INSTRUCTION BOOK

GATES MODEL 52-CS STUDIOETTE

Gates Radio Company

MANUFACTURING ENGINEERS SINCE 1922

QUINCY, ILLINOIS

TEMPORARY INSTRUCTIONS FOR

GATES TYPE 52-CS STUDIOETTE MO-3388

PREFACE

The following instructions for the installation and operation of the Gates 52-CS Studioette are offered as temporary instructions until the regularly scheduled instruction book is received from the printer. The printed instruction book will be forwarded in the very near future.

The instructions contained in this book, together with the diagrams and the enclosed brochure on the Model 52-CS, should suffice in the installation and operation of this unit.

The engineer in charge will find that the operating instructions are covered very completely in the brochure. The installation procedure will be outlined on the following pages.

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Before the installation is begun it is suggested that the engineer in charge become familiar with the Studioette functional diagram C-16536. A careful study of this diagram will clearly indicate the various major circuit components, such as amplifiers, keys and mixing circuits and the part that these various components play in the overall operation of this unit. It is likewise suggested that a careful survey be made of the tentative location of the Studioette and a sketch drawn of the proposed wiring layout. If some attention is given to this matter before the actual wiring is started the time will be well spent for the ultimate result will be a professional installation that is relatively easy to make and extremely orderly as well as simple to maintain.

GENERAL DESCRIPTION

The Gates Model 52-CS Studioette is an entirely self-contained speech input system. While not as elaborate as the SA-50 or the SA-40 Console it does incorporate sufficient circuits so that it forms an exceedingly flexible speech input system.

The entire 52-CS is housed in a sheet metal cabinet of a rather unique design, The cabinet itself is streamlined by virtue of a sloping front panel and sweeping cabinet lines. The main chassis is mounted in an inverted position with the tubes projecting downward. A hinge top provides easy accessibility to the various components, such as the resistors, condensers and the underside of tube sockets and transformers. Under this hinged lid are also accessible the various tie points to which internal connections are made for various microphone impedance and relay combinations.

The tubes are exposed by lifting the cabinet proper, which is hinged on a base plate at the rear.

As mentioned before, the Studioette is entirely self-contained. It needs no external power supply. The 52-CS contains the following main circuit components:

a. Two preamplifiers consisting of one 6J7 and one 6C5 cascaded, and terminating in an additional 6C5 cathode follower stage. The cathode follower stage provides an extremely low distortion and low noise methods of transferring a high impedance circuit to a low impedance device, such as a mixing channel.

b. One Program Amplifier employing a 6J7 first stage and a 6C5 second stage, a 6SJ7 third stage and a 6SN7 output stage. It is well to note that the master gain control for the program amplifier is located between the second and third stages. This provides an excellent way of maintaining a good signal to noise ratio, resulting in better overall noise characteristics in the entire unit. The position of this gain control does make it possible to overload the first stage of the program amplifier, however, with proper operation this will never occur.

c. One monitor amplifier. The monitor amplifier is entirely push-pull and consists of a 6SN7 push-pull feeding a second 6SN7 push-pull, which in turn drives two 6V6's functioning as push-pull output tubes.

d. One Power Supply employing a type 5U4G rectifier. This power supply furnishes all the necessary power for the operation of all of the amplifiers in the Studioette, in addition to supplying the energy for the speaker muting relays. Voltage for the excitation of the relays is obtained from the voltage drop across a 100 ohm resistor located in the center tap of the high voltage winding on the power transformer.

e. Mixing System. The mixing system consists of a four-channel mixer utilizing ladder type controls connected in a parallel type mixing circuit. The mixing system is extremely linear in its operation causing a minimum of frequency discrimination between the minimum and maximum rotation on the individual mixing controls. The mixing circuit is of the high level low impedance type.

f. Circuit Switches. Lever type key switches are employed in all instances where audio circuits require a switching action such as in the case of microphones, remote lines, etc.

