TS-590S HOWTO: SSB Audio Setup

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Introduction

This HOWTO provides general guidelines in setting up the audio for SSB transmission in the Kenwood TS-590S transceiver. There are many variables involved, but with a structured step-by-step approach you will be able to set up audio to that is second to none!

The TS-590S is a complex transceiver, and with a few moments of random menu fiddling you can easily transform the transmitted audio from superb to terrible. Roger Halstead, K8RI, summed up the situation in a recent message on one of the Kenwood reflectors:

> "What I see as a fault with many of today's rigs is they give the operator
> far too much control over too many functions. Compression, clipping,
> tailored bandwidth, audio equalization, etc... Some swear by them and
> some swear at them."

Legacy radios are much simpler than the TS-590S. You just plug in the mic, whistle a few times for maximum smoke, maybe switch on the audio processor if there is one, and you're away – there are virtually no audio controls to worry about. The TS-590S, on the other hand, does have many controls for compression, clipping, tailored bandwidth and audio equalization, and at first sight there seem to be so many variables that it's difficult to understand how to set them all up.

The aim, then, of this HOWTO is to provide a methodical approach in setting up the audio. It isn't difficult to do, but does require a basic understanding of the radio. A good knowledge of the TS-590S Instruction Manual [1] is assumed.

This HOWTO also complements the TS-590S TechNote on SSB Audio Handling [2]. Specifically:

- The SSB Audio Handling TechNote provides information on how the radio handles audio processing.
- This SSB Audio Setup HOWTO explains the mechanics for making it all work.

Scope

This HOWTO comprises the following parts:

Part 1: BACKGROUND
- External factors that affect the audio
- TS-590S Menus: Menu A and Menu B, numeric menus
- Selecting Menu A and Menu B, meanings of A and B on the display
- Transmit Equalizers
- Equalizer Profiles for digital, pre-processed voice and analog SSTV transmission
- Low Cut and High Cut filters
- ALC and the Speech Processor

Part 2: THE EQUIPMENT
- Monitoring the audio: TX Monitor, external receiver, signal recording
- Use of dummy load

Part 3: AUDIO SETUP PROCEDURES
- Checking the DC supply voltage
- Selecting Menu A or Menu B
- Setting up Programmable Function Key A for TX TUNE
- Checking the SWR
- Setting up the microphone
- Selecting the TX Equalizer
- Setting up the audio with the processor off
- Setting up the audio with the processor on
- Meaning of the Power Output display

Appendix 1: SELECTING AND MODIFYING A TX AUDIO EQUALIZER PROFILE
- Using the ARCP-590 program for User-defined profiles

Appendix 2: RECORDING THE AUDIO
- The "Mix Beep Tones" option to route TX audio via the USB port to the PC
- Using Audacity to record the audio

PART 1 – BACKGROUND

Factors that affect the audio

There are several factors affecting the audio that apply even before the audio reaches the radio. See Figures 1-4.

Figure 1: People – we're all different

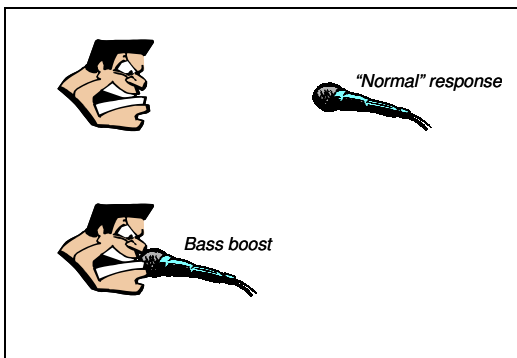Figure 2: Microphones – they're all different

Figure 3: Distance from the mic can make a big difference to the audio frequency response
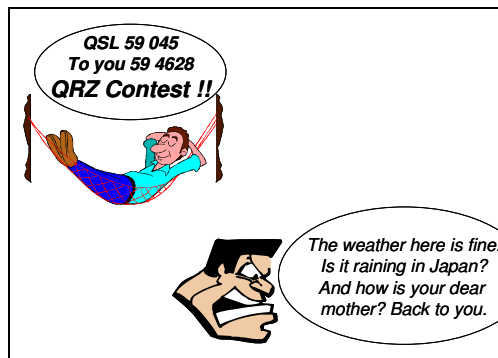

Figure 4: Mood – the audio can depend on the type of QSO

People – Everybody is different. Some people have chest cavities like oil barrels, grunting and growling in their boots at well below 1000Hz. Others squeak along with the birds, with very little audio below 1000Hz. Most of the rest of us are somewhere in between.

Microphones – There are literally hundreds of different microphones that you could use with the TS-590S, each with its own output amplitude and frequency response. Some have built-in pre-amps that you can switch on or off. Some let you switch between high and low impedance.

Distance from the mic – The distance that the mic is away from your mouth can make a significant difference to the audio output. With many microphones the bass will be boosted when the mic is close to the mouth – the so-called "proximity effect" [3][4].

Mood – The audio can vary considerably depending on whether we are aggressively chasing DX, or having a relaxed chat across town, or somewhere in between.

Clearly, with all these variations, it isn't possible to explain exactly how to get the "right" settings in the TS-590S for "perfect" audio transmission. Fortunately, however, the radio has a wide range of controls that can compensate for all these differences, resulting in very high quality audio in all situations.

Menu A and Menu B

The TS-590S has two menus: Menu A and Menu B. Each of these menus lets you configure a large number of settings for the radio. These settings are selected through numbered menus (Menu 00, Menu 01, etc.).

Menu A and Menu B each has a total of 88 menus, numbered 00 to 87. These are summarized on pages 15-19 of the TS-590S Instruction Manual [1]. Several of these numbered menus are used in configuring the audio – for example, Menu 30 lets you select a TX audio equalizer.
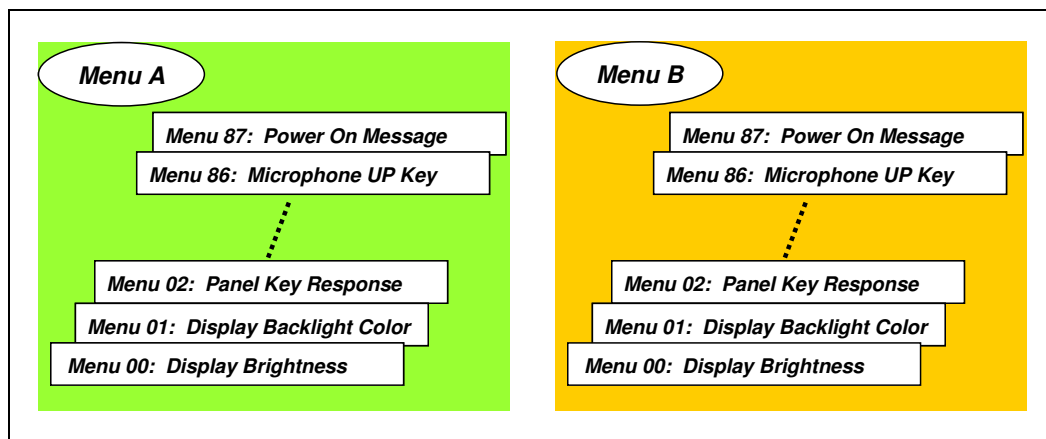
See Figure 5.

Figure 5: Menu A and Menu B

Menu A is independent of Menu B. You can set different values for each numbered menu – for example, you can set the Menu A Display Backlight Color (Menu 01) to green, and the Menu B Display Backlight Color to amber.

Having separate Menus A and B lets you to switch quickly and easily between two different environments, depending on the mood or operational requirement. For example, you could decide to use:

        Menu A for "CHAT" and Menu B for "DX"
   or Menu A for "VOICE" and Menu B for "DIGITAL"
   or Menu A for "OPERATOR 1" and Menu B for "OPERATOR 2"

and so on.

Selecting Menu A and Menu B

Kenwood makes it harder than necessary to understand how to select Menu A or Menu B. All that appears on the display to indicate which menu is selected is the letter **A** or the letter **B**. Unfortunately the letters **A** and **B** also indicate the VFO in use. This leads to the question: how do you know whether **A** on the display means "Menu A" or "VFO-A"?

The answer lies in whether there is a left arrow symbol to the left of the letter. See Figure 6.

- If the **MENU** key has not been pressed, and the frequency appears on the display, there will be a left-pointing arrowhead alongside the letter **A** or **B**. In this case **A** or **B** means "VFO-A" or "VFO-B".

- If you press the **MENU** key, the frequency display disappears, and a menu setting appears. By toggling the **A**/**B** key you can switch between Menu A and Menu B. There is no left arrow on the display. You can then select one of the 88 available numbered menus and display or change its value. You can select a different menu value in Menu A and Menu B.

