International Broadcast Transmitters Ltd.

Model Wantok-SBS-2

FM BROADCAST STATION

OPERATIONS

and

TRAINING MANUAL

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INTRODUCTION

Purpose of this Manual

This training manual is designed to accomplish three primary objectives.

First, it is to introduce you to the equipment you will be working on, to show you how it is assembled, how each individual piece operates, and how it functions as a whole.

Second, through use and reference to the manual along with practice on the equipment itself, we will develop into accomplished operators capable of delivering accurate, timely and informative programming to our designated audience.

Finally, it is intended that you retain this manual as a constant reference source. It's something that you can refer back to and obtain information and reinforcement as required.

Manual Methodology

The material in the manual will be taught by working through each section and then completing a short quiz at the end. The quiz will ensure that you have not missed any of the critical pieces of information in the section and to ensure that you understand each area that is covered.

In addition, by reading, taking a break for the quiz, and then discussing the answers, it gives you, as the student, an opportunity to question any aspects you may not understand. You are encouraged to do this. No question is invalid if you do not know the answer.

Instructor/Student Obligations

Both the instructor and the students have obligations to meet during this learning exercise.

It is the obligation of the instructor to ensure that the information conveyed by the training process is understood by the students. This may mean repetition, varying the medium of the message or whatever it takes, to ensure that knowledge transfer occurs.

It is the obligation of the student to make sure that a clear understanding of the knowledge has been received. If you do not understand some point, or wish further clarification, you are obliged to let the instructor know. Only you can tell when you have reached a comfort level that you understand the information. Do not be afraid to ask questions.

Retaining the Knowledge and the Manuals

As each quiz is completed, the instructor will review the questions and supply confirmation of the correct answers. At that time you should correct any errors or omissions on the quiz sheet. It is intended that you retain and use this manual as a working guide. Therefore it is important that it contain only correct and accurate information. Do not be shy about creating your own notes and comments for future reference.

Let us now work forward through the manual to a new and rewarding learning experience.

SECTION I

THE BROADCASTING CONSOLE

Purpose

This broadcast studio console provides a number of necessary functions, particularly for community and rural broadcast radio stations.

It provides a standard layout for the equipment that is the same for all operators and permits the standardization of training and procedures. Just as one does not have each computer keyboard operator coming in and changing the arrangement of keys on a computer keyboard, so too, we cannot have each radio announcer coming in and shifting the equipment around to suit his or her own particular desires. The present layout is that recommended by experienced broadcasters as being the most efficient and comfortable for operational periods over an extended period of time.

By permanently fixing each unit in its location, we can provide a permanent wiring harness to carry power and audio to and from each unit. You should not use the studio equipment elsewhere for other purposes. If you begin utilizing the equipment outside the studio, it is almost guaranteed that inexperienced hands will damage it operationally or it will become lost, leaving your station without necessary functioning equipment.

It is amazing how much wire accumulates when you begin tying equipment together to work in a coordinated manner. If no console were provided, all the wiring would lay on the operating table or be fed down through holes drilled in the operating table. By utilizing a console we keep unsightly wiring out of view and away from the danger of being inadvertently snagged and pulled out of the equipment or broken off by accident.

Layout of Equipment

The layout is designed with the low profile CD player forward for easy access, since discs should be handled carefully by the edges only. Also, they are top loaded with little but the hand to guide them to correct placement. Therefore, the operator must have a good visual perception of placement.

The solid state recorder/players are directly behind the disc players. These units are small and usually battery operated. They can easily be picked up and programmed or re-played and placed back in the pocket.

The left front portion of the console contains the mixer board with the cue control knob and slider feed controls. This permits the use of both hands to control the outgoing signal level while simultaneously cuing and preparing the next piece of material to be played. It puts the over modulation display directly in the operators range of vision to permit visual output monitoring.

Directly behind the mixer is a platform which holds the announcers microphone. This locations permits adjustment to suit all operators and leaves them "hands free" to operate the mixer and other program sources. This platform also holds the on-off switch and "on" light indicator

To the right of the CD player is a three microphone mixer box which is tied directly to microphone slider # 2. The three controls on the mixer box are colour coded so they can be matched to extended microphones. This permits the announcer/operator to control round-table discussions or guest speakers from the console and interact with them as required.

The space above the CD / MP3 player may be used to store an iPod / MP3 player, a satellite receiver such as the Tongshi DAMB-R World Space receiver, or any other audio source device.

Above the microphone control box are two RCA connectors. One is for the iPod / MP3 player, or other solid state device input. The other is for any audio input that might require audio compression or expansion and amplification to level out an incoming signal. These signals might be shortwave or other radio rebroadcast signals. This input is called a compander input.

Your computer may sit to the left or to the right of the console or if you are using a notebook or laptop type computer. If you are using a standard desktop model with large monitor it may be placed behind the console. As we do not always supply the computer, or the audio editing program to be used, placement and operation of the computer program are left to your discretion.

All units are connected in to the console and power is supplied from a power strip inside the console itself. By connecting a 12 Volt DC source into the back of the console, power is distributed to all units at the level required. This avoids the requirement for announcer/operators facing the need to become "technicians" for replacement of power systems or inadvertently making incorrect power connections that could damage the equipment. As much as possible, different types of connectors have been used on the console to avoid the possibility of incorrect connections.

Auxiliary Audio Input Board

At the rear of the console is an auxiliary audio input board. It consists of a standard RJ11 telephone jack and three RCA input jacks. Above the Input 1, 2, and 3 jacks are their respective switches and below the RJ11 connectors is its switch. Sliding each switch from the right hand position (the audio components in the console) to the left hand position will connect that channel to the auxiliary audio input jack on the rear of the console. This permits computer audio, telephone call in shows, shortwave radio broadcasts, satellite radio broadcasts, CD stackers, or any other audio generating device to be connected and controlled through the mixer on the console.

Auxiliary DC Output Board

Also on the rear we have located a DC Voltage output board. This small board supplies DC voltage at 12V, 9V, 6V, and 5V outputs to power systems like the World Space receivers and data terminals or other devices that would normally require batteries which are not always readily available. Using this power source, you can by-pass the need for batteries and permit the units to operate from the primary power supply, either solar or converted AC.

Maintenance

Routine maintenance on equipment is an ongoing responsibility of the operators. It is a simple matter of keeping the equipment and program materials as clean and free of dirt and dust as you possibly can. Do not lay cigarettes, coffee, soft drinks or food on the console or equipment. Use a cloth to cover the console when it is not in use.

Technical maintenance, such as replacement or repairs to equipment would normally be conducted by a qualified technician or the station manager. However, replacement of equipment is fairly straight forward. If you have to replace a unit, the following procedures are recommended:

(1)   Disconnect all power to the console.

(2)   Lift the console from the front to an approximate 45 degree angle and brace it there. Do not try to hold it up with one hand and work with the other; that is almost a guarantee that it will be dropped.

(3)   Follow the wiring from the unit to be replaced to each termination point. Disconnect and label them one at a time. There is a connection chart beneath the console which is visible when the console is lifted.

(4)   Remove the defective unit.

(5)   Place the new unit into the console. Connect the cables to the appropriate locations as indicated by the wiring chart.

(6)   Check adjacent wiring to ensure you have not inadvertently disconnected something else.

(7)   Apply power and test the unit.

Everything in the console is designed to make changes and operation as easy as possible. All power is hardwired in to protect polarity. If you change CD players, ensure that the new unit's polarity is the same as the old unit before you apply power. All audio is plug in and play.

Console Repairs

The console itself is made of abs (plastic water pipe) material. It will withstand normal usage without damage; however, particularly in cold climates a sharp blow may cause a crack. If this occurs, a can of plastic pipe cement will usually provide an effective repair. Close the cracked portion as tightly as you can, lift the console from the front and apply the cement from beneath. Allow 30 minutes minimum to dry, one hour if temperatures are quite low.

SECTION I QUIZ

(1)   The broadcasting console provides two main functions, it _____
_____and it provides a _____
_____

(2)   The equipment layout was designed by broadcasters for _____
and for _____.

