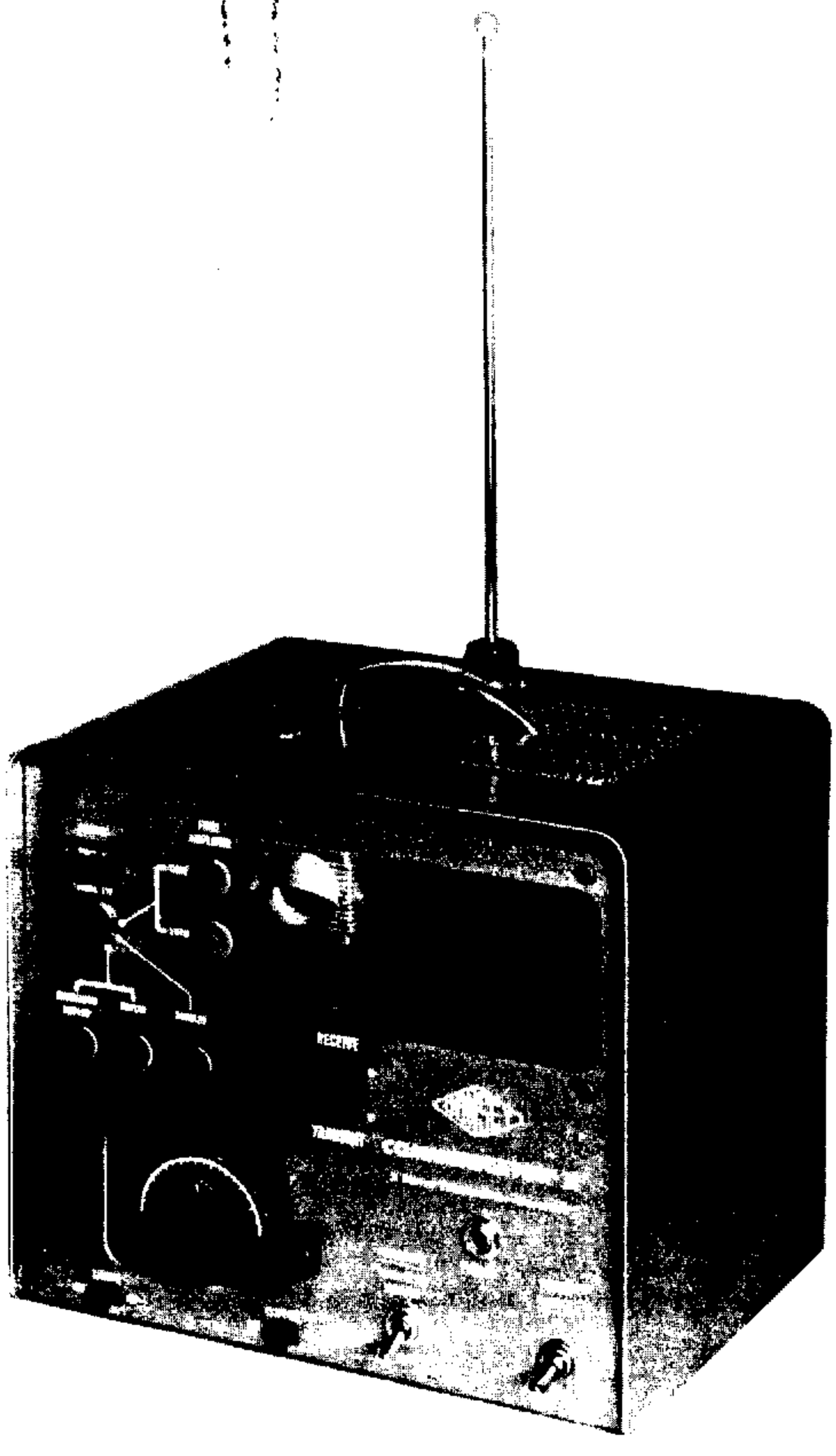


WARRANTY

The Gonset Company warrants this product to be free from defective material and workmanship when new, and will remedy any defect or replace any defective part other than the vibrator unit free of charge for a period of 3 months from date of original purchase, provided warranty registration card is filled in and mailed to us. This warranty does not apply to units which have in any way been abused or misused, either deliberately or accidentally, or have been altered.

The defective unit or part must be returned to us transportation charges prepaid, after first getting authorization to return.

No dealer or other person is authorized to assume any further liability on our behalf when selling this unit.

OPERATOR LICENSE REQUIRED FOR TRANSMISSION

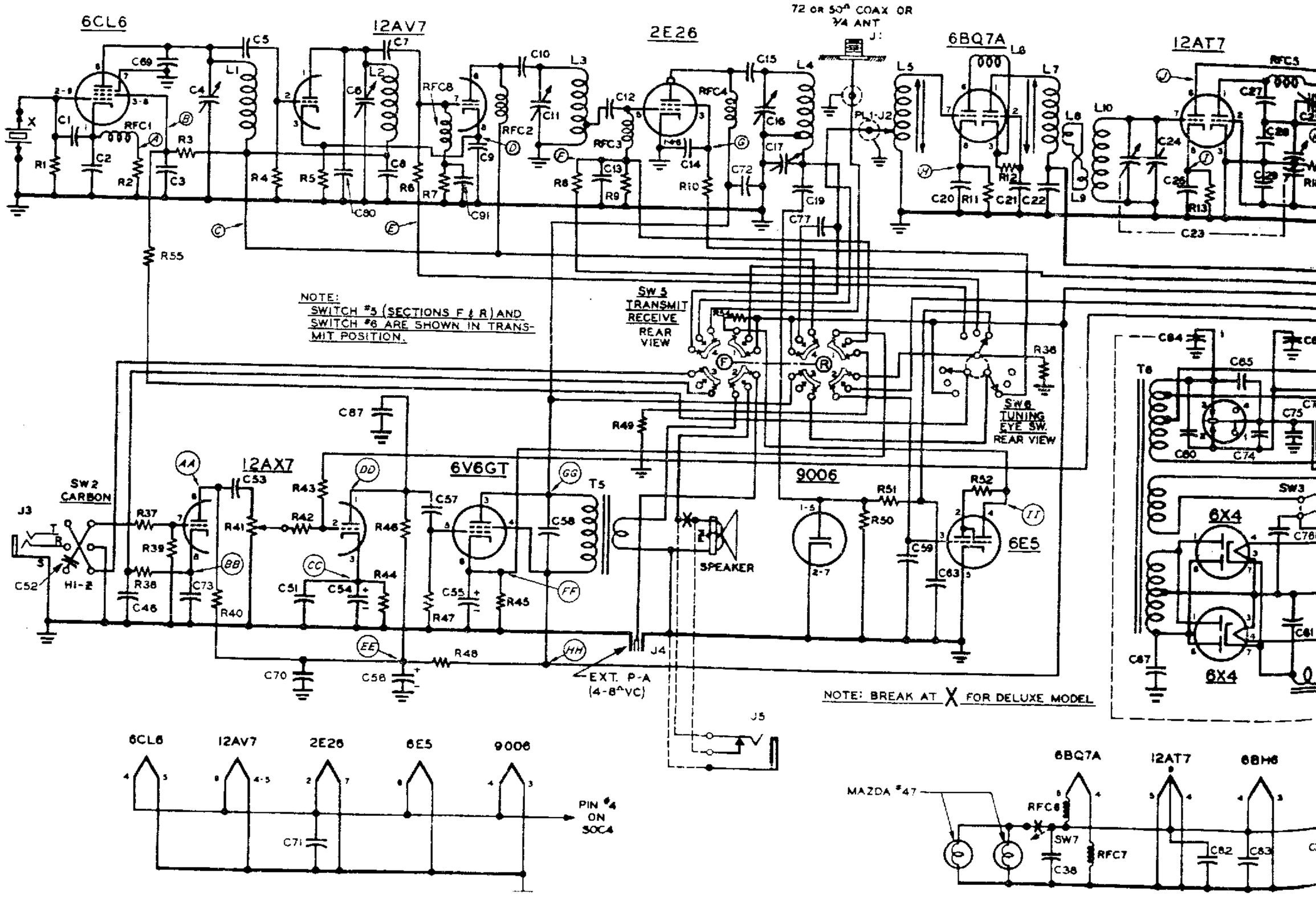
Operation of the *transmitter* in this equipment requires a Federal Communications Commission license. Operation without a license is illegal and is subject to penalty.

DANGER, HIGH VOLTAGE

The voltages employed in this unit are sufficient to cause fatal shock under some conditions. Do not attempt to work on the unit out of the cabinet unless you are qualified to the extent of knowing what precautions to observe with regard to avoiding electrical shock. Take especial note that plate voltage appears on the plate cap of the 2E26 at all times the power supply is on, regardless of the position of the transmit-receive switch and the switch which disables the transmitter heaters.

Made in U.S.A.

GONSET CO. 801 S. Main Street BURBANK, CALIF.