- Once you have set up the required menu values, you press **MENU** again to restore the frequency display.
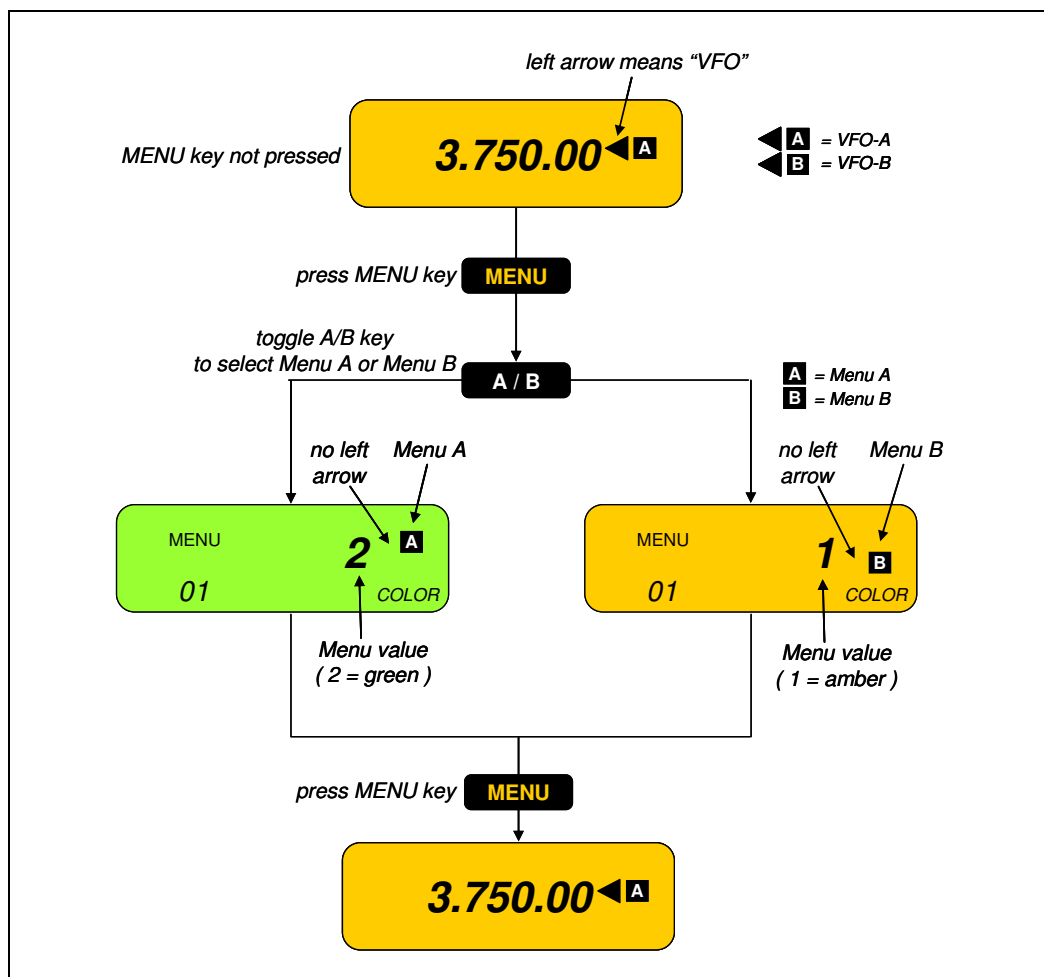

Figure 6: Selecting Menu A or Menu B.

Transmit Equalizer

The TS-590S has built-in 18-band TX equalizers that tailor the audio frequency passband over the frequency range from 0 Hz to 5100 Hz. For example, Figure 7 shows the profile of the High Boost 1 (HB1) equalizer.
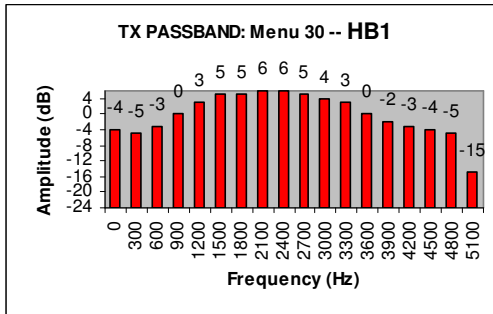

Figure 7: The High Boost 1 passband

In all, you can select from seven different built-in TX equalizers. You select the required TX equalizer for Menu A and Menu B with Menu 30. The selection can be different for Menu A and Menu B. For example, for VOICE/DIGITAL operational modes, you could set Menu 30 to HB1 for Menu A (VOICE) and OFF for Menu B (DIGITAL).
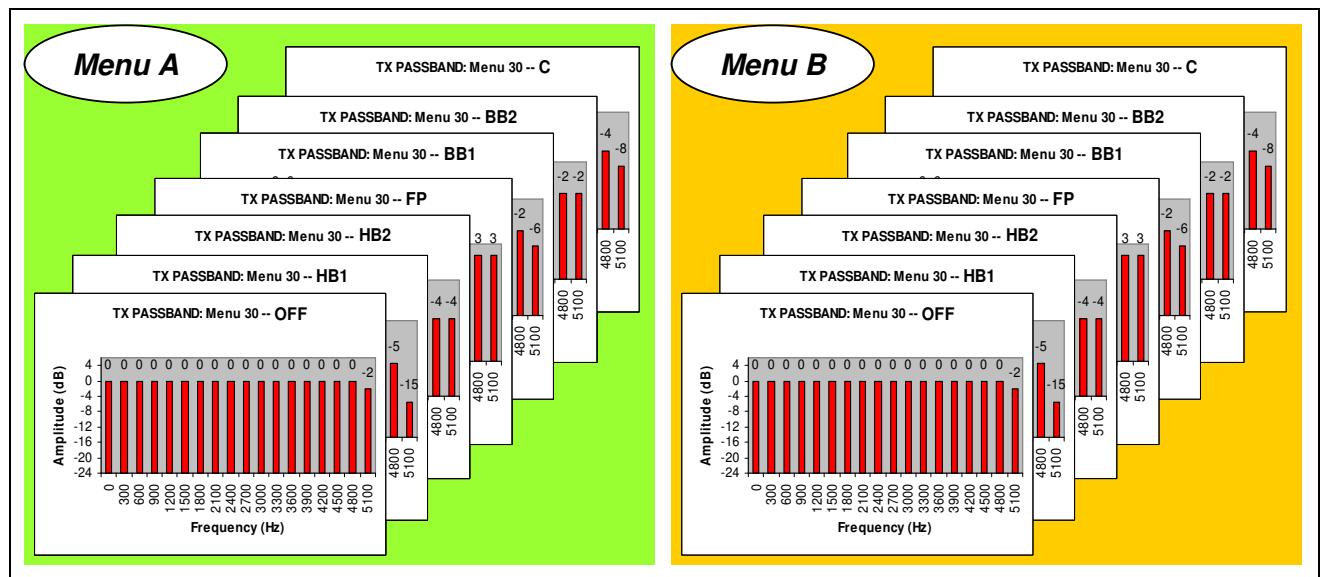
See Figure 8.

Figure 8: The seven built-in TX equalizers, selected by Menu 30

The profiles of the seven built-in equalizers are shown in detail in the SSB Audio Handling Technote [2].

In addition, Menu A and Menu B each has a User-Defined TX equalizer setting (U). This is described in Appendix 1.

Equalizer Profiles for Digital, Pre-Processed Voice and Analog SSTV Transmission

Although there is a wide choice of built-in equalizer profiles, plus countless variations of User-defined profiles, it is recommended that you set the TX equalizer profile to OFF in three situations:

- When transmitting digital signals.
- When transmitting analog voice that has already been equalized and/or processed externally (for example, in an external processor such as EQPlus, or in a PC program).
- When transmitting analog SSTV.

This will minimize distortion of the transmitted audio.

