AIR COOLED

• RCA 5KW TRANSMITTER

5D

RCA IS PROUD TO OFFER TO THE BROADCASTING INDUSTRY A UNIQUE NEW 5000 WATT TRANSMITTER WHICH INCLUDES A NUMBER OF EXTREMELY IMPORTANT FEATURES, NEVER BEFORE INCLUDED IN A TRANSMITTER OF THIS POWER, SUCH AS —

1. Complete elimination of all water cooling.
2. Power consumption cut nearly in half.
3. Extremely high tube efficiency.
4. Low distortion over entire audio range.
5. Lower installation costs.
6. New, long life air-cooled metal anode tubes.
7. High level modulation.
8. Equalized high gain feedback.
9. Vertical chassis construction.
10. Unusually complete control circuits.

A COMPLETELY AIR COOLED 5 KW TRANSMITTER

THE RCA 5-D TRANSMITTER IS THE FIRST BROADCAST EQUIPMENT OF 5000 WATTS RATING EVER OFFERED FOR SALE WHICH PROVIDED FOR COMPLETE AIR COOLING OF ALL TUBES. THIS MEANS ELIMINATION OF WATER JACKETS, PUMPS, COOLING RADIATORS, TANKS, THE NECESSITY FOR OBTAINING DISTILLED WATER AND ALL THE ATTENDANT INCONVENIENCES WHICH HAVE MADE WATER COOLING SYSTEMS EXPENSIVE TO INSTALL AND A PROBLEM TO MAINTAIN. THE DISCARDING OF THE WATER COOLING ACCESSORIES NATURALLY MEANS A CONSIDERABLY CHEAPER INSTALLATION AND MUCH LESS MAINTENANCE WORK BY THE OPERATING STAFF. IT ALSO MEANS LESS EXPENSE BECAUSE NO WATER NEED BE PURCHASED AND LOWER REPLACEMENT CHARGES BECAUSE THERE ARE NO WATER JACKETS, PUMPS OR RADIATORS TO WEAR OUT.

HIGH LEVEL MODULATION AND METAL ANODE TUBES

THE ELIMINATION OF WATER COOLING HAS BEEN ATTAINED IN THE 5-D TRANSMITTER AND AT THE SAME TIME THE POSSIBILITY OF USING UNTRIED OR EXPERIMENTAL TUBES HAS BEEN AVOIDED. THE LARGE SIZE TUBES ARE STANDARD METAL ANODE TYPES WHICH HAVE BEEN USED IN SERVICE FOR A CONSIDERABLE PERIOD AND WHOSE LIFE IS KNOWN TO BE LONG AND SATISFACTORY. THESE TUBES ARE MOUNTED IN SOCKETS PROVIDED WITH COPPER RADIATING FINS OVER WHICH A STREAM OF AIR IS BLOWN BY SILENT SIROCCO BLOWERS. BECAUSE OF THE HIGH EFFICIENCY CIRCUITS, THE AMOUNT OF HEAT LIBERATED FROM THE TUBES IS OF THE SAME ORDER AS THAT FROM MANY 1000 WATT TRANSMITTERS. SINCE AIR TO THE BLOWERS IS SUPPLIED THROUGH A DUST FILTER AT THE BOTTOM OF THE CABINET AND SINCE THERE IS NO OTHER AIR-ENTRY, COMPONENTS WILL HAVE MORE CIRCULATION OF AIR, EQUIPMENT WILL RUN COOLER AND APPARATUS WILL REQUIRE LESS CLEANING THAN FORMERLY.

THE HIGH PLATE EFFICIENCY IS ATTAINED BY THE USE OF HIGH LEVEL, CLASS B MODULATION. THIS EFFICIENCY IS MORE THAN DOUBLE THAT OF ANY PREVIOUS 5 KW. TRANSMITTER. THIS MEANS LOWERED POWER COSTS AND BECAUSE LESS POWER IS DISSIPATED, OPERATION OF TUBES WILL BE LESS SEVERE AND THE LIFE LONGER. IN ADDITION, TUNING AND ADJUSTMENT OF SUCH A CIRCUIT IS CONSIDERABLY SIMPLER THAN FOR A LOW LEVEL AMPLIFIER.

AIR COOLING OF METAL ANODE TUBES ACTUALLY PROVIDES CONSIDERABLY BETTER TUBE OPERATION WHICH WILL BE APPARENT WHEN IT IS CONSIDERED THAT NOT ONLY THE METAL ANODE, BUT THE GLASS SEAL AND PRESS ARE AIR-COOLED. SINCE NO SCALE CAN FORM NOR CAN BOILING TAKE PLACE, THERE WILL BE NO HOT SPOTS ON THE ANODE — TUBES WILL OPERATE COOLER AND LIFE EXPECTANCY WILL BE LONGER.

LOWER COSTS THROUGHOUT

THE DESIGN OF THE 5-D EQUIPMENT RESULTS IN IMPORTANT SAVINGS TO THE BUYER. FIRST, INSTALLATION IS CHEAPER DUE TO THE LACK OF WATER COOLING EQUIPMENT AND PIPING, AND TO THE CONSOLIDATION OF THE EQUIPMENT INTO A FEW MAJOR UNITS. THE AIR BLOWERS FOR THE AIR-COOLED TUBES ARE SUPPLIED MOUNTED IN THE TRANSMITTER.

SECONDLY, THE EXTREMELY HIGH EFFICIENCY REDUCES THE POWER COSTS BY A LARGE AMOUNT.

At zero modulation, the transmitter will require only 16.5 kw. of a.c. power and under average conditions of modulation, 18.5 kw. Even when operated at reduced output to produce 1000 watts, the power drain is only 11.0 kw. for average modulation. A comparison with power requirements of non-air cooled equipment will indicate the enormous saving in power. At many stations, this item alone may be in the order of $2000. savings per year. Tube costs will also be reduced because of the longer life.

Thirdly, because of the reduction of physical equipment, the ease in adjustment, the elimination of the water element, and the dust filtered air cooling of components, maintenance charges will be considerably reduced.

HIGH FIDELITY OF A NEW ORDER

Many claims have been made for high fidelity operation of transmitters, but in the case of 5-D, distortion, frequency response and noise level characteristics have been tested under many different conditions to preclude any possibility of unnatural reproduction. For example, distortion measurements at 400 cycles, as often taken, give no indication of distortion at other important frequencies. In the case of the 5-D, distortion is low over the entire audio range (less than 3% r.m.s.) as indicated on the curves in this folder. Frequency response is also uniform over the range under all normal conditions of use. Hum level with 1 kw. or 5 kw. output will be minus 60 db unweighted or more below the 100% modulation level.

