cause false adjustments.

    At this time the COR LED should be off.

12. Turn R2 clockwise, slowly until the COR LED comes on. Then

continue turning clockwise slightly past that point.

13. Un-key the user radio. The COR LED will go off.

Every time the user radio is keyed the COR LED will come on and stay on until the users radio is un-keyed.

R2 is the sensitivity adjustment for the audio input to the RV2. Turning R2 clockwise increases its sensitivity. Its sensitivity can be set lower to trigger upon the presence of voice; however, that is not where it should be set for the SR4/SR4-D to operate correctly. The RV2 should trigger on a dead carrier as well as voice. The dead carrier will require a higher sensitivity setting, that is why it is very important not to have any audio and or voice transmitted to the SR4/SR4-D at the time when the sensitivity adjustment is made.

SR4 AUDIO LEVEL ADJUSTMENTS

Before proceeding to audio level adjustments, you must have first satisfied the carrier detection requirements. When the user radio is transmitting the COR LED will light and when the user radio is un-keyed the COR LED will go off.

The user radio will need to have a DTMF ENCODER. If the user does not have one built-in, you may use an external one and hold it up to the user radio microphone during transmission, to acoustically couple the DTMF tones to the radio's microphone.

SR4 POT IDENTIFICATION

R3 = RADIO 1 SPEAKER IN ..... MULTI-TURN
R32 = RADIO 1 MIC IN .....MULTI-TURN
R13 = RADIO 1 DTMF IN ..... SINGLE TURN

SR4 POT ADJUSTMENTS

1. Turn "R32" 7 turns counterclockwise. This is the "mic level" adjustment, seven turns are enough to assure that you will hear some audio when the SR4 responds to you.
2. While monitoring the status LEDs on the front of the SR4, Key the user radio. The COR LED will come on.
3. While keying the user radio, send DTMF digit "1" at the same time. The DTMF LED should not be on.
4. While sending the DTMF digit, slowly turn R3 counterclockwise until the DTMF LED comes on. Then continue turning a few turns past that point.
5. Un-key the user radio. When you un-key the user radio, the SR4 will key it's radio and transmit a tone back to you. The tone it will transmit back to you will be an "error tone", that is what it is supposed to do. When the DTMF LED came on, the SR4 thought you were trying to program

it.
6. Execute a SYSTEM RESET.
7. While monitoring the status LEDs. Key the user radio and send all the DTMF digits to the SR4, one at a time without un-keying. This is done to test that it will detect all of the DTMF digits. When you are sending the digit the DTMF LED should come on and stay on "SOLID", WITHOUT FLICKERING.
8. Un-key the user radio. When you un-key the user radio, the SR4 will key it's radio and transmit multiple, short and long tones back to you. These tones are "error and pass" tones. That is what it is supposed to do. The SR4 thought that you were trying to program it.
9. Execute a SYSTEM RESET.

Now the DTMF IN level and the AUDIO IN level have been adjusted.

10. Key the user radio, speak into it, then un-key. When you un-key the SR4/SR4-D will key it's radio and transmit what you said back to you. The SR4/SR4-D just simplex repeated your message.
11. Now you may adjust R32 for the proper mic. level for the SR4/SR4-D's radio. Repeat "step 10." until this level is adjusted.

12. R34 controls the DTMF out level. It is at half level now. You may adjust it to any desired level.

This completes the quick set-up section of this manual. You may now go to **"PROGRAMMING THE SR4/SR4-D WITH REMOTE DTMF COMMANDS"** on PAGE 46, in the technical instruction section of this manual.

UNTERMINATED CABLE CONNECTION

All cable connections with your radio should be done with the cable un-plugged from the SR4, so you get a chance to check all your connections before plugging the cable into the SR4/SR4-D.

1. Locate the RADIO 1 cable. (BLACK by the connector)
2. Strip the jacket off of the cable to expose the wires.
3. Connect the BLACK wire to the GROUND of your radio.
4. Connect the DRAIN (bare, shield) wire to GROUND.
5. Connect the GREEN wire to the **SQUELCHED** SPEAKER OUTPUT of your radio.
6. Connect the BLUE wire to the MIC. INPUT of you radio.
7. Connect the ORANGE wire to the PTT INPUT of your radio.

Leave the following wires open. Do not connect them anywhere.

WHITE ..... not connected (unused)
RED ..... not connected (unused)

CONNECTING THE SR4/SR4-D TO A HAND HELD RADIO

Most of todays newer HAND HELD radios do not have a separate PTT input for external activation. An example of external PTT activation is the use of a HAND MIC. The HAND MIC. plugs into the hand held radio. The only connections it has with the radio is SPEAKER and MIC. The PTT activation is done through the MIC. connection. When the HAND MICROPHONE'S PTT is pressed by the user, the microphone resistance changes from a high resistance to a low resistance, this is how the hand held radio is KEYED.

The SR4's microphone output automatically generates that change required for most hand held radios; therefore, you do not need to make a PTT connection with your hand held radio.

The only connections you should need to make with a hand held radio is: SPEAKER, MIC. and GROUND.

CONNECTING THE SR4/SR4-D TO A MOBILE OR BASE RADIO

Mobile and base radios will require connections to the SPEAKER, MIC. and PTT. The speaker connection can easily be made with the AUX. SPEAKER OUTPUT available at the back of most radios. If this output is not available, you will need to directly connect to the speaker.

The speaker output must be squelched. (squelch must be closed)

The MIC. and PTT inputs will be available through the MIC. PLUG.

Now you may refer to the "REMOTE PROGRAMMING COMMAND CODES" section in the technical section in this manual.

TECHNICAL INSTRUCTIONS

The following technical instructions apply to the SR4 and the SR4-D.

Reference the "TERM DEFINITIONS" section of this manual for terms with which you are not familiar. The terms used in this manual are generic terms as well as SR4/SR4-D terms and names. For example "COR" is Carrier Operated Relay or Carrier Operated Receiver.

SR4/SR4-D DIP-SWITCH SETTINGS

POS 1: DRAM QTY. MSB.
POS 2: DRAM QTY. LSB.
POS 3: RADIO 1 ACCEPT REMOTE CONFIGURATION.
POS 4: RADIO 2 ACCEPT REMOTE CONFIGURATION.
POS 5: RADIO 1 ACKNOWLEDGE ENABLE.
POS 6: RADIO 2 ACKNOWLEDGE ENABLE.
POS 7: RADIO 1 RX FORCED ON AT POWER UP.
POS 8: RADIO 2 RX FORCED ON AT POWER UP.
POS 9: RADIO 1 LOCK CURRENT RX CONFIGURATION.
POS 10: RADIO 2 LOCK CURRENT RX CONFIGURATION.
POS 11: 3 MINUTE PTT TIME-OUT TIMER
POS 12: POST RECORD REWIND

To the left of the 12 POSITION DIP-SWITCH (S3), there is a 1 and a 0, if the switch is up it is position 0. If the switch is down it is 1.

DIP-SWITCH POS 1, POS 2

POS 1 & POS 2 tell the SR4 how many DRAM chips are installed. The SR4 can hold a maximum of 4 DRAM chips, but requires to have at least one chip to operate. The SR4's come standard from the factory with all 4 DRAM chips installed.

POS 1	POS 2	DRAM QTY.
0	0	1
0	1	2
1	0	3
1	1	4

FACTORY SETTINGS ARE: POS 1 = 1
POS 2 = 1
The factory settings tell the SR4 that there are 4 DRAM chips installed.

DIP-SWITCH POS 3, POS 4

POS 3 & POS 4 enable and disable the radio from accepting remote DTMF commands.

POS 3: CONTROLS RADIO 1
POS 4: CONTROLS RADIO 2

Setting **"1"** will **ENABLE** the radio to accept remote commands.
Setting **"0"** will **DISABLE** the radio from accepting remote commands from the user.

FACTORY SETTINGS ARE: POS 3 = 1
POS 4 = 1

The factory settings tell the SR4 to ACCEPT remote DTMF configuration commands from radio 1 and radio 2.

DIP-SWITCH POS 5, POS 6

POS 5 & POS 6 enable or disable the SR4/SR4-D from transmitting acknowledgment tones.

POS 5: CONTROLS RADIO 1
POS 6: CONTROLS RADIO 2

Setting "1" will **ENABLE** the SR4/SR4-D to transmit ACKNOWLEDGMENT tones to the user.
Setting "0" will DISABLE the SR4/SR4-D from transmitting ACKNOWLEDGMENT tones to the user.

FACTORY SETTINGS ARE: POS 5 = 1
POS 6 = 1

The factory settings allow the SR4/SR4-D to transmit acknowledgment tones to the user.

DIP-SWITCH POS 7, POS 8

POS 7 & POS 8 forces radio 1's and or radio 2's receivers on at power up. If the receivers were turned off by the user via DTMF commands, that will disable the SR4/SR4-D to respond to any user thereafter. This will effectively disable the SR4/SR4-D repeater system from operating, until the user goes to the "SR4/SR4-D location" and turns the power off then back on. When the power is turned back on the (RX DISABLE) command that was sent by the user to turn the SR4/SR4-D's receiver or receivers off, will be automatically changed from (RX DISABLE) to (RX ENABLE) if "POS 7" and or "POS 8" are set to "1". Another way to turn the receivers back on is to execute a SYSTEM RESET. The disadvantage with executing a SYSTEM RESET is, it will replace your programming with the factory programming.

POS 7: CONTROLS RADIO 1
POS 8: CONTROLS RADIO 2

Setting "1" will force the (receiver) **RX ON** upon power up.
Setting "0" will **not effect the RX setting.**

FACTORY SETTINGS ARE: POS 7 = 1
POS 8 = 1

The factory settings will not effect the RX settings on either radio.

DIP-SWITCH POS 9, POS 10

POS 9 & POS 10 will lock in the the current (RX) programming, this will disable the user from being able to change the (RX) programming remotely. The user will have to go to the SR4/SR4-D location to do so.

POS 9: CONTROLS RADIO 1
POS 10: CONTROLS RADIO 2

Setting "1" will **LOCK** the current (RX) programming.
Setting "0" will allow the user to change the (RX) programming remotely.

FACTORY SETTINGS ARE: POS 9 = 0
POS 10 = 0

DIP-SWITCH POS 11

Position 11 activates and deactivates the 3 minute PTT time-out timer. This feature only applies, when operating in duplex repeater mode; therefore, it only applies to the SR4-D. If any user transmits to the SR4-D any longer than 3 minutes, the SR4-D will shut off its transmitters until the user un-keys. Once the user un-keys, the SR4-D will again enable it's transmitters.

Setting **1** = 3 MINUTE PTT TIME-OUT TIMER **ON**
Setting **0** = 3 MINUTE PTT TIME-OUT TIMER **OFF**

FACTORY SETTING IS: POS 11 = 1

DIP-SWITCHPOS 12

POS 12 is the POST RECORD REWIND enable and disable. During simplex repeater operation; when the digital recorder records the audio from the receiver, it also records the squelch tail. During play back the users hear two squelch tails. For some applications this is an inconvenience. The POST RECORD REWIND will digitally rewind approximately the last 0.3 seconds from the end of the audio message it recorded. As a result the double squelch tail is eliminated, and it **increases the speed** in which radio operators can communicate with one another.

Setting "1" will **ENABLE** POST RECORD REWIND
Setting "0" will **DISABLE** POST RECORD REWIND

FACTORY SETTING IS: POS 12 = 0

INITIAL SR4/SR4-D POT ADJUSTMENTS

The SR4/SR4-D has two types of of POTs. One type is a multi-turn, the other type is a single turn. You will need to be able to adjust these pots to their approximate center (half level) position.

SINGLE TURN POTS

To adjust the single turn POTS to their approximate center position. Turn the adjusting screw fully to the right then fully to the left, and approximate the center position. The single turn POTs sit flat on the board.

MULTI-TURN POTS

To adjust the multi-turn POTs to their approximate center position. Turn the adjusting screw 30 turns counterclockwise. Then turn the adjusting screw 15 turns clockwise to the approximate center (half level) position. The multi-turn POTs stand vertically on the board.

SR4/SR4-D POT IDENTIFICATION

THESE POTs ARE LOCATED ON THE SR4/SR4-D BOARD. **THEY ARE NOT ON THE CARRIER DETECTION BOARDS.**

R3 = AUDIO IN (SPK)	MULTI-TURN	RADIO 1
R32 = AUDIO OUT (MIC)	MULTI-TURN	RADIO 1
R13 = DTMF AUDIO IN	SINGLE TURN	RADIO 1
R7 = AUDIO IN (SPK)	MULTI-TURN	RADIO 2
R33 = AUDIO OUT (MIC)	MULTI-TURN	RADIO 2
R14 = DTMF AUDIO IN	SINGLE TURN	RADIO 2
R34 = DTMF AUDIO OUT	SINGLE TURN	RADIO 1 & RADIO 2
R26 = DUPLEX LEVEL	SINGLE TURN	RADIO 1 & RADIO 2

ADJUSTMENTS

RADIO 1

Adjust R3 fully clockwise to the minimum position.
Adjust R13 approximately to the center position (half level).

Adjust R32 fully clockwise, then turn counterclockwise 6 turns.

RADIO 2

Adjust R7 fully clockwise to the minimum position.
Adjust R14 approximately to the center position (half level).
Adjust R33 fully clockwise, then turn counterclockwise 6 turns.

RADIO 1 & RADIO 2

Adjust R34 fully counterclockwise, then turn 1/4 turn clockwise.
Adjust R26 approximately to the center position (half level).

INITIAL RV2 CARRIER DETECTION BOARD POT ADJUSTMENTS

THESE POTs ARE LOCATED ON THE RV2 BOARDS. **THEY ARE NOT LOCATED ON THE SR4/SR4-D BOARD.**

The RV2 has 3 POT adjustments. You will be adjusting all three.

R2 = input sensitivity level ..... fully counterclockwise (min.)
R13 = attack delay time ..... adjust to half level.
R8 = hang time ..... adjust to half level.

CABLE IDENTIFICATION

Both SR4 and the SR4-D come with one standard cable that will work with both units. This same cable can be used for one radio or dual radio operation. This cable has three cables going into one MALE DB25 connector. Two cable ends have Alinco mobile radio microphone plugs, and one cable end has an unterminated end.

The three cables are identified by colored sleeving near the DB25 connector. The power cable has no sleeving by the connector; therefore, its color by the connector is the same color as the rest of the cable, which is GRAY. The radio cables have color coded sleeving by the connector.

CABLE 1: (**BLACK** COLOR JACKET BY THE CONNECTOR) .... RADIO 1

CABLE 2: (**WHITE** COLOR JACKET BY THE CONNECTOR) .... RADIO 2

CABLE 3: (**GRAY** COLOR, CABLE JACKET BY THE CONNECTOR) .... POWER SUPPLY CONNECTIONS, AUX. OUTPUT, HARDWIRE PLAY INPUTS.

All three are 7 conductor cables. The two radio cables have the same color codes. The power supply cable has a different color code.

The wire colors that are in the cables are RED, BLACK, GREEN,

BLUE, ORANGE, WHITE, BROWN, and a bare drain wire (shield).

All these cables have a drain (shield) wire. This bare drain wire should always be connected to ground any opportunity you have. The drain wires in all three cables are connected to the power supply ground in the SR4/SR4-D, when the cable is plugged into the SR4/SR4-D. The actual electrical connection is made through the SR4/SR4-D, meaning if the cable is unplugged from the SR4/SR4-D the grounds will not be connected together. This ground connection should not be used to supply ground to other devices, it is only for the SR4/SR4-D. If you need to connect another device to the same ground as the SR4/SR4-D, do not use the SR4/SR4-D cable ground. Use the ground source from your power supply or another point that has the capability to handle the current requirements of the additional device. The only time you may use the SR4/SR4-D cable to supply power to another device is if the other device is a **very low current device**, such as an external CTCSS decoder, which may draw about 20 ma (0.02 A).

You will see these color wires in the power cable. The only time you will see these color wires with the radio cables is if, you are using the UNTERMINATED ADAPTER.

POWER SUPPLY CONNECTIONS

LOCATE CABLE 3 (GRAY JACKET NEAR THE CONNECTOR)

The color wires you will be working with are:

RED..... +12VDC ..... (DB25 PIN # 1)
BLACK ..... GROUND (GND) ..... (DB25 PIN # 14)

1. Connect the RED wire to a +12VDC power supply (@ 160 ma.).
2. Connect the BLACK wire to GROUND.

The SR4/SR4-D is reverse polarity protected, however it is always good practice to use caution when making power supply connections. In most cases if the SR4/SR4-D's power supply leads were reversed, no damage is expected to result.

HARDWIRE PLAY INPUTS

LOCATE CABLE 3 (GRAY JACKET NEAR THE CONNECTOR)

The color wires you will be working with are:

GREEN..... HARDWIRE ID PLAY ..... (DB25 PIN # 24)
BLUE ..... HARDWIRE VOICE MAIL PLAY ..... (DB25 PIN # 12)

The HARDWIRE PLAY inputs are located in the power supply cable. You are not required to use these inputs, they may be left open.

