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Drawings:

- C-77721 - Schematic - 10 Watt Monitor Amp. for M5548 Power Deck
- D-22127 - Schematic for M5548C Power Deck Assembly.
- C-77729 - Relay Mod. Wiring Info. Mon. Supply & Pwr. Supply
- B-65309 - Muting Wiring On Key Switches. Relay Deck
- B-65304 - Schematic for M5567 Cue Amplifier.
- B-65305 - Wiring for Switches, S-4, S-5, & S-6.
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- B-65310 - Schematic, Monitor Booster Amplifier.
- C-19446 - Schematic Program Amplifier.
- C-77600A - Functional Diagram.
- C-77915 - Terminal Wiring For Added Pre-Amps. & Matching Transformers.
- M-5215 - Pre Amp Instruction Book.

M5526 YARD CONSOLE

SPECIFICATIONS

1. Microphone to Regular Program Line Out

GAIN: 103 db, \pm 2 db @ 1000 cycles.
RESPONSE: \pm 1.5 db from 30 to 15,000 cycles.
DISTORTION: 1% or less, from 30 to 15,000 cycles
@ \pm 8 dbm output.
NOISE: 60 to 65 db below \pm 8 dbm output with -60 dbm input.
The equivalent noise input is -120 dbm or better.
CROSSTALK: Below noise level with normal levels and control positions.

2. Remote, Tape, Net, and Turntable Inputs to Regular Program Line Out.

GAIN: 60 db \pm 2 db @ 1000 cycles.
RESPONSE: \pm 1.5 db from 30 to 15,000 cycles.
DISTORTION: 1% or less, from 30 to 15,000 cycles
@ \pm 8 dbm output. 1½% or less, from 30 to
15,000 cycles @ \pm 18 DBM output.
NOISE: 70 to 75 db below \pm 8 dbm output with -10 dbm input.

3. Monitoring Amplifier

GAIN: Approximately 130 db from microphone to Monitor out.
This can not be adjusted above 105 db gain without
the possibility of oscillation.
RESPONSE: \pm 2 db from 50 to 15,000 cycles.
DISTORTION: 1% or less from 50 to 15,000 cycles @ \pm 40 dbm
output (10 watts)
NOISE: 62 db below \pm 40 dbm output with -10 dbm input to
remote position in (channel control position 8).

4. Power Requirements

PRIMARY POWER: 105/125 volts, 50/60 cycles, 130 watts.

5. Mechanical Specifications

CONSOLE: Length - 36", Height 5-3/4", Depth - 12½".
POWER DECK: 7 X 19 Panel
Overall Depth 8".

INTRODUCTION

The M-5526 Yard Console is a simple, straight forward console providing the ultimate in fidelity and functional design. It fills the need for most program requirements, broadcasting, recording, or any installation requiring the finest quality speech input system. See functional drawing C-77600.

Facilities include three microphone channels (as many as five addition microphone channels can be provided). Each of these three channels has a switch selecting one of two microphones. This provides inputs for six microphones.

The console includes five high level channels. Channel 4 is a 150 ohm unbalanced utility circuit. Channel 5 is a 150 ohm unbalanced input circuit for a tape recorder. Channel 6 and 7 are both turntable inputs (150 ohms unbalanced). Channel 8 provides a balanced 600 ohm input for network, or one of the two remote lines.

There is a three position switch on each of the two remote positions. Monitoring the remote line on the built-in cue amplifier speaker is possible when this switch is in the center position. The other two positions are for feeding program cue to the remote line and for feeding the remote line into the channel mixer.

The two turntable inputs have cue type faders. The turntable is connected to the built-in cue amplifier, when the fader is set in the cue position. There is a gain control on the panel for the cue amplifier. The speaker is in the lid under the louvers on the left side.

The console has an audition channel so that any of the input circuits can be previewed or checked independent of any circuits used on the air. There is a monitor input switch on the panel to select between the program and audition channels.

Other controls on the panel include the monitor gain on the left and the master program control on the right.

There are two headphone jacks on the right side. The upper one is for monitoring the network line. The lower one is for monitoring the program.

The power supply, monitor amplifier and speaker muting relays are on a separate power deck.

All connections to the console are made through terminal strips on the back of the console.

Two speaker muting relays are provided. They can be connected to the six microphone inputs to mute either of two speakers. These would probably be the control room and studio speakers.

This introduction has touched on some of the more important points of the console to give general information without excessive details. Those concerned with daily operation should carefully study the section labeled "Operation". The installation crew should study their section before actually starting work. Each section is broken down to cover different phases so that unnecessary confusion may be eliminated and the answer to any particular question may be easily found. The engineering staff is urged to become acquainted with all sections so that they can advise other groups in the best performance, as well as being able to keep the console in top operating condition.

Installation

The console will arrive in several boxes or cartons. The following items will be enclosed.

1. Console proper, with tubes installed.
2. Power Deck assembly with relay deck, power supply, and monitor amplifier, with tubes installed.
3. M4666, DC53 Knob Decal Kit
4. IB 2013 Instruction Book for Yard Console.

The base of the cabinet has large dimples pressed into it to raise it from the desk surface. Each of these dimples have holes in them to permit the use of wood or sheet metal screws in fastening the cabinet to the desk. Before any drilling is done, cable routing and isolation must be planned. Keep in mind that the connections to the console are made on the cabinet.

Ambient Temperatures

The Power Deck assembly containing the relays, power supply and monitor amplifier is the standard 7" x 19" size for rack mounting. If desired it may be mounted in a small wall box or in the base of a desk. Ample ventilation must be provided since the units generate considerable heat. When rack mounted, the panel is designed for natural convection cooling. If the ambient temperature of the rack is below 50° C or 122° F the rack does not need forced ventilation.

If the deck assembly is placed immediately below a unit that blocks the natural rising of the warm air; or if a unit generating a lot of heat is placed closely below it, the rack should be exhausted with a fan to provide a much greater air flow through it. Under these conditions, forced ventilation should be used even if the ambient rack temperature is under 50° C. Of course, if the ambient rack temperature is above 50° C, forced ventilation should be used. These limitations also apply to the Power Deck assembly when wall mounted or desk mounted.

Cable and Conduit Layout

Cable and conduit layout is very important so it should be very carefully planned. An installation hastily made, without thought is a continuous source of trouble until it is rebuilt.

The matter of signal levels is of prime importance. A low level cable can include circuits from -60 dbm to -20 dbm. A medium level cable may include levels from -20 dbm to ± 14 dbm. The high level cable would include levels from ± 14 dbm to ± 40 dbm. The 115 volt a.c. lines should be run in separate cables.

Avoid running cables of a different level classification in the same conduit. If it is necessary to use cables of different levels in a common conduit, the difference between the lowest and the highest level in the two cables should not be greater than 40 db. Use high quality shielded twisted pair for all audio wiring, such as Gates catalog number 1261. All microphone and long medium level runs should be made in insulated shielded pair. Shielded pair with rubber, plastic, or cloth covering should be used. This eliminates the possibility of ground loops and the noise problems that accompany such conditions.

Number 8/40 (Gates catalog) Microphone Cable is recommended for all such conduit runs.

Physical isolation is the best way to avoid trouble between parallel cables. Six inches, or more spacing is preferred. If space does not permit this isolation, at least keep the cables of different level classifications laced separately. Never lace all the wires into one cable. Better isolation is achieved, even though the cables are in close proximity, if the circuits of the same level are laced separately. Deviations from these preferred methods must not be taken lightly. Deviations should be made only as a last resort, and not as a matter of convenience.

The terminal board is arranged to allow separation for the various levels. The higher level circuits are on TB-1. The microphone cables connect to the right side (looking from rear) of TB-2. The left side of this terminal has the medium level terminals. Ground studs are spaced below the terminal for connecting the shields of the connecting cables.

The shielding of conduit is sufficiently effective that isolation of conduits carrying different levels is unnecessary. Conduits carrying microphone cables can be run adjacent to those containing speaker level cables without danger of crosstalk. However, if practical it is advisable to maintain physical separation and add to the safety of the installation. Power circuits, especially those with high current, should not be in close proximity with program carrying conduit. This is because the electro-magnetic shielding in most conduit is poor.

Grounding Circuits

Grounding circuits are unpredictable to a certain extent. No hard and fast rules apply 100% of the time. In this section it is attempted to cover the things to avoid. Certain general practices will be presented that will always give good results, or allow good results to be obtained with minor modifications. Entirely different approaches to this problem, have been used. Some of these have been used with good results, but unless you are an expert on the subject most of them are risky.

The console grounding system is based on the one point ground. Different circuit grounds are insulated from the chassis and other grounds except at one point. At this point they all join together and go to earth ground. This system prevents multiple ground loops, that result in hum pickup (from circulating currents and R.F. pickup) and regeneration.

External circuits connecting to the console should not destroy this system. Microphone circuits are not grounded in the console. They should not be grounded externally until noise checks have proven that better results can be obtained. The turntable and tape inputs are grounded in the console and should not be grounded externally. The net and remote inputs are ungrounded. They should not be grounded externally. The program line output is not grounded in the console. It may be center tap grounded at the telephone line if desirable.

A safe rule to follow is: Do not ground either side of an external circuit. Generally the shields should be grounded at the console only. They may be connected to the ground terminals below the regular terminal board. There may be exceptions to this rule, especially on microphone input circuits. The shield grounds should be connected in such a way that they can be lifted at the console and grounded at the other end. This is part of the test procedure and should be used to obtain lowest noise.

Balanced and Unbalanced Lines

If a circuit is ungrounded, it is considered balanced to ground. If one side is grounded it is unbalanced. If the circuit is center-tap grounded, with pad or coil, it is balanced to ground. Refer to the third paragraph under "Grounded Circuits" for determining the proper classification. Twisted shielded pairs should be used for all circuits, whether they are balanced or unbalanced. Cancellation of noise and crosstalk pickup is approximately the same for either when the one point ground system is used.

If it is necessary to connect a balanced circuit to an unbalanced circuit or the opposite, an isolation transformer should be used between them. The transformer must have good balance, an electrostatic shield and magnetic shielding sufficient to reduce the hum

pick-up at least 65 db below the signal level. Impedance taps on primary and secondary are important to properly match both circuits. Gates transformer A21 is recommended for this use. Balanced lines require balanced pads and attenuators, unbalanced lines require that they be unbalanced. Mixing them generally results in poor noise, frequency response, or other poor operation.

Circuit Impedances

The microphone inputs are factory connected for 150/250 ohms. This can be changed to 30/50 ohms by connecting the input transformer according to drawing B-13307. These are balanced inputs.

Turntable, tape, and utility inputs are 150/250 ohms and cannot be changed in the console. Other impedances could be obtained by the use of a matching pad or isolation transformer. If a matching pad is used, it should be unbalanced and its common side connected to the common or grounded side of the inputs. The lower terminal on the terminal board is the grounded side. It would be well to check the incoming circuit for grounds with an ohmmeter prior to connecting them. The external ground, if any, should be removed.

The net and remote input is factory connected 600 ohms. The impedance of this input may be changed by changing taps on T1, the matching transformer for this channel. Terminals 1 & 3 are for 500/600 ohms, 1 & 2 for 150/250 ohms and 2 & 3 for 30/50 ohms. This channel accommodates both remote, and network so any change in the input impedance will effect both of these circuits.

Power Wiring and Interconnection

A five ampere circuit, 105/125 volts 50/60 cycles single phase is sufficient to operate the console power supply. This connects to TBl-1 & 2 on the power deck. This circuit should be completely isolated from other power circuits of the station so that a possible short will not shut down all the facilities. Proper A.C. wiring in the studio demands many branch circuits. If carefully planned, it will minimize down time.

Drawing D-22127 wiring diagram of the power deck shows all the interconnection data between it and the console cabinet. The main functional drawing G-77600 essentially duplicates this but does not separate the pairs of some circuits.

The monitor amplifier is factory wired for 16 ohms output. The speakers should have a 45/50 ohm to voice coil transformer to match the speakers to the amplifier load. Use a Gates A-30601 transformer. The deck has back loading resistors across the lines when speakers are muted. Two muting relays are supplied. Provision is made for attaching a third unmuted speaker for an office or lobby. The output of the monitor amplifier can be changed to 8 ohms. See the instructions on drawing D-22127.

Note: The monitoring speakers, and warning lights are set up to operate with certain microphone channels. Drawing B-65309 shows this coding. Microphones 1, 3, and 5 operate relay 1. These microphones should go in Studio A. Microphones, 2, 4 and 6 operate relay 2. They should go in Studio B. To change this standard coding change the jumpers on TB2 on the rear of the cabinet. See drawing B-65309.

Provision is made to interrupt the cue speaker (in console) when relay 1 is used to mute the control room speaker. This is done by a pair of contacts on relay 1. If this relay is used as a studio muting relay a jumper from terminal TB1-5A ("A" refers to the top row terminals) to TB1-1A will disable this feature.

The only interconnections left are the monitor input and the monitor bridging output (program cue to remote). For the input, connect TB1-4 to TB102-20. This is an unbalanced circuit. The bottom terminal is the ground terminal in each case. The monitor bridging output is balanced and connected between TB1-6 to TB102-18.

Wire Sizes

The only circuit that demands a minimum wire size in interconnection is the filament pair. #16 AWG is recommended for this connection. Do not worry about some voltage drop in this circuit, the source voltage is high enough to permit this. #16 AWG is also recommended for the 115 volt a.c. input line to panel and shelf assembly. All other wiring may be as small as #24 AWG with no bad effects. Adequate insulation must be provided for all wiring, 600 volt insulation would suffice in all cases.