g. VU Meter. A four-inch type Weston Illuminated VU meter is employed for visual level indication. This VU meter is so arranged in the circuit that it indicates a zero reading when an audio level of +8 dbm is being fed into either one of the two program lines. The VU meter is isolated from the external program lines by virtue of its position in the circuit. It is located on the high side of the 6 db isolation pad. The meter is placed in this position so that various telephone line reactances will not cause erroneous readings at various audio frequencies.

h. Relays. Two telephone type relays are employed for speaker muting and warning light operations. These relays are so arranged in the circuit that their operation is extremely flexible. They may be connected in such a fashion that they are energized in any sequence desired by the two microphone lever keys. The microphone selector keys are used to set up not only the microphones in use, but also the circuit for the excitation of any particular relay. The actual excitation of the relay is performed by a miniature switch located on each of the mixer 1 and mixer 2 controls. These relays are normally de-energized. As the mixer 1 control, for example, is moved from its infinity position the relay is energized and thus mutes the speaker in that particular studio and also completes the warning light circuit for that particular studio. The same application applies to mixer 2.

i. Inputs. The 52-CS provides the following inputs:

1. Four microphone inputs. 30/50 ohms or 200/250 ohms. Connected for 250 ohms at the factory.

2. Two turntable inputs, 250 ohms. The turntable inputs are connected directly to the mixing channel. Therefore, turntable preamps must be provided at the turntables, or at least before the turntable inputs on the Studioette. The various Gates type turntables are usually provided with these preamps.

3. One network input, 250 ohms. This input is also connected directly to the mixing channel. It is, therefore, as unbalanced input and must be isolated from the incoming network line by an isolation transformer. Many network lines when installed by the telephone company are already provided with isolation transformers. It should be noted, however, that in order to take advantage of a proper impedance match the secondary of this isolation transformer must be connected for 250 ohms impedance. If an isolation transformer is not provided at your particular installation we suggest that you employ a Gates Type MI-4900C isolation transformer.

4. Three remote lines, impedance 500/600 ohms. These remote lines are connected to the mixing channel by means of three remote switches. The remote lines are isolated from the mixing channel by a common isolation transformer contained in the Studioette. Therefore, equalized or unequalized remote lines may be connected directly to the remote inputs on the Studioette.

5. External Program Amplifier Connections. Two external program amplifier connections are provided by means of a program input switch. This switch has three positions, making it possible to operate the Studioette program amplifier from either the internal mixing system or any one of two external inputs. External inputs are 250 ohms impedance. This arrangement adds to the flexibility of this unit by way of providing for additional inputs should future expansion demand this.

6. Monitor amplifier inputs. The monitor amplifier inputs are of a high impedance bridging nature. They are controlled by means of a selector switch. An external monitor signal may be applied to the monitor amplifier through the air monitor connection. Such an air monitor signal can be obtained from the AM modulation monitor, the FM station monitor or by means of sampling diodes connected to the antenna system of the transmitting plant. The use of the air monitor system is very advantageous for it provides a complete microphone to antenna check on the operation of the entire broadcasting plant.

j. Outputs.

1. Program line outputs. Two program line outputs are provided by means of an output key. Both outputs are 500/600 ohms impedance. If possible, it is recommended that both program outputs be connected for service during the time of installation. For example, program line 1 should be connected to the regular program loop from the studios to the transmitting plant. Program line output 2 should be connected to the emergency loop, or possibly the transmitter order line. If this procedure is followed and a similar switching arrangement is provided at the transmitting plant it will become exceedingly easy to change program loops should an emergency arise which necessitates such an action.

2. Turntable Cue, 250 ohms. The use of a turntable cueing system is becoming increasingly popular due to the convenience and flexibility it adds to turntable cueing. It is suggested that the turntable cue output be used in conjunction with a cueing amplifier, such as the Gates Type SA-22. The signal for turntable cueing is derived from any turntable not in program service by means of a cue step on turntable mixers 3 and 4.

3. Order Phone, impedance 500 ohms. The order phone circuit can be connected to any remote line by means of key switches. It is exceedingly useful in lining up remote broadcasts without tying up other console facilities. It is suggested that a sound powered phone be utilized for this service.