Low Cut and High Cut Filters

Despite being able to select an equalizer that covers the audio range from 0 Hz to 5100 Hz, the transmitted SSB bandwidth will actually be much narrower. This is because of the action of the Low Cut and High Cut SSB filters[1]. See Figure 9.
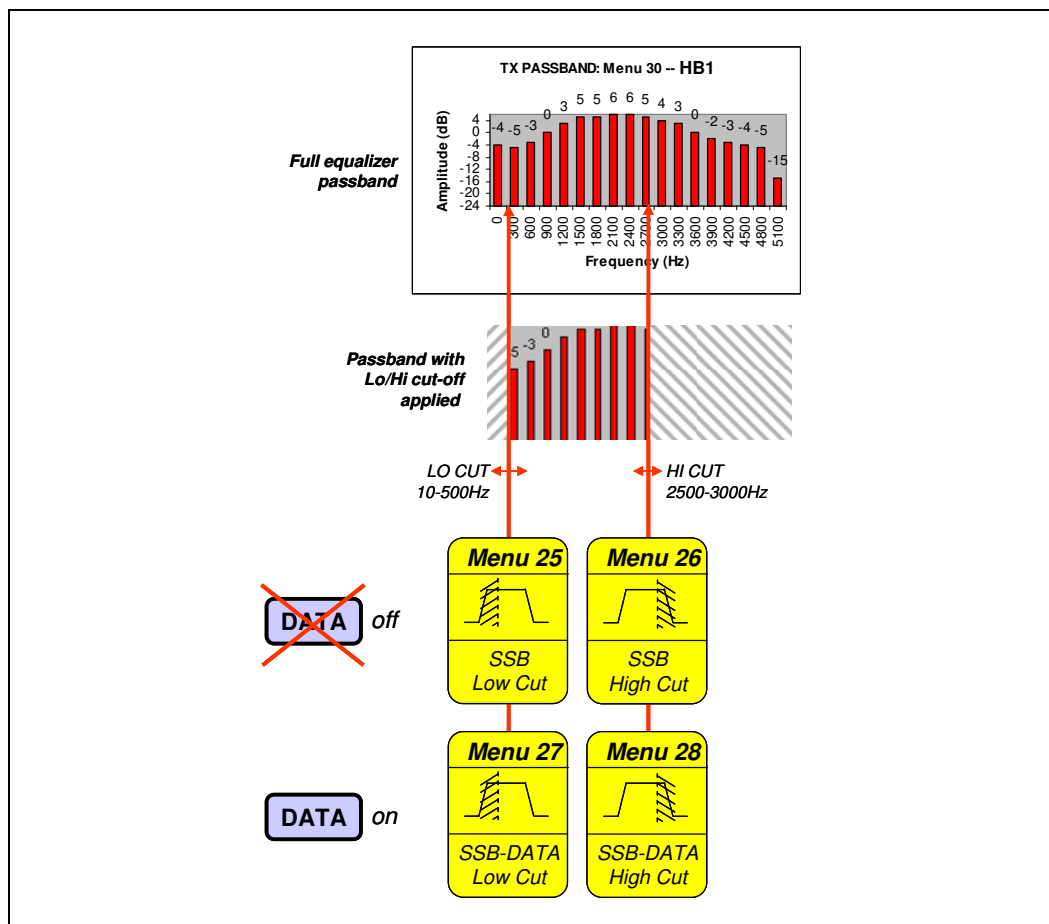

Figure 9: The Low and High Cut filters. Menus 25/26 are active when DATA is switched off, and Menus 27/28 are active when DATA is switched on

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[1] Note: The Low Cut and High Cut filters are only active when transmitting. When receiving, the whole of the RX equalizer bandwidth is available

There are two sets of Low Cut/High Cut filters, selected by the radio's DATA setting.

- If **DATA** is *not* selected (that is, the word "DATA" does *not* appear on the display), the filters are set by Menus 25 and 26.
- If **DATA** *is* selected (that is, the word "DATA" *does* appear on the display), the filters are set by Menus 27 and 28.

In each case, the Low Cut filter can be set in the range 10 Hz to 500 Hz, and the High Cut filter in the range 2500 Hz to 3000 Hz.

You cannot switch these filters off, so ultimately the absolute maximum bandwidth that you can transmit on SSB is between 10 Hz and 3000 Hz.

For further details on when to set **DATA** on and off, see the SSB Audio Handling Technote [2].

Automatic Level Control (ALC) and the Speech Processor – the Big Picture

Putting it simply, ALC is a means of controlling the output power of the transmitter. At low modulation levels, ALC has no effect, but as you increase the modulation level beyond a certain threshold the ALC kicks in to prevent overdriving and distortion.

The speech processor lets you process the modulating audio. This does introduce a degree of distortion in the audio, by raising the average modulation level, but providing this is not taken too far there will be a marked increase in communications effectiveness.

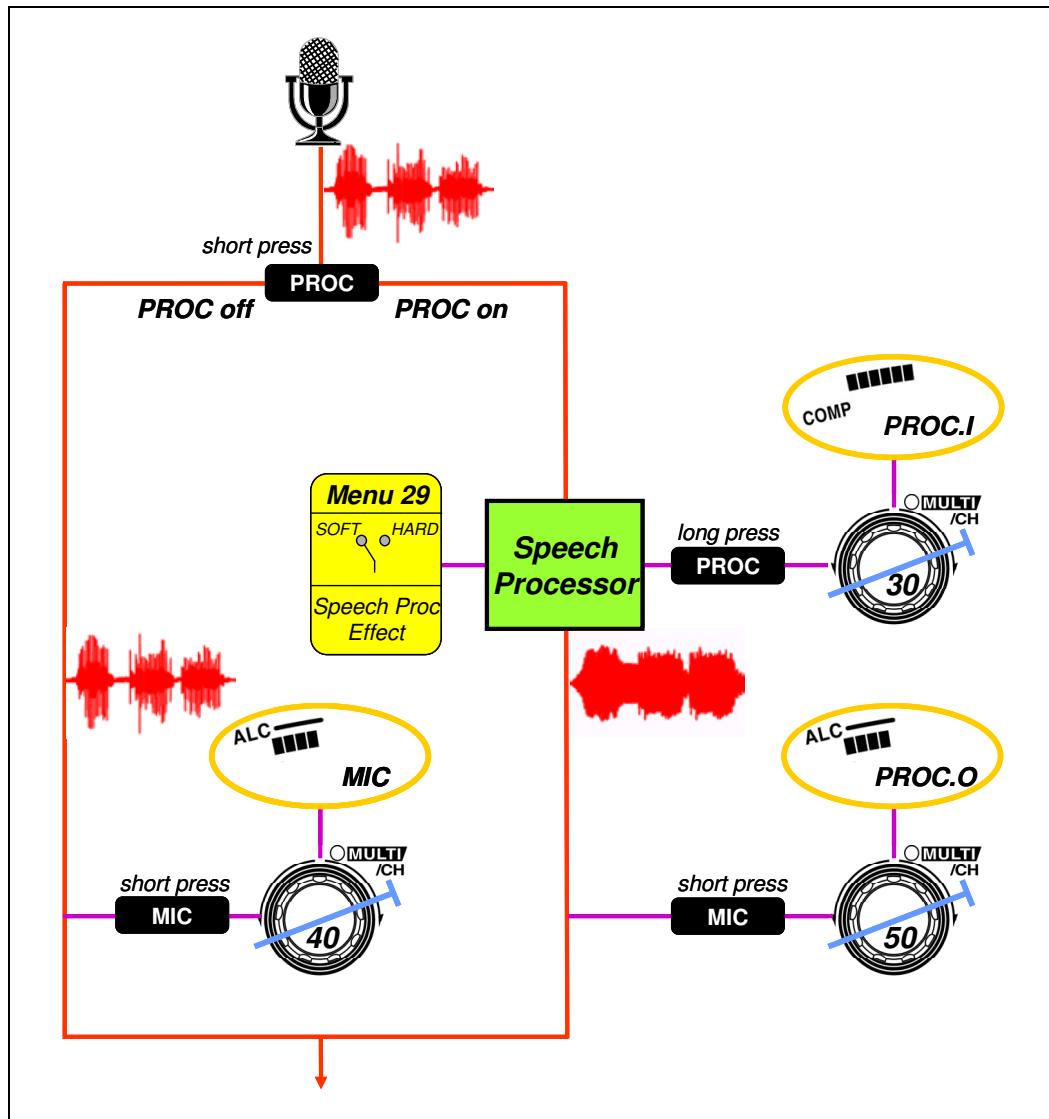Figure 10 shows the ALC and speech processor controls.

Figure 10: ALC and speech processor controls. The left-hand side shows the path for unprocessed audio when the processor is switched OFF, and the right-hand side shows the path for processed audio when the processor is switched ON.
(*The numbers 30, 40 and 50 on the MULTI/CH controls are suggested starting points for setting up the audio*)

A short press on the **PROC** key on the front panel will toggle the processor OFF or ON:

- When the processor is OFF:
    - The "PROC" label disappears from the front panel display.
    - A short press on the **MIC** key lets you set up the audio level with the **MULTI/CH** control (bottom left of Figure 10).
    - The legend "MIC" appears towards the right-hand end of the display (inside the amber oval in this picture).
- When the processor is ON:
    - The "PROC" label appears at the top right-hand end of the display.
    - A long press on the **PROC** key lets you set up the input level to the processor (center right in Figure 10), and the legend "PROC.I" appears towards the right-hand end of the display.
    - A short press on the **MIC** key then lets you set up the output level of the processor (bottom right of Figure 10), and the legend "PROC.O" appears on the display.
    - You can change the degree of processor "hardness" with the Speech Processor Effect control (Menu 29). The Soft setting is usually preferable, as it produces more rounded audio than the Hard setting, which can make the audio sound very harsh.

Automatic Level Control Display

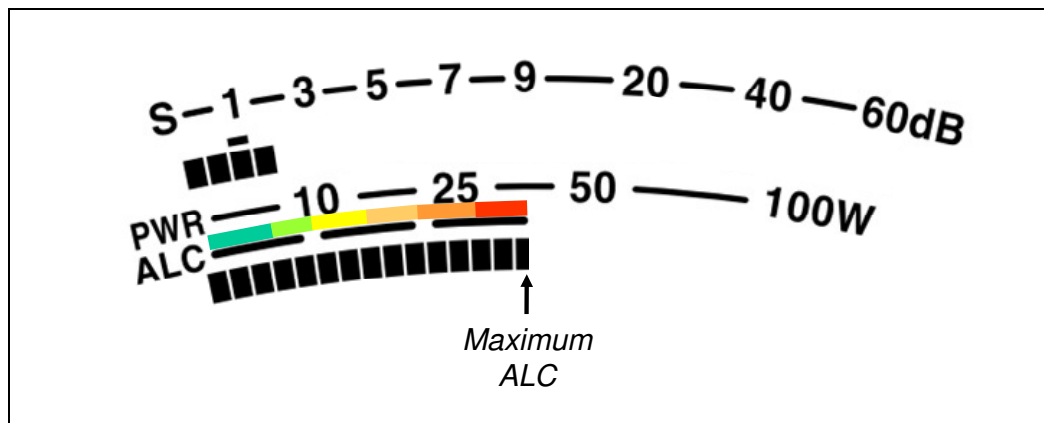The amount of ALC at any particular moment is shown by small blocks ("pips") on the TS-590S display. See Figure 11.

