INSTRUCTION BOOK

M6467
FM TOP LEVEL AMPLIFIER

HARRIS INTERTYPE CORPORATION

GATES

GATES RADIO COMPANY
A Subsidiary of Harris-Intertype Corporation
QUINCY, ILLINOIS, 62302

REPLACEMENT PARTS

When ordering replacement parts please address your order to:

GATES RADIO COMPANY
Order Department
Quincy, Illinois 62302

The following information must be supplied if applicable:

(1) Quantity required.
(2) Gates Part Number—Ten digit I.B.M. or M number.
(3) Item or Symbol Number from Instruction Book schematic or Parts List.
(4) Type Number of equipment in which component is used.
(5) Complete address for shipping and billing instructions.

RETURNS AND EXCHANGES

Do not return any merchandise without our written approval and Return Authorization. We will provide special shipping labels and a code number that will assure proper handling and prompt issuance of credit. Please furnish a detailed report to assure prompt handling of returned merchandise. Custom built equipment or merchandise specially ordered for you is not returnable. Where return of standard equipment is allowed by Gates, a restocking fee of 15% will be charged. All returned merchandise must be sent freight prepaid and properly insured by the customer. When writing to Gates Radio Company about your order, it will be helpful if you specify the Gates Factory Order Number or Invoice Number.

MODIFICATIONS

Gates reserves the right to modify the design and specifications of the equipment shown in this Instruction Book without notice or to withdraw any item from sale provided, however, that any modifications shall not adversely affect the performance of the equipment so modified.

INSTRUCTIONS

M6467, FM TOP-LEVEL AMPLIFIER

IB-888 0890 001
August 23, 1965

Gates Radio Company
Quincy, Illinois

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M6467, FM TOP-LEVEL AMPLIFIER PAGE

SPECIFICATIONS

FM TOP-LEVEL OVERMODULATION PROTECTION AMPLIFIER TECHNICAL DATA

PURPOSE:	Prevention of FM overmodulation by means of frequency dependent peak clipping.
MODE:	Dual channel, stereophonic or two-channel monophonic.
INPUTS:	One per channel (two total).
GAIN:	28 db maximum.
RESPONSE:	±1 db, 30-15,000 cps below threshold of clipping. −1, +3.5 at 10KHz
DISTORTION:	0.5%, 30-15,000 cps below threshold of clipping. yes
NOISE & CROSSTALK:	-75 db or better below +18 DBM out. −68 −71 below 18 DBM
ATTACK & RELEASE TIME:	Virtually instantaneous.
INPUT LEVEL:	-10 DBM to +24 DBM (adjustable).
OUTPUT LEVEL:	+18 DBM after a 6 db isolation pad (adjustable).
IMPEDANCES:	Input, 600 ohms balanced or unbalanced. Output, 600 ohms balanced or unbalanced.
LEVEL CONTROLS:	Continuously variable input and output level controls.
POWER:	117 volts, AC 50/60 cycles.
POWER CONSUMPTION:	5 watts maximum.
TRANSISTORS:	16 - 2N1307 5 - 2N1306 3 - 2N1414 1 - 2N1539
DIODES:	4 - 1N2069 2 - 1N710 zener 4 - 1N67A
AMBIENT TEMPERATURE:	-20° C to +60° C (-4° F to 140° F.)

SPECIFICATIONS

SIZE:	5¼" x 19" x 12". Mounts in standard 19" relay cabinet.
WEIGHT:	25 lbs. net cubage 12. 45 lbs. domestic pack.
FINISH:	Medium gloss grey.
CONTROLS:	Each channel: Input level, output level, calibrate. A limiter/operate disable switch is included for Proof of Performance tests.
TEST POINTS:	Adjust level, bias adjust, front panel test points are provided.

RECEIVING

Immediately upon receipt, the unit should be carefully unpacked and inspected for apparent or concealed shipping damage. In case of damage in transportation notify the delivering carrier at once. After he has approved the damage report, which indicates he will accept your billing for the damage, order new parts from Gates Radio Company. Our billing of these parts plus transportation expense will be your claim to the transportation company.

WARRANTY

FM Top-Level is covered under the standard Gates Warranty, a copy of which may be had on request from Gates Radio Company, 123 Hampshire Street, Quincy, Illinois 62301.