Several types of distortion meters have been employed for checking purposes and elaborate listening tests have been made on high fidelity receivers to assure that quality was exceptional. All of this has been done to make certain that the 5-D will meet all possible high fidelity standards, even far into the future.

VERTICAL CHASSIS CONSTRUCTION

RCA's exclusive Vertical Chassis transmitter construction has been employed in the 5-D. Components are mounted on vertical L shaped panels which form the framework of the equipment. Two of these panels are bolted together to form a U. The flat portion of the U is parallel to the front panel of the enclosing cabinet which supports no weight and is for protective purposes only. Thus the surfaces on which the apparatus is mounted are vertical instead of horizontal as in the older shelf type construction, and to a man standing at the rear of the cabinet, everything is clear and within easy reach. Because of this construction the equipment can be made physically smaller with greater accessibility than formerly. Thus the depth of the 5-D is only 24 inches. The rear view photo illustrates the clean cut, open construction of the power amplifier and modulator units.

NEW EQUALIZED FEEDBACK

A fundamentally high quality audio system is used in the 5-D transmitter combined with a new push-pull feedback circuit permitting stable operation with 30 db of degenerative feedback or more. The feedback circuit is unique in many respects — it requires no adjustment, it covers a wider band of frequencies, is non-critical and independent of tubes and a change in power from 1 to 5 kw. requires no alterations of setting. The feedback acts from the audio input of the transmitter up to the primary of the modulation transformer. However, with a high level modulation system, the

FEEDBACK DEVICE WILL COMPENSATE FOR DISTORTION OR RIPPLE TAKING PLACE IN THE CLASS C, R.F. AMPLIFIER AND ALSO TENDS TO COMPENSATE THE MODULATING VOLTAGE OF THE CLASS C STAGE. AT THE SAME TIME, SINCE THERE IS NO R.F.RECTIFICATION, THERE IS NO POSSIBILITY OF CHANGE IN COUPLING,VARIATION OF FEEDBACK WITH POWER OUTPUT OR OTHER DIFFICULTIES APT TO BE EXPERIENCED WITH SUCH A METHOD. THUS THE ADVANTAGES OF FEEDBACK HAVE BEEN ADAPTED TO THE TRANSMITTER BY MEANS OF A NEW CIRCUIT WITHOUT THE LIMITATIONS OF LESS STABLE FEEDBACK METHODS.

CONTROL CIRCUITS

A TRANSMITTER OF 5 KW. POWER OR OVER REQUIRES RATHER ELABORATE CONTROL EQUIPMENT FOR PROPER OPERATION. THIS IS NEEDED FOR AUTOMATIC STARTING,FOR PROTECTIVE PURPOSES AND FOR CHANGING POWER. THE 5-D TRANSMITTER IS PROVIDED WITH A SEPARATE POWER CONTROL PANEL ON WHICH ALL OF THE RELAYS, BREAKERS AND CONTROL APPARATUS ARE MOUNTED INSTEAD OF HAVING THE EQUIPMENT SCATTERED THROUGH THE TRANSMITTER. BY CENTRALIZING SUCH DEVICES ON ONE PANEL, AS IS CONSIDERED GOOD PRACTICE IN POWER WORK, A NERVE CENTER IS CREATED WHERE ALL OF THE CONTROL FUNCTIONS TAKE PLACE AND WHERE CHANGES IN TIMING OF RELAYS OR OTHER ADJUSTMENTS CAN BE MADE EASILY. THIS POWER PANEL IS WIRED IN ACCORDANCE WITH SWITCHBOARD STANDARDS AND IS A NEAT, CONVENIENT UNIT, WHICH HARMONIZES IN APPEARANCE WITH THE REST OF THE EQUIPMENT.

THE CONTROL CIRCUITS ARE MORE COMPLETE THAN THOSE OF FORMER TRANSMITTERS. AUTOMATIC STARTING IS, OF COURSE, PROVIDED. A RESETTING DEVICE OPERATING FROM ANY OVERLOAD RELAY WILL REMOVE OR INTERRUPT THE PLATE POWER QUICKLY AND RETURN IT AGAIN AUTOMATICALLY, PERFORMING THIS FUNCTION THREE TIMES BEFORE THE POWER IS FINALLY TAKEN OFF. THIS RESETTING SYSTEM ALSO OPERATES FROM THE ANTENNA POWER RECTIFIER, SO THAT IF AN ARC-OVER IN THE ANTENNA CIRCUIT SHOULD TAKE PLACE,DUE TO LIGHTNING OR STATIC CHARGES, THE ARC WILL BE BROKEN AND THE TRANSMITTER RETURNED TO THE AIR WITHOUT AN APPRECIABLE BREAK. HIGH GRADE OVERLOAD AND SUPERVISORY RELAYS ARE EMPLOYED AND WHILE THESE ARE MORE EXPENSIVE, THEY ARE INSURANCE AGAINST DAMAGE TO EXPENSIVE APPARATUS. DE-ION CIRCUIT BREAKERS ARE EMPLOYED EXTENSIVELY AND ASSURE A RAPID BREAK OF THE CIRCUIT WITHOUT ARCS AS WELL AS A CONVENIENT SWITCHING METHOD. FUSES ARE LIMITED PRACTICALLY TO METER CIRCUITS.

AUTOMATIC AIR BLAST INTERLOCKS ARE USED IN THE TRANSMITTER TO PREVENT APPLICATION OF FILAMENT OR PLATE POWER WITHOUT PROPER COOLING. THE AIR BLAST CONTINUES AUTOMATICALLY AFTER THE TRANSMITTER HAS BEEN CLOSED DOWN, EVEN THOUGH TUBES WILL NOT BE DAMAGED (AS IN THE CASE OF WATER COOLING) WITHOUT CIRCULATION. IF A.C.POWER FAILS, THE TRANSMITTER WILL BE AUTOMATICALLY RESTORED TO THE AIR WHEN POWER RESUMES,THE RESTORING TIME BEING PROPORTIONAL, WITHIN LIMITS, TO THE TIME OF FAILURE. THUS ON A SHORT BREAK, LESS TIME WILL BE LOST OFF THE AIR SINCE THE FULL STARTING CYCLE TIME IS NOT REQUIRED.

