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THE WRSU CONSOLE ENGINEER'S HANDBOOK

LIMITED EDITION

D. RESSLER '60

CONTAINING ONLY BASIC INFORMATION FOR APPRENTICE ENGINEERS, PLUS HELPFUL DIAGRAMS AND ILLUSTRATIONS

SEPTEMBER 1958

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Limited Edition

Apprentice Engineers are responsible for all material contained in the first section of this book.

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THE ENGINEER - STATUS AND QUALIFICATIONS

Engineering at WRSU is an art, not just a technical manipulation. The thrill of doing a good job of engineering comes only from knowledge and experience. This manual is prepared as a basis for the knowledge; the experience is up to you.

Engineers are divided into three classifications according to proficiency:

3rd Class: Apprentice Engineer - knows bare operating essentials, uses this as a basis for gaining experience toward advancement.

2nd Class: Qualified Engineer - is fully acquainted with all normal control room practices, broadcast procedures, and studio equipment. Can be relied upon to handle all normal situations smoothly.

1st Class: Master Engineer - Has full knowledge and familiarity with all procedures and equipment, plus special knowledge of emergency and seldom-used circuits. Can handle any engineering situation which arises.

This manual is divided into four sections, one covering the necessary material for each class of engineer and a fourth section containing helpful information and other notes. The red-covered editions of this book contain only the first section plus certain helpful diagrams. The complete editions have black covers.

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NON-TECHNICAL RESPONSIBILITIES OF CONSOLE ENGINEERS

1. Console Engineers are responsible to the Chief Operating Engineer at all times, and are immediately responsible to the Studio Supervisor while on duty.

2. Studio Supervisors cannot be worried about whether an engineer is going to show up or not. An engineer is to appear for duty sufficiently before his assignment begins to assure all concerned of his presence at the proper time. Fifteen minutes is considered sufficient.

3. The Chief Operating Engineer must be notified of any forthcoming absence at least three days in advance so a replacement can be made. In the event of a last minute emergency, the Studio Supervisor must be contacted immediately. It is very difficult to contact people quickly, especially replacement engineers.

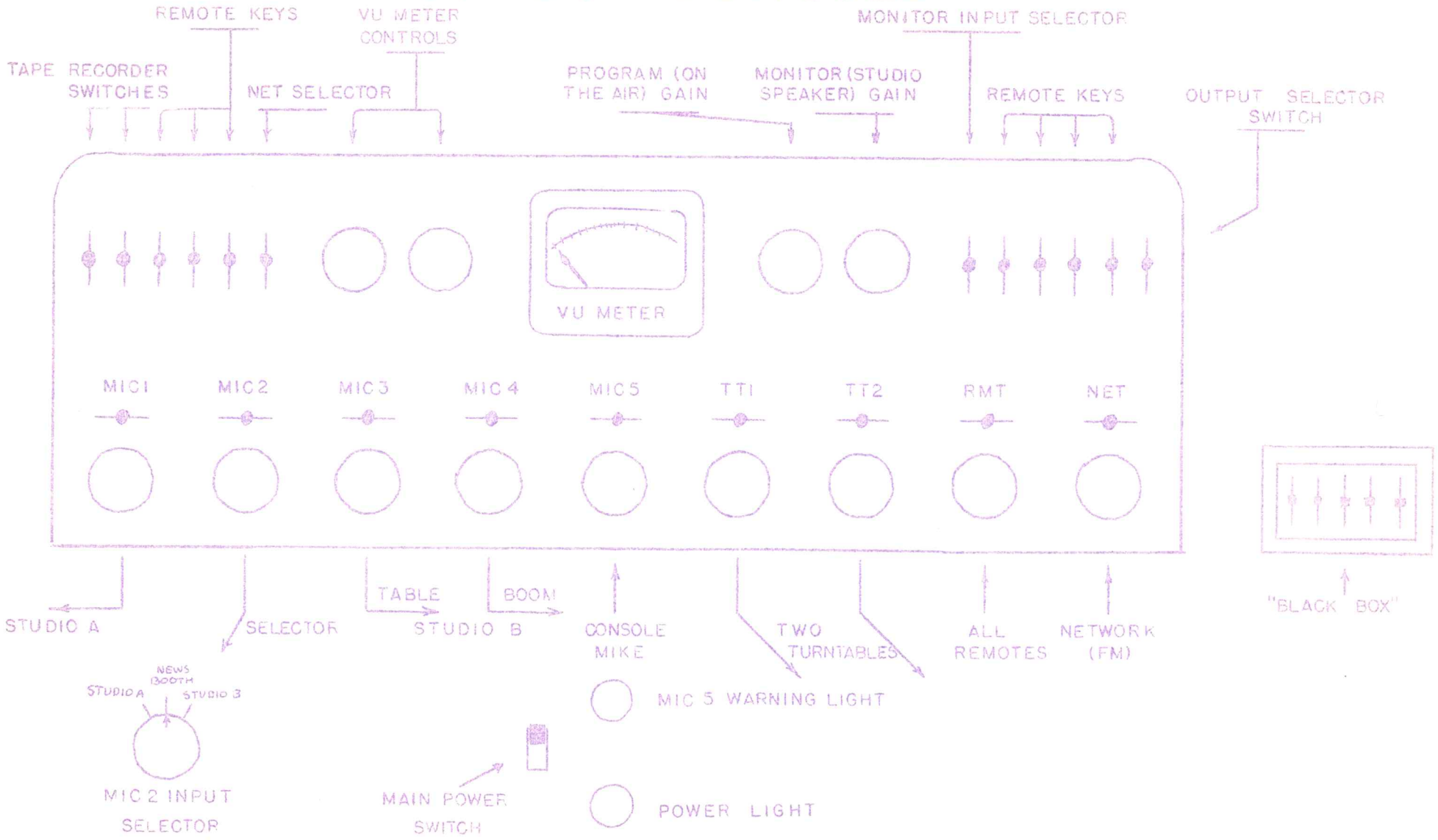
4. Console Engineers are held strictly accountable for timing. Beginning and ending shows on time is of utmost importance. This may be hard to see at first, but a little experience reveals that to ignore timing is extremely detrimental to the station in many ways. Shows must begin and end on time, and Console Engineers are instructed to cut off any show running over. NOTE: COMMERCIALS ARE EXCEPTED - commercials and station breaks are not to be interrupted.