The warning lights are supplied with 115 volts A.C. out of the power deck. One side is switched with the muting relay, one side is common. It is recommended that lights of over 60 watts should not be used. This would cause excessive arcing in the relay contacts. Studio A; (or control) warning light 1, connect one side only to TB 101-3, Studio B: warning light 2, connect to TB 101-4. Connect the other side of both lights to TB 101-2. The common side must not be grounded. See drawing D-22127.

OPERATION

The M5526 Yard Console is very simple and straight forward in design. This makes the console extremely simple to operate. Since there are few switching functions errors in switching will be rare.

Remote Net Switch

The Remote-Net switch is in the upper left of the panel. This is a two position switch and selects the input to channel 8. When the switch handle is in the center position, Channel 8 is set-up to receive a remote program. Switching to the right, the channel is set-up to receive the network program.

Remote Line Input Keys.

There are two remote input keys. A remote line can be permanently connected to each of these keys. A more flexible practice would be to connect each of these remote circuits to jacks, so that various remote lines can be patched into them as the lines are used.

When these keys are in the center position, the remote line is connected to the cue amplifier. This makes it possible to listen to the remote through the cue speaker in the console. This cue circuit can be used to monitor the remote to make sure the equipment is working properly. The volume on the cue circuit can be adjusted with the small knob near the lower left of the panel.

This remote cue feature can also be used by the man at the remote end for calling in when he has his equipment set-up. This is possible only when the remote key is in the center position.

Switching the remote keys to the left will feed program cue to the remote. This position is labeled "pgm. cue.". When the key is to the right, the remote program is fed into the mixer. The gain is adjusted with the channel 8 fader.

The use of two remote keys makes it possible to use one key for a remote on the air, while a second can be set up and made ready. Although it is possible, it is not good practice to feed both remotes into the mixer at one time. The mixer input is designed to accommodate one signal at a time. Two signals would cause a mismatch in the circuit and individual control of the levels would not be possible.

The man at the remote can call in and the studio man can talk back to him on the audition channel. This will be covered later in this section under "Channel 1 Through 8."

Monitor Gain

The Monitor Gain control is a medium impedance, unbalanced control located on the lower left side of the panel. It is located circuit-wise between the Monitor Selector switch and the Monitor Amplifier.

Monitor Selector

The Monitor Selector is next to the Monitor gain control. It switches the input of the monitor amplifier to either the audition or program bus.

Microphone Selector Switches

The second row of switches are the microphone selector switches. These switches are connected to the first three channels. The top switch selects between microphone 1 and 2 for Channel 1. Microphone 3 and 4 is selected for Channel 2, and microphone 5 and 6 for Channel 3. The muting relays are interconnected between the channel switch and the microphone selector in such a manner that the proper speaker is muted whenever a microphone is turned on. As previously outlined the speaker muting can be connected according to the location of the microphone. As factory wired: microphone 1, 3 and 5 are wired for muting the speaker in Studio A. 2, 4 and 6 are wired for Studio B.

Channel 1 Through 8

The eight mixing channels are next on the panel. The channel keys direct the output of the channel to the audition bus in position A and to the program bus in position P. Throwing the key to either A or P operates the muting relay in the appropriate studios to prevent acoustical feedback. Very rapid switching may connect the microphone before the speaker is cut off because of the mechanical inertia of the muting relays. Both the audition and program mixing busses are compensated so that any number of channels may be mixed without level changes.

The controls are step type and are calibrated in 2 db steps, tapered to infinity. They are normally adjusted to position 12 to give good fader range.

The Channel attenuators for Channels 6 and 7 (turntables) have a cue position. This is one step counter clockwise from the off or infinite position. When rotated to the cue position the signal from the turntable is connected to the input of the cue amplifier. This allows a cue or preview of the signal. The cue amplifier is the same one that is used to check the remote positions.

The program channel "P" is the channel feeding the regular program circuit. The audition channel "A" is used for previewing or checking the channel. To use this channel switch the channel or channels to be checked to "A", and turn the Monitor switch to audition.

This feature can be used as means of checking with a remote, provided there is a microphone channel set-up in the control room. Set the control mike on the audition channel, and turn the monitor switch to "Aud." To listen to the remote, the remote switch should be set in the center position. When the studio operator is talking the remote switch must be in the "Pgm. Cue" position. When listening this switch should be in the center position.

After checking with the remote the Monitor switch should be restored to "Pgm" and the remote key left on "Pgm. Cue." The latter key should be left in this position until the remote has received his cue to go on the air. The console operator will throw the key to "Mix" and bring it in on Channel 8 (Net.Rmt.)

Channel 4 and 5 are medium level circuits and fed directly into the 150 ohm input to the attenuator. Channel 4 is designated as a utility channel and Channel 5 is for a tape recorder. These are unbalanced inputs. Either or both channels can be used for turntables, projectors, tape recorders, or network. A transformer can be installed if the input equipment is to be balanced. Blank plates for mounting Type A-21 line transformers are furnished with each console. These transformers will give balanced matching for 500/600, 150/250, and 30/50 ohms. (See section on "Balanced inputs for Channels 4 through 7" under Modification for Extra Facilities.)

VU Meter

The VU meter is calibrated to feed $\frac{1}{8}$ VU into a 600 ohm line when the meter reads 0-VU or 100%. The station engineer should instruct the operator concerning the proper level desired on the meter. Normally $\frac{1}{8}$ VU is the proper level to feed the telephone line.

Program Line Selector Key

This key is located on the right side and is labeled "Program 1 and 2." This key connects the output to line 1 or line 2. In the center position the amplifier is terminated in 620 ohms. The center position can be used to feed an audition channel, or a recorder. If a 600 ohm load is put on these terminals, remove the resistor.

Master Gain Control

This control is located on the right of the panel. It is a tandem connected high impedance interstage control. It is located electrically between the first and second, and the second and third stages of the program amplifier.

Phone Jacks

Two phone jacks for headphone monitoring are on the side of the console. The lower one is the "Line" monitor and is connected across the program amplifier. The upper jack is across the incoming network line. It is used to check what is happening, so the transfer to the network program can be as smooth as possible.

PRINCIPLES AND THEORY OF OPERATION

This section is presented to give the engineer more detail on any unusual operation of part of the console. It is hoped that it will give the engineer a complete understanding of all the circuits and enable him to maintain and trouble shoot the console effectively. The very obvious circuits will not be covered since they are common knowledge, or have been covered in previous sections of this instruction book.

Frequency Determining Components

The M5526 Yard Console is a speech input system in itself. As many as three amplifiers are cascaded in some operations. The frequency response of each of these amplifiers would have to be nearly perfect to allow this cascading, yet keep the system within specifications, since any deviations in response will add. Slight deviations in response do occur in the production of the amplifiers so compensation must be employed to make each console meet specifications.

In some of the amplifiers this compensation is standard enough to give the normal value of the capacitor (small capacitors are generally used to compensate for response deviations). In some cases it will be given an X value, determined by frequency response. In rare cases a standard value will be deleted, changed, or a capacitor will be added where none is shown on the schematic diagram. Also in rare cases the value of a resistor must be changed to bring the system within specifications. The console as you receive it will be within all specifications. Each one is given a complete test. The component deviations that you may encounter are to make it perform accurately, not errors. Do not change them unless you are compensating for abnormal conditions external to the console. If you need special compensation in your application, and do not know the best way to obtain it, contact the Engineering Department of Gates Radio Company. Have the complete details at hand and we will be happy to give assistance in solving it.

Cue Amplifier

B-65204 is the schematic of this amplifier. The speaker for this amplifier is built into the left side of the lid behind the louvers.

This amplifier is used for monitoring the two remote inputs, and to check cue on the turntables. The remote input and turntable cue input are isolated so the unbalanced turntable circuit will not affect the balanced remote circuits. This isolation is accomplished by using separate windings on the input transformer. Since a common volume control is used, it might be necessary to disable one of these inputs temporarily from time to time to avoid confusion. Remote switches are set to feed the cue amplifier whenever they are in the center position. This position can be disabled by throwing the switch to the "Pgm. Cue" position. The turntable cue input can be disabled by turning the fader clockwise just through the detent.

Switch Details

Switch details are shown on drawings B-65305, and B65306. They show the physical location of the contacts as viewed from the rear of the switch. The use of these detail prints along with the function diagram C-77600 will explain most switch functions. Drawing B-65309 shows details of the relay switching along with the microphone channel switches.

Mixing System

The mixing system consists of an eight channel mixer utilizing ladder type controls connected in a parallel, minimum loss, type mixing circuit.

Preamplifier

(See separate instruction sheet in this book)

Program Amplifier

The M5233A Printed Chassis Program Amplifier has four stages. The first three stages all use a pentode connected 5879 tube. The output stage uses a parallel connected 12AU7. Negative feedback from a separate winding on the output transformer is applied to the cathode of V3. The master gain control is a tandem connected high impedance interstage control (R4A-R4B). It is electrically connected between the first and second, and the second and third stages. It does a good job of keeping the signal to noise ratio acceptable.

VU Meter and Isolation Pad

A four inch illuminated VU meter is so arranged in the circuit that it indicates zero reading when an audio level of 78 VU is being fed into the program line. The VU meter is isolated from the external program by a 4 db isolation pad. This pad isolates the meter from the various telephone line reactances that would cause erroneous readings at various audio frequencies

Monitor Booster Amplifier

In this console the Monitor Booster Amplifier is used to bring the audition bus up to the level of the program bus input to the monitor amplifier. This makes it possible to switch monitor amplifier from program to audition without change in level. B-65310 is a schematic diagram of this amplifier. The output is unbalanced. It is brought out to terminals TB 1-2 and could be used to feed an external bridging monitor amplifier, or program to a tape recorder. (See following paragraph.)

Input to Tape Recorder

The audition bus can be used to feed a tape recorder. It is picked up on TB1-2. This bus can be used from input channels that are not being used for simultaneous broadcast.

The level of this bus is the equivalent of 0 DBM and the impedance is 10,000 ohms. The recorder input should be at least 20,000 ohms bridging and must be balanced.

The recorder should bridge the output of the program line for simultaneous broadcasting and recording. The recorder input must be balanced.

Power Deck Assembly

The Deck Assembly contains the mainpower supply, the monitor amplifier and the relays. The schematic drawing for the Deck is D-22127.

The relay power is obtained from the voltage drop across a 250 ohm resistor located, electrically, between center tap of the high voltage winding of the power transformer and ground.

Two relays are used for the speaker muting. These relays have one set of B (normally closed) and one set of A (normally open) contacts connected to form a set of D (make before break) contacts. This set of D contacts is used to load the amplifier and break the speaker connection. A set of A contacts energize the warning lights when the speaker is muted. A set of B contacts on relay #1 break the cue monitor when a microphone is used in the control room. This keeps the cue speaker muted while the control room microphone is in use.

As many as four monitoring speakers, with 48 ohms to voice coil transformers, will match the amplifier loading without making any changes in the amplifier. More than four speakers will make it necessary to change the amplifier output to 8 ohms. There is an 8 ohm tap on the amplifier transformer. R16 will also have to be changed from 1000 to 620 ohms to maintain the amplifier characteristics. See drawing C-77721.

Relays can be added to the muting deck if additional muting is necessary. See section under "Modification for Extra Facilities".

Regulated Power Supply

In operation, the conductance of V1, the series regulator tube, is controlled by the sharp cut-off pentode, V2. The gaseous regulator tube, V3, establishes the cathode of V2 at a constant 150 volts, regardless of output voltage.

If a change in load occurs, causing the output voltage to increase, the grid of V2 becomes more positive, increasing the plate current through this tube and increasing the voltage drop across plate resistor R2. Thus the voltage at the grids of regulator tube V1 is reduced, increasing the internal voltage drop in this tube and compensating for the original rise in output voltage. A decrease in output voltage will cause the opposite effect.

Control R101, the hum balance control, applies a positive bias to all amplifier filaments to reduce hum caused by heater cathode emission. It should be adjusted for minimum noise.

The taps on the primary of power transformer T101 provide a means of maintaining the secondary voltage at the minimum value required for proper operation of the regulating circuit, as the load current is varied from zero to full load. The correct tap is determined by the line voltage at the particular location.

In Gates control consoles employing this power supply, the tap is connected at the factory to provide optimum operating conditions at the specified plate voltage of 310 volts.

CAUTION: Do not remove the load from the Power Supply with the power turned on!

Monitor Amplifier

The monitor amplifier has three stages. The first stage is one half of a 12AX7. The other half of this tube is not used. Another 12AX7 is used for the second stage. This tube is used in a phase-inverter circuit to drive the third stage, two EL84's in push-pull, connected into the output transformer.

Secondary feedback is used between the output transformer and the cathode of the first half of the phase inverter. This lowers the output impedance, gives good load regulation and reduces distortion in the output section.

Maximum and Minimum Voltages

The Yard Console is designed to operate with an input line voltage of 105/125 volts, 50/60 cycles, single phase. The operation of the console is not guaranteed beyond these limits and damage may occur with voltages above 125 volts. The console is designed to operate with a power supply output voltage of 310 volts. The power supply regulation will retain this voltage. The only time it is permissible to change the primary tap on the power transformer is when the input voltage is excessively low and the power supply loses regulation. This situation will seldom be encountered.

