Restricted

MODEL RAB-1
RADIO RECEIVING EQUIPMENT

CLASS II—A. C. OPERATED

Range 1,000—30,000 KC

INSTRUCTIONS

Manufactured for

NAVY DEPARTMENT—BUREAU OF ENGINEERING

by

RCA Victor Co., Inc., Camden, N. J., U. S. A.

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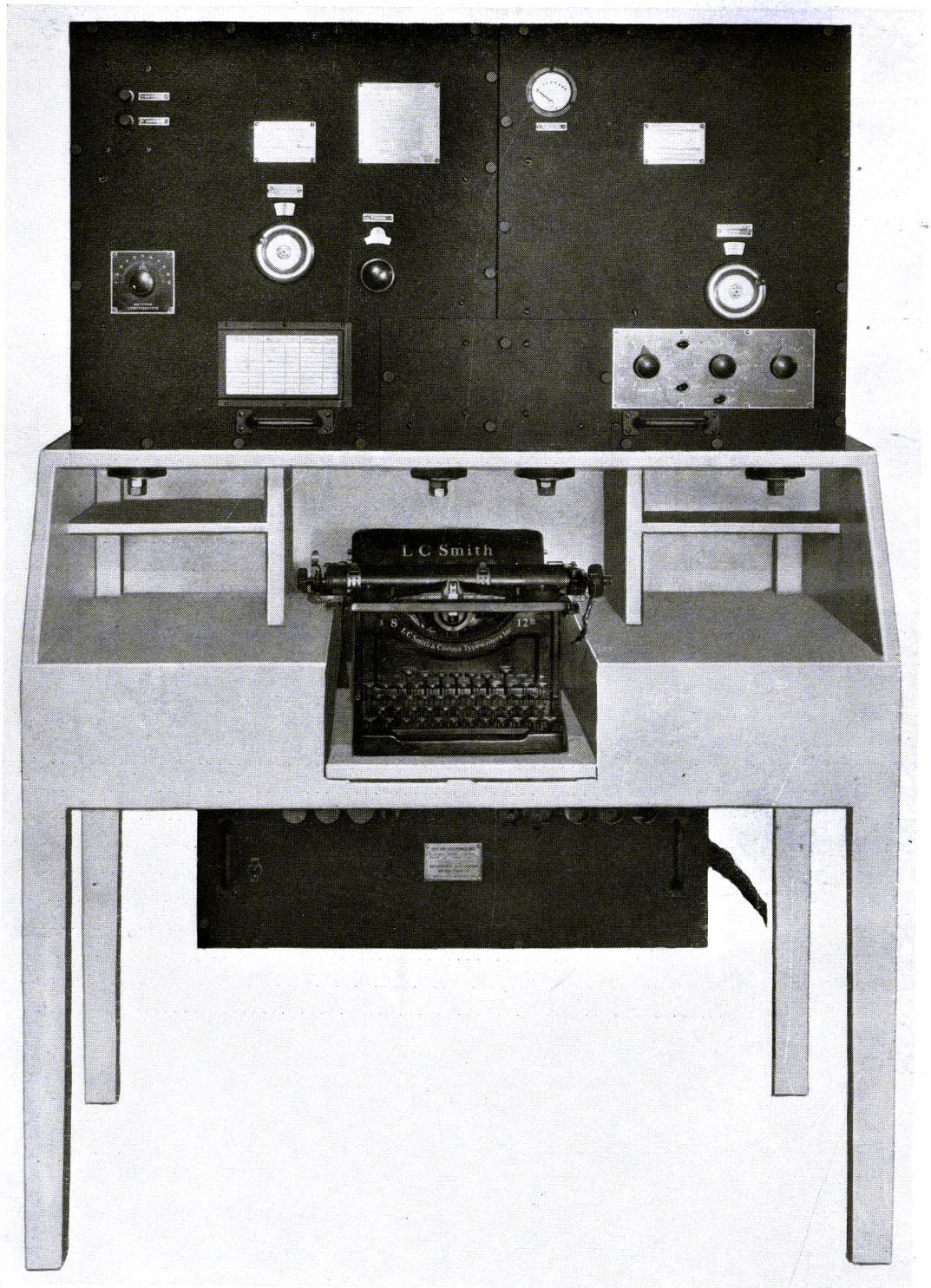
INDEX

Illustrations

Drawings



Frontispiece—Typical Installation Model RAB-1 Equipment

Restricted

This instruction book is furnished for the information of commissioned, warranted, enlisted and civilian personnel of the Navy whose duties involve design, instruction, operation and installation of radio and sound equipment. The word "RESTRICTED" as applied to this instruction book signifies that this instruction book is to be read only by the above personnel, and that the contents of it should not be made known to persons not connected with the Navy.

I

INTRODUCTION

1.1 THESE INSTRUCTIONS SHOULD BE READ AND STUDIED WITH GREAT CARE BEFORE THE INSTALLATION OR OPERATION OF THIS EQUIPMENT IS ATTEMPTED, IN ORDER THAT OPTIMUM PERFORMANCE MAY BE OBTAINED.

1.2 These instructions cover the installation, operation and servicing of the Model RAB-1 radio receiving equipments. These equipments are of the a-c operated superheterodyne type and cover the frequency range of 1,000 to 30,000 kilocycles, being designed for optimum performance for the reception of pure, modulated or interrupted CW or damped waves, or telephone modulated radio frequency signals. They operate directly from a 110 volt, 60 cycle power supply. The output circuit is designed for use with from one to four pairs of 600 ohm (impedance) telephone receivers connected in parallel.

1.3 This equipment consists of the following component units designed primarily for mounting on a Navy standard operating table. The frontispiece shows an equipment so mounted.

Radio Frequency (RF) Tuner, Type CRV-46035.
Intermediate and Audio Frequency (IF-AF) Amplifier, Type CRV-50023.
Power Unit, Type CRV-20016.

Each unit is separately and completely shielded. The cabinets and inter-connecting cables are permanently secured to the operating table upon installation, the chassis being removable for servicing and tube replacements.

1.4 The Radio Frequency Tuner employs eight bands to cover the range (1,000 to 30,000 kc.) a different set of inductances being used in the tuned circuits for each band. The inductances are permanently mounted upon the receiver chassis while the condenser and tube assembly is movable to permit contact with any desired set of coils. Thus band selection is attained by operation of a single control on the front panel.

1.5 The Intermediate Frequency Amplifier utilizes four different frequencies. The necessary inductance changes are accomplished in a manner similar to that used in the RF Tuner.

II

TUBE COMPLEMENT

2.1 The following Navy standard vacuum tubes are required for a complete equipment:

2 Type 38058, R-F Amplifiers.
2 Type 38064 Oscillators.
2 Type 38035, I-F Amplifiers.
3 Type 38024, Detectors and first A-F Amplifiers.
3 Type 38027, Second A-F Amplifiers and AVC.
2 Type 38180, Power Rectifiers.
1 Type 38274, Voltage Regulator.

III

POWER REQUIREMENTS

3.1 All power is obtained from a single 110 volt, 60 cycle, single phase suitably wired supply with fast and slow voltage variation regulated to within $\pm 3\%$.

3.2 The total power consumption of the complete equipment is approximately 235 watts.

IV
CIRCUIT ARRANGEMENTS

4.1 *Radio Frequency Tuner CRV-46035.*

4.1-1 The Radio Frequency Tuner provides moderate amplification at any desired frequency within the range 1,000 to 30,000 kc. and a high degree of selectivity, permitting discrimination between a desired signal and interferent signals which might otherwise result in image response, overloading and spurious frequency combinations at the first detector. Further selectivity is secured in the IF-AF Amplifier.

4.1-1.1 Schematic diagram P-701165 shows the circuit arrangement of the RF Tuner. It consists of a two-stage r-f amplifier, first detector and first heterodyne oscillator. Type 38058 tubes are used in the r-f stages, a Type 38024 tube in the detector stage, and a Type 38064 tube for the oscillator. Four tuned circuits are employed in the r-f amplifier and a fifth to control the oscillator frequency. The individual r-f coil assemblies are enclosed in separate screw-on copper can shields. These units are mounted on fixed plates both above and below a movable carriage which encloses the tuning capacitor. The carriage moves in a horizontal plane, contacting the proper coils corresponding to the frequency band indicated on the band selector dial on the front panel. This construction is more fully explained in paragraph 5.1-1.1.

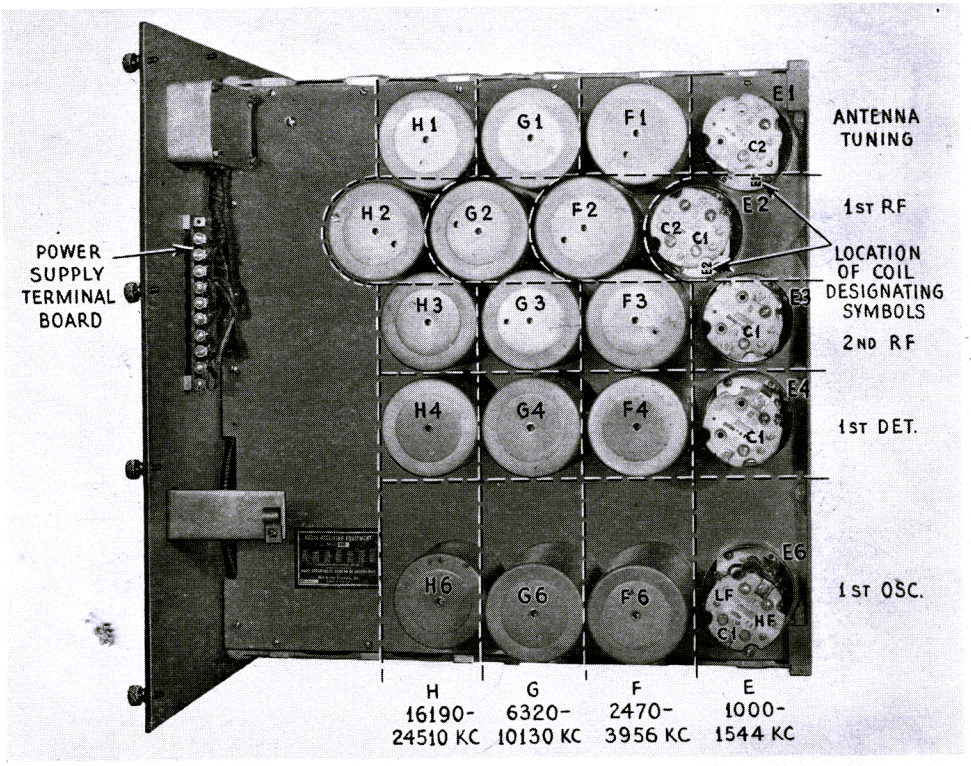


Figure 1—Radio Frequency Tuner CRV-46035
(Top View Chassis—"E" Coil Covers Removed)
Note: c1 indicates trimmer capacitors, c2 indicates coupling capacitors

4.1-1.2 The input circuit consists of a low impedance circuit capacitively coupled to the first tuned circuit. Variable capacity coupling is used between the antenna and the first tuned circuit. The coupling design minimizes tendencies for harmonics to be fed back to the antenna through the r-f system of one receiver and cause beats with the fundamental or harmonics of another receiver. The coupling is also designed to give optimum energy transfer from the antenna to the first tuned circuit to aid in realization of the best possible signal to noise ratio.

4.1-1.3 The first tuned circuit forms a link between the antenna and grid tuned circuit of the first r-f amplifier. Capacitive coupling is used between the first and second tuned circuits. This coupling is maintained near critical to assure maximum signal to noise ratio.

4.1-1.4 The third and fourth tuned circuits form impedance coupling elements between the r-f stages and the detector. The vacuum tube plates connect to taps on the tuned circuit inductances which improves selectivity and maintains more uniform sensitivity over the frequency range.

4.1-1.5 The four tuned circuits provide the high degree of r-f selectivity necessary to attenuate interferent signals emanating from local transmitters, not far removed in frequency from the desired signals.

4.1-1.6 A comparatively low degree of r-f gain is used which increases the apparent selectivity by decreasing the cross modulation and overloading effects at the first detector. The value of amplification is so adjusted that the shot effect of the first tube constitutes the greatest portion of the receiver noise, thus maintaining optimum signal to noise ratio.

4.1-1.7 The fifth tuned circuit controls the oscillator frequency which is higher than the signal frequency by an amount equal to the intermediate frequency used. Special provisions are made to obtain the necessary frequency stability. The oscillator plate supply voltage is controlled by a voltage regulator tube mounted in the power unit. A Type 38064 oscillator is used to eliminate frequency variations arising from the use of a heater type tube operating on a-c heater supply. Filament power for the Type 38064 tube is obtained from the rectified "B" power supply. The oscillator circuit is arranged to operate on the shock excitation principle so that plate current is drawn only over a portion of the cycle, which further reduces the effect of power supply variations on frequency.

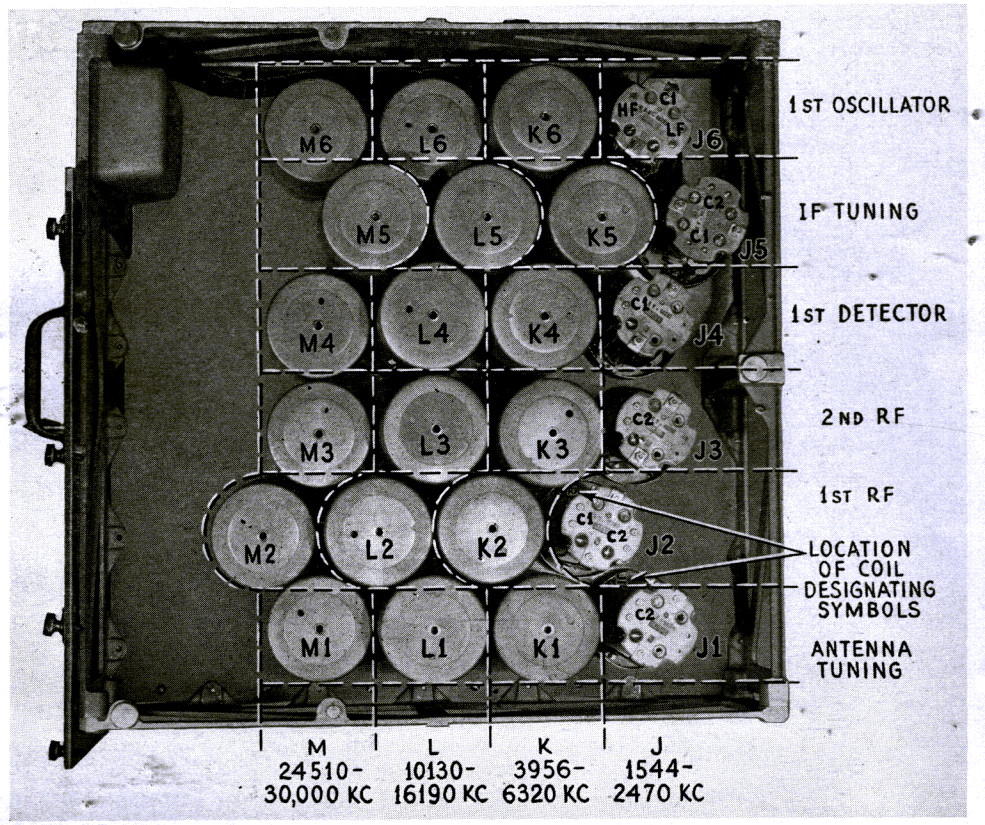


Figure 2—Radio Frequency Tuner CRV-46035
(Bottom View Chassis—"J" Coil Covers Removed)
Note: c1 indicates trimmer capacitors, c2 indicates coupling capacitors

4.1-1.8 The locally generated oscillations are fed into the detector grid circuit by means of a coupling coil in the detector cathode circuit, which provides sufficiently constant excitation over the frequency range. A power detector is used which is inherently lacking in blocking. The detector is operated at a relatively low voltage level which increases the apparent selectivity by reducing cross modulation and distortion effects.

4.1-1.9 Sensitivity is controlled by variation of the control grid potential of one r-f stage and the two if- stages. This control is located in the IF-AF Amplifier.

4.1-1.10 The unit is completely shielded externally to minimize cross-talk between receivers. All power leads are filtered with resistance capacity filters. Interstage shielding is provided to increase selectivity and stability and to minimize reaction.

4.1-1.11 The first tuned circuit of the i-f amplifier is located in the RF Tuner and is capacitively coupled through a low impedance interconnecting cable to the IF-AF Amplifier.

4.2 *Intermediate and Audio Frequency Amplifier CRV-50023.*

4.2-1 The intermediate frequency amplifier selects and amplifies the" difference" frequency component of the first detector plate current produced by combination of the signal and first heterodyne oscillator radio frequencies. This unit also contains the second detector and second heterodyne oscillator.

4.2-1.1 The intermediate frequency amplifier utilizes six fixed tuned circuits (in each of the four i-f bands) in conjunction with two Type 38035 intermediate frequency amplifier tubes, a Type 38024 second (power) detector, and a Type 38064 second heterodyne (CW) oscillator. These circuits are in addition to the i-f circuit located in the RF Tuner.