DESCRIPTION

The Gates FM Top-Level controls high frequency peaks which, when pre-emphasized by the standard FM 75 microsecond curve, would cause illegal overmodulation of the transmitter. The unit is a dual channel device that can be operated in stereo or as two independent single channel units for monaural, storecast, or television sound applications. The amplifier,which is solid state, consists of a regulated power supply and two identical amplifier boards. The amplifier section contains the following: an input amplifier to adjust the level of the incoming signal and FM pre-emphasis filter to exactly duplicate the signal as seen by the transmitter; a adjustable clipper which acts on signals in excess of a pre-set level; a output amplifier section to recover filter losses; and a de-emphasis filter to give an overall flat response curve. A drop-down panel permits access to the input and output level controls, calibrate control (clipping level adjust), fuse, and operate disable switch. This switch disables the clipper for Proof of Performance tests. Access to the top and bottom of the unit is accomplished by the use of 1/4 turn fasteners. Input and output terminations are made to a barrier type terminal strip located on the rear of the amplifier. A grounded 3-conductor line cord is supplied with the unit.

INSTALLATION

Preparation of System for Installation

Prior to the installation of the Top-Level it is necessary to check with sine wave and adjust, if necessary, the operation of the FM modulation monitor to insure correct flasher calibration with the modulation meter. The channel balance in a stereo system should also be checked. In stereo installations the audio chain should be balanced for equal output through the turntable stereo preamplifiers, console and limiter.

Installation Mechanical

The Top-Level should electrically feed the transmitter after the peak limiter. It is recommended that the Top-Level be installed at the transmitter site to recover losses incurred in the telephone program lines. Since routine adjustment is unnecessary, a transmitter site installation is satisfactory. The conventional limiter may be installed either at the transmitter site or at the studio. The FM Top-Level should be initially installed with the input and output controls minimum (counterclockwise). Do not change calibrate control. Adjustment of the Top-Level is described in the section titled ADJUSTMENT PROCEDURE.

Mounting and Wiring

The unit requires 5¼" of panel space in a standard 19" relay rack. Input and output terminations are made at the barrier-type terminal strip located at the rear of the unit. The various inputs and outputs are identified on the rear panel and also on the schematic diagram. Phase relationships have been maintained within the unit with the input and output phase marked with a dot on the barrier strip proper. Use the dotted terminal for the high lead of the audio pair and proper phasing will be maintained. Care should be taken to terminate the shields of the input and output cabling at one end only, and an appropriate place is shown on the barrier strip. For optimum results use insulated twisted shielded pairs such as Belden #8451 for both input and output wiring. Individual systems require individual ground system practices, however, avoid ground loops for best operation. The one point ground system is most commonly used and generally offers superior results. Ground the external ground point to station ground.

The one point grounding system requires that each unit of an audio system have its own conductor running to the common ground point. The common point should be connected with heavy copper strap to the station ground and/or earth ground to give the system the lowest possible ground reference.

Input Power

In order to comply with recent laws of some states the FM Top-Level uses a three-prong grounded power cord. The ground pin in the AC distribution system must be properly grounded for proper operations, or hum may be induced into the amplifier.

ADJUSTMENT PROCEDURE

After the FM Top-Level has been installed in the rack, calibration and adjustment may be performed. The complete procedure outlined below is for a stereo installation. Adjusting the left channel. For monaural installation or dual channel installation, follow Steps 1 through 8.

Materials and Equipment Required

1. Volt-ohmmeter such as a Simpson 269 or Triplett #630.
2. Modulation monitor instruction book.
3. Screwdriver.
4. 12" Jumper with standard tip to fit test points on the Top-Level.

Adjustment Procedure

1. Controls Settings - Check to make sure that all input and output controls are fully counter-clockwise. Switch the OPERATE/DISABLE switch to OPERATE and plug the line cord into a AC receptacle.

2. Peak Limiter Operation - Play a monaural record or tape with the conventional peak limiter operating in the stereo mode where used. The limiter should work normally, limiting about 5 to 6 DB.

3. Set the VOM to read approximately 10 volts DC and plug it into the left clipper bias test points located on the left side of the inside front panel behind the front door. The white terminal is positive and the black terminal is negative. (See FIGURE 1).

4. Calibrate Setting - (Factory adjusted). Adjust the left CALIBRATE control until the VOM reads 3.5 volts DC.

5. Input Level Adjustment - With the VOM still plugged in the left test points, increase the left input control until the VOM meter needle just begins to indicate a slight reduction in voltage. DO NOT INCREASE THE INPUT CONTROL BEYOND THE POINT OF INDICATION. Now adjust the left calibrate control until the VOM reads 4.1 volts DC.

6. Adjust the FM modulation monitor flasher to read at the desired level of modulation.

7. Increase the left channel output control until the modulation monitor flasher just indicates, then back it off slightly.