4. Loud Speaker Outputs. Provisions are made for three loud speaker outputs. The speaker circuits are connected in parallel across the output of the monitor amplifier. If three speakers are used, each speaker should reflect impedance of 1500 ohms. If four speakers are used, each speaker should have an impedance of 2000 ohms. Two of the speakers are muted by the muting relays. If an additional muted speaker is required for operation on a circuit other than that controlled by the two muting relays, an additional muting relay may be had externally. A Gates Type A-42105 relay should be employed for this purpose. It is suggested that no more than four loud speakers be operated from the Studioette monitor amplifier. If additional monitor speakers are required, use a separate monitor amplifier for driving these additional speakers. The Gates Type SA-10 monitor amplifier will provide more than ample power for most requirements.

5. Warning Lights. Two warning light switching circuits are provided. The warning light circuits are controlled by the two speaker muting relays. Voltages, either AC or DC, not to exceed 115 V. may be used for warning light operation. Warning lights on any one circuit should not exceed 60 W.

INSTALLATION PROCEDURE

As mentioned in preceding paragraphs, the engineer in charge should become well acquainted with the basic Studioette circuit before installing this equipment. If the decision of location has been made it would be well to determine the microphone impedance to be used and also the location of the various microphone circuits in regard to the studios in which they are placed. This is suggested so that the proper connections can be made in the Studioette to effect the correct switching circuits. When received from the factory the microphone inputs have been connected for 200/250 ohms. If microphones of 30/50 ohms are to be used make these changes on tie point 1 and tie point 2, located directly above each input transformer. Move the shielded pair connected to terminal 5 and 6 on tie point 1 or tie point 2 to terminal 7 and 8 on tie point 1 or tie point 2. The impedance of the program amplifier input should not be changed under any conditions. A change of the impedance on the input of the program amplifier will be detrimental to the operation of this unit by way of gain and response changes. After the location of the various microphones has been determined it is suggested that relays associated with the speakers located in the various studios concerned with these microphones be adjusted for the proper muting action.

The key controlling microphone 1 and 2 also sets up the circuit for the control of muting relay E1. The key associated with microphone 3 and 4 controls the circuit of relay E2. Relays E1 and E2 may be connected for operation in any sequence by means of jumpers on tie point 4. The coil of relay E1 is connected to terminal 2, tie point 4. The coil of relay E2 is connected to terminal 3, tie point 4. Microphone 1 relay circuit is connected to terminal 4, tie point 4; microphone 2 circuit to terminal 5, microphone 3 to terminal 6 and microphone 4 to terminal 7, all located on tie point 4. For example, if microphone 1 and 2 are located in Studio A, then relay E1 will control the speaker muting in Studio A. For this operation, on tie point 4 connect terminal 4 to terminal 2 and terminal 5 to 2. The same procedure in regard to the other terminals would apply to microphone 3 and 4. If an additional muting circuit is required add one Type Gates A-42105 Relay externally. The coil of this external relay should be connected across terminals 20 on the middle terminal strip at the base of the console. The control for this relay is connected to terminal 8 on tie point 4. Terminal 8 should then be connected to terminals 4, 5, 6 or 7 depending upon the circuit set up. The microphone selector switches, as mentioned in preceding paragraphs, merely set up the muting circuit for its porper operation. Miniature switches located on the mixer 1 and mixer 2 attenuators control the actual operation of the muting relays. As mixer 1 or mixer 2 control is advanced from its infinity position the miniature switches will be actuated and the relay circuit will function.

CABLE INSTALLATION AND ISOLATION

The final results of any speech input system depend to a great extent upon the care taken in its installation. In any high gain system such as exists with the Model 52-CS Studioette it becomes increasingly important to isolate low, medium and high level circuits from each other and to employ the proper type of connecting cables and finally to install an adequate ground system. We suggest that all external connections to the Studioette, with the possible exception of the 115V power input, be made with twisted pair shielded wire. It is likewise suggested that the inputs and outputs of the Studioette be divided into three major categories .... namely, low level lines; medium level lines and high level lines.