6CL6
12AV7
2E26
6BQ7A
12AT7
72 OR 50Ω COAX OR ¼ ANT
J1
PL1-J2
X
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
C13
C14
C15
C16
C17
C19
C20
C21
C22
C23
C24
C25
C26
C27
C28
C29
C69
C72
C77
C80
C91
L1
L2
L3
L4
L5
L6
L7
L8
L9
L10
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
RFC1
RFC2
RFC3
RFC4
RFC5
RFC8
R55
NOTE:
SWITCH #5 (SECTIONS F & R) AND SWITCH #6 ARE SHOWN IN TRANSMIT POSITION.
SW 5
TRANSMIT
RECEIVE
REAR VIEW
R36
SW 6
TUNING EYE SW.
REAR VIEW
C84
C85
C75
C60
C74
T6
SW3
6X4
C76
C81
C87
C67
R49
C87
12AX7
6V6GT
9006
6E5
SW2
CARBON
J3
T
R
S
C52
HI-Z
R37
R38
R39
R40
R41
R42
R43
R44
R46
R48
C46
C51
C53
C54
C55
C56
C57
C58
C59
C63
C70
C73
R45
R47
R50
R51
R52
T5
SPEAKER
J4
EXT. P-A
(4-8Ω VC)
J5
AA
BB
CC
DD
EE
FF
GG
HH
NOTE: BREAK AT X FOR DELUXE MODEL
6CL6
12AV7
2E26
6E5
9006
PIN #4 ON SOC4
C71
6BQ7A
12AT7
6BH6
MAZDA #47
RFC6
SW7
RFC7
C38
C82
C83

GONSET

801 S. Main Street Burbank, California

GONSET 2-METER COMMUNICATOR SCHEM

Standard & Deluxe Models (Deluxe Model Shown Dott

Components such as T1, T2, and others not listed below are special and should be ordered by symbol designation. All registo is 6 MC. Voltages should be measured with a diode type voltmeter having an input resistance exceeding 10 megohms and an iso On some units, sections 4-F and 4-R on switch SW5 have been transposed. Fuses are 2 amp "slo-blo" for 115 volt operation ((in hot lead). NOTE: On some models special Noma Electric "Christmas tree" fuses are used (obtainable at most dime stores)

C 1. 10 MMF Ceramic NPO
C 2. 50 MMF Ceramic NPO
C 3. .001 MFD Ceramic 20%
C 4. 25 MMF APC
C 5. 100 MMF Ceramic NPO
C 6. 5 MMF APC
C 7. 50 MMF Ceramic NPO
C 8. .004 MFD Ceramic 20%
C 9. .001 MFD Ceramic 20%
C 10. .001 MFD Ceramic 20%
C 11. 10 MMF APC
C 12. 100 MMF Ceramic NPO
C 13. .001 MFD Ceramic 20%
C 14. 100 MMF Ceramic NPO
C 15. 100 MMF 1000 V. Silver Mica
C 16. 15 MMF APC
C 17. 50 MMF APC
C 18. .047 MFD 400 V. Tubular
C 19. 3 MMF Ceramic NPO
C 20. .001 MFD Ceramic 20%
C 21. .001 MFD Ceramic 20%
C 22. .001 MFD Ceramic 20%
C 23. Special 3 Gang
C 24. RF Trimmer on C 23
C 25. OSC Trimmer on C 23
C 26. .01 MFD GMV Ceramic
C 27. 40 MMF Ceramic Neg. 30
C 28. 47 MMF 2% Ceramic Neg. 80
C 29. 47 MMF 2% Ceramic Neg. 30
C 30. .004 MFD Ceramic 20%
C 31. 50 MMF Ceramic 20%
C 32. .001 MFD Ceramic 20%
C 33. .01 MFD GMV Ceramic
C 34. .01 MFD GMV Ceramic
C 35. .001 MFD Ceramic 20%
C 36. .01 MFD GMV Ceramic
C 37. .01 MFD GMV Ceramic
C 38. .001 MFD Ceramic 20%
C 39. .01 MFD GMV Ceramic
C 40. .01 MFD GMV Ceramic
C 41. .01 MFD GMV Ceramic
C 42. 50 MMF Ceramic 20%
C 43. .01 MFD GMV Ceramic
C 44. .004 MFD Ceramic 20%
C 45. .001 MFD GMV Ceramic
C 46. .001 MFD Ceramic 20%
C 47. 0.47 MFD 200 V. Paper
C 48. .01 MFD GMV Ceramic
C 49. .01 MFD GMV Ceramic
C 50. .01 MFD GMV Ceramic
C 51. .001 MFD Ceramic 20%
C 52. .001 MFD Ceramic 20%
C 53. .004 MFD Ceramic 20%
C 54. 25 MFD 50 V.
C 55. 25 MFD 50 V. 85 C Electrolytic
C 56. 8 MFD 450 V.
C 57. .001 MFD Ceramic 20%
C 58. .0068 MFD 1600 V. Tubular
C 59. .001 MFD Ceramic 20%
C 60. .001 MFD Ceramic 20%
C 61. 12 MFD 450 V. Electrolytic (85 C)
C 62. 30 MFD 450 V. Electrolytic (85 C)
C 63. .001 MFD Ceramic 20%
C 64. .001 MFD Ceramic 20%
C 65. .001 MFD Ceramic 20%
C 66. .001 MFD Ceramic 20%
C 67. .05 MFD 1600 V.
C 68. 100 MMF Ceramic 20%
C 69. 10 MMF NPO Ceramic
C 70. .01 MFD GMV Ceramic
C 71. .001 MFD Ceramic 20%
C 72. 470 MMF 1000 V. Ceramic
C 73. .01 MFD GMV Ceramic
C 74. .001 MFD Ceramic 20%
C 75. .01 MFD GMV Ceramic
C 76. .001 MFD Ceramic 20%
C 77. 470 MMF GMV Ceramic
C 78. .001 MFD Ceramic 20%
C 79. .001 MFD Ceramic 20%
C 80. 5 MMF NPO Ceramic
C 81. .01 MFD GMV Ceramic
C 82. .001 MFD GMV Ceramic
C 83. .01 MFD GMV Ceramic
C 84. .01 MFD GMV Ceramic
C 85. .001 MFD Ceramic 20%
C 86. .001 MFD Ceramic 20%
C 87. 100 MMF NPO Ceramic
C 88. 470 MMF Ceramic 20%
C 89. .004 MFD Ceramic 20%
C 90. .1 MFD Tubular
C 91. .001 MFD Ceramic 20%
C 92. .01 MFD GMV Ceramic
C 93. .001 MFD GMV Ceramic
R 1. 100K ½ W
R 2. 82 Ohm ½ W
R 3. 18K ½ W
R 4. 27K ½ W
R 5. 82 Ohm ½ W
R 6. 4.7 Meg ½ W
R 7. 22K ½ W
R 8. 2.2 Meg ½ W
R 9. 22K ½ W
R 10. 22K 2 W
R 11. 120 Ohm ½ W
R 12. 470K ½ W
R 13. 1500 Ohm ½ W
R 14. 6800 Ohm ½ W
R 15. 82K ½ W
R 16. 22K 2 W
R 17. 270K ½ W
R 18. 680 Ohm ½ W
R 19. 10K 1 W
R 20. 270K ½ W
R 21. 120 Ohm ½ W
R 22. 10K 1 W
R 23. 1 Meg. ½ W
R 24. 120 Ohm ½ W
R 25. 10 K 1 W
R 26. 1.2 Meg. ½ W
R 27. 270K ½ W
R 28. 270K ½ W
R 29. 1 Meg. ½ W
R 30. 1 Meg. ½ W
R 31. 2.2 Meg. ½ W
R 32. 150K ½ W
R 33. 250K Pot. audio taper
R 34. 100K ½ W
R 35. 4.7K 4 W
R 36. 270K ½ W
R 37. 100K ½ W
R 38. 680 Ohm ½ W
R 39. 1.2 Meg ½ W
R 40. 47K ½ W
R 41. 100K Pot. AF taper
R 42. 100K ½ W
R 43. 270K ½ W
R 44. 3900 Ohm ½ W
R 45. 820 Ohm 1 W
R 46. 470 K ½ W
R 47. 470K ½ W
R 48. 12K ½ W
R 49. 390 Ohm 1 W
R 50. 39K ½ W
R 51. 39K ½ W
R 52. 1.2 Meg. ½ W
R 53. Mazda 63 lamp
R 54. 27K ½ W

GONSET COMMUNICATOR

PERTINENT DATA

6/115 volt 144-148.2 Mc. Model

(See page 12 for supplementary data on Deluxe Model II and Airport Unicom models.)