(3)   Do not place _____, _____, _____ or _____
on the operating console or equipment.

(4)   Routine operator maintenance consists primarily of _____
_____

(5)   Physical repair may be effected to a damaged console using _____.

SECTION II

AUDIO MIXER

General
The audio mixer provided was designed specifically for use on small community broadcast stations. It can also be used effectively as a field mixer; as a switching device for Studio Transmitter Links (STLs), or as a community access console on existing networks. It has two dynamic microphone inputs. One is high impedance the other low impedance (note that two microphones of the same type may be used, it just means the slider positions will be different). It also has four line inputs to accommodate up to four mono audio devices or two stereo audio devices. Each microphone and player component has its own slider to control the level of output from the mixer. This mixer has cue and control which lets you cue up a track ready for play. It also provides two means of monitoring the signal that is being fed to the transmitter. One method is aural via the headphones plugged into the mixer's 1/8th inch monitoring jack. The other method is visual, via an LED light display. One slider switch is dedicated to controlling the output level to the headphones for operator comfort.

Installation
The mixer is entirely a plug and play unit. All connections are standard RCA (phono) jacks with the exception of the +12 Volt DC power input. The microphones are plugged into their numbered positions; the audio input devices are plugged into their respective numbered line inputs; the mixer output to the transmitter may be plugged into either the HI or LO output, depending upon the required transmitter level. Normally the transmitter takes the HI output and the LO mixer output is normally used to feed an amplifier for a PA system or other amplified requirement, such as simultaneous radio broadcast and PA announcement at public events. Note that certain audio mixers have been modified for two high level outputs.

Power
The audio mixer operates on 12 Volts. It is a standard DIN jack with +12 Volts on the centre pin. The mixer derives power directly from the 12 Volt DC supply via the regulator board.

Purpose of the Audio Mixer

The purpose of the audio mixer is to take multiple separate audio sources and feed a final source to the transmitter input. In the process, by use of the slide levers, you can blend, mix, fade or add voice-over to the audio that you wish to transmit. In order to accomplish this, a five position cue and control knob is supplied. This lets you switch from one audio source to another and listen to each individual audio before you feed it to the transmitter. The microphones can be blended in over top of the music by means of the sliders for voice-over effect, and music can be faded in and out rather than just being switched off and on. We will cover much more on the actual "hands on" operation of the mixer and other audio components in the operating section of this manual. For now, it is sufficient that you understand the principle of each piece of equipment and what its features are.

Monitoring

To avoid sending a distorted signal to the transmitter, we have both an audible and a visual method of monitoring. As noted above, the cue & control knob lets you <u>listen</u> to the audio from the source in the headphones before feeding it to the mixer slider controls. At the point where you have assured yourself that the audio source is the correct one, at the correct location, that it is not distorting and you are not over driving the signal, you are ready to send it to the transmitter.

You may switch to any one of the four line input audio sources and monitor its output aurally, independent of what is being transmitted at the time. The cue positions are not affected by the position of the line slider controls. Only the monitor control slider affects the level of the cue signals.

To reiterate, there are seven slider controls on the mixer. Two control the microphone output levels. Four control the audio feed output levels. The seventh controls the audio monitor level.

It stands to reason then that you seldom want more than one of the first six sliders in the forward position, unless you are trying to mix two or more audio sources together. Always make sure you bring your microphone slider down as you bring your audio source up. You never want your mic left "live".

The visual LED display works in conjunction with the first six slider controls. As you advance a control, you will see the display flash farther across the screen. It should be operated so that only the occasional high peaks reach the full display level. Operating with the Mono/Stereo switch in the Stereo position gives you a dual display.

LED displays were chosen because they are solid state devices with no moving parts. This permits more portability of the unit without concern for damaging sensitive moving meter parts such as the VU meters found in professional broadcast studios.

Impact of Improper Levels

If you operate with improper levels, particularly levels that are too high, you risk damage to the audio amplification equipment in both the mixer and in the transmitter. In addition, your signal will be badly distorted, rendering it unusable to the listener.

Likewise, when the signal is too low, the listener cannot hear clearly. Either way, you risk losing your audience. You must always remember that you are not there to provide your own listening satisfaction, but the listening satisfaction of others. This applies not only to the adjustment levels of the equipment but the materials transmitted as well. The activities of a radio announcer may sound spontaneous, but they require much planning and practice to be properly conducted.

Maintenance

Routine maintenance consists of keeping the audio mixer clean and as dust free as possible. A cloth covering the equipment when it is not in use is a good idea. If the equipment becomes dirty, wipe the exterior with a damp cloth. **Do not attempt to wash it or permit water to get inside the unit.**

Technical maintenance and repairs on the mixer should be attempted only by a qualified technician equipped with the proper electronic repair equipment to diagnose and repair the problem.

Replacement, on the other hand, is a fairly simple process. It may be readily completed by plugging the unit in with the RCA connectors from the console.

If you have to replace a mixer, we suggest you follow these steps:

(1)   Shut off all power to the console.

(2)   Remove the existing mixer from its position by lifting up the front and pulling it gently toward you.

(3)   As it comes forward, you will note the RCA and power plugs coming with it. Pull it forward so that you have all the slack in the wires taken up.

(4)   Take the new mixer, hold it next to the mixer you are replacing, and change the plugs over one at a time to their identical location on the new mixer. In any event, you can follow the wiring instruction label located on the inside of the console.

(5)   Check your connections to make sure they are good. Slide the new mixer back into the tray making sure that the wire feeds back in under the console. You do not want the wire to kink up and interfere with the mixer positioning in the console.

(6)   Try an audio source from each unit in turn. The visual display should light up as you slide the levers forward for each particular unit. Check the microphones the same way by speaking into the microphone and watching the display.

(7)   When satisfied that all units are plugged in correctly, resume normal operations.

SPECIFICATION SHEET

AUDIO MIXER UNIT

Input Sensitivity

Microphone .... 1 mV

Line Input .... 100 m V

Output Level @ 1 KΩ load .... 1 V

Input Overload

Microphone .... >250 m V

Line Input .... > 6 V

Distortion .... < 0.5%

Signal -to-Noise-Ratio .... > 55 dB

Frequency Response .... 20-20,000 Hz +/- 2 dB

Power Requirements

DC .... 12 Volts

(10)

SECTION II QUIZ

1)   The audio mixer was specifically designed for small _____stations.

2)   The audio mixer may be effectively used for _____, _____, or a _____.

3)   The mixer has _____slider controls for microphones; _____ slider controls for audio input devices and _____slider control for audio monitoring.

4)   The general purpose of the audio mixer is to _____ and _____ the audio signals being sent to the transmitter.

5)   The potential impacts of poor operating levels include damage to the _____, damage to the _____ and loss of _____.

6)   The mixer is completely _____, requiring only _____.

SECTION III

CONSOLE MICROPHONES

General

The microphones provided are unidirectional dynamic microphones mounted on a goose neck mount to permit adjustment to the announcer/operator's liking and still leave the hands free to cue audio source units and the mixer. A unidirectional microphone was selected to cut down the transmission of extraneous background noise in the studio. Although this type of microphone is fairly directional, you will note side screening on the microphone head. This permits reception in an approximate 55 degree arc. This means live voice studio interviews can be done live as opposed to taping in advance.

The microphone is mounted on a fixed base with an XLR plug-in connection so it can easily be removed for shipping or replaced.

These dynamic type microphones do not have an internal battery source. All amplification provided to this microphone comes from an amplifier circuit in the mixer. Powered lapel microphones or other high gain condenser microphones requiring an external power source will not function with the mixer in the standard configuration as shipped. If you must use a gain microphone contact International Broadcast Transmitters for mixer modification instructions.

Some models of microphone, such as the Yoga GM9 may have an On/Off switch on the microphone head or the microphone base. This is normally left in the "ON" position and level is controlled by the slider.