The low level lines, which are the most important of all from the consideration of crosstalk and noise, should include only the four microphone input lines and possibly the two program amplifier external inputs. Great care should be taken in routing these microphone lines so they are not run in the proximity of 115V AC power lines. These microphone lines should be run in shielded cable for the entire length of their circuit, and if junction boxes are necessary these junction boxes should be well shielded. If after installing these microphone lines it is noticed that any one circuit seems to contain excessive hum or noise, the line should be disconnected from the console at the console terminal board and a dummy load inserted in its place across the terminal board connections. If the noise disappears after disconnecting the line, it is apparent that the noise is being picked up somewhere in the routing of this microphone line. Steps should then be taken to change the position of this line in respect to other wiring in the building. It is also possible that hum and noise may be induced in a microphone circuit at the microphone itself. This is sometimes caused by AC wiring in the walls or floor of the studio. This condition can be checked by merely moving the microphone from one location in the studio to another and then observing the difference in hum level. On long runs of microphone lines it is sometimes necessary to ground these lines at various points. This is particularly true if the speech equipment is in the proximity of radio frequency transmitters.

The medium level lines should include turntable inputs, network, remote lines, monitor amplifier inputs and program line outputs. Care should also be exercised in the position of these lines in regard to any 115V power source. It is recommended that all of these circuits be connected by means of twisted pair shielded cable.

The high level lines, while not subject to noise pickup themselves, may cause pickup in microphone or program line circuits by their position. It is possible to run speaker lines, warning light circuits and power circuits in the same conduit without any detrimental effects. These circuits should also be connected by means of twisted pair shielded cable in order to reduce their radiation to the more susceptible microphone and program circuits.

The subject of the proper grounding of speech equipment and various interconnecting cables cannot be stressed too strongly. On terminal board TB1, on the base of the console, terminal 9 is provided for a common ground for both the equipment and all incoming and outgoing lines. It is recommended that the shields of all external connections be bonded together after they enter the base of the Studioette and then that this bonding be brought directly to terminal 9 on terminal board TB1. As a general comment, if noise and hum seems to be peculiar to any particular circuit in the Studioette it is suggested that efforts be made to localize the trouble at some external point before the blame is placed upon the equipment itself. Our past experience has shown that equipment properly tested will perform according to specifications if careful installation is made. It is true that a noise free location is sometimes difficult to obtain, however by using the process of elimination on suspected external noise sources it is usually possible to reduce outside interference to a negligible amount. During installation should any problems arise that cause trouble in their solution, the Gates Radio Company invites inquiries along this line, and will utilize its past experience in suggesting the most practicable cure for the problem.

The various input and output terminations on the three terminal boards located on the base of the Studioette are clearly described on the wiring diagram, E-25125. Holes are provided in the base of the Studioette for the entrance of all external connections.

ELECTRICAL CHARACTERISTICS

Overall gain microphone to program line, 104 to 106 db.

Remote, network and turntable inputs to program line, 62 to 65 db.

Noise with minus 60 db simulated microphone input and ≠8 simulated program output, 60 db or better below ≠8 dbm.

Response, plus or minus 1.5 db from 30 to 15,000 cycles.

Distortion, less than 1% from 50 cycles to 15,000 cycles.

GATES RADIO COMPANY
Quincy, Ill. U.S.A.