8. For monaural or separate dual channel installation omit Steps 9 through 12 and go to Step 13. For stereo installations repeat Steps 1 through 7 for the right channel and then go on to Steps 10 through 13. (See FIGURE 2).

9. Stereo Channel Balance - Connect the bottom white ADJUST LEVEL test points together with the 12" jumper. (See FIGURE 3).

10. Set the VOM for about 10 volts AC and plug the meter into the two top black ADJUST test points. With the program level test tone of 1 KC fed from the console (this could be a 1 KC or 400 cycle test tone from a test record or signal generator), adjust the right output of the Top-Level until the VOM is at minimum reading. It now indicates that the levels in the right and left channels are equal and the channels are balanced.

11. Switch the VOM to the lowest practical AC voltage scale and adjust the right output of the Top-Level for minimum reading again.

12. Leave the jumper and meter in place.

.13. Adjust for optimum performance - Play several monophonic records of the type program material normally encountered in your station's operation, observing the modulation monitor flasher. Carefully adjust the left and right channels alternately (in stereo installations) in small increments until the peak flasher seldom, if ever, lights. It will be necessary to play several styles or types of records normally encountered in everyday usage to set the correct output feed to the transmitter. NOTE: Because sine wave testing will not react in the same manner as musical peaks, it is necessary to observe the flasher and adjust the output level until satisfactory modulation levels are maintained. It is now necessary to readjust the stereo balance in stereo installations when a suitable setting is achieved (Steps 9-12). IMPORTANT NOTICE! It is very important that the station engineer observe the modulation monitor flasher for a period of two or three hours in order to make sure that the output level is at the correct setting. Since this varies slightly from musical selection to musical selection, this adjustment and observation must be made. Typical test records for this purpose should preferably be muted trumpets and cymbal crashes, triangle and other percussion effects. These are good sources of typical problem passages which may be used in adjusting the FM Top-Level.

Operation

The Gates FM Top-Level is a device which clips high frequency peaks that exceed the pre-emphasis curve. In stations that desire to clip only random peak signals rather than trying to maintain the absolute maximum of modulations, slightly lower settings of the output control will be necessary. It must be remembered that when the FM Top-Level acts on these high frequency signals, it effectively clips them and while the effect is not noticeable in the form of distortion, it does reduce slightly the overall frequency response of that signal.

Proof of Performance Tests

After the unit has been adjusted and balanced for stereo operation or monaural operation, no additional operator attention is necessary. When running Proof of Performance checks the clipper section of the unit can be effectively disabled by switching the OPERATE/DISABLE switch to the DISABLE position. The clipping bias is raised to a level well above that signal used in the audio Proof of Performance tests. No re-adjustments are necessary and after the Proof has been completed, the FM Top-Level can be returned to normal operation by switching the unit back to OPERATE.

THEORY OF OPERATION

Overmodulation in FM Transmitters

FM overmodulation is becoming an increasingly serious problem to broadcasters due to the increasing amounts of high frequency content in today's program material as the result of improved recording techniques and equipment combined with the tendency to severely pre-emphasis highs or otherwise gimmick recordings. When such program material is itself pre-emphasized by the standard FM 75 microsecond curve with its 15 DB boost at 15 KC, a high percentage of overmodulation frequently occurs. Ideally the distribution of typical peaks should exactly follow the compliment-ary curve to the FM 75 microsecond curve to obtain maximum modulation. It has been shown from laboratory tests and field reports that the high end of the frequency spectrum is, in some cases, +10 DB or more greater than the ideal. When a system is set for medium frequency modulation level of 50% (50-3,000 cps) a typical uncontrolled high frequency peak can cause 170% modulation. Conventional limiters due to their finite attack time can not effectively control all of the overmodulating peaks.

The peak limiter sees and acts upon an entirely different wave form (a linear signal) than that which modulates the transmitter (a high frequency pre-emphasized signal).

Modulation monitors have inherent limitations regarding the indication of high frequency peaks. The modulation monitor meter and operated flasher devices can not follow such peaks due to the inertia and meter ballastics. Neon flashers may operate too quickly to be detected or may fail to indicate an overmodulating peak regardless of height if its duration is insufficient to charge the associated RC network to the ionization level of the neon bulb. Overmodulation can result in cross-channel interference, stereo crosstalk, and distortion of transmitters due to bandpass limitations and the generation of spurious signals.

The FCC rules state that modulation peaks should lie between 85 and 100%. A good rule of the thumb to use in complying with this requirement is that a peak of 85% should be reached at least a half a dozen times during every fifteen minutes. In cases of a loud commercial a reduction below 85% is permitted. If more detailed information is required on the subject of FM overmodulation, write for a copy of Gates Engineering Report - "Preventing FM Overmodulation". Send request to Gates Radio Company, 123 Hampshire, Quincy, Illinois 62301.