CONTROLS ARE PROVIDED ON THE POWER PANEL FOR ADJUSTING THE LINE VOLTAGE TO THE POWER AMPLIFIER AND MODULATOR UNITS. SEPARATE FILAMENT VOLTAGE CONTROLS ARE ALSO INCLUDED THERE FOR EACH HIGH POWER TUBE TOGETHER WITH ARRANGEMENTS FOR READING THE ACTUAL FILAMENT VOLTAGES. THUS THE HEATING VOLTAGE CAN BE ADJUSTED ACCURATELY ACCORDING TO THE TUBE DEMAND AND LIFE OF TUBES CAN BE IMPROVED.

A TUBE HOUR METER HAS BEEN INCLUDED ON THE PANEL FOR INDICATING THE NUMBER OF HOURS OF OPERATION AND AIDING IN KEEPING LOGS.

POWER CHANGES ARE ACCOMPLISHED EASILY AND EFFICIENTLY FOR STATIONS OPERATING WITH

1000 WATTS AT NIGHT, 5000 WATTS DAY. A REDUCED VOLTAGE TAP IS PROVIDED ON THE PLATE SUPPLY TRANSFORMERS AND ONLY A SMALL VERNIER ADJUSTMENT RESISTANCE IS IN THE CIRCUIT. THUS NO GREAT AMOUNT OF POWER IS DISSIPATED IN THE POWER REDUCING SYSTEM AND EFFICIENT 1000 WATT OPERATION WITH LOW POWER COSTS IS PROVIDED. AT THE SAME TIME THAT POWER IS REDUCED, THE INPUT TO THE MODULATION MONITOR IS MAINTAINED AT A CONSTANT LEVEL. POWER CHANGES MAY BE MADE WITHOUT A PROGRAM INTERRUPTION AND THE SLIGHT SWITCHING CLICK ON THE CARRIER IS AUDIBLE, ONLY UNDER EXCEPTION CONDITIONS.

IN STARTING, THE PLATE VOLTAGE APPLIED TO THE TUBES RISES SMOOTHLY AND RAPIDLY FROM ZERO AT THE INSTANT THE PLATE RECTIFIER CONTACTOR CLOSES TO FULL VOLTAGE APPROXIMATELY A SECOND AFTER CLOSURE OF THE BREAKER. EXCESSIVE PEAK CURRENTS THRU THE RECTIFIER TUBES ARE PREVENTED BY CHARGING THE FILTER CAPACITORS THROUGH A CURRENT LIMITING RESISTOR WHICH IS AUTOMATICALLY SHORT CIRCUITED WHEN THE CAPACITORS ARE FULLY CHARGED. THUS ARC BACKS ARE MINIMIZED, AND THE LIFE OF THE RECTIFIER TUBES PROLONGED.

TRANSMITTER CIRCUITS

THE TRANSMITTER CONSISTS ESSENTIALLY OF THE 250-F EXCITER (THE 250-D TRANSMITTER USED FOR EXCITATION PURPOSES) WITH A HIGH LEVEL MODULATED CLASS C STAGE AND RECTIFIERS.

IN THE EXCITER UNIT, TWO CRYSTAL OSCILLATORS ARE SUPPLIED WITH A CHANGEOVER SWITCH, EACH OSCILLATOR EMPLOYING A NEW ELECTRON COUPLED CIRCUIT WITHOUT TUNED CIRCUITS. THUS OPERATION WILL BE MORE STABLE AND LESS SUBJECT TO VARIATION FROM VOLTAGE CHANGES THAN MORE CONVENTIONAL CIRCUITS. RCA V-CUT CRYSTALS WITH LOW TEMPERATURE COEFFICIENT ARE USED. THE OSCILLATOR TUBE (AND THE SPARE OSCILLATOR) IS AN RCA-802 AND THIS IS FOLLOWED BY A BUFFER STAGE ALSO USING AN RCA-802. THE OUTPUT OF THIS STAGE FEEDS A STAGE USING ONE RCA-805 WHICH DRIVES THE FINAL STAGE IN THE EXCITER, TWO RCA-805'S IN PUSH PULL. THE RCA-805 TUBES WERE SPECIALLY DEVELOPED FOR THIS UNIT AND THE SMALL NUMBER OF DIFFERENT TYPES IN THE EXCITER SIMPLIFIES THE PROBLEM OF KEEPING SPARES ON HAND.

THE OUTPUT OF THE EXCITER FEEDS INTO A GRID TANK IN THE POWER AMPLIFIER UNIT. THE POWER AMPLIFIER TUBE IS AN RCA-892-R, THIS BEING THE DESIGNATION FOR THE STANDARD METAL ANODE TYPE TUBE USED IN THE AIR COOLED MOUNTING. THE PLATE TANK IS NOTABLE IN THAT, TOGETHER WITH THE OUTPUT COUPLING, IT FORMS A LOW PASS FILTER. BY THIS ARRANGEMENT HARMONICS ARE EXCLUDED FROM THE LINE TO THE ANTENNA AND FIELD INTENSITY MEASUREMENTS HAVE DEMONSTRATED THE GREAT EFFECTIVENESS OF THIS TYPE CIRCUIT IN PREVENTING HARMONIC RADIATION. TUNING IS BY MEANS OF A VARIABLE INDUCTOR IN A PORTION OF THE FILTER CIRCUIT WHICH MAY BE USED FOR SMALL ADJUSTMENTS OF POWER OUTPUT, IF DESIRED, SINCE CIRCUIT EFFICIENCY OR OPERATION DOES NOT CHANGE APPRECIABLY OVER ITS RANGE.

THE TRANSMITTER IS DESIGNED FOR USE WITH A CONCENTRIC LINE OR GROUNDED FOUR WIRE LINE AND AN ANTENNA COUPLING UNIT IS SUPPLIED AS STANDARD EQUIPMENT. THIS MAY BE USED WITH ANY NORMAL ANTENNA AND IS ARRANGED FOR OUTDOOR MOUNTING WITHOUT A TUNING HOUSE. IN ADDITION TO THE COUPLING CIRCUITS IT INCLUDES A TUBE RECTIFIER UNIT TO OPERATE A REMOTE ANTENNA CURRENT INDICATOR AT THE STATION, TO OPERATE AN AUDIO MONITORING CIRCUIT, AND FOR OPERATING THE NOTCHING MECHANISM IN THE EVENT OF AN ARC-OVER IN THE RADIATING SYSTEM.