POWER INPUT:	6 volts d-c or 115 volts a-c 60 to 400 cycles using appropriate power cord. On 6 volts the black wire is ground. No polarity need be observed. For 12 volt operation use Carter 12 v. d-c to 115 v. a-c rotary converter, model B1015C.
POWER DRAIN:	6 volt drain is 15 amps on transmit, 9.8 amps on standby receive, and 6.6 amps on receive alone. On 115 volts a-c the maximum drain (transmit) is 1 amp.
CRYSTAL:	Fundamental type in 8.000 to 8.250 Mc. range. Multiplication factor 18. In an emergency, 6 Mc. crystals may be used with a slight loss in r-f drive. FT-243 type holder.
MICROPHONE:	Single button carbon (telephone type F2 or T-1 recommended) or a high output crystal or dynamic (Shure 505-C recommended for mobile work). Hot mike lead connects to ring of PL-68 plug. "Crystal-Carbon" mike switch must be thrown to corresponding position. Push-to-talk switch should be shorted out if it breaks mike circuit. Gain control ordinarily is run full on except for p-a use.
TUNE-UP:	Remove snap buttons and starting with eye switch on "Osc-Tripler" position, tune for maximum eye closure by means of indicated control, in counter-clockwise sequence, T/R switch on "Transmit", both power switches in "on" position.
CRYSTAL SPOTTER:	With T/R switch on "Receive", turn eye switch to "Osc-Tripler" position. This turns on transmitter oscillator to permit spotting on receiver dial. Always return eye switch to "Tune-Load" position before trying to transmit.
USE AS P-A SYSTEM:	Connect 4 to 8 ohm voice coil of good trumpet type speaker to phono connector on rear recess. Turn "Filaments" switch to "Receiver-PA" and the T/R switch to "Transmit". Adjust a-f gain control as required.
MATING CONNECTORS:	Type 83-1SP coax connector. Type PL-68 mike plug. Type 13A or M-93 Cinch "phono plug" p-a voice coil connector.
TUBE COMPLEMENT:	1-6CL6; 1-12AV7; 1-2E26; 1-6BQ7A; 1-12AT7; 2-6BH6; 1-6BJ6; 1-6T8; 1-12AX7; 1-6V6GT; 1-9006; 1-6E5; 2-6X4.
FUSES:	A-c fuses are 2 amp slo-blo type (in line plug). 6 volt fuse should be inserted in series with hot six volt lead. Replace with 20 amp. slo-blo type. (See schematic for variation.)
OTHER:	Dial lamps, Mazda No. 47. Vibrator, Mallory 294.

GENERAL

The Gonset COMMUNICATOR is a 2 meter AM transceiver designed for use on either 6.3 volts d-c or 115 volts a-c. The receiver has a noise figure of approximately 5.5 db, and the transmitter a power output of approximately 6 watts at nominal supply voltage. These figures will vary slightly with different 6BQ7A and 2E26 tubes.

POWER SOURCE

The power supply circuit is automatically changed from a-c to d-c and vice versa by jumpers in the two plugs. Fuses are 2 amp slo-blo type for 115 volt a-c operation (located in line plug) and 20-30 amp. for d-c operation. The drain on transmit with 6 volt supply is approximately 15 amps, and it is recommended that except for very short periods the vehicle engine

be run at charging speed during transmissions. Of the two 6-volt wires the *black wire is the ground wire* and the white wire the "hot" 6 volt wire.

Because of the current drawn on transmit (15 amps) it is desirable that heavy wire be used to supply voltage to the COMMICATOR in a vehicular installation. No. 8 B&S gauge is recommended from the battery or starter terminal up to the point where the flexible cable furnished with the COMMUNICATOR is attached. For casual operation in "stray" automobiles simply clip on the ammeter terminal or main "hot" terminal under the dash. Voltage will be adequate when the generator is charging but it may on the shy side when the motor is not running.

RECEIVER

Receiver operation is self-explanatory. On reception the tuning eye acts as a carrier strength indicator, actuated by the a.v.c.

TRANSMITTER

The COMMUNICATOR transmitter is designed for intermittent service with a "transmit" time not to exceed 10 minutes during any 20 minute period. If the transmitter "on" time exceeds this duty cycle, or if the COMMUNICATOR is operated for a long period in an unusually high ambient temperature, it is recommended that the back screen be removed (when this can be done safely).

The transmitter employs a crystal multiplication factor of 18, and utilizes crystals in the 8.0 to 8.25 Mc. range in FT-243 type holders.

The output circuit is designed to work either into a quarter wave whip screwed into the coaxial connector on the top, or into 50 or 70 ohm coaxial line having a moderately low standing wave ratio.

The multiplier stages are tuned by removing the snap buttons and starting with the osc-tripler position, closing the eye as far as possible on each indicated position of the tuning eye switch in sequence with the transmit-receive switch in the "transmit" position. The final amplifier is automatically disabled on all positions of the tuning eye switch *except* the last (tune-load) position. Therefore,

ALWAYS BE SURE TO RETURN THE SWITCH TO THE "TUNE-LOAD" POSITION BEFORE TRYING TO TRANSMIT.

When tuning up, either insert a microphone in the mike jack or else throw the microphone selector switch to "carbon"; otherwise feedback may occur. On the "tune-load" position the eye indicates relative r-f voltage across the coax output, and therefore the maximum amount of closure will vary somewhat with the impedance of the load to which the unit is connected.

A very useful feature is the "crystal spotter", which permits one to spot his own transmitter frequency on the receiver dial and thus check receiver calibration or to determine if a received signal is close enough to cause QRM. With the T/R switch in the receive position, the tuning eye switch is thrown to the osc-tripler position. This turns on the exciter at reduced plate voltage. To avoid feedback and get a closer dial reading, the signal should be zeroed in by eye, with the receiver gain turned down. In some cases a second indication may be observed on another portion of the dial, but this will be weaker. Also, it will be far enough removed from the known crystal frequency that there will be no ambiguity. BE SURE TO RETURN THE TUNING EYE SWITCH TO "TUNE-LOAD" BEFORE ATTEMPTING TO TRANSMIT.

With the T/R switch on "Receive" and the "Filaments" switch on "Receiver P-A", the receiver will work normally but the drain will be lower because the transmitter tube heaters will not be lighted. This is a useful feature when operating on 6 volts for long periods and it is not required that the transmitter be in standby condition. The transmitter heaters take approximately 20 to 30 seconds to reach operating temperature.

The microphone input circuit takes either a carbon microphone or a high-impedance high-output type crystal or dynamic (approximately minus 50 db level). In both cases the microphone is connected between shell (ground) and the *ring* of a PL-68 plug. This is the standard connection for a carbon microphone, except that there is no push-to-talk function. Therefore the push-to-talk switch on a carbon microphone may as well be jumpered if it opens the microphone circuit as well as the separate push-to-talk circuit (which is not used in this case). The "Xtal-Carbon" switch on the rear panel recess should be thrown to the correct position for a particular microphone. The adjacent slotted shaft is the audio gain control for the transmitter and for p-a work. The transmitter speech system is designed for close talking, rather than "studio" type pick up, and ordinarily the gain control will be run full on. The main function of the gain control is to permit reduction of the audio gain if desired when using the COMMUNICATOR as a public address system.

PUBLIC ADDRESS OPERATION

The small "snap in" coaxial connector (phono type connector) is for connection to the 4 to 8 ohm voice coil of an external speaker for p-a work. A good, trumpet type PM speaker with husky magnet is recommended for best coverage with good efficiency. To use the unit for p-a work, connect the external speaker, turn the "Filaments" switch to "Receiver P-A", and the T/R switch to "Transmit". Adjust the gain control on the rear recess to the desired level.