The filament voltage of the 5879 tubes must be held between 6.1 and 6.9 volts for best operation of the general run of them. Some 5879's will operate below 6.1 volts but require excessive selection. The other amplifier tubes are rated 6.3 volts $\pm 10\%$. Thus the filament voltage to the console should be held as close to 6.1 to 6.9 volt range as possible with normal line voltage variations. If necessary, this voltage may be adjusted by placing the proper resistors in series with the filament lines. An alternate method is to insert a sufficient length of small wire in series with the feed to drop the voltage to the desired value. Filament voltage may be raised by changing the primary tape on the power transformer, but only if the line voltage is low. Do not exceed 6.9 volts.

The only requirement for the small wire is that it does not heat up enough to damage the insulation. Ten percent line variation will not cause the filament voltage to get out of the prescribed limits, if the preceding instructions are followed. Laboratory tests of all the tubes used in the console prove that they can tolerate far wider limits than this. If these precautions, along with the suggestions on "Ambient Temperature" under the "Installation" section, are followed, the console should give very satisfactory service.

MAINTENANCE

Without routine maintenance even the finest equipment soon becomes erratic or inoperative. The Yard Console is no exception to this rule. The maintenance schedule is subject to conditions that vary with each installation. It must be planned by the station engineer. Most stations set up a schedule similar to automobile service schedules. Some sections receive maintenance on a basis of every week, other sections on a basis of every two weeks or a month. Proof of performance measurements are taken at least every six months. We strongly recommend that the station engineer plan a routine maintenance program and make every effort to follow it carefully.

Present day vacuum tubes are very reliable compared with those of a few years ago. Yet, some fail in a relative short time due to some defect in it or from rough handling. In the design of the console every effort was made to keep all components, including tubes, well below maximum ratings. Unless some component has suffered a major change, the circuitry will not cause tube failure. Routine dynamic or emission tube checking will spot tubes that are liable to give trouble. Substitution of new tubes in the console will show up old ones that have started to go bad. Gates TK282 tube kit should be ordered for a complete set of spares.

Tube Socket Voltage

Typical tube voltages are shown below. These voltages are subject to tube characteristic variations and age. In most cases a variation of 30% from these readings is permissible. When in doubt, try several tubes in the socket and measure the voltages of each to establish an average in your location and with your particular test meter. All measurements were taken with a 20,000 ohm per volt Simpson 260 meter. Vacuum tube meters will give high readings since the meter will not load some of the high impedance circuits that the Model 260 loads. Filament pins and pins with no voltage readings are not listed in the following charts. All readings were taken with no signal applied.

Program Amplifier

V1	pin 1	(.029)	
	pin 3	1.5V.	
	pin 7	50V.	
	pin 8	100V.	(1.2)
V2	pin 1	(.09)	
	pin 3	1.5V.	
	pin 7	50V.	
	pin 8	100V.	(1.6)
V3	pin 1	(.44)	
	pin 3	1.7V.	(.41)
	pin 7	50V.	
	pin 8	150V.	(2.7)
V4	pin 1	280V.	(21)
	pin 2	(2.7)	
	pin 3	11V.	
	pin 6	280V.	(21)
	pin 7	(2.7)	
	pin 8	11V.	

Preamplifiers

V1	pin 1	(.015)	
	pin 3	1.2V.	(.012)
	pin 7	46V.	
	pin 8	95V.	
V2	pin 1		(.11)
	pin 3	2.8V.	
	pin 7-8-9	125V.	(.57)

Monitor Booster Amp.

V1	pin 1	180V.	
	pin 2	(.03)	
	pin 3	1.7V.	(.028)
	pin 6	225V.	(.37)
	pin 7	(.175)	
	pin 8	2.V.	

Cue Amplifier

V1 pin 1 220V.
 pin 2 (.074)
 pin 3 1.9V.
 pin 6 220V.
 pin 7 (1.0)
 pin 8 2V.

V2 pin 1 (9.8)
 pin 2 24V.
 pin 5 310V. (32)
 pin 6 310V.
 pin 7 24V.

() RMS Signal Voltage

Monitor Amplifier

V1 pin 1 210V.
 pin 2 (.15)
 pin 3 1.8V.

V2 pin 1 170V.
 pin 2 (2.4)
 pin 3 1V. (2.25)
 pin 6 170V.
 pin 7 (.15)
 pin 8 1V.

V3 pin 1 (8.0)
 pin 3 11V.
 pin 7 285V. (160)
 pin 9 295V. (40)

V4 pin 1 (7.4)
 pin 3 11V.
 pin 7 285V. (160)
 pin 9 295V. (40)

Regulated B_b voltage
All filament voltages

310 volts D.C.
between 6.1 and
6.9 volts A.C.

Input Line Voltage - 105/125 volts, 50/60 cycles single phase
 Relay Supply Voltage - 35 V. D.C. no relays
 Relay Supply Voltage - 24 volts D.C. 2 relays operated
 Filament Bias Voltage - 20 volts D.C.
 Line Power Consumption - 130 watts
 Power Supply Load - 128 ma.
 83 ma. for monitor amplifier
 45 ma. console proper

ACCESS TO UNDER SIDE OF AMPLIFIER DECK

The amplifier deck can be lifted, from the rear, and folded forward to gain access to the lower side of the deck. To do this remove the four retaining nuts. Lift the deck up from the rear, at the same time slide it back slightly when the studs are cleared. This will put the deck on edge with rear part of the deck slightly forward. It can not be completely inverted.

OTHER COMPONENTS

The channel attenuators are low impedance attenuators. They require cleaning about four times a year in the average location. A well air-conditioned room would allow longer periods between cleaning them. A very dusty location would require more frequent cleaning. The attenuator contacts should be cleaned and lubricated by using Davenol (sometimes called Daven Oil). A soft lint-free cloth should be used to remove the dirty accumulation from the contact surfaces. Davenol is inexpensive and may be purchased from the Gates Radio Company.

Relays in the Yard Console are high quality telephone type. They are selected for long life and trouble-free service. The contacts are self wiping and everyday use will keep these contacts burnished. Contacts on the relays that receive infrequent service can be cleaned by operating the relays several times. Periodic operation of unused equipment will keep the contacts clean. In cases of stubborn trouble use a contact burnishing tool. A contact burnishing tool, Gates' TM-1, is listed in the general catalog. Abrasive papers, files, grease or oil, and grease solvents should never be used on these contacts. Grease or oil would make them collect dust, get gummy and cause contact burning, and possible failure.

The Centralab lever keys have excellent wiping action and will probably not require any cleaning. If one of these keys is damaged, it is better to replace it than to attempt to repair it. Use the parts list for the description, if it is necessary to order a new one.

Electrolytic capacitors have been perfected to the point where they probably are subject to little maintenance. If one does become defective it is better to catch it in routine maintenance than to let it cause loss of air time. The main filter in the regulated power supply is plug-in and may be readily changed. To check it: Insert a new one and measure the voltage to the plates of the 6080 tube. If this voltage increases 20 volts or more with the new capacitor, the old one should be considered unfit for service. C102, the 250V. 50 MFD capacitor, may be checked by bridging it with a new capacitor. With no relays energized, the voltage should be around 30V. If the new capacitor makes a change of 3V. or more, replace C102.

Decoupling capacitors may be checked by testing the console at maximum gain as outlined in the specification section. If any decoupling capacitors are defective, oscillation or motor boating will occur. Parallel each section of the capacitors individually with the rated capacity (or close to rated capacity). Replace capacitors that need the additional capacity to prevent oscillation. Caution must be used when checking the monitor amplifier circuit, a gain of 100 db must not be exceeded or the test is not valid and oscillation may occur with all good components.

MODIFICATION FOR EXTRA FACILITIES

You may have noticed that we have included, in the Yard Console, all of the most needed facilities. Yet, some installations may require facilities that are not common, so this chapter is devoted to a summary of the modifications available and some of the suggested uses. Plan your modification carefully. Allot sufficient time for completion so that it will be well executed and not be a source of trouble.

Additional Microphone Channels

Three microphone preamplifiers are standard on the Yard Console, but as many as five additional channels can be converted by the addition of preamplifiers. These additional channels will, of course, mean that other facilities, such as Tape, Turntable, and Remote will have to be sacrificed. (See drawing)

Order a Gates M-5304 Preamplifier Kit. Install the preamplifier and shield in the space provided, next to the other preamplifiers, in place of the filler plate. Jumper the B₊, B₋, and Filament feed from the adjacent preamplifier, complete the wiring exactly the way the other channels are wired. Terminals 4 and 5 will go to the attenuator "in" and "common". The pair that is removed from the attenuator terminals will connect to 1 and 3 on the preamplifier terminal.

Some of the wiring for the muting has been made on the channel key switches. A .1 mfd 200V. condenser will have to be connected between terminals 5 and 11. (See drawing B-65306). A shielded lead must be connected from terminal 5 to one of the spare terminals (5 or 6) on TB2. TB2 is the center terminal board on rear of the console. This terminal should then be jumpered to 1A or 1B on the same board according to which muting relay is energized by this new microphone channel.

Balanced Input for Channels 4 Through 7

Channels 4 through 7 are all 150 ohms and unbalanced. If any of these channels are to be used on a circuit that must be kept balanced; a Type A-21 transformer must be installed. It should be installed, on the filler plate, on the amplifier deck in the console.

Connect the transformer to the terminal strip as follows: #5 on the transformers to #4 on terminal, 4 on the transformer to #5 on terminal. Ground on transformer to #3 on terminal. This takes care of the 150 ohm secondary of the transformer. Run a shielded pair from terminals 4 and 5 to the attenuator in and common. The shield of this wire should run to terminal #3. Be sure the shield on this wire makes contact with the other cable shields in the console.

The wiring on the primary or line side of the transformer will depend on the desired impedance. For 500/600 ohms connect transformer terminals 1 and 3 to 1 and 2 on terminal strip. For 150/250 ohms connect 1 and 2 transformer to 1 and 2 terminal. For 30/50 ohms connect 2 and 3 transformer to 1 and 2 terminal. The pair removed from the attenuator input should connect to 1 and 2 on the terminal strip.

Additional Speaker Muting Relays

As many as three additional relays can be added to the M5548C Power Deck. Mounting holes are provided on the relay bracket. Instructions for connecting these relays is furnished on drawing C-77729. When adding relays, the substituted load will keep the relay voltage essentially the same as it is for two relays. Order Gates relay AK-12626 for the extra relays. Complete information on this unit is covered under the heading "Power Deck Assemblies" under the section "Principles and Theory of Operation".

Turntable Preamplifiers

We do not recommend the use of microphone preamplifiers for turntable use. The normal 40 db gain of a microphone preamplifier is about 15 to 20 db low for good operation. The level out of present day turntable equalizers is in the region of -75 dbm. The less distance between the equalizers and the preamplifier, the less noise will be picked up by the wiring. We recommend a turntable preamplifier for this service. We believe that it should be installed in the turntable cabinet or desk. Gates' SA-134 amplifier is recommended for use with most external equalizers. The M5235 Preamplifier with internal equalization can be used with the G.E. and other high fidelity cartridges and has a self-contained power supply and a filter selection switch with the three most popular standard curves available.

If the installation demands that the turntable preamplifiers be mounted in the console, and the two preamplifiers are not used for microphones, they may be used for turntables. If the channels are available and no preamplifiers are in place, they may be installed as described under "Additional Microphone Channels" and used for turntables. The inputs may be connected for 30/50 ohms or 150/200/250 ohms. The output must be connected for 150 ohms to match the input to the channel attenuator.

We would like to emphasize that all modifications be carefully studied for possible sources of operational or technical trouble before starting the job. Sufficient time must be allowed to permit the modification to be installed and thoroughly checked before it is used on any of the circuits it affects. Make a permanent record of the modification by making drawings or marking up existing drawings and any written description that will help you remember all the details. The record should be sufficient to enable other members of your staff to understand it also. Explain the new operation to the operators so they will not make mistakes. Include all necessary parts of your maintenance schedule.

ORDERING REPLACEMENT PARTS

When ordering a replacement component please refer to the parts list in this instruction book. Identify the component by its symbol number and, if possible, its Gates drawing number. The type of equipment in which the part is used is also necessary. This procedure will insure receiving the correct component and at the earliest possible date.

GUARANTEE

This equipment is fully guaranteed by the Gates Radio Company of Quincy, Illinois, to be free from all defects in materials and workmanship and will be repaired, replaced or adjusted in accordance with the manufacturer's option and terms as outlined below.

- 1 - Gates believes the purchaser has every right to expect first-class quality materials and workmanship and has created rigid inspection and test procedures plus excellent packing methods to assure good arrival at destination.
- 2 - Gates agrees to supply daily factory service, and will make emergency shipments at any time where possible.
- 3 - Gates fully guarantees, under normal and proper usage, all component parts in Gates equipment, except as noted. These parts will be replaced or repaired at the option of Gates as follows:

Transmitter Parts: main power or plate transformer, modulation transformer, modulation reactor, main tank condensers.

(replacements or repairs) - where less than 1 year old...no charge, between 1 and 2 years old 50% of new price

Moving Parts: Guaranteed for six months.

Electron Tubes: Subject to manufacturer's warranty at the time of shipment. Adjustment will be made to the customer as given to Gates Radio Company by the tube manufacturer.

All other component parts: (Except as listed above or below) Guaranteed for one year.

Abuse: Damage resulting from an Act of God, or by fire, wind, rain, hail, or any other condition other than normal usage is not covered by the guarantee.