THE AUDIO AND MODULATION CIRCUITS HAVE BEEN SPECIALLY DESIGNED AND A NEW LOW POWER AUDIO AMPLIFIER, ESPECIALLY ADAPTED FOR FEEDBACK IS INCLUDED IN THE POWER AMPLIFIER UNIT. THIS IS PUSH-PULL THROUGHOUT AND IS INTENDED TO OPERATE FROM A ZERO LEVEL SIGNAL. THE INPUT STAGE EMPLOYS A PAIR OF RCA-1603'S FOLLOWED BY TWO RCA-807'S. THE

STAGE BEFORE THE MODULATORS CONSISTS OF FOUR RCA-845'S IN MULTIPLE. THE MODULATORS ARE AIR-COOLED, METAL ANODE RCA-891-R TUBES OPERATED CLASS B, PUSH-PULL. THE MODULATION TRANSFORMER HAS ALSO BEEN ESPECIALLY DESIGNED FOR THIS SERVICE. THE FEEDBACK SYSTEM IS ENTIRELY UNIQUE IN THAT IT OPERATES FROM A PUSH-PULL CIRCUIT. ALL OF THE AUDIO STAGES UP TO THE MODULATOR ARE RESISTANCE-CAPACITY COUPLED, WITHOUT TRANSFORMERS, AND SO PHASE TURNOVER POINTS HAVE BEEN AVOIDED THROUGHOUT THE AUDIO RANGE.

THE MAIN RECTIFIER EMPLOYS RCA-872-A TUBES IN A THREE PHASE, FULL WAVE CIRCUIT WITH AN UNUSUALLY ADEQUATE FILTER. THE EXCITER UNIT IS EQUIPPED WITH SEPARATE RECTIFIERS USING RCA-866 TUBES AND A CRYSTAL OSCILLATOR RECTIFIER WITH A 5-Z-3. BIAS FOR THE MODULATORS OBTAINED FROM A SEPARATE RECTIFIER EMPLOYING TWO RCA-866 TUBES. BIAS FOR THE POWER AMPLIFIER IS BY MEANS OF GRID LEAK, AND CIRCUITS ARE ARRANGED SO THAT THE TUBE CAN DRAW ONLY NORMAL PLATE CURRENT IN THE EVENT OF FAILURE OF EXCITATION.

NEUTRALIZATION OF THE POWER AMPLIFIER IS OF THE FIXED TYPE AND IS NOT CRITICAL.

THE R.F. POWER AMPLIFIER TANK HAS BEEN DESIGNED FOR A LOW K.V.A.RATIO SO THAT CIRCULATING CURRENT LOSSES ARE LOW AND SIDEBAND CUTTING IS PREVENTED AT LOW CARRIER FREQUENCIES. THE PLATE CIRCUIT EFFICIENCY OF THE POWER AMPLIFIER IS PHENOMENALLY HIGH, A FACT WHICH ASSURES FULL POWER OUTPUT IN THE ANTENNA, EVEN WITH LINE LOSSES, BY THE USE OF PLATE POWER MEASUREMENTS. IT IS THUS UNNECESSARY TO OPERATE BY DIRECT POWER MEASUREMENTS.

ABOUT OPERATION

THE MOST CAREFULLY DESIGNED TRANSMITTER CAN, IF IT IS IMPROPERLY OPERATED, PRODUCE RATHER DISCONCERTING RESULTS. THIS IS NOT ALWAYS THE FAULT OF THE OPERATING STAFF WHO ARE USUALLY NOT SUPPLIED WITH THE MEASURING INSTRUMENTS AVAILABLE TO THE DESIGNER. IF COMPLICATED AND ELABORATE ADJUSTMENTS ARE NECESSARY FOR GOOD FIDELITY OR EFFICIENCY, IT WILL BE DIFFICULT TO MAINTAIN THE EQUIPMENT AT PEAK FORM.

SUCH PROBLEMS ARE CONSIDERABLY LESS SERIOUS IN THE 5-D. WITH CLASS C RADIO AMPLIFIERS, ADJUSTMENTS ARE NON-CRITICAL AND EVEN THE GRID BIAS OF THE POWER AMPLIFIER IS AUTOMATIC. THE MODULATORS ARE OPERATED TRULY CLASS B AND SMALL CHANGES IN BIAS DO NOT PRODUCE ANY CHANGE IN DISTORTION. EVEN THE FEEDBACK SYSTEM REQUIRES NO ADJUSTMENTS.

THIS, OF COURSE, DOES NOT MEAN THAT THE 5-D SHOULD NOT BE OPERATED CAREFULLY. IT MEANS THAT WITH NORMAL OPERATION, THE HIGH FIDELITY TRANSMISSION CONTEMPLATED BY THE MANUFACTURER CAN BE ACHIEVED WITHOUT CONTINUAL READJUSTMENT OR FUSSING.

IN OTHER RESPECTS THE 5-D OFFERS DEFINITE OPERATING ADVANTAGES. WITHOUT MAINTENANCE OF WATER COOLING EQUIPMENT THE STATION STAFF CAN DEVOTE THEIR TIME TO MORE PROFITABLE WORK. TUBES ARE CHANGED EASILY AND QUICKLY — THE PROCESS IS SCARCELY MORE COMPLICATED THAN CHANGING A RECEIVING TYPE TUBE. OVERLOAD PROTECTION IS UNUSUALLY COMPLETE SO THAT MISTAKES WILL NOT RESULT IN DESTRUCTION OF EQUIPMENT. CONTROLS ARE EASILY REACHED AND POWER CIRCUIT ADJUSTMENTS ARE CENTRALIZED ON A SWITCHBOARD TYPE PANEL.

TRULY, THE 5-D WILL PLEASE AN ENGINEER WHO HAS OPERATED A BROADCASTING STATION. IT SHOULD BE SO, FOR RCA ENGINEERS WHO HAVE RUN STATIONS HAVE KNOWN WHAT STATION ENGINEERS WANT IN A 5 KW. TRANSMITTER AND HAVE BUILT THE 5-D TO CONFORM TO THESE IDEAS.

FIDELITY

SINCE THE 5-D TRANSMITTER HAS BEEN RECENTLY DESIGNED IT IS ONLY NATURAL THAT THE AIM SHOULD BE TO MAKE THE STANDARDS OF FIDELITY AS HIGH AS POSSIBLE. THIS HAS BEEN DONE TO THE FULLEST EXTENT. DISTORTION, WHICH IS A FACTOR CONSIDERED GREATLY BY BROADCAST ENGINEERS IN RECENT YEARS, HAS BEEN REDUCED TO A LEVEL WHICH WOULD HAVE BEEN THOUGHT IMPRACTICABLE IN A STUDIO AMPLIFIER SOME YEARS AGO. DISTORTION HAS BEEN REDUCED, NOT ONLY AT THE USUAL MEASURING POINT OF 400 CYCLES, BUT THROUGHOUT THE GAMUT, FROM 30 TO ABOVE 7000 CYCLES. IN FACT, THE DISTORTION OF THE ENTIRE 5-D IS ACTUALLY LESS THAN THAT OF MANY LINE AMPLIFIERS DESIGNED SOME YEARS AGO.