4.2-1.2 Complete external shielding eliminates external pickup of interference on the intermediate frequencies used. Interstage shielding is provided to permit a high degree of stable amplification.

4.2-1.3 The interstage transformers consist of coils designed so that capacity coupling can be varied, which permits adjustment of the frequency response and gain of the amplifier to maximum selectivity. Both primary and secondary of each transformer are tuned by means of trimmer condensers to the desired intermediate frequency and the variable coupling capacitors are properly adjusted at the factory and should need no further adjustment in the field. The transformers are mounted in separate copper can shields. A carriage is arranged to move in a horizontal plane with a mechanism similar to that used for changing the radio frequency bands. By this means the desired intermediate frequency is obtained by operating a control on the front panel. Four different intermediate frequencies are utilized, which require four sets of transformers.

4.2-1.4 A self-biased power detector is utilized permitting a high output without overloading. The plate circuit contains a radio frequency filter and output transformer.

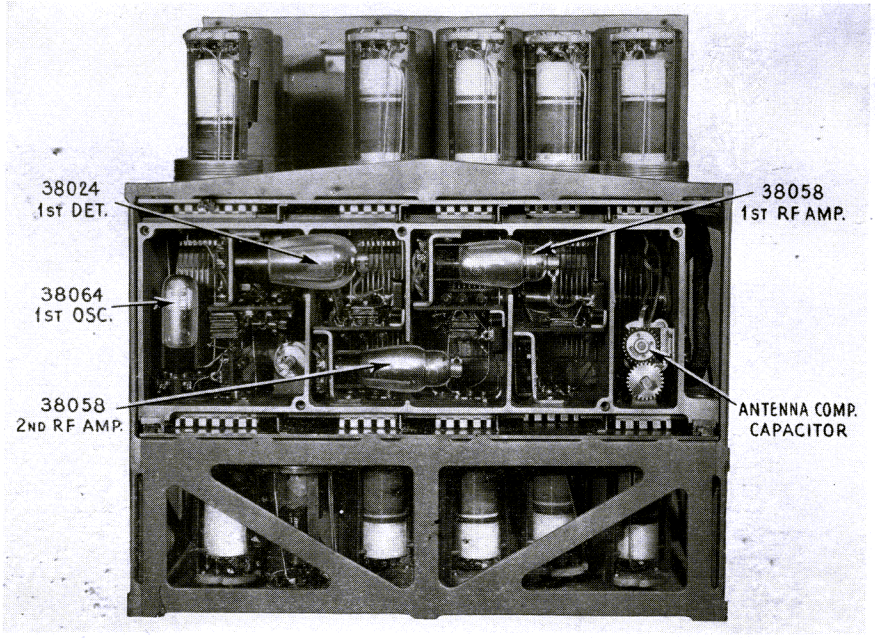


Figure 3—Radio Frequency Tuner CRV-46035
(Rear View Chassis—Carriage Cover Plate Removed)

4.2-1.5 A second heterodyne oscillator provides local oscillations for heterodyne detection of CW signals. The tuning is adjusted for maximum response with a 1,000-cycle audio beat note, with frequency vernier set at "0." The oscillator frequency is set 1,000 cycles higher than the intermediate frequency. A different oscillator coil is utilized for each of the four intermediate frequencies used. These coils are mounted on the same plate with the intermediate frequency transformers, and are switched into the circuit simultaneously with the intermediate transformers by operation of the control on the front panel. A switch is provided on the front panel to turn the oscillator on or off for CW or ICW reception.

(a) A frequency vernier is provided to permit fine adjustment of beat note for CW reception on the six highest frequency r-f bands. The vernier consists of a small variable capacitor connected across a portion of the tuned circuits of the 2nd oscillator associated with the three highest frequency intermediates. The capacity variation is adjusted to provide approximately $\pm 6{,}000$ cycles variation of beat note on the four highest r-f bands and approximately $\pm 4{,}000$ cycles on the next two lower r-f bands. No vernier adjustment is provided for the two lowest r-f bands since sufficiently fine control is obtained with the main tuning control.

4.2-1.6 All power supply leads are filtered with resistance capacity filters. A voltmeter on the front panel indicates when the receiver is in operation and power supply normal.

4.2-1.7 Two filters are provided following the i-f amplifier, to eliminate the undesired radio and audio frequency components of the second detector plate current.

(a) A low pass filter provides substantially flat response to frequencies from 200 to 4,000 cycles, and provides attenuation of not less than 40 D. B. of frequencies of 5,500 cycles and above. This filter, together with a radio frequency filter in the detector plate circuit, removes substantially all radio frequency potentials from the output circuit.

(b) A band pass filter, which may be switched in or out of the circuit from the operating panel, provides attenuation of not less than 40 D. B. at frequencies above 1,600 and below 550 cycles, and not more than 6 D. B. from approximately 700 to 1,300 cycles.

4.2-1.8 The audio amplifier consists of a Type 38024 tube in the first audio stage, resistance coupled to a Type 38027 tube in the output stage feeding a 600 ohm output transformer.

(a) The output circuit is balanced with respect to ground.

4.2-1.9 The automatic volume control device has been designed for limiting the audio output of the receiver (for telegraph reception) to a desired level over a wide range of input voltages. A switch is provided on the front panel to turn the automatic volume control on or off.

(a) The AVC consists of a high ratio step up transformer with a center tapped secondary winding through which the receiver output is fed to two Type 38027 tubes connected as biased rectifiers.

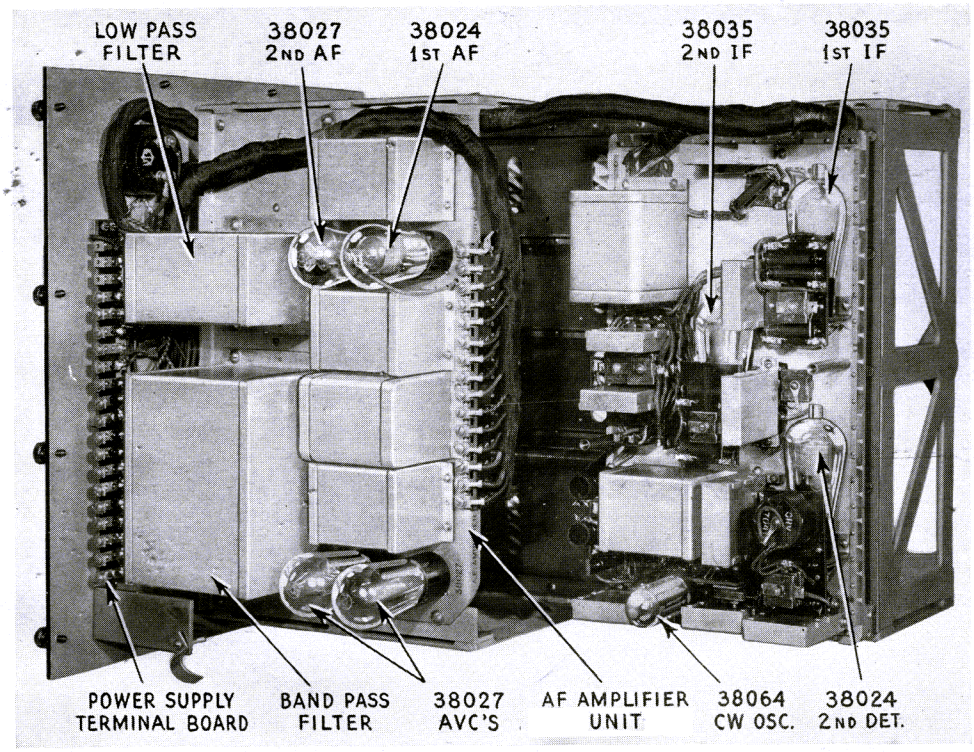


Figure 4—IF and AF Amplifier CRV-50023
(Top View Chassis—Carriage Cover Removed)

(b) When the receiver output voltage reaches a certain level (determined by an adjustable bias on the rectifiers), the rectifiers start drawing current and the rectifier anode (plate-grid) resistance decreases. This resistance, reflected through the high ratio input transformer, results in a low effective impedance load in the receiver power stage plate circuit, and thus limits the output voltage to a certain value.

(c) Since the AVC is operated by the audio output only, it is not affected by strong CW signals which do not produce an audio beat note.

(d) The output level to which the signal is limited can be varied by adjustment of the rectifier bias from a control on the front panel.

(e) Control is obtained over a range of input variation of the order of 10,000:1.

NOTE: This control is *not* intended for use on voice modulated signals since it introduces harmonics of the audible note and produces prohibitive distortion.

4.3 *Power Unit CRV-20016.*

4.3-1 The Power Unit, shown on the schematic diagram P-701165, has been very carefully designed in order to maintain an accurate calibration of the receiver and a high degree of frequency stability. Several special features are embodied in the design in order to afford very constant voltages on the plates and filaments of the first and second heterodyne oscillators over long periods of time. The power supply circuit consists essentially of an r-f filter in the voltage supply line and the electro-statically shielded power transformer, two Type 38180 rectifier tubes, a specially developed two-stage filter, a voltage regulator and the voltage divider system.

4.3-1.1 The r-f filter unit has been very carefully designed to substantially eliminate any cross talk between several equipments, operating from one power supply system.

4.3-1.2 The primary of the power transformer has been designed for operation on 110 volt, 60 cycle supply. Total power consumption of this transformer under normal operation is approximately 235 watts.

4.3-1.3 In order to provide for constant frequency output of the first and second oscillators, the filaments are supplied with rectified current. These oscillators are of the 38064 type and the filaments, which are in series, consume approximately 0.25 ampere. Two 38180 rectifier tubes are used in parallel to obtain the high current necessary for this filament supply and to furnish a plate source of good regulation.

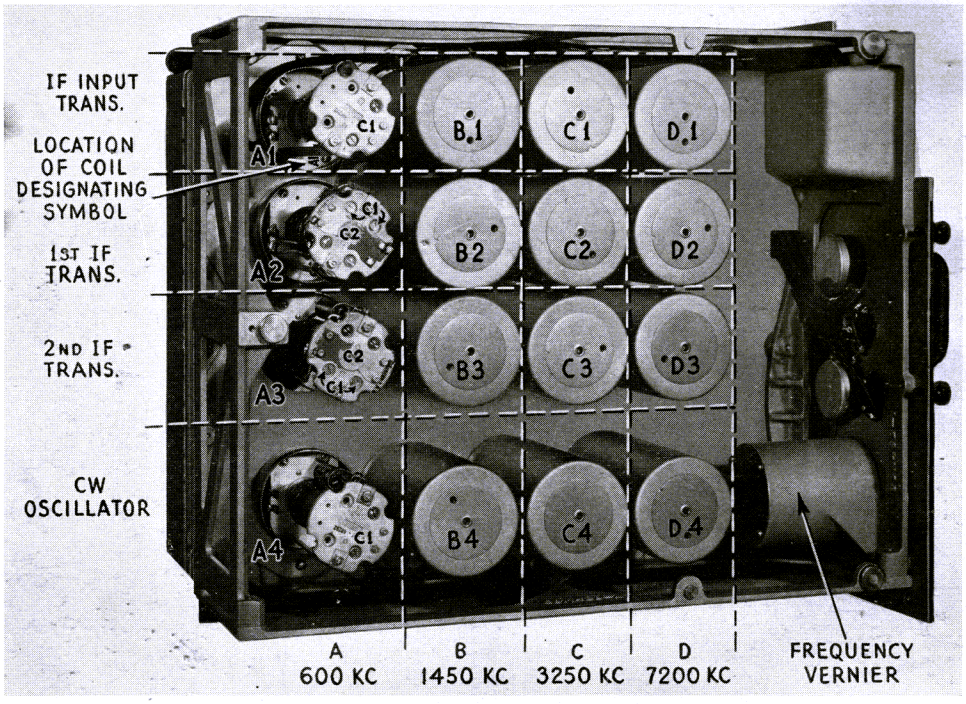


Figure 5—IF and AF Amplifier CRV-50023
(Bottom View Chassis—"A" Coil Covers Removed)

Note: c1 indicates trimmer capacitors, c2 indicates coupling capacitors

4.3-1.4 The plate voltage of the two oscillators is stabilized by means of a Type 38274 regulator tube.

4.3-1.5 A power switch is provided on the panel of this unit for turning the equipment on and off.

V
CONSTRUCTION

5.1 Outline drawing P-701352 illustrates the overall dimensions of the complete equipment as mounted on a Navy standard operating table. The approximate weights of the units complete, are as follows:

Radio Frequency Tuner	190 Pounds
Intermediate and Audio Frequency Amplifier	155 Pounds
Power Unit	110 Pounds
Complete Equipment	455 Pounds

5.1-1 *Radio Frequency Tuner* (See Figures 1, 2 and 3.)

5.1-1.1 The frequency range of each of the 8 bands is covered continuously by means of a five-gang variable capacitor. For each band, a different set of inductances is required, there being five coils in a set, or a total of 40 coils. These coils, in separate shield cans, are mounted in two groups of 20. They are permanently mounted on the chassis of the receiver, one group above and the other below the condenser assembly. Four i-f coils in separate cans are also mounted below this assembly. The condenser and tube assembly is arranged

to move in a horizontal plane permitting contact with any desired set of coils and is actuated through a worm drive by a control on the front panel. Thus any desired set of coils may readily be connected into the circuit by this simple operation.

5.1-1.2 The five-gang tuning condenser is mounted in a special cast frame with its shaft parallel to the front panel. The condenser casting also provides interstage shielding and mounting for the tubes, radio frequency filters and other circuit elements. The upper and lower sides of the casting are fitted with rows of contact jacks to engage with the coil contacts.

5.1-1.3 The coil assembly, front panel, and supporting framework are permanently bolted together so as to permit removal as a compact unit from the radio frequency cabinet. The unit is held in the cabinet by means of thumb screws which remain with the panel when loosened.

5.1-1.4 Access to tubes is accomplished by withdrawing the chassis from the cabinet and removing the shield cover at the rear of the carriage.

5.1-2 *Intermediate and Audio Frequency Amplifier* (See Figures 4 and 5).

5.1-2.1 The general mechanical arrangement is similar to that used for the Radio Frequency Tuner. A special casting is used to support the tubes, radio-frequency filters and other circuit elements. One side of the casting is fitted with a row of contact jacks to engage with coil contacts.

5.1-2.2 The tube casting is arranged to slide horizontally in a manner similar to that of the r-f condenser casting. Four sets of coils are used, each set consisting of three intermediate transformers and an oscillator coil. Each transformer and oscillator coil is enclosed in a separate copper can, there being a total of 16 cans.

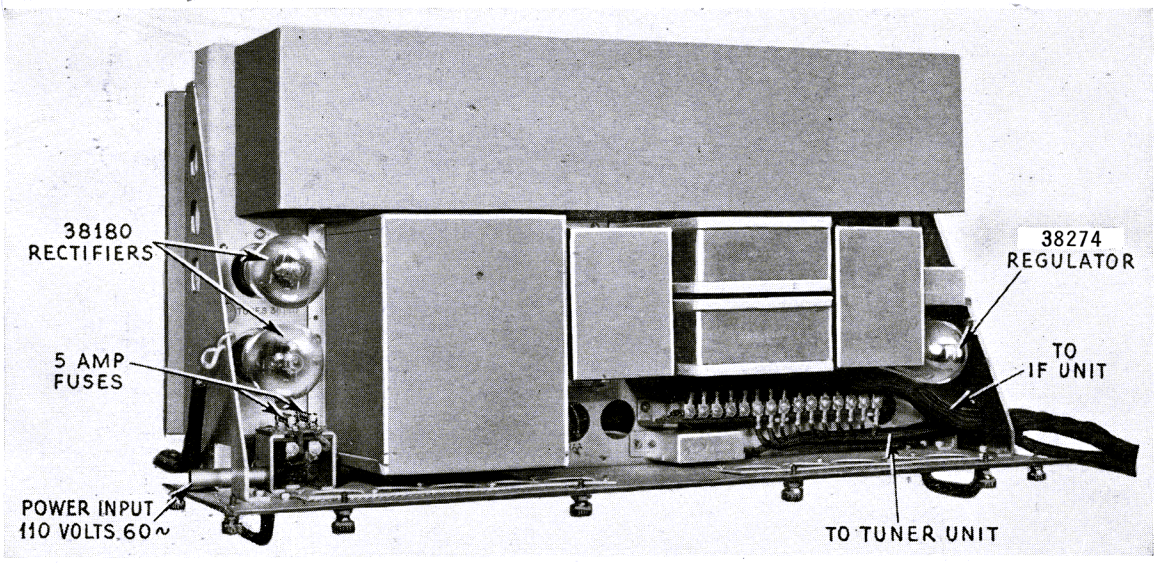


Figure 6—Power Unit CRV-20016
(Top View Chassis—Tube Shield and Fuse Block Shield Removed)

5.1-2.3 The coil assembly, front panel, and frame are bolted together permanently and form the chassis. The filter unit and audio unit, mounted as separate assemblies are fastened to this chassis, which is removable as a compact unit from the metal cabinet.