- 4 - Date of invoice to original user-purchaser and date of receipt by Gates Radio Company of notification from the customer will determine the age of equipment or parts.
- 5 - In case of adjustment, as on certain transmitter parts listed above "new price" is Gates' current price at time of replacement and/or adjustment.
- 6 - This guarantee covers only Gates manufactured parts and complete Gates equipments including all parts therein, with exceptions as noted. Any purchased part not manufactured by Gates will be subject to the manufacturer's guarantee, unless such part is a unit incorporated in Gates manufactured equipment.

- 7 - Transcription pickups, regardless of make, are guaranteed for ninety days - said guarantee including every associated part of the pickup except the stylus, which because of its fragility is not guaranteed by Gates.
- 8 - Where the replacement part in question must be supplied under the guarantee before the defective part can be returned for inspection, as might sometimes be required, the customer will be billed in full and credit or adjustment will be given on receipt of the defective part in accordance with this guarantee and the terms herein. In order for credit adjustment to be received in line with this guarantee the defective or replaced part must be shipped prepaid to Gates Radio Company or to any other destination requested by Gates within two weeks of the date of the invoice covering the replacement part. Any item alleged defective shall not be returned to Gates until after written permission has been first obtained from Gates' home office at your request.
- 9 - All shipments under this guarantee will be made f.o.b. Quincy, Illinois and all materials returned will be shipped prepaid by the customer f.o.b. Quincy, Illinois
- 10 - As a material part of this guarantee the customer agrees to employ capable technical personnel to maintain all equipment under this guarantee in good, normal condition, properly serviced and cleaned and to use said equipment as and for the purpose intended by seller. This guarantee does not extend to the supply by Gates of any personnel to make any replacement, repair or adjustment.
- 11 - Gates shall not be responsible for damages to items in transportation or careless handling; or injuries to persons or damage to property arising out of the use or operation of Gates equipment or parts, but Gates will supply repair or replacement items speedily, which will be billed to the customer who, in turn, will place claim with the carrier, with assistance from Gates if necessary and when so requested.
- 12 - Delays in fulfilling any part of this guarantee because of depleted stock, floods, war, strikes, power failures, transportation delays, or failure of suppliers to deliver, or because of Acts of God or any other conditions beyond the control of Gates, does not in any way render Gates liable under this guarantee; however, every effort will be made to render prompt service.
- 13 - Gates agrees that this equipment sold is manufactured, where need be, under Royalty License Agreements with Western Electric Company and Radio Corporation of America.
- 14 - This Guarantee is not transferable from the original user-purchaser, and no right of subrogation is given herein.
- 15 - This Guarantee is effective on all standard Gates cataloged items sold after June 11, 1951.

Gates Radio Company
Quincy, Illinois

PARTS LIST

<u>Symbol No.</u>	<u>Drawing No.</u>	<u>Description</u>
AB1	M5568	Monitor Booster Amplifier
AC1	M5567	Cue Amplifier
AL1	M5233A	Program Amplifier
AP1, AP2, AP3	M5215	Preamplifier
AT1; AT2; AT3 AT4, AT5, AT8	A-9703-1	Attenuator
AT6, AT7 AT9 AT10	M-5659B A-3404-34	Attenuator w/cue position VU and 4 db Isolation Pad Control
LS1		Capactor, .1 mfd. 200V.
ML		Speaker, 2"
J1, J2	A-31059-1	VU Meter
		Jack
	A-3404-24	Control; (cue amp.)
	A-5544-8	Control; (pgm. amp.)
		Resistor; 270 ohms $\frac{1}{2}$ W. 5%
		Resistor; 560 ohms $\frac{1}{2}$ W. 5%
		Resistor; 240 ohms $\frac{1}{2}$ W. 5%
		Resistor; 100 ohms $\frac{1}{2}$ W. 5%
		Resistor; 150 ohms $\frac{1}{2}$ W. 5%
		Resistor; 2000 ohms $\frac{1}{2}$ W. 5%
		Resistor; 620 ohms $\frac{1}{2}$ W. 5%
S1; S2		
S3; S4	A-10900-4	Switch
S5; S6; S15	A-10900-2	Switch
S7, S8, S9		
S10; S11, S12		
S13, S14	A-10901-1	Switch
S16		Rotary Switch
T1		Transformer
TB1	B-10130-2	Terminal Board
TB2	B-10130-1	Terminal Board
TB3		Terminal Board

BASIC PROGRAM AMPLIFIER, M5233A

<u>Symbol No.</u>	<u>Drawing No.</u>	<u>Description</u>
C1		Capacitor, 15-15-10 mfd 450V.
C2		Capacitor, 20-20 mfd 450V.
C4; C5, C7, C8		Capacitor; .1 mfd. 400V.
C6		Capacitor, (Determined by Frequency Response)
C9, C10, C14		Capacitor; .47 mfd. 200V.
C3		Capacitor, .0056 mfd. 400V.
R1		Resistor; 1200 ohm 1W
R2; R6, R11		Resistor; 820K ohm 1W
R3; R7		Resistor; 180K ohm 1W
R5, R8		Resistor; 1500 ohm 1W
R9		Resistor; 10K ohm 1W
R10		Resistor; 6800 ohm 1W
R12, R13		Resistor; 150K ohm 1W
R14		Resistor; 750 ohm 1W
R15		Resistor; 5100 ohm 1W
R16		Resistor; 390K ohm 1/2W
R17		Resistor, 100K ohm 1/2W
R19		Resistor, 100 ohm, 1/2W.
T1	A1-10379T	Transformer; input
T2	A0-10864T	Transformer, output
V1, V2, V3		Tube; 5879
V4		Tube, 12AU7
XV1; XV2 XV3, XV4		Socket, 9 pin

PRINTED WIRING CUE AMPLIFIER M5526

C1		Capacitor; .1 mfd. 400V.
C2, C3		Capacitor; .47 mfd. 400V.
C4		Capacitor; .47 mfd. 200V.
C5		Capacitor, 30-30 mfd. 350-300V.
R1		Resistor; 56K ohms, 1W.
R2		Resistor; 1200 ohms 1W.
R3		Resistor; 820K ohms 1W.
R4		Resistor; 180K ohms 1W.
R5		Resistor; 220K ohms 1W.
R6		Resistor; 750 ohms 1W.
R7		Resistor; 33K ohms 2W.
R8, R9		Resistor, 6200 ohms 1/2W.

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M5526

<u>Symbol No.</u>	<u>Drawing No.</u>	<u>Description</u>
T1	A1-10426T	Transformer; Input
T2	AO-10427T	Transformer, Output
V1,V2		Tube, 5879
X1,X2		Socket, 9 pin

PRINTED WIRING CUE AMPLIFIER, M5526

C1		Capacitor; .0056 mfd 400V.
C2		Capacitor; .001 mfd. 400V.
C3		Capacitor; .1 mfd. 400V.
C4		Capacitor, 30-30 mfd. 350-300V.
R2,R5		Resistor, 220 ohms $\frac{1}{2}$ W.
R3;R4 R6,R7		Resistor, 100K ohm 1W.
R8		Resistor; 1800 ohm $\frac{1}{2}$ W
R9		Resistor, 10K ohm $\frac{1}{2}$ W
T1	A1-10426T	Transformer; Input
T2		Transformer, Output
V1		Tube; 12AX7
V2		Tube, 6AK6
XV1		Socket; 9 pin
XV2		Socket, 7 pin

PRINTED WIRING, MON-BOOSTER AMPLIFIER, M5526

C1		Capacitor; 20-20 mfd. 450V.
C2		Capacitor; .1 mfd. 400V.
C3		Capacitor; 8 mfd. 350V.
C4		Capacitor; .15 mfd. 200V.
C5		Capacitor, .0002 mfd. 500V
R1		Resistor; 2200 ohm $\frac{1}{2}$ W.
R2		Resistor; 100K ohm $\frac{1}{2}$ W.
R3		Resistor; 180K ohm $\frac{1}{2}$ W.
R4		Resistor; 1500 ohm $\frac{1}{2}$ W.
R5,R6		Resistor; 10K ohm $\frac{1}{2}$ W.
R7		Resistor, 33K ohm $\frac{1}{2}$ W.
T1	A1-10426T	Transformer, Input
V1		Tube, 12AX7
XV1		Socket, 9 pin
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POWER DECK, M5548C

<u>Symbol No.</u>	<u>Drawing No.</u>	<u>Description</u>
A101		Lamp Pilot
C101		Capacitor, 30-30 mfd 525V.
C102		Plug-in Capacitor, 250 mfd. 50V.
F101		Fuse, 3 amp.
K101, K102	AK-12626	Relay
L101		Filter, Reactor
R101	A3404-17	Control, 100 ohm.
R102		Resistor, 250 ohm 20W.
R103, R104		Resistor, 47 ohm 2W.
(R108 & R109)	A-31153-101	Fil. Dropping Resistor Assy.
S101		Toggle Switch
T101	AP-9653	Power Transformer
T102		Output Transformer
TB101		Terminal Board
TB102	B-10130-1	Terminal Board
V101		Tube G234 or 5V4
XA101		Pilot Light
XC101, XV101		Socket, Octal
XF101		Fuse Holder

PRINTED BOARD REGULATOR FOR POWER SUPPLY

C1	Capacitor, .47 mfd. 200V.
R1	Resistor, 6800 ohm $\frac{1}{2}$ W. 10%
R2	Resistor, 820K ohm $\frac{1}{2}$ W. 5%
R3	Resistor, 22K ohm $\frac{1}{2}$ W. 10%
R4	Resistor, 75K ohm, 1W. 5%
R5	Resistor, 51K ohm $\frac{1}{2}$ W. 5%
R6	Resistor, 10K ohm, $\frac{1}{2}$ W. 10%
V1	Tube, 6080
V2	Tube, 5879
V3	Tube, 0A2
XV1	Socket, Octal
XV2	Socket, 9 pin
XV3	Socket, 7 pin

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M5526

PRINTED BOARD MONITOR AMPLIFIER

<u>Symbol No.</u>	<u>Drawing No.</u>	<u>Description</u>
C1		Capacitor; 20-20 mfd. 450V.
C2, C4, C5		Capacitor; .1 mfd. 400V.
C3, C6		Capacitor; 25 mfd. 25V.
C7		Capacitor; .0056 mfd. 400V.
C8		Capacitor; .47 mfd. 200V.
C9, C10		Capacitor; .4 mfd. 450V.
R1, R3, R5		Resistor; 100K ohm, 1/2W. 10%
R9, R10		Resistor; 220 ohm; 1/2W. 10%
R2, R17, R18		Resistor; 10K ohm, 1/2W. 10%
R4		Resistor; 200K ohm; 1/2W. 5%
R11, R12, R6		Resistor; 1000 ohm, 1/2W. 10%
R7, R16		Resistor; 200 ohm; 2W. 10%
R8		Resistor; 270 ohm, 2W. 10%
R13, R14		Resistor; 4700 ohm, 1/2W. 10%
R15		Resistor; 620 ohm, 1/2W. 5%
R19, R20		
T102		Output Transformer
V1, V2		Tube, 12AX7
V3, V4		Tube, EL84
XV1, XV2, XV3, XV4		Socket, 9 pin

M5215 PRINTED CHASSIS PREAMPLIFIER

INSTRUCTIONS

Gates' M5215 Printed Chassis Preamplifier was developed primarily for use in the new line of consoles. However, where the output levels permit, it may be used for an isolation amplifier or booster amplifier as well as a microphone preamplifier. Its small size and excellent electrical characteristics are due, to a great extent, to the use of the printed chassis wiring employed.

The schematic diagram, B-13307, shows the circuit and external connections. It is a two stage amplifier, using a pentode connected 5879 tube in the first stage and a triode connected 5879 tube in the second stage. Negative feedback is taken from the plate of the second stage back to the cathode of the first stage. This compensates for differences in tube characteristics, reduces distortion and noise. The triode connected stage is shunt fed into the output transformer to allow small size and best operation of the transformer. The amplifier is connected 150 ohms in and out, in the factory. The schematic diagram shows the possible changes in impedances.

SPECIFICATIONS

GAIN: 40 db, ± 1 db @ 1000 cycles.
RESPONSE: ± 1.5 , -1.5 db from 30 to 15,000 cycles.
DISTORTION: .5% or less from 50 to 15,000 cycles @ -6 dbm output.
1% or less from 50 to 15,000 cycles @ ± 4 dbm output.
NOISE: 90 to 95 db below ± 10 dbm output, or a relative input noise of -120 to -125 dbm.
TUBES: Two 5879. TK-239.
POWER: ± 275 to ± 310 volts DC @ 5 ma., 6.3 volts AC @ 0.3 amps.
SIZE: 3-5/8" high, 4-5/8" long and 2-3/8" wide.
WEIGHT: 10 Ounces.
INPUT IMPEDANCE: 30/50 - 150/250 ohms.
OUTPUT IMPEDANCE: 150/250 - 500/600 ohms

SOCKET VOLTAGES

V1: pin 3	1.2 v.	V2: pin 3	2.8 v.
pin 7	46 v.	pin 7	125 v.
pin 8	95 v.	pin 8	125 v.

All measurements taken with a 20,000 ohm per volt meter. Use Simpson Model 260 or equivalent. Allow 20% variation in most readings.