EVEN LAYMEN APPRECIATE THE IMPORTANCE OF THE ENGINEER'S DESIRE FOR TRANSMISSION WITHOUT DISTORTION. A DEMONSTRATION OF REPRODUCTION, WITH AND WITHOUT HARMONIC DISTORTION, IS CONVINCING PROOF THAT NATURALNESS CAN ONLY BE ATTAINED WITHOUT THE ADDITION OF SPURIOUS HARMONICS. LOW FREQUENCY DISTORTION WHILE LESS NOTICEABLE, CHANGES THE CHARACTER OF TONE; MIDDLE RANGE DISTORTION IS APT TO PRODUCE THE IMPRESSION OF FUZZINESS AND HIGHER FREQUENCY HARMONIC DISTORTION MAY CAUSE INTERFERENCE WITH STATIONS ON ADJACENT CHANNELS.

BY STARTING WITH A HIGH LEVEL MODULATION SYSTEM, DIFFICULTIES IN REDUCING DISTORTION WERE MINIMIZED. IN ADDITION, THE USE OF THE UNIQUE FEEDBACK CIRCUIT REDUCES WAVE DEFORMITY OVER THE ENTIRE AUDIO BAND ALTHOUGH ORDINARY FEEDBACK METHODS OFTEN TEND TO INCREASE HIGH FREQUENCY DISTORTION.

THE SAME COMPENSATION SYSTEM HAS BEEN USED TO REDUCE THE BACKGROUND CARRIER HUM AND NOISE LEVEL. AGAIN, HIGH LEVEL MODULATION SYSTEMS ARE WELL ADAPTED FOR ALTERNATING CURRENT OPERATION AND THE FEEDBACK SYSTEM REDUCES THE RESIDUAL HUM TO A LEVEL FAR BELOW ANY NORMALLY AUDIBLE RANGE. AT THE SAME TIME THE FEEDBACK CIRCUIT IS SO SIMPLE AND SO STABLE THAT NO ADJUSTMENT IS REQUIRED AFTER INSTALLATION NOR WILL CHANGING TUBES AFFECT ITS SATISFACTORY OPERATION.

THE FREQUENCY RESPONSE OF THE TRANSMITTER IS UNIFORM WITHIN $1\frac{1}{2}$ DB AS HAVE BEEN ALL RCA TRANSMITTERS BUILT IN RECENT YEARS, THUS ASSURING FURTHER SATISFACTORY REPRODUCTION.

CURVES ARE SHOWN ON THE OPPOSITE PAGE ILLUSTRATING DISTORTION AND FREQUENCY RESPONSE CHARACTERISTICS. AMPLE VERIFICATION OF THE FOREGOING STATEMENTS WILL BE FOUND IN THESE DATA. THE GUARANTEE LIMITS ARE OF NECESSITY SOMEWHAT HIGHER TO ALLOW FOR EXIGENCIES OF SERVICE, BUT WITH NORMAL, REASONABLY CAREFUL OPERATION OF THE EQUIPMENT, FIELD RESULTS SHOULD CORRELATE WITH THESE CURVES.