5.1-2.4 Access to the i-f tubes is effected by withdrawing the chassis from the cabinet and removing a cast aluminum shield. Access to the audio tubes is accomplished by partially removing the chassis from the cabinet.

5.1-2.5 The automatic volume control is designed as part of the audio unit, with controls located on the i-f and a-f amplifier panel.

5.1-3 *Power Unit* (See Figures 6, 7 and 8).

5.1-3.1 Component parts of the unit are assembled on the front panel and chassis which is enclosed in a metal cabinet. The panel is securely fastened to the chassis and the assembly is held in the cabinet by means of thumb screws attached to the panel. Two handles are attached to the panel which facilitates the removal of the chassis from the cabinet.

5.1-3.2 A power switch is mounted on the power unit panel, and a voltmeter on the i-f and a-f amplifier panel indicates when power is being supplied to the receiver.

5.1-3.3 Access to the power unit tubes is effected by partly withdrawing the chassis from the cabinet and tilting downward. A stop and supporting chains are prov ded to hold the chassis in this position while tubes are inserted as shown in Figure 6.

VI

ANTENNA REQUIREMENTS

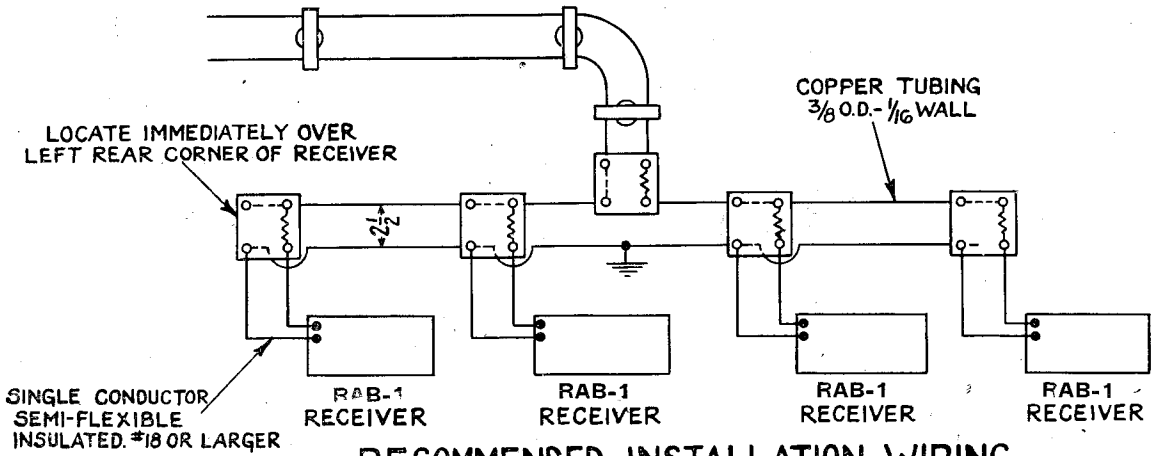
6.1 From one to six receivers may be operated from one antenna. The antennas should be spaced at least six feet from any parallel stay, mast or stack, must be well insulated and erected as high as possible. The length of antenna should be approximately 50 feet in the clear. A half megohm static drain resistor should be permanently installed between each antenna and ground.

NOTE: NO RECEIVERS OTHER THAN THE *RAB-1* SHOULD BE USED ON THE SAME ANTENNA EXCEPT AS AN EMERGENCY MEASURE.

6.2 Where one or more receivers are to be operated from one antenna, it may be found desirable to insert 1 watt "metallized" resistors in the order of 150 ohms in series with the antenna leads to the receivers. The purpose of this arrangement is to reduce reaction between receivers and standing waves on the antenna bus and leads. This reaction and the effect of standing waves is such as to reduce the signal voltage at the input of a particular receiver at a particular frequency. To maintain uniform performance throughout the entire frequency range of the receiver the resistors may be required directly in series with the antenna lead or in series with the bus. The best arrangement should be determined by trial upon installation. The figure below illustrates the recommended method for a multi-receiver installation.

6.3 *A short, direct, low resistance ground lead* is very essential. Make the ground connection to some grounded metal portion of the ship as is specified under Wiring, paragraph 7.3.

6.4 The use of bonded stays is equally as desirable with this equipment as with other Navy receivers to eliminate noises arising from variable contacts or grounds on such stays.



RECOMMENDED INSTALLATION WIRING
OF ANTENNA & GROUND LEADS

VII

INSTALLATION

7.1 *Receiver Mounting.*

7.1-1 In mounting the receiver it is essential that the Radio Frequency Tuner and the Intermediate and Audio Frequency Amplifier be secured to the top of the operating table by means of the rubber shock absorber mountings provided. Drawing P-701352 gives details of installation including the dimensions for drilling the desk. In planning the installation care should be exercised to provide for a clearance of at least 3 inches (preferably 5 inches) from back of receiver to bulkhead or nearest obstruction in order to permit free movement of cables when withdrawing chassis from cabinets for servicing, etc.

7.1-1.1 The cabinets must be bolted in place with the chassis removed. To remove the chassis from the cabinet of either the Tuner Unit (CRV-46035) or the Amplifier Unit (CRV-50023) it is necessary to first remove a screw located at the rear of the bottom of the cabinets. *This screw is painted red* for identification and secures the chassis to the cabinet for shipping purposes only. Loosen the thumb-screws holding the panels to the cabinets. Note that these do not come clear of the panel, but engage with nuts which are held to the case by means of springs. Turning each thumb-screw six or eight complete turns will suffice to disengage the same. Exert pressure inward while loosening these screws. Pull the chassis out of the cabinet about 4 inches, or until it strikes a stop. (If the equipment has been previously set up it would be necessary to disconnect the cable terminals which are attached to a connector block just back of top of the front panels. After the initial installation, the two power cables remain with the cabinets.) Completely remove the chassis

from the cabinet by lifting them a small distance to clear the stop. CARE SHOULD BE TAKEN TO SET THE CHASSIS ON A FLAT SURFACE FREE FROM ANY OBJECT WHICH MIGHT DAMAGE THE COIL SHIELDING CANS. **CAUTION:** DO NOT REMOVE ANY OF THE SCREW-ON COPPER CAN COIL SHIELDS. (See paragraph 10.3-1.) The cables should be fed through the holes at the rear of the cabinets of both the Tuner and IF-AF Units. The large cable (Schematic No. 207) connects the IF-AF Unit to the Power Unit, while the smaller cable (Schematic No. 208) serves the same purpose for the Tuner Unit. The end of the cables nearest the point where the clamps and bushing are attached should connect to the IF-AF and Tuner Units. After pulling the cable through the cabinet hole, insert the threaded bushing in the hole in the cabinet. Slip the nut over the power unit end of the cable and fasten the threaded bushing in place.

7.1-1.2 Using a one-inch drill, drill the top of the desk in accordance with dimensions given on drawing P-701352. Place a ¾ inch rubber bushing in each of these holes. Locate the cabinets in the proper positions on the desk top so that their mounting holes coincide with the holes just drilled. Note that the Tuner Unit is placed on the left of the Amplifier Unit. Insert the mounting bolts. Place a ¾ inch rubber bushing, a metal washer, a nut and lock nut on each bolt as shown on drawing P-701352, but do not tighten the nuts. If necessary (due to space limitation) trim the lower rubber bushings to fit in the compartment spaces under the table top. Bolt the adjacent sides of the two cabinets by means of the 4 short bolts provided. Place these bolts in the holes inside the cabinets. Place washers under the heads and washers, lockwashers and nuts on the opposite end of the bolt. Before tightening these nuts, carefully align the cabinet both horizontally and vertically. When the cabinets have been secured to each other, tighten the mounting bolts just sufficient to slightly compress the rubber washers.

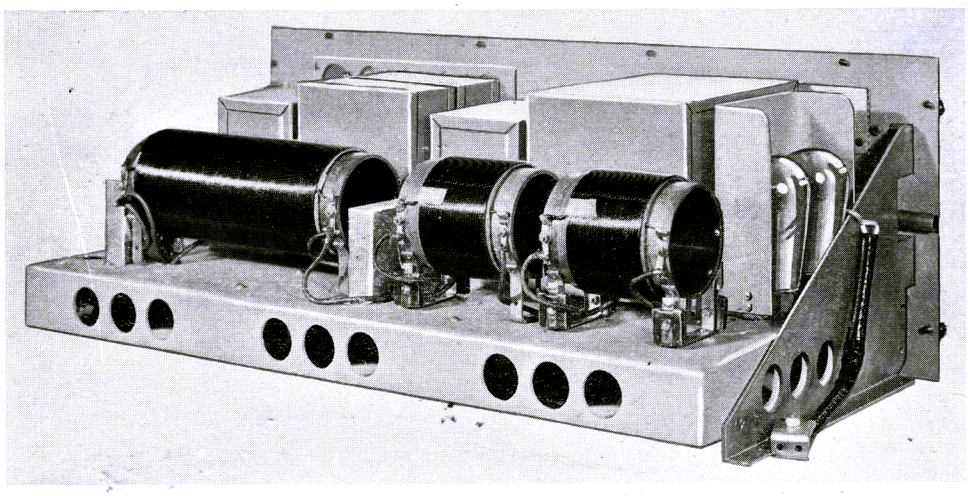


Figure 7—Power Unit CRV-20016
(Rear View Chassis—Line Filter Shield Removed)

7.1-1.3 The cabinets for the tuner and power units have holes at the back in which should be assembled the screws, lockwashers and nuts for ground connection, as shown on Drawing P-701352. These terminals should be used to make a short, direct connection to ground, using the lug provided, or preferably a copper strap drilled to go over the screw. Individual ground connections for each cabinet should be run, as shown, to reduce the length of conductor to ground to the very minimum.

7.2 *Power Unit Mounting.*

7.2-1 The power unit cabinet should be mounted beneath the operating table by means of four bolts, washers and lockwashers (not supplied). It should be spaced a minimum of 1½ inches from the bottom of the table by cleats or other means so as to allow ample ventilation. The details of installation and the drilling plan for these mounting bolts are also shown on drawing P-701352. Access to the bolts for supporting the power unit cabinet may be had by removing the table drawers or by providing hand holes at the rear of the table. Remove the Power Unit from the cabinet by loosening the panel thumb screws and unfasten the retaining chains which are exposed when the chassis is partly withdrawn by opening the "S" hooks (note that when the chassis is again replaced in the cabinet, these chains must be attached and "S" hooks closed, as their purpose is to hold the chassis at approximately a 45 degree angle while changing tubes). If the equipment has been previously set up it will be necessary to remove the cable connections from the terminal board at the right side of the Power Unit just in back of the panel before the retaining chains are unfastened.

7.3 *Wiring.*

7.3-1 All interconnections of the various units are made by means of three flexible cables as shown on Drawing P-701584. A 9-conductor shielded cable connects the RF Tuner to the Power Unit;

a 16-conductor shielded cable (with two phone leads branching off) connects the IF-AF Amplifier to the Power Unit, and a short 5-conductor cable connects the Tuner Unit to the Amplifier Unit. Note that all shielded cables have one more lug at each end than actual conductors, these being ground lugs connected to each end of the shielding. Also the largest cable has two extra terminal lugs at the i-f and a-f unit end. The leads attached thereto branch off for connection to the telephone jack box and supervisory plug board.

7.3-2 It is very important that the power supply be brought to the equipment by a shielded twisted pair of wires (No. 14 or larger) or run in grounded conduit as far as the bulkhead adjacent to the Power Unit, and terminating in a junction box, in order to eliminate as much as possible a-c hum and other electrical interference. In no case should transformers or other a-c equipment be located in close proximity to the IF-AF Amplifier.

7.3-3 Grounds should be made to some grounded metal portion of the ship. Contact surfaces must be scraped free from paint. Pipes should be avoided since they are questionable ground aboard ship.

NOTE: The importance of securing a good ground with a short, direct, low-resistance ground lead cannot be over-emphasized. This is of particular importance in minimizing pick-up and interference from nearby transmitters.

7.4 *Cable Connections on Power Unit.*

7.4-1 Connect a shielded twisted pair (not smaller than No. 14 B. & S.) from the power supply junction box to the terminals located at the extreme left just in back of the panel. See Figure 6. Insert the leads through the tubing provided, and solder to the spade terminals. Securely tighten the screws holding the terminals.

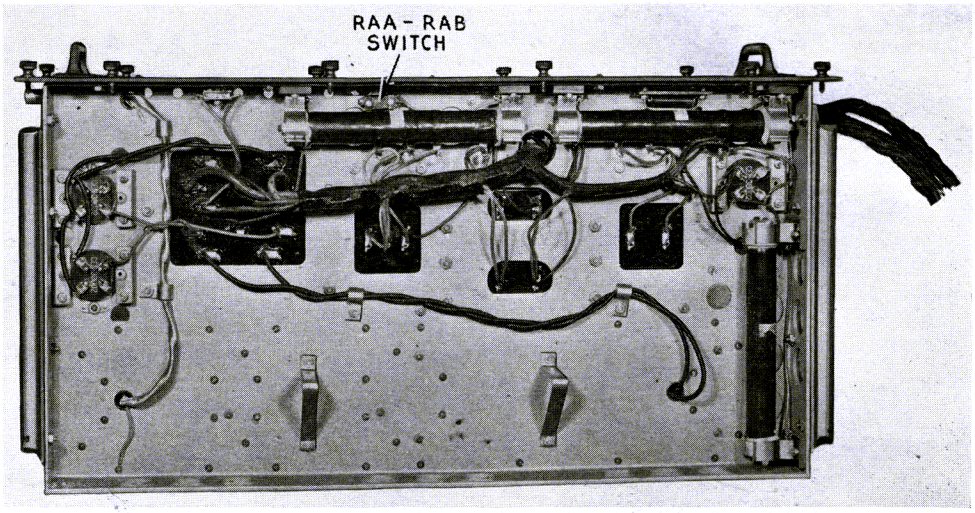


Figure 8—Power Unit CRV-20016
(Bottom View Chassis)

7.4-2 Inspect connections of the two 5 ampere fuses in the clips just in back of the power connection terminals.

7.4-3 Connect the small shielded cable from the RF Tuner and the large shielded cable from the IF-AF Amplifier to the terminal board at the right side of the Power Unit just in back of the panel as shown in Drawing P-701584. Both sets of cable terminals should be attached under the same screws. Replace the Power Unit part way in its cabinet, attach the retaining chains and push the chassis completely into its cabinet. Securely tighten the thumb screws on the front panel.

7.5 *Cable Connections on RF Tuner and IF-AF Amplifier.*

7.5-1 After placing all tubes in their proper sockets in accordance with Section VIII, replace both chassis in their respective cabinets. Connect the 9-conductor shielded cable to the terminal board in the RF Tuner and the 16-conductor shielded cable to the terminal board of the IF-AF Amplifier, being certain of the agreement of the color code of each terminal. Secure each cable under clamp on bracket attached to each panel. Push both chassis back in the cabinets and secure by means of their thumb screws. It should be noted that with the power supply cables of either the Tuner or IF-AF Unit attached to their respective cabinets by means of the ground clamp bushing and nut, sufficient slack is provided so that the chassis may be pulled out from the cabinet until it hits the stop (which permits approximately four inches movement). In this position cables may be connected to or disconnected from the terminal boards.

NOTE: Sufficient slack should be left in the section of cables external to the cabinets to permit pulling chassis out of cabinets, after ground clamp bushing and nut have been released, to permit service checking with voltages applied to all units.

7.5-2 Connect the short 5-conductor shielded jumper cable, which interconnects the two units, in its proper place at the front of the units. See Figure 9. It should lay in the groove and connect the two terminal boards located in the recesses in the respective chassis. The red mark on one end of this cable should appear adjacent to a red mark provided on the terminal strip in the IF-AF Unit. The terminals connected to the braided shield should be connected to the bottom of the terminal board, and the red marking on the cable bridle should correspond with the red marking at the top of the terminal board in the IF-AF Unit. Place the shield cover plate (in accessory box) over this cable and secure by means of the four thumb screws.

7.6 *Telephone Leads.*

7.6-1 Run the two conductor branch phone leads from the large cable to a suitable terminal block near lower right rear corner of receiver or to jacks at the front of the operating table. The terminal block or phone jacks should be permanently wired to the jack box or convenient phone terminals and supervisory plug board. This method of wiring phone leads permits ready removal of receiver from cabinet for tube replacement or service checking. Shielded jack boxes and telephone cords are not necessary due to the excellent filtering throughout and the use of a shielded output transformer. Shielding, when used, should be grounded.

VIII

TUBE LOCATION

8.1 *Power Unit.*

8.1-1 Figure 6 shows the tube locations in the Power Unit. Insert two Type 38180 tubes in the sockets on the left (facing the panel) and one Type 38274 in the socket on the right.

CAUTION: The toggle switch near the center of the base and just in back of the panel *must* be thrown to "RAB" to adjust the Power Unit for the operation of Model RAB-1 (high frequency) equipment.