Figure 11: The ALC display. The ALC level must never be allowed to exceed the maximum shown here

Purists will say that for the "best" transmission quality there should be never be any ALC pips indicated on the display. This is certainly true for digital transmission, where distortion must be kept to an absolute minimum and there should *never* be *any* ALC action.

However, for SSB voice transmission, if you always keep below the ALC threshold you may get reports that your audio is "quiet" or "thin". In practice, you can, in the extreme, increase the audio until you reach the maximum ALC level shown in Figure 11 without introducing unacceptable distortion. The TS-590S is designed to handle that. But you should never go beyond this point.

As a general guideline, then, it is perfectly acceptable to allow the ALC to display, say, 5 or 6 pips (the green regions in Figure 11) on voice peaks. This should result in a noticeable improvement in your signal reports.

Speech Processor Level Display

You set up the amount of processing with the Processor Input (PROC.I) control. Figure 12 shows the PROC.I display.
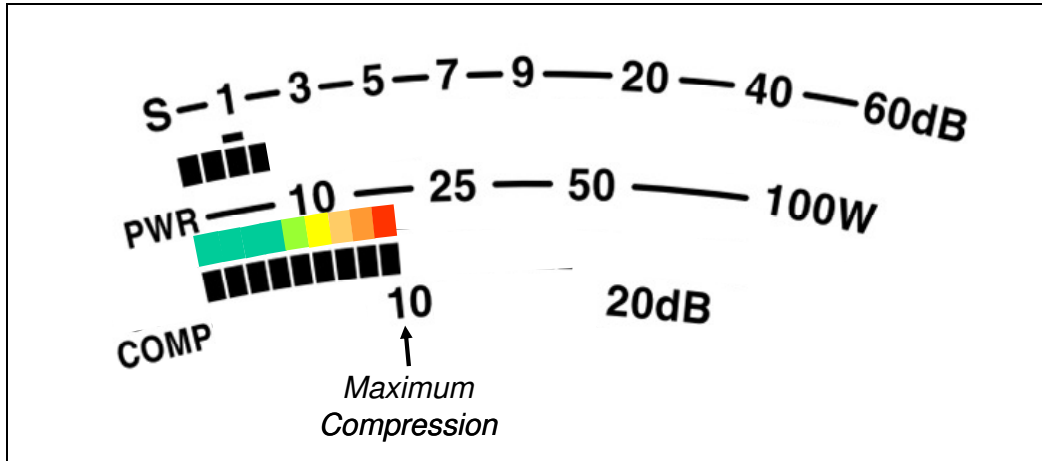

Figure 12: The Processor Input setting. If the processing level is allowed to exceed 10dB the audio will become severely distorted

The processing level should never exceed 10dB. A level up to about 5dB (the green zones in Figure 12) is a good compromise, and will significantly improve the readability and "punchiness" of your signal.

PART 2 – THE EQUIPMENT

The recommended equipment you need to set up the audio is shown in Figures 13 and 14.

Apart from the radio and a microphone, there is little other hardware that you need for setting up the audio. However, as an absolute minimum you really do need:

- A dummy load – you will be doing a lot of experimenting and testing, and the rest of the world doesn't want to hear this! Reference [5] provides detailed construction details for a suitable load.
- Headphones – to monitor the transmitted audio.
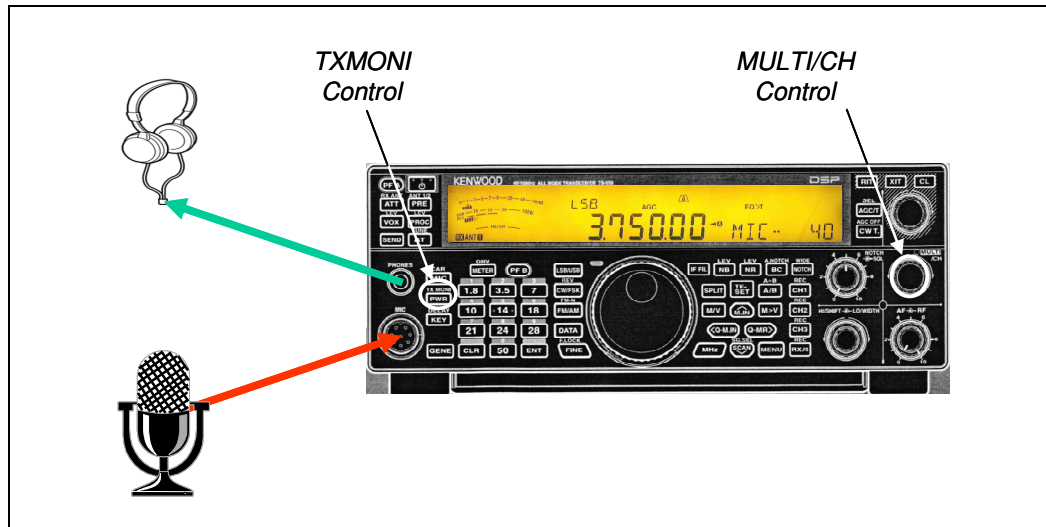
See Figure 13.

Figure 13: The simplest way of monitoring the transmitted audio. The audio level in the headphones is set by selecting the TXMONI control then adjusting the MULTI/CH control

It can also be useful to have a separate SSB receiver to monitor your transmitted signal. However, you need to be aware that the receiver settings can affect the received audio.

Better, if you have a software defined receiver (SDR) you can "see" as well as hear the audio, and you can also record the audio. Being able to see the audio lets you easily adjust the frequency response for signal "fullness", and being able to listen to recordings afterwards lets you easily distinguish between the nuances of different audio settings.

Whatever type of local receiver you use, you need to take precautions to prevent overload, by:

- Reducing the RF gain to zero.
- Switching off the pre-amp if it has one.
- Shorting the RX antenna input to ground.
- Using the receiver's attenuation control (if one is available).
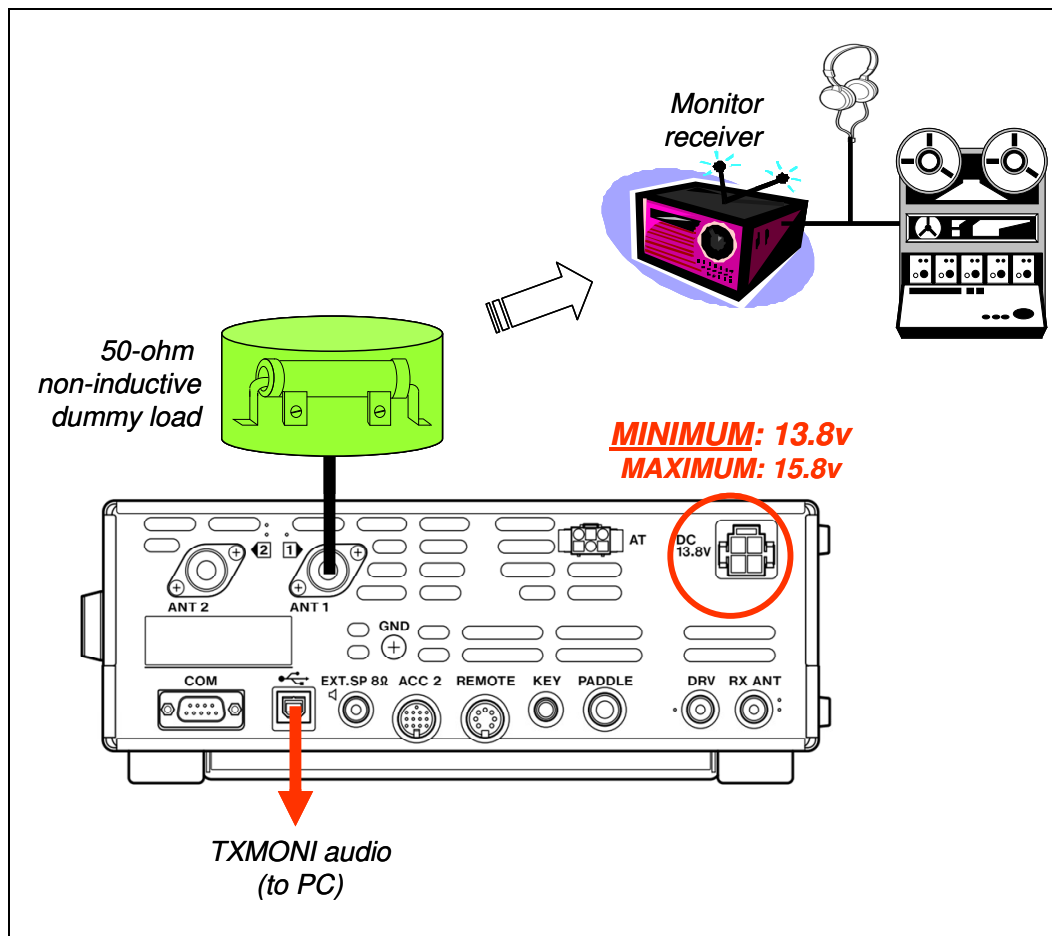
See Figure 14.