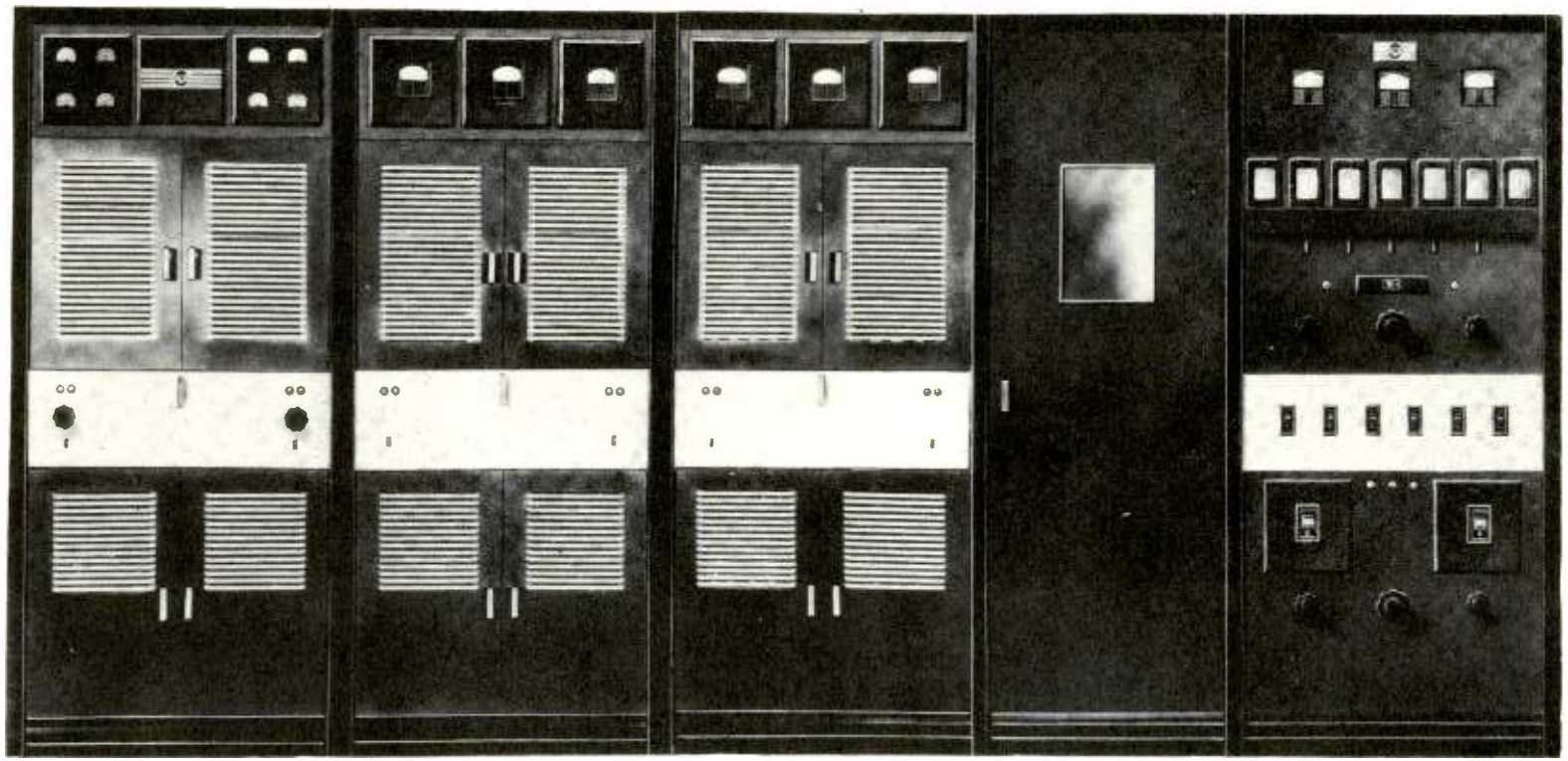
SPECIFICATIONS

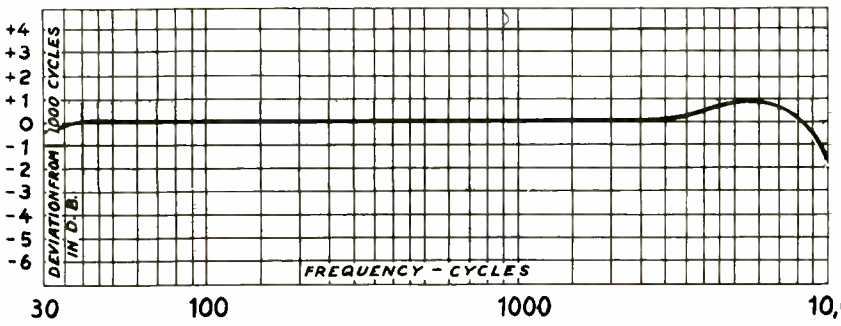
Carrier Power Output	–	5000 w. or 5000/1000 watts
Carrier Frequency Range	–	550–1600 kc.
Carrier Frequency Stability	–	Within ± 10 cycles
Modulation Capability	–	100%
Audio Distortion	–	Less than 3% r.m.s. 0-95% modulation, 50 – 7,500 cycles
Audio Frequency Response	–	Uniform within ± 1½ db. 30 – 10,000 cycles
Carrier and Hum Level	–	Better than 60 db below 100% modulation, unweighted
Power Input (Total)	–	5 kw., 16½ kw. without modulation 18½ kw. with average modulation 1 kw., 10½ kw. without modulation 11 kw. with average modulation
Power Data	–	Power factor approximately 88% 230 volts, 3 phase, 60 cycles
Antenna and Line	–	For use with concentric or grounded 4 wire line antennas of 20 to 200 ohms resistance
Audio Input Level	–	Zero level (12.5 m.w.) at 500 ohms for 100% modulation
Tubes	–	3 – 802 2 – 891-R 1 – 5-Z-3 4 – 845 3 – 805 1 – 892-R 2 – 1603 2 – 217-C 8 – 866 6 – 872-A 2 – 807

Overall Physical Dimensions –

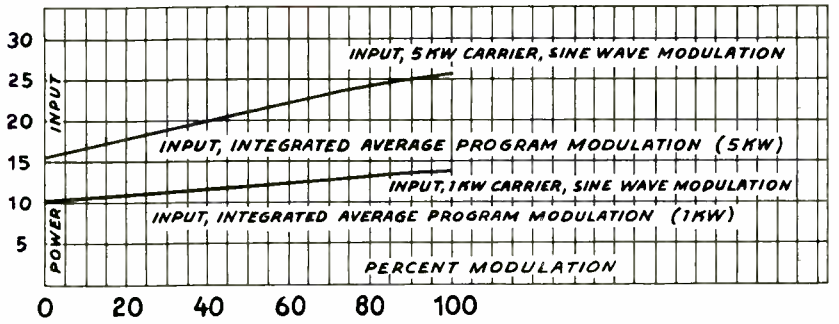
Transmitter Unit:	–	115" wide x 84⅛" high x 27" deep Weight about 4000 lbs.
Power Panel	–	33" wide x 84⅛" high x 36" deep Weight: 750 lbs.
Filter Rack	–	33" wide x 49½" high x 26" deep Weight: 500 lbs.
Modulation Transformer and Reactor Unit	–	68" wide x 28" high x 24" deep Weight: 1700 lbs.
Plate Transformer	–	39" wide x 24" deep x 46" high Weight: 1100 lbs.
Antenna Coupling Unit	–	40" wide x 33" high x 23" deep

June 21, 1937

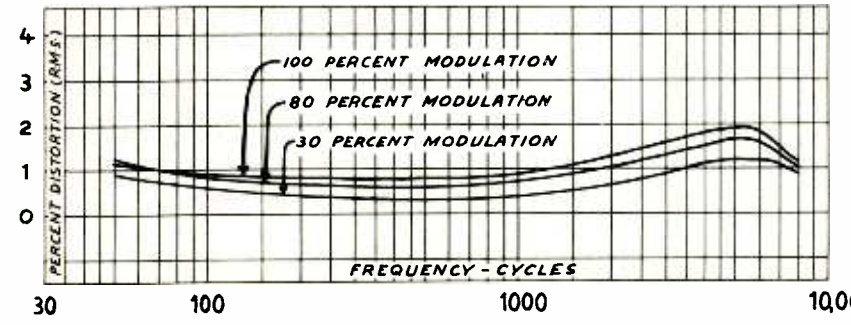




FREQUENCY CHARACTERISTIC TYPE 5-D TRANSMITTER



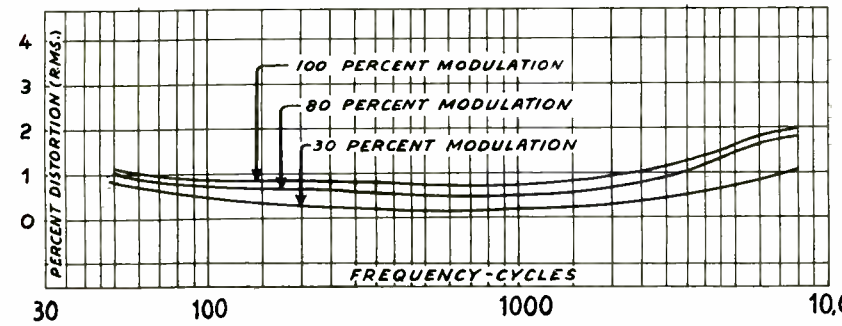
TYPE 5-D TRANSMITTER POWER INPUT 230 V-3 PHASE



DISTORTION CHARACTERISTIC TYPE 5-D TRANSMITTER

INPUT, MODULATED AMP. 1.54 KW.

