



VHF RECEIVERS

901 A
904
905
906



TYPE 906

GENERAL

The CEI 900 series receivers were designed to fulfill a need for a compact, high performance VHF receiver covering the frequency range of 30 to 300 mc.

The Type 901A is the basic receiver. To meet certain requirements, modifications and additions to this instrument were designed and are now available as standard commercial units.

The Type 904 has the same specifications as the 901A, but includes a crystal marker unit (CEI Type CMO-21). The 905 is the basic 901A receiver plus the addition of a carrier-operated relay (CEI Type COR 11). In the 906, both the crystal marker system and the carrier-operated relay have been added.

All these receivers are designed to handle either amplitude modulated, frequency modulated, or continuous wave signals.

RF TUNERS

Two separately tuned RF front ends are employed—one tuning the 30 to 60 mc range, the other 60 to 300 mc. When one tuner is used, the other is in stand-by position, ready to be activated immediately, without warm-up, when the range switch is thrown. The 30-60 mc tuning control covers the range with 40 turns. A 60-division dial calibrated at 500 kc intervals is used. The 60-300 mc tuning control covers the range with 50 turns. A 240-division dial calibrated at 1-mc intervals is used. The dial drive mechanisms operate smoothly. The scales are back illuminated for maximum legibility. The front ends use GE Type 7077 Ceramic Triodes and RCA Type 6CW4 Nuvisors as RF amplifiers in cascode configuration. AGC is applied to the RF stages to prevent overloading at high signal levels.

The receivers are designed to operate from a 50-ohm source impedance. Separate inputs are

provided permitting the use of the optimum antenna for each frequency range. Provision is also made for use of a single antenna, if desired, which is automatically switched to the front end being used when the range switch is operated.

An isolated terminal is provided on the rear apron for connection to a signal display monitor, CEI Type SM-9310A. Additional external IF systems can also be connected to this terminal without affecting the performance of the receiver.

In conformance with CEI's policy of always stating conservative noise figures, we have rated this series of receivers as follows: The noise figure is less than 4 db from 30 to 60 mc and less than 6.5 db from 60 to 300 mc.

IF SYSTEM

The IF system operates at 21.4 mc and provides two bandwidths—300 kc and 20 kc. In the 20 kc position a crystal filter is used. The signal-to-noise ratios are as follows: In the 300 kc position an amplitude modulated signal of 4 uv produces at least 10 db S/N. In the 300 kc position on FM signals, 4 uv produces at least 21 db S/N for 100 kc deviation at a 1 kc rate. When operated in the more selective 20 kc bandwidth position, amplitude modulated signals of 2 uv 50% modulation produce at least 17 db S/N, and frequency modulation signals of 2 uv produce at least 20 db S/N for a 7 kc deviation at a 1 kc rate.

The front end and IF system are designed so that up to 20 IF strips can be connected externally to the IF output terminal on the rear of the chassis without affecting the alignment of the front end or without interaction between strips. This feature is particularly interesting to users engaged in surveillance or counter measures activity where simultaneous monitoring of a number of different frequencies lying in the pass band of the 901A front end is desired.

Communication  Electronics, Inc.
4900 HAMPDEN LANE BETHESDA, MARYLAND



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IMAGE AND IF REJECTION

From 30 to 60 mc the minimum image rejection is 60 db. From 60 to 300 mc the minimum image rejection is 50 db.

The IF rejection at 30 mc is greater than 54 db. Above 50 mc the IF rejection is greater than 80 db.

BEAT FREQUENCY OSCILLATOR

A beat frequency oscillator is provided for reception of CW signals. The oscillator is tuned by means of a variable air trimmer in order to reduce temperature effects. The BFO is temperature compensated. A buffer amplifier between the oscillator and the signal circuit provides isolation to prevent pulling. The BFO is operable in both the 300 kc and 20 kc bandwidth positions.

METERING

Two meters of adequate size are provided. One is a tuning indicator, and the other provides an approximate indication of signal strength. The tuning meter amplifier used for FM reception employs a novel self-balancing circuit, eliminating the need for a "zeroing" potentiometer.

AUDIO AND VIDEO SYSTEMS

Separate transistorized amplifiers are used for audio and video, with independent controls for the adjustment of operating levels. The video amplifier has a bandwidth of 150 kc. Its output stage is an emitter follower capable of delivering 5 volts RMS into a 10K unbalanced load. Audio amplification is provided by a separate transistorized amplifier capable of delivering 0.1 watt into

a 600 ohm balanced or unbalanced load. This is sufficient power to drive an external speaker unit.