EXTENSION MICROPHONES

Extension microphones are available as optional extras. A microphone mixer box with the capability of three extension microphones is supplied as part of the console. If extension microphones are required, they simply plug into the microphone mixer box and are controlled from the console by the operator or from a switch on the microphone by the user.

These are also a dynamic type microphone and come with a simple plastic prop stand. They offer an opportunity for the station to provide "guest" speakers or "round table" discussion on the community radio station.

Keep in mind, this will be live broadcasting and no "time delay" switching is provided.

SPECIFICATIONS

MICROPHONES

Console Microphones

Impedance .... 600 Ohms

Directivity .... Unidirectional

Frequency Response .... 20 Hz - 20,000 Hz

SECTION III QUIZ

(1)   What do we mean when we say a microphone is "unidirectional" as opposed to being "omnidirectional"?

_____
_____

(2)   What is the purpose of having a variable sliding volume control on the microphone as opposed to having only a simple on-off switch?

_____
_____

(3)   Where does the microphone get its amplification power from? (mark your choice)

(a)   A 9 Volt battery in the base   (   )
(b)   The console mixer   (   )
(c)   An external 20 Watt line amplifier   (   )

SECTION IV

COMPACT DISC/MP3 PLAYERS

General

The CD/MP3player utilizes a laser beam to read the information on the disc. This means that any significant amount of vibration may cause the beam to misread or "skip" part of what is being read. If it is music for example, blank spots of interruption will be heard. To minimize this effect the turntable of the CD player is mounted on both steel spring and rubber shock absorbers. Given that it is tray mounted in a studio type situation, little vibration effects should be experienced. You should however be aware of their effect.

Most of the CD players we supply have an anti-shock memory. When turned on, this permits the CD player to read and store bits of information. When a shock occurs, it simply plays the stored information into a skipped location and no interruption is noted unless the shock or vibration is severe.

Installation

The units are simply plugged into the console. However, they are not intended to be removed and utilized in any other situation. As noted earlier, this simply leads to loss or damage.

Laser Safety

WARNING:
As noted, this unit employs a laser. Only qualified service persons should remove the cover or attempt to service this device, due to possible eye injury. Always follow operating instructions to avoid any possible eye injury.

Power

The CD/MP3 players provided are power wired in to the console power strip and do not require separate batteries. They operate at 4 to 6 Volts from a regulated power source mounted beneath the console. Most CD/MP3 players also contain power regulation within the units themselves.

Examination of the CD/MP3 player will reveal a battery compartment. **Do not place batteries in these units.** They are intended and wired to operate off the console power strip provided. Likewise, a "charger switch" may be noted on some CD/MP3 players. Leave it in the "off" position. It has no applicability to your application when using the player in the console. Certain CD/MP3 players have a switch marked "Hold". This locks up the CD player at its present settings. You do not need this feature. **Leave the "Hold" button in the off position.**

The power on-off switch should be left in the "on" position and the console power switch used to control power to all units in the console. This ensures that when you shut down operations all units are shut off at the same time and no motors are inadvertently left on.

Audio Output & Levels

Audio output is taken from the phone jack on the CD/MP3 player. This ensures ability to control the audio output with the audio volume control - if required. Under normal operating conditions, the same low level, undistorted settings would be used for cue and control and the audio level to the transmitter would be controlled by the slide control on the mixer.

Operating Features

The CD/MP3 player models change continuously; however, most have excellent features to assist in cuing up sections of the disc for playing. These features may include:

(1)	Memory/Time	provides a track number and the elapsed time played
(2)	Audible Search	permits monitoring a track to ensure the right location
(3)	Skip/Search	permits the operator to jump from track to track on the disc
(4)	Pause & Cue	permits you to pause on a given track or pause and skip tracks
(5)	Intro Scan	allows the operator to listen to the first 10 seconds of each track
(6)	Repeat Play	permits repeat of a single track or repeat of the entire CD
(7)	Random Play	the CD/MP3 will play all tracks in random order
(8)	Programmed Play	the operator can program up to 20 tracks in any specified order

A small manufacturer's manual of your specific player will be included with the console.

Later in the workbook we will deal with the detailed operation of all the studio units. For now it is sufficient that you know their capabilities.

Note: Some community broadcast stations are purchasing CD "stackers" or "changers". These units will automatically change and randomly play up to 10, 20 or more CD's. This permits un-interrupted music throughout lengthy periods of time without the requirement of an operator.

Other stations are moving to computer storage of programming where the prescribed hours of programming are stored on a hard drive and then fed to the console. This is readily accomplished by using the auxiliary audio input board on the Wantok-SBS-2 console.

Maintenance

Routine maintenance consists of keeping the CD/MP3 player clean and as dust free as possible. Dust and dirt can cause premature wear of parts. Cover the equipment when not in use. When cleaning, use a damp cloth only. **Do not use chemical cleaners.** Do not get water inside the unit. Liquids contain minerals that corrode the electronic circuits.

The discs themselves must be kept in their jackets when not in use and be kept dust free. Dirt and scratches on the CD's surface may prevent the laser beam from correctly reading the digital information. Always handle the discs by their edges. Do not put thumb and finger prints on the discs as body oils are particularly difficult to clean off.

Keep the CD dry. A water drop can act as a lens and affect the laser beam focus. To clean the CD's use a CD cleaner kit. Do not wipe the laser lens. Clean it by blowing air over it.

If a CD player undergoes a fairly rapid temperature change, for example if brought in from -20 degrees in to a warm building, the laser lens will likely fog over. You will simply have to wait for an hour for the unit to come up to temperature. You may speed up the process by gently fanning the unit to move the air around the lens and motor. In tropical areas of high humidity where temperatures drop in the early morning hours, the same "fogging" may occur if a window has been left open and adequate temperature change occurs. The same application of simply warming the unit slowly by air movement will resolve the problem.

Do not place anything except a standard 5-inch or 3-inch CD in the disc tray. Doing so will damage the drive mechanism of the unit.

During play, a sudden shock or jolt (like bumping the console hard with your elbow) could make the CD's rotation speed change suddenly and produce some noise. This is not a malfunction.

Troubleshooting

Problem	Possible Cause	Remedy
CD is loaded but it does not start.	CD is loaded upside down. CD is dirty. **Hold** function is activated	Reload the CD label-side up Clean the CD or try another Set **Hold** to **Off**
The sound skips	CD is dirty Vibration is heavy	Clean the CD or try a different CD Eliminate vibration source or add additional damping to the CD player (i.e. foam pad under the console).

SPECIFICATION SHEET
CD/MP3 PLAYERS

Audio

Frequency Response ($\pm$ 1 dB) ....20-2000 Hz
Dynamic Range .... 85 dB
Signal-to-Noise Ratio .... 80 dB
Harmonic Distortion at 1 kHz 0.05%
Phone Output (10% THD at 32 Ohm) ....10 mW + 10 mW
Line Output .... 0.80 V

Disc

Diameter ....Standard 5 and 3 inch CD's

Signal Format

Sampling Frequency .... 44.1 kHz
Over sampling .... 4 times
Quantization Number ....16-Bit Linear/Channel
Transmission Bit Rate...4.3218 Mb/Second
Signal-Processing Rate ....176.4 kHz

Pick-Up

Tracking System ....3-Beam Tracking Servo Type
Object Lens Drive System .... 2-Dimensional Parallel Drive
Optical Source ....Semiconductor Laser
Wavelength ....780 nm

Power

Power Requirement ....Minimum 6 V
Power Consumption .... 8 Watts

Note: Specifications may vary with each manufacturer. Please see the included manufacturer's instruction and specification sheet.

SECTION IV QUIZ

(1)   CD players are more susceptible to _____ than cassette tape players.

(2)   CD's must be _____ and _____ for proper playback from a laser.

(3)   Eye damage can occur from the _____ within the CD player if operated in a disassembled condition.

(4)   Power for the CD player is supplied from _____.

(5)   All warranty will be void on the CD player if _____.

(6)   The charger switch on the back of the CD player has no applicability to this application and must be _____ at all times.