OPERATING SUGGESTIONS

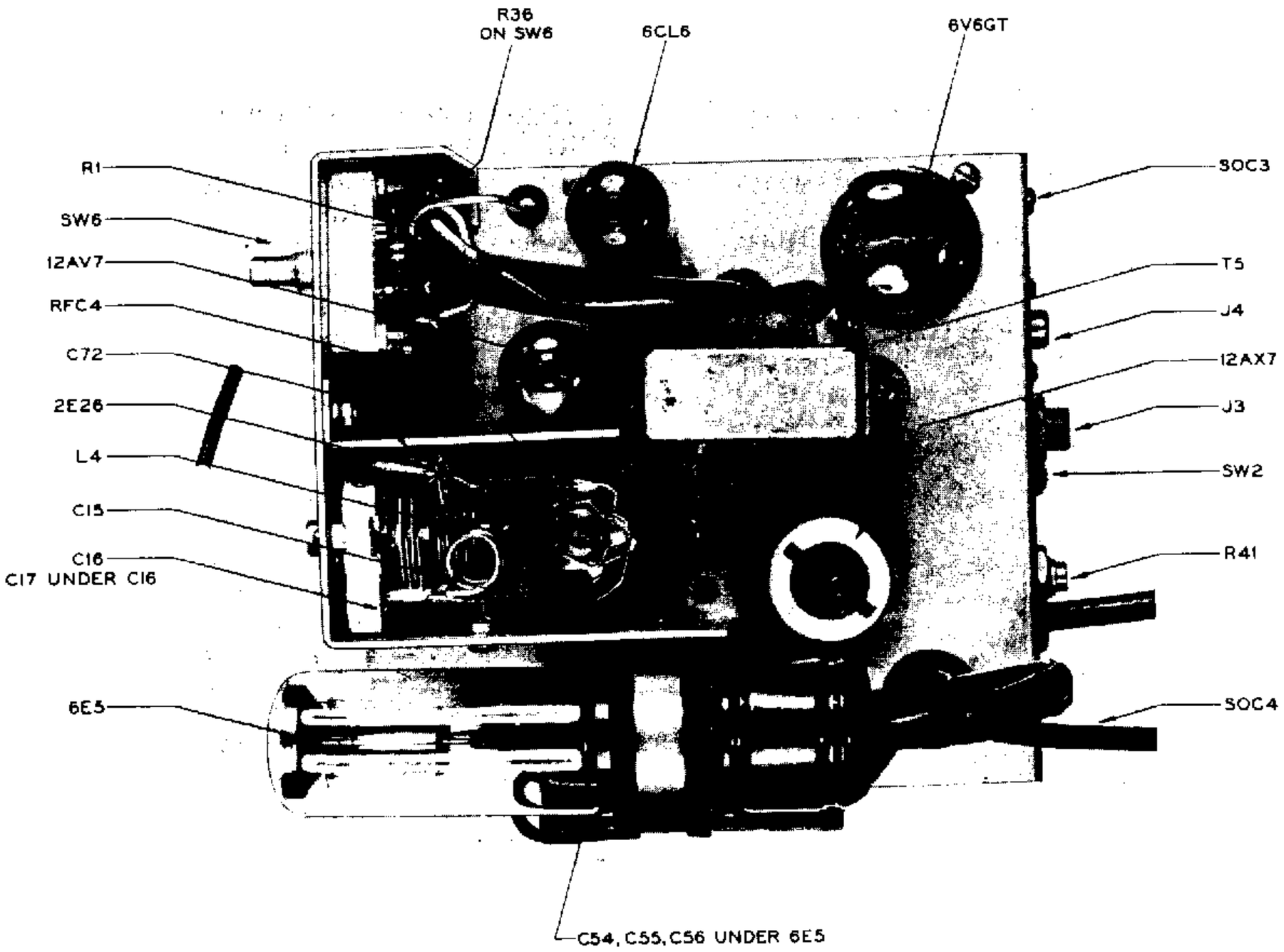
For maximum life of the T/R switch the lever should be "flipped" quickly with the tips of the fingers; do NOT grab hold of the lever like a knob and turn it slowly. When used as recommended the switch will give long, trouble-free service. Should replacement ever be required, the switch is available with wiring harness attached in order to facilitate restoring the circuit.

When the power supply switch is turned off, it should not be turned on again for about 1 minute. If this precaution is not observed, the discharged input filter condenser will act for an instant as virtually a dead short on the 6X4 rectifiers, which will still be in condition to pass current due to the fact that nearly a minute is required for the cathodes to cool.

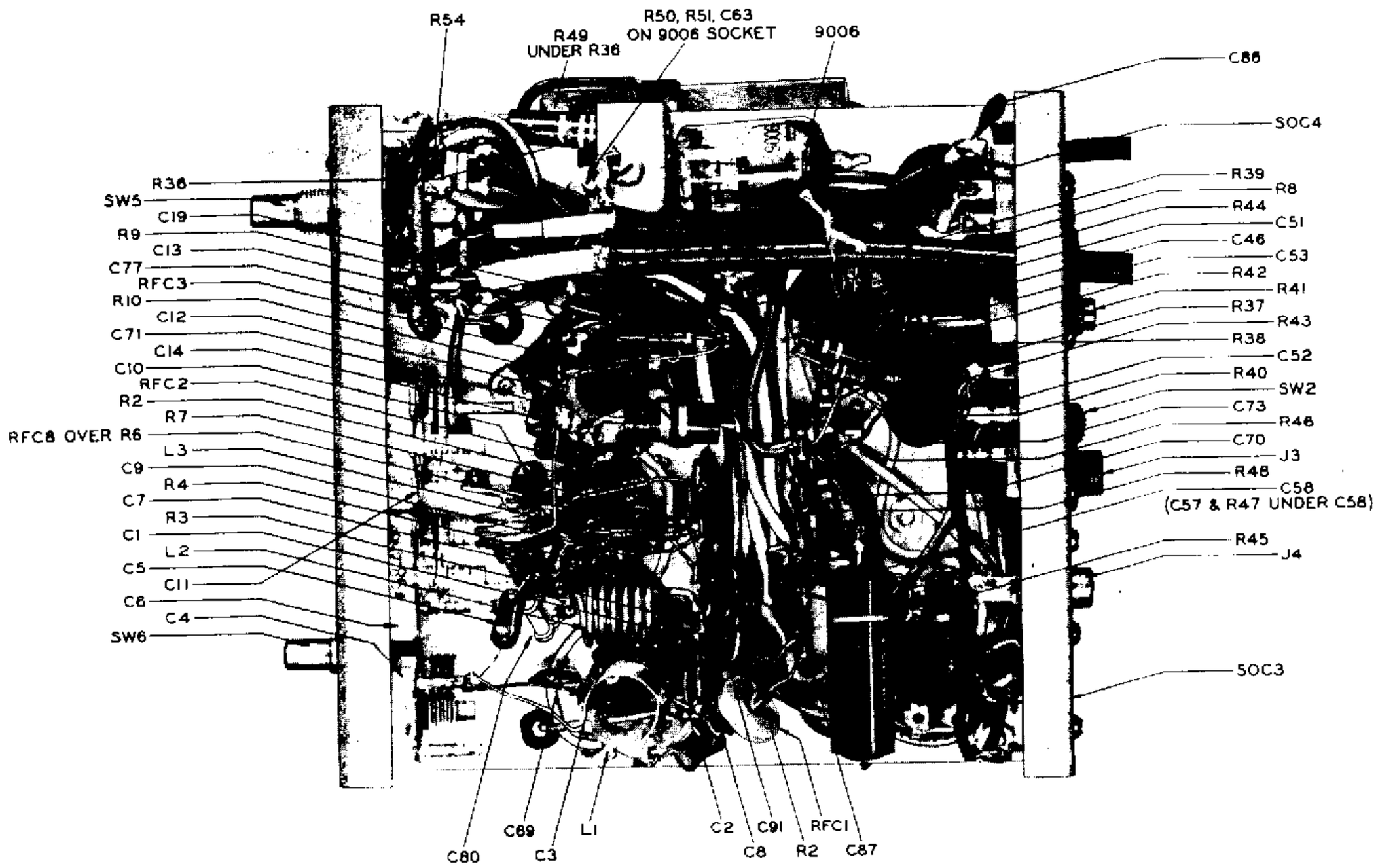
ANTENNA AND COMMUNICATION RANGE

The communication range of the COMMUNICATOR depends largely upon terrain factors and the antenna employed. At extreme ranges the weather also is a determining factor.

It is not within the scope of this manual to attempt to cover thoroughly the considerations involved in v-h-f



TOP VIEW - TRANSMITTER



BOTTOM VIEW - TRANSMITTER

propagation, nor the design of antennas. Summarizing briefly, the higher the elevation of the site, the greater the range, particularly when the height of the antenna above ground is low. Also, the higher the antenna above ground, the greater the range, particularly when the site is not elevated. (Height of the antenna above ground becomes less important when the station is located atop a hill.)

The range also is dependent upon the same factors at the other end of the circuit, as well as the character of the intervening terrain. It also is dependent upon the transmitter power, receiver sensitivity, and antenna gain of the other station. Because some stations employ more transmitter power and many have less receiver sensitivity, it is possible to hear more stations than can be worked. The very high sensitivity of the receiver in the COMMUNICATOR tends to make this condition the more noticeable.

To obtain the best possible performance from the COMMUNICATOR at a given site, a good antenna is important. For general coverage fixed-station work with vertical polarization, a ground-plane type antenna designed for 2 meter operation is recommended. A good directional array such as the Gonset "Twin-Six" dual Yagi array will greatly increase the range and reduce QRM problems. This array may be orientated for either vertical or horizontal polarization.

When using coax, RG-8/U or RG-11/U is recommended in preference to the smaller types in order to minimize line loss. If the antenna is located more than about 120 feet from the COMMUNICATOR, a worthwhile reduction in line loss can realized by the use of 450 ohm open wire "Gonset Line" stocked by jobbers for TV use. Enough RG-11/U is used to get the line outside the building, then a balun consisting of a half wave phase inverter section of coax (27 inches long) is used to convert to the open line. Four spacers then are removed and the open line is tapered from 1 inch down to $\frac{1}{2}$ inch at the point where it attaches to the two ends of the inner conductor in the balun loop. The tapered section must be kept pulled taut. If the antenna is designed for connection to coax, a similar balun may be employed at the antenna end.

For mobile work a 19 inch car top whip will provide good performance as a ground-plane type antenna. (152-174 Mc. commercial whips are a little short for best results.) If the car does not have a metal top, a coaxial "sleeve" type antenna my be used, but this antenna is quite frequency sensitive and will not give maximum performance over the entire 2 meter band.