Block Diagram

The block diagram of the Gates FM Top-Level is shown in Figure 4. Since both channels are the same, only one will be described. The constant impedance attenuator enables the input to accept a wide range of signal levels. The amplifier is one of two identical solid state amplifier sections designed to recover losses in the pre-emphasis and de-emphasis filters. The pre-emphasis filter is an LCR combination which follows a standard curve from 30 to 15,000 cycles.

The clipper unit consists of two high frequency diodes connected in a balanced series clipping configuration with a variable bias which allows a clipping level to be adjusted over a wide range of audio signals. For proper operation 4.1 volts DC is recommended.

Any pre-emphasis peak which exceeds a preset level will be clipped and only that peak. The rest of the complex wave is unaffected.

The signal is then amplified by the second amplifier and passed through a de-emphasis filter which is the exact complement to the pre-emphasis filter up to 15 KC. The signal is then fed to the output transformer, 6 DB isolation pad and attenuator.

When the FM Top-Level is properly adjusted, its action is inaudible because only a small percentage of the actual wave is acted upon at any time. Effects will be masked by the higher level low frequency components when de-emphasized. The ear is also relatively insensitive to level changes at high frequencies. Finally, the high frequency harmonics generated by clipping are largely ultrasonic second or higher order harmonics and are attenuated by the de-emphasis filter.

MAINTENANCE

General

No routine maintenance of the FM Top-Level is required except for periodic removal of dust and dirt with a soft brush. A check of the circuit voltages on a semi-annual basis will forecast impending problems. Certain resistors on the block circuit diagram are marked with a suffix "A". These may be paralleled with a resistor with a suffix "B" at the factory for compensation. Average readings of AC and DC levels are shown on a schematic diagram. It is recommended that they be checked with the meter which will be used for maintenance and recorded for future reference before installation. In making such checks, do not probe the printed circuit board with an exposed metal probe. A momentary short can permanently damage transistors.

Positive rather than negative ground is employed so circuit voltages are reversed from standard vacuum tube practices as is the polarity of the electrolytic capacitors. Observe these polarities when installing new capacitors or diodes.

Transistors

Direct coupled circuitry will allow one defective transistor to affect most or all of the circuit voltages in that section, therefore, when trouble occurs in such circuitry, all transistors should be checked on a good commercial transistor tester.

NOTE OF CAUTION!!

1. Do not remove or insert transistors with the POWER ON!
2. Do not probe the board with an exposed metal probe!
3. Do not make ohmmeter readings with transistors in the circuit!
4. Avoid temperatures above 99° C, such as accidental contact with a soldering iron.

When replacing transistors or servicing, check to see that the transistors are properly seated in their sockets. When replacing Q101, and before turning on the power, use an ohmmeter to check the resistance between the screw mounting and the metal chassis to make certain that it is not shorted out.

On all voltage readings allow at least 10% deviations due to differences in meters and variations in components.

A resistance chart is shown in Figure 3 to aid in troubleshooting. All transistors must be removed from their sockets before taking resistance measurements, and do not remove or insert transistors with the power ON.

Gain, Response and Distortion Measurement Techniques

Because of the frequency dependent nature of Top-Level, certain precautions are necessary to obtain meaningful data with regard to gain, response and distortion readings.

Gain - Measure gain at 200 cps which is on the flat part of the pre-emphasis curve. To measure -

1. Turn all input and output controls maximum clockwise.
2. Feed a -10 DBM signal of 200 cps at 600 ohms into the input terminals.
3. The output should read +18 DBM into a 600 ohm load, which is a gain of 28 DB.

Response - The response readings must be taken below the threshold of clipping at 15 KC. Therefore, make all frequency response measurement tests with a -40 DBM input. The output level will be approximately -12 DBM if the controls are wide open.

Distortion - The distortion readings must be taken using the input levels shown below:

200 Cycles	-10 DBM input.
1 KC	-11 DBM input.
5 KC	-18 DBM input.
10 KC	-24 DBM input.
15 KC	-27 DBM input.

These input levels provide a constant level to the clipper section, for correct action of the FM Top-Level. Any other input will yield erroneous data.

Parts List

When ordering replacement components, please refer to the parts list in the instruction manual. Identify the component by its symbol number, its Gates stock number, and the unit in which it is to be used (M-6467 Top-Level). The complete information requested will help insure that the correct component will arrive at the earliest possible date.