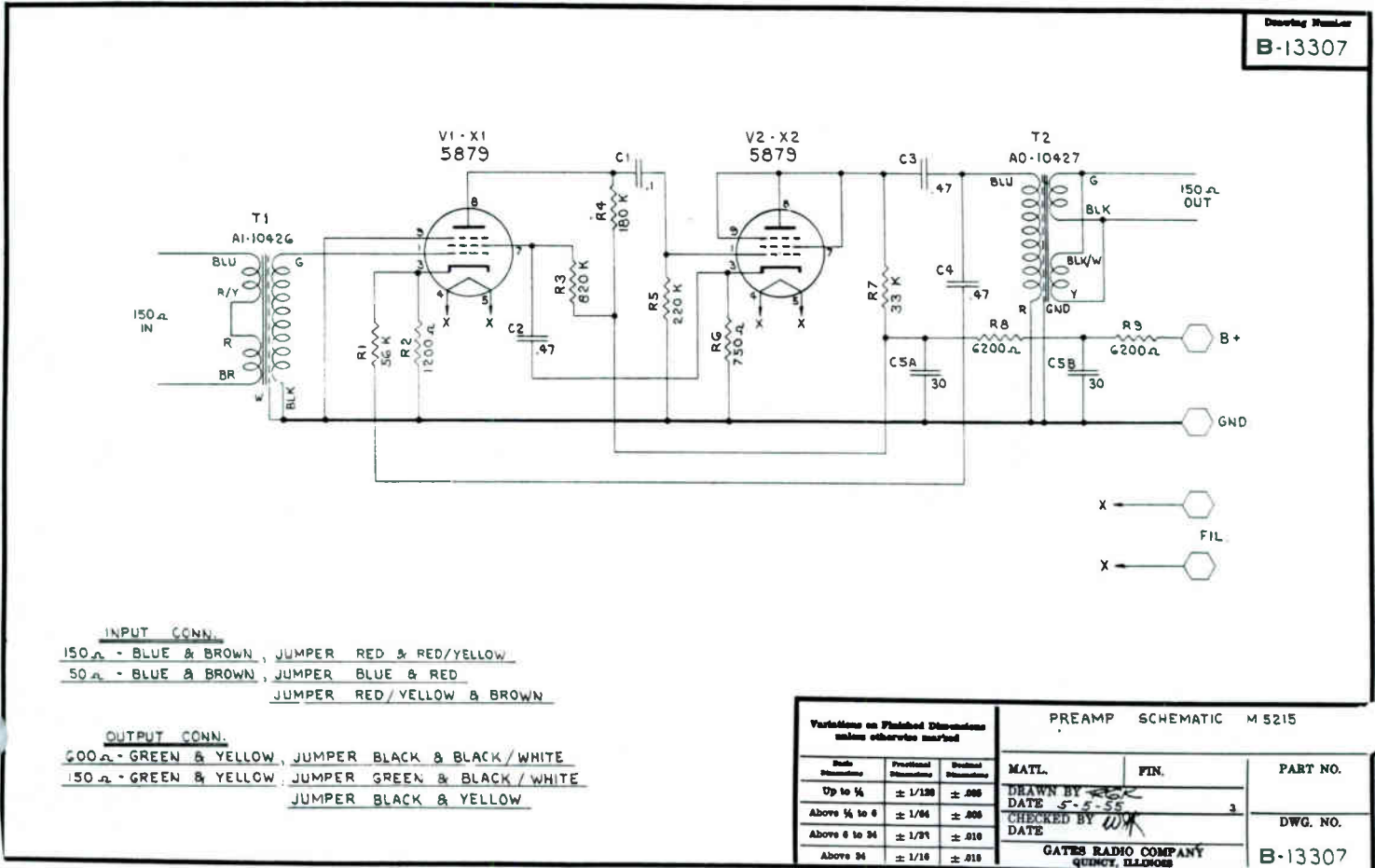
M5215 PRINTED CHASSIS PREAMPLIFIER

PARTS LIST

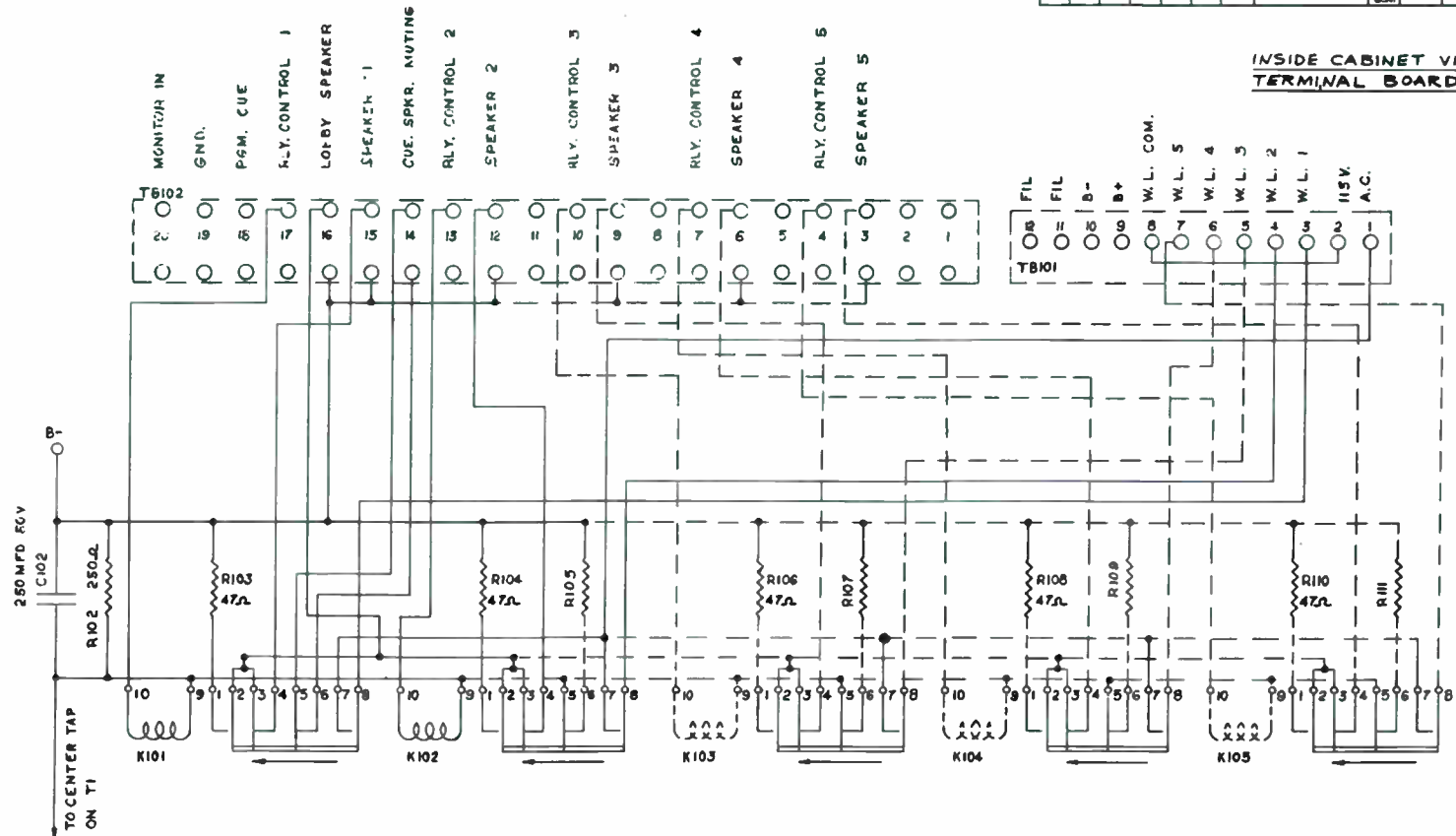
<u>SYMBOL NO.</u>	<u>DRAWING NO.</u>	<u>DESCRIPTION</u>
C1		Capacitor .1 mfd., 400 V.
C2, C3		Capacitor .47 mfd., 400 V.
C4		Capacitor .47 mfd., 200 V.
C5		Capacitor 30-30 mfd., 350-300 V.
R1		Resistor 56K ohms, 1 W., 10%
R2		Resistor 1200 ohms, 1 W., 10%
R3		Resistor 820K ohms, 1 W., 10%
R4		Resistor 180K ohms, 1 W., 10%
R5		Resistor 220K ohms, 1 W., 10%
R6		Resistor 750 ohms, 1 W., 5%
R7		Resistor 33K ohms, 2 W., 10%
R8, R9		Resistor 6200 ohms, 1/2 W., 5%
T1	AI-10426T	Input Transformer
T2	AO-10427T	Output Transformer
V1, V2		Tube 5879
X1, X2		Socket

ORDERING REPLACEMENT PARTS

When ordering a replacement component, please refer to the parts list. Identify the component by its symbol number and if possible its Gates' drawing number. The type of equipment in which the part is used is also necessary. This procedure will insure the customer receiving the correct component and at the earliest possible date.



GATES RADIO COMPANY GARDEN CITY, ILLINOIS										C-77729	
										SCALE	
LIST OF PARTS											
100	100	104	104	102	101	101	101	101	101	101	101
QTY.	QTY.	QTY.	QTY.	QTY.	QTY.	QTY.	QTY.	QTY.	QTY.	QTY.	QTY.
ITEM	REFERENCE	PT. NO.	PN.	DESCRIPTION	MATERIAL						



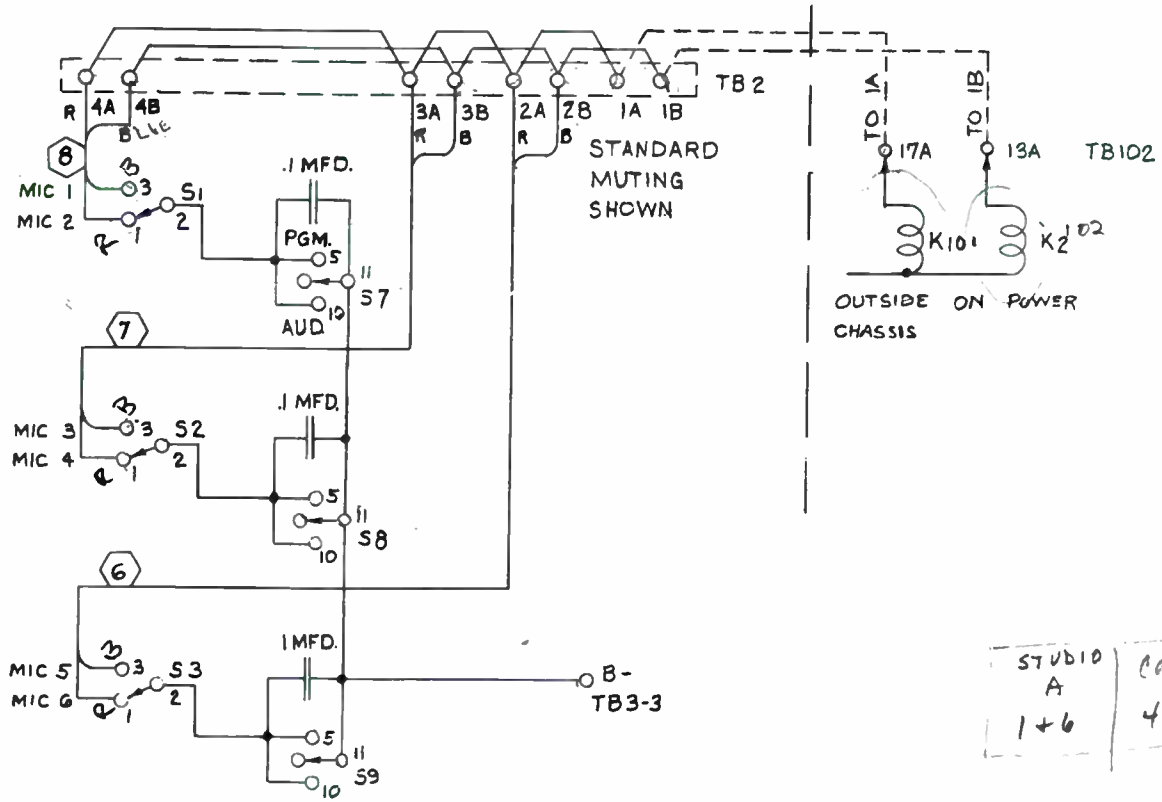
INSIDE CABINET VIEW OF
TERMINAL BOARDS

MODIFICATION DETAILS FOR ADDING RELAYS TO PROVIDE
ADDITIONAL SPEAKER MUTING ON M5548C DECK

- TO ADD 1 EXTRA RELAY (K105), R105, AND R107 = 1000Ω 2W
R102 = 500Ω 10W
- TO ADD 2 EXTRA RELAYS (K103 & K104), R105, R107, & R109 = 1000Ω 2W
R102 = 1000Ω 2W
- TO ADD 3 EXTRA RELAYS (K103, K104, & K105)
R105, R107, R109, & R111 = 1000Ω 2W
~~R102 = 1000Ω 2W~~

TITLE			
RELAY MOD. WIRING INFORMATION			
MON. AMP. & PWR SUPPLY RELAY DECK M5548C			
DR. BY	CHK. BY	ENG. DATE	FILE
DATE: 2-22-57	DATE	DATE	
<small>UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES</small>			C-77729

							FIRST PAGE FOR		GATES RADIO COMPANY QUINCY, ILLINOIS			B-65309	
												SCALE	
106	108	104	103	102	101	99 NO.	LIST OF PARTS						
QTY.	QTY.	QTY.	QTY.	QTY.	QTY.	ITEM	REFERENCE	PT. OF G.N.	FIN.	DESCRIPTION		MATERIAL	