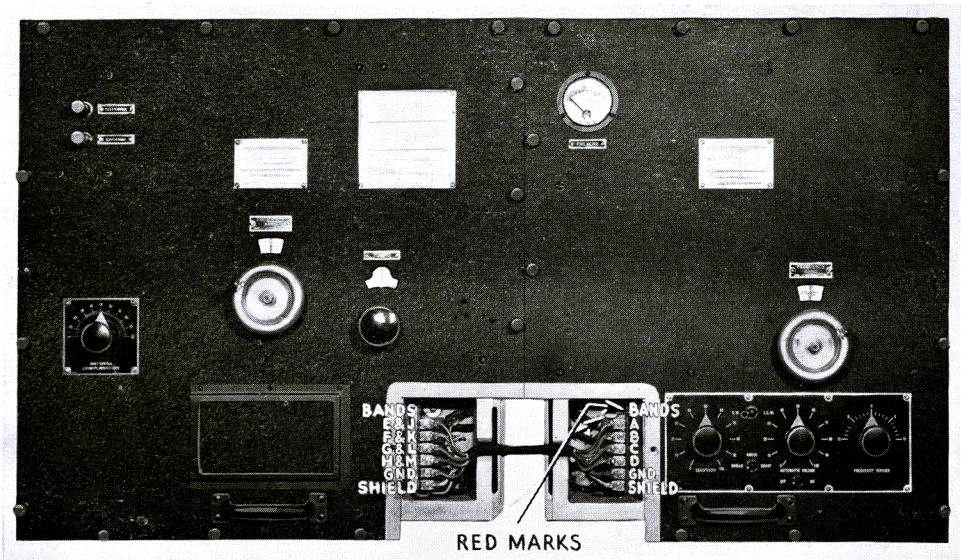


Figure 9—RF Tuner and IF-AF Units—Model RAB-1 Equipment
(Front View—Interconnecting Cable Cover Removed)

8.2 *RF Tuner.*

8.2-1 Figure 3 shows the tube location in the RF Tuner. To insert tubes, move the carriage to the rear of the chassis and remove the cover plate. Facing the rear of the chassis and reading from left to right, the tubes should be placed in the sockets in the following order:

1. Type 38064, 1st Oscillator.
2. Type 38024, 1st Detector.
3. Type 38058, 2nd R-F Amplifier.
4. Type 38058, 1st R-F Amplifier.

Replace the shield cover plate and tighten securely.

8.3 *IF-AF Amplifier.*

Figure 4 shows the tube location in the IF-AF Amplifier. To insert tubes in the carriage move the carriage to the extreme rear of the chassis, remove the two wing nuts and lift the casting from its base. Facing the rear of the equipment and reading from left to right, the tubes should be located in the sockets in the following order:

1. Type 38064, CW Oscillator.
2. Type 38024, 2nd Detector.
3. Type 38035, 2nd I-F Amplifier.
4. Type 38035, 1st I-F Amplifier.

Replace the cast cover on the carriage and tighten securely (hand tight).

The sockets located on the shelf directly above are labeled to indicate the type of tube used. Their arrangement, reading from left to right, facing the rear of the equipment, is as follows:

1. Two Type 38027, Automatic Volume Control.
2. (Nearest the panel) Type 38027, 2nd Audio.
3. (Farthest from panel) Type 38024, 1st Audio.

IX

OPERATION

9.1 Controls on RF Tuner.

9.1-1 The Antenna and Ground Binding Posts.

The antenna should be connected to the upper post, while the ground should be connected to the lower post. See Antenna requirements, Section VI.

9.1-2 Frequency Band Selector Control.

This control serves as a means for changing the required inductances for the various radio frequency bands. The letter appearing adjacent to each setting of the dial should correspond to the letter appearing on the setting of the similar dial on the IF-AF Unit.

9.1-3 Tuning Control.

The Tuning control varies the setting of the 5-gang variable tuning condenser. The scale increases with frequency.

9.1-4 Antenna Compensation Control.

This control is a variable coupling capacitor between the antenna and the first tuned circuit. In general, it is adjusted for best signals but once for each band, preferably at the L. F. end.

9.2 Controls on IF-AF Amplifier.

9.2-1 Voltmeter.

The plate supply voltmeter indicates when the power is turned "ON," and should read approximately 204 volts when the equipment is operating properly.

9.2-2 Audio, Broad-Sharp Switch.

This switch when in the "Sharp" position, inserts a band-pass filter which produces audio selectivity centered near 1000 cycles.

9.2-3 Automatic Volume, Off-On Switch.

This switch, when in the "On" position, places the automatic volume control in operation; when in the "Off" position, it disconnects the automatic volume control.

9.2-4 CW-ICW Switch.

This switch controls the operation of the second heterodyne oscillator. When in the "CW" position, this oscillator is placed in operation; when in the "ICW" position, the oscillator is disconnected.

9.2-5 Sensitivity Control.

This control varies the active grid bias of the two i-f and one of the r-f amplifier tubes.

9.2-6 Automatic Volume Control.

This control varies the bias placed on the AVC tubes and thereby sets the volume level when the "Automatic Volume" switch is in the "ON" position. The automatic volume control is NOT intended for use on voice modulated signals.

9.2-7 Frequency Band Selector Control.

This control serves as a means for changing the required inductances for the various intermediate frequency bands. The letter appearing adjacent to each setting of the dial should correspond to the letter appearing on the setting of the similar dial on the RF Unit.

9.2-8 Frequency Vernier.

The frequency vernier permits of slight variation of the frequency of the CW oscillator when receiving on the six highest frequency bands, enabling convenient adjustment of the audio beat note. This control, when tuning, should be set at zero on the scale.

9.3 Controls on Power Unit.

9.3-1 Off-On Switch.

This switch when in the "On" position connects the 110-volt source of power and places the entire receiver in operating condition.

9.4 **For CW Reception, proceed as follows:**

9.4-1 Throw the power switch to the "On" position. The "Plate Voltage Meter" should indicate approximately 204 volts. Allow sufficient time for the tube heaters to reach their operating temperature.

9.4-2 To receive a signal whose frequency is known, throw the "Audio, Broad-Sharp" switch to the "Broad" position; the "Automatic Volume" switch to the "Off" position; and the "CW-ICW" switch to the "CW" position.

9.4-3 Set the "Frequency Band" controls on both the Tuner and Amplifier Units to indicate the band which includes the frequency of the station desired. (After moving carriages to proper position, "back-up" on control slightly in order to relieve strain on the gears.) Adjust the "Antenna Compensator" to 50 on the scale.

9.4-4 The "Tuning" control should be set to the desired frequency by reference to the "Calibration Chart" with the "Frequency Vernier" at "zero," and the "Sensitivity" control advanced until a perceptible noise level is obtained. The "Tuning" control should then be adjusted until the desired signal is heard and finally set to produce as near a 1000 cycle beat note as possible, making final beat note adjustments with the "Frequency Vernier." Finally adjust the "Antenna Compensation" control for maximum signal.

NOTE: As a guide to permit approximate pre-setting of the "Antenna Compensation," the control should be first set between 17 and 25 for Bands 1–6 inclusive, and between 50 and 60 for bands 7 and 8.

CAUTION: KEEP SENSITIVITY CONTROL RETARDED. Due to the high degree of sensitivity incorporated in the equipment the Sensitivity control can only be used near maximum under ideal conditions of low external noise level. For ordinary operating conditions it is necessary to retard the "Sensitivity" control in order to avoid *overloading the receiver with noise* and masking the desired signal.

9.4-5 In cases where the frequency of the signal is not known (such as when searching), excellent advantage may be taken of the uni-control feature, exercising care to keep the "Sensitivity" control to such a point so as not to overload the receiver with noise.

9.4-6 The "Automatic Volume" control will maintain a substantially constant output signal level for fluctuations in the field intensity of the received signal of the order of 10^4 to 1 thus permitting satisfactory reception of telegraphic signals that would be unreadable because of excessive fading. To utilize this control advance the "Sensitivity" control until the noise level is perceptible (not in excess of ½ volt), then throw the "Automatic Volume" switch to the "On" position and adjust the "Automatic Volume" control until a copiable signal is obtained.

NOTE: To use the automatic volume control to best advantage the signal should be held to as *low* a value as will permit good copy.

9.4-7 Throwing the "Audio, Broad-Sharp" switch to the "Sharp" position will result in increased selectivity. The desired signal should be tuned so as to produce a 1,000 cycle beat note. The "Frequency Vernier" permits adjusting the audio beat note on the six higher frequency bands.

9.5 **For ICW or Modulated Signal Reception:**

9.5-1 The procedure is the same as outlined above with the exception that the "CW-ICW" switch should be thrown to the "ICW" position.

9.5-2 The automatic volume control is *not* intended for use when receiving voice modulated signals and the "Automatic Volume" switch should be thrown to the "Off" position during such reception.

9.5-3 When receiving ICW, the audio selectivity can only be used for the reception of a 700 to 1,300 cycle modulated signal and the "Audio, Broad-Sharp" switch should be thrown to the "Broad" position except for this condition.

X

MAINTENANCE-TROUBLE LOCATION AND REMEDY

10.1 **General.**

10.1-1 The normal sensitivity (number of microvolts input required to produce 5 m.w. output—1.73 volts across a 600-ohm non-inductive resistance) of the receiver is better than 5 microvolts when measured under the following conditions:

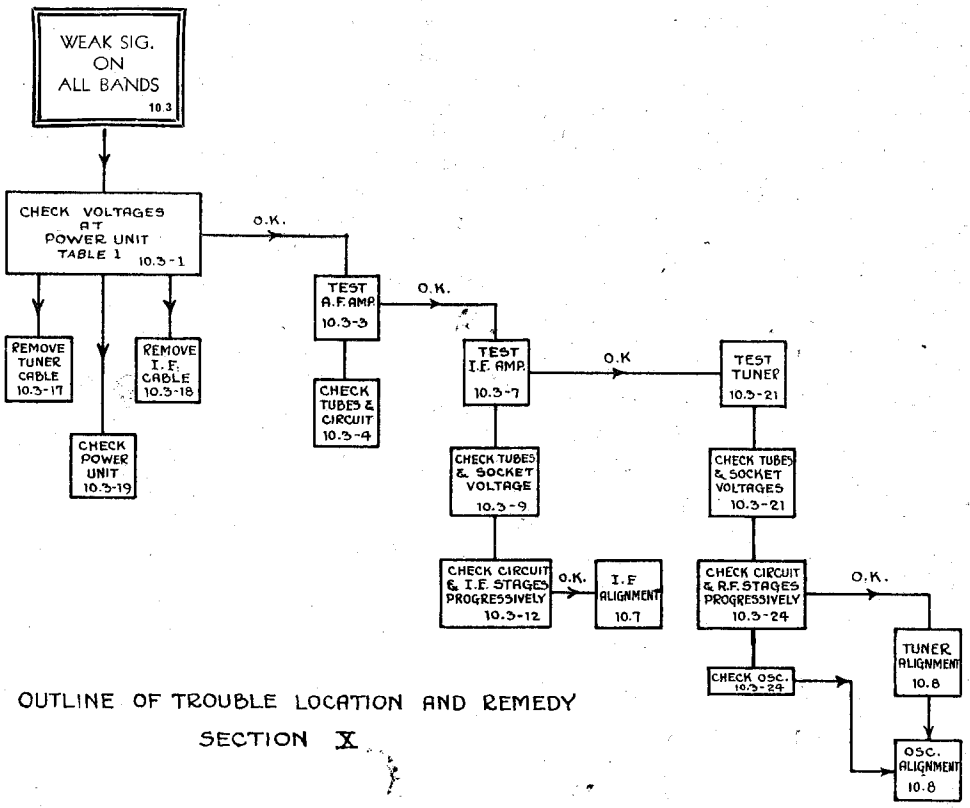
"AVC–Off," "Audio-Broad," "CW," output load 600 ohms non-inductive resistance, pure CW input from signal generator applied between antenna-ground terminals in series with a 300 ohm non-inductive resistance dummy antenna, "Sensitivity" control set to produce ½ volt noise output.

This sensitivity will, of course, vary from receiver to receiver and be subject to variation with time due to humidity, etc. THEREFORE, IT IS RECOMMENDED THAT NO ATTEMPT BE MADE TO RETRIM OR REALIGN THE EQUIPMENT UNLESS THE SENSITIVITY IS FOUND TO BE LESS THAN 10 MICROVOLTS WITH NEW TUBES.

This receiving equipment has been carefully adjusted and aligned by the manufacturer before shipment and should maintain these adjustments over reasonably long periods of time. No radio receiving equipment, in common with all delicate and complex apparatus, is immune from requiring readjustment from time to time, and this equipment is no exception. However, every effort should be made to make any major adjustments and repairs in a laboratory well equipped with the necessary servicing tools and equipment and to refrain from changing any of the adjustments of any of the radio frequency circuits until it is ascertained that the difficulty being experienced is not the result of external or normal deteriorating influences, such as worn-out vacuum tubes, improper operating voltages, blown fuses, external noises, etc. However, in order to permit the servicing of this equipment, the following procedure should be followed in determining the sources of trouble and in their correction. This has been divided into the following major divisions, with respect to the nature of the troubles being experienced:

10.3 Weak signals on all bands.
10.4 No signal on all bands "CW"—"ICW" reception satisfactory.
10.5 No signal or weak response on one or two bands, "ICW."
10.6 No signal or weak response on one or two bands "CW"—"ICW" reception satisfactory.
10.7 Alignment of IF Amplifier and CW Oscillator.
10.8 Alignment of RF Stages and First Oscillator.
10.9 Tube characteristics.
10.10 Laboratory measurements.
10.11 Lubrication.
10.12 Resetting frequency indicator dial—RF Tuner or IF-AF Amplifier.
10.13 Tuning capacitor assembly.

The chart below graphically outlines the procedure for trouble location.



OUTLINE OF TROUBLE LOCATION AND REMEDY

SECTION X

10.2 Equipment Required.

10.2-1 Few instruments other than those found on a standard test set are required in locating and correcting the most probable troubles on the Model RAB-1 receiver. These individual instruments are as follows:

10.2-1.1 A modulated test oscillator with a frequency range from 600 to 30,000 kc. with provision for calibration accuracy of 0.1% at aligning frequencies.

10.2-1.2 A high resistance multi-range D.C. voltmeter, 250 volts maximum; 1,000 ohms per volt, 1% accuracy.

10.2-1.3 Continuity tester (ohmmeter, voltmeter or phones and battery).

10.2-1.4 Output meter, rectifier type, O-3 V.

10.3 **Weak Signals on All Bands.**

10.3-1 This is the usual symptom of worn-out vacuum tubes and under most conditions it is usually the best policy to suspect the vacuum tubes as the most probable source of trouble. All radio receiving equipments are subject to a gradual falling off in performance as the vacuum tubes in use age. Due to the gradual nature of the condition it is most difficult to recognize, except by the fact that with signals of somewhat constant intensity it is found necessary to advance the Sensitivity control from time to time. In general, it is good policy to completely change vacuum tubes every thousand (1,000) hours of operation, and where possible a log may be kept of the hours of operation between tube changes to permit this to be done.

Due to the difficulty of changing tubes in this equipment it will be found most advantageous to change *all* tubes when the equipment is opened for this purpose. The tubes removed should not be arbitrarily "surveyed," but should be tested either by a measurement of "Mutual Conductance" or "Emission Current" with normal working voltages. If the "Mutual Conductance" or "Emission Current" measures less than the minimum values shown in the table of paragraph 10.9. for the respective tubes, such tubes should be "su[illegible]ed." It is good policy, after tubes have been removed and tested, to paste stickers on the glass [illegible] which should be noted the date of test and either the "Mutual Conductance" or the "Emission Current" as determined.

Certain tubes may, however, deteriorate in less than a thousand hours of operation so that it should not be arbitrarily assumed that all tubes are good because they are relatively new. As an operating test of the general condition of the equipment and tubes the following procedure may be followed:

With the leads disconnected from the antenna and ground posts on the front panel, advance the Sensitivity control to "100" (the maximum position), with the CW oscillator "On" and the AVC "Off." A high steady noise level should be heard in the phones at any setting of the "Antenna Compensation" or "Tuning" controls. With all controls set as above reduce the Sensitivity control to "Zero." A barely noticeable hum, previously inaudible over the tube noise, should be heard. Failure of these tests indicates that the receiver is inoperative and tubes should be changed before looking for trouble elsewhere.

If a reliable Standard Signal Generator is available the actual sensitivity may be tested at several points in each frequency band. If the various measured sensitivities are below 10 microvolts the tubes should be changed.

NOTE: A loss in sensitivity does not necessarily indicate that troubles other than worn-out tubes do not exist, but under any condition the tubes should be changed before disturbing any of the internal receiver adjustments.

CAUTION: Do not remove screw-on copper can coil shields except when necessary in servicing the receiver, and only under *strict* necessity should the copper can shields of the CW oscillator coil assemblies (A_4, B_4, C_4, D_4) be removed. The oscillator beat note is adjusted at the factory for most efficient operation with the band pass filter ("Audio-Sharp") which is centered at 1,000 cycles $\pm 5\%$.

If no signals are receivable with the equipment or the sensitivity is still poor after changing all vacuum tubes, proceed as follows:

Set switches and controls in IF-AF Amplifier Unit as follows:

"Audio-Broad"; "Automatic Volume-Off"; "ICW."