RESISTANCE CHART FOR AMPLIFIER BOARD

SOCKETS	COLLECTOR TO GROUND	COLLECTOR TO B-	BASE TO GROUND	BASE TO B-	EMITTER TO GROUND	EMITTER TO B-
XQ1	40K	32K	5.2K	23K	3.7K	26K
XQ2	28K	4.5K	40K	32K	1.5K	24K
XQ3	24K	0	28K	4.5K	2.2K	24K
XQ4	24K	0	28K	4.5K	2.2K	24K
XQ5	0	24K	28K	4.5K	2.2K	24K
XQ6	38K	32K	5K	23K	3.9K	26K
XQ7	28K	4.5K	38K	32K	1.5K	24K
XQ8	24K	0	28K	4.5K	2.2K	24K
XQ9	24K	0	28K	4.5K	2.2K	24K
XQ10	0	24K	28K	4.5K	2.2K	24K

(1) Transistor removed from the board.
(2) Meter polarity observed.
(3) Power supply disconnected from the board under measurement.
(Wire 5 and Wire 7)

RESISTANCE CHART FOR POWER SUPPLY BOARD

XQ101	* 2 neg.	20K	10K	6K	1.8K	0
XQ102	* 2 neg.	20K	* 2 neg.	30K	10K	6K
XQ103	* 2 neg.	30K	9K	12K	2.1K	600 ohm
XQ104	9K	12K	4.5K	2.5K	4.2K	19K
XQ105	4.5K	2.5K	700 ohm	1.2K	2.1K	600 ohm

* Allow time for capacitor to charge

(1) Transistor removed from power supply
(2) Meter polarity observed.
(3) Amplifier disconnected from power supply for readings.
(Neg. lead only - Wires 7-8-10-12)

PARTS LIST

994 6467 CABINET PARTS

Symbol No.	Gates Stock No.	Description
A101	406 0355 000	Pilot Light, 125V.
AT1,AT2, AT5,AT6	554 0278 000	Attenuator, 600 ohms "T" Pad
AT3,AT4	992 1689 001	Output Pad, 6 DB "H" Pad
F101	398 0017 000	Fuse, 1 amp. 250V.
J1,J3, J6,J8	612 0312 000	Test Point Jack, White
J2,J4, J5,J7	612 0311 000	Test Point Jack, Black
Q101	380 0016 000	Transistor, 2N1539
R25,R45	550 0029 000	Potentiometer, 10K ohm, 2W.
S1	604 0302 000	Slide Switch, DPDT
T2,T3, T4,T5	478 0265 000	Output Transformer
T101	472 0099 000	Power Transformer
TB1	614 0036 000	Terminal Board
XF101	402 0023 000	Fuseholder
XQ101	404 0136 000	Transistor Socket

PARTS LIST

PRINTED WIRING AMPLIFIER 992 1687 001

SYMBOL NO.	GATES STOCK NO.	DESCRIPTION
C1,C15	522 0160 000	Cap., 100 uf., 3 V.
C2,C16	522 0189 000	Cap., 300 uf., 6 V.
C3,C17	522 0241 000	Cap., 20 uf., 25 V.
C4,C18	522 0195 000	Cap., 200 uf., 10 V.
C5,C19	522 0210 000	Cap., 100 uf., 12 V.
C6,C20	500 0787 000	Cap., 200 pf., 500 V.
C7,C21	516 0054 000	Cap., .001 uf., 1 KV
C8,C23	508 0292 000	Cap., .068 uf., 100V.
C9,C22	522 0336 000	Cap., 250 uf., 15 V.
C10	508 0293 000	Cap., .01 uf., 500 V.
C11	500 0866 000	Cap., Var. Mica
C12,C13,C14	522 0244 000	Cap., 50 uf., 25 V.
CR1,CR2	384 0009 000	Diode, 1N67A
L1	492 0313 000	Toroid Coil, 5 MH
L2	492 0314 000	Inductor, 3 MH
Q1,Q2,Q3,Q4, Q6,Q7,Q8,Q9	380 0018 000	Transistor, 2N1307
Q5,Q10	380 0033 000	Transistor, 2N1306
R1,R2, R4,R5	540 0025 000	Res., 100 ohm, 1/2 W. 5%
R3	540 0047 000	Res., 820 ohm, 1/2 W. 5%
R6	540 0050 000	Res., 1100 ohm, 1/2 W. 5%
R7,R29	540 0083 000	Res., 27K ohm, 1/2 W. 5%
R8,R31	540 0068 000	Res., 6200 ohm, 1/2 W. 5%
R9,R32	540 0080 000	Res., 20K ohm, 1/2 W. 5%
R10,R33	540 0063 000	Res., 3900 ohm, 1/2 W. 5%
R11,R34	540 0022 000	Res., 75 ohm, 1/2 W. 5%
R12,R35	540 0078 000	Res., 16K ohm, 1/2 W. 5%
R13,R36	540 0056 000	Res., 2000 ohm, 1/2 W. 5%
R14,R23, R24,R37	540 0059 000	Res., 2700 ohm, 1/2 W. 5%
R15,R38	540 0053 000	Res., 1500 ohm, 1/2 W. 5%
R16,R39,R44A	540 0057 000	Res., 2200 ohm, 1/2 W. 5%
R17,R18,R19, R40,R41,R42	540 0001 000	Res., 10 ohm, 1/2 W. 5%
R20,R43	540 0079 000	Res., 18K ohm, 1/2 W. 5%
R21A,R28	540 0044 000	Res., 620 ohm, 1/2 W. 5%
R22A	540 0069 000	Res., 6800 ohm, 1/2 W. 5%
R26A	540 0067 000	Res., 5600 ohm, 1/2 W. 5%
R27	540 0062 000	Res., 3600 ohm, 1/2 W. 5%
T1	478 0183 000	Input Transformer
XQ1 thru XQ10	404 0066 000	Transistor Socket