ELECTRONIC COMPONENT COMPLEMENT

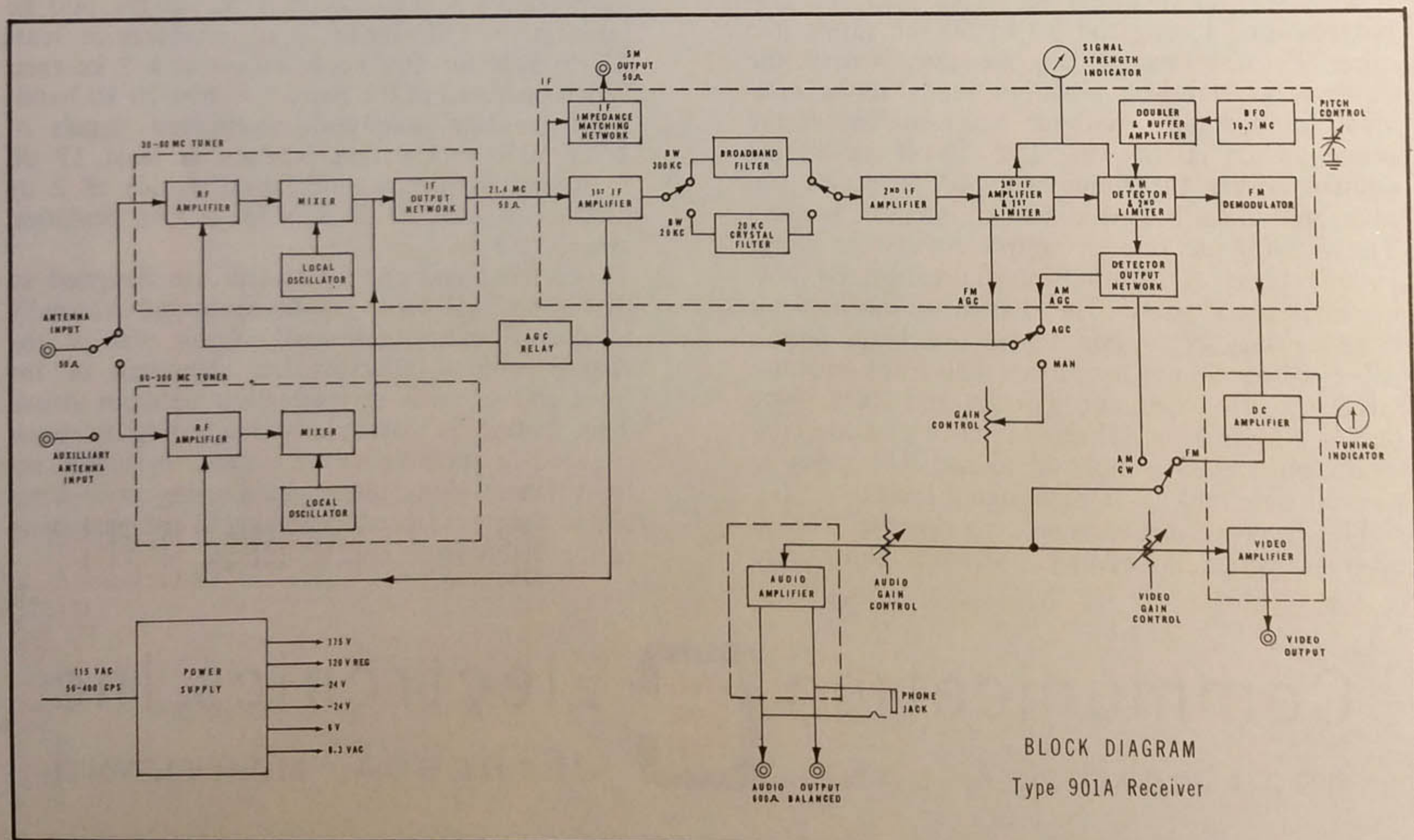
The receiver employs both solid state and vacuum devices, using each type where indicated from the standpoint of efficiency. No attempt has been made to utilize transistors for the sake of their advertising value. Where Nuvistors will do the job best, they are used. Where transistors will perform adequately, they are used. The 901A receiver uses 11 Nuvistors, 2 Type 7077 ceramic triodes, 7 silicon transistors; 4 Zener diodes; and 12 silicon and germanium diodes. The 904, 905, and 906 receivers use additional transistors to provide the extra features included in these units.

POWER CONSUMPTION

Due to the use of modern electronic components as described above, the receiver requires only 40 watts of input power. The heat problem is therefore virtually non-existent even when a number of these receivers are stacked. No vents are needed, and natural ventilation in the receiver is more than sufficient to keep all operating temperatures below a value which might deteriorate its performance. All power components in the receivers are designed and produced in our plant and subjected to rigid quality control.