"Sensitivity-100"; "Frequency Vernier"-0.

Set "Frequency Band" selector controls on both Tuner and Amplifier Units for reception on 1000 to 1544 kc band. Check voltages at terminal strip on Power Unit with high resistance, multi-range D.C. voltmeter. Refer to Table I for terminal arrangement, conditions of measurement and proper voltages.

TABLE I

TERMINAL VOLTAGES POWER UNIT

All voltages measured with 1000 ohm/volt D.C. voltmeter, 250 volts maximum, from terminals to ground with internal switch in "RAB" position.

The following are the conditions for measuring these voltages: voltage supply 110-volt, 60 cycles, A.C., all tubes in sockets, "CW-ICW" switch in "ICW" position, "Automatic Volume" switch "Off" and "Sensitivity" set at "100."

Power Unit terminals numbered from left to right facing the panel. (See drawing P-701584).

Terminal No.	Cable Color Code	Use (See Schematic Diagram)	Voltages (±20%) Both Cables OFF	Tuner Cable OFF IF-AF Cable ON	Both Cables ON	IF-AF Cable OFF Tuner Cable ON
	I. F. Panel Voltmeter Readings		0	193	204	0
1	Yellow—Red Tracer	Automatic Volume Control Heater	A. C.	A. C.	A. C.	A. C.
2	Yellow—Blue Tracer	Automatic Volume Control Heater	A. C.	A. C.	A. C.	A. C.
3	Yellow	Oscillator Filament	—48	—26	—2.3	—27
4	Green—Red Tracer	Volume Bias	—110	—97	—82	—95
5	Blue	Amplifier Screen	77	75	73	81
6	Yellow—Black Tracer	Main Heater	A. C.	A. C.	A. C.	A. C.
7	Yellow—Green Tracer	Main Heater	A. C.	A. C.	A. C.	A. C.
8	Black	Ground	0	0	0	0
9	Blue—Black—50-50	Detector—Radio Frequency Screen	45	43	36	47
10	Green	Amplifier Bias	—32	—25.8	—1.7	—10.8
11	Green—Black Tracer	Volume	0	—16	—0.7	0
12	Red	Amplifier Plate	195	193	204	206
13	Red—Black—50-50	Oscillator Plate	88	87	88	88
14	Black—Yellow—50-50	Oscillator Filament	—24	—25	—1.2	—1.2
15	Shield		0	0	0	0

10.3-2 If the green wire terminal No. 10 measures considerably in excess of the value shown in Table I, the 1st oscillator filament is open, and a new tube should be tried. If other voltages fail to check, refer to 10.3-16. If voltages are correct, test Audio Amplifier as follows:

10.3-3 Touch the grid cap of the first audio tube with the finger. If a pronounced click is heard in the phones, the Audio Amplifier is operative.

10.3-4 If no response is heard, check the audio amplifier tubes and replace if defective.

10.3-5 If the audio tubes are satisfactory and the test of 10.3-3 still results in no response, remove the Audio Unit and check the wiring for shorts, open circuits, poor contacts, etc.

10.3-6 When Audio Unit is operative (as determined by 10.3-3) proceed to test i-f amplifier stages as follows: Couple the test oscillator tuned to 600 kc to the grid of the 2nd detector. A 1000-cycle beat note should be heard. If not heard, either the 2nd detector or CW oscillator is at fault. Check tubes and wiring.

IN THE FOLLOWING INSTRUCTIONS FOR TEST AND REALIGNMENT OF THE RADIO AND INTERMEDIATE FREQUENCY CIRCUITS, ALL REFERENCE TO TEST OSCILLATOR VOLTAGES PREDICATES THEIR APPLICATION WITH RESPECT TO GROUND (CASE OF EQUIPMENT). THE DEGREE OF COUPLING (*i. e.* "LOOSELY," "TIGHTLY," ETC.) PREDICATES THE RELATIVE APPLIED RADIO FREQUENCY VOLTAGES AND MAY BE OBTAINED BY THE METHOD OF COUPLING (SMALL CAPACITIES, ETC.) OR BY MEANS OF AN ADJUSTABLE ATTENUATOR ON THE TEST OSCILLATOR OR SIGNAL GENERATOR. IN ALL CASES THE TEST OSCILLATOR VOLTAGES SHOULD BE HELD TO SUCH A POINT THAT THE AUDIO OUTPUT DOES NOT EXCEED 3 VOLTS, IN ORDER TO PREVENT OVERLOADING OF ANY OF THE VACUUM TUBES, WHICH WILL MAKE PROPER ALIGNMENT IMPOSSIBLE.

10.3-7 Set the test oscillator to produce 600 kc. Couple the oscillator output to the grid of the first i-f tube and listen for a response in the phones when the oscillator is tuned near that frequency.

10.3-8 If a single, sharply tuned response is heard with loose coupling of the test oscillator, the IF-AF Amplifier Unit is functioning correctly on that particular i-f band. See 10.3-21 for procedure.

10.3-9 If a weak signal or no response is obtained, the two i-f amplifier and second detector tubes should be checked and replaced if defective. The interconnecting cable should also be checked for continuity and proper connection.

10.3-10 If the tubes and interconnecting cable are satisfactory and the test of 10.3-7 fails, remove each tube one at a time and check the voltages at the tube sockets with a high-resistance voltmeter (1,000 ohms per volt).

10.3-11 The voltages at the various socket terminals should conform to within ±20% to those shown in Table II, measured under the conditions stated therein.

TABLE II

TUBE SOCKET VOLTAGES

Tube voltages measured with 1000 ohm/volt D. C. voltmeter and measuring by taking out *one* tube at a time. All voltages measured at socket prongs to ground.

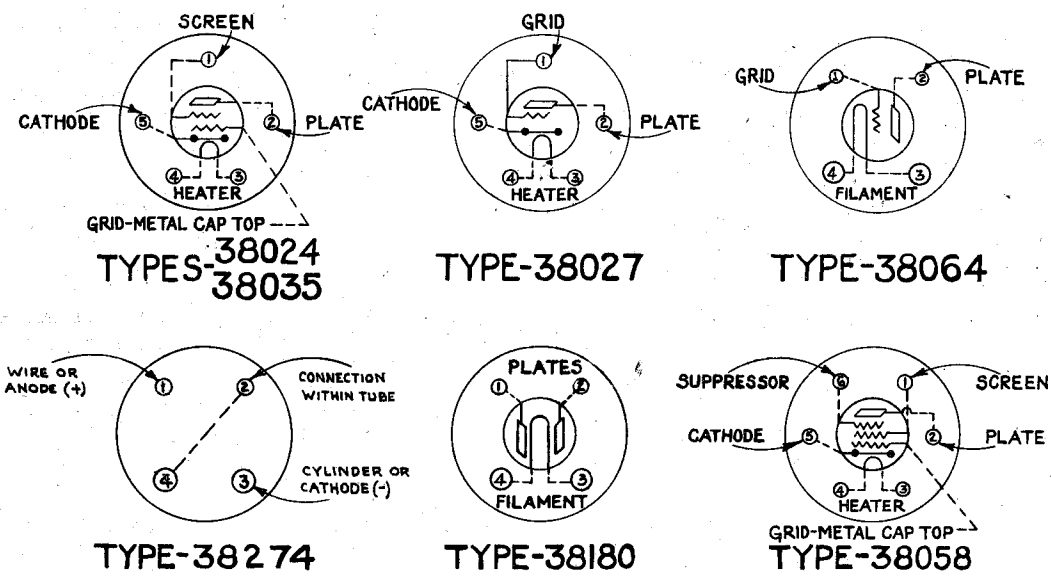
The conditions are identical with those used in Table I except "CW" instead of "ICW," AVC switch "On," "AVC" control max., all interconnecting cables on.

RF Tuner			IF AF Amplifier					
Tube	Terminal	Volts	Tube	Terminal	Volts	Tube	Terminal	Volts
1st and 2nd R. F. 38058*	Plate	190	1st I. F. 38035	Plate	190	C. W. Osc. 38064	Plate	85
	Screen Grid	85		Screen Grid	70		Control Grid	—0.1
	Control Grid	—0.1		Control Grid	—1.0			
1st Detector 38024	Plate	190	2nd I. F. 38035	Plate	190	1st A. F. 38024	Plate	160
	Screen Grid	32		Screen Grid	70		Screen Grid	35
	Control Grid	0		Control Grid	—1.0		Control Grid	—1.2
	Cathode	2						
Oscillator 38064	Plate	85	2nd Detector 38024	Plate	100	2nd A. F. 38027	Plate	200
	Grid	0		Screen Grid	32		Control Grid	0
				Control Grid	0		Cathode	5
				Cathode	3			
						A. V. C.'s 38027	Plate	0
							Control Grid	0
							Cathode	200
							Heaters	180

*Suppressor grids connected to cathodes.

NOTE: These are not the actual operating electrode potentials, being merely representative voltmeter readings. They will vary considerably with the type and scale of voltmeter employed, but are approximately correct for the following meters:

Voltages from 0 to 5 use Weston Model 301 Voltmeter, 5 volt scale—resistance 5000 ohms. Voltages from 5 to 50 and 50 to 250 use 0–50 and 0–250 volt scales, respectively, of Westinghouse Style 516583 D.C. Voltmeter; 50 volt scale—resistance 50,000 ohms, 250 volt scale—resistance 250,000 ohms.



TOP VIEW OF SOCKET CONNECTIONS OF VACUUM TUBES

10.3-12 If the tube socket voltages do not conform to those in Table II, check the particular tube circuits for open or shorted circuits, poor contacts, cold soldered joints, etc.

10.3-13 If the tube voltages check and still there is no response, throw to "ICW" and couple the modulated test oscillator adjusted to proper frequency to the grid clip of each stage progressively beginning with the second detector, and working toward the first r-f stage.

10.3-14 When the stage from which there is no response has been definitely located, check for shorted or open connections, poor contacts, i-f transformer continuity, etc.

CAUTION: In checking the continuity of the circuits of the various i-f amplifier stages it may be necessary to remove the i-f transformer coil shields. *Extreme care should be exercised not to change the setting of the various i-f tuning adjustments in order not to disturb the alignment of the tuned circuits.* This applies with equal importance to the Tuner Unit as well.

10.3-15 When the test of 10.3-7 results in a weak response, even with close coupling of the test oscillator, and the check of the tubes and socket voltages has been made without locating the trouble, the i-f alignment should be checked. (See Alignment of IF Amplifier and CW Oscillator, 10.7).

10.3-16 If the voltages at the terminal strip of the Power Unit fail to check remove the cable connection to the Tuner Unit.

10.3-17 Recheck the voltages, referring to Table I, for correct values with the tuner cable removed. If the voltages are approximately correct, the trouble is located in the tuner cable or wiring.

10.3-18 If the voltages do not check, remove the amplifier unit cable. If the voltages agree with the values of Table I for this condition, the trouble is located in the amplifier unit cable or wiring.

10.3-19 If the voltages still fail to check, test the tubes, wiring and components of the Power Unit.

CAUTION: TURN POWER "OFF." Operating personnel should bear in mind that when checking wiring of the Power Unit (power "On") the A-C voltage across the secondary of the power transformer is approximately 800 volts and the D-C voltage (center tap to rectifier filament) is approximately 300 volts.

10.3-20 With the IF-AF Amplifier Unit functioning on the 1000–1544 kc band, as determined by the tests of 10.3 to 10.3-7, replace the interconnecting cable between the IF-AF and Tuner Units.

10.3-21 Couple the modulated test oscillator to the antenna post. If a weak signal or no response is heard when the test oscillator is tuned over the 1000–1544 kc band check the tuner unit tubes.

10.3-22 If the response is still weak or missing entirely, check the voltages at the tube sockets. Refer to Table II.

10.3-23 If the tube voltages check and still there is no response, couple the modulated test oscillator to the grid clip of each stage progressively, beginning with the first detector.

10.3-24 If no response is obtained from the first detector, the oscillator circuit is defective since the detector circuit has been tested in paragraph 10.3-7.

10.3-25 When the stage from which there is no response has been definitely located, check for shorted or open connections, poor contacts, etc.

10.3-26 When the above tests fail to locate the trouble the tuner alignment should be checked. (See Alignment of RF Stages and First Oscillator, 10.8.)

10.4 No Signal on All Bands "CW"—"ICW" Reception Satisfactory.

10.4-1 Failure of "CW" reception on all bands would result from a defective CW oscillator tube (in IF-AF Amplifier) or fault in this oscillator circuit. Check tube, voltages and circuit.

10.5 No Signal or Weak Response on One or Two Bands "ICW."

10.5-1 When any band is operative the tubes and circuits in both the Tuner and the Amplifier Units for that band are functioning and the trouble is localized in the coils and contacts directly associated with the faulty bands.

10.5-2 If response is obtained on band No. 1 (1000–1544 kc), but not on band No. 2 (1544–2470 kc), or vice-versa, the trouble is located in that particular band in the Tuner Unit, since one i-f band is employed for these two tuner unit bands. Trouble location and correction is then reduced to that of 10.3-23 to 10.3-26.

10.5-3 If no response is obtained on both bands Nos. 1 and 2 (1000–1544 kc and 1544–2470 kc) both of which are associated with the same band in the IF-AF Unit, the trouble is located in that particular i-f band, and the procedure is reduced to that of sections 10.3-12—10.3-13.

10.6 No Signal or Weak Response on One or Two Bands "CW"—"ICW" Reception Satisfactory.

10.6-1 Failure of "CW" reception on two bands would result from a fault in the CW oscillator coil circuit associated with the particular i-f band.

10.6-2 Weak "CW" reception or maximum response, at some frequency other than 1000 cycles on one or two bands, indicate misalignment of the CW oscillator and the i-f band in question. (See Alignment of IF Amplifier and CW Oscillator, 10.7.)

10.7 Alignment of IF Amplifier and CW Oscillator.

10.7-1 Set the IF-AF Amplifier "Frequency Band" control on the band to be aligned and set the switches and controls as in 10.3-1, except with "CW" switch on "ICW."

10.7-2 Set the frequency of the modulated test oscillator accurately (check with frequency meter) to the intermediate frequency determined by reference to Table III and couple as loosely as possible to the proper terminal in the i-f and a-f unit interconnection box. See Drawing P-701584.

TABLE III

Band	1	2	3	4	5	6	7	8
RF Coil Assembly Designating Symbol	E	J	F	K	G	L	H	M
RF Tuner Frequency in K. C.	1000 to 1544	1544 to 2470	2470 to 3956	3956 to 6320	6320 to 10130	10130 to 16190	16190 to 24510	24510 to 30000
IF Amplifier Frequency in K. C.	600		1450		3250		7200	
IF Coil Assembly Designating Symbol	A		B		C		D	

10.7-3 Referring to Figure 5 for the location of the tuning and coupling capacitors, turn the moving cover plate on the bottom of the shielding can to expose the condenser adjusting screws in turn.

CAUTION: *Only under the most unusual circumstances will it be necessary to adjust the i-f transformer coupling condensers (c_2 on Figure 5, identified by the small adjusting screws at the centers of the copper shield coil covers) and their setting should not be disturbed in checking for slight misalignment.*

10.7-4 Adjust the i-f tuning capacitors of each stage, by means of an insulated screw driver, for maximum response as indicated by an output meter across the phones. Check the second i-f transformer first, proceeding toward the input.

10.7-5 Check the alignment of the CW oscillator after completing the tuning of the i-f circuits. This should be done by setting the modulated test oscillator on the i-f frequency as described above. Cut off the modulation and thus throw the "CW"–"ICW" switch to the "CW" position and adjust the oscillator tuning condenser c_1 (see Figure 5) for a 1000-cycle beat note with the least trimmer capacity. The "Frequency Vernier" should be set at "0" on the scale during this operation.

10.7-6 If it becomes necessary to check the adjustment of the coupling capacitors on the 1st and 2nd i-f transformers the following procedure should be followed.

10.7-7 Couple the modulated test oscillator to the grid of the 2nd i-f amplifier tube. Set the frequency accurately to the required intermediate frequency and adjust the primary and secondary tuning condensers on the 2nd i-f transformer for maximum response. Tune the test oscillator slightly above and below the desired setting and note whether or not double peak response is obtained. If a definite response is obtained on more than one frequency the coupling adjustment should be changed slightly (usually decrease capacity) and after retuning both the primary and secondary condensers with the test oscillator set on the desired frequency, check for double response in the same manner as above. If the double peaked response is still noted, but the position of the response peaks move closer together, continue the adjustment of the coupling capacitor in the same manner. It should be noted in following this procedure that the i-f transformers are so designed that the capacitive and inductive coupling are opposing. The sets have been adjusted with the coils coupled in such a way that the capacitive coupling is greater than the value required to give critical coupling. Thus a decrease in capacity coupling reduces the resultant coupling.

In adjusting the trimming and coupling capacitors *the use of some type of output meter is highly recommended.*

10.7-8 When a single peaked response is obtained with the test oscillator set on the desired frequency and both the primary and secondary condensers tuned, note the reading of the output meter (or headphone response). Slightly decrease the coupling capacity, retuning the primary and secondary condensers until the output drops approximately 5% of the previous maximum reading.