PARTS LIST

PRINTED WIRING POWER SUPPLY 992 1688 001

SYMBOL NO.	GATES PART NO.	DESCRIPTION
C101,C104	522 0321 000	Cap., 500 uf., 50 V.
C102	522 0326 000	Cap., 100 uf., 50 V.
C103	506 0005 000	Cap., .1 uf., 200 V.
CR101,CR102, CR103,CR104	384 0018 000	Silicon Rectifier, 1N2069
CR105,CR106	386 0019 000	Zener Diode, 6.8V. 1N710 or 1N754
Q102,Q103, Q105	380 0014 000	Transistor, 2N1414
Q104	380 0033 000	Transistor, 2N1306
R101	540 0284 000	Res., 10 ohm, 1 W. 5%
R102,R104, R106	540 0073 000	Res., 10K ohm, 1/2 W. 5%
R103	540 0049 000	Res., 1000 ohm, 1/2 W. 5%
R105	540 0045 000	Res., 680 ohm, 1/2 W. 5%
R107	540 0059 000	Res., 2700 ohm, 1/2 W. 5%
R108	540 0054 000	Res., 1600 ohm, 1/2 W. 5%
R109A	540 0048 000	Res., 910 ohm, 1/2 W. 5%
R109B		Res., 1/2 W. 5% (Lab selected)
XQ102,XQ103, XQ104,XQ105	404 0066 000	Transistor Socket

R.F. LINE FILTER ASSY. 992 1690 001

SYMBOL NO.	GATES PART NO.	DESCRIPTION
C105,C106, C107,C108	516 0054 000	Cap., .001 uf., 1 KV.
J101	610 0413 000	Receptacle, A.C. 3 pin, 7A
L101,L102	494 0004 000	R.F. Choke