For portable use, emergency work or casual mobile operation, the quarter wave whip furnished with the COMMUNICATOR may be used by screwing it directly into the coax fitting on the unit.

Surprisingly good results have been obtained using the COMMUNICATOR in this manner with it setting on the front seat of a metal-top sedan, though of course much better results will be obtained with a regular mobile type antenna connected via coaxial line.

In some cases an ordinary side-cowl auto radio antenna will give nearly as good results as a car top whip. The antenna is extended to approximately 58 inches (3/4 wave) and undesirable out-of-phase radiation from the lower quarter wave is partially suppressed by proximity to the windshield support post. Best results with this arrangement require that the lead-in be of the type using polyethylene insulation. (Most of the better quality auto radio antennas employ this type lead in.) An extension cable of RG-59/U or TV-59 using the proper fittings will permit use of the auto radio antenna either for its intended purpose or for occasional "picnic" use of the COMMUNICATOR as a mobile unit.

When working mobile, it will be noticed that a "flutter" is apparent on both the transmitted and received signal, particularly when the signal is weak. The a-v-c in the COMMUNICATOR receiver has been designed with a fast time constant which minimizes the effect when the received signal is moderately strong, but it will still occur to some extent, particularly when travelling at high speed and the "flutter" rate is high. When working mobile-to-mobile the effect is of course accentuated, as the amount of flutter is thereby compounded by the transmitter flutter being superimposed upon the receiver flutter (assuming both vehicles are in motion).

This "flutter" is typical of two meter mobile operation and is not caused by any peculiar characteristic of the COMMUNICATOR.

RECEIVER AUDIO SYSTEM

The second detector, noise clipper, and audio system of the COMMUNICATOR receiver have been designed for maximum intelligibility of weak signals. Because the individual characteristics have been engineered to complement each other as an overall system, often it will be found that it is possible to copy weak signals which are not intelligible on a receiver having a comparable measured noise figure (which is the figure of merit commonly employed as a yardstick of receiver sensitivity). This is true even in a quiet location where a noise clipper ordinarily would not be needed for suppression of impulse type noise.

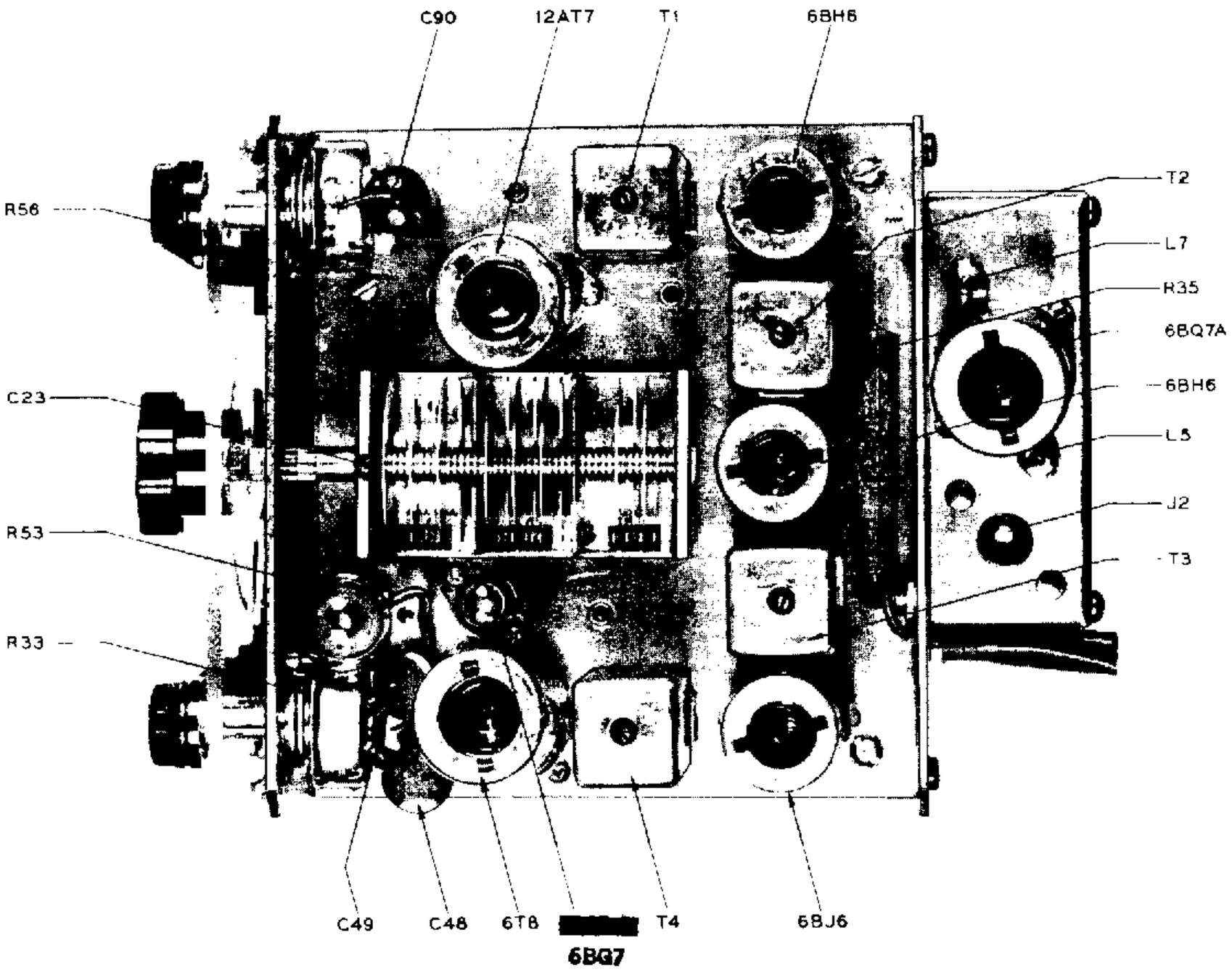
It is recommended that the noise clipper be left on all the time, the in-out switch being provided primarily to assist in aligning the r-f and i-f trimmers on background noise when a signal generator is not available.

TRANSMITTER AUDIO SYSTEM

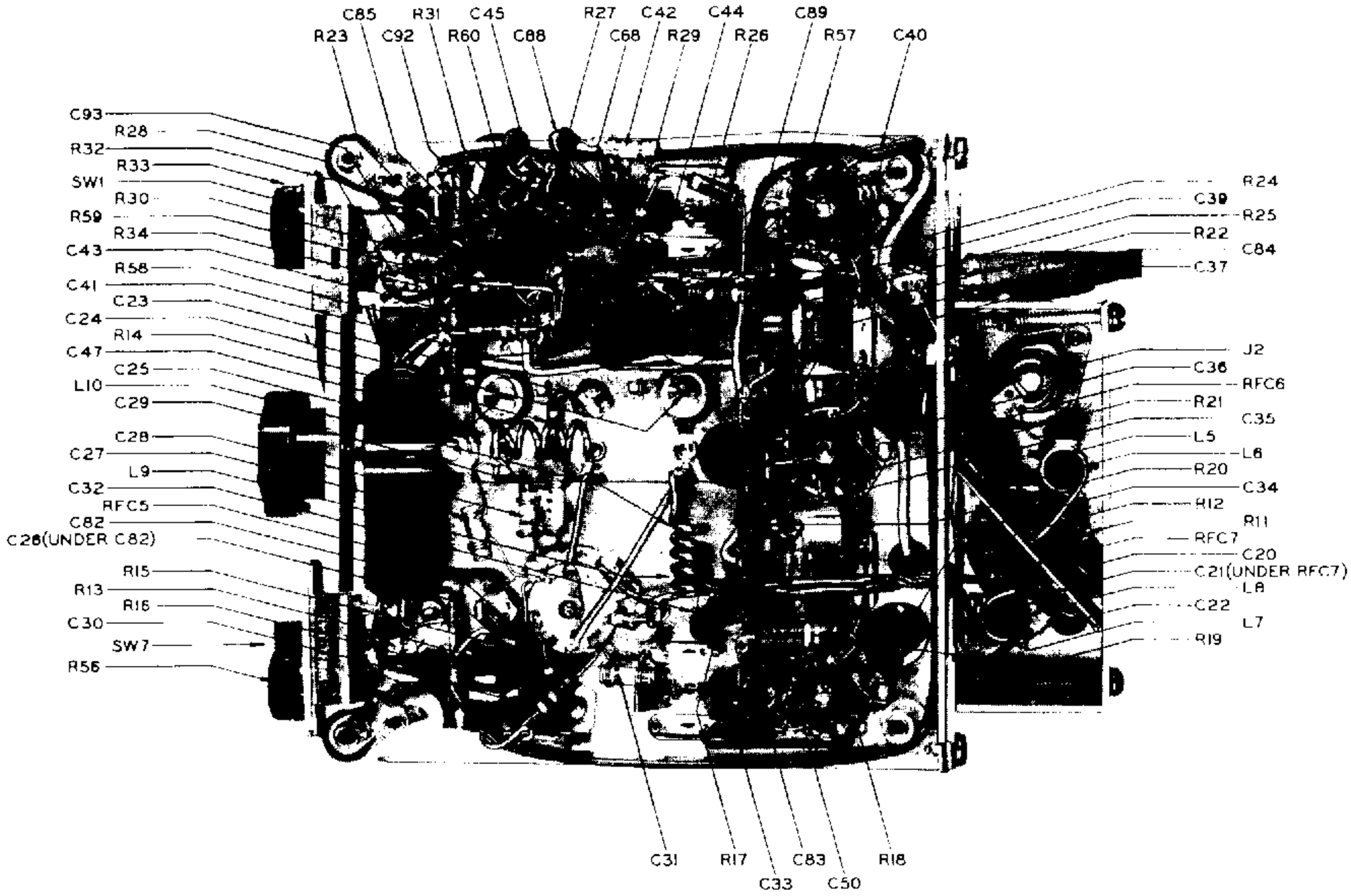
It will be noted that a Class A single-ended beam tetrode is used in preference to a Class B modulator. The reason for this is that when "square wave" audio is involved, as when heavy speech clipping is employed at high modulation percentages, the former type modulator compares very favorably with the latter, with the advantage of more constant plate current drain and elimination of a driver stage and its transformer. It also facilitates designing the modulator for integral speech clipping, making the incorporation of a separate speech clipper unnecessary, as well as adjustment thereof.