10.7-9 Proceed to adjust the 1st i-f transformer by coupling the test oscillator to the grid of the 1st i-f tube and checking the tuning of the primary and secondary condensers. Note the reading of the output meter. Slightly decrease the coupling capacity, re-checking the tuning capacitors after every adjustment, and noting the output meter reading. Continue this step by step process until the output meter shows a decided drop in response. Re-set the coupling capacitor at a value such that the output is approximately 5% below the maximum reading previously obtained, thus insuring that the coupling is slightly below critical. This completes the adjustment of the 1st i-f transformer. Loosely couple the test oscillator to the proper terminal in the junction box and tune the secondary of the input transformer for maximum response.

10.7-10 The tuning of the i-f circuit in the first detector plate circuit or i-f tuning circuit located in the Tuner Unit (refer to Figure 2) is best accomplished with the two units in operation and the test oscillator (or harmonic) tuned in on one of the two r-f bands associated with the i-f band being aligned. Adjust the tuning condenser on this coil assembly for maximum response and note the reading of the output meter. Increase the coupling capacitor on this coil assembly, re-checking the tuning condenser each time until the output reading no longer continues to rise with increased coupling. Re-set the coupling capacitor at a value just below this point to insure coupling just below critical.

NOTE: In Figure 5 (Bottom View IF-AF Unit) the coil assembly designating symbols read from the panel to the rear of the chassis (when the coil covers are removed). If any coil assembly is removed, it must be replaced so that symbols read in accordance with the above.

10.8 Alignment of RF Stages and First Oscillator.

10.8-1 If the receiver shows particularly low sensitivity on only one band when the others are functioning properly, the following procedure should be observed. Check all socket voltages as in paragraph 10.3-11 with the band change control cranked to the position of the defective band. Connect test oscillator through a blocking condenser (.001 mf. approx.) to the grid clip of the 1st r-f tube. If sensitivity appears normal, the antenna circuit coil should be checked.

10.8-2 If the sensitivity of the 1st r-f grid does not appear normal then the r-f and oscillator alignment may be checked as follows: Remove the Tuner Unit from the cabinet and place it on either side, such that the defective band coils may be reached conveniently. Replace the power cable and connect two insulated wires in place of the interconnecting cable to the IF-AF Amplifier. These wires may be several feet long if necessary to get the Tuner Unit in a convenient location. Care should be taken to connect these wires to the proper two terminals in both the Tuner Unit and the IF-AF Unit. (See Figure 9.)

10.8-3 For bands 1 to 5 inclusive, proceed as follows: Set the tuning dial at the reading given in the table below. Connect the modulated test oscillator to the antenna binding post and adjust the frequency of the oscillator until the modulated signal is heard in the output of the receiver. The signal output of the test oscillator must be kept low enough so that the receiver is not overloaded when a maximum indication is obtained. Note the frequency of the test oscillator, and if it does not correspond to that given in the table below, set the test oscillator to that given in the table and adjust the oscillator "HF" trimmer (coil No. 6) for a maximum signal indication. Next, adjust the trimmers on coil 3 and 4 (E3, E4, for band No. 1, etc.) until a maximum signal is indicated. *The receiver must not be overloaded during these adjustments.* It is advisable to use an output meter and keep the output under 3 volts by reducing the sensitivity control, or the input signal, or both. The next step is to turn the receiver frequency dial to 1.00 on the scale and adjust the frequency of the test oscillator for a resonance indication. The trimmer condenser c_f on coil 2 should then be adjusted until a maximum signal is indicated. This is the final step in the adjustment of one band. If, however, the receiver sensitivity appears to be too low at the low frequency end of the band (1.00 on the scale), remove the test oscillator and adjust the oscillator "LF" trimmer (coil 6) until a maximum "receiver noise" is obtained. After this adjustment, check the "HF" adjustment at the high frequency end of the band. It is very important to again adjust trimmer condenser c_f on coil 2, at the low frequency end of the band, using the signal from the test oscillator.

10.8-4 To align bands 6, 7 and 8 the following procedure should be followed. Set the tuning dial on 9.00 and adjust test oscillator until signal is heard. Next, adjust the trimmers on coils 3 and 4 for a maximum indication. Then set the tuning dial on 1.00 and tune the test oscillator until the signal is picked up. Next, adjust trimmer c_f on coil 2 for a maximum indication. The band is then completed. The oscillator coils on these bands have no trimmers, and have been adjusted very carefully at the factory. It should not be necessary to make any further adjustments on them.

TABLE IV

Band No.	Dial	Frequency
1	8.81	1544
2	8.91	2470
3	8.88	3956
4	8.95	6320
5	8.91	10130
6	8.96	16190 approximately
7	8.98	24510 approximately
8	8.36	30000 approximately

10.8-5 The coupling capacitors c_2 (in photographs) have been adjusted at the factory for critical coupling at the low frequency end of the bands and are of such a stable nature that a relatively large change in adjustment will not noticeably impair performance. These capacitors may be adjusted at the nominal low frequency end in the same manner as the coupling capacitors located on the i-f tuning stage in RF Tuner (10.7-10).

NOTE: In Figure 1 (Top View Tuner Unit) the coil assembly designating symbols read from the rear of the chassis looking toward the panel (when the coil covers are removed).

In Figure 2 (Bottom View Tuner Unit) the coil assembly designating symbols (when the coil covers are removed) read from the panel toward the rear of the chassis *with the exception of the IF Tuning Coils* (M5, L5, K5, and J5) which can be read only from the side (bottom to top of Figure 2). If any coil assembly is removed, it must be replaced so that the designating symbol reads in accordance with the above.

10.9 Tube Characteristics.

10.9-1 The following tabulation gives standard operating data for the tubes used. These ratings are not exceeded in the application of the equipment. The two columns at the right give the *minimum usuable* values of emission current and mutual conductance; if the tubes test less than these values they should be replaced.

Tube Type	Fil. Volts E_f	Fil. Current I_f Amps.	Plate Voltage E_b	Grid Bias E_c Volts	Plate Current I_p m. a.	Emission Current I_m m. a.	Screen Grid E_d Volts	AC Plate Resistance r_p Ohms	Mutual Conductance g_m Micromhos	Voltage Amp. Factor Mu	Minimum Usable Values *I_m m. a.	Minimum Usable Values g_m Micromhos
38058	2.5	1.0	250	—3 min.	8.2	100	100	800,000	1600	1280	50	1300
38035	2.5	1.75	180	—3 min.	6.3	100	90	300,000	1020	305	50	850
38064	6.1	0.25	90	— 4.5	2.7	30	—	14,500	610	8.2	10	530
38024	2.5	1.75	180	— 3.0	4	100	90	400,000	1000	400	50	800
38027	2.5	1.75	180	—13.5	5	100	—	9,000	1000	9.0	50	800
38274	—	—	90	—	30	—	—	—	—	—	—	—
38180	5.0	2.0	—	—	—	120	—	—	—	—	95	—
38180	A. C. Voltage per plate (RMS) 350, D. C. Output current (Max.) 125 M. A.											

*For emission test all grids are connected to the plate and are 50 volts (DC) positive with respect to the cathode or filament except the Type 38180 tube on which 40 volts is used with both plates connected together.

The above low limits indicate in general the point at which normal operation of the receivers will be impaired by low tubes, but cannot be relied on as an absolute indication of the condition of the tubes for their various applications, particularly in the case of the Type 38064 first oscillator. A low tube in this position is best indicated by the fact that it ceases to oscillate at the low frequency ends of the bands (indicated by a sudden decrease in receiver noise level as the receiver is tuned toward the low frequency end of a band). If this occurs the tube should be replaced. The second oscillator will, in general, function with a lower tube than is required in the first oscillator position. Types 38058, 38035, 38024, and 38027 may be used with considerably lower characteristics than the above without seriously affecting operation, resulting in lowered sensitivity. Low Type 38058 tubes will also occasion a decrease in signal to noise ratio. Use of Type 38180 tubes with characteristics appreciably lower than those stated above will result in the oscillators ceasing to function. The Type 38274 tube is considered objectionably low if the striking (ionizing) voltage is greater than 125 volts, the voltage drop at 10 m.a. less than 77 volts, and at 50 m.a. greater than 103 volts. A low Type 38274 tube will result in decreased frequency stability under conditions of power supply variations.

10.10 Laboratory Measurements.

10.10-1 The above information covers methods of trouble locating in the field where a standard signal generator is not available. It is highly desirable to use a signal generator for trouble location and particularly for r-f and i-f alignment. The following table shows approximate inputs to various points in the circuit required for standard output (5 milliwatts or 1.73 volts). These values of input will be found to vary considerably for different receivers, for different bands, and for different points in a particular band, but will serve as a guide as to the receiver operation. In general, the inputs required will be less than those stated if the receiver is normal.

Input to:	Microvolts (30% Mod.)
Second detector grid (intermediate frequency)	100,000
Second intermediate grid (intermediate frequency)	6,000
First intermediate grid (intermediate frequency)	400
First detector grid (intermediate frequency)	200
Second radio frequency grid (radio frequency)	50
First radio frequency grid (radio frequency)	10
Dummy antenna (radio frequency)	5

Conditions of measurement are: "ICW," "AVC-Off," "Audio-Broad," output load 600 ohms non-inductive resistance, output 5 m.w. or 1.73 volts, input CW modulated 30% at 1,000 cycles, "Sensitivity" control maximum (except for overall or measurements from the r-f stages if the receiver noise output is greater than 0.5 volt with no signal applied). In the latter case the "Sensitivity" control should be retarded until the output noise level is reduced to 0.5 volt. For overall measurement the signal should be applied to the receiver input in series with a 300 ohm non-inductive resistance dummy antenna.

CAUTION: A stopping condenser (approximately 0.5 mfd.) must be inserted between the signal generator and tube grid when applying a signal to the r-f and i-f stages to avoid burning out the signal generator attenuator and to maintain proper tube bias.

The above measurements may be made with an unmodulated signal (the receiver being set for "CW" reception). The input values will be less than those given above by a factor of between 5 and 10 except for overall or measurements from an r-f stage where it is necessary to retard the "Sensitivity" control to reduce the output noise level to 0.5 volt. In these cases the values given in the above table apply for CW as well as modulated signals.

10.11 Lubrication.

10.11-1 All mechanical moving parts such as carriage shoes, rails, condenser shafts, lead screws, and frequency band indicator pinions should be periodically inspected, cleaned and lightly greased with a non-fluid mineral oil or light grease such as Grade A of Navy Department Specification 14G1e.

CAUTION: Under no circumstances should any abrasive material such as emery cloth, steel wool, etc., be used for cleaning in or about any part of the receiver.

10.12 Resetting Frequency Indicator Dial—RF Tuner or IF-AF Amplifier.

10.12-1 If, due to the removal of the panel or for any other reason, the frequency indicator dial becomes shifted, it may be reset as follows:

Move carriage to extreme rear, against stop. With handwheel nut loosened, rotate the disc carrying the pinions (which is in back of the dial) until the "1,000 kc" line on the dial coincides with the index line on the window. Securely tighten handwheel nut. The dial will then read correctly for all positions.

10.13 Tuning Capacitor Assembly.

10.13-1 If for any reason the entire r-f tuner capacitor assembly is removed, when replaced the plates should be fully meshed and the condenser tuning shaft should be engaged with the worm with both dials set at "0." The stop for the tuning capacitor is incorporated in the indicating mechanism, not in the capacitor itself.

XI

PARTS LIST

11.1 The following parts list is included for identifying the parts of the various receiver and power unit circuits. Schematic numbers refer to part numbers shown on Schematic Diagram P-701165.

NOTE: The Audio Frequency Amplifier (AF) CRV-50024 and the Power Unit (PU) CRV-20016 of both Model RAB-1 and RAA-1 Equipments are identical and, therefore, their components have the same part numbers on their respective schematic diagrams and parts lists.

Sch. No.	Navy No.	Quantity	Location	Description	Mfg. Ref. Dwg.
1		1	T	Five-gang special tuning cap. Minimum 20±3 mmf. Maximum 159±3% each section	T-601273
2	CHC-48302	1	T	Antenna trimmer cap. Max. 100 mmf. ±5%	K-811656-P1
3	(see below)		T-IF	Compensating capacitors, for location and ratings see tables below	
2 of 3	CRV-48291	1	T	Trimmer capacitor, 10-60 mmf. each, double unit (used on Coil E_6)	K-806783-G1
3	CRV-48292	14	T-IF	Trimmer capacitors 10-60 mmf. (Used on Coils A_1, A_4, B_1, B_4, D_4, E_3, J_3, K_3, M_3, E_4, J_4, F_4, K_4, and M_4)	K-806783-G2
2 of 3	CRV-48293	6	T	Trimmer capacitors, 4–25 mmf. each, double unit (Used on Coils E_2, J_2, F_2, K_2, G_2, and L_2)	K-806783-G3
3	CRV-48294	18	T-IF	Trimmer capacitor, 4–25 mmf. (Used on Coils E_1, J_1, F_1, K_1, G_1, L_1, H_1, M_1, F_3, G_3, L_3, H_3, G_4, L_4, H_4, C_1, C_4, and D_1)	K-806783-G4
2 of 3	CRV-48295	4	T	Trimmer capacitor, 4–25 and 10–60 mmf. each, double unit (Used on Coils J_6, F_6, K_6, and G_6)	K-806784-G1
2 of 3	CRV-48296	6	T	Trimmer capacitor, 10–60 and 4–25 mmf. each, double unit (Used on Coils H_2, M_2, J_5, K_5, L_5, and M_5)	K-806784-G2
2 of 3 119	CRV-48297	4	IF	Trimmer capacitor, two 10–60 and one 3–10 mmf. each, triple unit (Used on Coils A_2, B_2, A_3, and B_3)	K-806784-G3
2 of 3 119	CRV-48298	4	IF	Trimmer capacitor, two 4–25 and one 3–10 mmf. each, triple unit (Used on Coils C_2, C_3, D_2, and D_3)	K-806784-G4
4	CAW-48201	5	T-IF	Coupling cap. Aervox No. 1455, 250 mmf. ±10%, 1000 volts DC	K-30090-P1
5A		30	T-IF	RF series capacitor. For ratings see tables below (Used on Coils M_1, M_2, M_3, M_4, J_5, K_5, E_6, J_6, F_6, K_6, G_6, L_6, H_6, M_6, A_1, A_2, A_3, A_4, B_1, B_2, B_3, C_1, C_2, C_3)	
6	CRV-48231	41	T-IF-PU	By-pass capacitor (one side gnd.) 0.01 mfd. ±10%, (Tested at 700 V., 500 cycles A. C.)	P-32170-G11
6A	CRV-48175	5	T-PU	Cap.—Same as Item 6, except not grounded	P-32170-G13
				For location see table of tuner coils below.	
7A, 7B 7C, 7D	*	33		By-pass cap. 0.1 mfd. ±10%, 300 volts, DC	
	*CRV-48233	5		3 of Item 7A in one case	M-64575-G1
	*CRV-48234	2		3 of item 7B in one case	M-64575-G2
	*CRV-48235	3		2 of item 7C in one case	M-66000-G1
	*CRV-48236	3		2 of item 7D in one case	M-66000-G2
8	CBZ-63288	5	T-IF	Carbon resistor, 1 watt, 1 megohm ±10%	K-804224-P12
9	CRV-38305	2	T	Tube socket, 6 prong	K-806695-G2

TUNER COIL ASSEMBLIES

With reference to schematic diagram P-701165, the coil assemblies in the Tuner CRV-46035 and the IF-AF Amplifier CRV-50023 for each frequency band are indicated within the variable contact points designated by arrowheads terminating at small circles. These variable sections are enclosed by screw-on copper can shields. Units comprising the various assemblies differ and only the most complicated L & C arrangements are shown on this diagram. Items actually comprising the coil assemblies for any and all bands are tabulated below.

The r-f coils are marked E1, E2, E3, E4, E6; J1, etc.; F1, etc.; K1, etc.; G1, etc.; L1, etc.; H1, etc.; and M1, etc., as shown in Figures 1 and 2. Note that all the E, F, G and H coils are on the top plate (Figure 1) and the J, K, L and M coils are on the bottom plate (Figure 2). Coils having the same letter comprise a complete set of r-f coils for one frequency band, and the numerical designation following the letter indicates the function of the particular assembly. For example, E1 is the antenna coupling coil assembly for the 1000–1544 kc band, E2 is the first r-f grid coil assembly, E3 is the second r-f grid coil assembly, E4 is the first detector grid coil assembly and E6 is the first oscillator coil assembly, all for the 1000–1544 kc band. The coils for the remaining frequency bands are arranged similarly and in accordance with Table III. It should be noted that only coils J, K, L and M appear with the number 5 following. These represent the first i-f coil assemblies, which are located in the tuner unit. Referring to Table III it is seen that J5 also covers E5, K5 covers F5 and so on, since all i-f coil assemblies cover two r-f bands.

NOTE: Numbers on isolantite coil tubes (both Tuner and IF Amplifier) are for manufacturing reference only and should not be used in referrring to the coil assemblies.