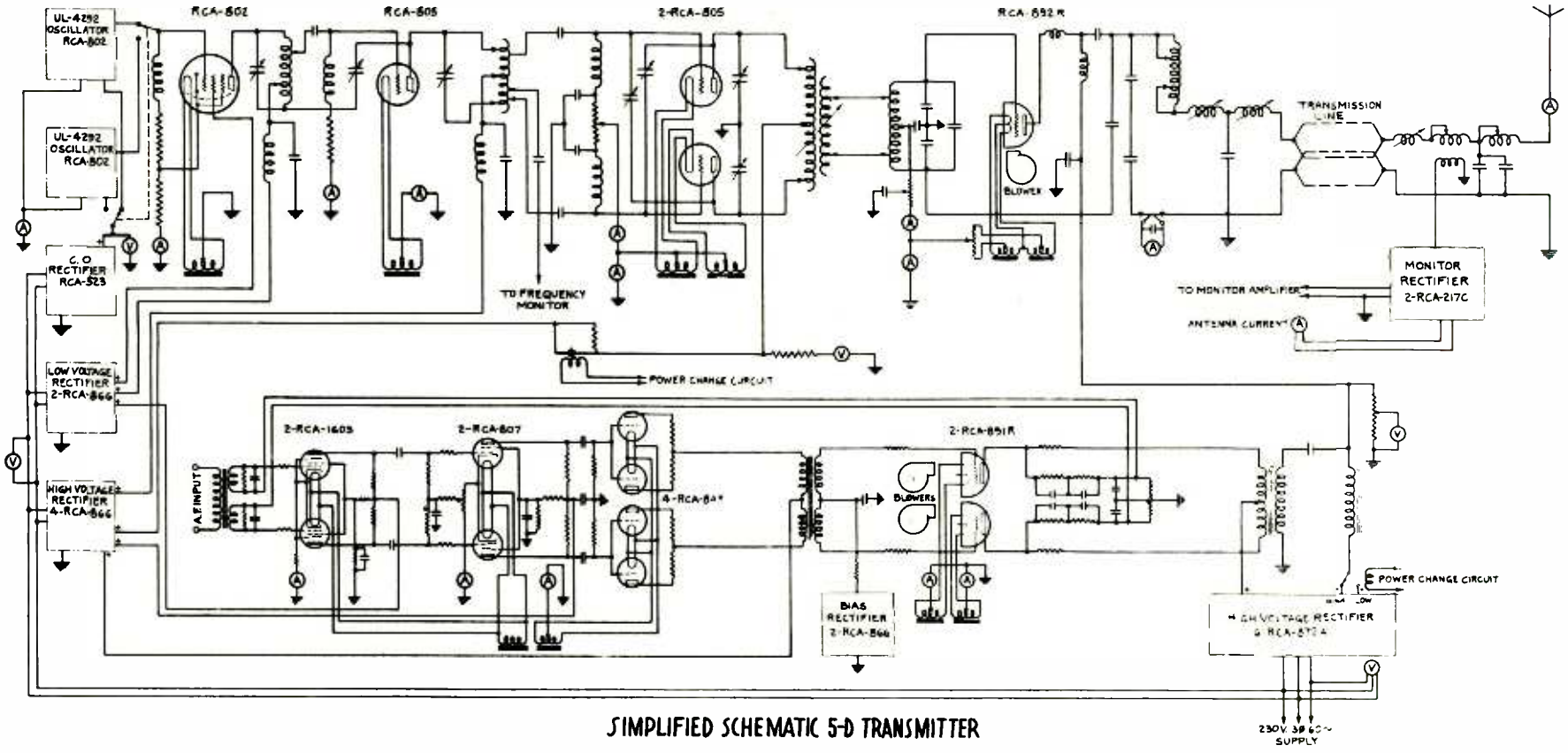
(1 KW. OPERATION)