Figure 14: A separate SSB receiver with headphones (and possibly a recorder) is another way of monitoring the signal, provided the signal does not overload the front end. An SDR is even better. As an alternative, the TX audio can be routed via the USB port to a PC, where it can be recorded. Note that the DC voltage <u>at the input to the radio</u> should be <u>at least</u> 13.8v

Even if you don't have an SDR, you can still use someone else's SDR to monitor the audio. To do this, you install software such as SDR Radio [6] on your PC, then configure it to receive audio from a remote SDR across the internet. This has the advantage that you can set up the remote receiver's characteristics the way you want, rather than rely on someone else's preferences.

Another alternative is to route the monitored audio from the TS-590S via the USB port to your PC, where the audio can be recorded. This is described in detail in Appendix 2.

PART 3: AUDIO SETUP PROCEDURES

Step-by-Step Setup

The next few pages describe in detail a suggested procedure for setting up the audio. At several points the phrase "starting point" is used – it isn't always possible to specify definite settings for everything. You have to start somewhere, and then refine the settings as the audio improves.

Summary of the Setup Steps

Step	Operation	Notes
1	Check the DC supply voltage	The DC input voltage should be at least 13.8v under load
2	Select Menu A or Menu B	Choose Menu A or Menu B according to operational mode/mood, and set the backlight color for each menu
3	Set up a Programmable Function Key for TX TUNE	
4	Check the SWR	The SWR should be under about 1.5:1
5	Set up the microphone	Choose impedance, pre-amplifier, distance
6	Select the TX equalizer	Choose a TX equalizer to suit the voice and operational mode/mood
7	Set up the radio for unprocessed audio	The basic audio setup for highest quality
8	Set up the radio for processed audio	Select Hard or Soft audio processing Set up the Processor Input level Set up the Processor Output level

Step 1: Check the DC Supply Voltage

The TS-590S specification states that the minimum DC input voltage to the radio is 13.8v minus 15%; that is 11.73v. In practice this is far too low for satisfactory operation – at this voltage the maximum output power will be significantly less than the nominal 100 watts. It is recommended that the DC voltage be at least 13.8v. The maximum permissible voltage is 15.87v.

Step 2: Select Menu A or Menu B

It is convenient to arbitrarily assign Menu A and Menu B to different operational modes/moods. For example, Menu A = "CHAT" and Menu B = "DX". You can then independently set up the 88 menus for each operational mode/mood without affecting the settings of the other.

Let's say you want to use Menu A for "CHAT" and Menu B for "DX", and you now want to set up the audio for DX operation. First, you need to select Menu B in the radio. To do this:

1. Press the **MENU** key.
2. Toggle the **A**/**B** key until **B** shows on the right-hand side of the display (see the right-hand side of Figure 6).

It is also a good idea to allocate different display backlight colors to Menu A and Menu B, so that you can see immediately which menu is being displayed at any time. For example, to set the backlight color for Menu B to amber, select Menu B as above, then rotate the **MULTI/CH** control to select Menu 01. Then press either the **M.IN** or **SCAN** key to select amber.

Finally, press the **MENU** key again to save the menu setting.

Step 3: Set up a Programmable Function Key for TX TUNE

It is a good idea to assign a programmable function key to the TX TUNE function. Then, whenever you want to transmit a low power CW tuning signal, all you need do is press the function key.

For example, the **PF A** function key (at the top left-hand corner of the front panel) is very convenient for this purpose. To assign the TX TUNE function to this key:

1. Select Menu A or Menu B, as in Step 2 above.
2. Rotate the **MULTI/CH** control to select Menu 79.
3. Press either the **M.IN** or **SCAN** key to select the value 204. (This means TX TUNE).
4. Press **MENU** to save the setting.

From now on, all you do to transmit a tuning signal is toggle key **PF A**.

(Alternatively you can set up function key **PF B** for TX TUNE, using Menu 80 instead).

Step 4: Check the SWR

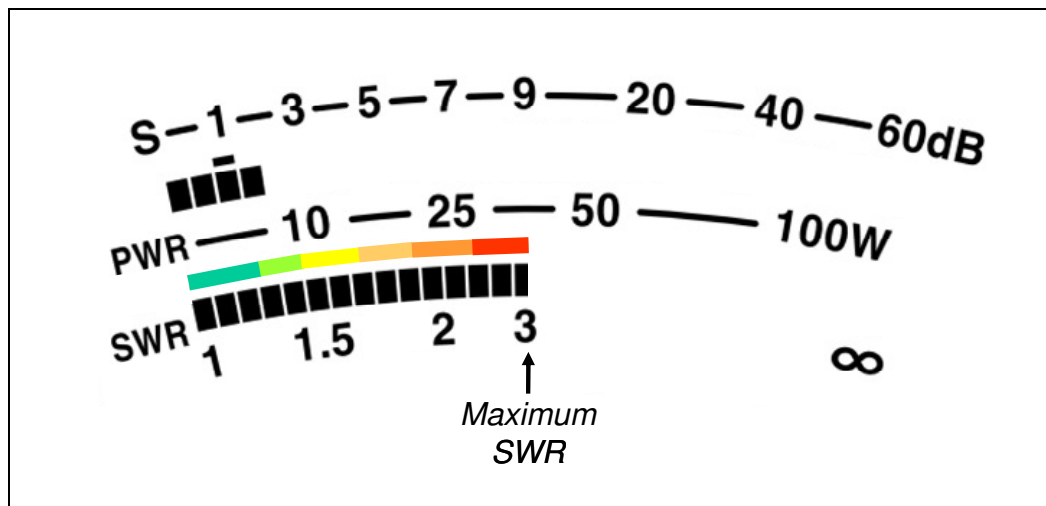The SWR should ideally be kept well below 3:1. See Figure 15.

Figure 15: The SWR display. The SWR should ideally be better than 1.5:1, and should never exceed 3:1

To check the SWR, press function key **PF A** (having set it up as in Step 3 above).

When using a dummy load, of course, the SWR should be exactly 1:1.

This emphasizes the importance of using the dummy load when first setting up the audio. If the audio sounds good with the dummy load, but then deteriorates in quality or quantity when the antenna is connected, the first things to suspect are an excessive SWR or RF in the shack.

Step 5: Set up the Microphone

With some microphones you will have a choice of settings. For example:

- Impedance: High or Low. The TS-590S microphone input impedance is 600 ohms, so theoretically you should choose the nearest microphone impedance for a good match. In practice it doesn't really matter. A Low impedance setting may boost the low frequency input.
- Pre-Amplifier: On or Off. Probably better to leave switched off unless you need the gain, to save on battery life, or do without a battery altogether.

Also, as already noted in Figure 3, the distance of the microphone from your mouth can affect the low frequency response – if you hold it very close to your lips, the bass response may be enhanced.

Step 6: Select TX Equalizer

The choice of TX equalizer depends on all the variables such as voice type, microphone type and so on, as summarized in Part 1 of this HOWTO. There is no "correct" one to use.

Perhaps the best starting point is to listen to your own voice. If you normally grunt in your boots, then you will probably need some emphasis in the higher frequencies, so the High Boost 1 (HB1) or High Boost 2 (HB2) equalizer may be appropriate. On the other hand, if you normally sound as if you are breathing helium, the Bass Boost 1 (BB1) or Bass Boost 2 (BB2) equalizer may be a better choice. Don't forget that your mood (CHAT or DX) may also condition your voice!

To select a TX equalizer:
1. Select Menu A or Menu B, as in Step 2 above.
2. Rotate the **MULTI/CH** control to select Menu 30.
3. Press either the **M.IN** or **SCAN** key to select the equalizer[2]:
   OFF   **(select this setting for digital transmission)**
   HB1   (High Boost 1)
   HB2   (High Boost 2)
   FP   (Formant Passband)
   BB1   (Bass Boost 1)
   BB2   (Bass Boost 2)
   C   (Conventional)
   U   (User-Defined – for use with ARCP-590, see Appendix 1)
4. Press **MENU** to save the setting.

Step 7: Set up the Radio with the Processor disabled

If you want to use unprocessed audio, the setup process is very simple:
1. Select Menu A or Menu B, as in Step 2 above.
2. Press the **PWR** button on the front panel, then, using the **MULTI/CH** control, set the power to 5 watts. Press the **PWR** button again.
3. Toggle the **PROC** key with one or two short presses until the "PROC" legend disappears from the right-hand end of the display.
4. Give a short press on the **MIC** key. The display will then look something like Figure 16.