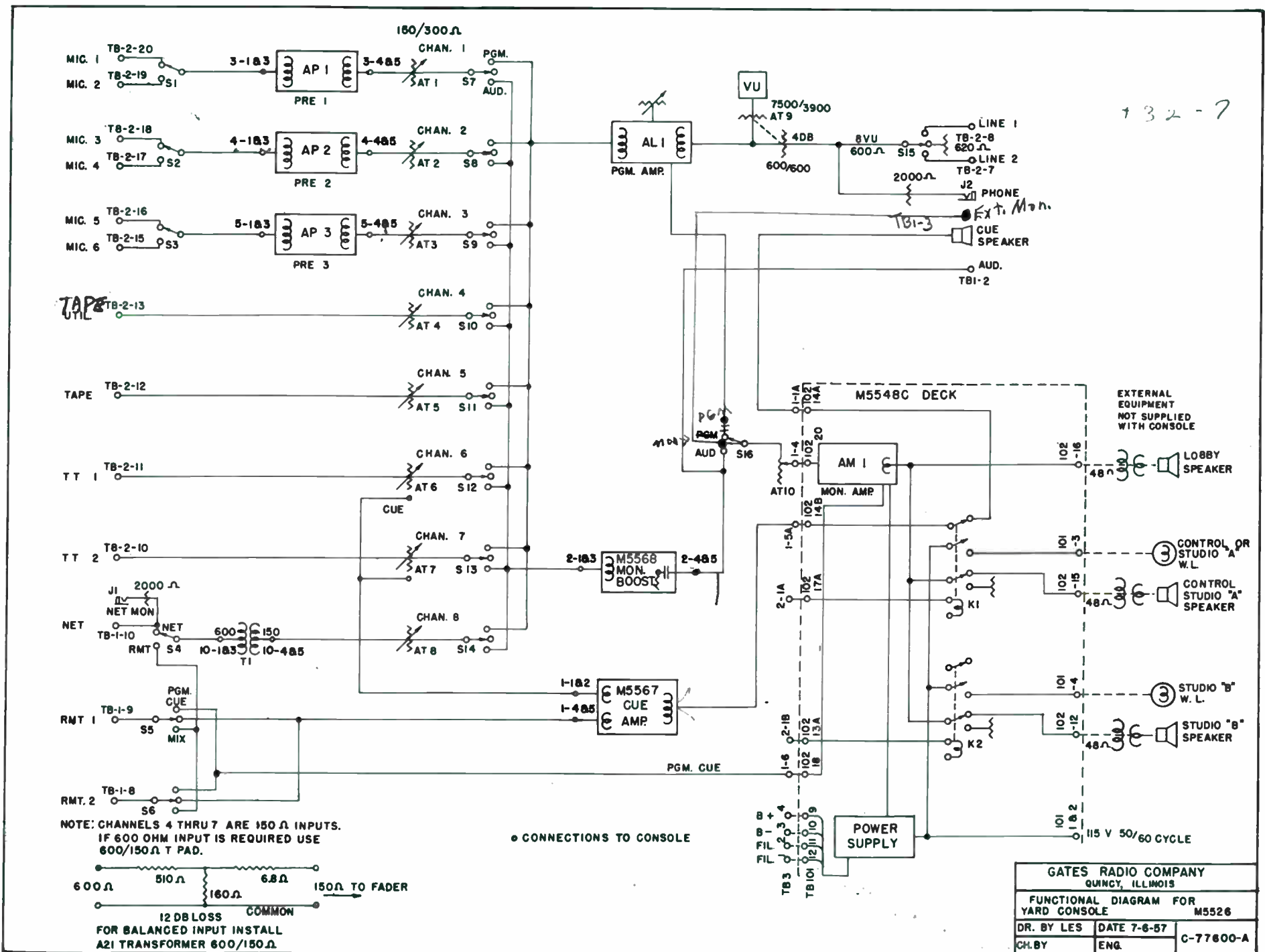
MIC 1,2,3+6
 RELAY K102
 JUMPER (1B, 2A, 3B, 4A, 4B)

MIC 4+5
 RELAY K101
 JUMPER (1A, 2B, 3A)

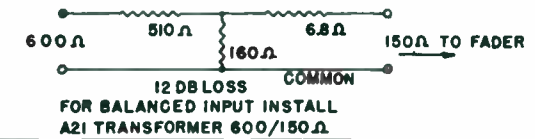
STUDIO A	CON	STUDIO B
1+6	4+5	2+3

TITLE MUTING WIRING ON KEY SWITCHES				NEW YARD		M5526	
MTL			FIN.			UNLESS OTHERWISE SPECIFIED, ALL TOLERANCES PER GATES SPEC. GUIDE.	
DR. BYLES DATE 7-8-57	CH. BY DATE	ENG. V.W DATE 7.15-57				B-65309	

132-7



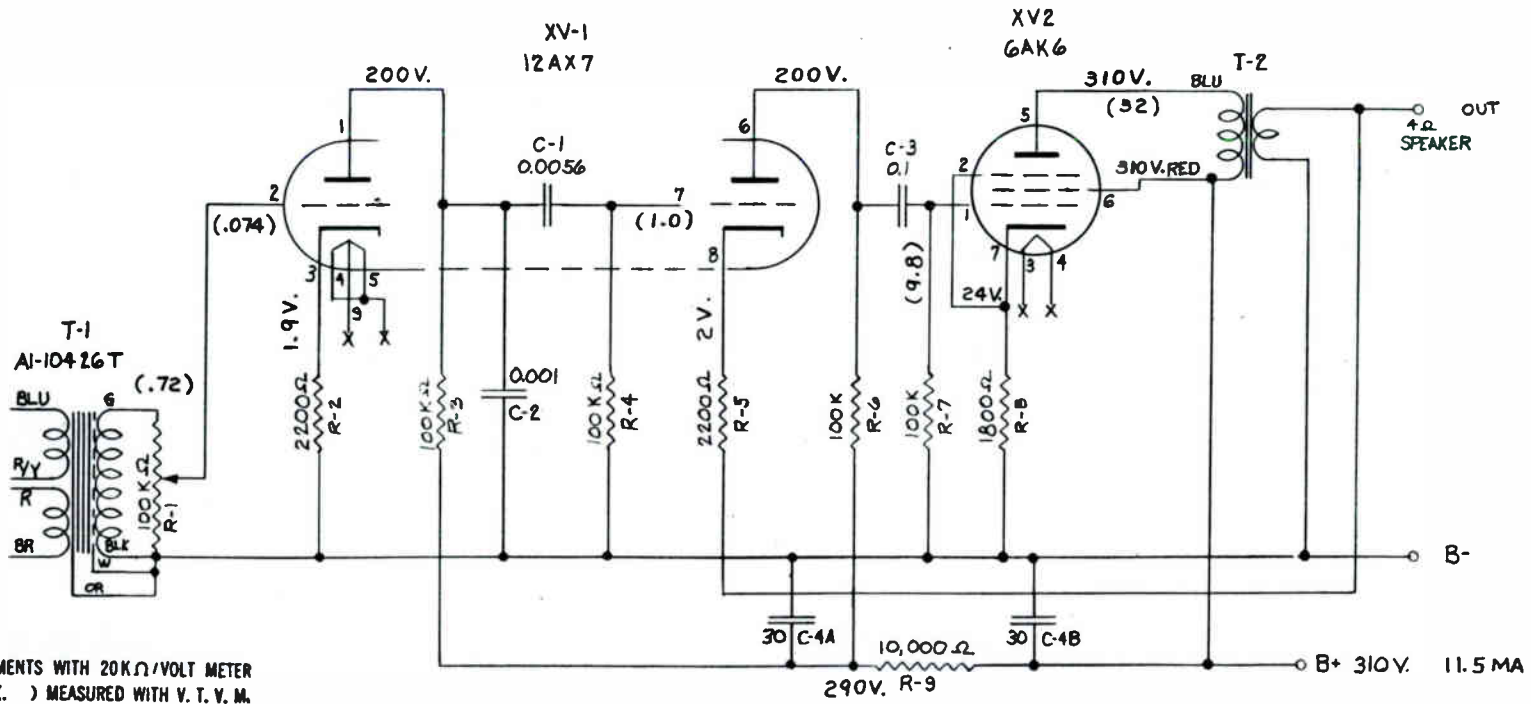
NOTE: CHANNELS 4 THRU 7 ARE 150 Ω INPUTS.
IF 600 OHM INPUT IS REQUIRED USE
600/150 Ω T PAD.



• CONNECTIONS TO CONSOLE

GATES RADIO COMPANY QUINCY, ILLINOIS		
FUNCTIONAL DIAGRAM FOR YARD CONSOLE M5526		
DR. BY LES	DATE 7-6-57	C-77600-A
CH. BY	ENG.	

							GATES RADIO COMPANY QUINCY, ILLINOIS	B-65304			
							SCALE				
108	108	104	103	102	101	SR. NO.	LIST OF PARTS				
QTY.	QTY.	QTY.	QTY.	QTY.	QTY.	ITEM	REFERENCE	PT. OR S.N.	FIN.	DESCRIPTION	MATERIAL



ALL D. C. MEASUREMENTS WITH 20K Ω /VOLT METER
 ALL R.M.S SIGNALS () MEASURED WITH V. T. V. M.
 ALLOW 20% ERROR ON MOST READINGS.

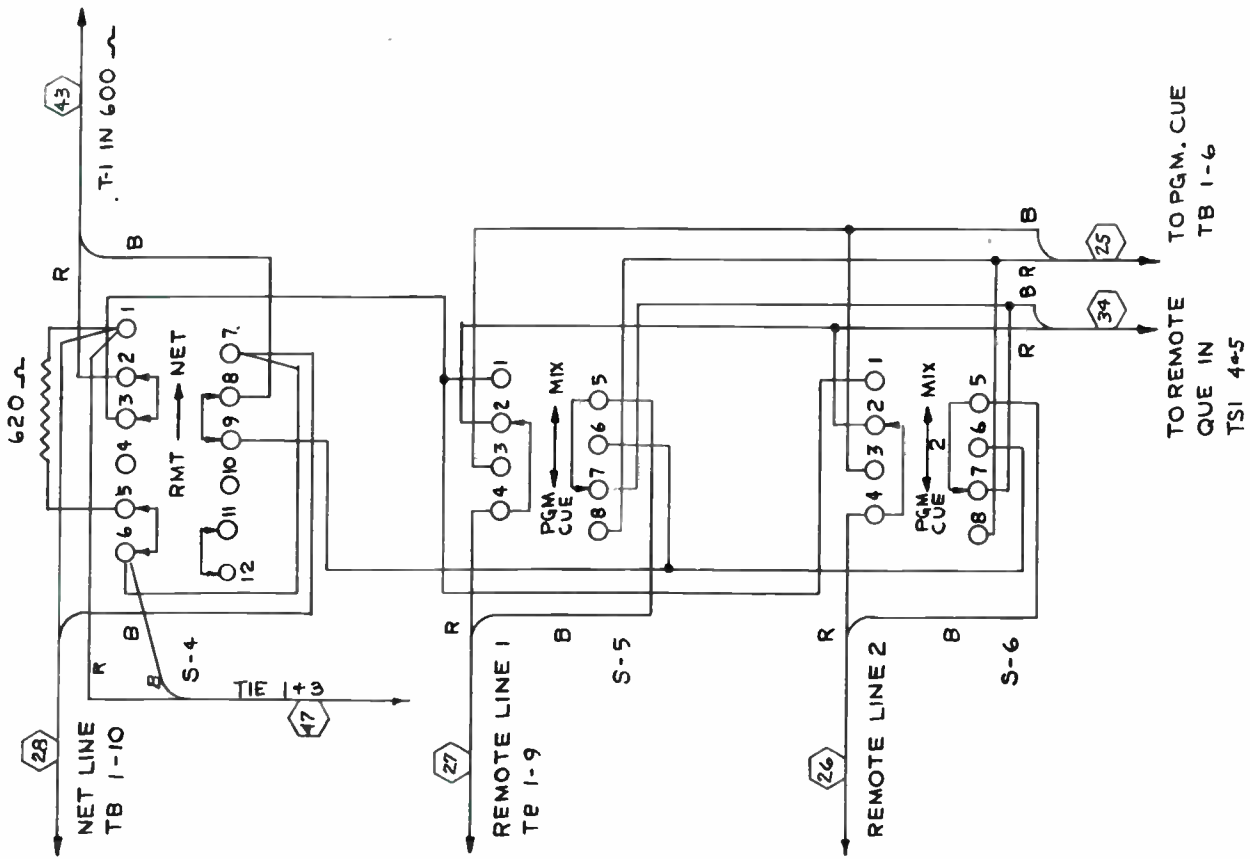
NOTE: R₁ EXTERNAL CONTROL

X ———— ϕ
 FIL. 6.3V.
 X ———— ϕ
 .45A.

VOLTAGES SHOWN ARE AS MEASURED ON M5526 YARD CONSOLE.
WHEN USED ON OTHER EQUIPMENT SEE VOLTAGES AS LISTED FOR THAT EQUIPMENT IN THE INSTRUCTION BOOK.