(7)   To avoid leaving the console units turned on for unnecessary periods, all power to the units is controlled by _____ on the console.

(8)   Under normal operating conditions, the audio output level from the CD player is not adjusted and remains at a _____, _____ level.

(9)   List 8 operating features of the CD player (refer to your workbook if you wish to).

(a) _____   (b) _____   (c) _____

(d) _____   (e) _____   (f) _____

(g) _____   (h) _____

(10)   Never use _____ when cleaning a CD player.

(11)   Routine maintenance on a CD player consists of keeping it _____ and _____.

(12)   Speed changes may occur when playing if the CD player receives a _____.

SECTION V

SOLID STATE STORAGE DEVICES

General

Probably the best known solid state storage device is the Apple iPod. However, there are many other similar MP3 media player devices that work equally as well.

Most of these devices run off batteries or may be charged by plugging into a USB port on a computer.

International Broadcast Transmitters normally supplies one of these devices, of various models, due to the wide variety and commercial availability at any given time. The Wantok-SBS-2 console has an input connector for this, and the purchaser may or may not choose to use these devices for broadcast purposes.

SECTION VI

LOGGING RECORDER

Certain jurisdictions require that a logging recorder be available to continuously monitor the output of the broadcasting station.   International Broadcast Transmitters does not supply any specific monitoring recorder, but any solid state storage device is capable of serving as a logging recorder.

SECTION VII

THE TRANSMITTER

Important Notice to Owner

The owner of the radio transmitter is responsible for its operation in full compliance with existing National regulations which govern the use of radio emissions under current legislation applicable to the use of radio transmitters and the emission of electromagnetic waves.

Operation of the Transmitter

The transmitters that accompany each console vary in both power and design. Consequently, a separate manual is included with each transmitter describing its operation.

Maintenance

As with all other components of the station, keeping the transmitter clean and dry is of the utmost importance.

Never operate the transmitter without either a Dummy Load or the antenna connected. Failure to do so may burn out the final stages of the transmitter.

Transmitters are designed to work properly at their proper operating voltages. While systems are frequently referred to as a 12 Volt nominal operating systems, batteries and AC to DC converters actually produce 13.8 Volts. For your transmitter to have the proper power radiation, it is important that it be operated at its correct input voltage which is 13.8 Volts. Any reduction in Voltage (power) to the transmitter results in a reduction in the radiation power output.

SECTION VIII

POWER SUPPLIES

Generally, a single AC to DC power supply is used to supply power to both the transmitter and the console. A safe minimum for our 30 Watt transmitters and the console is 10 Amps. You may see power supplies rated at 12 Amps "duty cycle". Such a unit will only deliver approximately 10 Amps continuously. Always over power if you can. Try to leave a margin for cooler operation. It will pay off in maintenance in the long run. For example, we supply a 23 Amp power supply with our 100 Watt transmitter although only about 16-18 Amperes is required.

Switching Power Supplies

Power supplies may be either a transformer analog type or a switching / oscillator principle type of supply. Switching power supplies used by International Broadcast Transmitters are practical for our purposes. They are light in weight, small in size and deliver a steady voltage and current supply to the units. Switching power supplies have another advantage; they are very forgiving of erratic input voltages. We generally supply a Samlex1223 model or an Astron equivalent.

The disadvantage to switching power supplies is that they do generate some radio frequency noise. Also, as they operate on the oscillator principle, they should not be operated without a load. Lengthy operation at no load can result in the oscillator circuit burning out. So, as a precaution, make sure your switching power supply is not left in the "ON" position for any lengthy period of time without either the console or the transmitter being connected and turned on, so that it can provide a load for the power supply.

If you attempt to take a voltage reading at the terminals of a switching power supply, you may get no reading. The unit may be working, but the meter is not a sufficient load to cause current to flow.

Maintenance

To clean the power supply units, wipe them with a damp cloth. Do not use chemical cleaners and do not immerse them or run water through the interior of the unit.

Operate the unit in an area where a free flow of air is permitted to pass through the vents. Do not place objects on top of the power supply as they will act as a thermal blanket and could cause overheating of the power supply unit.

POWER SUPPLY SPECIFICATIONS
Samlex Model 1223

Input Power
AC Voltage - 230 Volts (default)

Frequency - 50 Hz

Output Power
DC Voltage - 13.8 Volts

Current Supply - 25 Amps Duty Cycle - 23 Amps continuous operation

Protection - over current; over Voltage; over temperature shutdown; temperature controlled fan.

SECTION VIII - QUIZ

(1)   Both console and transmitter may receive their power from _____.

(2)   Always allow a margin for _____ supply to avoid overloading the power supply.

(3)   The Samlex power supply operates from _____ Volts supply sources.

(4)   Advantages of switching power supplies: (a) _____
        (b) _____ (c) _____ (d) _____

(5)   Disadvantages of switching power supplies: (a) _____ (b) _____.

(6)   If you measure the output terminal of a switching power supply you will get _____ Volts
        even thought it may be turned on because the meter is not a sufficient _____.

(7)   Maintenance of power supplies consists of keeping them _____ and free of _____.

(8)   Always allow plenty of _____ around the power supply and do not
        _____ the supply as this may cause overheating.

NOTE: On the lower powered 30 Watt or less DC transmitters, a standard computer type AC to DC switching power supply is sometimes used. These tend to run a little hot. If you feel that your switching power supply is running too hot, turn it on its edge. This provides a wider surface to the air on both sides and will keep it cool enough.

SECTION IX

ANTENNAS

Gain Antennas

International Broadcast Transmitters generally supplies either Veronica stacked dipole antennas or the Comet CFM95-SL. Both of these units are gain antennas.

The antennas supplied with our systems are generally omni directional, 2.7dBd nominal gain antenna. This means that it will radiate a "line of site" signal equally well in all directions (barring a reflected path obstruction).

Any 50 Ohm impedance matched antenna may be connected to the transmitter provided it is matched to the frequency of operation. Additionally, the coaxial cable length must be a 50 Ohm type.

The 2.7 dBd nominal gain of the antenna means that your effective radiated power will be approximately twice the output of the transmitter.

Using "Gain" antennas has some distinct advantages. As the Gain antenna will not consume any more power, your input power requirement will not increase. This is particularly advantageous if you are using solar power as a supply source. It allows for a less elaborate solar system.

Also, a gain antenna may allow you to operate your transmitter at a level less than its maximum output level, meaning you will remain well within the component operational performance range, decreasing technical maintenance and repairs.

It permits you to have a higher effective signal while using physically small and light weight equipment which saves on shipment and makes transportability much easier.

Signal delivery in the FM band is primarily a factor of line-of- site. If you raise your antenna to a height sufficient to give it a clear view of an area, a 30 watt output can provide a useable signal to a 30 kilometre radius using the antenna provided. When calculating the height of the antenna a good rule of thumb to follow is "a metre a mile". Hence, an antenna 30 metres in height should give you a line of sight coverage area of up to 30 miles (48 km) provided terrain or other obstructions do not interfere with the signal.

SECTION X

OPTIONAL DEVICES

Telephone Interconnect

All of the Wantok-SBS-2 units now come with a standard input / output and audio distribution board that includes a telephone interconnect port. These ports are standard 4 wire RJ11 telephone jacks. This system provides you with the option of selecting either an audio device (such as an iPod / MP3 player) on line 4, or sliding switch L4 on the back of the console to the left hand position, in favour of a telephone line connection to the mixer. Thus you may use Line 4 on the mixer for to control the level of either audio input, the jack on the top of the console, or a call-in on the telephone. The telephone switch must be in the downward position for the telephone connection to function.

Auxiliary Inputs

In addition to the telephone, which is permanently connected to Line 4 of the mixer, we have provided 3 more auxiliary switched inputs.

Any audio generating device may be connected through these jacks by sliding its L1, L2, or L3 switch to the left hand position. We suggest that the computer input be done on Input # 1. Not all computers have the same output levels and Input # 1's gain can be adjusted with A3. You will receive more instruction on this in the operating section of the manual.