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SYMBOL NO.	DESCRIPTION
A1	#1075 Fuse Holder
C1	.0001 mfd. Type K Capacitor Sangamo
C2	40-40 mfd., 250 V. Cond. Sangamo PLD-2540
C3	.05 mfd. 400 V. Tubular C-D
C4	25 mfd., 25 V. BR-252A C-D
C5	.1 mfd., 400 V. Aerolite Aerovox
C6	.1 mfd., 400 V. Aerolite Aerovox
C7	Value Determined By, Frequency Response
C8	25 mfd., 25 V. BR-252A C-D
C9	20-20 mfd., 450 V. Cond. Type PLD-4520 Sangamo
C10	Part of C9
C11	50 mfd., 25 V. Cond. BR-502 C-D
C12	.0001 mfd. Type K Capacitor Sangamo
C13	Part of C2
C14	25 mfd., 25 V. BR-252A C-D
C15	.1 mfd., 400 V. Aerolite Aerovox
C16	.05 mfd. 400 V., Tubular C-D
C17	.1 mfd., 400 V. Aerolite Aerovox
C18	Value Determined by Freq. Response
C19	25 mfd., 25 V. BR-252A C-D
C20	20-20 mfd., 450 V. Cond. Type Sangamo PLD-4520
C21	Part of C20
C22	50 mfd., 25 V. Cond. BR-502 C-D
C23	.1 mfd., 400 V. Aerolite Aerovox
C24	.5 mfd., 400 V. Aerolite Aerovox
C25	20-20-20 mfd., 25 V. UP-222-25 C-D
C26	Part of C25
C27	Part of C25
C28	.1 mfd., 400 V. Aerolite Aerovox
C29	20-20 mfd., 450 V. Type Sangamo PLD-4520
C30	Part of C29
C31	.015 mfd., 400 V. Tubular C-D
C32	.5 mfd., 400 V. Aerolite Aerovox
C33	20-20 mfd., 450 V. Type Sangamo PLD-4520
C34	Part of C33
C35	.1 mfd., 400 V. Aerolite Aerovox
C36	25 mfd., 25 V. BR-252A C-D
C37	20-20 mfd., 450 V. Type Sangamo PLD-4520
C38	Part of C37
C39	.1 mfd., 400 V. Aerolite Aerovox
C40	.1 mfd., 400 V. Aerolite Aerovox
C41	20-20 mfd., 450 V. Type Sangamo PLD-4520
C42	Part of C41
C43	.1 mfd., 400 V. Aerolite Aerovox
C44	.1 mfd., 400 V. Aerolite Aerovox
C45	.1 mfd., 400 V. Aerolite Aerovox
C46	.1 mfd., 400 V. Aerolite Aerovox
C47	20-20-20 mfd., 25 V. UP222-25 C-D
C48	Part of C47
C49	20-20 mfd., 450 V. Type Sangamo PLD-4520
C50	Part of C49

SYMBOL NO.	DESCRIPTION
C51	20-20 mfd., 450 V. Type Sangamo PLD-4520
C52	Part of C51
C53	25 mfd., 50 V. Sangamo MT-0525
C54	.1 mfd., 200 V. Aerolite Aerovox
C55	.1 mfd., 200 V. Aerolite Aerovox
C56	.1 mfd., 200 V. Aerolite Aerovox
C57	.1 mfd., 200 V. Aerolite Aerovox
C58	25 mfd., 25 V. BR-252A C-D
C59	25 mfd., 25 V. BR-252A, C-D
C60	.1 mfd., 200 V. Aerolite Aerovox
C61	.1 mfd., 200 V. Aerolite Aerovox
E1	Relay Clare A-47078
E2	Same as E1
F1	3 Amp. Littlefuse Type 3AG
J1	#701 Jr. Jack Mallory
L1	R18 Choke UTC
M1	VU Meter, Burlington, A-6398 (GD-100-J11)
Pad 1	Meter Pad, A-6453-101 (GA-100-S12)
Pad 2	6 DB Pad, C-16240-101
Pad 3	Cue Pad, A-5717-101
R1	2700 ohm 1/2 W. 10% A-B
R2	56 K ohm 1/2 W. 10% A-B
R3	56 K ohm 1/2 W. 10% A-B
R4	56 K ohm 1/2 W. 10% A-B
R5	56 K ohm 1/2 W. 10% A-B
R6	56 K ohm 1/2 W. 10% A-B
R7	100 K ohm 1/2 W. 10% A-B
R8	1500 ohm 1/2 W. 10% A-B
R9	15 K ohm 1 W. 10% A-B
R10	470 K ohm 1/2 W. 10% A-B
R11	2700 ohm, 1 W. 10% A-B
R12	1500 ohm 1 W. 10% A-B
R13	2700 ohm 1/2 W. 10% A-B
R14	56 K ohm 1/2 W. 10% A-B
R15	56 K ohm 1/2 W. 10% A-B