TITLE		
SCHEMATIC FOR M5567 CUE AMPLIFIER		
MTL _____	FIN. _____	UNLESS OTHERWISE SPECIFIED, ALL VOLTAGES PER GATES SPEC. BOOK.
DR. BY LES DATE 2-8-57	CH. BY _____ DATE _____	ENG. V. W. DATE 7-5-57
		B-65304

REAR VIEW



							GATES RADIO COMPANY QUINCY, ILLINOIS		B-65305			
							FIRST MADE FOR		SCALE			
106	108	104	103	102	101	QTY.	ITEM	REFERENCE	PT. OF G.N.	FIN.	DESCRIPTION	MATERIAL
QTY.	QTY.	QTY.	QTY.	QTY.	QTY.	QTY.	QTY.	REFERENCE	PT. OF G.N.	FIN.	DESCRIPTION	MATERIAL

TITLE WIRING FOR SWITCHES S-4, S-5 & S-6
M-5526 CONSOLE.

MTL _____ FIN. _____

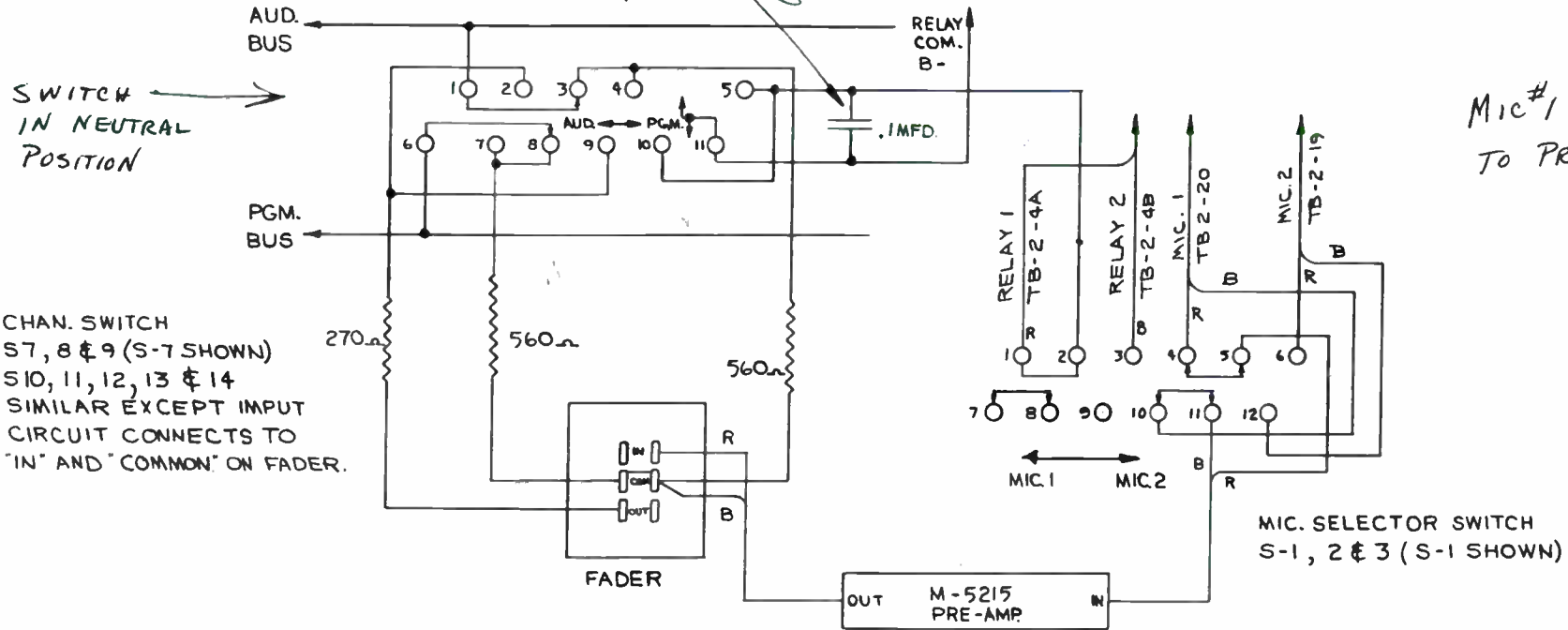
UNLESS OTHERWISE SPECIFIED,
ALL TOLERANCES FOR GATES
SPDS GOVERN.

DR. BY WV CH. BY _____ ENG. V. W. W.
DATE 7-1-57 DATE _____ DATE 7-15-57

B-65305

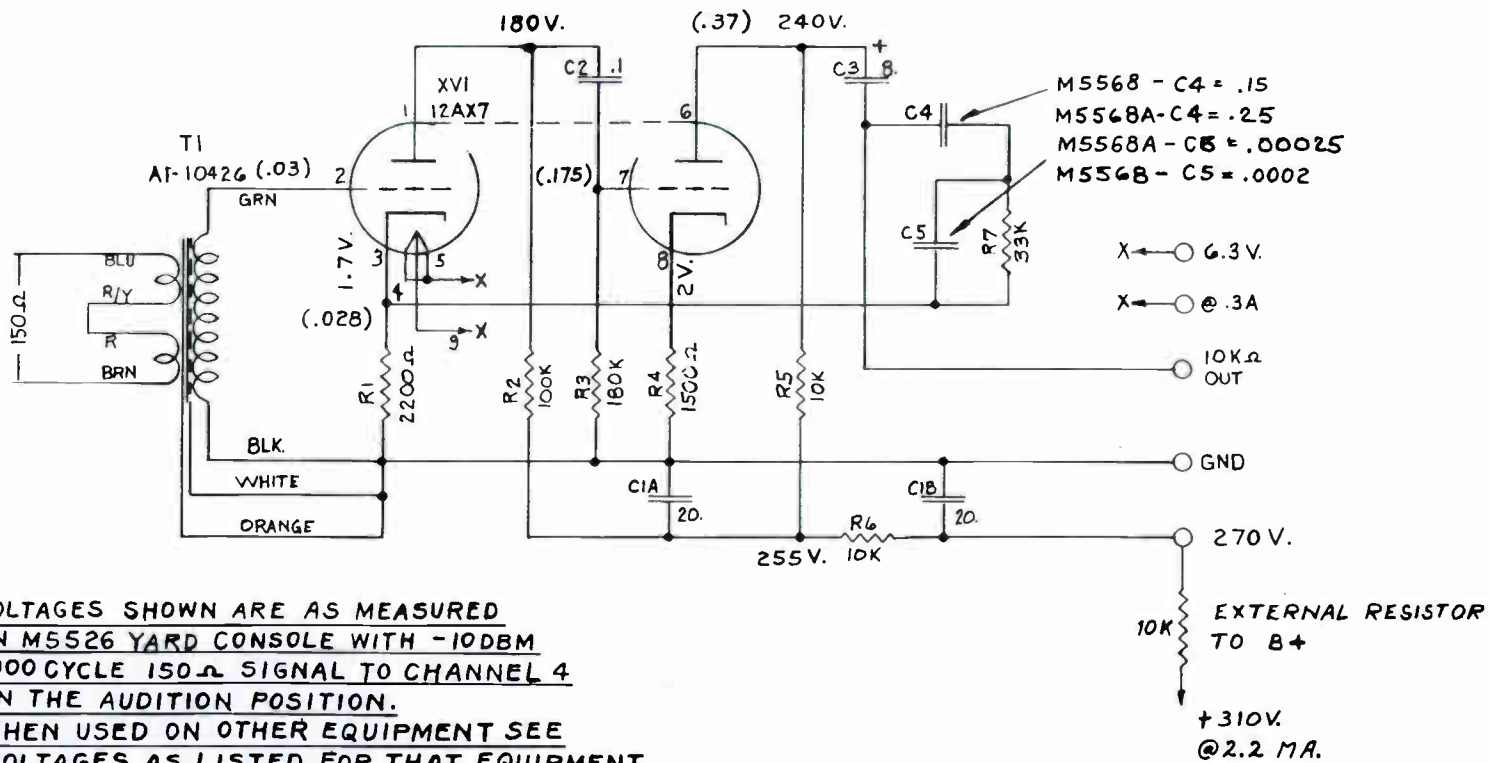
							MADE FOR	GATES RADIO COMPANY QUINCY, ILLINOIS			B-65306		
								LIST OF PARTS					SCALE
108	108	104	103	102	101	SR. NO.	REFERENCE	PT. OF G.N.	FIN.	DESCRIPTION	MATERIAL		
QTY.	QTY.	QTY.	QTY.	QTY.	QTY.	ITEM							

DELETE CONDENSER
ON S10, S11, S12
S13 & S-14



TITLE				SWITCH DETAIL M-5526	
				YARD CONSOLE	
MTL		FIN.		UNLESS OTHERWISE SPECIFIED, ALL TOLERANCES PER GAY'S SPEC CODES	
DR. BY	CH. BY	ENG. V. W.			
DATE 7-6-57	DATE	DATE 7-15-57	B-65306		

							GATES RADIO COMPANY QUINCY, ILLINOIS			B-65310 SCALE	
106	105	104	103	102	101	.. ..	LIST OF PARTS				
QTY.	QTY.	QTY.	QTY.	QTY.	QTY.	ITEM	REFERENCE	PT. OR G.N.	FIN.	DESCRIPTION	MATERIAL



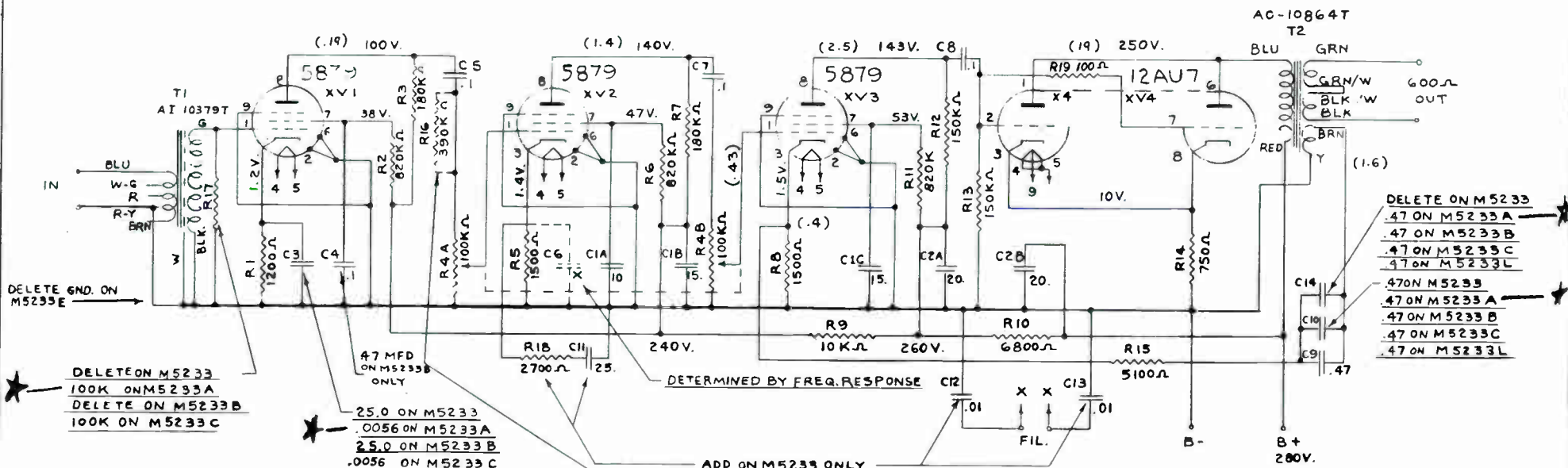
VOLTAGES SHOWN ARE AS MEASURED ON M5526 YARD CONSOLE WITH -10DBM 1000 CYCLE 150Ω SIGNAL TO CHANNEL 4 ON THE AUDITION POSITION.
WHEN USED ON OTHER EQUIPMENT SEE VOLTAGES AS LISTED FOR THAT EQUIPMENT IN THE INSTRUCTION BOOK.

ALL D. C. MEASUREMENTS WITH 20KΩ/VOLT METER
 ALL R.M.S SIGNALS () MEASURED WITH V. T. V. M.
 ALLOW 20% ERROR ON MOST READINGS.

TITLE			
SCHEMATIC OF MONITOR BOOSTER AMPLIFIER M5568, M5568A			
MTL		FIN.	
DR. BY LES		ENG. V. W.	
DATE 7-8-57		DATE 7-15-57	
UNLESS OTHERWISE SPECIFIED, ALL TOLERANCES PER GATED SPEC. DRAWING.			B-65310

							GATES RADIO COMPANY QUINCY, ILLINOIS		C-19446		
							SCALE				
LIST OF PARTS											
106	106	104	103	102	101	...	...	...	...	...
QTY	QTY	QTY	QTY	QTY	QTY	...	...	...	...	...
ITEM	REFERENCE	PT. CL.	FIN.	DESCRIPTION	MATERIAL						

NO. 18
R4A & R4B (EXTERNAL CONTROL)



DELETE GND. ON M5233E

DELETE ON M5233
100K ON M5233A
DELETE ON M5233B
100K ON M5233C

47 MFD ON M5233B ONLY
25.0 ON M5233
.0056 ON M5233A
25.0 ON M5233B
.0056 ON M5233C
.01 ON M5233L
.015 ON M5233D

NOTE
M5233 AMPLIFIER USED IN DYNAMOTE
M5233A AMPLIFIER USED IN "YARD" CONSOLE
M5233B AMPLIFIER USED IN BIAMOTE
M5233C AMPLIFIER USED IN GATE SWAY
M5233D AMPLIFIER USED IN DUALUX
M5233E AMPLIFIER USED IN DUALUX
M5233L AMPLIFIER USED IN STUDIOETTE (M5381)

DETERMINED BY FREQ. RESPONSE
ADD ON M5233 ONLY
ADD ON M5233A ONLY

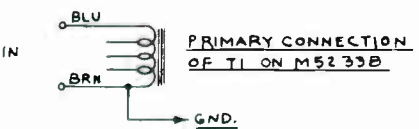
M5233 E SAME AS M5233-A EXCEPT R16-560K
M5233L SAME AS M5233-A EXCEPT R16-60K
680K

DELETE ON M5233
47 ON M5233A
47 ON M5233B
47 ON M5233C
47 ON M5233L
47 ON M5233
47 ON M5233A
47 ON M5233B
47 ON M5233C
47 ON M5233L

ALL VOLTAGES SHOWN WERE MEASURED ON THE M5233 DYNAMOTE. FOR VOLTAGE ON OTHER EQUIPMENT SEE THE INSTRUCTION BOOK FOR THAT EQUIPMENT.