Extension Microphones

We do supply good quality extension microphones as an option. These microphones are tested with the console prior to shipping.

CAUTION

When you place the auxiliary switches in the right hand position, you have the console's audio sources generating the audio. When you place these switches in the left hand position, your input will be from the rear auxiliary input. If you are having trouble getting audio from one source or the other, check your switch positions.

NOTE:

Prior to using an "Off-Air" signal or a satellite received signal for rebroadcast purposes, you should investigate your legal requirements to enter into agreements with the signal provider. In some jurisdictions, re-broadcasting is not permitted without the legal authority from the regulators and the signal owners.

SECTION XI

STUDIO/TRANSMITTER CARRYING CASE

Features

The durable carrying case, or suitcase, will permit shipping and transport between broadcast locations, while minimizing damage to the equipment. Only the antenna and coaxial cable are shipped or transported separately.

Exterior

- A composition exterior that is washable and extremely durable.
- Molded composite construction throughout.
- Ribbed for additional strength.
- Double hinged. Six clasp closures on the lid.
- Double reinforced lock hasps.
- Purge valve. (As the unit becomes air tight on closure, changes in altitude require that a valve be installed to permit air entry and reduction of interior pressure or subsequent vacuum on landing so the lid may be easily opened).

Interior

- "O" ring seal on the lid to prevent any moisture or dust entry.
- Four layers of custom medium-density packing foam.
- Pre-cut graphed packing areas for custom fit to desired equipment.

SECTION XII

OPERATIONS

Operating the Console

All units making up the studio console are powered from one common source. There are two levels of power functioning within the console, as all units do not operate on the same voltage. This will not matter to you as operators.

When you arrive to start your shift as an announcer, follow these steps to check out your console before the transmitter is on the air:

(1)   Turn on the power supply, followed by the console's power switch. The green light above the switch should come on indicating power to the components;

(2)   Advance the monitor slider control to mid range with the headphones on. Put the Cue switch to "Out", slide the appropriate microphone slider forward and speak into the microphone. You should hear your voice in the earphones and you should get a visual display on the mixer. Adjust the flexible neck on the microphone to a comfortable operating position.

(3)   Check out your CD player:

    (a)   Insert a CD into the player, set your cue switch to the CD and listen for the disc content. You should hear it at a prominent level in the cue position. Remember, if it is too loud or too weak in the cue position, use the monitor slider control to adjust level at this point, not the volume control on the CD.

    (b)   With the audio being received in the headphones, switch cue to "Out" position. Advance the associated line slider forward and as you hear the audio coming up in your headphones you should see the LED light display move across as you bring the lever forward.

    (c)   Note the position of the lever at maximum light display. It should be near the top of its slide. If it is not near the top of its slide, lift the front of the CD up and adjust the volume on the CD till the display is near maximum with the slide nearly at the end of its upward slide. The same applies if the signal is too low. Adjust it so that slide and display coincide with full scale.

    (d)   Remember, this is your signal to the transmitter. What you feed the transmitter it will radiate, so you want a nice clean clear signal.

(4)   Check out your iPod or other solid state player in the same manner.

(5)   Check out your computer audio feed through the mixer in the same manner, and make sure you are getting display on the LED indicators.

Operating the Mixer

The mixer is the heart of your studio operation. It is designed to take in all the inputs from your programming sources and feed them out to your transmitter. As the signals are fed to the transmitter, you need a visual indication of what level they are going out at. To meet this requirement, LED visual displays are provided. They are equivalent to an analogue output level meter, but without the moving parts which are so frequently damaged when meters are shipped from place to place.

As in any radio studio, a cue and control feature ensures that you can listen to the material ahead of time and cue it up exactly as you want it before it goes to the transmitter.

You will note that the Cue knob, on the upper right side of the mixer, has five positions. They are labeled 1 through 4 to correspond to the line sliders on the mixer. The fifth position on the Cue knob is labeled "Out" for Output to the transmitter. You also monitor your microphone output via this position. (If you continue to rotate the knob there is one more sixth position but it is not connected; it is blank. The only precaution is not to leave the Cue in that position since you will hear nothing).

This means that if you choose to cue something up on position 1, you will be able to listen to it without broadcasting it until you move the corresponding Line 1 slider forward. It is only when that slider control goes forward and your digital light display starts flashing that you will begin to transmit that audio signal.

For that reason, you will normally only have one slider control in the forward position at any given time. If you put two or more forward, you will get the modulation mixing and becoming just a garble of sound. It is only if you wish to blend one with the other, say for example, voice over top of a soft music background, that you would adjust more than one slider in the forward position.

You must remember to bring your microphone slider back down as you bring up your music. Otherwise, you will also be broadcasting every noise in your studio location out over the transmitter. Unless you are talking into the microphone, that microphone slider should be in the downward position.

Let us now try a sample Cue, Control and Broadcast:

(1)   Put the headphones on. An external speaker could be connected into the earphone jack, but it is not recommended. Operators have a tendency to forget and broadcast their cue signals through the microphone over top of the current track or voice announcement being played.

(2)   With the Cue control positioned on the sound source you want, select a piece of music. Get the music set up to the point you want it to start playing and put it on pause. Switch the Cue control to "Out".

(3)   Slide the microphone slider forward, and announce the piece you are about to play. As you finish speaking, release the pause feature on the playing device, slide the associated channel slider forward and watch your display until you are getting a good scale reading (that is, one where only the occasional peaks reach full scale). As you brought the music up you should have been backing the microphone down. Otherwise, extraneous studio noises will be broadcast over top of the music being played.

(4)   While the first piece of music or first program is playing, you set up your next piece of material. Get it ready in the same way and put it on pause. While waiting, sort out the next three or four items you wish to broadcast and have them ready at hand.

You have a variety of ways to monitor your programmed material. You have the visual display, which will cease with the end of modulation and you have the "Out" position on the cue/control switch which gives you an audio indication in the headphones. After cueing up a selection, switch to the "Out" position so you will know when your current selection is ending. On a CD the player gives you a "by the second" display of play time.

(5)   As the piece ends, bring down its associated slider, slide up your microphone volume and make your comments and/or introduce the next item. Release the pause on the new item and bring its associated slider up as you bring your microphone down to zero.

(6)   Start cueing the next piece.

(7)   You should come on to your shift as an operator with a plan, a schedule and a firm idea of what you want to play or what you want to accomplish. If you think that you can come on shift, unprepared, with no plan or idea of what your will be doing, that is exactly what you will sound like to the audience. Someone with no plan and no idea of what he/she is doing. There is no substitute for good planning and preparation. It takes work, and lots of it, to be a good announcer.

(8)   Planning need not be extensive, but you should at least map out the time slot you will be working in into 15 minute segments as a minimum. For that 15 minutes, know what you plan to say, what you plan to play and what sequence it will happen in.

You can get a wealth of information off commercial music jacket covers, use that as commentary when you introduce or close out musical pieces. If you are introducing locally prepared material, fill in some background ahead of it, give the listener an idea of Where, When and Why the interview, or other recorded event took place. Try to add some significance to what you are broadcasting.

(9)   Of course, with the computer, you can lay out your entire program ahead of time, by means of a playlist, if you so desire or play segments of pre-prepared programming as you wish.

(28)

Copyright Note:

Most material on pre-recorded tapes or CD's is copyrighted. Unauthorized duplication of copyrighted material is a violation of the copyright laws of some countries and may carry a penalty. Also, some countries have legislation requiring a fee be paid as a form of royalty to the entertainer whose music you may be playing. You are obliged to check the legislative requirements of your particular situation. (In Canada for example, the organization that collects the royalty and pays it out to performers is SOCAN. To determine if you are required to pay a fee, contact SOCAN's Broadcast Licensing Department at 1-800-557-6226 Extension 785).