AUTOMATIC GAIN CONTROL

Since AGC is employed on both the IF and RF amplifiers, good output stability is obtained. On FM signals the output will vary less than 2 db for any input above 1.5 uv. On AM the output will vary less than 15 db for input signal ranges of 2 uv to 10,000 uv.





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OSCILLATOR TO ANTENNA CONDUCTION

The local oscillator voltage appearing at the antenna terminal will be less than 15 uv between 30 and 260 mc and less than 25 uv between 260 and 300 mc.

CRYSTAL MARKER OSCILLATOR

The 904 Receiver and the 906 Receiver both employ a dual crystal marker oscillator (CEI Type CMO-21) for use in checking the dial calibration. These are transistorized units employing two crystals, 5 mc and 1 mc, selectable from a front panel switch. On the 904 and 906 Receivers, both tuning dials are equipped with a movable fiducial line so that the dial indication can be set accurately.

CARRIER OPERATED RELAY

The 905 and 906 Receivers are equipped with a transistorized carrier operated relay (CEI Type COR-11) in order to control external devices as a function of the received signal. The unit is completely transistorized and, except for operating controls and relay, is contained on a small printed wiring board. The unit consists of a two-stage DC amplifier, relay driver, release time delay circuitry and relay. A sensitivity control is provided on the front panel to permit selection of the signal level at which the relay operates. The selection of slow (6 seconds) or fast (less than 0.5 second) release time is also provided by a front panel switch. The unit derives its operating voltage from the signal strength meter circuit, and since this meter has an approximately logarithmic scale, the carrier operated relay works at approximately uniform sensitivity for inputs from zero to

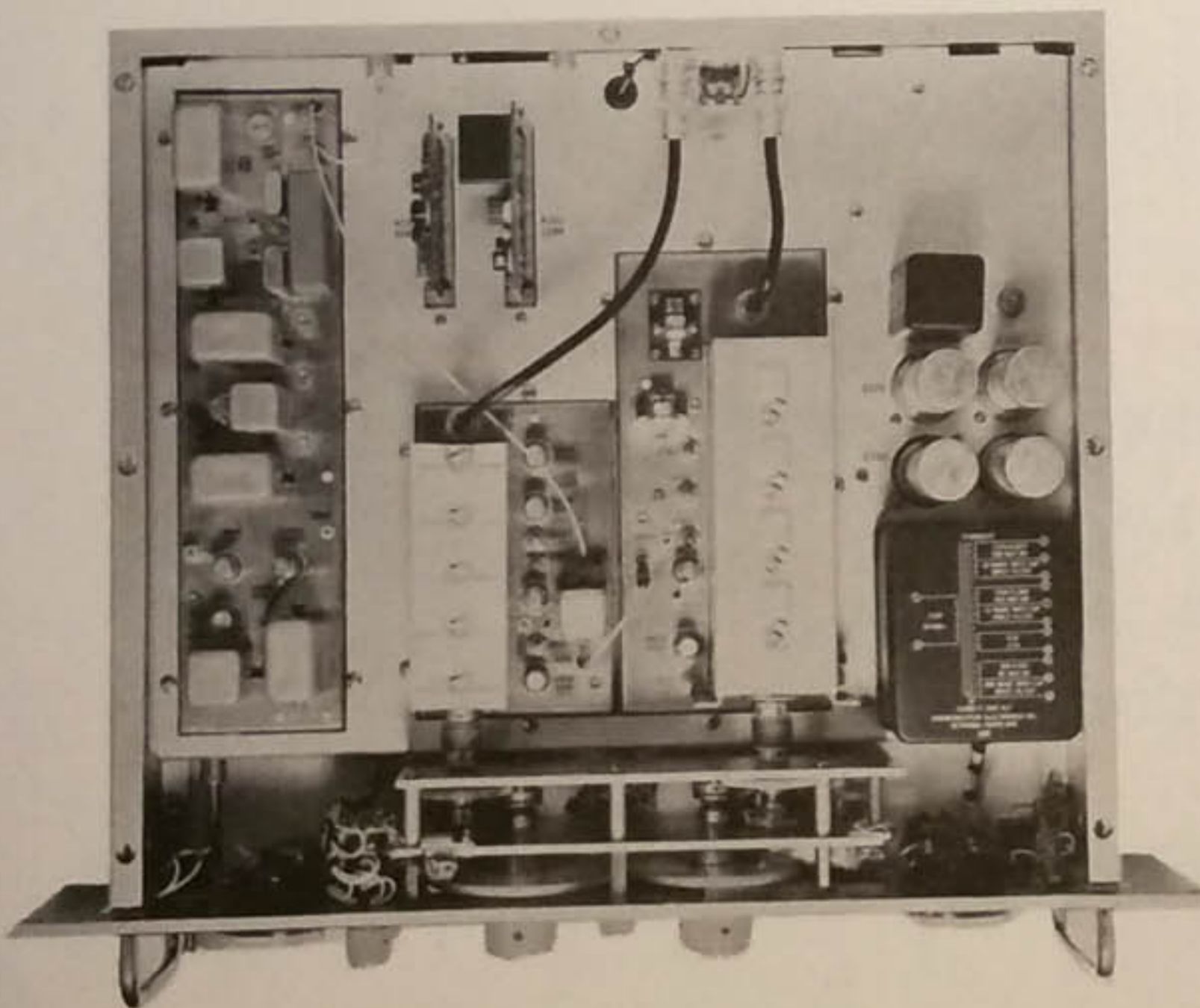
80% of the maximum receiver RF input. The magnetic relay built into the receiver provides DPDT contacts rated at 2 amperes at 28 volts DC or 120 volts AC adequate to handle the external devices usually employed in this type of operation.