COIL				TRIMMER CAPACITORS				TOOTHPICK CAPACITORS				
Coil Assem. Desig. Symbol	Sch. No.	Coil Winding Drawing	Ind. Microhen at 1 KC	Sch. No.	Drawing No.	Cap. mmf. (max.)	Navy No.	Sch. No.	Drawing No.	Cap. mmf.	Navy No.	Coil Assem. Drawing
E1	10	P-701519-P1	169.3 (200 kc)	3	K-806783-G4	25	CRV-48294	...	.....	.....	.....	M-401868-G1
J1	10	P-701519-P5	68.2 (200 kc)	3	K-806783-G4	25	CRV-48294	...	.....	.....	.....	M-401871-G1
F1	10	P-701519-P6	25.2	3	K-806783-G4	25	CRV-48294	...	.....	.....	.....	M-401871-G2
K1	10	P-701519-P2	9.0	3	K-806783-G4	25	CRV-48294	...	.....	.....	.....	M-401868-G2
G1	10	P-701519-P7	3.1	3	K-806783-G4	25	CRV-48294	...	.....	.....	.....	M-401883-G1
L1	10	P-701519-P3	1.5	3	K-806783-G4	25	CRV-48294	...	.....	.....	.....	M-401868-G3
H1	10	P-701519-P4	3 turns	3	K-806783-G4	25	CRV-48294	...	.....	.....	.....	M-401868-G4
M1	10	P-701519-P8	2½ turns	3	K-806783-G4	25	CRV-48294	5A	K-35912-P5	220±2%	CRV-48322	K-806796-G1
E2	11	K-806796-G1	167.5 (200 kc)	3	K-806783-G3	25–25	CRV-48293	...	.....	.....	.....	M-401869-G1
J2	11	P-701519-P9	67.3 (200 kc)	3	K-806783-G3	25–25	CRV-48293	...	.....	.....	.....	M-401869-G2
F2	11	P-701519-P10	25.2	3	K-806783-G3	25–25	CRV-48293	...	.....	.....	.....	M-401869-G3
K2	11	P-701519-P11	9.0	3	K-806783-G3	25–25	CRV-48293	...	.....	.....	.....	M-401869-G4
G2	11	P-701519-P13	3.1	3	K-806783-G3	25–25	CRV-48293	...	.....	.....	.....	M-401870-G1
L2	11	P-701519-P23	1.5	3	K-806783-G3	25–25	CRV-48293	...	.....	.....	.....	K-806793-G1
H2	11	P-701519-P12	3 turns	3	K-806784-G2	60–25	CRV-48296	...	.....	.....	.....	K-806793-G2
M2	11	K-806792-G1	2½ turns	3	K-806784-G2	60–25	CRV-48296	5A	K-35912-P5	220±2%	CRV-48322	K-806792-G1
E3	12	P-701519-P18	169.2 (200 kc)	3	K-806783-G2	60	CRV-48292	...	.....	.....	.....	M-401867-G1
J3	12	P-701519-P22	67.6 (200 kc)	3	K-806783-G2	60	CRV-48292	...	.....	.....	.....	M-401867-G2
F3	12	P-701519-P16	24.9	3	K-806783-G4	25	CRV-48294	...	.....	.....	.....	M-401867-G3
K3	12	P-701519-P17	8.9	3	K-806783-G2	60	CRV-48292	...	.....	.....	.....	M-401867-G4
G3	12	P-701519-P14	3.2	3	K-806783-G4	25	CRV-48294	6A	P-32170-G13	.01 mfd	CRV-48175	M-401873-G1
L3	12	P-701520-P2	1.4	3	K-806783-G4	25	CRV-48294	...	.....	.....	.....	M-401873-G4
H3	12	P-701520-P5	3 turns	3	K-806783-G4	25	CRV-48294	...	.....	.....	.....	M-401874-G1
M3	12	K-806792-G1	2 turns	3	K-806783-G2	60	CRV-48292	5A	K-35912-P5	220±2%	CRV-48322	K-806795-G1
E4	13	P-701519-P19	169.2 (200 kc)	3	K-806783-G2	60	CRV-48292	...	.....	.....	.....	K-806791-G1
J4	13	P-701519-P20	68.4 (200 kc)	3	K-806783-G2	60	CRV-48292	...	.....	.....	.....	K-806791-G2
F4	13	P-701519-P21	24.9	3	K-806783-G2	60	CRV-48292	...	.....	.....	.....	K-806791-G3
K4	13	P-701519-P15	9.0	3	K-806783-G2	60	CRV-48292	...	.....	.....	.....	K-806791-G4
G4	13	P-701520-P1	3.4	3	K-806783-G4	25	CRV-48294	6A	P-32170-G13	.01 mfd	CRV-48175	M-401873-G2
L4	13	P-701520-P2	1.4	3	K-806783-G4	25	CRV-48294	...	.....	.....	.....	M-401873-G3
H4	13	P-701520-P5	3 turns	3	K-806783-G4	25	CRV-48294	...	.....	.....	.....	M-401874-G2
M4	13	K-806800-G1	2 turns	3	K-806783-G2	60	CRV-48292	6A 5A	P-32170-G13 K-35912-P5	.01 mfd 220±2%	CRV-48175 CRV-48322	K-806800-G1
J5	33	P-701520-P3	330	3	K-806784-G2	60–25	CRV-48296	5A	K-35912-P9	110±5%	CRV-48326	M-401875-G1
K5	33	P-701520-P8	58.4	3	K-806784-G2	60–25	CRV-48296	5A	K-35912-P6	155±5%	CRV-48323	M-401876-G1
L5	33	P-701520-P9	36 turns	3	K-806784-G2	60–25	CRV-48296	...	.....	.....	.....	M-401876-G2
M5	33	P-701520-P10	15 turns	3	K-806784-G2	60–25	CRV-48296	...	.....	.....	.....	M-401876-G3
E6	14 15 16	P-701520-P4	83 (200 kc) 3.9 (200 kc) 12.2 (200 kc)	3	K-806783-G1	60–60	CRV-48291	5A	K-35912-P4	345±5%	CRV-48321	M-401878-G1
J6	14 15 16	P-701520-P6	42.1 (200 kc) 3.5 (200 kc) 6.7 (200 kc)	3	K-806784-G1	25–60	CRV-48295	5A	K-35912-P1	540±5%	CRV-48318	M-401879-G1
F6	14 15 16	P-701520-P11	12.5 3½ turns 5 turns	3	K-806784-G1	25–60	CRV-48295	5A	K-35912-P4	345±5%	CRV-48321	M-401880-G1
K6	14 15 16	P-701520-P7	5.6 4 turns 2.4	3	K-806784-G1	25–60	CRV-48295	5A	K-35912-P1	540±5%	CRV-48318	M-401881-G1
G6	14 15 16	P-701519-P24	1.85 3½ turns 3 turns	3	K-806784-G1	25–60	CRV-48295	5A	K-35912-P3	400±5%	CRV-48320	M-401882-G1
L6	14 15 16	See K-806797-G1	3½ turns 3 turns 3 turns	...	.....	....	.....	5A	K-35912-P2	500±5%	CRV-48319	K-806797-G1
H6	14 15 16	See K-806799-G1	2 turns 2 turns 1 turn	...	.....	....	.....	5A	K-35913-P1 Code Marking "A"	400±2%	CRV-48316	K-806799-G1
M6	14 15 16	See K-806798-G1	1 turn 2 turns 0 turn	...	.....	....	.....	5A	K-35913-P2 Code Marking "B"	154±2%	CRV-48317	K-806798-G1
...	..	.....	Coil Covers	...	37 required	5 1/32" long	Dwg. K-806746-G2	...				
...	..	.....	Coil Covers	...	7 required	3 3/32" long	Dwg. K-806746-G3	...				

NOTE: Specify coil base as follows: Base for Coil Assembly M-401873-G2, etc.

Sch. No.	Navy Number	Quan.	Location	Description	Mfg. Ref. Dwg.
17	CRV-48244	1	PU	By-pass capacitor (CP-95) 2 mf +25% −10%, 300 V. DC.	M-64574-G1
18	*	6	IF-AF	By-pass capacitor 1.5 mfd. +25% −10%, 300 V. DC.	.....
	*CRV-48049	2	IF-AF	3 of Item 18 in one case	M-66005-G1
19	CRV-38301	4	AF	5 prong tube socket	M-401806-G2
19A	CRV-38300	4	T-IF	5 prong tube socket	K-806695-G1
20	CEN-38002 (38311)	3	PU	4 prong tube socket	K-7859721-P5
20A	CRV-38201 (38303)	2	T-IF	4 prong tube socket (oscillators)	K-7859620-G2
21	.....	3	T-IF	RF choke coil (68 turns) IF / T	K-806734-G1 / K-806729-G2
22	CBZ-63288	1	AF	Grid leak resistor, 1 watt, 50000 ohms ±10%	K-804224-P17
23	.....	1	T	Antenna-ground terminal assembly	K-806762-G1
24	CBZ-63288	1	T	Resistor, 1 watt, 25000 ohms ±10%	K-804224-P13
25	CBZ-63288	15	T-IF-PU	Resistor, 1 watt, 10,000 ohms ±10%	K-804224-P9
27	CRV-48232	2	IF	Capacitor, 42 mmf. ±10%, (Tested at 700 V., 500 cycles A. C.)	P-32170-G12
28	CRV-48240	1	IF	Capacitor, 1 mfd. +25% −10%, 300 V. DC.	M-66003-G2
29	CRV-48238	1	IF	Capacitor, .05 mfd. ±10%, 300 V. DC.	M-66002-G2
30	CBZ-63288	1	AF	Bias resistor, 1 watt, 3000 ohms ±10%	K-804224-P20
31	CBZ-63288	2	IF-AF	Resistor, 1 watt, 250000 ohms ±10%	K-804224-P15
32	CSM-63246	1	IF	Resistor, 4.40 ohms ±5%, .5 watt	K-806712-P1

IF COIL ASSEMBLIES

The following is inserted as a guide to locating parts of the various i-f coil assemblies. These coils are marked A1, A2, A3, A4; B1, etc., C1, etc., and D1, etc., as shown in Figure 5. Coils of the same letter comprise a complete set of i-f coils for one frequency, and the numerical designation following the letter indicates the function of the particular assembly. For example, A1 indicates the coupling coil assembly for the 600 kc band, A2 is the first i-f transformer for the same frequency, A3 is the second i-f transformer and A4 is the CW oscillator coil assembly for the 600 kc band. The "B" coils cover like functions for the 1450 kc band, "C" coils are for the 3250 kc band and "D" coils for the 7200 kc band as indicated in Table III.

COIL				TRIMMER CAPACITORS				TOOTHPICK CAPACITORS				
Coil Assem. Desig. Symbol	Sch. No.	Coil Winding Drawing	Ind. Microhen at 1 KC	Sch. No.	Drawing No.	Cap. mmf. (max.)	Navy No.	Sch. No.	Drawing No.	Cap. mmf.	Navy No.	Coil Assem Drawing
A1	33A, 34	P-701514-P1	37, 327	3	K-806783-G2	60	CRV-48292	5A	K-35912-P6	155±5%	CRV-48323	M-401851-G1
A2	35, 36	P-701514-P8	303, 318.5	3, 119	K-806784-G3	60–60, 10	CRV-48297	5A	" (2)	155±5%	CRV-48323	M-401854-G1
A3	37, 38	P-701514-P8	303, 318.5	3, 119	K-806784-G3	60–60, 10	CRV-48297	5A	" (2)	155±5%	CRV-48323	M-401855-G1
A4	39, 40, 41	P-701514-P9	301.0, 10.6, 60.8	3	K-806783-G2	60	CRV-48292	5A	" (1)	155±5%	CRV-48323	M-401858-G1
B1	33A, 34	P-701514-P2	12.9, 75	3	K-806783-G2	60	CRV-48292	5A	K-35912-P8	125±5%	CRV-48325	M-401852-G1
B2	35, 36	P-701514-P5	74.4, 76.7	3, 119	K-806784-G3	60–60, 10	CRV-48297	5A	" (2)	125±5%	CRV-48325	M-401853-G1
B3	37, 38	P-701514-P5	74.4, 76.7	3, 119	K-806784-G3	60–60, 10	CRV-48297	5A	" (2)	125±5%	CRV-48325	M-401850-G1
B4	39, 40, 41	P-701514-P10	74.4, 6.09, 14.3	3	K-806783-G2	60	CRV-48292	116	K-35912-P7	130±5%	CRV-48324	M-401856-G1
C1	33A, 34	P-701514-P3	2.4, 32.9	3	K-806783-G4	25	CRV-48294	5A	K-35912-P12	35±5%	CRV-48329	M-401852-G2
C2	35, 36	P-701514-P6	29.95, 31.1	3, 119	K-806784-G4	25–25, 10	CRV-48298	5A	" (2)	35±5%	CRV-48329	M-401853-G2
C3	37, 38	P-701514-P6	29.95, 31.1	3, 119	K-806784-G4	25–25, 10	CRV-48298	5A	" (2)	35±5%	CRV-48329	M-401850-G2
C4	39, 40, 41	P-701514-P11	22.5, 2.53, 3.85	3	K-806783-G4	25	CRV-48294	116	K-35912-P10	70±5%	CRV-48327	M-401856-G2
D1	33A, 34	P-701514-P4	3.8, 16.25	3	K-806783-G4	25	CRV-48294	...	.....	.....	.....	M-401852-G3
D2	35, 36	P-701514-P7	13.27, 14.7	3, 119	K-806784-G4	25–25, 10	CRV-48298	...	.....	.....	.....	M-401853-G3
D3	37, 38	P-701514-P13	12.32, 14.50	3, 119	K-806784-G4	25–25, 10	CRV-48298	...	.....	.....	.....	M-401850-G3
D4	39, 40	P-701514-P12	4.93, 1.8	3	K-806783-G2	60	CRV-48292	117, 116	K-35912-P1, K-35912-P11	540±5%, 40±5%	CRV-48318, CRV-48328	M-401857-G1
...	..	.....	Coil Covers	...	16 required	$5\frac{21}{32}$" long	Dwg. K-806746-G1	...				

Note: Specify coil base as follows: Base for Coil Assembly M-401851-G1, etc.