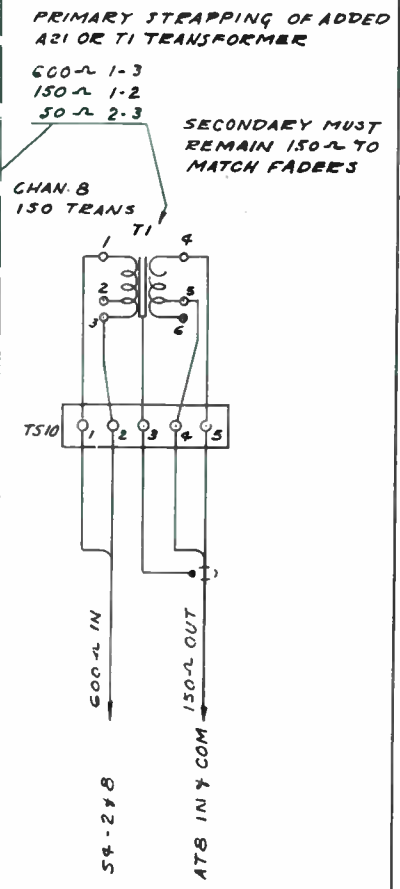
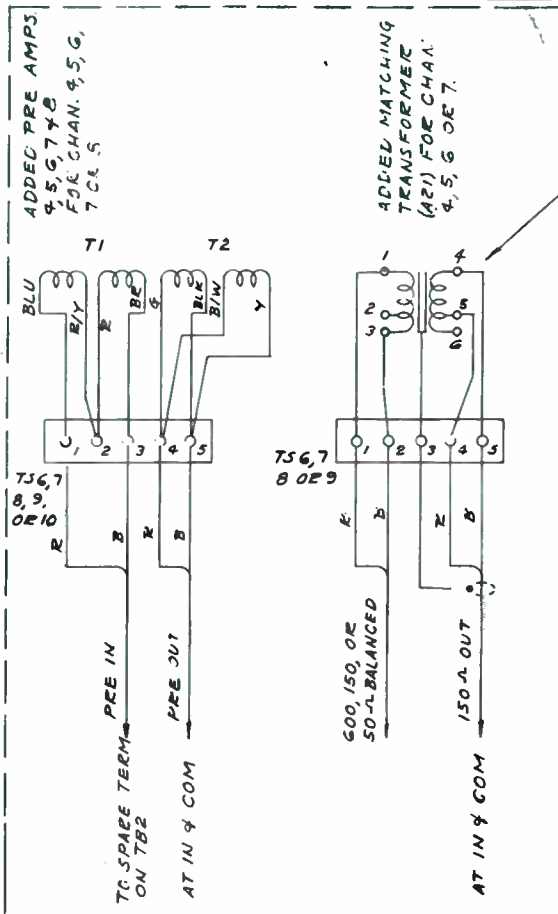
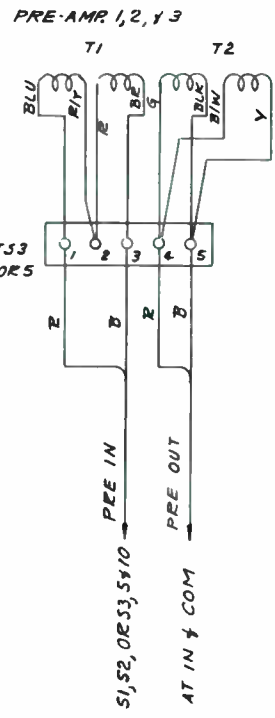
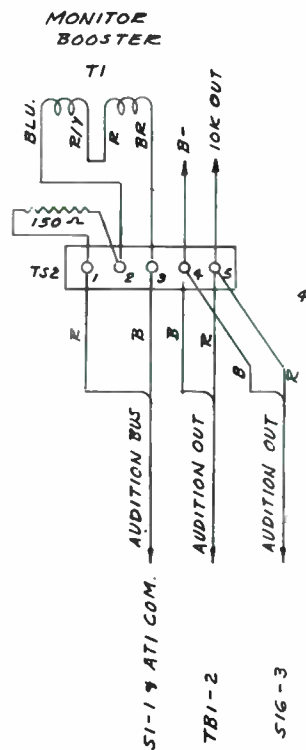
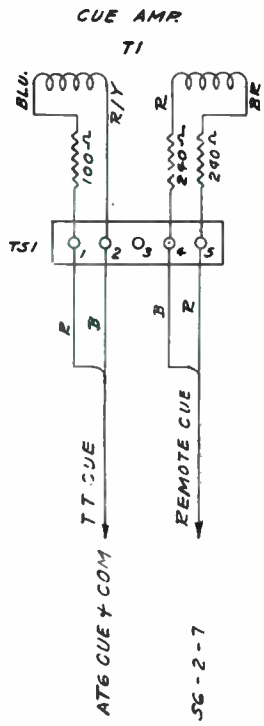
RMS SIGNAL VALUES WERE MEASURED WITH 1000 CYCLES AT -50 DBM AT 150Ω TO ONE OF THE INPUTS. THE AMPLIFIER OUTPUT IS ADJUSTED TO FEED +12 DBM TO A 600Ω LOAD (+8 DBM TO LINE) FADER IS SET AT 14 AND MASTER CONTROL AT 11.

ALL D. C. MEASUREMENTS WITH 200KΩ/VOLT METER
ALL R.M.S. SIGNALS () MEASURED WITH V. T. V. M.
ALLOW 20% ERROR ON MOST READINGS.



ECN 7306	11	10	9	8	7	6	5	4	3	2	1	SCALE	SCHEMATIC, PROGRAM AMPLIFIER M 5233, M5233A, B, C, D, E, L	
REV 3-11-58												FTL	FIN	DATE 10-7-58
ECN 7199	10	9	8	7	6	5	4	3	2	1	DATE 10-7-58	DATE 10-7-58	DATE 10-7-58	C-19446
REDRAWN														
TAB 8-7-58														
ECN 7098	8	7	6	5	4	3	2	1						
SDR 9-10-57														
ECN 6725	7	6	5	4	3	2	1							
RW 3-15-57														
ECN 6663	6	5	4	3	2	1								
JAA 6-22-56														
ECN 6619	5	4	3	2	1									
VPK 6-12-56														
ECN 6527	4	3	2	1										
JAA 3-2-56														
ECN 6557	3	2	1											
AWC 11-8-56														
ECN 6363	2	1												
AWC 11-8-56														
ECN 6333	1													
AWC 11-8-56														

GATES RADIO COMPANY BUNRY, ILLINOIS										C-77915 SCALE	
LIST OF PARTS											
106	106	104	103	102	101	00	00	00	00	00	00
QTY.	QTY.	QTY.	QTY.	QTY.	QTY.	ITEM	REFERENCE	PT. OR C.A.	FIN.	DESCRIPTION	MATERIAL



DOTTED LINES SHOWS WIRING OF OPTIONAL EQUIPMENT THAT CAN BE ADDED AS NEEDED TO CHANNEL 4, 5, 6, 7 AND B

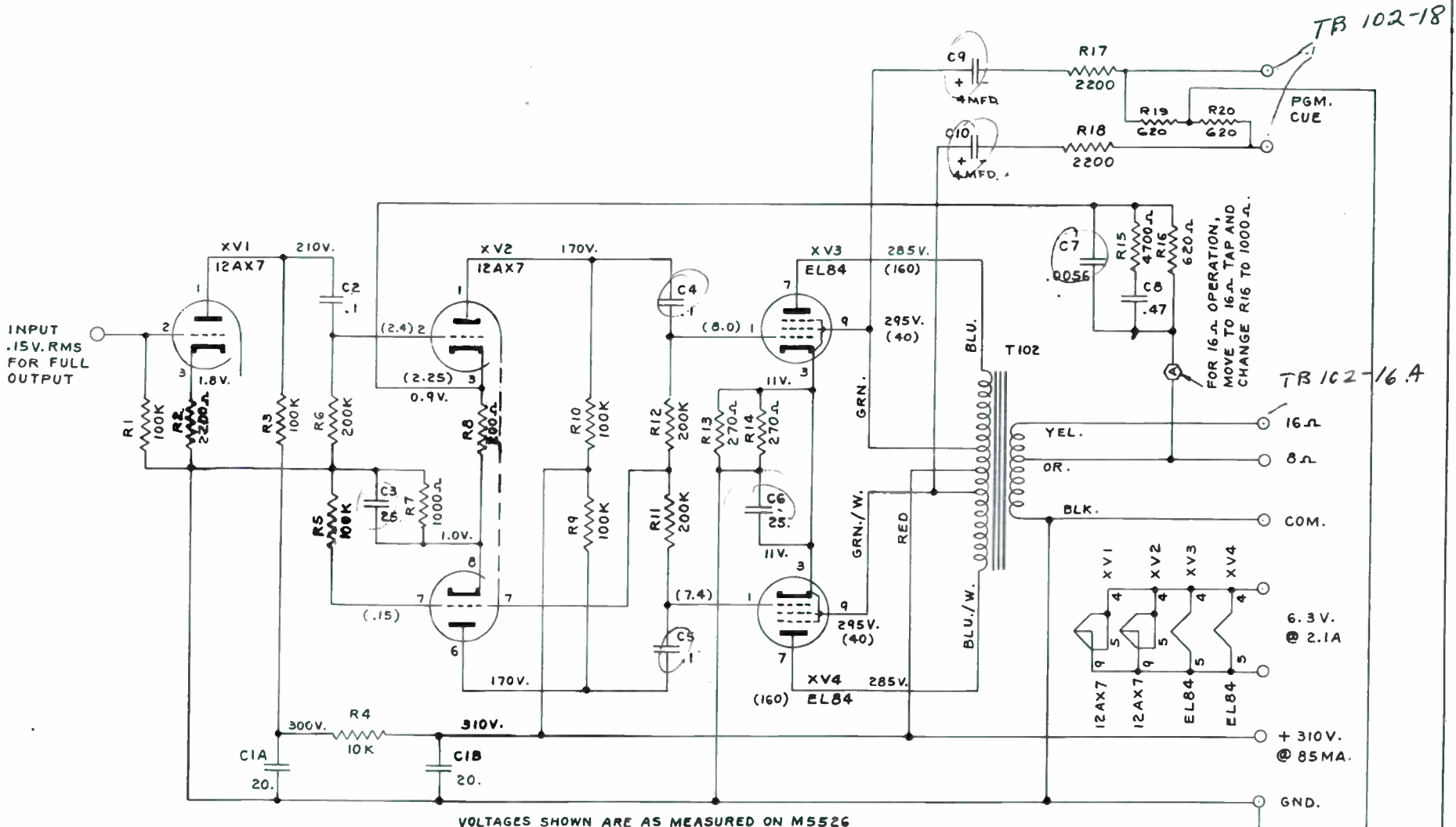
TITLE TERMINAL WIRING FOR ADDED PRE AMPS AND MATCHING TRANSFORMERS
CONSOLE M552G

APPROVED _____ **DATE** _____

DR _____ **CH. BY** _____ **ENG.** _____ **DATE** _____

C-77915

							GATES RADIO COMPANY QUINCY, ILLINOIS		C-77721 SCALE		
100	100	100	100	100	100	100	LIST OF PARTS				
QTY.	QTY.	QTY.	QTY.	QTY.	QTY.	ITEM	REFERENCE	PT. OF C.K.	FIN.	DESCRIPTION	MATERIAL



VOLTAGES SHOWN ARE AS MEASURED ON M5526
YARD CONSOLE WITH 1000 CYCLE SIGNAL WITH
GAIN SET FOR +40DBM (10WATT) ACROSS 16-ohm LOAD.
WHEN USED ON OTHER EQUIPMENT SEE VOLTAGES
AS LISTED FOR THAT EQUIPMENT IN THE
INSTRUCTION BOOK.

ALL D. C. MEASUREMENTS WITH 20K/ohm/VOLT METER
ALL R.M.S SIGNALS () MEASURED WITH V.T.V. M.
ALLOW 20% ERROR ON MOST READINGS.

REV 07/20 E.L.D. 11/20/57	TITLE SCHEMATIC - 10 WATT MONITOR AMP. FOR M5548 POWER DECK			DATE 7-11-57	DATE JA	ENG. WK DATE	FIN.	UNLESS OTHERWISE SPECIFIED, ALL VALUES ARE FOR GATES ORDER PARTS	C-77721
	DR BY D.L.	CH BY	DATE						