MECHANICAL

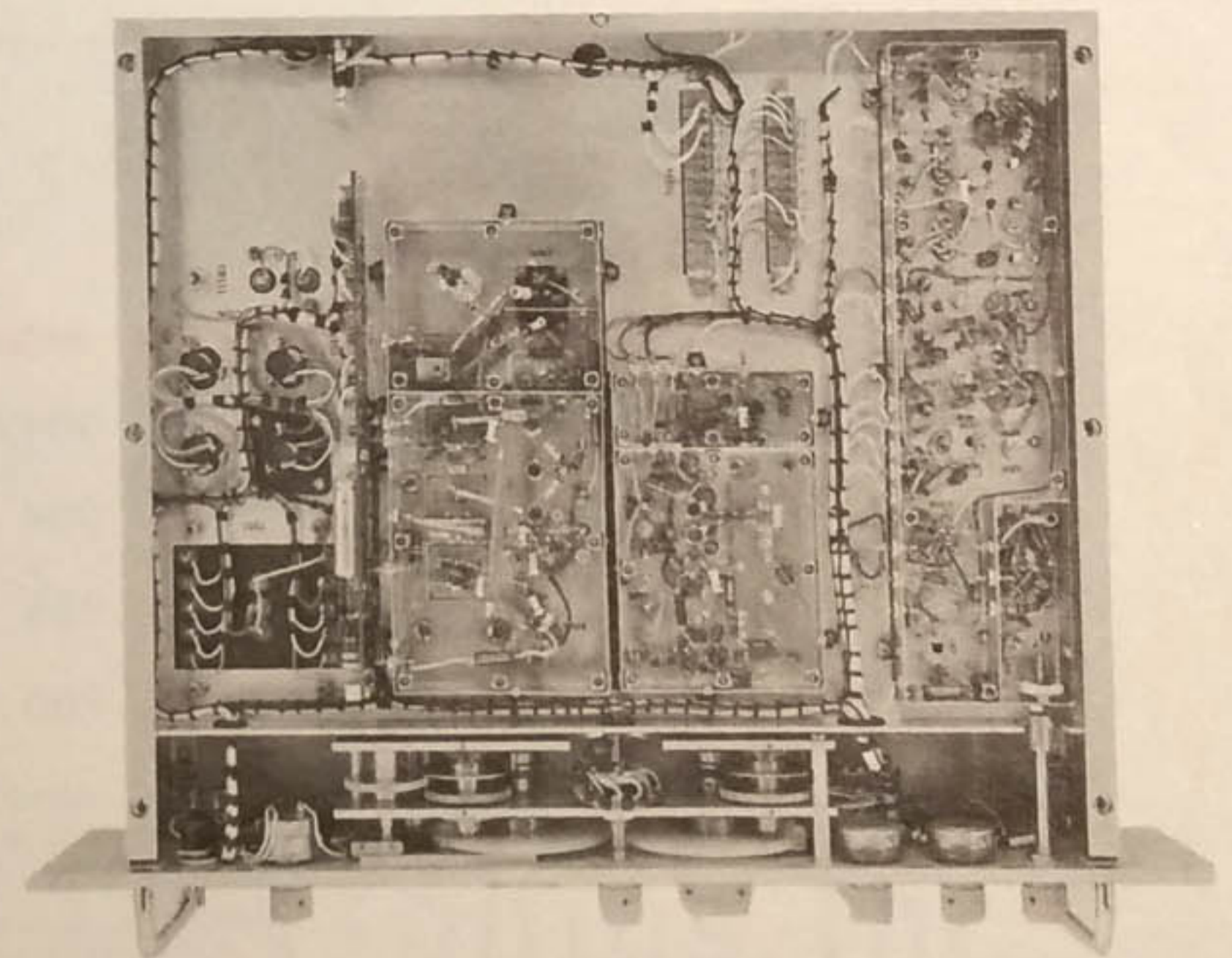
This compact receiver utilizes only 3 1/2 inches of rack space. The overall depth, including connectors, is 15 1/2 inches. Antenna input connector, auxiliary antenna connector, and 50-ohm signal monitoring connector, all BNC, are provided on the rear chassis. An audio output terminal is also mounted on the rear, and a phone jack is available on the front panel. A heavy-duty A-C power cord extends from the rear of the chassis. The fuse holder is on the rear chassis.