OPERATING THE COMPACT DISC PLAYERS

Switch Positions (see accompanying booklet for your particular model)

The CD/MP3 player that we provide is a standard commercial model. They tend to change styles, shape, etc. every six months to supply the commercial market. They are not intended for studio use and as a consequence, if used extensively, they may have to be replaced.

The Wantok-SBS-2 console is designed to allow you to replace the CD/MP3 player with nearly any model you can find locally. You may have to drill new holes in the console to accommodate the audio and power cables, but this is easily done. Just be careful when drilling not to hit other wiring underneath. Though style may change, there are certain basic principles of CD operation that are common. We would like to bring your attention to some of these.

There are three switches on most portable CD players that you normally will <u>not</u> use.

The first is the **Hold** switch. This switch locks up the controls at their last used position. It will normally be left in the off position for your applications. If you come on shift and your CD/MP3 player does not work, check that someone has not left it in the "hold" position.

The second switch is the **EBass** for "Enhance Bass" or possibly just marked "Bass". This is used to enhance the bass sound on particular selections. It may be used quite extensively, depending upon the operator and the music.

The third switch is the **Battery Charger**. As the CD/MP3 players get their power from the console supply in our system, this switch should always be left "Off". Batteries should not be left in the CD/MP3 player when it is being powered by another power source.

Playing a CD
Your CD player is designed to play normal 5 inch and 3 inch music industry compact discs, or MP3 music recorded onto standard 5 inch discs. Putting other objects on the turntable will damage the mechanism and destroy the disc player.

(29)

These commercial CD players are extremely versatile and we would like to point out some of the features that can be performed. A booklet on your particular CD/MP3 player accompanied the unit and should be consulted for application. In general though, most have the following features.

Press **Open** - the player cover will partially open. Lift the cover fully open and carefully place the CD, label side up, over the disc compartments centre hub. Press lightly till it clicks in place and lies flat within the compartment. Close the compartment cover.

Press **Play/Pause** - the CD player turns on. "00" or "--" usually flashes momentarily on the display, and then track # 1 begins to play. The display will show the current track number. Some also begin display of elapsed play time. Others require that you press a **Memory/Time** button for elapsed time. (As total elapsed time is usually shown on the album cover, you can use this to assist you in your cueing.)

There are numerous minor variations as the new models of CD players come out. Most operate on the same principles however and have nearly identical operating specifications (check the booklet with your player).

Audible Search
You may use the **Audible Search** feature to rapidly search forward and backward on the disc to locate a specific section of track. During audible search, the CD plays at a lower volume and a higher speed. The current tracks elapsed time sometimes appears on the display.

To search forward, press and hold **>>I**. To search backward, press and hold **I<<**. Release the button to resume normal play. This is useful on sound effect discs or if you are searching for a certain section within a disc to cue up for broadcast.

Skip Search
You can use **Skip/Search** before or during regular or programmed play to quickly locate any track on a CD. During play, press **I<<** to return to the beginning of the current track. Press **I<<** again to return to the beginning of the previous track. To move forward to the beginning of the next track, press **>>I**. While the CD is stopped, repeatedly press **I<<** or **>>I** to move backward or forward to any desired track. Again, use your album cover as a guide, if you have one, to speed up your cueing process.

Pause and Cue
To temporarily pause play, press **Play/Pause. II** will flash on the display. Press **Play/Pause** again to resume play. When you wish to cue a track, with the CD player stopped, press **>>I** or **I<<** to select the track you want to cue. Then press **Play/Pause** twice and the display begins flashing (don't be concerned that the disc is spinning, it isn't going anywhere until you release it).

If you wish to cue a track in a programmed sequence, press **Play/Pause** to pause the CD. **II** flashes on the display. Press **>>I** or **I<<** to display the track you want to cue. Then to play the cued track, press **Play/Pause.**

Intro Scan (Introductory Scan)
The Intro Scan lets you listen to the first 10 seconds of each track on a CD. To use IntroScan, press **Play/Pause** to start play. Now repeatedly press **Play Mode** until **INTRO** appears on the display. Scan starts from the first track. To end **Intro Scan** press **Play Mode. INTRO** disappears from the display and the CD player resumes normal play with the current track.

Repeat Play
Your CD will repeat a single track, the entire CD or a programmed sequence continuously. To repeat a single track before or during play, press **Play Mode** once so a circular loop and the number 1, inside a box, appears on the display. At the end of that track, the CD player will repeat the same track. To repeat an entire CD or a series of programmed   tracks proceed as follows. Before or during <u>Regular</u> or <u>Programmed</u> play, press **Play Mode** twice so only the circular loop appears on the display. When the CD player reaches the end of the CD or the end of the programmed sequence, it returns to the first track and re-plays all the tracks.

Random Play
In random play, the CD plays all the tracks once in random order, and then automatically stops. To start a random play sequence while a CD is playing, repeatedly press **Play Mode** until **RANDOM** appears on the display. The player will now randomly select and play all the tracks.

Note: If you select random play during a programmed play sequence, the CD player temporarily stops the programmed sequence and does a random play of all tracks. It then returns to the programmed play and completes it. (In effect, you can set up a double random play for the listeners.)

To cancel random play, press **Play Mode** so **RANDOM** disappears from the display. If you have started random play during programmed play, the CD player re-starts the programmed sequence.

Programmed Play
You can program up to 20 tracks on a CD to play in any order you choose, and you may program the same track to play more than once. Just follow the steps below to program a sequence. (**Note** procedure may vary slightly from CD player to CD player. Use your particular booklet guide.)

(1)   Press **Play/Pause** to turn on the CD player, and then press **Stop**.

(2)   **Within 5 seconds** press **Memory/Time.** The selection number (01) and the track number (00) appear as **MEMORY** flashes on the display in the upper right corner in small print.

(3)   **Within 5 seconds** press either **>>I** or **I<<** to display the number of the first track you want to program.

(4)   **Within 5 seconds** press **Memory/Time** to store the selected track number. The selection number advances by one and the track number on the display returns to 00. **Note:** If you do not press any button within 15 seconds after this step, the CD player automatically turns off and the programmed information will be lost.

(5)   Repeat steps 3 and 4 to program up to 20 tracks. **Note:** If you try to store more than 20 tracks in memory, **FuLL** appears on the display.

(6)   **Within 15 seconds**, press **Play/Pause** to play the programmed sequence. When you do, **MEMORY** lights steadily and the first track in the sequence begins playing.

Note: While the programmed sequence plays, you can use **>>I** or **I<<** to move forward or backward in the sequence. After the last programmed track ends, the CD player automatically stops.

You can repeat the programmed sequence by pressing **Play/Pause within 5 seconds** after the CD player stops. Otherwise, the CD player turns off in 5 seconds and clears the programmed sequence out of memory.

To manually stop the CD before the end of the sequence, press **Stop/Clear.**

Points of Interest on Programmed Play
If you wish to check the programmed sequence, press **Memory/Time** after you stop the CD player. The display shows the number of the first programmed track. Each time you press **Memory/Time**, the display shows the number of the next track in sequence. If you wish to add to the end of a programmed sequence, stop the CD player and press **Memory/Time** until track **00** appears on the display. Then follow steps 3 and 4 again.

HANDLING OF COMPACT DISCS

The following information applies to the general care and cleaning of compact discs.

Your CD player is designed to play compact discs that bear the Compact Disc Digital Audio Logo. Discs that do not carry this logo may not conform to international CD standards and may not play properly. Likewise, some home recorded MP3 discs (CD-R or CD-RW) will not play properly if they are not properly recorded.

Dirty, scratched or warped discs may cause skipping or noise. Take the following precautions:

1)   Handle the disc only by the edges. To keep the disc clean, do not touch the surface of the disc. Body oils are quite damaging to the surface.

2)   Return the discs to their cases after use to avoid serious scratches that could cause the laser pickup to skip.

3)   Do not expose the discs to direct sunlight, high humidity or high temperatures for extended periods. Prolonged exposure to high temperatures can warp the disc.

4)   Do not apply paper on the compact disc. Be cautious if writing anything on either side of the compact disc since some inks could damage the disc surface.