The speech system of the COMMUNICATOR is designed so that to obtain maximum practical speech clipping one need only talk closer to or louder into the microphone, up to the point where the maximum tolerable distortion is obtained. No splatter will occur. No adjustment of a clipping level control is required.

With voice waveforms and sufficient audio input to produce heavy speech clipping, the percentage modulation is held to approximately 85 or 90 per cent, and under no conditions is it possible to exceed this modulation percentage. This means that "splatter" from negative peak clipping is avoided, and no critical adjustments are involved. Assuming that a noise clipper



TOP VIEW - RECEIVER



BOTTOM VIEW - RECEIVER

is employed on the receiver at the other end of the circuit when the received signal is weak, upward modulation exceeding approximately 50 or 60 per cent is clipped at the receiver and therefore is of questionable utility anyhow.

For those who insist upon heavier modulation, it can be accomplished by the simple process of substituting a 5881 for the 6V6-GT. No circuit changes are required. The carrier power will be slightly less than when a 6V6-GT is used (about 10 per cent) due to the heavier plate current drain upon the power supply. Also, the "transmit" hours life of the vibrator (and to a slight extent the 6X4 rectificers) will be reduced, though not seriously if the transmit periods are kept short. When the unit is used mostly or exclusively on 6 volts, the substitution is not recommended.

The audio characteristics of the transmitter, from microphone input through the modulator, have been engineered to provide maximum utilization of the carrier power from the standpoint of intelligibility under unfavorable receiving conditions.

TVI AND OTHER INTERFERENCE

When operated in an area in which television signals are of sufficient strength to provide a completely snow-free picture, ordinarily no difficulty with TVI will be encountered if the COMMUNICATOR and antenna are both located a reasonable distance from the TV set and TV antenna respectively. Use of coaxial line with the COMMUNICATOR will tend to minimize TVI. In some cases mild TVI may be experienced on channel 10, due to the frequency relationship. Often moving frequency to another part of the 2 meter band will cure the trouble.

Spurious radiations from the COMMUNICATOR are minimized through the use of a double tuned output circuit. The loaded Q of the antenna coupling circuit is sufficient to provide considerable rejection of frequencies removed from the carrier by as little as 8 Mc. Spurious radiations are further minimized through the use of high Q tunable tank circuits in the multiplier chain, rather than the "broad band" slug tuned tank circuits sometimes employed.

In spite of these precautions a few microwatts of power will be radiated on some frequencies which are a multiple other than 18 of the crystal frequency. In some instances this infinitesimal amount of power will be sufficient to interfere with nearby taxicab, police, etc. receiving installations designed for reception of mobile units, particularly if one or both antennas are well elevated. In other cases the interference to other services may be due to receiver image response.

Such interference can be avoided simply by choosing crystal frequencies within the 2 meter band which do not interfere. Usually such services will be glad to co-operate to the extent of giving a telephone check as to which crystal frequencies interfere and which do not.

USING 9 MC CRYSTALS

In some cases interference to another service, such as TVI on channel 10, can be dodged more easily by altering the oscillator-multiplier to employ a 9 Mc. crystal and a multiplication factor of 16, rather than an 8 Mc. crystal and multiplication factor of 18. When using 9 Mc. crystals it is necessary to alter the first tuned circuit as follows:

Remove 10 mmf. fixed padder C-69 across first tuned circuit. Remove coil and replace with 8½ turns of Barker & Williamson No. 3003 "Miniductor", resulting in a coil having 4 less turns.

Tune as with 8 Mc. crystals except be sure that first condenser peaks at approximately half capacity, as it is possible to get a "peak" on the tuning eye (wrong frequency) at minimum capacity and again at full capacity. Least QRM to channel 10 usually will be obtained with 9 Mc. crystals when operating between approximately 144.8 and 145 Mc.

USING 24 MC CRYSTALS

Because of their lower price, better availability, and greater stability, the COMMUNICATOR was designed for use with 8 Mc. fundamental crystals. However, by making minor modifications to the oscillator circuit, 24 Mc. overtone type crystals may be employed, with a considerable reduction in potential interference to other services operating receivers close by.

Modification consists of removing the 10 mmfd. condenser C-1 which is connected from 6CL6 grid to cathode, and shunting the 50 mmfd. condenser C-2 from cathode to ground with .001 ufd. disc ceramic.

The unit is tuned as before except that the "Osc-Tripler" tuning condenser will be found to "kick out" suddenly on one side of the setting giving maximum eye closure, because what was previously the 24 Mc. tripler tank circuit becomes the tank circuit for the tuned-plate oscillator. To make sure the crystal always starts without sluggishness when switching from receive to transmit, the tuning condenser should be tuned past the point where the oscillator kicks out, then backed up slowly until the oscillator kicks in again.

Early production COMMUNICATORS have a recessed crystal socket which prohibits use with holders employed with some overtone crystals. The two spacer bushings between the crystal socket and panel should be removed to bring the holder up flush with the panel. This change also allows the crystal to run cooler.

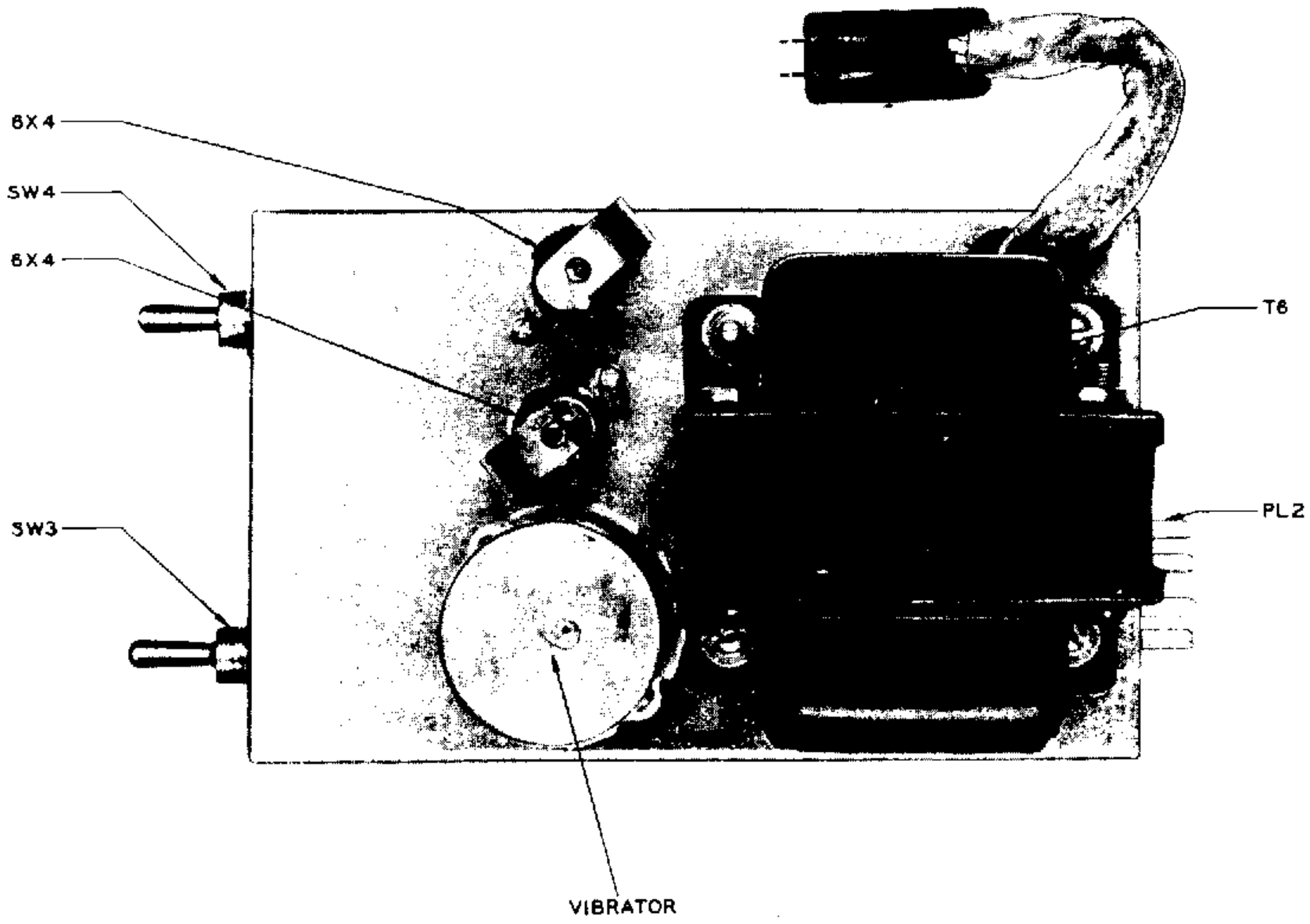
NOTE: When the oscillator is modified to use a 24 Mc. overtone crystal the "crystal spotter" function must be sacrificed.