5. Any material in obviously poor taste must be cut by the engineer as quickly as possible. Disk jockeys AND engineers will both be held accountable for obscene or off-color jokes, language, or records.

6. The program log is on a clipboard on the wall behind the engineer. It is to be signed in the proper place by the engineer on duty - the one who actually does the show. That means if anyone takes over for ANY length of time, his initials must appear on the log also. Failure to do this will result in inconvenience to several people, the engineer included.

7. Some commercials are recorded, and some involve a mixture of recorded and live segments. The engineer must familiarize himself with the exact procedure for commercials involving tapes or records BEFOREHAND. A commercial means money, and we can't afford to take chances.

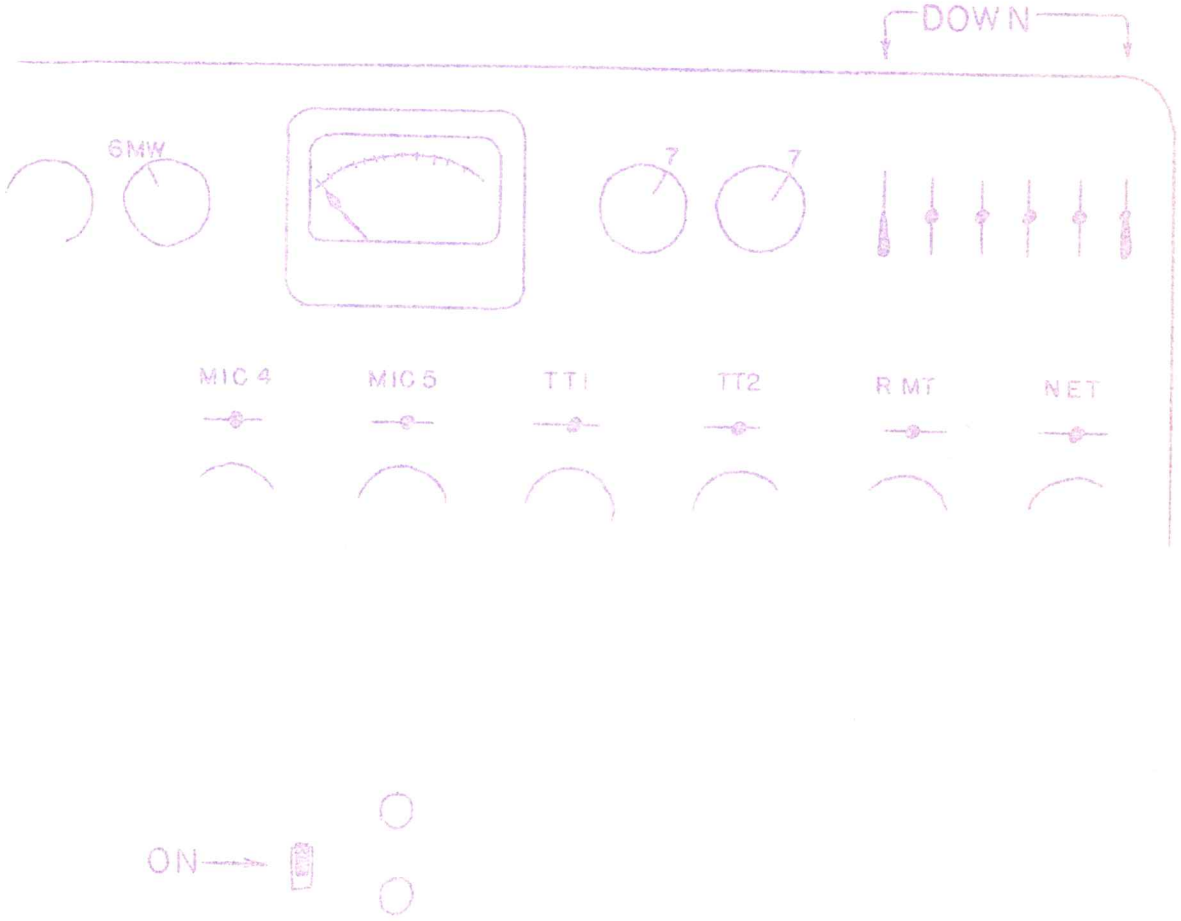
WRSU CONSOLE



SETTING UP THE CONSOLE FOR NORMAL OPERATION

OPERATION	FUNCTION AND NOTES
a) Turn on main power switch	a) Turns on power to all equipment used in studio broadcasting.
b) Turn PROGRAM gain to 7	b) Controls on-the-air volume.
c) Turn MONITOR gain to about 7	c) Controls volume of loudspeakers in the studio.
d) Push monitor input selector down to PRO	d) Connects studio loudspeakers to the program (on-the-air) line.
e) Push output selector switch down to PRO OUT	e) Selects correct console circuit for going to transmitter lines.
f) Set VU meter range switch to "6 MW"	f) Calibrates VU (Volume Unit) meter to correct output range.