ACCESSORY EQUIPMENT

Available for use with the 900 series receivers are several auxiliary equipments and accessory units. The Type SM-9310A Signal Monitor employs the same design techniques as the Receivers. It provides a visual display of signals in a band around the received signal. The S-9901 and S-9902 Speaker Panels, using oval PM speakers to provide high efficiency and distinct reproduction, are ideal companion units for the CEI Receivers. The panel height of the Signal Monitors and Speaker Panels are each 3 1/2 inches. Slide mountings are available for use with the Receivers and Signal Monitors. Spare parts kits containing replacement components based on 2,000 hours of equipment operation can be supplied.



TOP INTERIOR VIEW
TYPE 901 A



BOTTOM INTERIOR VIEW
TYPE 901 A

(COVERS REMOVED)

SPECIFICATIONS

TYPE 901A VHF RECEIVER

Type of reception	AM, FM, CW
Frequency range	30 to 300 mc (Band 1: 30 to 60 mc) (Band 2: 60 to 300 mc)
Input impedance	To operate from a 50-ohm source
Noise figure	4 db max. (30 to 60 mc) 6.5 db max. (60 to 300 mc)
Image rejection	60 db min. (30 to 60 mc) 50 db min. (60 to 300 mc)
IF rejection	54 db min. at 30 mc 80 db min. above 50 mc
Oscillator to Antenna Conduction	15 uv max. (30 to 260 mc) 25 uv max. (260 to 300 mc)
IF Bandwidths	300 kc and 20 kc
Sensitivity	
300 kc bandwidth	AM—4 uv produces at least 10 db S/N for 50% modulation FM—4 uv produces at least 21 db S/N for 100 kc deviation at a 1 kc rate
20 kc bandwidth	AM—2 uv produces at least 17 db S/N for 50% modulation FM—2 uv produces at least 20 db S/N for 7 kc deviation at 1 kc rate
Meters	Two (signal strength and tuning)
Outputs	1. VIDEO—Emitter follower capable of delivering 7 volts RMS into a 10K unbalanced load 2. AUDIO—Separate transistorized amplifier capable of delivering 0.1 watt into a 600 ohm balanced or unbalanced load 3. SM— For operation of signal display scope
Output stability	FM—Output varies less than 2 db for inputs above 1.5 uv. AM—Output varies less than 15 db for input range of 2 uv to 10,000 uv
BFO	Operates in both bandwidth positions
Power input	115 volts, 50/60 cps
Power consumption	40 watts (approximately)
Weight	18 lbs (approximately)
Size	19" x 3 1/2" x 15 1/2"

Specifications for the types 904, 905, and 906 are identical to the 901A except for the addition of the crystal marker oscillator, CMO 21, to the type 904 and the carrier operated relay, COR 11, to the type 905. The type 906 receiver contains both the CMO 21 and COR 11.

SPECIFICATIONS

CMO 21

Outputs	1.0 mc } Harmonics to 5.0 mc } 300 mc
Output amplitude	5 uv minimum
Frequency Stability	± .005% from 0° to 120° F

COR 11

Input current range	0 to 40 microamperes, DC
Input voltage drop	0.5 v approx.
Differential sensitivity	2 microamperes, max
Release time delay	Fast—less than 0.5 sec. Slow—6 sec.
Outputs	DPDT contacts
Contact rating	2 amperes at 28v DC or 120v AC

PRICES

901A	— \$1925.00
904	— 2075.00
905	— 2025.00
906	— 2175.00

F.O.B. BETHESDA, MARYLAND
TAXES EXTRA WHERE APPLICABLE

PRICE SUBJECT TO CHANGE WITHOUT NOTICE
WE RESERVE THE RIGHT TO MAKE CHANGES IN SPECIFICATIONS



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