IMAGE RESPONSE

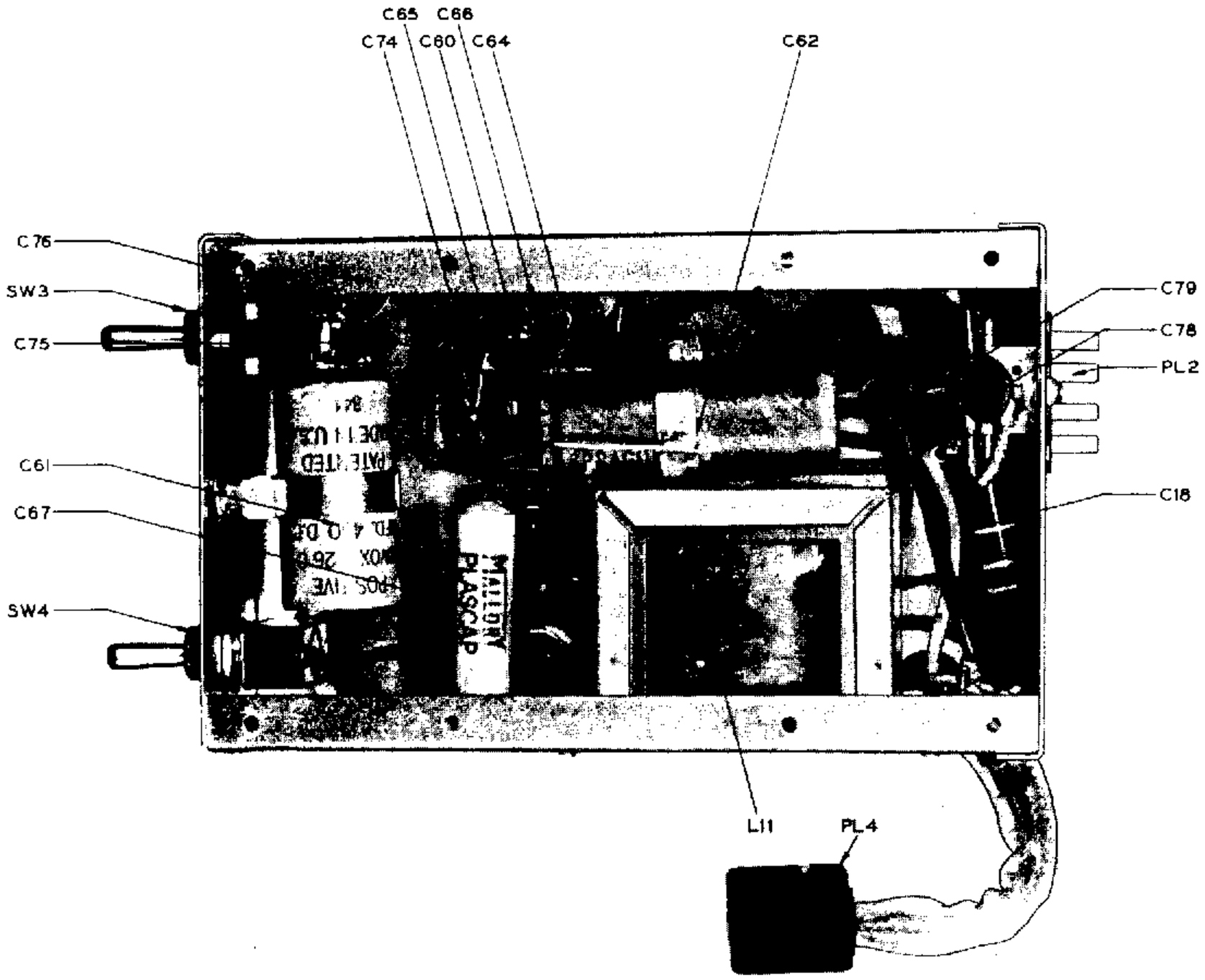
In a unit as compact as the COMMUNICATOR and in the interest of avoiding excessive circuit complexity, some compromises of necessity must be made. Use of a 6 Mc. i-f system permits better selectivity with single conversion than would be obtained with a higher frequency i-f system. However, use of the 6 Mc. i-f aggravates the problem of images, and occasional reception of image signals of considerable amplitude may be expected in areas where the aircraft frequencies between 132 and 136 Mc. are actively employed.

RECEIVER SELECTIVITY

The selectivity of the receiver is about as great as can be utilized with a receiver having a tunable high frequency oscillator and designed for mobile use (with accompanying wide variations in heater supply voltage during operation). Also, it is about as great as can be utilized successfully for "net" operation without resorting to very close tolerance transmitter crystals. Reception of transmitters using overtone crystals prone to drift would also be complicated by greater selectivity. The bandwidth of the i-f system of the COMMUNICATOR is a compromise between these factors and QRM considerations. Use of four i-f transformers re-



TOP VIEW - POWER SUPPLY



BOTTOM VIEW - POWER SUPPLY

sults in a good "shape factor" (low ratio of skirt selectivity to nose selectivity).

TRIMMER ADJUSTMENTS

The r-f and oscillator trimmers on the receiver seldom will require adjustment. To check them, tune the receiver near the middle of the band, turn off the noise clipper, and adjust the compression trimmer accessible through the rear of the two trimmer holes on the under side of the chassis (mixer grid) for maximum background noise. Then peak the slug on the rear of the receiver farthest from the antenna connector for maximum background noise (cascode output). This requires removing the back screen from the cabinet. The other slug is the antenna input trimmer but tunes so broadly that retuning should never be required.

Repeaking or checking the i-f trimmers requires removal of the receiver from the cabinet. It may be done on background noise if the transformers are not too far out of adjustment. If one of the transformers is replaced it probably will require a signal generator for realignment. This should be set to 6 Mc., connected to the mixer grid, and the output level of the generator reduced as alignment proceeds, in order to prevent overload. Final alignment (touching up all i-f trimmers) should be done either on background noise or with the signal generator reduced to the point where the tuning eye just flickers slightly.

The front trimmer on the bottom of the cabinet is the oscillator trimmer and should not be touched unless the calibration is off more than about 100 kc., as day to day variations in temperature, humidity, etc. may cause this much error in calibration. The oscillator trimmer should be set *after* the adjacent mixer trimmer has been peaked at the center of the band, as the latter pulls the oscillator trimmer slightly. It is for this reason that the mixer trimmer always should be peaked on background noise rather than a signal.

REMOVAL OF INDIVIDUAL UNITS

To remove the transmitter section from the cabinet (including the receiver audio output section) remove the tuning eye switch nut, remove the T/R switch nut, disconnect the cable connectors involved, disconnect the voice coil lead from the speaker terminal stud (pull straight off), remove four screws on antenna connector, and pull the chassis straight back out of the cabinet. Reverse the procedure to replace the transmitter.

To remove the receiver, unscrew the four screws on the bottom of the cabinet, remove the two small receiver knobs, disconnect cables involved, and slide unit back out of the cabinet. To replace, reverse the procedure.