CONSOLE SET UP FOR NORMAL OPERATION

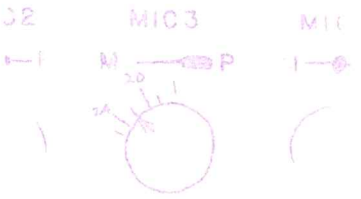


BRINGING IN A MICROPHONE ON THE CONSOLE

Microphones are controlled by the first five knobs on the left of the console. The OFF position of the knob is completely counterclockwise, where the dial says ∞. The dial calibrations are in decibels (db) attenuation. The less attenuation, the louder the signal.

OPERATION	FUNCTION AND NOTES
a) Select proper microphone control	a)
b) Set microphone gain control at proper number - about 22 is good for a start.	b) This setting varies depending on the characteristics of the mike, the studio and the announcer. Try to get to know what to expect from individual announcers with whom you work, thus avoiding blasting listeners out of their chairs.
c) Flip MIC switch (above gain control) to the right (—) to the P (PROGRAM) position	c) This switch does the actual connecting. It also automatically turns on a warning light inside and outside the door of the proper studio. In addition it turns off the loudspeaker in the studio to avoid feedback.
d) Watch the VU meter on the console. The needle should never go above 80 for voice.	d) Failure to watch this results in an "amateurish" sound on the radio - the voice is either too loud or too soft, and it forces the listener to continually readjust his radio. "Bending the needle" also causes distortion of the sound and in addition ruins the VU meter.

MICROPHONE CONTROL SET UP FOR OPERATION



SPECIAL INSTRUCTIONS CONCERNING MIC 2

MIC 2 control serves three different microphones, depending on how the mic 2 input selector switch on the panel below the console is set. The MIC 2 control on the console will control either an auxiliary microphone in Studio A, the mike in the News Booth, or a mike in Studio B, depending on how the selector switch is set. It is usually left in the NEWS BOOTH position.

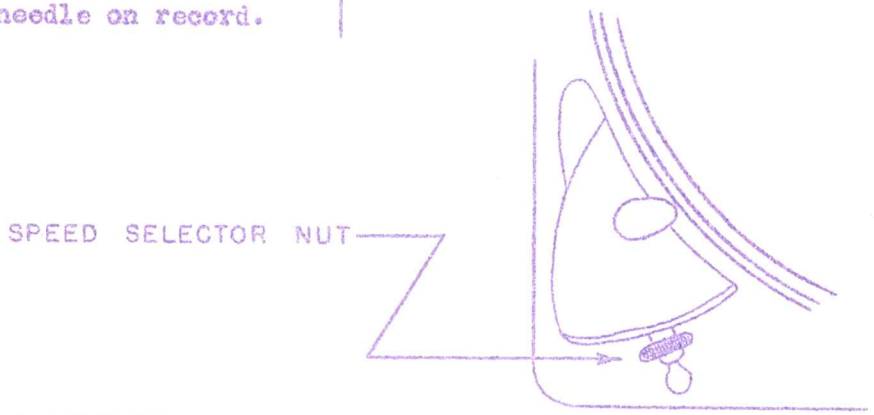
The selector switch also controls the proper loudspeakers and warning lights in the studios.

PLAYING A RECORD

1. OPERATING THE TURNTABLE

There are two turntables, designated on the console as TT1 and TT2. They are provided with a cue system so a record can be started at the proper instant. The turntable motor is turned on automatically when the proper gain control is turned up.

OPERATION	FUNCTION AND NOTES
a) Loosen speed selector nut and adjust up or down to select proper turntable speed. Push assembly against turntable and tighten nut.	a) NEVER forget to check speed before playing a record. Playing an LP at 45 RPM is embarassing for announcer and engineer both USE TWO HANDS!
b) Place record on turntable	b) ALWAYS handle records by the edges, taking care not to touch the groves with your fingers.
c) Select correct needle on pick-up arm	c) The wrong needle on a record harms the record and seriously impares the quality of the music. NOTE: 16 INCH TRANSCRIPTIONS ARE PLAYED WITH A 78 NEEDLE AT 33 1/3 RPM. "Thesaurus" disks use a regular LP needle.
d) Set needle on record.	



2. CUEING A RECORD

e) Put on earphones and push intercom button marked "CUE"	e) Turntable gain control must be in OFF position.
f) Put finger on record label and, using as little pressure as possible, turn record by hand until beginning of record is heard in phones	f)
g) Turn record backwards until very beginning of music is heard, then continue back for another half turn (3/4 for 78)	g) This allows turntable to come to full speed before the music begins. There are actually many different ways to cue a record, and a little experience helps each find his own way. Watch other experienced men and practice.

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3. STARTING THE RECORD

h) Put switch above proper turntable control on console to P (Program) as you did with the mic switch.	h) This does not put the pick-up on the air, of course, because the gain control is still turned off. This switch is therefore usually left in this position.
i) When time to start record turn gain control up to proper position - usually about 18	i) Feel the control click as you turn it up - this is the switch that turns on the turntable motor. Readjust record gain when music starts if necessary.