SYMBOL NO.	DESCRIPTION
R16	56 K ohm 1/2 W. 10% A-B
R17	56 K ohm 1/2 W. 10% A-B
R18	56 K ohm 1/2 W. 10% A-B
R19	100 K ohm 1/2 W. 10% A-B
R20	1500 ohm 1/2 W. 10% A-B
R21	15 K ohm 1 W. 10% A-B
R22	470 K ohm 1/2 W. 10% A-B
R23	2700 ohm 1 W. 10% A-B
R24	1500 ohm 1 W. 10% A-B
R25	100 K ohm 1/2 W. 10% A-B
R26	1500 ohm 1/2 W. 10% A-B
R27	100 K ohm 1/2 W. 10% A-B
R28	56 K ohm 1/2 W. 10% A-B
R29	56 K ohm 1/2 W. 10% A-B
R30	56 K ohm 1/2 W. 10% A-B
R31	100 K ohm 1/2 W. 10% A-B
R32	1500 ohm 1/2 W. 10% A-B
R33	56 K ohm 1 W. 10% A-B
R34	470 K ohm 1/2 W. 10% A-B
R35	2000 ohm 1/2 W. 5% A-B
R36	750 ohm 1 W. 5% A-B
R37	100 K ohm 1/2 W. 10% A-B
R38	470 K ohm 1/2 W. 10% A-B
R39	470 ohm 1 W. 10% A-B
R40	4700 ohm 1 W. 10% A-B
R41	10 K ohm 1 W. 10% A-B
R42	2700 ohm 1 W. 10% A-B
R43	2700 ohm 1 W. 10% A-B
R44	82 K ohm 1 W. 10% A-B
R45	82 K ohm 1 W. 10% A-B
R46	12 K ohm 1 W. 10% A-B
R47	82 K ohm 1 W. 10% A-B
R48	270 K ohm 1/2 W. 10% A-B
R49	3300 ohm 1 W. 5% A-B
R50	3300 ohm 1 W. 5% A-B
R51	270 K ohm 1/2 W. 10% A-B
R52	82 K ohm 1 W. 10% A-B
R53	270 K ohm 1/2 W. 10% A-B
R54	270 K ohm 1/2 W. 10% A-B
R55	390 K ohm 1/2 W. 10% A-B
R56	390 K ohm 1/2 W. 10% A-B
R57	470 ohm 2 W. 10% A-B
R58	470 ohm 2 W. 10% A-B
R59	B-21170 Resistor
R60	100 ohm 10 W. Wirewound P.T.
R61	**A-3404-8 1000 ohm Control**
R62	Spec. #2574-EF Control 250/500 Daven
R63	360 ohm 1/2 W. 5% A-B
R64	Spec. #2574-EF Control 250/500 Daven
R65	360 ohm 1/2 W. 5% A-B
R66	LAQ 350 EF Control 250/500 Daven
R67	360 ohm 1/2 W. 5% A-B
R68	LAQ 350 EF Control 250/500 Daven
R69	360 ohm 1/2 W. 5% A-B
R70	CP354-X, 250,000 ohm Control Daven
R71	100 M1, 100,000 ohm Dual Control

SYMBOL NO.	DESCRIPTION
R72	100 K ohm 1 W. 10% A-B
R73	100 K ohm 1 W. 10% A-B
R74	470 ohm 1 W. 10% A-B
R75	1000 ohm 1/2 W. 10% A-B
R76	1000 ohm 1/2 W. 10% A-B
R77	270 K ohm 1/2 W. 10% A-B
R78	270 K ohm 1/2 W. 10% A-B
R79	1500 ohm 1 W. 10% A-B
R80	1500 ohm 1 W. 10% A-B
R81	100 ohm 1 W. 10% A-B
R82	2000 ohm 1 W. 10% A-B
R83	100 ohm 1 W. 10% A-B
R84	2000 ohm 1 W. 10% A-B
R85	3600 ohm 1/2 W. 5% A-B
R86	2700 ohm 1/2 W. 5% A-B
R87	2000 ohm 1/2 W. 5% A-B
R88	2000 ohm 1/2 W. 5% A-B
R89	10K ohm, 1 Watt, 10% Resistor
S1	Lever Action Switch N9735 Centralab
S2	Lever Action Switch N9735 Centralab
S3	Lever Action switch N9735 Centralab
S4	Lever Action switch N9735 Centralab
S5	Lever Action Switch N10076 Centralab
S6	Lever Action Switch N10076 Centralab
S7	Lever Action Switch N10076 Centralab
S8	Lever Action Switch N10076 Centralab
S9	Lever Action Switch N10076 Centralab
S10	Lever Action Switch N10076 Centralab
S11	Lever Action Switch N10076 Centralab
S12	Lever Action Switch N10076 Centralab
T1	Input Transformer Triad, AI-3006
T2	Input Transformer Triad, AI-3006
T3	Input Transformer Triad, AI-3006
T4	CG710 Transformer UTC
T5	CG710 Transformer UTC
T6	Power Transformer UTC, AP-3065
T7	Repeater Transformer UTC, AS-3154
TB1	Terminal Board, B-10130-2
TB2	Terminal Board, B-10130-1
TB3	5-142Y Terminal Board
TIE1	Tie Point, A-2751-13
TIE2	Tie Point, A-2751-13
TIE3	Tie Point, A-2751-13
TIE4	Tie Point, A-2751-13