The SR4/SR4-D's VOICE MAIL and VOICE IDer are controlled by the

user with DTMF commands. The user may record, play, and clear the VOICE MAIL and VOICE ID messages with remote DTMF commands. The user may also play the VOICE MAIL or the VOICE ID message by applying a voltage to the corresponding HARDWIRE PLAY INPUT. The hardwire play inputs will play back a message, only if there is one present. If there is no VOICE MAIL or VOICE ID message saved and its hardwire input is activated, the SR4/SR4-D will key the radio and play back half a second of dead air (no audio).

Both hardwire inputs are POSITIVE LEVEL TRIGGERED. To activate the input, apply +2VDC to +12VDC with ground reference. The voltage should be applied in a pulse. The duration of the pulse may be any length up to the length of the message. The minimum length for the pulse should be 100 ms (1/10 of a second).

If you wish to make the message repeat, you can do so by holding the hardwire input at its active level (+2VDC to +12VDC). The message will continue to repeat as long as the input is kept active. Once the input is made active and the message begins to play the signal may be removed, and the message will be played once. If the input is kept active longer than the length of the message the SR4 will play the message a second time.

Executing a hardwire play is the same as executing a remote DTMF play, the message may be played as many times as desired. THE HARDWIRE ID PLAY HAS HIGHER PRIORITY THAN THE HARDWIRE VOICE MAIL PLAY.

If the HARDWIRE VOICE MAIL PLAY and the HARDWIRE ID PLAY inputs are both activated at the same time the HARDWIRE ID PLAY input is the one that will be acknowledged by the SR4. The SR4/SR4-D will play the ID message.

If the SR4/SR4-D is playing one of the messages (ID or the VOICE MAIL), any other activating signal occurring at either input will not be acknowledged by the SR4/SR4-D. The only time the SR4/SR4-D will accept a hardwire signal is when the SR4 is not busy executing another task. The following would classify as a task: presence of a carrier, PTT, recording a message, playing a message. The only time the SR4/SR4-D will execute a hardwire play is when all of these are not occurring.

If the hardwire input is kept active to repeat the message, all other SR4/SR4-D functions are disabled. The hardwire input has control while it is active. When the activating signal is removed from the hardwire input the SR4 will regain its ability to perform other tasks.

AUXILIARY OUTPUT

LOCATE CABLE 3 (GRAY JACKET NEAR THE CONNECTOR)

The color wires you will be working with are:

WHITE ..... **AUX. OUTPUT** .....Normaly Open..... (DB25 PIN # 11)
ORANGE ..... Common ..... (DB25 PIN # 22)
BROWN ..... Normally Closed .. (DB25 PIN # 10)

The AUX. OUTPUT is located in the power supply cable. You are not required to use this output it can be left open (unconnected).

AUXILIARY RELAY OPTION

SR4/SR4-D has a SPDT auxiliary relay option that can be added to the SR4/SR4-D when ordering in large quantities. When this relay is installed, "D9" diode is installed as well. Both the diode and the relay are installed on the SR4/SR4-D board. The diode is to protect the 2N2222 transistor that completes the relays path to ground for activation. The collector on "Q2" (2N2222 NPN transistor) connects to one end of the coil on the relay if it is installed. The maximum current loop capability for the aux. relay is 50 milliamps (0.050 AMP). If higher current switching is required, use external high current switching devices such as another relay to satisfy your individual applications.

OPEN COLLECTOR OUTPUT

The auxiliary output is the collector on "Q2". The emitter is connected to ground. There is a wire jumper installed on the SR4/SR4-D circuit board where the relay would have been installed. This wire jumper goes from the collector on Q2 to the normally open output for the aux. relay. The way this connection is made by jumpering the open collector output from the transistor to where the relays normally open pin would insert into. The normally open relay output is not called the AUX. OUTPUT. The aux. output wire is located in CABLE 3, the power power supply cable. The WHITE wire is the aux. output.

The maximum current load for the aux. output is 50 milliamps (0.050 AMP). Do not attempt to locate the base resistor for the aux. output transistor and reduce it to saturate the transistor any more to handle larger amounts of current. This 50 ma. limitation is also for the diameter of the circuit board trace that is supplying the aux. output. If the current is exceeded, damage may result to the trace. If higher current switching is required, use external high current switching devices such as a relay to satisfy your individual applications.

SYSTEM RESET

The system reset erases your programming and re-loads the factory programming. After you (the user) have executed a system reset, you can begin to program the SR4/SR4-D with your own custom configurations for your applications. All user programming is done remotely via DTMF commands. The system reset is very useful

If you are un-sure of what programming the SR4/SR4-D currently contains. The system reset will set all the user programmable variables to known settings. Once the system reset has been executed the SR4/SR4-D factory programming is loaded into the non-volatile "configuration memory", which is user programmable.

HOW TO EXECUTE A SYSTEM RESET

1. Turn the power switch OFF.
2. Press and hold the PROG. switch.
3. Turn the power switch ON.
4. Release the PROG. switch.
5. Turn the power switch OFF.
6. Wait for at least 20 seconds.
7. Turn the power switch ON.

When step "7" is executed the SR4/SR4-D will execute a self test. Now the SR4/SR4-D is ready for use again.

SELF TEST

Once the power supply requirements have been satisfied, without connecting a radio(s) to the SR4/SR4-D you should execute a self test.

IT MAY BE NECESSARY TO CONDUCT A SELF TEST EXECUTE A SYSTEM RESET.

YOU MUST HAVE AT LEAST ONE CARRIER DETECTION BOARD INSTALLED TO CONDUCT A SELF TEST.

1. Monitor the status LEDs on the front of the SR4/SR4-D case.
2. Turn the power switch OFF.
3. Wait for at least 20 seconds.
4. Turn the power switch ON.

Once step "4" has been executed the SR4/SR4-D will automatically conduct a self test. Every time the SR4/SR4-D is turned OFF then turned back ON, it will automatically execute a self test. Upon POWER UP the SR LED will come on and stay on until the SR4/SR4-D is turned off either manually or remotely by the user. The SR LED indicates the SR4/SR4-D is ON (remotely enabled to function). If the remote DTMF command "00" is sent, the SR4/SR4-D will be turned OFF, and the SR LED will go OFF.

RESULT OF A SUCCESSFUL SELF TEST

SR4/SR4-D (IN SIMPLEX REPEATER MODE)

As soon as you turn the POWER SWITCH on, the COR LED will come on and remain on for an interval of 1 to 6 seconds. After the COR LED goes off the PTT LED will come on for the same duration the COR LED was on. Now the SR4/SR4-D is ready for operation. The

variable power on COR time is dependent on where the HANG TIME setting is on the RV2. The time the COR LED stays on during the SELF TEST is two times longer than the longest HANG TIME SETTING the RV2 board.

SR4-D (IN FULL-DUPLEX MODE)

As soon as you turn the POWER SWITCH on, the COR LED and the PTT LED will come on at the same time and remain on for an interval of 1 to 6 seconds. After the COR LED goes off the PTT will go off with it. Now the SR4/SR4-D is ready for operation. The variable power on COR time is dependent upon where the HANG TIME setting on the RV2. The length of time the COR and PTT LEDs will stay on during the SELF TEST is two times longer than the longest HANG TIME SETTING on the RV2.

If you have the SR4-D operating in FULL-DUPLEX MODE and in SIMPLEX REPEATER MODE at the same time, the result of the self test will be the combination of both of the self tests. The PTT and the COR light will come on at at the same time for a period of 1 to 6 seconds, then the PTT light will remain on for another like duration.

RADIO CONNECTION OPTIONS

The SR4/SR4-D comes with a cable that plugs directly into any Alinco mobile radio. If you are using an Alinco mobile radio you can just plug the cable into the microphone jack, and the speaker jack if necessary (will be explained later). The SR4/SR4-D cable replaces the microphone that is normally plugged into the microphone jack.

If you wish to use a HAND HELD radio, you will need to purchase an adapter which plugs into your SR4/SR4-D cable. The hand held adapter plugs directly into the eight pin female microphone plug on the end of the SR4/SR4-D, and the other end plugs directly into the microphone and speaker jacks on your radio. These jacks are normally supplied for a speaker-mic.

Contact your local Alinco dealer for SR4/SR4-D adapters for other manufactures hand held and mobile radios.

If you wish to connect the SR4/SR4-D to a radio that we do not supply an adapter for, there is an unterminated adapter available. The unterminated adapter plugs into the eight pin female SR4/SR4-D plug and supplies the user with unterminated color coded wires which may be connected to the radio by the user.

COMMON CONNECTIONS FOR ALL TYPES OF RADIOS

The SR4/SR4-D needs to make four connections with the radio. These four connections are: SPEAKER, MICROPHONE, PTT and GROUND.

The **GROUND** connection connects to the common ground of the radio.

The **PTT** connection connects to the PTT of the radio.

The **MICROPHONE** connection connects to the microphone input of the radio.

The **SPEAKER** connection requires a little more thought, because it must be SQUELCHED. Meaning when the radio is not receiving a signal there is no audio, hiss, or hum heard from the speaker of the radio. The only time audio will be heard, is in the presence of a carrier (carrier = another radio operator intentionally transmitting to the SR4/SR4-D's radio). In this manual the receiver audio is referred to as speaker audio, because the term "receiver audio" is a very ambiguous and generic term. It can mean discriminator, squelched, un-squelched, un-amplified, amplified, emphasized, or un-emphasized audio. However, the term "speaker audio" is more specific, it is understood that the audio heard from the speaker will be audible for the human ear without any electronic conditioning. The term "speaker audio" is very likely to be squelched audio, based on the conclusion that, the most commonly desired way of being on the receiving end of a two way radio communication conversation is only hearing audio when there is another radio operator speaking to you, and not hearing any audio from the speaker when they are not speaking to you.

The cable supplied with the SR4/SR4-D has two ways to connect to the speaker audio of your mobile radio. (Hand held radio speaker audio connection will be discussed in further paragraphs) One way is through the microphone plug. If the radio has an active squelched speaker output pin in the microphone jack, the SR4/SR4-D cable can use it. Some radios will have this feature and some will not.

If the radio does not have an active (active = functional) squelched speaker output pin in the microphone jack, or if it does and you do not want to use it, you may exercise the second option the SR4/SR4-D cable offers for speaker audio connection with the radio. There is a round black housing about 6 inches behind each of the two Alinco mobile radio plugs. In this housing there is an 1/8 inch mono jack. When a plug is inserted into this jack, the connection is broken (opened) between the SR4/SR4-D's speaker audio connection with the microphone plug. The center conductor of the plug is now the speaker audio connection for the SR4/SR4-D. There are two 1/8 inch mono plug patch cords supplied with each SR4/SR4-D. One patch cord will be used for each radio as needed. One end will plug into the jack in the black housing on the cable that is connected to the radio, and the other end will plug into the radio's external speaker output, most commonly located at the back of the radio. Now the SR4/SR4-D will use the speaker audio from the external speaker. If you are uncertain weather or not there is squelched speaker

audio pin in your microphone plug, this method is a sure way for successful operation.

ONLY CERTAIN ALINCO RADIOS HAVE "SPEAKER AUDIO" AVAILABLE AT THE MICROPHONE PLUG (PIN 6). FOR SOME ALINCO RADIOS THAT DO NOT HAVE SPEAKER AUDIO AT THE MICROPHONE PLUG, PIN 6 MIGHT BE AN "NC" NO CONNECTION. **USE CAUTION, SOME ALINCO RADIOS MIGHT BE USING PIN 6 FOR A CONTROL INPUT. REFER TO THE MICROPHONE PINOUT FOR THIS INFORMATION WITH ALL ALINCO AND OTHER MANUFACTURERS' RADIOS.**

INFORMATION FOR HAND HELD RADIOS

This information applies to all hand held radios, regardless of the manufacturer. The easiest way to connect the SR4/SR4-D to a hand held radio is with an Alinco SR4/SR4-D adapter cable. One end of the adapter cable plugs directly into the SR4/SR4-D cable. The other end has two smaller cables that plug directly into the radio's microphone and speaker jacks, more commonly known as the "speaker-mic" jack.

RADIO CONNECTION PROCEDURES (WITH PRE-WIRED ADAPTERS)

CONNECTING THE SR4/SR4-D TO AN ALINCO MOBILE RADIO

1. Select the SR4/SR4-D's RADIO 1 or RADIO 2 cable.
2. Unplug the microphone from the radio if it (if applicable).
3. Plug the SR4/SR4-D cable into the microphone jack on the front of the radio. Use the patch cord for speaker audio if necessary.

CONNECTING THE SR4/SR4-D TO A MOBILE RADIO OTHER THAN AN ALINCO

1. Select the SR4/SR4-D's RADIO 1 or RADIO 2 cable.
2. Unplug the microphone from the radio (if applicable).
3. Plug the matching end of the Alinco SR4/SR4-D adapter into the SR4/SR4-D cable.
4. Plug the other end of the adapter into the microphone jack in the front of the radio. Use the patch cord for speaker audio if necessary.

CONNECTING THE SR4/SR4-D TO ANY HAND HELD RADIO

1. Select the SR4/SR4-D's RADIO 1 or RADIO 2 cable.
2. Unplug the speaker-mic accessory from the radio (if applicable).
3. Plug the matching end of the Alinco SR4/SR4-D HAND HELD adapter into the SR4/SR4-D cable.
4. Insert the other two plugs on the other end of the adapter into the radios speaker and microphone jacks. Pay attention to the size of the plugs with relation to the size of the jacks on the radio.

CONNECTING THE SR4/SR4-D TO A MOBILE RADIO (UNTERMINATED ADAPTER)

The unterminated adapter is used for supplying you with an unterminated cable for each radio, which you can wire yourself to the radio of your choice.

One end of the unterminated adapter plugs into the SR4/SR4-D cable. The other has an open, unterminated end, for you to strip and connect to the radio.

The following radio connection instructions will be treating the SR4/SR4-D cable as if it is unterminated, because it will be when you plug the unterminated adapter into it.

CABLE 1: (**BLACK** COLOR JACKET BY THE CONNECTOR) .... RADIO 1
CABLE 2: (**WHITE** COLOR JACKET BY THE CONNECTOR) .... RADIO 2

References will be made to "radio 1" or "radio 2" with or without the radios really existing. The only way the SR4/SR4-D knows if it has a radio (s) connected to it, is if it detects a carrier from the radio. The only way it can detect a carrier from the radio, is if the carrier detection board (RV2) detects the carrier and informs the SR4/SR4-D.

Once this section is complete the SR4/SR4-D is not yet ready for operation. Once the CARRIER DETECTION section, and the AUDIO LEVEL ADJUSTMENTS section have been completed the SR4/SR4-D will be ready for use.

RADIO 1 CONNECTION

LOCATE CABLE 1 (**BLACK** JACKET NEAR THE CONNECTOR)

RADIO 1 GROUND CONNECTION

The color wires you will be working with are:

BLACK ..... GROUND ..... (DB25 PIN # 2)
BROWN ..... GROUND .... (EXTRA) ..... (DB25 PIN # 6)

The black and the brown wires are both ground (GND) wires. They are electrically the same connection. The only reason there are two ground wires, is for the installers convenience. If you are connecting the SR4/SR4-D to a radio that requires a second ground connection you can use both ground wires, so you don't have to use a jumper wire. You may use either ground wire. The only reason the brown wire is labeled "EXTRA" is because, the color black is more commonly used for ground than the color brown.

RADIO 1 RECEIVE AUDIO CONNECTION

The color wire you will be working with is:

GREEN..... SPEAKER (AUDIO IN) ..... (DB25 PIN # 19)

The SR4/SR4-Ds receive audio input impedance is 100K.
The green wire is the receive (RX) audio for the SR4/SR4-D, it connects to the radios receive audio. A receive audio connection with the radio is made by connecting the green wire to the squelched SPEAKER OUTPUT.

RV2 RECEIVE AUDIO CONNECTION

The RV2 (RX VOX) board uses the SR4/SR4-D's receiver audio connection to the radio for its input; therefore, there are no additional connections required for receiver audio for carrier detection. The RV2 must have squelched receiver audio to operate. This squelched audio can come from the speaker output or from another low or high level output from the radio. Some of the newer mobile radios have the receive audio available at the microphone plug. The microphone plug receive audio, must be squelched audio, when there is no carrier there must be no audio present (no noise).

CTCSS CARRIER DETECTION

It is highly recommended to use CTCSS on the radio connected to the SR4/SR4-D, for security. If CTCSS is not used, any carrier that the radio detects, the SR4/SR4-D will repeat. CTCSS is the most simple and effective way to control which transmissions the SR4/SR4-D is to repeat.

To use CTCSS, simply turn on the CTCSS decoder in your radio. Your radio owner's manual can instruct you how to do so. If the radio which is connected to the SR4/SR4-D does not have CTCSS capability, you may need to look into an after market CTCSS decoder.