Figure 16: Setting up the microphone gain and ALC for unprocessed audio. The legend "MIC" appears on the display, and the legend "PROC" is absent. (The "RX" antenna happens to be enabled on this display, but this is not relevant to setting up the audio)

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[2] The equalizer profiles are described in detail in the TS-590S TechNote: SSB Audio Handling [2].

5. Adjust the **MULTI/CH** control for a microphone gain starting point of 40 – displayed at the far right-hand of the display.

6. Press and hold the PTT, and speak into the microphone.

7. Adjust the **MULTI/CH** control up or down until ALC pips appear within the recommended range shown in Figure 16. (Or, if you do not want to exceed the ALC threshold, adjust for no pips). However, do not be overly concerned if the ALC level *occasionally* exceeds the recommended range on voice peaks, sibilants etc. – the radio is designed to handle this. You may find that the optimum ALC setting varies slightly from band to band and/or with TX power level.

8. Once set up, press the **MIC** key again to restore the main default display.

This completes the setup for unprocessed audio.

Step 8: Set up the Radio with the Processor enabled

If you want to use processed audio, you need to set up:
- The Speech Processor Effect (Hard or Soft).
- The Processor Input level (PRO.I).
- The Processor Output level (PRO.O).

To do this:
1. Select Menu A or Menu B, as in Step 2 above.
2. Press the **PWR** button on the front panel, then, using the **MULTI/CH** control, set the power to 5 watts. Press the **PWR** button again.
3. Press the **MENU** key, then select Menu 29 using the **MULTI/CH** control.
4. Press either the **M.IN** or **SCAN** key to select Hard or Soft. The Soft setting is probably preferable for "smoother" sounding audio.
5. Press the **MENU** key again to save the setting.
6. Toggle the **PROC** key with one or two short presses until the "PROC" legend appears at the right-hand end of the display.
7. Give a long press on the **PROC** key. The display will then look something like Figure 17.
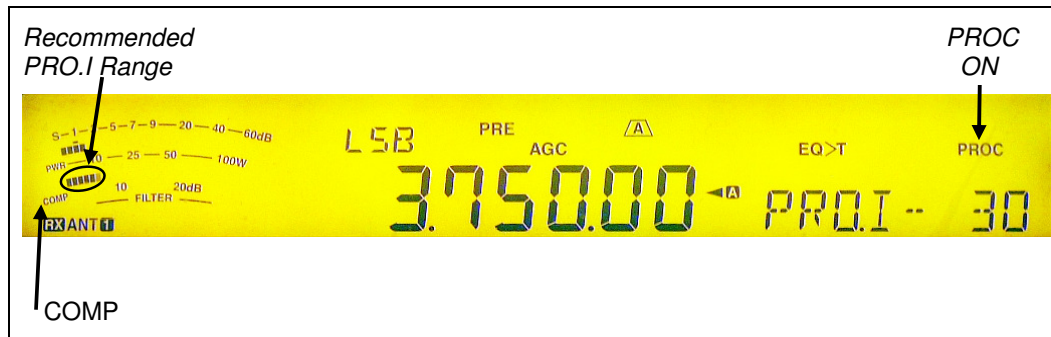

Figure 17: The Processor Input display. The legends "PRO.I" and "PROC" appear towards the right-hand end

8. Adjust the **MULTI/CH** control for a PRO.I starting point of 30 – displayed at the far right-hand of the display.
9. Press and hold the PTT, and speak into the microphone.
10. Adjust the **MULTI/CH** control up or down until COMP pips appear within the recommended range shown in Figure 17.
11. Press the **METER** button repeatedly until "ALC" appears at the left-hand end of the display.

12. Once the processor input level is set up, press the **MIC** key. The display will then look something like Figure 18.

Recommended
PRO.O Range

PROC
ON

ALC

Figure 18: The Processor Output display. The legends "PRO.O" and "PROC" appear towards the right-hand end

13. Adjust the **MULTI/CH** control for a PRO.O starting point of 50 – displayed at the far right-hand of the display.

14. Press and hold the PTT, and speak into the microphone.

15. Adjust the **MULTI/CH** control up or down until ALC pips appear within the recommended range shown in Figure 18.

16. Once set up, press the **MIC** key again to restore the main default display.

This completes the setup for processed audio. As with unprocessed audio, optimum settings may vary slightly from band to band and/or with TX power level.

Power Output Display

Up to this point in the HOWTO there has been no mention of the Power Output (PWR) display and its possible role in setting up the audio. This is intentional. The PWR display serves no useful function here, as it only displays approximate values of output power at random moments in time. According to the Instruction Manual [1], the meter has a "Peak Hold function [that] holds each reading for approximately half a second." This does not mean that it is a peak-reading power meter.

The only way to measure the peak output power to check that it complies with the specification is to use an external professional power meter or an oscilloscope.

If you have no such test equipment you will be forced to rely on the TS-590S PWR display. If you set the power control to 100 watts, the following guidelines apply for satisfactory output:

- For unprocessed audio, you will reach about 100 watts PEP output when the PWR display fluctuates around 20-30 watts.
- For processed audio, you will reach about 100 watts PEP output when the PWR display fluctuates around 30-40 watts.

Intuitively these values may seem low, but they are close to reality for 100 watts PEP. The TS-590S PWR display is a very blunt instrument.

Proof of the Pudding

Having set up all the controls as described above, the next steps are to:

- Listen carefully to your audio, ideally recorded.
- Get on-air reports from critical listeners.
- Make changes to the settings and go around the loop again. And again. And again.

Keep notes of the settings as you progress, so you can return to earlier values if necessary.

You will find that as you refine the settings your audio will improve in quality and quantity by leaps and bounds – Kenwood quality to be proud of.

The Acid Test

Once you have achieved your ideal audio setup, there is one final test that will confirm everything is spot on. Replace the dummy load with your antenna, but keep the PWR setting at 5 watts! Now call any station that you can hear. You will be amazed at the responses you get. Don't forget that 5 watts is only about 13dB below 100 watts – if they can hear you at S9+15dB on 100 watts, you will still be over S9 on 5 watts.

APPENDIX 1: Selecting and Modifying a TX Audio Equalizer Profile

In the unlikely event that none of the seven built-in TX equalizers is suitable for your audio setup, you can tailor the audio using the 18-band User-defined equalizer instead. The TS-590S Control Program (ARCP-590) is the tool to use [7].

ARCP-590 will let you temporarily modify one of the default profiles, or define a new User profile:

1. Start the ARCP-590 program in the usual way. Check that the program is communicating with the radio (for example, rotate the tuning knob, and verify that the frequency on the ARCP-590 display tracks the frequency on the radio display).

2. In ARCP-590, click on the **Menu...** button (on the left-hand side, below the **Power** and **Connect** buttons). The **Menu Functions** dialog box should pop up. See Figure A1-1.

3. In the **Menu Functions** dialog box, toggle the **Menu A/B** button until the chosen menu (Menu A or Menu B) appears in the box to the left of the button. Click on the **Close** button.
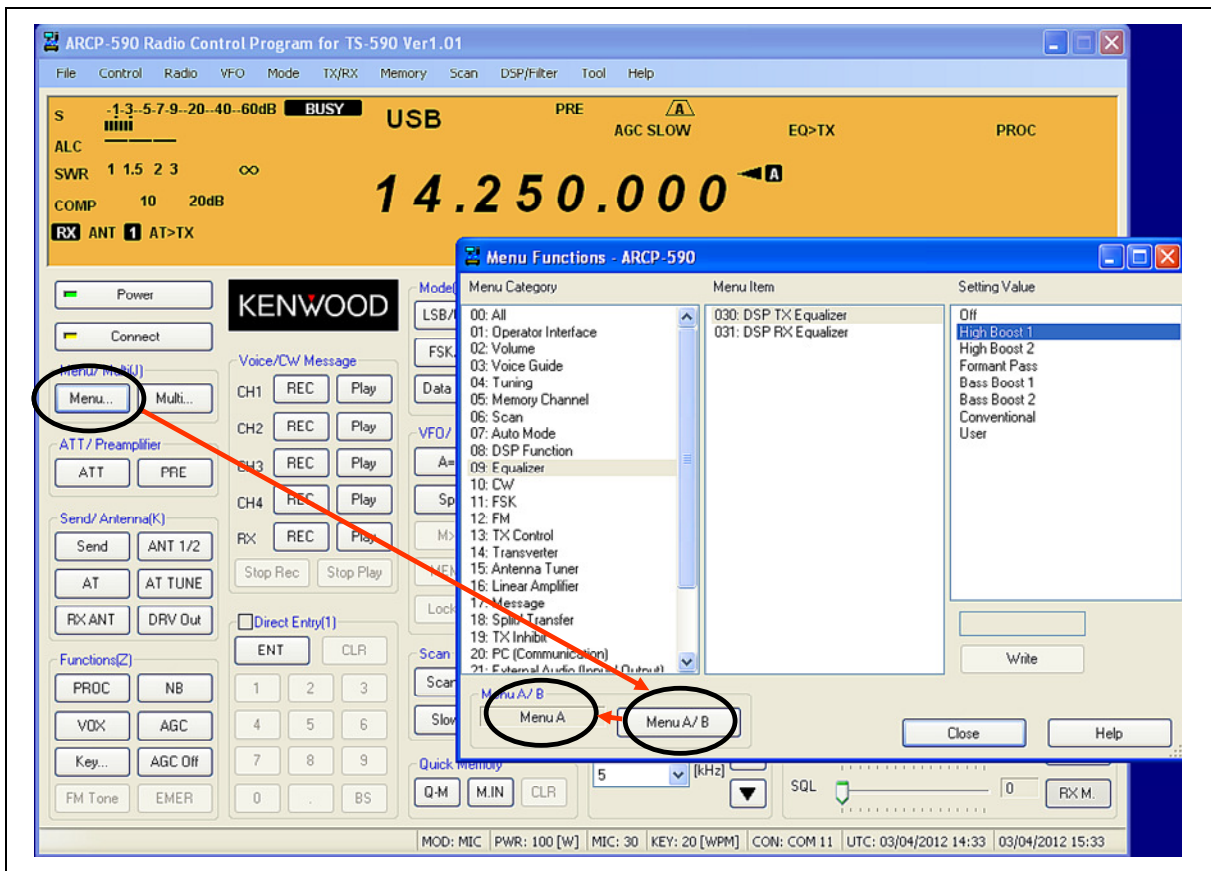