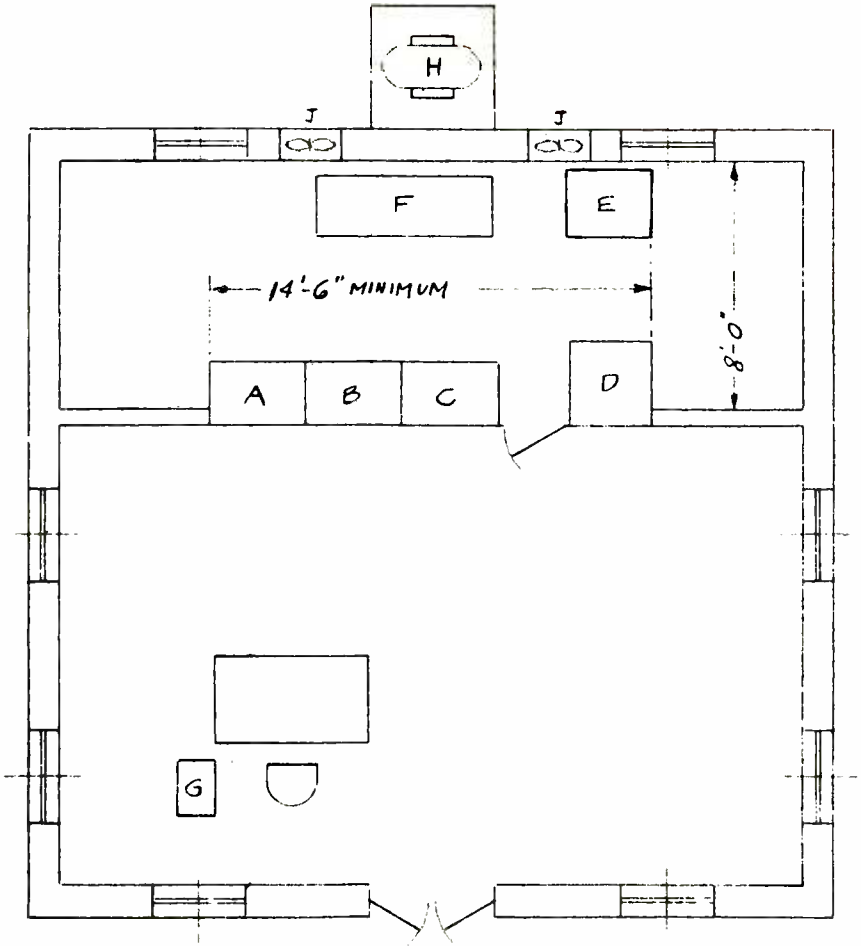
DISTORTION CHARACTERISTIC TYPE 5-D TRANSMITTER

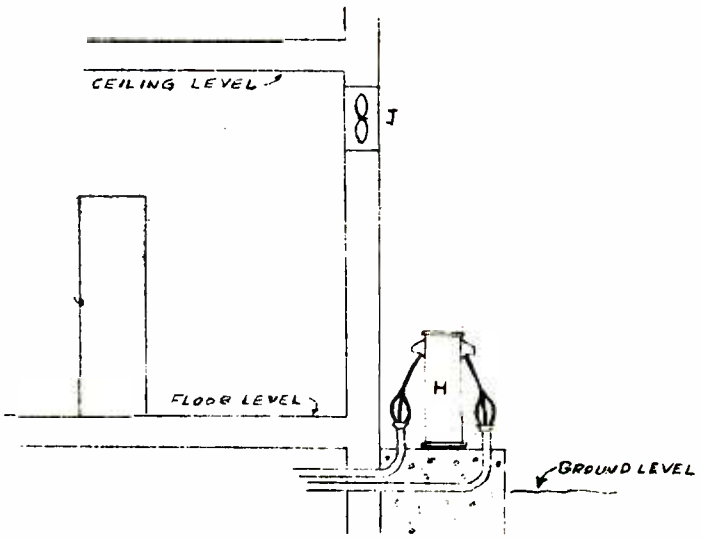
INPUT, MODULATED AMP. 7.7 KW.

(5 KW. OPERATION)



SIMPLIFIED SCHEMATIC 5-D TRANSMITTER

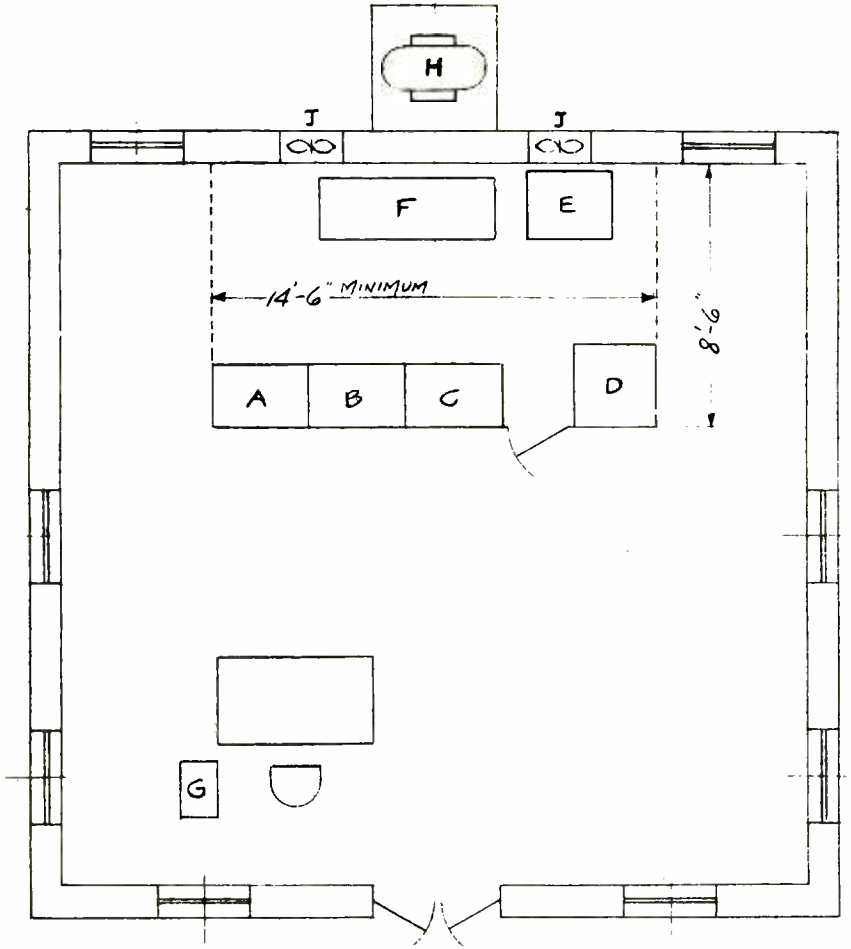


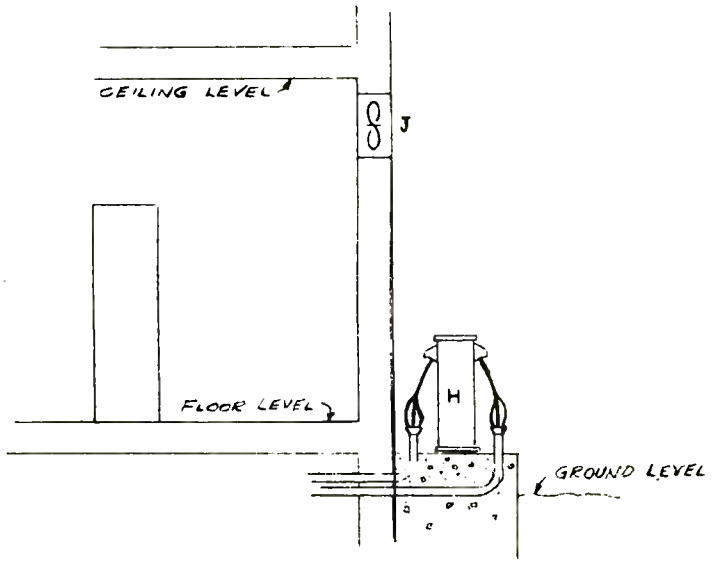


FLOOR PLAN - 5-D TRANSMITTER

- LEGEND -

A EXCITER
B POWER AMPLIFIER
C MODULATOR & RECTIFIER
D CONTROL PANEL
E FILTER RACK
F MOD. TRANS-REACTOR
G SPEECH INPUT EQUIP
H POWER TRANSFORMER
J EXHAUST FANS TOTAL CAP 3000 CU FT PER MIN.





FLOOR PLAN - 5-D TRANSMITTER

—LEGEND—

A EXCITER
B POWER AMPLIFIER
C MODULATOR & RECTIFIER
D CONTROL PANEL
E FILTER RACK
F MOD TRANS-REACTOR
G SPEECH INPUT EQUIP
H POWER TRANS
J EXHAUST FANS - TOTAL CAP 3000 CU FT PER MIN

TRANSMITTER SECTION

RCA MANUFACTURING CO., INC., Camden, N. J.

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