RADIO 1 TRANSMIT AUDIO CONNECTION

The color wire you will be working with is:

BLUE ..... MICROPHONE (AUDIO OUT) ..... (DB25 PIN # 3)

The SR4/SR4-Ds transmit audio impedance is 5000 ohm (5K ohm).

The blue wire is the transmit (TX) audio for the SR4/SR4-D. It connects to the radios microphone (MIC.) input.

Some radios will have a separate ground for the microphone.

Connect the "MIC. GROUND" to the common SR4/SR4-D ground. This will be a good time to use the "EXTRA BROWN GROUND WIRE". The PTT ground and the MIC. ground will be connected together, this only applies if the radio has separate PTT and MIC grounds.

MICROPHONE IMPEDANCE MATCHING

This section will help you if you are having problems with LOW microphone audio level or if you are using a HAND HELD radio and the radio remains keyed at all times, especially when the SR4/SR4-D is turned off, when the SR4/SR4-Ds microphone wire is connected to the hand held radio. If you have either of these problems follow this section, otherwise DO NOT MAKE CHANGES TO ANY COMPONENTS.

WHEN USING HAND HELD RADIOS J4 AND J5 SHOULD BE UN-INSTALLED.

To change the SR4/SR4-D's (RADIO 1) MIC impedance from 5000 ohms to 500 ohms, install J4. This will accommodate most mobile radios.

To change the SR4/SR4-D's (RADIO 2) MIC impedance from 5000 ohms to 500 ohms, install J5. This will accommodate most mobile radios.

If a lower or higher impedance is required for your radio, capacitor "C15" can be changed to accommodate your needs. "C15" is the coupling capacitor from the SR4/SR4-Ds audio output amplifier IC.

CAPACITOR "C15" IS ONLY FOR RADIO 1

In most cases if the radios microphone input impedance is higher than the SR4/SR4-Ds audio output impedance, it will be ok. This type of a impedance mismatch is acceptable.

If the radios microphone input impedance is lower than the SR4/SR4-Ds audio output impedance, there will be an audio attenuation problem. The SR4/SR4-Ds audio output level will be attenuated in preparation to the difference in impedance. In simpler terms the SR4/SR4-Ds audio output will be "loaded down". If the impedance mismatch isn't too far apart, it will be ok. If the impedance mismatch is too far apart, you will experience not being able to raise the audio output level (MIC. LEVEL) high enough to fully modulate the radio. The result will be that when the SR4/SR4-D is keying its radio and transmitting audio. The audio will be too low for the receiving station to hear satisfactorily.

To solve an impedance mismatch with the SR4/SR4-Ds MIC. output and the radio you have connected it to, you will need to know the radio's microphone input impedance. Compare the SR4/SR4-D's (5000 ohm) MIC. output impedance with the radios MIC. input impedance.

The SR4/SR4-Ds present mic. output impedance is: 5000 ohm. "C15" is 0.1 MFD changing it to different values will produce the following results.

(1000 ohm = 1 Kohm)

If C15 = 66 MFD, the SR4/SR4-Ds microphone output impedance will be 8 ohm.
If C15 = 33 MFD, the SR4/SR4-Ds microphone output impedance will be 16 ohm.
If C15 = 10 MFD, the SR4/SR4-Ds microphone output impedance will be 50 ohm.
If C15 = 5 MFD, the SR4/SR4-Ds microphone output impedance will be 100 ohm.
If C15 = 1 MFD, the SR4/SR4-Ds microphone output impedance will be 500 ohm.
If C15 = 0.5 MFD, the SR4/SR4-Ds microphone output impedance will be 1 Kohm.
If C15 = 0.1 MFD, the SR4/SR4-Ds microphone output impedance will be 5 Kohm.

CHANGE "C15" ONLY IF NECESSARY. USE CARE NOT TO DAMAGE THE PCB.

If changes were made to "C15", to start with turn the SR4/SR4-Ds microphone audio level all the way down. In most cases if you needed to change "C15", it would have been because of insufficient MIC. output audio. It is very possible that the last MIC. level adjustment you have made, would have been adjusting the MIC. level pot to its maximum setting. After changing "C15" to match the impedance of the SR4/SR4-D's radio, the power transfer ratio would have improved; therefore, the new higher level might be too high for your radios MIC. input, and may cause damage. Turning the SR4/SR4-D MIC. level all the way down will allow you to increase the SR4/SR4-D audio output level progressively and safely.

TO MAKE CHANGES TO **RADIO 2** MICROPHONE OUTPUT, REPLACE ALL REFERENCES MADE TO "C15" TO **"C16"**.

HAND HELD RADIOS

Most hand held radios are keyed externally through the MIC. plug, they do not have a separate external PTT input. To key the hand held radio the MIC. resistance is changed. The change is recognized by the radio and the radio is keyed. This change is lowering the MIC. resistance to ground.

The SR4/SR4-D has a built-in resistor switch that will lower the MIC. resistance to key the hand held radio. This eliminates the need for the user to add an external resistor from the PTT to the microphone, to key the hand held radio.

When the SR4/SR4-D keys its radio it also saturates an NPN

transistor that pulls one end of a 3.3 Kohm resistor to ground. The other end of the resistor is connected to the MIC. output of the SR4/SR4-D. The NPN transistor is "Q4" a 2N2222. The emitter is connected to ground. Collector goes to the 3.3 Kohm resistor "R47". Q4 and R47 are only for radio 1.

To disable the MIC. resistance switching, cut either end of R47. Cutting one end of the R47 resistor will prevent the resistance change for the MIC. output for radio 1. If either end of R47 is cut, you will have to make your own separate PTT connection for radio 1.

RADIO 1 PTT CONNECTION

The color wire you will be working with is:

ORANGE .... PTT ..... (DB25 PIN # 13)

The SR4/SR4-Ds PTT output is an open collector 2N2222 NPN transistor. The PTT output only has a 50 ma. pull to ground. If you require a larger pull to ground use the PTT output to drive another switching device to satisfy your requirements.

Most radios require a ground signal to key the transmitter. If your radio requires the SR4/SR4-Ds PTT output to be "active high" (positive when keyed). Use another switching device like a relay, to supply you with a contact closer, that can be used to supply your radio with any signal it requires to be keyed.

In most cases a PTT connection will not be required if a HAND HELD radio is used. Hand held radios are keyed by adding a 3.3 Kohm from the MIC. to ground. The SR4/SR4-D has this 3.3 Kohm resistor switching built-in to its MIC. output.

RADIO 2 CONNECTION

LOCATE CABLE 2 (**WHITE** JACKET NEAR THE CONNECTOR)

Follow the RADIO 1 CONNECTION instructions, except for the following information.

"Q5" IS TO RADIO 2 AS "Q4" IS TO RADIO 1.

"R48" IS TO RADIO 2 AS "R47" IS TO RADIO 1.

"C16" IS TO RADIO 2 AS "C15" IS TO RADIO 1.

BLACK ..... GROUND ..... (DB25 PIN # 4)
BROWN ..... GROUND .... (EXTRA) ..... (DB25 PIN # 18)
GREEN..... SPEAKER (AUDIO IN) ..... (DB25 PIN # 7)
BLUE ..... MICROPHONE (AUDIO OUT) ..... (DB25 PIN # 5)
ORANGE .... PTT ..... (DB25 PIN # 25)
RED .....(NOT USED)... (DB25 PIN # 20)

WHITE .....(NOT USED)... (DB25 PIN # 8)

CARRIER DETECTION

In this manual the term "COR" is the same as "COS".

All references made to the CARRIER DETECTION BOARDS themselves being connected to the radio is a figure of speech. The carrier detection boards are installed in the SR4/SR4-D. **The actual connection between the carrier detection boards and the radio connected to the SR4/SR4-D is made through the SR4/SR4-D, the carrier detection boards plug into the SR4/SR4-D.**

Each radio will require a carrier detection board, this board plugs into the SR4/SR4-D. If you are using only one radio, you will only require one carrier detection board. If you are using two radios you will require two carrier detection boards, one for each radio.

The purpose of the carrier detection boards are to tell the SR4/SR4-D when there is a carrier present, when the "user" is transmitting.

Location 1 is for an RV2 (RX VOX) board for radio 1.
Location 2 is for an RV2 (RX VOX) board for radio 2.

Location 3 is for a (CTCSS) board for radio 1. UNUSED
Location 4 is for a (CTCSS) board for radio 2. UNUSED

RV2 (RX VOX)

The RV2 is an RX VOX board, which supplies an active output when its "user" pre-set AC voltage threshold has been exceeded.

The RV2 is a voice activated switch. The RV2s input is connected to the squelched speaker output of your radio, and its output to the SR4/SR4-D.

The radios squelch is set to a closed position, so there is no audio present at the speaker output when there is no carrier. When there is a carrier present the squelch will open, allowing audio to pass to the speaker output. Even if the transmitting party (user) is not talking while they are transmitting (dead carrier), there is still a much larger amount of audio present at the speaker output than when the user was not transmitting. This change in the audio level at the speaker output can be detected by the RV2.

The trigger audio level can be set to trigger on a signal as small as the presence of a dead carrier, or as large as the presence of voice, this signal level requirement is selectable by the user via a POT on the RV2 board.

The RV2s threshold level is set to trigger when your radios squelch is opened by a carrier. When the RV2 is used in the SR4/SR4-D for carrier detection, anytime the radios squelch is opened the SR4/SR4-D will be told by the RV2 that there is a carrier present.

When using the RV2 board for carrier detection, there is no need for making any internal connections to your radio. When the RV2 board is plugged into the SR4/SR4-D, the SR4/SR4-D supplies the RV2 with speaker audio from the radio. You are only required to supply the SR4/SR4-D with speaker audio. When using an RV2 the only connections you are required to make with the radio are "SPK", "MIC", and "PTT".

USING THE RV2 WITH CTCSS

The RV2 does not only have to be used with carrier squelch. You can also use the RV2 with CTCSS. If your radio has a CTCSS decoder option or if it is built-in, you can use that decoder for your CTCSS carrier detection. When your radios CTCSS decoder is turned on, the only time audio will be passed to the speaker output is when the correct CTCSS tone that you have selected on your radio is present. When the users radio encodes the correct CTCSS tone during transmission the SR4/SR4-D radios CTCSS decoder will detect that tone and allow audio to pass to the speaker output, causing the RV2 to detect a carrier. The only time the RV2 will detect a carrier is when the SR4/SR4-Ds radio detects the selected CTCSS tone.

RV2 (RX VOX) BOARD SET-UP AND ADJUSTMENTS

The following POTs are on the RV2 carrier detection board, they are not on the SR4/SR4-D board.

R13 = ATTACK TIME ..... SINGLE TURN
R8 = HANG TIME ..... SINGLE TURN
R2 = SENSITIVITY LEVEL ..... SINGLE TURN

At this time the radio must be connected and the RV2 must be installed in the correct carrier detection location for the radio you are using. If you are using two radios, first adjust one carrier detection board then adjust the other carrier detection board.

1. Turn the USER radio on.
2. If the USER radio has CTCSS capabilities, turn them off.
3. Turn the SR4/SR4-D radio on.
4. Set the **USER radio** and the **SR4/SR4-D radio** on the same frequency.
5. Close the squelch on the SR4/SR4-D's radio. Set the squelch to a point where when there is no carrier, there is no audio heard on the speaker output.
6. Turn the SR4/SR4-D on.

7. The SR4/SR4-D will execute a SELF TEST.
8. On the RV2 set R13 to half level. (ATTACK DELAY)
9. On the RV2 set R8 to half level. (HANG TIME)
10. On the RV2 set R2 fully counterclockwise. (TRIGGER LEVEL)

While monitoring the STATUS LEDS on the front of the SR4/SR4-D:

The "SR" LED will be on, indicating the SR4/SR4-D is on.

While keying the user radio; turn R2 on the RV2 slowly (CLOCKWISE) towards the HIGH sensitivity setting, until the "COR" LED comes on. Then continue turning R2 slightly past that point, to assure a solid trigger.

Un-key the user radio; the "COR" LED will go off. The "PTT" LED will come on and the SR4/SR4-D will key it's radio for the duration the "COR" LED was on. The SR4/SR4-D just performed a simplex repeat.

Now anytime the user keys their radio the "COR" LED will come on, and when the user un-keys the radio the "COR" LED will go off.

(SR4-D ONLY) Key the user radio; the "COR" and "PTT" LEDs will come on together and stay on until the user un-keys their radio. There will be no simplex repeat.

SR4/SR4-D AUDIO LEVEL ADJUSTMENTS

If you are using the SPEAKER output from your radio for receive audio, set the VOLUME level on the radio to about 1/4 level if it is a MOBILE radio. If it is a HAND HELD set the VOLUME level on the radio to about 1/2 level. When making final adjustments set the radios volume level as low as possible to reduce the amount of audio distortion your radios speaker amplifier will be producing.

If you are using discriminator output for receive audio, the receive audio level will most likely be a low level output, and there will be no radio receive audio level adjustment. The only receive audio level adjustment, all receive audio adjustment will be done only with the SR4/SR4-Ds "SPK". (audio in) POT.

AUDIO OUT GAIN JUMPER

If the SR4/SR4-Ds audio output POT adjustment for either radio is at its maximum setting and a higher audio level is required. You can install a "SHUNT JUMPER" on "J1" or "J2" on the SR4/SR4-D board. Installing the jumper will increase the audio output by 10 times.

USE CAUTION IF J1 OR J2 ARE INSTALLED

When the jumper is installed the SR4/SR4-D will be able to supply

a very large amount of audio that may damage your radio's microphone input. Only install the jumper if necessary.

GAIN JUMPER INSTALLATION

All SR4/SR4-D audio in settings should be set at this time.

"J1" is for radio 1.
"J2" is for radio 2.

1. Turn the SR4/SR4-Ds power OFF.
2. Turn the audio output (MIC.) POT to its minimum setting.
3. Plug the "SHUNT JUMPER" on the jumper header on the SR4/SR4-D.
4. Turn the SR4/SR4-Ds power ON.
5. Begin adjusting the audio out (MIC.) POT again, you will have a much higher output range.

RADIO 1 AUDIO LEVEL ADJUSTMENTS

SR4/SR4-D

The following POTs will be used: R3, R13, and R32, they are all located on the SR4/SR4-D board.

R3 = RADIO 1 AUDIO IN (SPK.).
R13 = RADIO 1 DTMF IN.
R32 = RADIO 1 AUDIO OUT (MIC.).

The carrier detection for radio 1 must be functioning properly at this time. When the user keys their radio the "COR" light on the SR4/SR4-D must come on, and stay on until the user un-keys their radi

1. Turn the SR4/SR4-Ds power OFF.
2. Turn **R13** to about **HALF LEVEL.**
3. Turn **R32** completely **CLOCKWISE**, to the minimum position.
4. Turn **R32** 7 turns **COUNTERCLOCKWISE.**
5. Turn **R3** completely **CLOCKWISE**, to the minimum position.
6. Execute a SYSTEM RESET.
7. Execute a SELF TEST.

8. While monitoring the DTMF LED on the front of the SR4/SR4-D. Key the user radio and send a **DTMF** tone to the SR4/SR4-D. The DTMF LED should not be ON. While sending the DTMF tone, TURN R3 COUNTERCLOCKWISE **until the DTMF LED lights, continue** turning R3 counterclockwise, slightly past that point. Turning R3 a few turns past the minimum DTMF detection point will help assure solid DTMF detection.

When you un-key the user radio, the SR4/SR4-D will key it's radio and transmit an acknowledgment or non-acknowledgment tone back to you then it will un-key it's radio.

Now RADIO 1's AUDIO INPUT and DTMF LEVEL have been set.

Key the user radio and transmit a message to the SR4/SR4-D. When you un-key the SR4/SR4-D will repeat your message back to you.

Pay attention to the audio level and clarity you heard from the SR4/SR4-D radio, because the next step is to adjust the SR4/SR4-D audio output (MIC. LEVEL).

Use R32 to adjust the level required by the SR4/SR4-D's radio for optimum audio quality. Repeat the record and playback procedure until you have adjusted R32 to your satisfaction.

Adjust R3, R13, and R32 to any combination to suit your radio.

RADIO 2 AUDIO LEVEL ADJUSTMENTS

SR4-D ONLY

The following POTs will be used: R7, R14, and R33, they are all located on the SR4/SR4-D board.

R7 = RADIO 1 AUDIO IN (SPK.).
R14 = RADIO 1 DTMF IN.
R33 = RADIO 1 AUDIO OUT (MIC.).

The carrier detection for radio 1 must be functioning properly at this time. When the user keys their radio the "COR" light on the SR4/SR4-D must come on, and stay on until the user un-keys their radio.