5)   If finger prints get on the disc, they should be carefully wiped from the surface of the disc with a soft, lint free cloth. Unlike conventional records, compact discs have no grooves to collect dust and microscopic debris. Gently wiping them with a cloth should remove most particles and oils. When cleaning, wipe in a straight motion, from the inside to the outside of the disc. Small dust particles and light stains should have no effect on reproduction quality.

6)   Never use such chemicals as record sprays, gasoline, anti-static sprays, thinners or household chemicals to clean compact discs. These chemicals can damage the plastic surface of the disc.

Notes: The disc player will not play a disc that has been inserted upside down.
It may not play discs that do not conform to the Compact Disc Standard.
It may not play discs that are excessively soiled, scratched or fingerprinted.
8 cm (3") discs may be played without an adaptor.

SECTION XIII

CONSOLE WIRING

Inside the console is a two sided circuit board that filters all of the audio to clean up the noise from CD/MP3 players and any extraneous power supply noise so that it will not be fed through to the transmitter and transmitted over the air.

These boards, shown below handle all of the audio signals from the sound sources, feed them through the mixer and out to the transmitter.

(33)
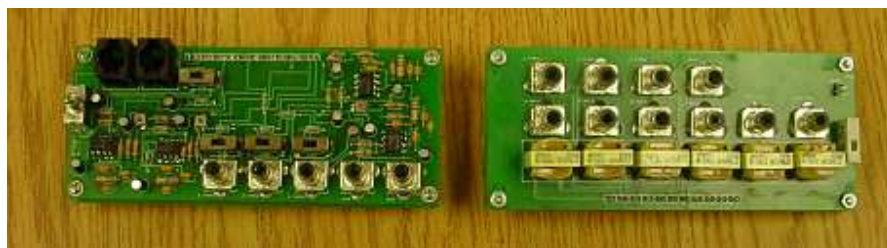
The board on the left faces outward at the back of the console and switches, jacks, and adjustments are accessed through holes drilled in the console deck.

The board on the right faces inward and it is this board that holds all of the plug-in connections and connects everything to the mixer. To the right side of this board is a small circuit breaker switch. The circuit breaker switch replaces a fuse, so instead of having to replace fuses, you simply reset the breaker switch. The red dot on the switch should be visible in order for power to reach the audio board. If the red dot is not visible, reset the breaker, if it pops off again, you have a short somewhere in your DC wiring and you should trace it through, find the short and correct it.

On the back of the console is a decal that corresponds to the required access points on the outward facing board. L1, L2, L3 and L4 correspond to Line 1, Line 2, Line 3 and Line 4 on the mixer. A1, A2, A3 and A4 correspond to the amplifier adjustment points.
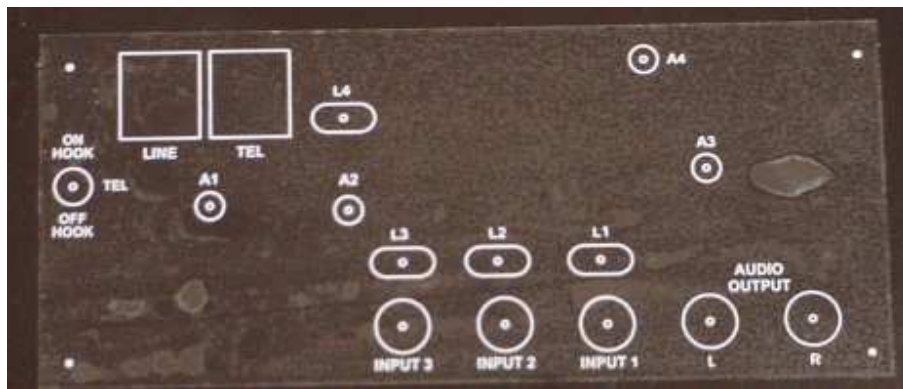
AMPLIFIERS

Adjusting the amplifiers on the console audio board should not be required. However, situations may arise where the audio device feeding into the mixer may be either too high or too low. In this case, adjustment of the amplifiers labeled A1, A2, A3, or A4 may be required. They come from the factory pre set at a middle range and under normal operating conditions should not require adjustment.

Certainly, do not adjust them unnecessarily as this is increased wear and tear on the potentiometer and may lead to amplifier failure.

Adjusting A1
Adjusting A1 controls the level of whatever audio you feed into internal input jack #4. This feeds into line 4 on the mixer. This adjusts the level of the iPod / MP3 player input.

If you move the L4 switch at the back of the console to the left hand position, cutting out the iPod / MP3 player, switching in the telephone line on Mixer Line 4, you will not amplify the telephone line level by adjusting A1 as it is bypassed. Telephone line input levels are controlled by the telephone company. Amplification of the telephone audio is achieved by advancing Line 4 on the mixer the same as it controls the iPod / MP3 player audio level. A1 adjusts only the audio that is connected to internal Jack Input # 4 corresponding to Line 4 on the mixer.

Adjusting A2
Adjusting A2 controls the level of whatever audio you feed into internal input jack #3.
This feeds into Line 3 on the mixer and adjusts the level of whatever audio you feed through internal Line 3, normally the CD/MP3 player located on the console.

If you move the switch at the back of the console (L3 switch) to cut out the console audio source, you will not increase or decrease the audio you have connected to External Input #3 on the back of the console. A2 only adjusts the internal input level from whatever source you have plugged into Internal Input #3.

Adjusting A4
The Internal jack Input 2 audio is not amplified, and is usually the compander audio input. This audio goes directly to the switch and out to Mixer Line 2. Its only amplification is that which is provided by the mixer when you advance the Line 2 slider. However, External Input # 2 is amplified. Adjusting A4 will adjust whatever audio is fed into External Input # 2. It acts as a back-up position for External Input # 1, if required. The signal can be further amplified by the mixer amplifier as controlled by the Line 2 slider control.

Adjusting A3
Internal Input # 1 is also not amplified. This is a spare input and is normally not in use unless you wish to connect a sound source to it. If Switch L1 is in the left hand position, to activate External Input 1, then whatever audio is connected to External Input 1 will be affected by A3. Therefore, External Input 1 can be used to connect any external audio source or used as a back-up input for External input # 2. You may wish to connect your computer input here. Computer sound boards vary in maximum output level; some put out a better signal than others. For that reason, this External input is amplified to accommodate computer input.

Normally these four levels are factory adjusted and should not need further adjustment. Constant toying with level adjustment means other operators on the station are never sure of what the levels should be and in addition it creates wear and tear on the potentiometers which can lead to malfunction over time.