Figure A1-1: ARCP-590. Selecting Menu A or Menu B, prior to selecting the TX equalizer

4. Back in the main ARCP-590 window, click on DSP/Filter > Audio Equalizer ... The equalizer window will pop up. See Figure A1-2.
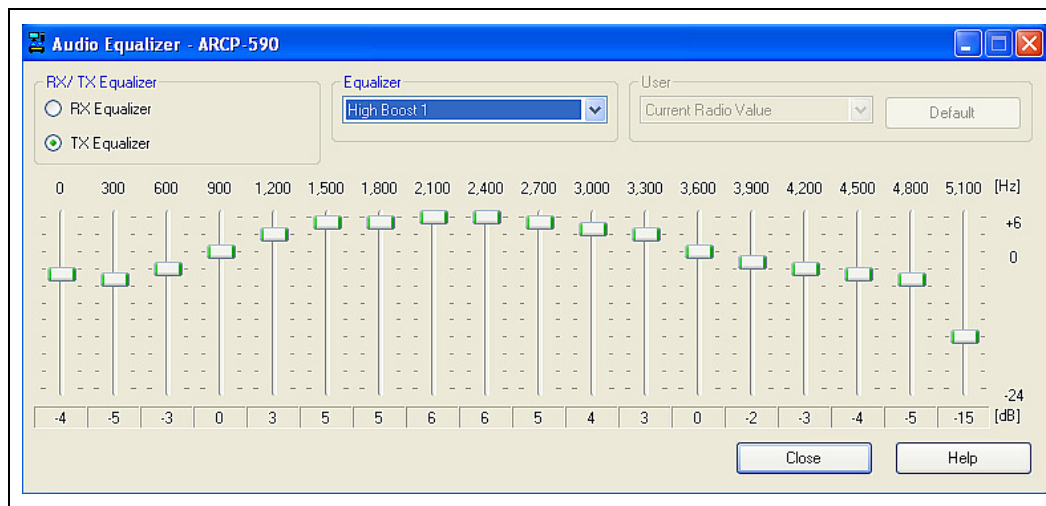

Figure A1-2: The ARCP-590 equalizer window

5. Select the TX Equalizer button (top left), then select the wanted equalizer profile from the dropdown list.
6. Move the sliders up and down to modify the profile as required.
7. Click on Close to save the profile.

Some important points to remember when changing equalizer profiles:

• Select Menu A or Menu B before changing any profiles.

• When you make changes to a profile, the changes are immediately transferred to the radio and become effective immediately.

• When you make changes to a *default* profile, the changes are only temporary. The changes are lost when you power down the radio or switch it to standby[3]. (This applies to all profiles except a User-defined profile).

• The current User-defined profile is stored indefinitely in the radio, and is not affected by powering down or switching to standby.

• When you select a new profile from the dropdown list, any changes you made to the previously selected profile are lost (except where the previous profile was the User-defined profile).

• Since the SSB TX bandwidth is limited in DSP by Menus 25, 26, 27, and 28 to a maximum of 2990 Hz, making adjustments to any TX equalizer profile beyond 3000 Hz will not have any noticeable effect on the transmitted audio.

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[3] "Power down" means removing the DC supply to the radio. "Standby" means toggling the front panel power button until the display goes out.

Multiple User-Defined Profiles

Because any changes that you make to the *default* profiles are only temporary, it is usually preferable to define User profile(s) to meet your own requirements. ARCP-590 lets you define up to five different profiles. See Figure A1-3.
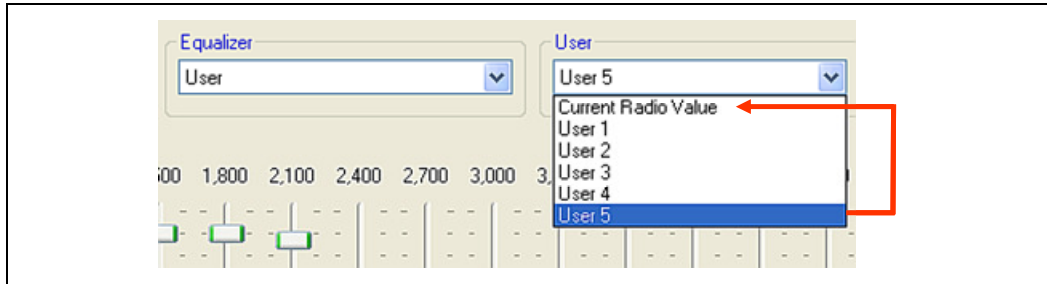

Figure A1-3: Selecting User-defined profiles

When you select a profile from the dropdown list, that profile becomes the current profile (**Current Radio Value**), and is stored in the radio. In addition, ARCP-590 saves all five User profiles, so that they are available each time you open the program.

APPENDIX 2: Recording the Audio

When setting up the audio, it is usually preferable to record the tests and play them back afterwards – it's not very easy talking and listening to yourself at the same time! Also, you can save the recordings for posterity and refer back to them at any time.

The TS-590S has a very nice undocumented feature that lets you record your own TX audio very simply. See Figure A2-1.
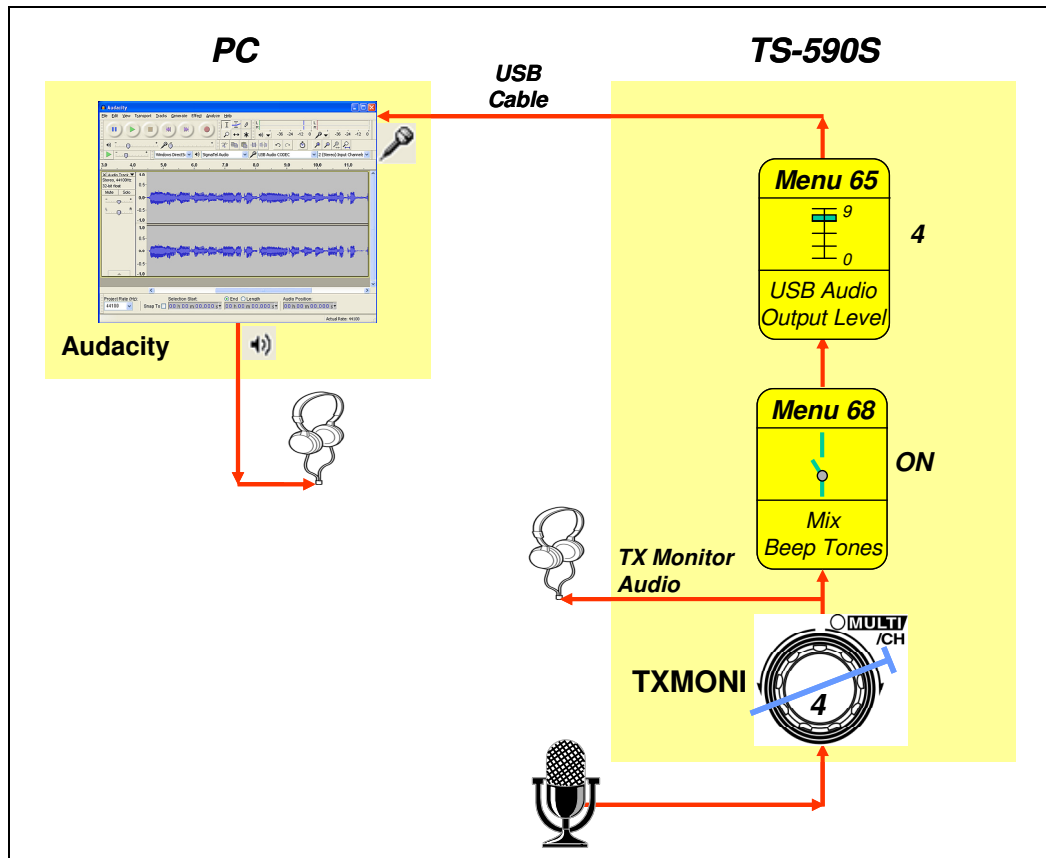

Figure A2-1: Recording audio using Menu 68. The number alongside the Menu 65 control (4) and the number inside the TXMONI control (4) are suggested starting points for the audio levels

Starting at the bottom right-hand corner, audio from the mic passes to the TX monitor (TXMONI) in the radio, and from there to the headphones, where you can monitor the audio. You set the headphones audio level with the TXMONI control.