4. ENDING THE RECORD

j) Turn gain control all the way off until it clicks. Overcome tendency to make jerky movement.	j) Note that you don't have to put TT switch from P (Program) to neutral position.
k) Replace record in jacket	k) Never leave naked records lying around - they just can't take it. Always use inner paper or plastic jackets with the LPs.

Sometimes a disk jockey will ask for a fade-out, or will want to talk over the music. Be ready to do this for him. Use your good judgement for the relative volumes of voice and music.

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PLAYING A TAPE

Apprentice engineers are responsible for basic operation of both tape recorders...see instructions in rear.
Rack-mounted Magnecorder is designated TR1, portable Ampex TR2.
~~Apprenti~~

1. CUEING THE TAPE

OPERATION	FUNCTION AND NOTES
a) Make sure tape recorder is off the air	a) This means at least one of the controls used to put the recorder ON the air is turned OFF. DON'T FORGET THIS!
b) AMPEX: remove earphone plug from intercom and insert in monitor jack in Ampex recorder. Put input selector on recorder to TAPE. MAGNECORDER: push speaker button in to the ON position.	b) MAKE SURE RECORDER IS IN PLAYBACK POSITION!#
c) Adjust tape back and forth until first sound on tape is just ready to be heard.	c) This adjustment is similar to cueing a record.
d) Return earphone plug to intercom, or pull speaker button out to OFF position	d)

2. PLAYING THE TAPE

e) Put proper tape recorder switch (at far upper left of console) down to PLAYBACK	e) This selects which tape recorder will go on the air.
f) Put switch above RMT gain control to the P (Program) position.	f) It doesn't matter at this point if the RMT gain is turned up, since the tape is not yet moving. Therefore this switch can be thrown anytime before the tape is started.
g) Turn up RMT gain to proper position - about 24.	g) Once again, MAKE SURE RECORDER IS IN PLAYBACK POSITION! You'll ruin the tape if it isn't.
h) At proper time, start machine.	

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(For what to do when the tape is finished, turn the page.)

3. WHEN THE TAPE IS FINISHED

1) Turn off either the RMT gain control or the switch above it. DO NOT TURN OFF THE RECORDER FIRST!	1) If the recorder is turned off first, you might hear the tape coasting to a stop - very unprofessional.

Be ready to fade down or under just like with a record.

BRINGING FM THROUGH THE CONSOLE

FM is brought through the console at the beginning and end of each session of broadcasting at the studios. The FM set is located in the rack behind the console, and need never be touched by the engineer.

OPERATION	FUNCTION AND NOTES
a) Put NET selector switch up to NET 1	a)
b) Put switch above NET gain control to P (Program)	b)
c) Turn up NET gain control to the marked position	c) The marked position is calibrated to equalize the FM volume for the "switchover" (see next page).

BEGINNING AND ENDING A BROADCAST DAY

During the hours WRSU is not broadcasting from its own studios, concert music from FM is rebroadcast. When the engineer arrives to begin a broadcast session, the console is turned off and the FM set is connected directly to the outgoing lines.

1. TO PUT THE CONSOLE ON THE AIR:

OPERATION	FUNCTION AND NOTES
a) Set up console for normal operation and bring in FM on NET 1	a)
b) On "black box" to right of console - second switch from left (solid yellow) - throw to upper position	b) This breaks the direct connection of the FM to the transmitters and connects the console to them. This means as soon as you throw the switch, the console is on the air. Do this during a pause in the music - there will be a "dead" space if you do not.
c) When time to begin broadcasting, fade out FM with NET gain control and proceed with regular programming	c)

NOTE: When the intercom button marked "PRO" is pushed, the earphones tell you what's on the air. If the music in the earphones stops as you throw the switch, you have done something wrong. Throw the switch back and recheck your work.

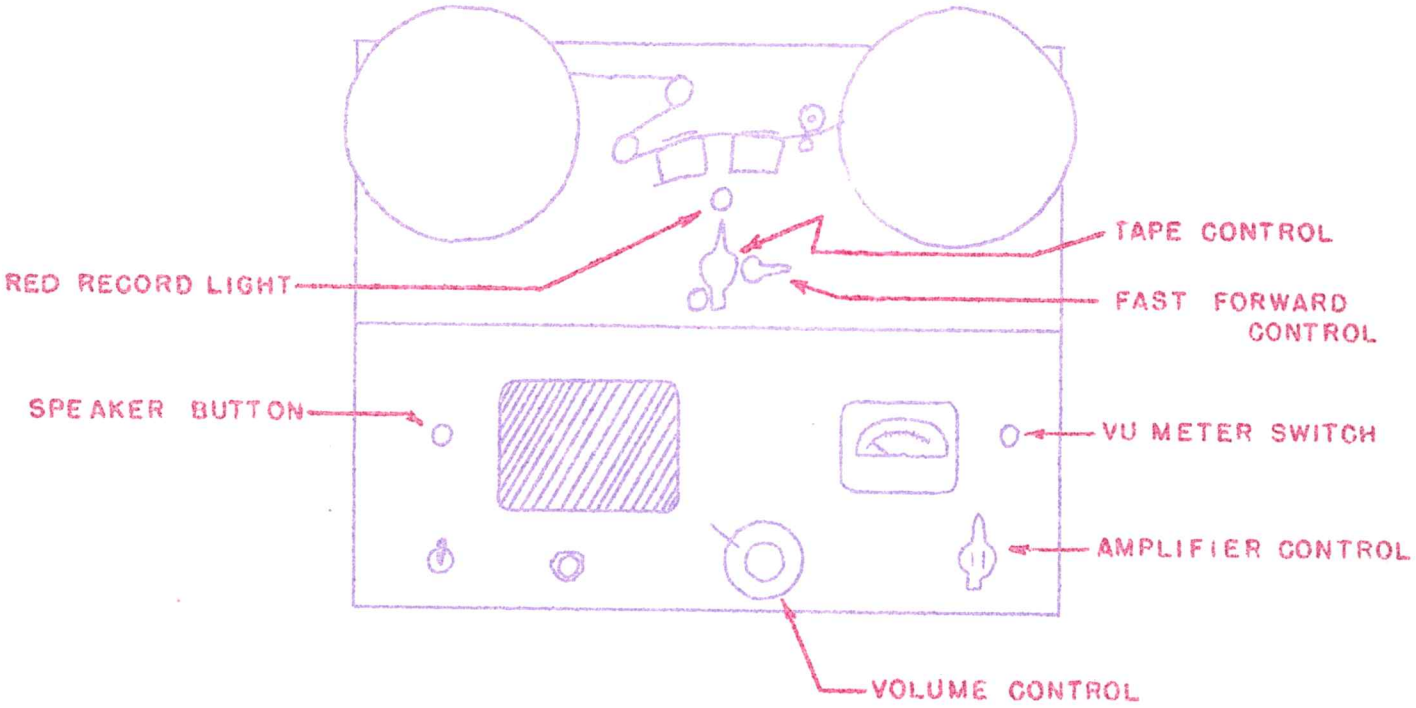
2. TO TAKE THE CONSOLE OFF THE AIR AND TURN IT OFF:

Follow reverse procedure. When turning off console, turn all knobs and switches to the "OFF" position. IMPORTANT - BE SURE TO TURN OFF VU METER RANGE SWITCH BEFORE THROWING MAIN SWITCH OFF! If the meter is left on, a temporary surge of current as the console is turned off can damage the meter.

STUDIO TAPE RECORDERS

1. NOMENCLATURE

TR1 - THE MAGNECORDER

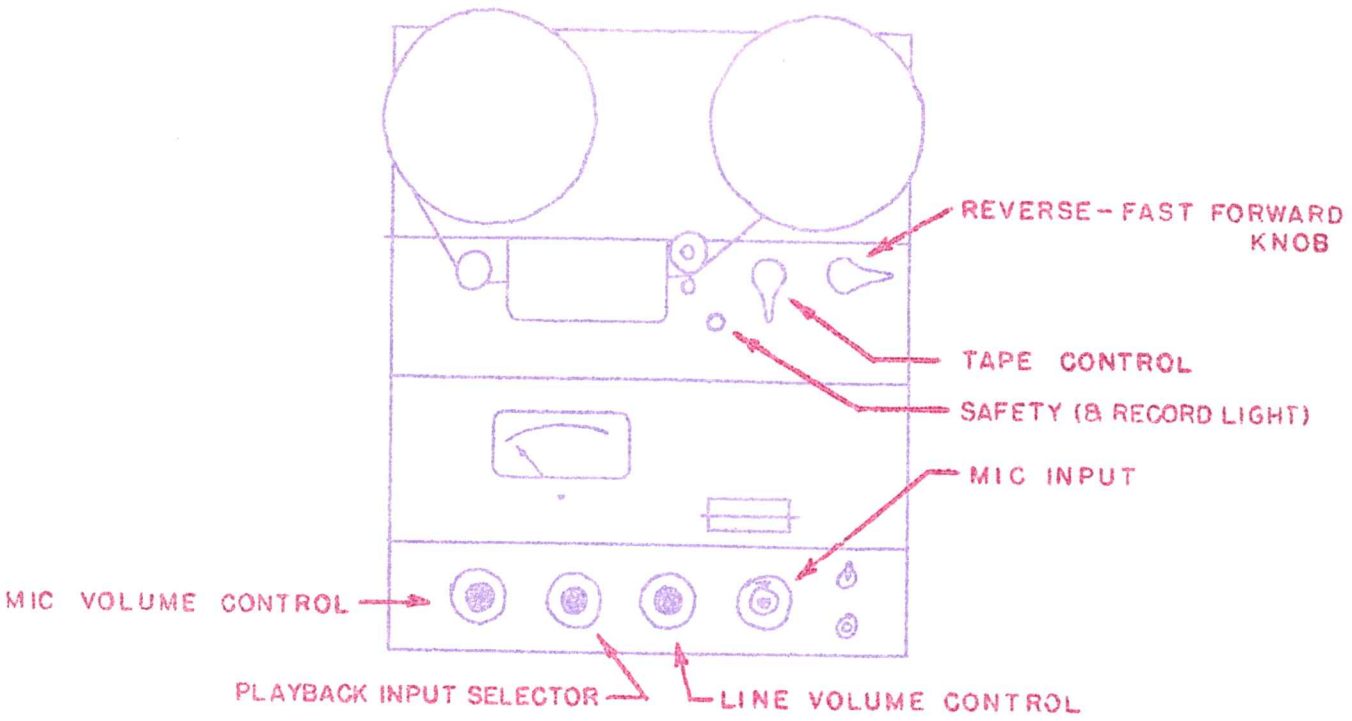


Functions of the Various Controls

TAPE CONTROL - controls tape movement forward, stop, or rewind
SAFETY - must be pushed in before tape control can be put in forward position
FAST FORWARD KNOB - moves tape forward quickly...when tape control os off.only
RED RECORD LIGHT - lights when maching is recording only
AMPLIFIER CONTROL - sets amplifier for record or playback. Amplifier position is seldom if ever used
VOLUME CONTROL - leave this set at indicated mark
VU METER SWITCH - connects machine's VU meter when pushed in. Left in OFF (out) position when recording