V1	6J7 Tube Metal
V2	6C5 Tube Metal
V3	6C5 Tube Metal
V4	6J7 Tube Metal
V5	6C5 Tube Metal
V6	6C5 Tube Metal
V7	6J7 Tube Metal
V8	6C5 Tube Metal
V9	6SJ7 Tube Metal
V10	6SN7GT Tube
V11	6SN7GT Tube
V12	6SN7GT Tube
V13	6V6 Tube Metal
V14	6V6 Tube Metal
V15	5U4G Tube
X1	M1P8T Socket Amphenol
X2	Same as X1
X3	Same as X1
X4	Same as X1
X5	Same as X1
X6	Same as X1
X7	Same as X1
X8	Same as X1
X9	Same as X1
X10	Same as X1
X11	Same as X1
X12	Same as X1
X13	Same as X1
X14	Same as X1
X15	Same as X1

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 service, and will make emergency shipments at any time where possible.

3 - Gates fully guarantees the following transmitter parts for the life of the equipment, said life to be considered five (5) years. These parts will be replaced or repaired at the option of Gates as follows:

Where less than one year old	no charge
Between 1 and 2 years of age	30% of new price
Between 2 and 3 years of age	50% of new price
Between 3 and 4 years of age	65% of new price
Between 4 and 5 years of age	75% of new price

Date of invoice to original user-purchaser and date of receipt of notification by Gates will determine the age. "New price" is Gates current price at time of replacement and/or adjustment.

Transmitter parts referred to in this section (item 3) are as follows:

Main Power or Plate Transformer
Modulation Transformer
Main Filter Choke or Chokes in highest voltage circuit
Modulation Reactor
Main Tank Condenser or Condensers
Main Tank Coil

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 - All other components with exception of vacuum tubes and moving parts are guaranteed for one year from invoice date to original

user-purchaser, said guarantee unconditional regardless of part, except where evidence of abuse or damage, etc., as stated in item 3 above.

5 - Vacuum tubes are subject to the manufacturer's guarantee and adjustment will be passed on as made to Gates by the tube manufacturer. Moving parts will be adjusted where it is agreed that they have not given proper service, and in case of dispute arbitration will be acceptable to both parties by mutual agreement on a third disinterested party to decide on the basis of facts submitted by both parties.

6 - This guarantee covers only Gates manufactured parts and complete Gates equipments including all parts therein. Any purchased part not manufactured by Gates will be subject to the manufacturer's guarantee, unless such part was a unit 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 defective part in accordance with this guarantee and the terms herein.

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. This guarantee does not extend to the supply by Gates of any personnel to make said replacement, repair or adjustment. Any item alleged defective shall not be returned to Gates until after permission has been first obtained from Gates.

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 repair, properly serviced and cleaned, and to use said equipment as and for the purpose intended by seller.

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 effective only in the United States and Canada, and is not transferable from the original user-purchaser, and no right of subrogation is given herein.

GATES RADIO COMPANY
QUINCY, ILLINOIS