1. Turn the SR4/SR4-Ds power OFF.
2. Turn **R14** to about **HALF LEVEL.**
3. Turn **R33** completely **CLOCKWISE**, to the minimum position.
4. Turn **R33** 7 turns **COUNTERCLOCKWISE.**
5. Turn **R7** completely **CLOCKWISE**, to the minimum position.
6. Execute a SYSTEM RESET.
7. Execute a SELF TEST.
8. While monitoring the DTMF LED on the front of the SR4/SR4-D. Key the user radio and send a **DTMF** tone to the SR4/SR4-D. The DTMF LED should not be ON. While sending the DTMF tone, **TURN R7 COUNTERCLOCKWISE** until the DTMF LED lights, continue turning R3 counterclockwise, slightly past that point. Turning R3 a few turns past the minimum DTMF detection point will help assure solid DTMF detection.

When you un-key the user radio, the SR4/SR4-D will key it's radio and transmit an acknowledgment or non-acknowledgment tone back to you then it will un-key it's radio.

Now RADIO 1's AUDIO INPUT and DTMF LEVEL have been set.

Key the user radio and transmit a message to the SR4/SR4-D. When you un-key the SR4/SR4-D will repeat your message back to you.

Pay attention to the audio level and clarity you heard from the SR4/SR4-D radio, because the next step is to adjust the SR4/SR4-D audio out (MIC. LEVEL).

Use R33 to adjust the level required by the SR4/SR4-D's radio for optimum audio quality. Repeat the record and playback procedure until you have adjusted R32 to your satisfaction.

Adjust R7, R14, and R33 to any combination to suit your radio.

DUPLEX AUDIO LEVEL ADJUSTMENTS

SR4-D ONLY

BI-DIRECTIONAL DUPLEX REPEATER MODE

When the SR4/SR4-D detects a carrier on radio 1 it will key radio 2 and pass the audio it is receiving from radio 1.

When the SR4/SR4-D detects a carrier on radio 2 it will key radio 1 and pass the audio it is receiving from radio 2.

Both radios are transceivers. They both need to be able to receive and transmit to operate in BI-DIRECTIONAL DUPLEX MODE.

SINGLE DIRECTION DUPLEX REPEATER MODE

RADIO 1 TO RADIO 2

When the SR4/SR4-D detects a carrier on radio 1 it will key radio 2 and pass the audio it is receiving from radio 1. It will not operate from radio 2 to radio 1.

RADIO 2 TO RADIO 1

When the SR4/SR4-D detects a carrier on radio 2 it will key radio 1 and pass the audio it is receiving from radio 2. It will not operate from radio 1 to radio 2.

One radio is a receiver and the other radio is a transmitter. The user may select which radio is the receiver and which radio is the transmitter. These selections are made with DTMF commands sent by the user.

If you are using the SR4/SR4-D in SINGLE DIRECTION DUPLEX REPEATER MODE, you only need to make audio level adjustments for one direction. **EXAMPLE:** you only need to adjust radio 1's receiver audio and radio 2's transmitter audio.

If you are using the SR4/SR4-D in BI-DIRECTIONAL DUPLEX REPEATER MODE, you need to adjust radio 1's and radio 2's, receiver and transmitter audio, because you are now using two transceivers,

each of which requires separate transmitter and receiver audio adjustments.

With SINGLE or BI-DIRECTIONAL operation "R26" will need to be adjusted. R26 is the DUPLEX level adjustment. It is the joining point for all audio being passed between both radios.

RADIO 1 AND RADIO 2 MUST BE USING DIFFERENT FREQUENCIES.

The following POTs will be used: R3, R7, R13, R14, R32, R33 and R26, they are all located on the SR4/SR4-D board.

R3 = RADIO 1 AUDIO IN (SPK.).
R13 = RADIO 1 DTMF IN.
R32 = RADIO 1 AUDIO OUT (MIC.).

R7 = RADIO 2 AUDIO IN (SPK.).
R14 = RADIO 2 DTMF IN.
R33 = RADIO 2 AUDIO OUT (MIC.).

R26 = DUPLEX AUDIO TRANSFER LEVEL
RADIO 1 TO RADIO 2
RADIO 2 TO RADIO 1

RADIO 1 TO RADIO 2 AUDIO LEVEL ADJUSTMENT

1. Turn **R26** to about **HALF LEVEL.**
2. Turn **R13** to about **HALF LEVEL.**
3. Turn **R3** completely **CLOCKWISE**, to the minimum position.
4. Turn **R33** completely **CLOCKWISE**, to the minimum position.
5. Turn **R33** 7 turns **COUNTERCLOCKWISE.**

6. While monitoring the DTMF LED on the front of the SR4/SR4-D. Key the user radio 1 and send a **DTMF** tone to the SR4/SR4-D. The DTMF LED should not be on. While sending the DTMF tone, **TURN R3 COUNTERCLOCKWISE** until the DTMF LED lights, continue turning R3 counterclockwise, slightly past that point. Turning R3 a few turns past the minimum DTMF detection point will help assure solid DTMF detection.

Now the radio 1 SPK. and DTMF audio level is set.

Key and talk into radio 1 while listing to radio 2. Adjust **R33** (microphone level) until good sounding audio is heard from radio 2.

RADIO 2 TO RADIO 1 AUDIO LEVEL ADJUSTMENT

1. Turn **R26** to about **HALF LEVEL.**
2. Turn **R14** to about **HALF LEVEL.**
3. Turn **R7** completely **CLOCKWISE**, to the minimum position.
4. Turn **R32** completely **CLOCKWISE**, to the minimum position.

5. Turn R32 7 turns **COUNTERCLOCKWISE.**
6. While monitoring the DTMF LED on the front of the SR4/SR4-D. Key the user radio 2 and send a **DTMF** tone to the SR4/SR4-D. The DTMF LED should not be on. While sending the DTMF tone, **TURN R7 COUNTERCLOCKWISE** until the DTMF LED lights, continue turning R7 counterclockwise, slightly past that point. Turning R7 a few turns past the minimum DTMF detection point will help assure solid DTMF detection.

Now the radio 1 SPK. and DTMF audio level is set.

Key and talk into radio 2 while listing to radio 1. Adjust **R32** (microphone level) until good sounding audio is heard from radio 1.

Once the simplex and duplex levels are adjusted, you may use **R26** to adjust the duplex audio level between radio 1 and radio 2. Radio 1 and radio 2 have one duplex path, that path's audio level is controlled by R26.

DTMF AUDIO OUTPUT LEVEL ADJUSTMENT

COURTESY TONES AND ROGER BEEPS

Once you have completed all other audio level adjustments, then you can adjust the DTMF AUDIO OUTPUT LEVEL.

REFERENCE RANGE TEST FUNCTION

"R34" will be used to adjust the DTMF OUTPUT LEVEL, it is located on the SR4/SR4-D board.

To adjust **R34**, EXECUTE REMOTE DTMF FUNCTION **"RANGE TEST".** The RANGE TEST feature will cause the SR4/SR4-D to key its transmitters and encode a series of DTMF TONES. During the time the SR4/SR4-D is encoding the DTMF TONES, **ADJUST R34** to a suitable level.

SR4/SR4-D ACKNOWLEDGMENT TONES

The user communicates with the SR4/SR4-D with DTMF TONES. The SR4/SR4-D communicates with the user with ACKNOWLEDGMENT TONES. These are DTMF tones.

The SR4/SR4-D will send a SHORT BEEP for a "PASS", "ACCEPT" or "OK". A SHORT BEEP means the SR4/SR4-D processed the command code you entered.

The SR4/SR4-D will send a LONG BEEP for a "FAIL" or "NOT ACCEPTED". A LONG BEEP means the SR4/SR4-D DID NOT process the command code you entered.

REASONS FOR THE SR4/SR4-D TO FAIL (NOT ACCEPT) A COMMAND CODE:

1. Buffer over flow.
2. Non valid command code. May occur if the SR4/SR4-D has trouble detecting DTMF tones.
3. All the requirements for the command have not been met prior to entering the command.

The SR4/SR4-D will respond with one PASS or FAIL beep for every command code entered.

SHORT BEEP = ACCEPTED = PROCESSED = **PASS**
LONG BEEP = NOT ACCEPTED = NOT PROCESSED = **FAIL**

EXAMPLE: If the user sends one command code to the SR4/SR4-D, and if the SR4/SR4-D accepts the command, it will respond with a PASS TONE (SHORT BEEP). If the SR4/SR4-D does not accept the command it will respond with a FAIL TONE (LONG BEEP).

EXAMPLE: If the user sends 2 command codes to the SR4/SR4-D and they pass the SR4/SR4-D will respond with 2 PASS TONES (2 short beeps).

EXAMPLE: If the user sends 3 command codes to the SR4/SR4-D and they all pass, the SR4/SR4-D will respond with 3 PASS TONES respectively.

EXAMPLE: If the user sends 3 command codes to the SR4/SR4-D and the first two pass but the third fails, the SR4/SR4-D will respond with TWO PASS TONES and ONE FAIL TONE respectively.

EXAMPLE: If the user sends 3 command codes to the SR4/SR4-D and the FIRST PASSES, the SECOND FAILS, and the THIRD PASSES. The SR4/SR4-D will respond with ONE PASS TONE, ONE FAIL TONE and one PASS TONE respectively.

(short beep)(long beep)(short beep)
pass fail pass

If one or more of your commands failed, you do not have to re-enter the entire command string, if you know what order you entered the command codes. When the SR4/SR4-D responds with its pass or fail acknowledgment tones, you can count the tones; therefore, knowing which commands failed and which passed.

ACCESS PREFIX

The SR4/SR4-D has the capability of accepting a 0 to 30 digit access prefix. This prefix may consist of any of the 16 DTMF digits. The access code must be entered by the user, before the SR4/SR4-D will respond to any DTMF commands sent remotely by the user. This access prefix is optional.

The SR4/SR4-D's commands are all two digit commands. There are two sequential digits for each command. These command codes are factory set. EXAMPLE: "00" will turn the SR4/SR4-D OFF, and "01" will turn the SR4/SR4-D ON. When the access prefix is used, the prefix must be entered before the command, or the SR4/SR4-D will not execute the command. If there is no access prefix the commands may be directly entered.

THE SR4/SR4-D's BUFFER SIZE IS 32 DIGITS. It can accept up to 16 commands in one string (32 DTMF digits), when there is no access prefix used.

The access prefix and the command digits entered by the user share a DTMF digit buffer. EXAMPLE: if your access prefix is 2 digits, there are only 30 digits remaining for the user to enter command codes. EXAMPLE: if your access prefix is 6 digits, there are only 26 digits remaining for the user to enter command codes. If your access prefix is 5 digits, you will still 26 have digits remaining for command codes, because each command code requires 2 digits. With 26 digits, the user may enter 13 commands in one string. Most strings will only consist of about 4 commands, so don't worry about running out of buffer space. This buffer is automatically cleared every time the user keys their radio.

If your string exceeds the buffer space you have available, divide the command string in half, because the buffer is cleared every time the user keys their radio and the SR4/SR4-D detects a carrier.

To divide-up your command string, enter your access prefix followed by a portion of your command string, then un-key. The SR4/SR4-D will respond with a PASS or FAIL tones. If they all passed, enter the access prefix again and send the remainder portion of your command string. You can not separate command codes, both digits must be entered sequentially, or the SR4/SR4-D will not accept the command. Any time you un-key the access prefix will need to be re-entered before sending additional command codes.

PROGRAMMING ACCESS PREFIX

1. Turn the SR4/SR4-D ON.
2. Press and release the **PROG** switch on the SR4/SR4-D board.
3. The PROG LED will come on.
4. Key your radio and send your desired access prefix via your radios DTMF encoder. You only have 8 seconds to key your radio, or the SR4/SR4-D will time-out, and the PROG LED will go off.
5. After the last digit is entered, un-key your radio.

The SR4/SR4-D will respond with a PASS TONE.

The SR4/SR4-D will also flash the PROG LED one time.

If the programming failed the SR4/SR4-D will respond with a FAIL TONE, and the PROG LED would flash 3 times.

Make sure you key your radio long enough for the SR4/SR4-D's COR LED to come on before entering your access prefix.

To program a new access prefix, just repeat these steps again.

REMOVING THE ACCESS PREFIX

1. Press and release the **PROG** switch on the SR4/SR4-D board.
2. Key your radio, until the COR LED comes on.
3. Un-key your radio.
4. The SR4/SR4-D will respond with a PASS TONE.

The maximum length for an access prefix is 30 digits, because the buffer size is 32 digits and you need to be able to enter at least one command code. If the SR4/SR4-D does not accept your access prefix programming it will retain its old prefix.

PROGRAMMING THE SR4/SR4-D WITH REMOTE DTMF COMMANDS

If you have not already covered the SR4/SR4-D ACKNOWLEDGMENT TONES and the ACCESS PREFIX, cover them before this section.

For the SR4/SR4-D to respond to any DTMF tones, it must first detect a carrier; therefore, allow enough time after you key your radio before entering DTMF commands. We found a 0.5 second pause to be ample time to wait before beginning to enter DTMF commands.

First you must decide which command code you want to send. The SR4/SR4-D will not respond to any command codes unless the SR4/SR4-D ON command "01" has been sent.

1. Key your radio, and send the access code, if there is one.
2. Keep your radio keyed, and send the command code or codes.
3. Un-key your radio, and listen for the PASS / FAIL tones.

EXAMPLE: To remotely turn the SR4/SR4-D on and turn the ROGER BEEP OFF.

1. Key your radio and send "01""43", then un-key.
2. The SR4/SR4-D will respond with two PASS TONES (TWO SHORT BEEPS).

EXAMPLE: to remotely turn the ROGER BEEP ON.

1. Key your radio and send "43", then un-key.
2. The SR4/SR4-D will respond with a PASS TONE (SHORT BEEP).

If all your commands passed, your programming is complete. Re-enter any commands that did not pass. If a command fails

multiple times, and your are sure the DTMF tones are reaching the SR4/SR4-D, check to see if you have satisfied all the requirements for using that command. EXAMPLE: The VOICE MAIL must be cleared before a new VOICE MAIL can be saved. EXAMPLE: The IDer voice message must be stored before storing a VOICE MAIL. If these commands are not used in this order, the SR4/SR4-D will not accept them.

REMOTE PROGRAMMABLE COMMAND CODES

COMMAND CODES WITH **EVEN** NUMBERS HAVE **NEGATIVE IMPACTS.**
COMMAND CODES WITH **ODD** NUMBERS HAVE **POSITIVE IMPACTS.**

SYSTEM FUNCTIONS

SR4/SR4-D ON/OFF

00 - SR4/SR4-D OFF
01 - SR4/SR4-D ON

Sending the SR4/SR4-D ON command will turn the SR4/SR4-D on. Sending the SR4/SR4-D OFF command will disable the SR4/SR4-D from operating. The VOICE MAIL and the VOICE IDer will not be disturbed, they will be saved. When the SR4/SR4-D is turned back on by sending the SR4/SR4-D ON command the saved massages will be there. The only two ways to erase messages are to send the erase (clear) command or turn the power switch OFF (lose power).

When the SR4/SR4-D ON command is sent the SR4/SR4-D will be turned ON and the **"SR" LED** will be ON.

When the SR4/SR4-D OFF command is sent the SR4/SR4-D will be turned OFF and the **"SR" LED** will be OFF.

POWER SAVER

02 - POWER SAVER OFF
03 - POWER SAVER ON

When the POWER SAVE is turned ON, the SR4/SR4-D will draw less current. Very useful if your are using battery operation. When the POWER SAVE is ON, the LED's on the front of the SR4/SR4-D **DO NOT LIGHT** to conserve power.

RADIO 1 FUNCTIONS

RADIO 1 RECEIVER

10 - RADIO 1 RX OFF
11 - RADIO 1 RX ON

The RADIO 1 RX OFF command will disable the SR4/SR4-D from receiving a carrier signal from radio 1. Radio 1's receiver will effectively be disabled. The SR4/SR4-D will not acknowledge a carrier signal from radio 1.

The RADIO 2 RX ON command will enable the SR4/SR4-D to receive a carrier signal from radio 1. The SR4/SR4-D will acknowledge a carrier signal from radio 1.

RADIO 1 TRANSMITTER

12 - RADIO 1 TX OFF
13 - RADIO 1 TX ON

The RADIO 1 TX OFF command will disable the SR4/SR4-D from keying radio 1. Radio 1's transmitter will effectively be disabled. The SR4/SR4-Ds radio 1's PTT output will be disabled.

The RADIO 1 TX ON command will enable the SR4/SR4-D to key radio 1. Radio 1's transmitter will be active. The SR4/SR4-Ds radio 1's PTT output will be enabled.

RADIO 1 SIMPLEX REPEATER

14 - RADIO 1 SIMPLEX REPEAT OFF
15 - RADIO 1 SIMPLEX REPEAT ON

When RADIO 1 SIMPLEX REPEAT IS OFF: when a carrier is received by radio 1 the SR4/SR4-D will not record and re-broadcast it.

When RADIO 1 SIMPLEX REPEAT IS ON: when a carrier is received by radio 1 the SR4/SR4-D will record and re-broadcast it on any active transmitter.

RADIO 1 DUPLEX

16 - RADIO 1 TO RADIO 2 DUPLEX OFF
17 - RADIO 1 TO RADIO 2 DUPLEX ON

When RADIO 1 TO RADIO 2 DUPLEX IS OFF: no duplex operation will occur from radio 1 to radio 2. These commands only apply to the SR4-D.