SPEAKER SWITCH - turns on machine's speaker when pushed in. Usually used only to cue tape

TR2 - THE AMPEX



Functions of the Various Controls

TAPE CONTROL - makes tape go forward for recording or playback
SAFETY - will not allow tape control to be put in RECORD position unless it (the safety) is pushed. Lights up when machine is recording
REVERSE - FAST FORWARD KNOB - works only when tape control is in OFF position
PLAYBACK INPUT SELECTOR - The ampex has two amplifiers, one for recording, the other for playback. This knob controls the input of the playback amp and Ampex VU meter.
LINE VOLUME CONTROL - controls recording volume when recording from line from the console
MIC VOLUME CONTROL - controls volume for recording of anything plugged into mic input. Always make sure this is off when not in use or you'll get hiss
MIC INPUT - used when machine is used outside the studio

2. PLAYING A TAPE *

OPERATION	FUNCTION AND NOTES
a) Thread tape on machine	a) See diagram
b) MAGNECORDER: put amplifier control to PLAY. Set volume control to marked position AMPEX: set playback input selector to TAPE **	b) Check this each time,. If you miss, you'll ruin the tape.
c) When time to play tape: MAGNECORDER: push in safety and put tape control on FORWARD. AMPEX: do NOT push in safety. Put tape control to PLAY.	d) NOTE: If Ampex doesn't play and all controls have been checked, make sure all plugs on the side of the machine are pushed in all the way.

* Describes mechanical operation only. See instructions in first section for electrical details.

If you know on which machine the tape was recorded, try to play it back on the same machine.

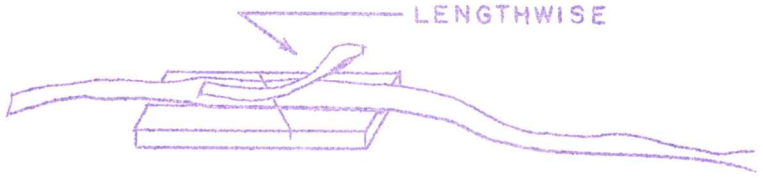
** Output during playback is independent of volume control settings, but does go through playback input selector