FIG. 1

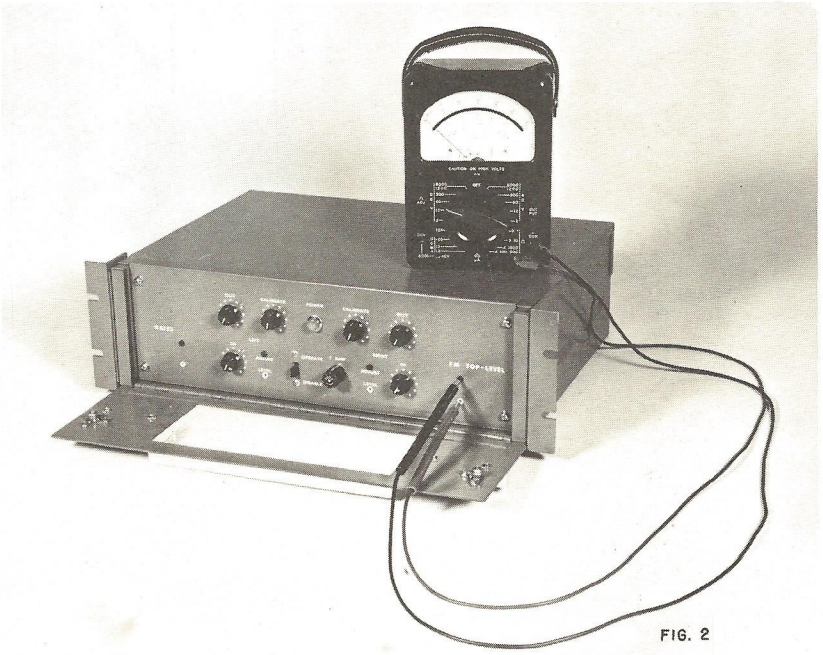
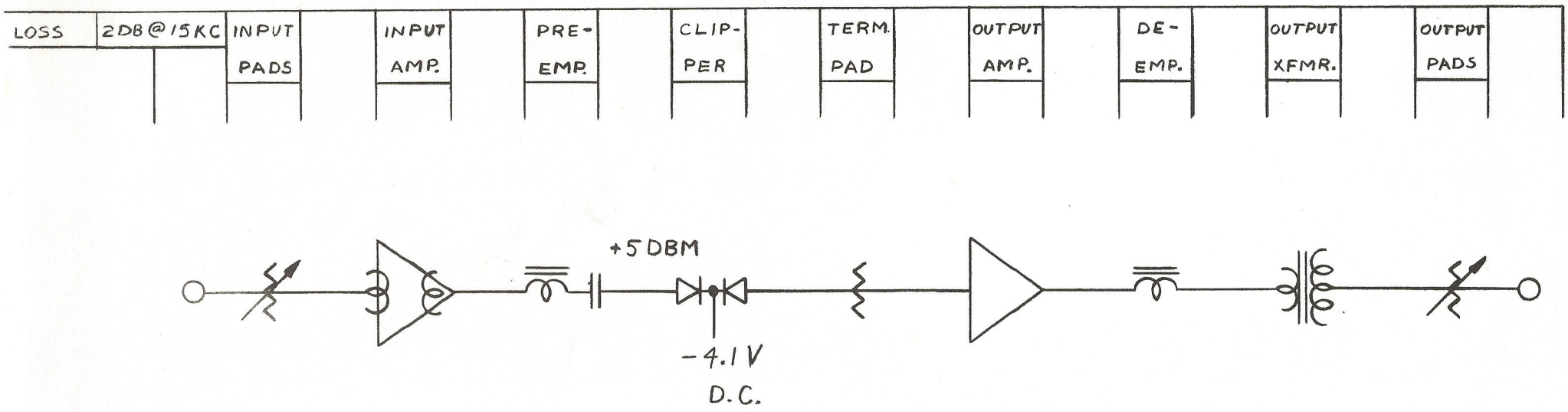