When RADIO 1 TO RADIO 2 DUPLEX IS ON: when a carrier is received by radio 1 the SR4-D will key radio 2 and transfer the audio being received by radio 1 to radio 2 simultaneously. When the carrier on radio 1 drops the SR4-D will un-key radio 2.

SPLIT SIMPLEX REPEATER

18 - RADIO 1 / RADIO 2 SPLIT SIMPLEX OFF

19 - RADIO 1 / RADIO 2 SPLIT SIMPLEX ON

The SPLIT SIMPLEX REPEAT only applies when SIMPLEX REPEAT is on. The SPLIT SIMPLEX REPEAT only applies to the SR4-D.

When the SR4-D is operating in SIMPLEX REPEATER mode, it will record audio from any active receiver and re-broadcast it on any active transmitter. The SPLIT SIMPLEX REPEAT command will split the two transmitters. The only transmitter that the SR4-D will key and transmit on will be the transmitter of the radio that it received the carrier from.

When RADIO 1 / RADIO 2 SPLIT SIMPLEX IS OFF: When SIMPLEX REPEAT is ON, any signal received by any active receiver will be re-broadcasted on any active transmitter.

When RADIO 1 / RADIO 2 SPLIT SIMPLEX IS ON: Any carrier received by radio 1 will be recorded and re-broadcasted on radio 1 only. Any carrier received by radio 2 will be recorded and re-broadcasted on radio 2 only.

RADIO 2 FUNCTIONS

REFER TO RADIO 1 COMMANDS

20 - RADIO 2 RX OFF
21 - RADIO 2 RX ON

22 - RADIO 2 TX OFF
23 - RADIO 2 TX ON

24 - RADIO 2 SIMPLEX REPEAT OFF
25 - RADIO 2 SIMPLEX REPEAT ON

26 - RADIO 2 TO RADIO 1 DUPLEX OFF
27 - RADIO 2 TO RADIO 1 DUPLEX ON

VOICE IDer

The SR4/SR4-D has a VOICE IDer, that the user can program with their own voice, just like a voice mail box. The only difference between the voice IDer and a voice mail box is that the voice IDer has an activity timer. The user can remotely record a voice ID message as often as desired. You are not limited to only recording voice, you can record a CW ID message by using a CW keyer and recording the station ID the same way you would record a voice ID.

The SR4/SR4-Ds voice IDer has a user remote programmable activity timer. The activity time monitors for carrier activity. If the SR4/SR4-D detects a carrier the SR4/SR4-D will play your ID message, and the activity timer will start. If in the period of the activity time there was a carrier detected the SR4/SR4-D will

play the ID message again at the end of the activity timer period. If the ID message was played at the end of the activity timer period the timer will start again, and will be waiting for another carrier. If no carrier is detected within the activity timer period the ID message will not be played again, until a carrier is detected by the SR4/SR4-D.

When there is an ID message stored, the **IDER LED** will be on, it will light SOLID (not flashing).

When the activity timer is running the **IDER LED** will **FLASH.**

The activity timer can only run when there is a ID message stored.

The SR4/SR4-D has a total of 2 minutes and 48 seconds of recording time. This time is shared between the VOICE IDer, VOICE MAIL, and the SIMPLEX REPEATER.

Any of the three can use all of the recording time or they can share it.

If you store an 8 second ID message you will have 2 minutes and 40 seconds left for voice mail and simplex repeater to use.

If you store an 8 second ID message and you store a 40 second voice mail message you will have 2 minutes of time left for the simplex repeater operation.

If you store a 48 second ID message and you store a 2 minute voice mail message, the simplex repeater will not function, because all the message time is occupied by the voice mail and the voice IDer.

If there is no voice mail or voice IDer stored the simplex repeater will have 2 minutes and 48 seconds of message time.

VOICE ID DTMF COMMAND GROUP

30 - RECORD ID MESSAGE
31 - PLAY ID MESSAGE
32 - ERASE ID MESSAGE
34 - ACTIVITY TIMER

RECORD A VOICE ID MESSAGE

30 - RECORD ID MESSAGE

To record an ID message there can not be a voice mail message stored. If there is a voice mail message stored, it must first be erased, then the ID message can be recorded.

To record a new ID message the old one must first be erased. The

SR4/SR4-D will not allow you to record an ID message if it already has one stored.

If you wish to record a VOICE ID and a VOICE MAIL, you will first have to store the voice ID and then store the voice mail.

1. ID and VOICE MAIL messages must first be cleared.
2. Send command code "30" then un-key. 3. The SR4/SR4-D will respond with a special distinctive tone.
4. Key your radio and say your ID message.
5. Un-key your radio, the SR4/SR4-D will respond with a PASS tone.
6. The SR4/SR4-D will play back your ID message once for your approval.

PLAY A VOICE ID MESSAGE

31 - PLAY ID MESSAGE

Another common term for "PLAY ID MESSAGE" is "FORCED ID".

1. Send command code "31" then un-key.
2. The SR4/SR4-D will play back the ID message.

Voice ID can be played by executing a hardwire play as well.

REFERENCE: HARDWIRE PLAY INPUTS

ERASE THE VOICE ID MESSAGE

32 - ERASE ID MESSAGE

To erase the ID message, there must be no voice mail message stored. The SR4/SR4-D will not allow the erasing of an ID message if there is a voice mail stored.

1. Send command code "32" then un-key.
2. The SR4/SR4-D will respond with a PASS tone.

IDer ACTIVITY TIMER

34 - TIMER INTERVAL

The activity timer is the only 4 DIGIT SR4/SR4-D command. It requires the 2 digit command code and a 2 digit number to be entered consecutively (in a string). The digits are entered in minutes. If you wish to enter a single digit number of minutes, you MUST enter a "0" before the number.

1. The timer can be set from 1 minute to 98 minutes.
2. Place a "0" in front of any single digit number.
   EXAMPLE: 1 = "01"

3. Send command code "34" followed by the time in minutes.
   EXAMPLE: Send "34""01". That will set the timer to 1 minute.
   EXAMPLE: Send "34""15". That will set the timer to 15 minutes.
4. To turn off the timer send a "00"
   EXAMPLE: Send "34""00". The ID message will be played every transmission.
5. The SR4/SR4-D will respond with a PASS tone.

VOICE MAIL

The user can store a voice mail message for another user to retrieve at a later time. The SR4/SR4-D is only capable of storing a one voice mail message.

When there is a voice mail message stored, the SR4/SR4-D automatically adds a special squelch tail. At the end of each transmission the SR4/SR4-D makes, this special string of tones will sound to alert the operators that there is a voice mail stored. If the voice mail is played the special tail is not effected because the voice mail is still stored. When the voice mail is erased the SR4/SR4-D automatically removes the special squelch tail.

The SR4/SR4-D has a total of 2 minutes and 48 seconds of recording time. This time is shared between the VOICE IDer, VOICE MAIL, and the SIMPLEX REPEATER.

Any of the three can use all of the recording time or they can share it.

If you store an 8 second ID message you will have 2 minutes and 40 seconds left for voice mail and simplex repeater to use.

If you store an 8 second ID message and you store a 40 second voice mail message you will have 2 minutes of time left for the simplex repeater operation.

If you store a 48 second ID message and you store a 2 minute voice mail message, the simplex repeater will not function, because all the message time is occupied by the voice mail and the voice IDer.

If there is no voice mail and voice IDer stored the simplex repeater will have 2 minutes and 48 seconds of message time.

VOICE MAIL DTMF COMMAND GROUP

36 - RECORD VOICE MAIL MESSAGE
37 - PLAY VOICE MAIL MESSAGE
38 - ERASE VOICE MAIL MESSAGE

RECORD A VOICE MAIL MESSAGE

If you wish to record a VOICE ID and a VOICE MAIL, you will first have to store the voice ID and then store the voice mail.

36 - RECORD VOICE MAIL MESSAGE

1. Send command code "36" then un-key.
2. The SR4/SR4-D will respond with a special distinctive tone.
3. Key your radio and say your VOICE MAIL message, then un-key.
4. The SR4/SR4-D will respond with a PASS tone.

PLAY THE VOICE MAIL MESSAGE

37 - PLAY VOICE MAIL MESSAGE

1. Send command code "37" then un-key.
2. The SR4/SR4-D will play the VOICE MAIL message for you.

Voice mail can be played by executing a hardwire play as well.

REFERENCE: HARDWIRE PLAY INPUTS

ERASE THE VOICE MAIL MESSAGE

38 - ERASE VOICE MAIL MESSAGE

Once the voice mail message has been erased, then the voice ID message can be erased.

1. Send command code "38" then un-key
2. The SR4/SR4-D will respond with a PASS tone.

MISCELLANEOUS DTMF PROGRAMMING

SAMPLE RATE

40 - MEDIUM AUDIO QUALITY
41 - HIGH AUDIO QUALITY

MEDIUM SAMPLE RATE SELECTION

1. Send command code "40" then un-key
2. The SR4/SR4-D will respond with a PASS tone.

HIGH SAMPLE RATE SELECTION

1. Send command code "41" then un-key
2. The SR4/SR4-D will respond with a PASS tone.

ROGER BEEP

42 - ROGER BEEP OFF
43 - ROGER BEEP ON

The ROGER BEEP, is a courtesy tone that will sound after the SR4/SR4-D un-keys, and it is time for the other radio operator to transmit.

TURNING ROGER BEEP OFF

42 - ROGER BEEP OFF

1. Send command code "42" then un-key.
2. The SR4/SR4-D will respond with a PASS tone.

TURNING ROGER BEEP ON

43 - ROGER BEEP ON

1. Send command code "43" then un-key.
2. The SR4/SR4-D will respond with a PASS tone.

DTMF MUTING

44 - MUTE DTMF TONES
45 - PASS DTMF TONES

MUTE DTMF TONES

44 - MUTE DTMF TONES

The SR4/SR4-D must have an **ACCESS PREFIX**, for it to be able to operate as follows, other wise all DTMF tones it detects it will consider as command codes and will respond with pass or fail tones. If there is no access prefix programmed, DTMF muting will not occur.

When operating in SIMPLEX REPEATER mode, any DTMF tone sent by the user will cause the SR4/SR4-D to not simplex repeat the message it recorded. Any DTMF tone transmitted to the SR4/SR4-D during the users transmission will cause the SR4/SR4-D to not repeat the message, effectively muting the DTMF tones.

When operating in DUPLEX REPEATER mode, the DTMF sent by the user will be muted by the SR4/SR4-D immediately upon detection of a DTMF tone by disabling the PTT output to the transmitter. The

PTT will remain disabled until the carrier is dropped.

When operating in SIMPLEX REPEATER mode and DUPLEX REPEATER mode at the same time. Any tone transmitted by the user to the SR4/SR4-D will cause the transmitter to be disabled until the carrier is dropped for duplex operation, and for simplex operation, there will be no simplex repeat.

1. Send command code "44" then un-key.
2. The SR4/SR4-D will respond with a PASS tone.
   Any DTMF tones received by the SR4/SR4-D will not be re-transmitted.

PASS DTMF TONES

45 - PASS DTMF TONES

The SR4/SR4-D must have an **ACCESS PREFIX**, for it to be able to pass DTMF tones. All tones will be passed as long as the access prefix digits are not the first digits entered. The only time DTMF tones will not be passed is when the access prefix is entered before any other tones are entered, because entering the access prefix will tell the SR4/SR4-D that you are programming it; therefore all tones entered after the access prefix will be processed as command codes.

Any DTMF tones received by the SR4/SR4-D when operating in SIMPLEX REPEATER mode will be recorded and played back, just like voice. The DTMF LED on the SR4/SR4-D will light for every DTMF tone detected; however, the SR4/SR4-D will not respond to the tones.

Any DTMF tones received by the SR4/SR4-D when operating in DUPLEX REPEATER mode will be simultaneously passed to the transmitting radio.

If the SR4/SR4-D is operating in SIMPLEX REPEATER mode and DUPLEX REPEATER mode at the same time. When the SR4/SR4-D receives DTMF it will simultaneously pass it to the transmitting radio, and when the carrier drops it will key the simplex repeat radio(s) and repeat the DTMF as well.

1. Send command code "45" then un-key.
2. The SR4/SR4-D will respond with a PASS tone.

RANGE TEST

The SR4/SR4-Ds range test feature will allow the user to conduct range tests with the SR4/SR4-D. The user will send the range test command to the SR4/SR4-D, the SR4/SR4-D will key its radio(s) and transmit 20 beeps at 1/2 a second intervals for 10 seconds. During this time the user can move around with their transceiver, and find the best location to transmit from.

The range test command can be entered many times in one string to obtain longer range test durations.

EXAMPLE: DTMF command "49" ..... 20 beeps, 10 seconds.
DTMF command "49,49" ..... 40 beeps, 20 seconds.
DTMF command "49,49,49" ..... 60 beeps, 30 seconds.

ACTIVATING RANGE TEST

49 - RANGE TEST

1. Send command code "49" then un-key.
2. The SR4/SR4-D will key any active transmitter and transmit a "BEEP" for approximately 10 seconds.

AUXILIARY OUTPUT CONTROL

50 - AUX. OUTPUT OFF
51 - AUX. OUTPUT ON

The auxiliary output control commands will turn the auxiliary output on and off. The auxiliary output is an open collector output from a NPN transistor. When the ON command is sent by the user the transistor is saturated (the collector is pulled to ground at 50 ma. max.). When the OFF command is sent the transistor is not saturated (the collector is not pulled to ground).

TURNING AUX. OUTPUT OFF

50 - AUX. OUTPUT OFF

1. Send command code "50" then un-key.
2. The SR4/SR4-D will de-activate the AUX. OUTPUT, then respond with a PASS tone.

TURNING AUX. OUTPUT ON

51 - AUX. OUTPUT ON

1. Send command code "51" then un-key.
2. The SR4/SR4-D will activate the AUX. OUTPUT, then respond with a PASS tone.

AUX. OUTPUT TOGGLE

52 - AUX. OUTPUT TOGGLE

1. Send command code "52" then un-key.

2. The SR4/SR4-D will change the present state the AUX. OUTPUT is at.
   If it is on, it will be turned off.
   If it is off, it will be turned on.

TEMPORARY COMMAND STRING RESPONSE DISABLE

88 - TEMP. DISABLE ACKNOWLEDGMENT TONES

If you want to send a command code string and you don't want to hear the PASS or FAIL tones, you can add an "88" to the end of your command string and that will drop the acknowledgments for only that command string.

COMMAND STRING ABORT

99 - ABORT COMMAND STRING

You may abort a command code string by entering a "99" at the end of the string. The SR4/SR4-D will respond with a FAIL, and the command string will be dropped. Your command string will have had no effect.

FACTORY PROGRAMMED CONFIGURATIONS

When a **SYSTEM RESET** is executed, the user programming is erased, and the following factory default configurations will be loaded into the SR4/SR4-D's user programmable, configuration memory. The only default configurations that will be re-loaded are those that apply to the version of the SR4/SR4-D you have. NOTE: The following factory configuration information is depending on the dip-switch (S3) to be set at factory settings.

FACTORY PROGRAMMED GENERAL SYSTEM CONFIGURATIONS

SR4/SR4-D

SYSTEM FUNCTIONS	00 - SR4/SR4-D OFF
	01 - SR4/SR4-D ON
	02 - POWER SAVER OFF
	03 - POWER SAVER ON
ID AND VOICE MAIL FUNCTIONS	30 - RECORD ID MESSAGE
	31 - PLAY ID MESSAGE
	32 - ERASE ID MESSAGE
	34 - ACTIVITY TIMER = 10 MINUTES
	36 - RECORD VOICE MAIL MESSAGE

37 - PLAY VOICE MAIL MESSAGE
38 - **ERASE VOICE MAIL MESSAGE**

MISCELLANEOUS FUNCTIONS

40 - MEDIUM AUDIO QUALITY
41 - **HIGH AUDIO QUALITY**

42 - **ROGER BEEP OFF**
43 - ROGER BEEP ON

44 - MUTE DTMF TONES
45 - **PASS DTMF TONES**

AUX. OUTPUT CONTROL

50 - **AUX. OUTPUT OFF**
51 - AUX. OUTPUT ON
52 - AUX. OUTPUT TOGGLE

FACTORY PROGRAMMED SYSTEM CONFIGURATIONS

SR4

RADIO 1 FUNCTIONS

10 - RADIO 1 RX OFF
11 - RADIO 1 RX **ON**

12 - RADIO 1 TX OFF
13 - RADIO 1 TX **ON**

14 - RADIO 1 SIMPLEX REPEAT OFF
15 - RADIO 1 SIMPLEX REPEAT **ON**

SR4-D

RADIO 1 FUNCTIONS

10 - RADIO 1 RX OFF
11 - RADIO 1 RX **ON**

12 - RADIO 1 TX OFF
13 - RADIO 1 TX **ON**

14 - RADIO 1 SIMPLEX REPEAT OFF
15 - RADIO 1 SIMPLEX REPEAT **ON**

16 - RADIO 1 TO RADIO 2 DUPLEX **OFF**
17 - RADIO 1 TO RADIO 2 DUPLEX ON

18 - RADIO 1 / RADIO 2 SPLIT SIMPLEX **OFF**
19 - RADIO 1 / RADIO 2 SPLIT SIMPLEX ON

RADIO 2 FUNCTIONS

20 - RADIO 2 RX OFF
21 - RADIO 2 RX **ON**

22 - RADIO 2 TX OFF

23 - RADIO 2 TX **ON**

24 - RADIO 2 SIMPLEX REPEAT OFF
25 - RADIO 2 SIMPLEX REPEAT **ON**

26 - RADIO 2 TO RADIO 1 DUPLEX **OFF**
27 - RADIO 2 TO RADIO 1 DUPLEX ON

ALINCO SR4/SR4-D

COMMAND CARD

02 - POWER SAVER OFF
03 - POWER SAVER ON

44 - MUTE DTMF
45 - PASS DTMF

88 - NO ACK
99 - ABORT

40 - MED. RATE
41 - HI. RATE

49 - RANGE TEST

30 - RECORD ID
31 - PLAY ID
32 - CLEAR ID
34 - ID TIMER

00 - SYSTEM OFF
01 - SYSTEM ON

50 - AUX OUT OFF
51 - AUX OUT ON
52 - AUX OUT TOG.