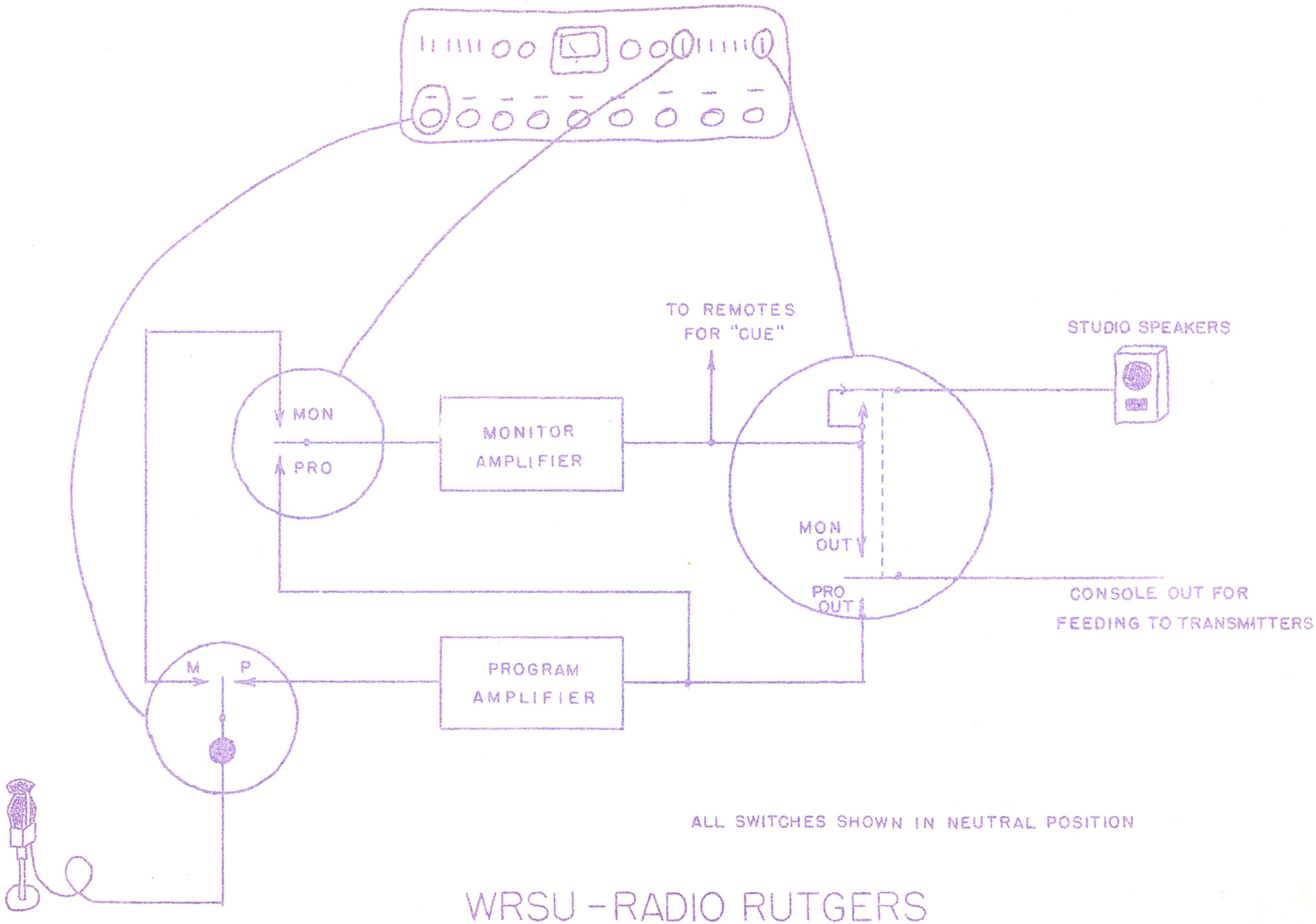
SPLICING RECORDING TAPE

There are hundreds of ways to incorrectly splice recording tape, each completely unsatisfactory from many standpoints. A good splice is easy to make, and will hold up as long as the tape itself. A good splice is also undetectable to the listener.

If a tape breaks while being played on the air, the machine should be rethreaded and the program continued. The tape should be repaired as soon as possible after the remainder of the tape has been played. In NO case is the tape to be returned to storage with an unrepaired break in it.

OPERATION	FUNCTION AND NOTES
a) Overlap the two broken ends of the tape in the aluminum tape splicing bar so that both tapes are over the diagonal slit.	a) Overlap as little as possible to avoid wasting tape.
b) Cut the two ends with a razor blade, using the diagonal slit as a cutting guide.	b) A diagonal splice prevents a "pop" as the splice passes through the machine.
c) Cut off about 1½ inches of splicing tape (on the thin white spool) and lay it lengthwise across the splice.	c)
d) Smooth splice and remove from bar.	d) Make sure splicing tape does not go outside the edges of the recording tape, or it will become sticky.