FIG. 2

FIG. 3



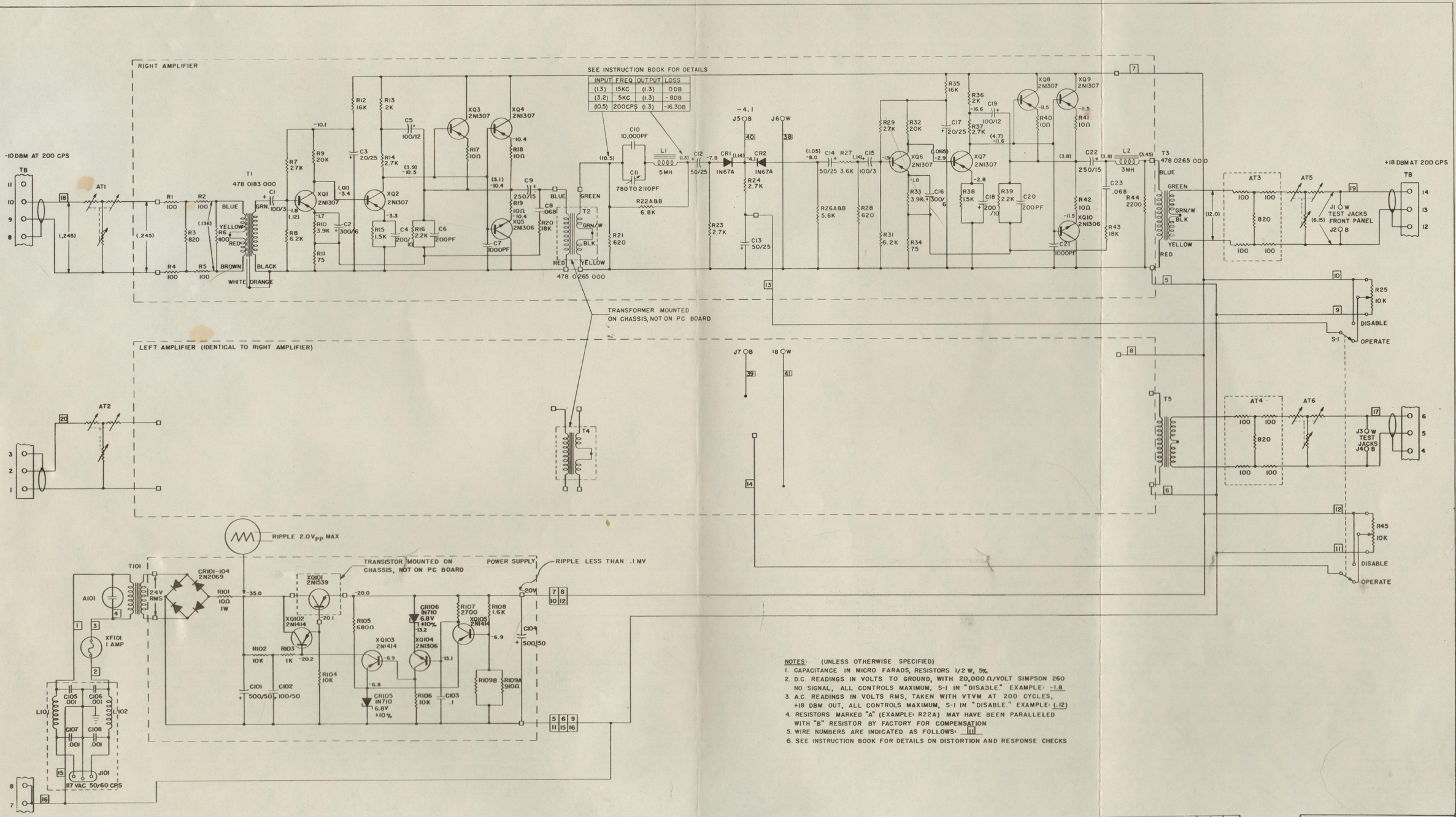
	PRE-EMP.	INPUT LEV.	LOSS	LEV.	GAIN	LEV.	LOSS	LEV.	LOSS	LEV.	LOSS	LEV.	GAIN	LEV.	LOSS	LEV.	LOSS	LEV.	LOSS	LEV.
200~	0	-10	-5	-15	+38	+23	-18	+5	-1	+4	-18	-14	+40	+26	-1	+25	-1	+24	-6	+18
1 KC	+1	-11	"	-16	"	+22	-17	+5	"	+4	"	-14	"	+26	-2	+24	"	+23	"	+17
5 KC	+8	-18	"	-23	"	+15	-10	+5	"	+4	"	-14	"	+26	-9	+17	"	+16	"	+10
10 KC	+14	-24	"	-29	"	+9	-4	+5	"	+4	"	-14	"	+26	-15	+11	"	+10	"	+4
15 KC	+17	-27	"	-32	"	+6	-1	+5	"	+4	"	-14	"	+26	-18	+8	"	+7	"	+1

INPUT AND OUTPUT CONTROLS
SET FOR 0 ATTENUATION.

BLOCK DIAGRAM & SIGNAL
LEVEL ANALYSIS
FM TOP LEVEL

FIGURE 4

814-3365-001



10/25/78

TRANSMITTER READINGS

+ 15dbM ant @ 400Hz

Durable switch -10dbM IN

AM TRANSMITTER

CIRCUIT	L METER READING	R DIAL READING	grid REMARKS
Oscillator Plate Current	+.9 .24% THD	+.9 .18% THD	58
Buffer Grid Current	+.6 (6)	+.6	100
Buffer Plate or Cathode Current	±0 .2% THD	-0 -2% THD	400
RF Driver Grid Current	+.3	+.3	1000
RF Driver Plate Current	+3.7	+3.8	5000
PA Grid Current	+4.1	+4.1	10000
PA Plate Current	+3.5	+3.5	18000
PA Plate Voltage No	-68db .12% THD	-68db .13 THD	Tones ref 400Hz 415@ M
PA Efficiency			
Filament Voltage			
Line Voltage			
Mod 1 Static Plate Current			
Mod 2 Static Plate Current			
RF Line Current			

FM TRANSMITTER

CIRCUIT	METER READING	DIAL READING	REMARKS
Driver Grid Current			
Driver Screen Current			
Driver Plate Current			
Driver Plate Voltage			
RF Output			
VSWR			
Filament Voltage			
PA Grid Current			
PA Screen Current			
PA Plate Current			
PA Plate Voltage			
PA Screen Voltage			
RF Output			
VSWR			
Efficiency			
Filament Voltage			
ne Voltage			