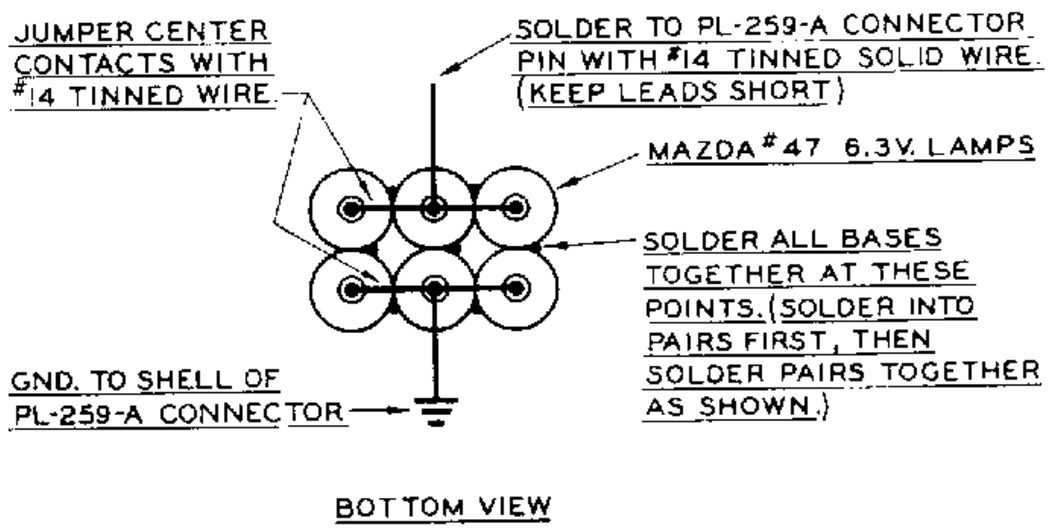
To remove the power supply, unscrew the six screws on the bottom of the cabinet, remove the nuts from the two toggle switches, disconnect cable, and lift unit up and out. To replace, reverse the procedure.

TROUBLE SHOOTING

When trouble develops the first thing to look for is a defective tube, as this trouble will represent about 90 per cent of that encountered in service. When replacing the 6T8, it is desirable to try two new tubes, as about 1 out of 10 brand new tubes will not perform satisfactorily when the supply voltage is low, as in mobile service when the generator is not charging. This is explained by the fact that the 6T8 heater voltage is dropped via a ballast resistor to prevent a-c hum or generator or vibrator hash from entering the audio circuit via the cathode of the noise clipper diode, and a 6T8 which is marginal at normal voltage will not perform satisfactorily at the reduced voltage. Failure of one 6X4 rectifier during transmit usually will damage the other; therefore if one is found bad the other should be checked.

If the trouble is not traced to a defective tube, then the voltage and resistance measurements should be made, referencing the schematic diagram and voltage chart.

RF OUTPUT INDICATOR



BOTTOM VIEW

DUMMY ANTENNA LOAD

A convenient and easily constructed dummy antenna load is shown in the accompanying illustration. The connecting leads to the PL-259-A connector should be kept very short. This r-f output indicator gives a check on carrier power output and a rough check on audio gain and modulation capability, and a periodic check with such a unit is recommended. When the lamps light to normal brilliancy the output is approximately 6 watts, which is average for a properly operating COMMUNICATOR. (The output varies slightly from unit to unit because of tube variations, etc.) When speaking directly into one of the recommended microphones at "conversational" voice level there should be a noticeable "upward flicker". Whistling into the microphone should cause a pronounced increase in lamp brilliancy.

HEADPHONE OPERATION

For special applications where headphone operation is desired and the speaker must be muted, a closed circuit headphone jack may be mounted on the rear screen or the side of the cabinet. The voice coil circuit is opened and rerouted via this jack, so that when a pair of low impedance (600 ohm type) headphones are inserted in the jack the voice coil winding of the speaker is automatically disconnected.

Because of the excellent sensitivity of the COMMUNICATOR receiver, many amateurs with high power transmitters will want to use it as their fixed station receiver, thus avoiding the expense of a second receiver. The simplest method of muting the receiver on transmit when used with a separate transmitter is to short the voice coil by means of a relay connected to the p-a "phono jack" on the rear recess. The relay contacts should be connected between the phono jack and chassis ground via reasonably short, heavy leads, or otherwise full muting will not be obtained.

For special applications where it is desired to connect the COMMUNICATOR to a private telephone line, as in certain Civil Defense or C.A.P. applications, simple modifications can be made which permit such connection to be made in such a manner that both received signals and transmitted signals (sidetone) are fed to the telephone line. Information regarding the necessary modifications will be furnished upon request.

MCW OPERATION

"MCW" operation (keyed tone with constant carrier) may be accomplished very easily by simply running a wire from the p-a connector (phono jack) on the rear of the transmitter chassis back via a telegraph key to the hot microphone terminal on a PL-68. A 1200 ohm ½ watt resistor should be connected from the hot microphone terminal to ground (shell) of this PL-68 and the microphone switch thrown to "CRYSTAL" position. The tone may be varied as desired by adjustment of the a-f gain control on the rear of the transmitter.

Polarity of the voice coil winding on current production sets is such as to give the correct feedback for audio oscillation using this method. However, it is conceivable that sets may be produced in the future which would require reversal of the voice coil leads to obtain audio oscillation in this manner.

USING COMMUNICATIONS RECEIVER AS I-F STRIP

For home station use it is possible to use any good communications receiver having (or adjustable to) an I-F bandwidth of not less than about 10 kc. following the I-F strip in the COMMUNICATOR, thus in effect making a composite "double conversion" superheterodyne having much greater selectivity than the COMMUNICATOR receiver alone.

This is accomplished by running a piece of coax to the input of the communications receiver from a 1 uufd. (approximately) condenser or "gimmick" connected to the plate of the last I-F tube in the COMMUNICATOR. The communications receiver is tuned to 6 Mc. The trimmers on the last I-F transformer in the COMMUNICATOR should be touched up after making this installation, as connection of the "gimmick" condenser will affect the tuning slightly.

MISCELLANEOUS NOTES

When removing the receiver from the main cabinet for any reason, it is extremely important that the dressing of the high frequency R-F leads not be disturbed, as some are quite critical.

On the tune-up positions of the tuning eye switch, screen voltage is removed from the 2E26 P-A tube. However, a few milliwatts of power will be radiated under these conditions, which is sufficient to be heard several blocks, if the set is hooked to an antenna. Therefore, tune-up should be accomplished as quickly as possible or else a dummy antenna used if this amount of radiation is likely to bother a net, such as CAP.

Trouble sometimes is encountered in getting positive contact in the microphone jack when a worn PL-68 plug is employed. The jack spring contacts are adjusted for use with a new plug, and if trouble is encountered when using a worn plug it is suggested that a new plug be substituted rather than tamper with the spring adjustment.

COMMUNICATOR II (DeLuxe Model)

The COMMUNICATOR II is basically the same as the standard model except for the addition of a speaker-disabling earphone jack and an adjustable squelch circuit using a 6BG7 dual triode. This is a highly effective carrier-actuated squelch circuit which may be used or not as desired. In the absence of a signal the exceptionally flat a-v-c characteristic of the COMMUNICATOR receiver normally will cause a high background noise which becomes objectionable if prolonged, as when maintaining a standby watch on C.D., C.A.P., or other net frequencies. The squelch facility permits muting of this background noise.

The squelch circuit employs a series gate diode following a d-c amplifier or "clamp tube" which, in turn, is actuated by the a-v-c voltage. The combination is very effective, gating cleanly on an a-v-c voltage change as small as 0.1 volt when the threshold control is set carefully. The circuit is designed so that compensating factors tend to hold the threshold setting substantially constant over a moderate change in supply voltage to the COMMUNICATOR.

To disable the squelch, just turn the squelch control slightly past the point where the gate "opens" on background noise with no station tuned in. It is not necessary to turn it full clockwise.

To use the squelch, back off the threshold control counter-clockwise just to the point where the background noise disappears, and stop there. This makes the squelch the most sensitive (so that it will open on weak signals). Unfortunately, this also makes the squelch sensitive to electrical noise that is sufficiently strong to cause the a-v-c voltage to change. This means that, if such noise (such as very strong ignition noise or interferences from a nearby commutator motor) is intermittent in nature, the threshold control must be backed off enough to prevent the intermittent noise from triggering the squelch. It will then take a stronger carrier to open the squelch. In extremely noisy locations it may be necessary to turn the threshold control full counterclockwise to prevent triggering of the squelch by noise. Such operation will be possible only if the desired signals are quite strong.

Certain limitations to the operation of the squelch should be kept in mind. For instance, the normal change in quiescent a-v-c voltage that occurs as the receiver is tuned over the band will cause the threshold setting to change slightly as one tunes over the band. For this reason it is recommended that the squelch be used only after a station is tuned in, and that it be disabled when "looking around the band." For best operation of the squelch, the noise clipper should be left on at all times.

AIRPORT UNICOM MODEL #3043

The airport "Unicom" model of the COMMUNICATOR is basically the same as the deluxe amateur model (COMMUNICATOR II) except for frequency coverage, a spring-loaded T/R switch, and the fact that transmitter tune-up adjustments, crystal, and eye switch are normally covered by an access plate, with only a push-button crystal spotting switch accessable in normal operation. Transmitter frequency normally furnished is 122.8 Mc., with tunable receiver coverage from 108 to 128 Mc. Other transmitter frequencies in this range are available on special order. Crystal multiplication factor in the transmitter is 18.