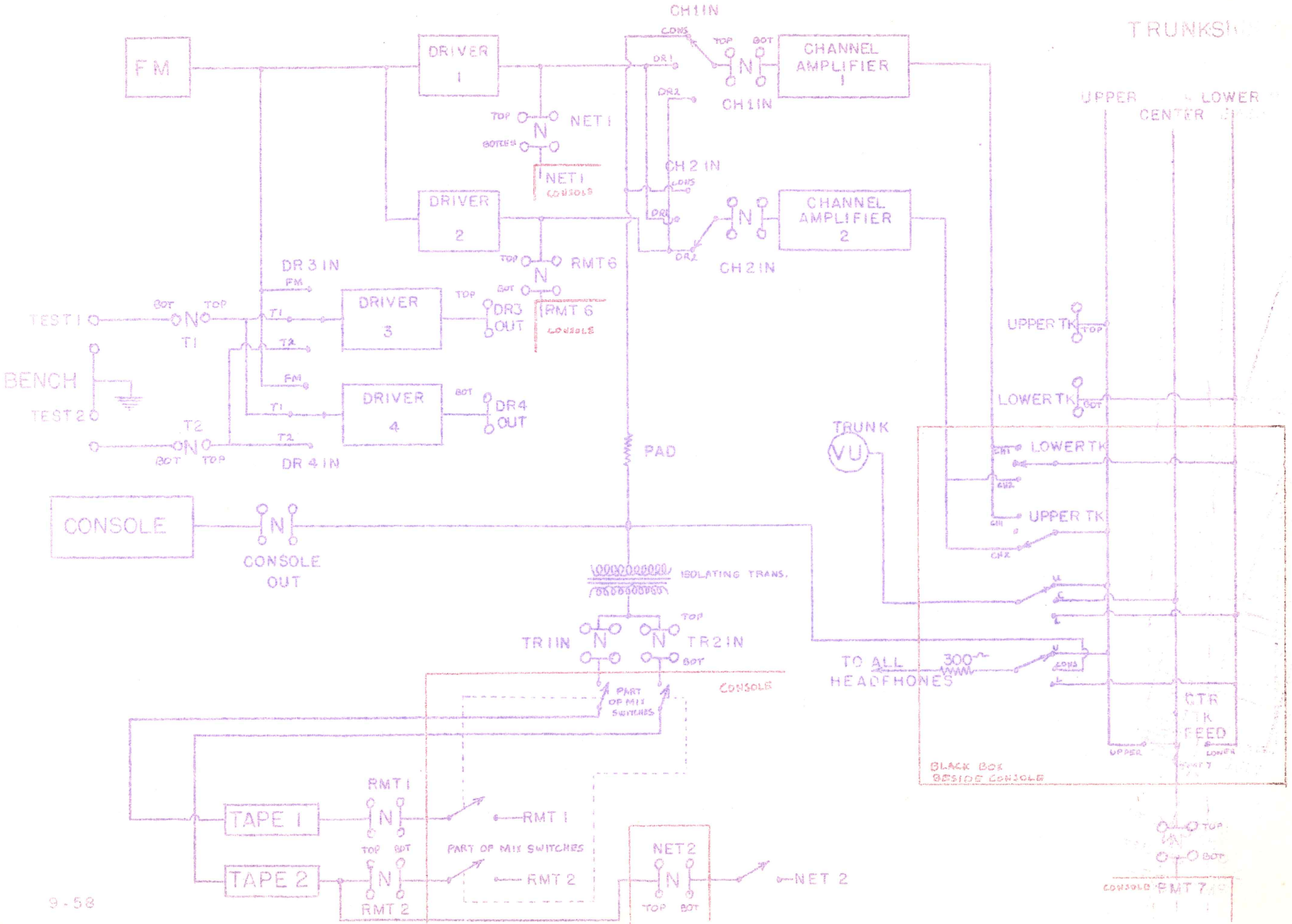




WRSU - RADIO RUTGERS

CONSOLE SWITCHING

WRSU-RADIO RUTGERS —— STUDIO SWITCHING



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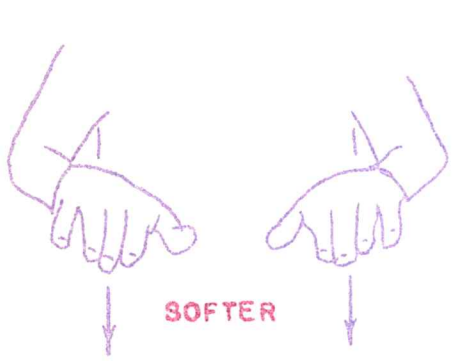
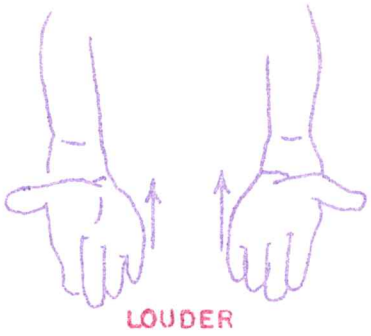
HAND SIGNALS

Hand signals are an important means of communication between engineer and announcer. Here are a few of the more important ones:

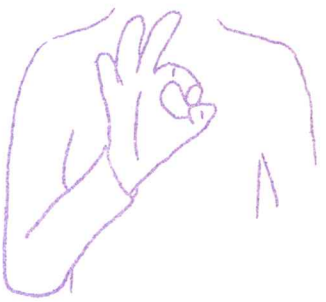


SOFTER



LOUDER

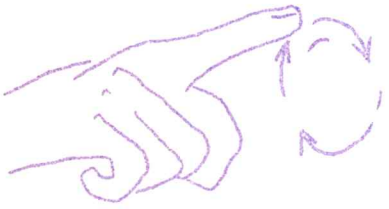
PERFECT →



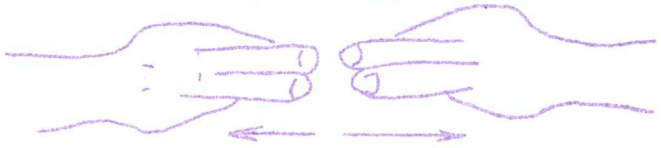
CLOSER TO MIKE

FARTHER FROM MIKE

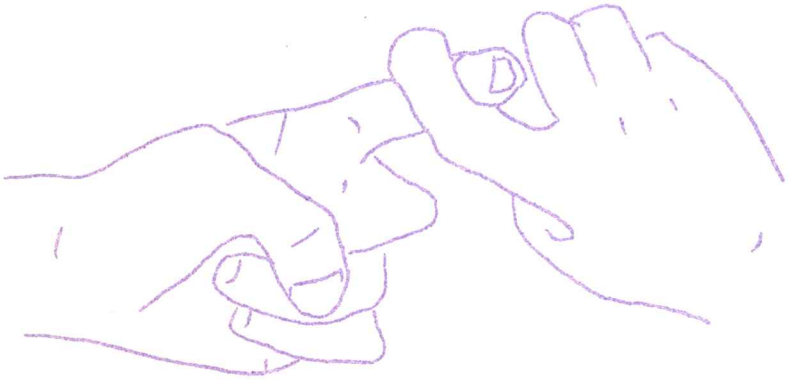
SPEED UP



STRETCH IT - SLOW DOWN



CUT - STOP →



SEGUE (SĀ'·GWĀ) - GO RIGHT ON WITH NEXT RECORD, TAPE, ETC.

ON THE NOSE - ON TIME

TRANSMITTERS

WRSU's signal reaches the students via between 10 and 20 individual transmitters located in various dormitories and fraternities on campus, including Douglass. The signal from these transmitters is carried by the electrical power circuits from each area. The signal does not stray far from a transmitter because it is blocked by transformers in the power line. This is fortunate, because WRSU is not licensed by the Federal Communications Commission, and it is necessary that the signal be so bounded.

Before the Fall of '58, each transmitter tended to interfere with all the others because they were not all on exactly the same frequency. Distortion and peircing whistles interfered with reception in many areas. This problem plagued the technical staff since WRSU first begun broadcasting in 1948. However, during the years '56-'57 and '57-'58 members of the Technical Department (Charles Molnar '56, Don Malpass '58, George Scherer '58, Dick Allen '59) devised an ingenious system which did away with this "beat" by synchronizing the carrier frequency of all the transmitters.

Basically, the system works like this: the sixteenth sub-multiple of 680 kc. (42.5 kc.) is generated in the studio by an extremely accurate crystal-controled oscillator. This basic frequency is sent along th[illegible]nsmitter lines along with the voice signal. When it reaches [illegible]ransmitter it is separated and multiplied by 16 in a speci[illegible]quency-multiplying circuit. It is then modulated and sent [illegible]wer lines, thence to the listener's radio. It follows [illegible] each [illegible]nsmitter is in perfect synchronization with all the others.

INDIVIDUAL TRANSMITTER SET-UP