Moving up the diagram, this is where the undocumented TS-590S feature comes into play. If you set Menu 68 (Mix Beep Tones) to ON, the TX Monitor audio also passes to the radio's USB output port. The output level is controlled by Menu 65 (USB Audio Output Level).

The audio now passes through the USB cable to the PC, and into the input of a recording software package – in this case Audacity [8]. Then, finally, you can listen to the recordings at the output of the package.

Audacity Setup

Audacity has many useful features, most of which are not needed here. The main points of interest are ringed in Figure A2-2.
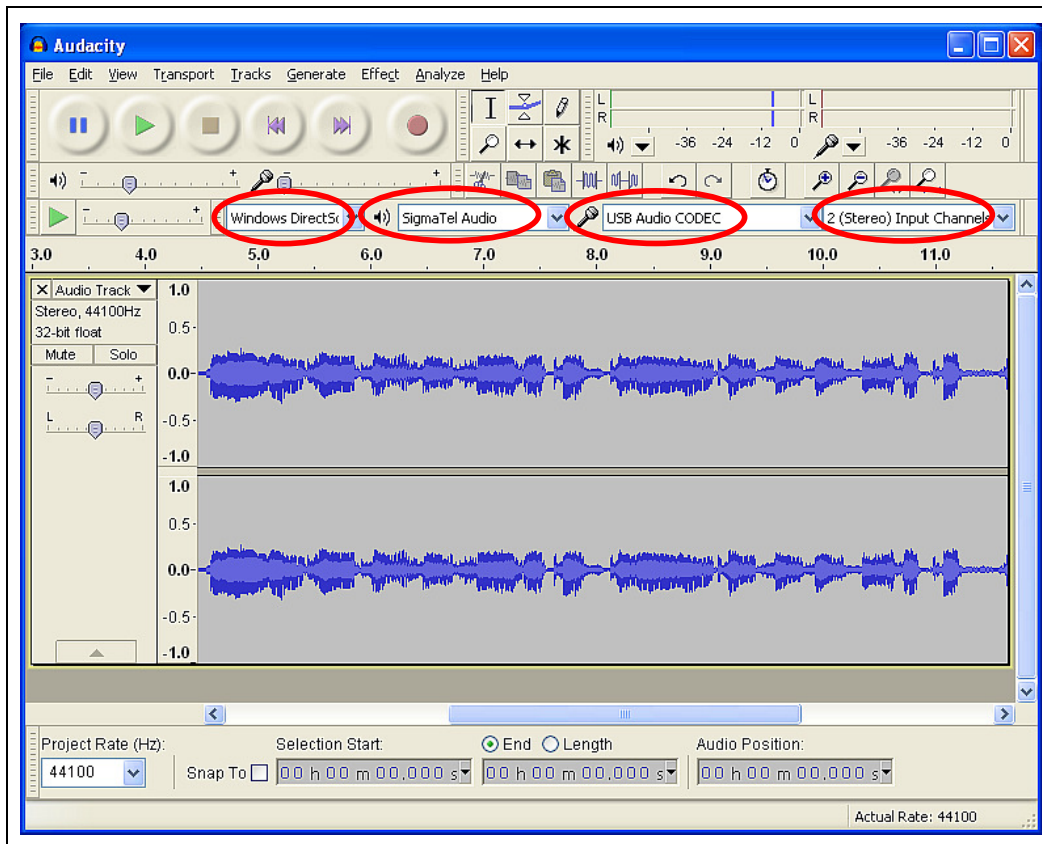

Figure A2-2: Audacity setup

The dropdowns, from left to right:

- Audio Host: select Windows Direct Sound.
- Output Device: select the built-in PC soundcard (SigmaTel Audio in this example).
- Input Device: select USB Audio Codec.
- Input Channels: select 2 (stereo).
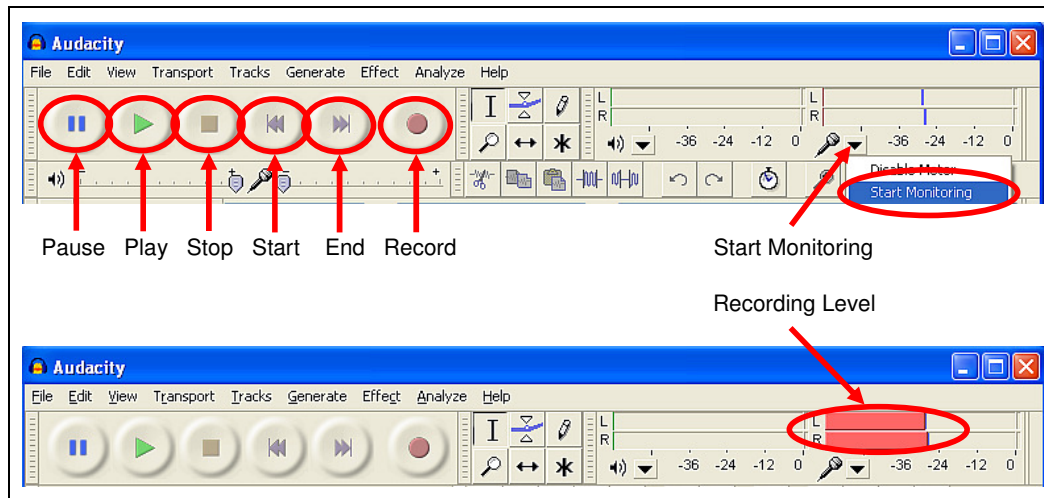
Figure A1-3 shows the principal controls.

Figure A2-3: Audacity – principal controls

The main recording controls (Start, Stop etc.) are arranged as a row of buttons at the top of the window.

To open the recorder input channel, click on the dropdown to the right of the microphone icon, and select Start Monitoring. The Recording Level should then be displayed. Make sure this does not hit the end stop. If your radio is receiving signals, you should see the Recording Level indicator fluctuate rapidly. Practise recording and playing back the received audio.

Audacity is now ready for use.

Setting up the TS-590S for recording TX audio

Setting up the radio for recording TX audio is straightforward. Refer again to Figure A2-1.

1. Connect the dummy load, and set the TX power to 5 watts.

2. Plug the headphones into the radio's PHONES jack.

3. Select Menu 68 (Mix Beep Tones) and turn it ON.

4. Press the PTT and speak into the microphone. You should now see the Recording Level indicator in Audacity move in sympathy with your voice.

5. Adjust the TX Monitor level for comfortable audio in the headphones (make a long press on the **PWR** button, then adjust the level for comfortable listening with the **MULTI/CH** control).

6. Select Menu 65 (USB Audio Output Level) and adjust the level for a suitable input into Audacity.

7. You are set. Press the Record button in Audacity to preserve the audio.

A small tip: When recording your voice, be sure to include the essential details of the setup in the recording as you speak. If you don't do this, you will have no idea later whether this recording is with PROC ON or OFF, which equalizer you were using etc. For example, say something like:

"October 17, PROC ON, in: 30, out: 50, HB1, Lo cut: 300, Hi cut: 2700, Monday Tuesday Wednesday Thursday Friday"

References

	Resource	URL
[1]	TS-590S Instruction Manual	Go to the TS-590S Resources Page: http://homepage.ntlworld.com/wadei/ts-590s.htm Click the **KENWOOD TS-590S DOCUMENTATION** button, then click on the link "Instruction Manual"
[2]	TS-590S TechNote: SSB Audio Handling	Go to the TS-590S Resources Page: http://homepage.ntlworld.com/wadei/ts-590s.htm Click the **TECHNOTES** button, then click on the link "TS-590S TechNote: SSB Audio Handling"
[3]	Microphone Proximity Effect	http://en.wikipedia.org/wiki/Proximity_effect_%28audio%29
[4]	Why does Proximity Effect Occur?	http://shure.custhelp.com/app/answers/detail/a_id/2844
[5]	Dummy Load Construction	http://k4eaa.com/dummy.html
[6]	SDR Radio software (from Simon Brown, HB9DRV)	http://sdr-radio.com
[7]	ARCP-590 Control Program	Go to the TS-590S Resources Page: http://homepage.ntlworld.com/wadei/ts-590s.htm Click on the **KENWOOD TS-590S SOFTWARE** button, then click on the "TS-590S Software" link. Then follow the Kenwood link to the ARCP-590 program
[8]	Audacity Audio Editor and Recorder	http://audacity.sourceforge.net/about/features

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Document Version History

Version	Date	History
1.0	26 October 2012	First public release