42 - ROGER BEEP OFF
43 - ROGER BEEP ON

36 - RECORD VM
37 - PLAY VM
38 - CLEAR VM

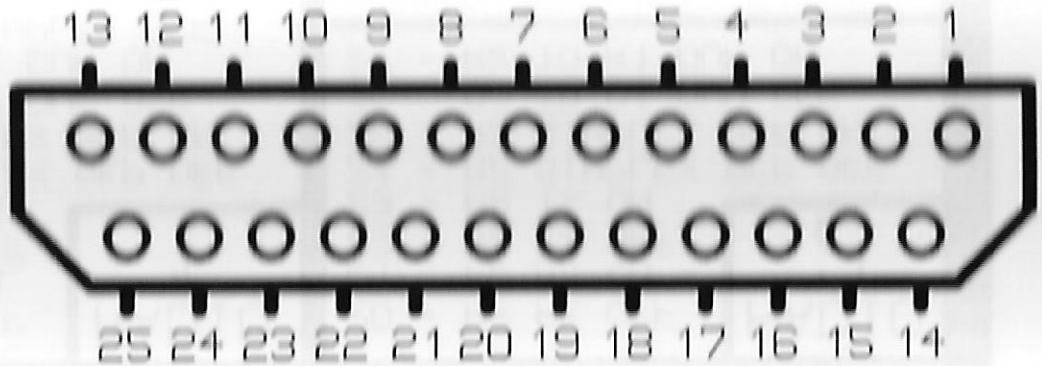
RADIO 1

10 - R1 RX OFF
11 - R1 RX ON
12 - R1 TX OFF
13 - R1 TX ON
14 - R1 SIMPLEX REP OFF
15 - R1 SIMPLEX REP ON
16 - R1 TO R2 DUP OFF
17 - R1 TO R2 DUP ON
18 - SPLIT SIMPLEX OFF
19 - SPLIT SIMPLEX ON

RADIO 2

20 - R2 RX OFF
21 - R2 RX ON
22 - R2 TX OFF
23 - R2 TX ON
24 - R2 SIMPLEX REP OFF
25 - R2 SIMPLEX REP ON
26 - R2 TO R1 DUP OFF
27 - R2 TO R1 DUP ON

1	+12VDC	14	GND
2	GND	15	GND
3	R1 MIC	16	GND
4	GND	17	GND
5	R2 MIC	18	GND
6	GND	19	R1 SPK
7	R2 SPK	20	N/C
8	N/C	21	N/C
9	N/C	22	N/C
10	N/C	23	PROG
11	AUX OUT	24	PLAY ID
12	PLAY VM	25	R2 PTT
13	R1 PTT		

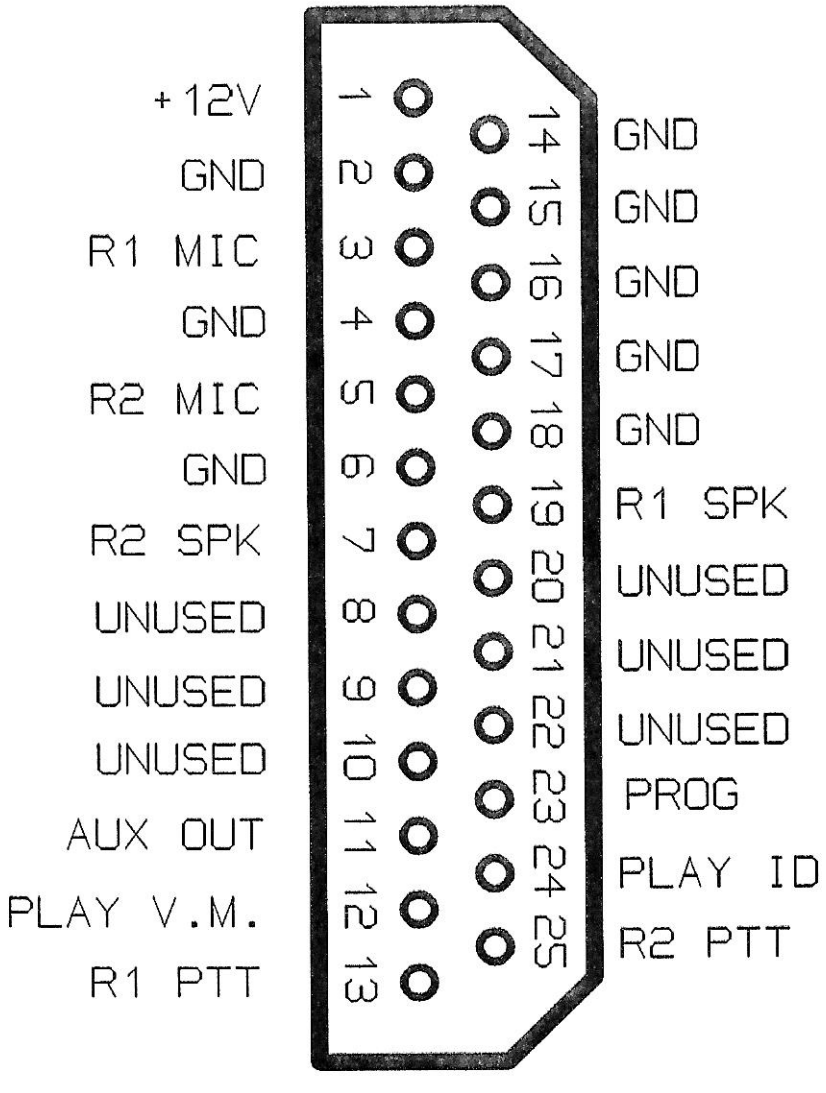


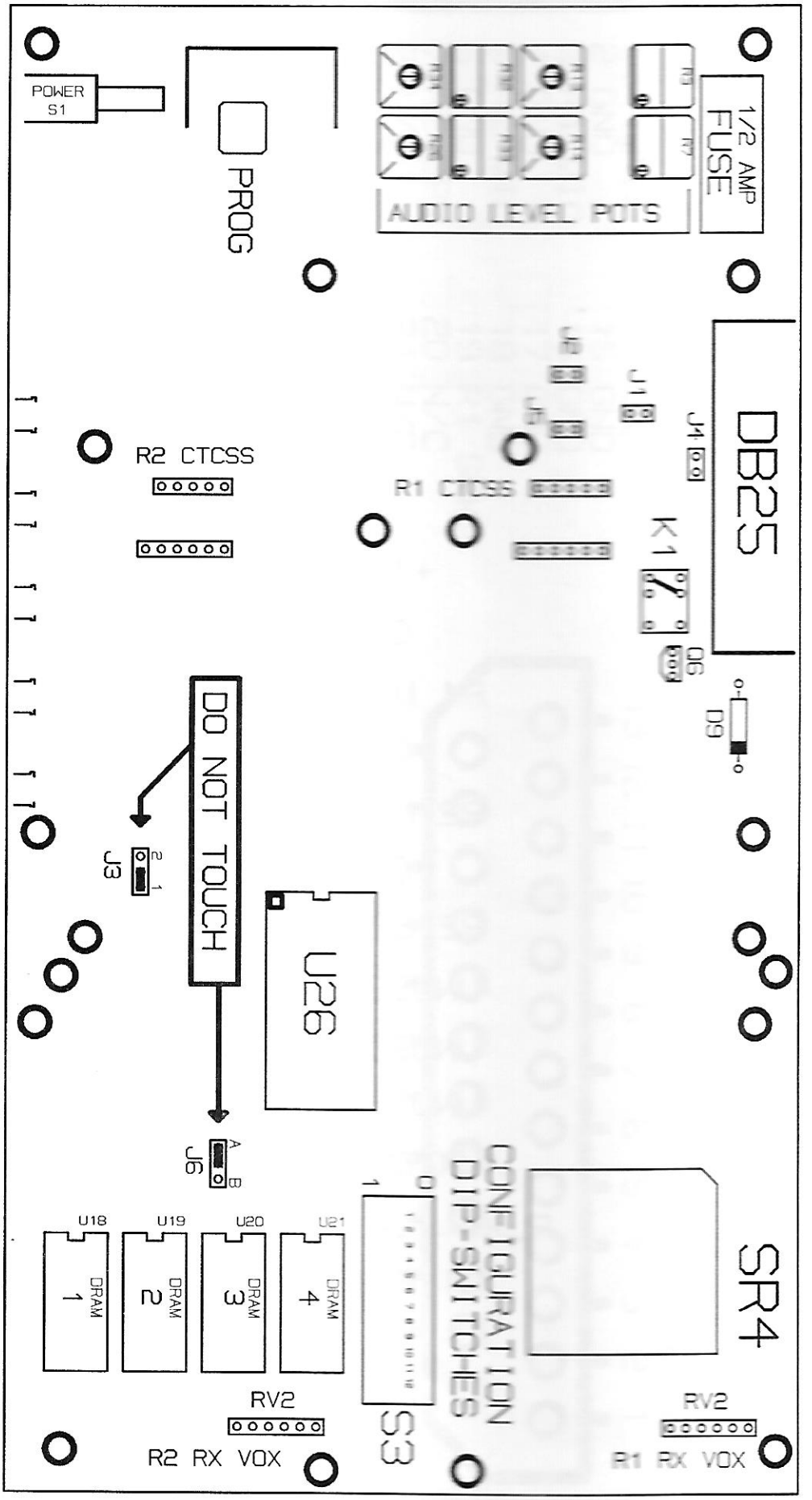
DIP-SWITCH SETTINGS SWITCH 3

POS 1 - DRAM QTY MSB
POS 2 - DRAM QTY LSB
POS 3 - R1 DTMF LOCK
POS 4 - R2 DTMF LOCK
POS 5 - R1 ACK ENABLE
POS 6 - R2 ACK ENABLE
POS 7 - R1 RX ON AT POWER UP
POS 8 - R2 RX ON AT POWER UP
POS 9 - R1 RX LOCK
POS 10 - R2 RX LOCK
POS 11 - PTT TIMER
POS 12 - PRR