Below is a block diagram which illustrates the above connections.
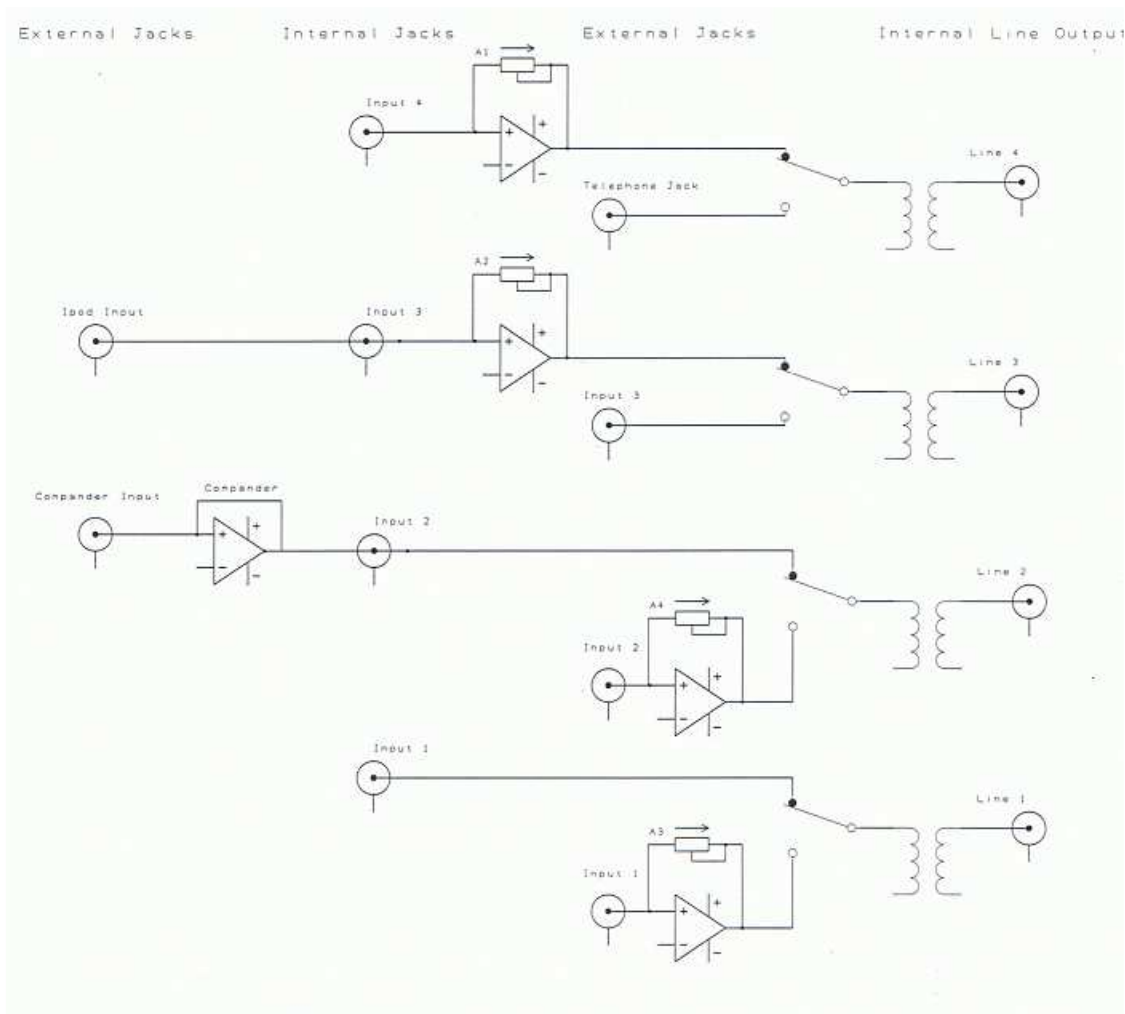
CONNECTION CHARTS

Internal Audio Connections
Input 1 – Spare (non-amplified)
Input 2 – Compander (low amplitude)
Input 3 – CD/MP3 (amplified)
Input 4 – iPod/MP3 player (amplified)

External Audio Connections
Input 1 – Amplified (normally PC)
Input 2 – Amplified
Input 3 – Non-amplified
Input 4 – Telephone input (non-amplified)

Note: The Internal Audio Connections refer to side of the circuit board inside the console. The External Audio Connections refer to the side of the audio board accessed from the back of the console. On the inside of the console are connection charts like the above showing where each connection goes. If something falls out in transit you should have no problem re-connecting.

COMPANDER

In the above block diagram we have shown Internal Input 2 as having a compander connected to it. A compander is device that compresses and expands the dynamic range of an audio signal. Hence, the abbreviation "compand". This is an ideal device if you are re-broadcasting a received radio signal that may be alternately strong and weak, such as the re-broadcast of national short wave radio events or radio messages during periods of emergency. The compander has a degree of amplification in it and can be used in conjunction with Internal Input 2 or Internal Input 3 as may be required. It is a simple matter of connecting it into the audio circuit in series with the RCA connectors provided.

THE TELEPHONE CONECTION

The telephone connection on the back of the console is normally not in the circuit. To place the telephone into the console circuitry you must slide the switch L4 to the left hand position. This will remove the iPod / MP3 player from the circuit and place the telephone line in the circuit and responsive to Line 4 on the slider.

The telephone line should be connected from the wall into the left hand telephone jack as you face the back of the console. The telephone should be plugged into the right hand jack. (If these are reversed it will still function as they are in parallel).

With the switch in the upward position, the telephone is "on hook" which means it is hung up in the normal position a waiting telephone is in. When it rings, the operator may pick up the telephone hand set and move the toggle switch on the phone line down to the off hook position. If you then advance Line 4 on the mixer, the normal conversation between the announcer and the call-in participant will be broadcast over the air.

When the conversation is finished, the telephone should be returned to the telephone cradle and the toggle switch on the console returned to the upward position, "on hook".

The telephone input level will not be affected by adjusting A1. The telephone input level is controlled by the telephone company. A1 adjustment changes only the amplification on the iPod / MP3 player, if required.

SECTION XIV

POWER BOARDS

There are two power boards in the console. The one on the left has a circuit breaker switch the same as the audio boards. The red dot must be visible for power to flow. This board has 5 tap off points (2 for 12VDC; 2 for 6VDC; 1 at 4.5VDC and 1 at 1.5VDC). It is the primary power board for the console.

The second board on the left is intended to provide 12VDC; 9VDC; 6VDC; and 5VDC to power any auxiliary systems you might choose to use. It is there simply to eliminate the need for stocking batteries and allows you to use your primary system to run other low voltage devices.

SECTION XV

COMPUTER OPERATED PROGRAMMING

The computers supplied by International Broadcast Transmitters are an optional item. Many communities or groups will use one of their existing computers to handle their programming. Likewise, the choice of software that is used will vary from location to location.

If you have opted for us to supply your computer, it will come to you with an MP3 recording software application (such as Audacity, which will allow audio recording and editing of segments) as well as an MP3 playing software application installed (such as Winamp, which will allow you to generate playlists or play individual files).

SECTION XVI

TRANSMITTERS

Operating the Transmitter

When you come on for your shift, particularly if you are doing the opening broadcast, you should come early enough that you can conduct a few tests and checks to satisfy yourself that everything is working.

<u>Ensure the antenna is connected prior to connecting the power cables.</u> Connect the transmitter to the power supply. Turn on the transmitter by switching on the power supply.

The DC power lights will come on. The PLL Unlock light will come on, flicker, and after three seconds, go out. The PLL Locked light will come on, flicker and lock in. The Drive Power light will come on, and then the Output Power light will come on, indicating that the transmitter is outputting RF power.

If the transmitter does not lock in, contact the technician or follow the steps as outlined in the Technical Manual that accompanied the Transmitter.

Assuming your transmitter comes on and locks in properly, return to your console, introduce your programming and start your first piece of material. Monitor your signal off-air with a radio receiver to make sure your signal is clean and clear.

It is important that you keep the area around the transmitter clear of all objects that might block the airflow from the fan that cools the transmitter. Never place books, papers or any other objects on the transmitter while it is operating. These items act as a thermal blanket and can cause the transmitter to overheat.

SECTION XVII

ANTENNAS

Typically, your transmitter will come with a stacked dipole antenna. The instructions for assembling the antenna are included in the transmitter manual. It is imperative that you get the spacing correct and that the antennas be placed directly above one another as shown.

These antennas are omnidirectional, which means that they radiate equally well in all directions and it does not matter what direction you have the booms on the antennas facing.
When the cable is brought into the building, ensure there is a loop that goes down below the entry point, so rain water running down the cable will not run into the building and short out the transmitter. This loop is called a drip loop. Visually check your antennas daily.

SECTION XVIII

CONCLUSION

Congratulations on concluding a very compressed and intensive course on both the equipment and the operating techniques required to have it perform at maximum efficiency.

Some of the procedures may appear a bit confusing at first, but with practice will come perfection.

Please retain this workbook as a reference tool along with all the notes you made in the process. It will help you over the frustrating parts and serve as a backup training tool for new replacement workers.

Please practice the following equipment care:

Keep the equipment dry at all times;

Do not handle the equipment roughly;

Avoid temperature extremes on the equipment;

Keep the equipment clear of dust and dirt;

Clean with a damp cloth. Do not use chemical cleaners.