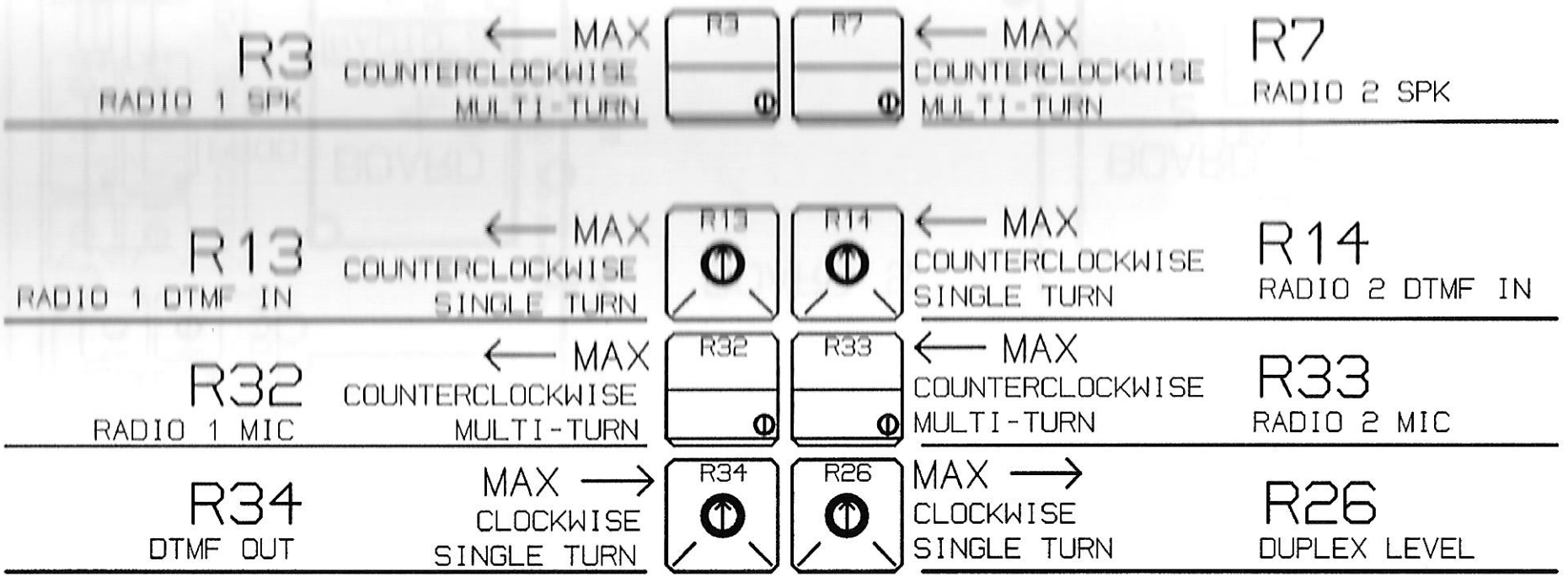
ALINCO

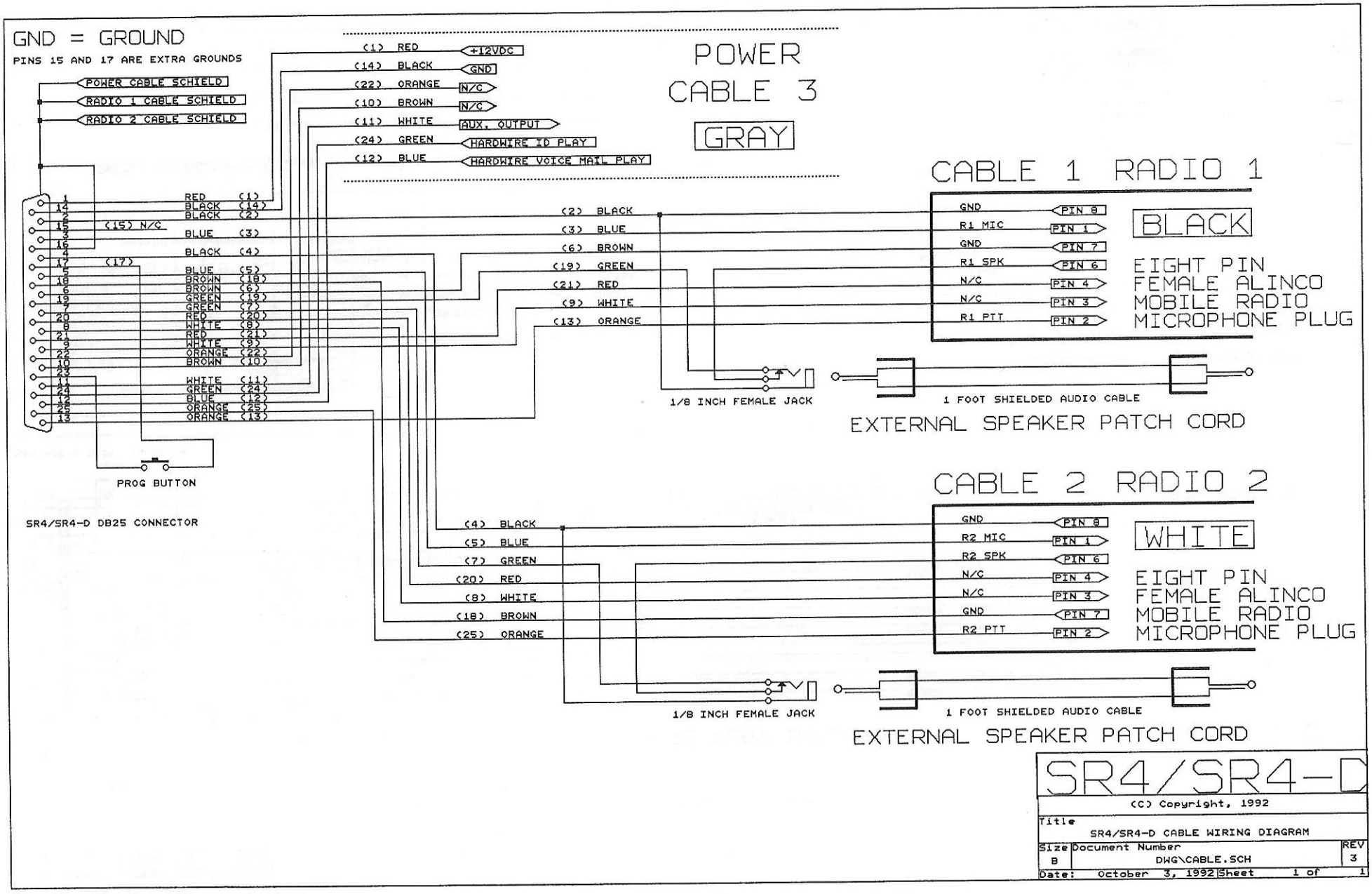
REV. 3

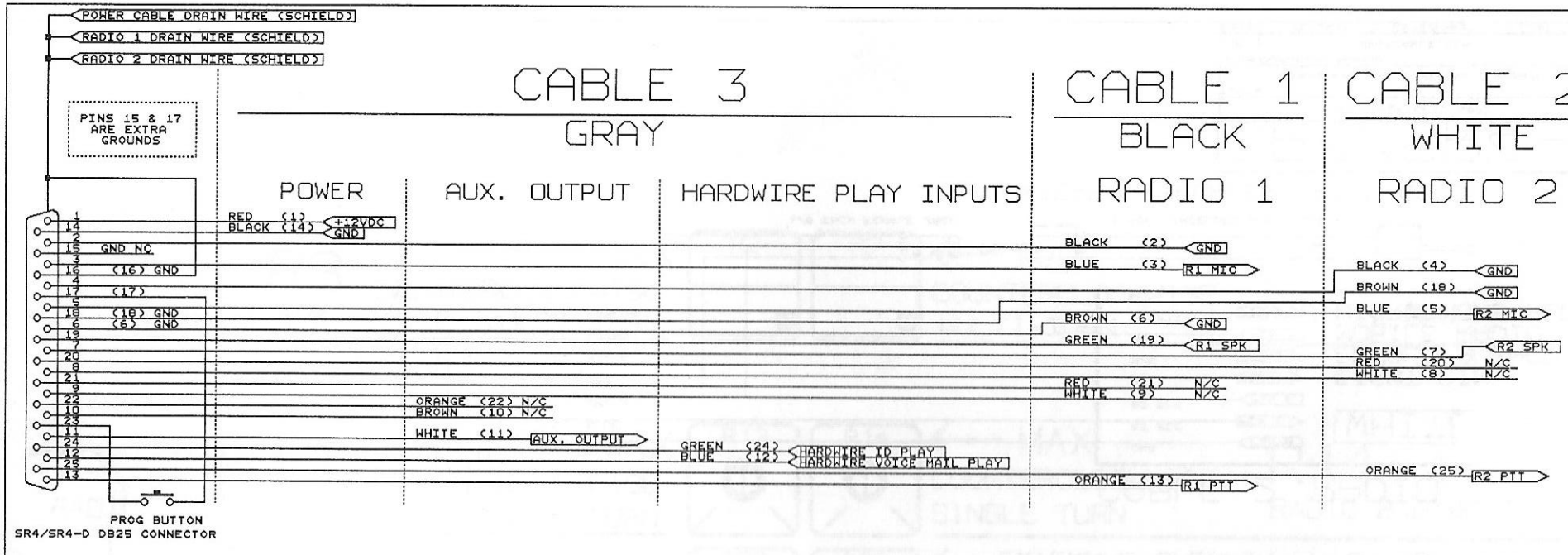

+12V
GND
R1 MIC
GND
R2 MIC
GND
R2 SPK
UNUSED
UNUSED
UNUSED
AUX OUT
PLAY V.M.
R1 PTT
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
GND
GND
GND
GND
GND
R1 SPK
UNUSED
UNUSED
UNUSED
PROG
PLAY ID
R2 PTT

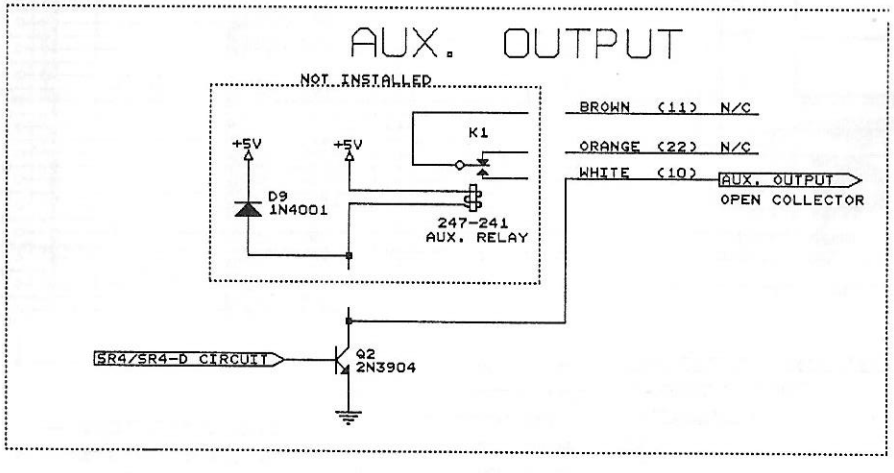

POWER
S1
PROG
1/2 AMP
FUSE
AUDIO LEVEL POTS
DB25
J1
J4
R2 CTCSS
R1 CTCSS
K1
D8
D9
DO NOT TOUCH
J3
U26
J6
A
B
U18
U19
U20
U21
DRAM
1
2
3
4
RV2
R2 RX VOX
CONFIGURATION
DIP-SWITCHES
S3
SR4
RV2
R1 RX VOX

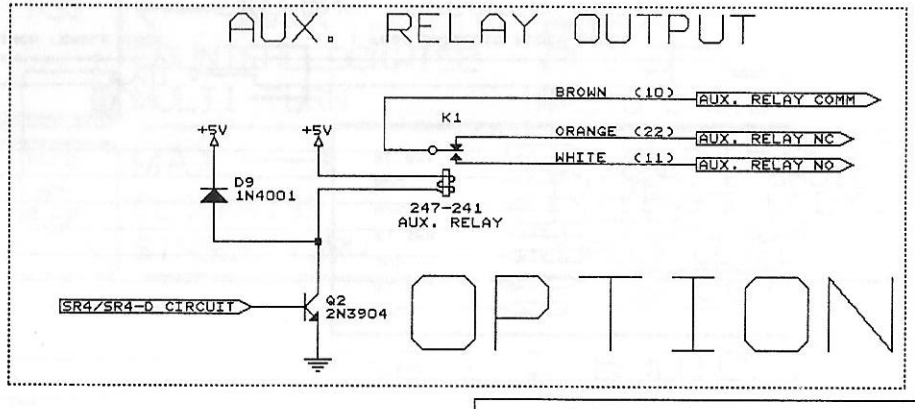
D1
D2
POWER
S1
PROG
R34
R32
R13
R26
R33
R14
R3
R7
1/2 AMP
FUSE
AUDIO LEVEL POTS
BOARD
4
RADIO 2
BOARD
3
RADIO 1
CTCSS CONNECTOR
CTCSS CONNECTOR
ACCESSORY
LOCATION
BOARD 5
BOARD
2
RADIO 2
BOARD
1
RADIO 1
S3
RXVOX
RV2
RXVOX
RV2


R3
RADIO 1 SPK
← MAX
COUNTERCLOCKWISE
MULTI-TURN
R3
R7
← MAX
COUNTERCLOCKWISE
MULTI-TURN
R7
RADIO 2 SPK
R13
RADIO 1 DTMF IN
← MAX
COUNTERCLOCKWISE
SINGLE TURN
R13
R14
← MAX
COUNTERCLOCKWISE
SINGLE TURN
R14
RADIO 2 DTMF IN
R32
RADIO 1 MIC
← MAX
COUNTERCLOCKWISE
MULTI-TURN
R32
R33
← MAX
COUNTERCLOCKWISE
MULTI-TURN
R33
RADIO 2 MIC
R34
DTMF OUT
MAX →
CLOCKWISE
SINGLE TURN
R34
R26
MAX →
CLOCKWISE
SINGLE TURN
R26
DUPLEX LEVEL


GND = GROUND
PINS 15 AND 17 ARE EXTRA GROUNDS
POWER CABLE SCHIELD
RADIO 1 CABLE SCHIELD
RADIO 2 CABLE SCHIELD
(1) RED +12VDC
(14) BLACK GND
(22) ORANGE N/C
(10) BROWN N/C
(11) WHITE AUX. OUTPUT
(24) GREEN HARDWIRE ID PLAY
(12) BLUE HARDWIRE VOICE MAIL PLAY
POWER CABLE 3
GRAY
(15) N/C
(17)
PROG BUTTON
SR4/SR4-D DB25 CONNECTOR
(2) BLACK
(3) BLUE
(6) BROWN
(19) GREEN
(21) RED
(9) WHITE
(13) ORANGE
1/8 INCH FEMALE JACK
CABLE 1 RADIO 1
GND PIN 8
R1 MIC PIN 1
GND PIN 7
R1 SPK PIN 6
N/C PIN 4
N/C PIN 3
R1 PTT PIN 2
BLACK
EIGHT PIN
FEMALE ALINCO
MOBILE RADIO
MICROPHONE PLUG
1 FOOT SHIELDED AUDIO CABLE
EXTERNAL SPEAKER PATCH CORD
(4) BLACK
(5) BLUE
(7) GREEN
(20) RED
(8) WHITE
(18) BROWN
(25) ORANGE
1/8 INCH FEMALE JACK
CABLE 2 RADIO 2
GND PIN 8
R2 MIC PIN 1
R2 SPK PIN 6
N/C PIN 4
N/C PIN 3
GND PIN 7
R2 PTT PIN 2
WHITE
EIGHT PIN
FEMALE ALINCO
MOBILE RADIO
MICROPHONE PLUG
1 FOOT SHIELDED AUDIO CABLE
EXTERNAL SPEAKER PATCH CORD
SR4/SR4-D
(C) Copyright, 1992
Title
SR4/SR4-D CABLE WIRING DIAGRAM
Size B
Document Number DWG\CABLE.SCH
REV 3
Date: October 3, 1992
Sheet 1 of 1







SR4\SR4-D

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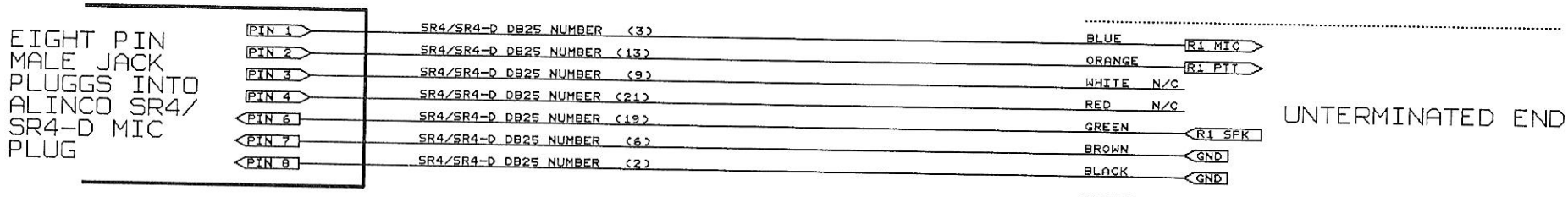
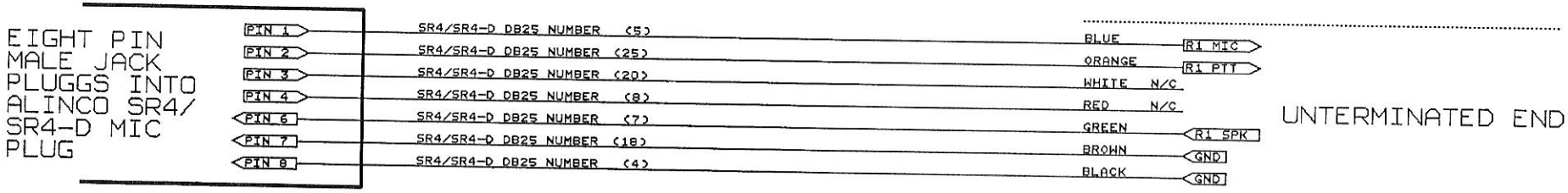
Title	SR4/SR4-D DB25 CONNECTOR PINOUT / AUX. OUT.	
Size	Document Number	REV
B	DWG\PINOUT.SCH	3
Date: October 3, 1992	Sheet 1 of 1	

UNTERMINATED ADAPTER

APPLIES, IF PLUGGED INTO RADIO 1 CABLE, BLACK



APPLIES, IF PLUGGED INTO RADIO 2 CABLE, WHITE



SR4/SR4-D

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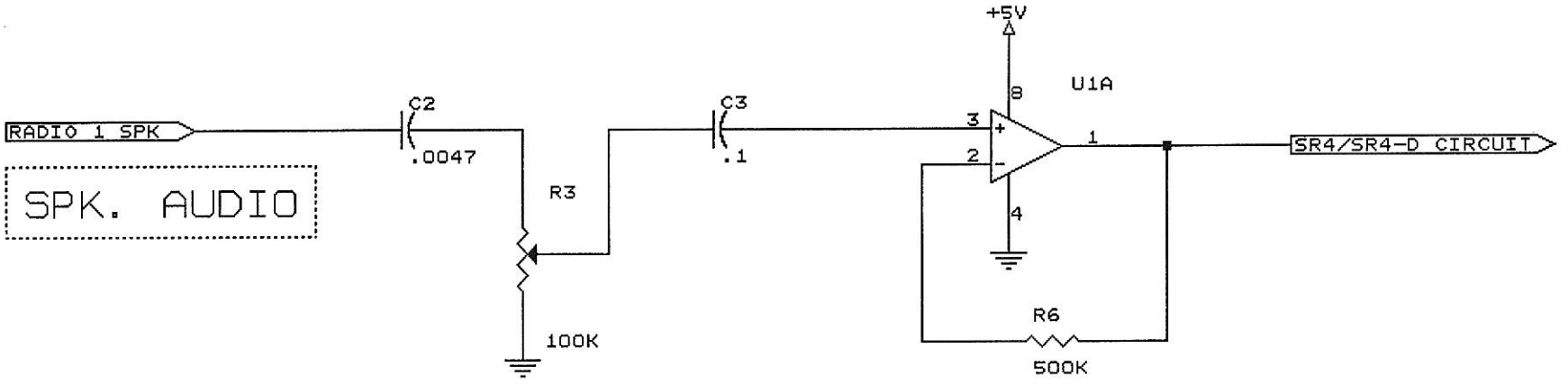
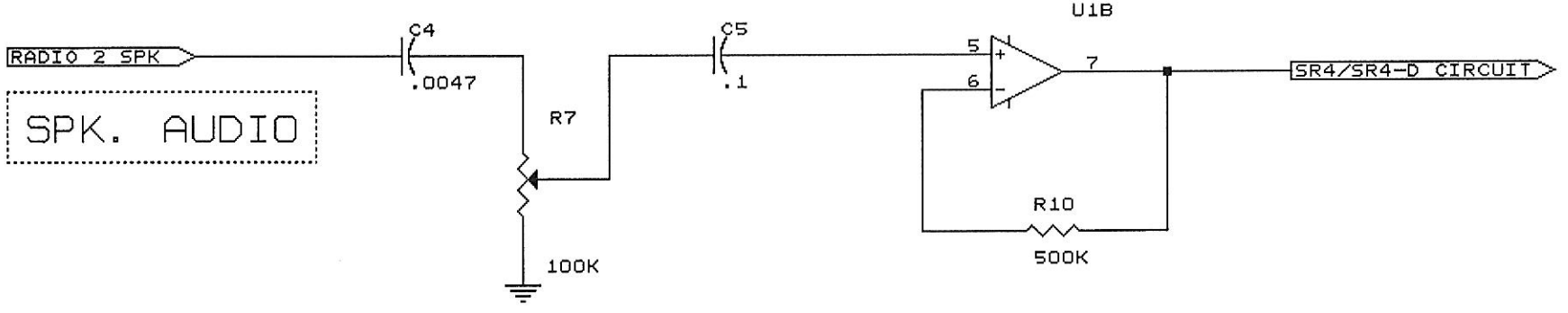
Title: SR4/SR4-D UNTERMINATED ADAPTER		
Size: B	Document Number: DWG\ADAPTERU.SCH	REV: 3
Date: October 3, 1992	Sheet 1 of 1	



RADIO 1 RECEIVE AUDIO INPUT



RADIO 2 RECEIVE ADUIO INPUT

SR4/SR4-D

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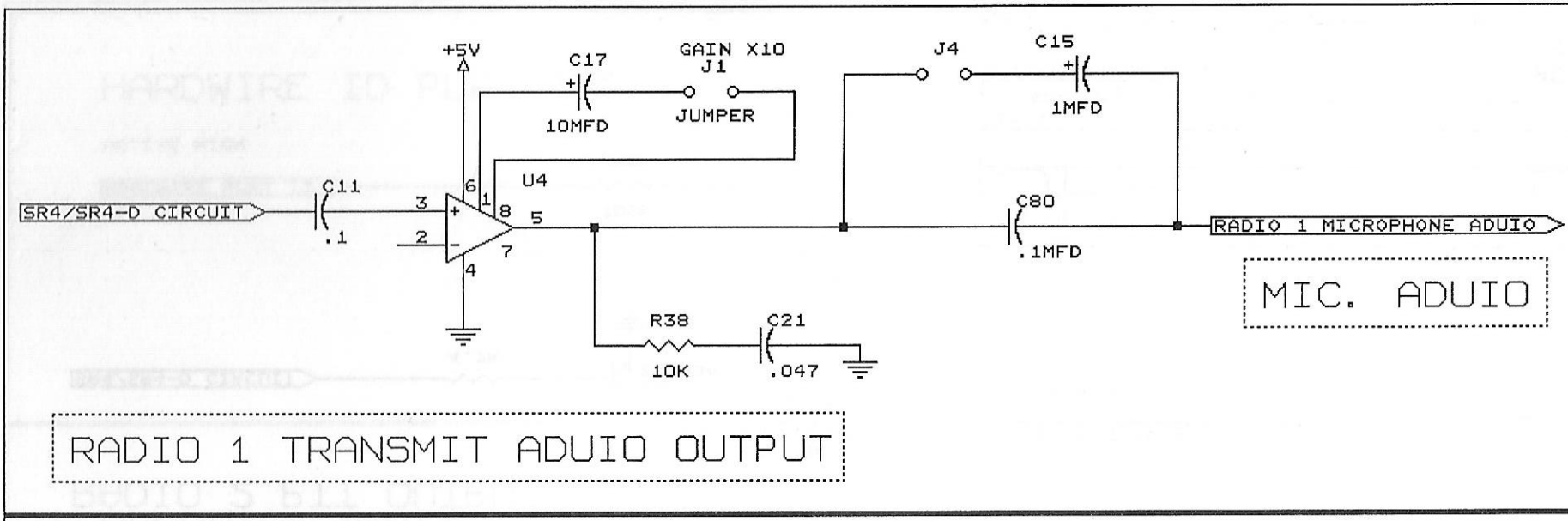
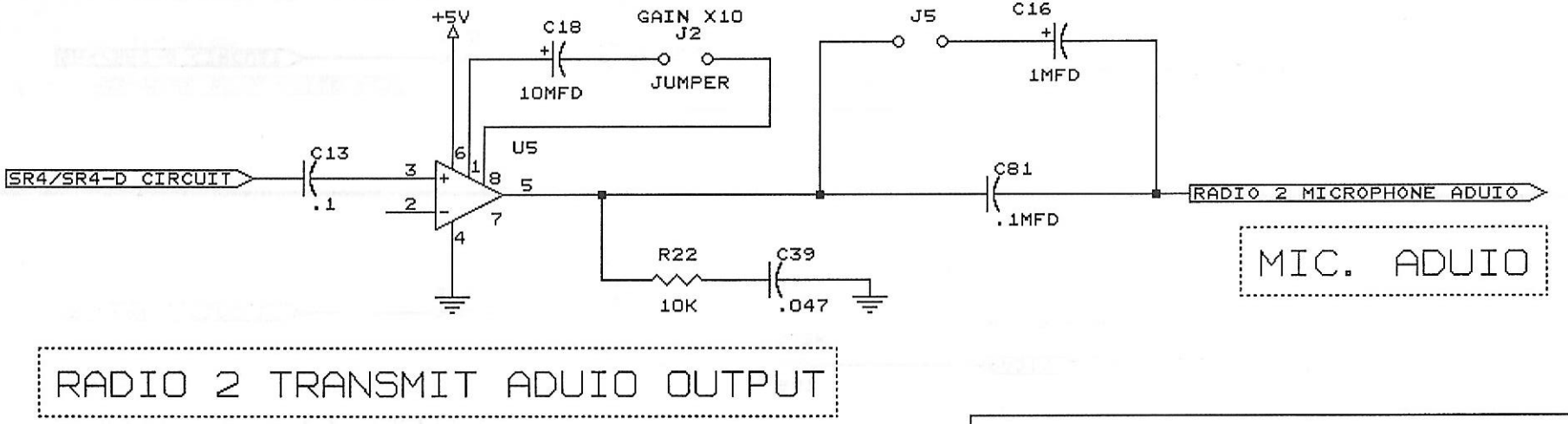
Size: A	Document Number: DWG\INPUT.SCH	REV: 3
Date: October 3, 1992	Sheet 1 of 1	





SR4/SR4-D

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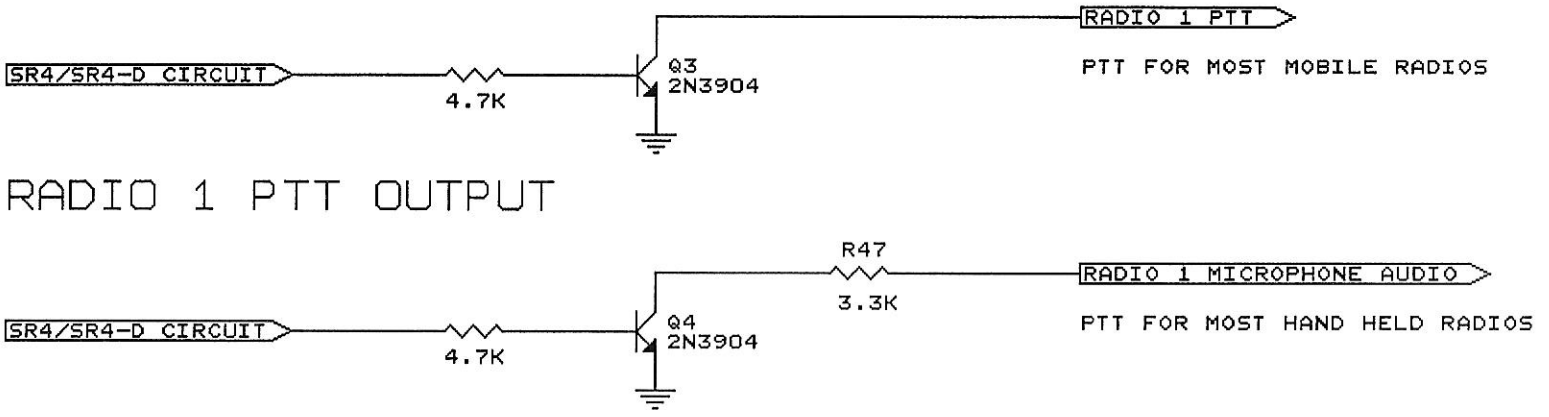
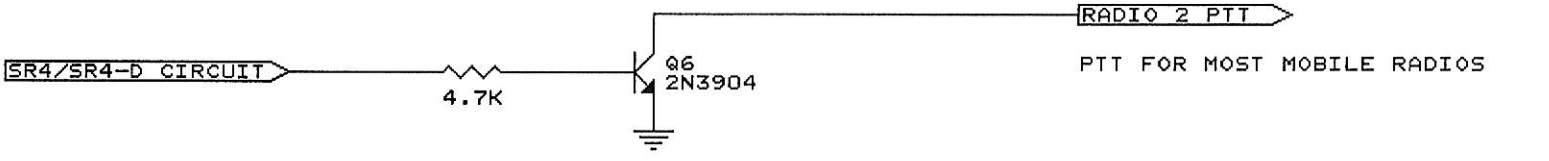
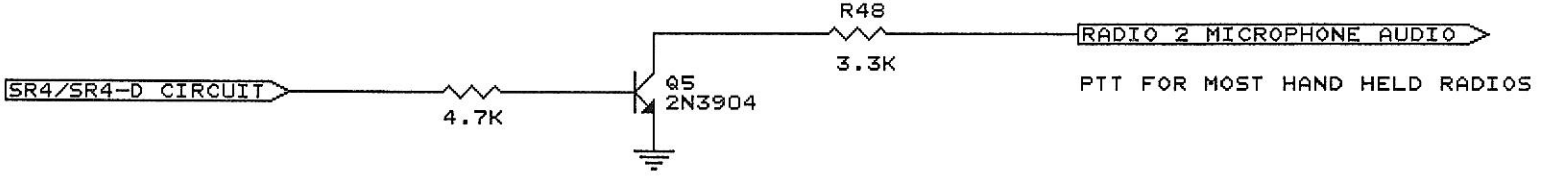


RADIO 1 PTT OUTPUT



RADIO 2 PTT OUTPUT



SR4/SR4-D

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Title: SR4/SR4D MOBILE & HT RADIO PTT OUTPUT		
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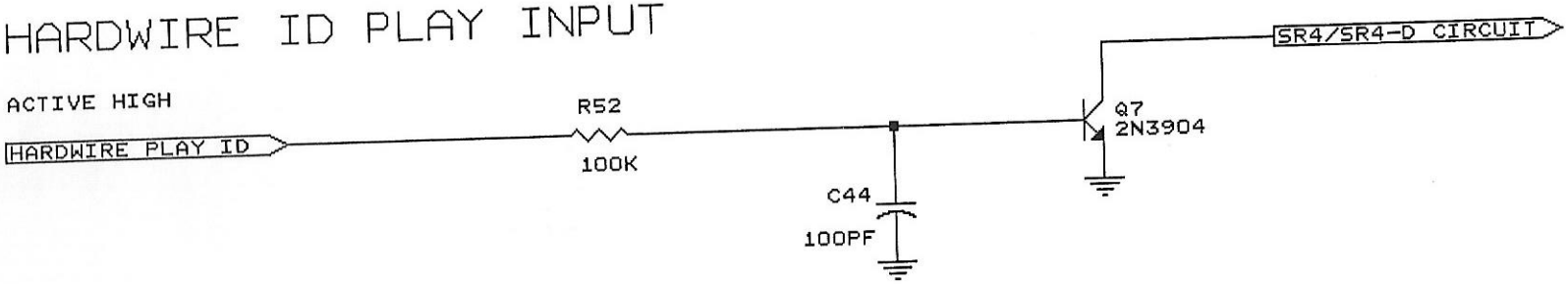
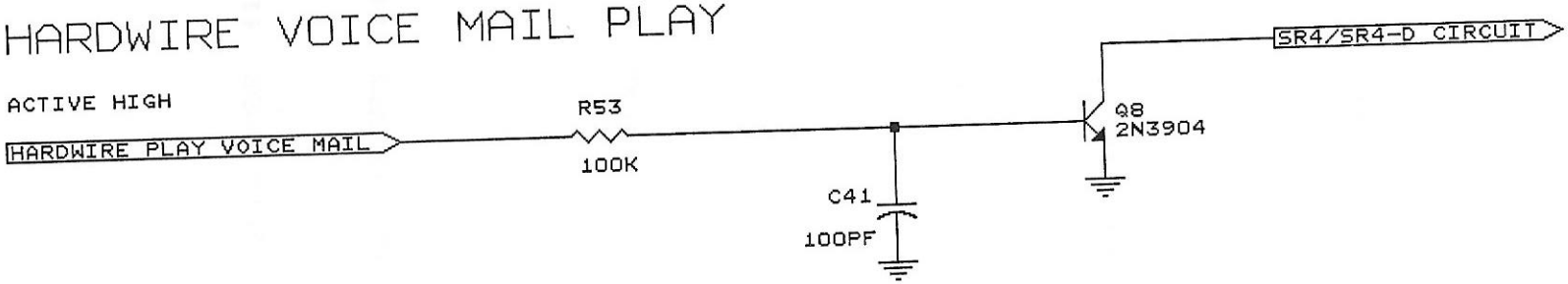
HARDWIRE ID PLAY INPUT



HARDWIRE VOICE MAIL PLAY



SR4/SR4-D

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● General

Frequency Coverage	144.00–147.995MHz (U.S. Version)
Frequency Resolution	5, 10, 12.5, 15, 20 and 25kHz
Antenna Impedance	50 ohms unbalanced
Power Supply requirement	13.8 Volts D.C.
Current Drain at 13.8V	Receiving Squelched: Does not exeed 500mA Transmitting High: 25W approx 5.5A Low : 5W approx 2.5A
Dimension	140mm(W)×40mm(H)×170mm(D) (5–1/2")×(2")×(6–3/4")
Weight	2.25LBS

● Transmitter

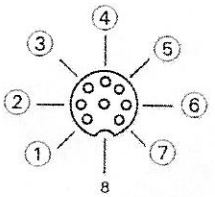
Output power	High: 25Watts Low : 5Watts
Emission Mode	F3E
Modulation System	Variable Reactance F.M.
Max. Frequency Deviation	±5kHz
Spurious Emission	More than 60dB below Carrier
Operating Mode	Simplex Duplex: ±600kHz 1.6MHz, 5MHz, 7.6MHz from receive frequency and 1 channel odd offsets programmable

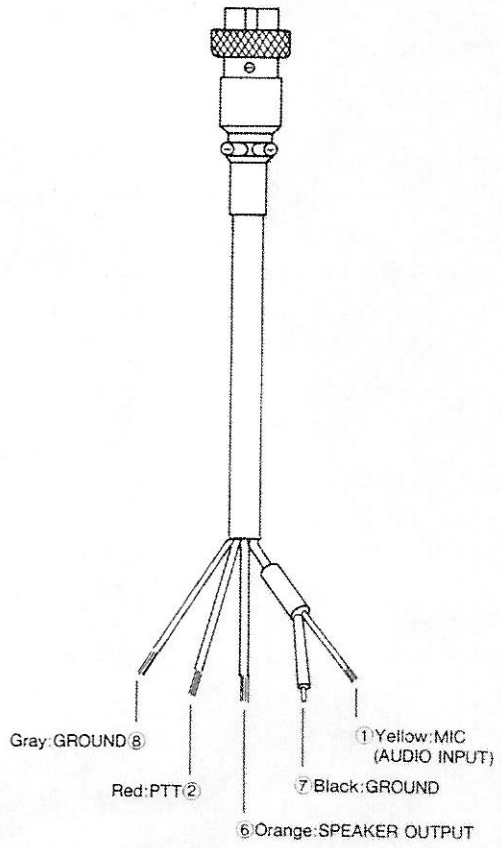
● Receiver

Receiving System	Superhetrodyne, dual conversion
Modulation acceptance	F3E
Intermediate frequency	1st 10.7MHz 2nd 455kHz
Sensitivity	12dB SINAD less than 0.16μV
Selectivity	More than ±6KHz at –6dB
Audio Power Output	More than 1.5Watts(8ohms –10% Distortion)
Speaker Impedance	8 ohms

Note: Specifications are subject to change without notice.
Specifications are guaranteed for amateur band only.

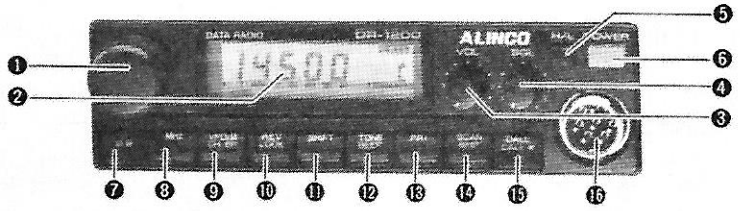
INTERFACE CABLE





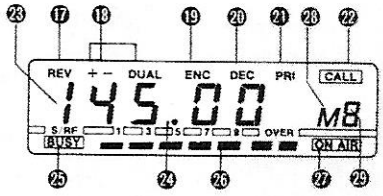
Remarks: The number of cables are five and ③, ④, ⑤ are un-useful.

■Front Panel



❶Main Dial
❷LCD Panel
❸Volume Control
❹Squelch Control
❺H/L Switch
❻Power Switch
❼Function/Memory Write Key
❽MHz(Band) Key
❾VFO/M/Channel Step Key
❿Reverse/Lock Key
⓫Shift Key
⓬Sub Tone/Beep Key
⓭Priority Key
⓮Scan/Memory Skip Key
⓯Call Channel/Call Channel Write Key
⓰Interface Jack
⓱Reverse Indication
⓲Offset Indication
⓳Tone Encoder Indication
⓴Tone Decoder (Tone Squelch) Indication
㉑Priority Indication
㉒Call Channel Indication
㉓Frequency Indication
㉔Decimal Readout Point
㉕Busy Indication
㉖S/RF Meter Indication
㉗On Air Indication
㉘Memory Indication
㉙Memory Channel Indication

■LCD Panel



- OPTIONAL ACCESSORIES
  Mobile Bracket
- Mobile Bracket Mounting Hardware
- Microphone for DR-1200T

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