Sch. No.	Navy Number	Quan.	Location	DESCRIPTION	Mfg. Ref. Drawing
42	*	1	IF	Plate reactor 2.0 mh ± 10%	K-806732-P5
43	*	1	IF	Plate reactor 83.5 mh ± 10%	K-806732-P3
	*CRV-47041	1	IF	Items 42 and 43 in one case	K-806732-G1
45	CG-24002	1	IF	Toggle switch, SPDT, CW-ICW	K-30066-P5
46	CWC-63247	1	IF	Volume Control 25000 ohms ±15%	K-806741-P2
47	CBZ-63291	3	IF-AF	Resistor, 1 watt, 30000 ohms ±5%	K-804224-P6
48	CRV-30019	2	IF-AF	Interstage transformer, RT-152, 35.7-1 ratio. Prim. imp. at 60 cycles–453 ohms	M-400361-G1
49	CG-24003	1	IF	Audio-broad-sharp toggle switch DPDT	K-30066-P6
50-54	CRV-53001	1	IF	Low pass filter	P-64915-G1
55-66	CRV-53010	1	IF	Band pass filter unit	P-64971-G1
67		1	T	Terminal board, 6 terminals	K-806716-G2
68		1	IF	Terminal board, 6 terminals	K-806716-G1
69	CBZ-63288	1	AF	Plate resistor, 1 watt, 80000 ohms ±10%	K-806370-P3
70	CBZ-63288	1	AF	Grid resistor, 1 watt, 500000 ohms ±10%	K-804224-P4
71	CAW-48202	1	AF	Audio coupling capacitor, .002 mf. ±10%, 1000 V. DC.	K-30095-P1
73	CRV-30020	1	AF	Output transformer, RT-155, 5.45-1 ratio. Primary imp. at 60 cycles 3760 ohms	M-400360-G1
76	CRV-30018	1	AF	AVC transformer, RT-147, 28-1 ratio. Primary impedance at 60 cycles–3600 ohms	M-31413-G1
77	CWC-63244	1	AF	AVC level potentiometer, 20000 ohms ±10%, tapered, 1000 ohms first quarter turn	K-80674J-P1
78	CG-24000	2	AF-PU	Toggle switch, SPST	K-30066-P3
82	CRV-48239	2	PU	Line filter by-pass capacitor 1.0 mfd. +25 −10%, 300 V. DC.	M-66003-G1
83		2	PU	HF line filter inductance:	
				1st section	P-701203-G1
				2nd section	P-701203-G2
84	30381	1	PU	Line filter	P-701203-G3
86	CRV-~~30017~~	1	PU	Power transformer RT-146	M-31412-G1
87	CRV-48242	1	PU	By-pass capacitor CP-93 0.1 mfd. ±10%, 1000 V. DC.	M-64573-G1
88	CRV-48243	1	PU	By-pass capacitor CP-94 10 mfd. ±10%, 400 V. DC.	P-64919-G1
89	CRV-30015	1	PU	Filter reactor, RT-144 imp. 3430 ohms at 60 cycles	M-31411-G1
90	CRV-30016	1	PU	Filter reactor, RT-145 Imp. 3430 ohms at 60 cycles	M-31411-G2
92	22124	1	IF	Voltmeter, 250 volts full scale, 200 ohms/volt	M-31018-P1
93	63271	1	PU	3000 ohm section; 7500 ohm section; 2000 ohm section; 3000 ohm section — Vitreous enameled resistor 15500 ohms ± 5% tapped at 3000, 10500, and 12500 ohms, 450 volts	K-30067-P1
94					
95					
96					
97	63272	1	PU	110 ohm section; 40 ohm section; 70 ohm section; 177 ohm section; 8.8 ohm section — Vitreous enameled resistor 405.8 ohms ± 5% tapped at 8.8, 118.8, 158.8, and 228.8 ohms, 100 watts	K-30068-P1
98					
99					
100					
101					
103	63273	1	PU	Vitreous enameled resistor 1144 ohms ±5%, 100 watts	K-30069-P1
108		1	T	Terminal board, 10 terminals	K-806715-G1
109		1	PU	Terminal board, 15 terminals	M-401441-G1
110		1	IF	Terminal board, 17 terminals (and Items 24, 32)	K-806711-G1
115		1	T	Antenna-ground shielded, flexible cable	K-806834-G1
116		3	IF	Capacitor (used on Coils B4, C4, D4 only) (See table of IF coils)	
117	CRV-48318	1	IF	Capacitor 540 mmf. ±5% (used on coil D4 only)	K-35912-P1
118	CHC-48301	1	IF	Oscillator frequency vernier capacitor 100 mmf.	K-806726-P1
119		8	IF	Coupling capacitor, 3-10 mmf. (See table of IF coils)	
204	CG-24001	1	PU	Power Switch, DPST toggle	K-30066-P4
205	28000	2	PU	Cartridge fuse, 5 amp.	K-811485-P1
206		1	T-IF	Interconnecting cable	M-401567-G1
207		1	PU-IF-AF	Power cable (shielded)	P-701535-G1
208		1	PU-T	Power cable (shielded)	M-401897-G1
	The following mounting accessories are shown on Outline Drawing P-701352.				
209		16	T-IF	Shock absorber for mounting	K-806699-P1
210		8	T-IF	Bolt to secure cabinets, shock absorber and washer to table	K-806306-P1
211		16	T-IF	Nut, 2 on each bolt, one to tighten and one to lock	K-59158-P60
212		8	T-IF	Washer, bears on each shock absorber	K-806304-P1
213		4	T-IF	Cap screw to hold T-IF cabinets together	K-59286-P53
214		8	T-IF	Washer—two on each cap screw	K-57428-P74
215		4	T-IF	Lockwasher—one on each cap screw	K-59048-P36
216		4	T-IF	Hex. nut, one on each cap screw	K-57435-P59
218		2	T-IF	Cable clamp (attached to cables, items 207, 208)	K-806705-G1
219		2	T-IF	Cable clamp nut (attached to cables, items 207, 208)	K-59149-P60
220		2	T-IF	Washer	K-57428-P56
221		6	T-IF	Lockwasher	K-59049-P68
222		4	T-IF	Nut	K-59149-P52
223		2	T-IF	Machine screw	K-59150-P63
224		2	T-IF	Terminal	K-7800182-P1
225		4	PU	Washer for mounting	K-806203-P1

XII

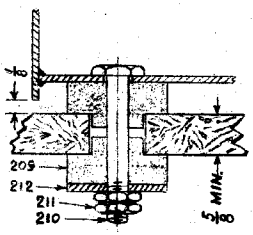
SPARE PARTS

12.1 The following items are included in each Model RAB-1 spare parts box.

Schematic diagram numbers refer to part numbers shown on Schematic Diagram P-701165.

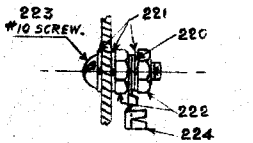
Qty.	Navy Type No.	Schematic Diag. No.	DESCRIPTION	Mfg. Ref. Drawing	Mfg. Type No.
1	-22124	92	Voltmeter, 250 volts full scale, 200 ohms/volt	M-31018-P1	
1	CG-24000	78	Toggle switch (SPST)	K-30066-P3	
1	CG-24001	204	Toggle switch (DPST)	K-30066-P4	
1	CG-24002	45	Toggle switch (SPDT)	K-30066-P5	
1	CG-24003	49	Toggle switch (DPDT)	K-30066-P6	
2	-28000	205	Cartridge fuse, 5 amp.	K-811485-P1	
1	CRV-30018	76	AVC transformer, ratio 28:1. Primary impedance at 60 cycles—3600 ohms	M-31413-G1	RT-147
1	CRV-30019	48	Input transformer, ratio 35.7:1. Primary impedance at 60 cycles—453 ohms	M-400361-G1	RT-152
1	CRV-30020	73	Output transformer, ratio 5.45:1. Primary impedance at 60 cycles—3760 ohms	M-400360-G1	RT-155
2	CEN-38002 (38311)	20	Tube socket (UX for PU)	K-7859721-P5	
1	CRV-38201 (38303)	20A	Tube socket (UX)	K-7859620-G2	
2	CRV-38300	19A	Tube socket (UY)	K-806695-G1	
2	CRV-38301	19	Tube socket (UY)	M-401806-G2	
1	CRV-38305	9	Tube socket, 6-prong	K-806695-G2	
1	CRV-48049	3 of 18	Paper capacitor 3-1.5 mfd. units in one case, +25%, −10%, 300 V. DC.	M-66005-G1	
3	CRV-48175	6A	Capacitor, 0.01 mfd. ±10% (Tested at 700 V., 500 cycles AC.)	P-32170-G13	Model T
3	CAW-48201	4	Capacitor, 250 mmf. ±10%, 1000 V. DC.	K-30090-P1	Aerovox 1455
1	CAW-48202	71	Audio coupling capacitor, .002 mfd. ±10%, 1000 V. DC.	K-30095-P1	
21	CRV-48231	6	Capacitor, 0.01 mfd. ±10% (Tested at 700 V., 500 cycles AC.)	P-32170-G11	Model T
1	CRV-48232	27	Capacitor, 42 mmf. ±10% (Tested at 700 V., 500 cycles AC.)	P-32170-G12	Model T
3	CRV-48233	3 of 7A	Paper capacitor, 0.1-0.1-0.1 mfd. ±10% each, 300 V. DC.	M-64575-G1	
1	CRV-48234	3 of 7B	Paper capacitor, 0.1-0.1-0.1 mfd. ±10% each, 300 V. DC.	M-64575-G2	
2	CRV-48235	2 of 7C	By-pass capacitor, 0.1-0.1 mfd. ±10% each, 300 V. DC.	M-66000-G1	
2	CRV-48236	2 of 7D	By-pass capacitor, 0.1-0.1 mfd. ±10% each, 300 V. DC.	M-66000-G2	
1	CRV-48238	29	Paper capacitor, 0.05 mfd. ±10%, 300 V. DC.	M-66002-G2	
1	CRV-48239	82	Paper capacitor, 1 mfd. +25% −10%, 300 V. DC.	M-66003-G1	
1	CRV-48240	28	Paper capacitor, 1 mfd. +25% −10%, 300 V. DC.	M-66003-G2	
1	CRV-48242	87	Paper capacitor, 0.1 mfd. ±10%, 1000 V. DC.	M-64573-G1	CP-93
1	CRV-48243	88	Paper capacitor, 10 mfd. ±10%, 400 V. DC.	P-64919-G1	CP-94
1	CRV-48244	17	By-pass capacitor, 2 mf. +25% −10%, 300 V. DC.	M-64574-G1	CP-95
1	CRV-48316	5A	Capacitor, 400 mmf. ±2%. (Used on Coil H6) (Code marking "A")	K-35913-P1	Model G
1	CRV-48317	5A	Capacitor, 154 mmf. ±2%. (Used on Coil M6) (Code marking "B")	K-35913-P2	Model G
2	CRV-48318	5A, 117	Capacitor, 540 mmf. ±5%. (Used on Coils J6, K6, D4)	K-35912-P1	Model G
1	CRV-48319	5A	Capacitor, 500 mmf. ±5%. (Used on Coil L6)	K-35912-P2	Model G
1	CRV-48320	5A	Capacitor, 400 mmf. ±5%. (Used on Coil G6)	K-35912-P3	Model G
1	CRV-48321	5A	Capacitor, 345 mmf. ±5%. (Used on Coil E6, F6)	K-35912-P4	Model G
2	CRV-48322	5A	Capacitor, 220 mmf. ±2%. (Used on Coils M1, M2, M3, M4)	K-35912-P5	Model G
4	CRV-48323	5A	Capacitor, 155 mmf. ±5%. (Used on Coils K5, A1, A2, A3, A4)	K-35912-P6	Model G
1	CRV-48324	116	Capacitor, 130 mmf. ±5%. (Used on Coil B4)	K-35912-P7	Model G
3	CRV-48325	5A	Capacitor, 125 mmf. ±5%. (Used on Coils B1, B2, B3)	K-35912-P8	Model G
1	CRV-48326	5A	Capacitor, 110 mmf. ±5%. (Used on Coil J5)	K-35912-P9	Model G
1	CRV-48327	116	Capacitor, 70 mmf. ±5%. (Used on Coil C4)	K-35912-P10	Model G
1	CRV-48328	116	Capacitor, 40 mmf. ±5%. (Used on Coil D4)	K-35912-P11	Model G
3	CRV-48329	5A	Capacitor, 35 mmf. ±5%. (Used on Coils C1, C2, C3)	K-35912-P12	Model G
1	CWC-63244	77	AVC level potentiometer, 20,000 ohms, ±10%, tapered, 1000 ohms first quarter turn	K-806741-P1	
1	CSM-63246	32	Resistor 4.4 ohms ±5%, 1/2 watt	K-806712-P1	
1	CWC-63247	46	Volume control potentiometer, 25,000 ±15%	K-806741-P2	
1	-63271	93, 94, 95, 96	Resistor (vitreous) 15,500 ohms ±5%, tapped at 3000, 10,500 and 12,500 ohms; 450 volts	K-30067-P1	
1	-63272	97, 98, 99, 100, 101	Resistor (vitreous) 405.8 ohms ±5%, tapped at 8.8, 118.8, 158.8 and 228.8 ohms; 100 watts	K-30068-P1	
1	-63273	103	Resistor (vitreous) 1144 ohms ±5%, 100 watts	K-30069-P1	
1	CBZ-63288	30	Resistor, 1 watt, 3000 ohms ±10%	K-804224-P20	
8	CBZ-63288	25	Resistor, 1 watt, 10,000 ohms ±10%	K-804224-P9	
1	CBZ-63288	24	Resistor, 1 watt, 25,000 ohms ±10%	K-804224-P13	
1	CBZ-63288	22	Resistor, 1 watt, 50,000 ohms ±10%	K-804224-P17	
1	CBZ-63288	69	Resistor, 1 watt, 80,000 ohms ±10%	K-806370-P3	
1	CBZ-63288	31	Resistor, 1 watt, 250,000 ohms ±10%	K-804224-P15	
1	CBZ-63288	70	Resistor, 1 watt, 500,000 ohms ±10%	K-804224-P4	
3	CBZ-63288	8	Resistor, 1 watt, 1 megohm ±10%	K-804224-P12	
2	CBZ-63291	47	Resistor, 1 watt, 30,000 ohms ±5%	K-804224-P6	

The following spare vacuum tubes are packed in a separate carton:
1-38274, 2-38180, 2-38064, 2-38058, 2-38035, 3-38027 and 3-38024.

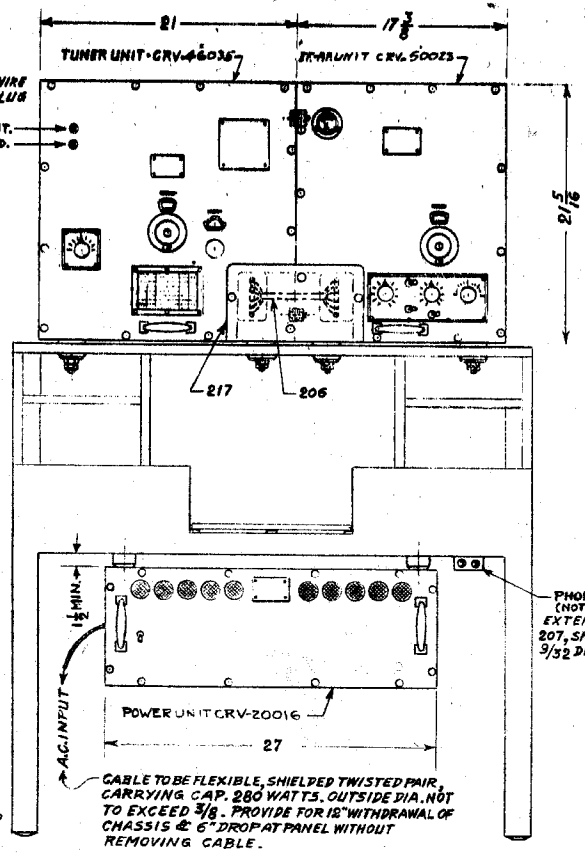


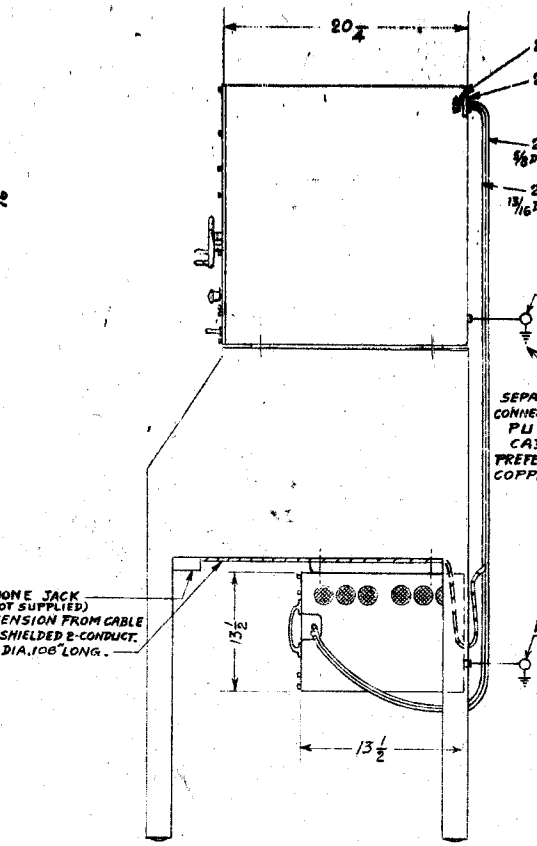
SECTION SHOWING INTERLOCKING OF UNITS.

SECTION THRU CABINET MOUNTING.

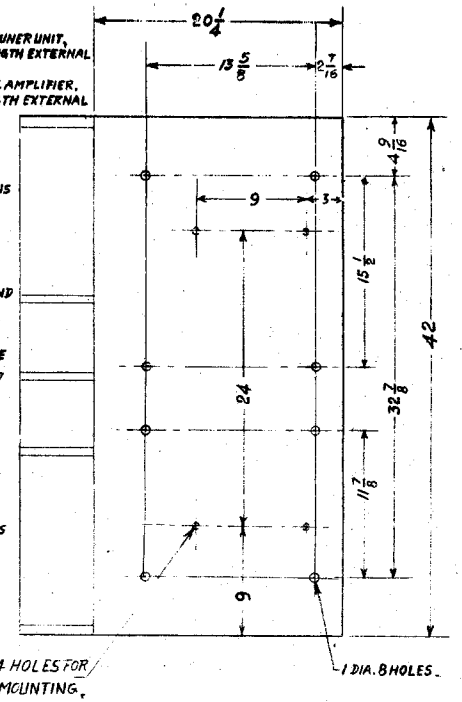


SECTION THRU GROUND TERMINAL FOR TUNER & P.U. CABINETS.





OUTLINE H.F. RECEIVER & MOUNTING CLASS II - NAVY TYPE RAB-1

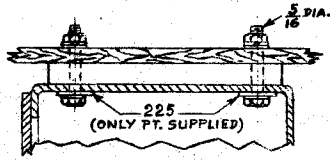


DRILLING PLAN OF DESK.

ITEM	MFG. DESIGNATION	REFER TO
206	M-401567, G-1	P-701165
207	P-701535, G-1	
208	M-401897, G-1	
209	K-806699	INSTR. BOOK.
210	K-806306	
211	K-59158, P-60	
212	K-806304	
213	K-59286, P-53	
214	K-57428, P-74	
215	K-59048, P-36	
216	K-57435, P-59	
217	M-401835, G-1	
218	K-806705, G-1	
219	K-59149, P-60	

ITEM	MFG. DESIGNATION	REFER TO
220	K-57428, P-56	INSTR. BOOK.
221	K-59049, P-68	
222	K-59149, P-52	
223	K-59150, P-63	
224	K-7800182	
225	K-806203	

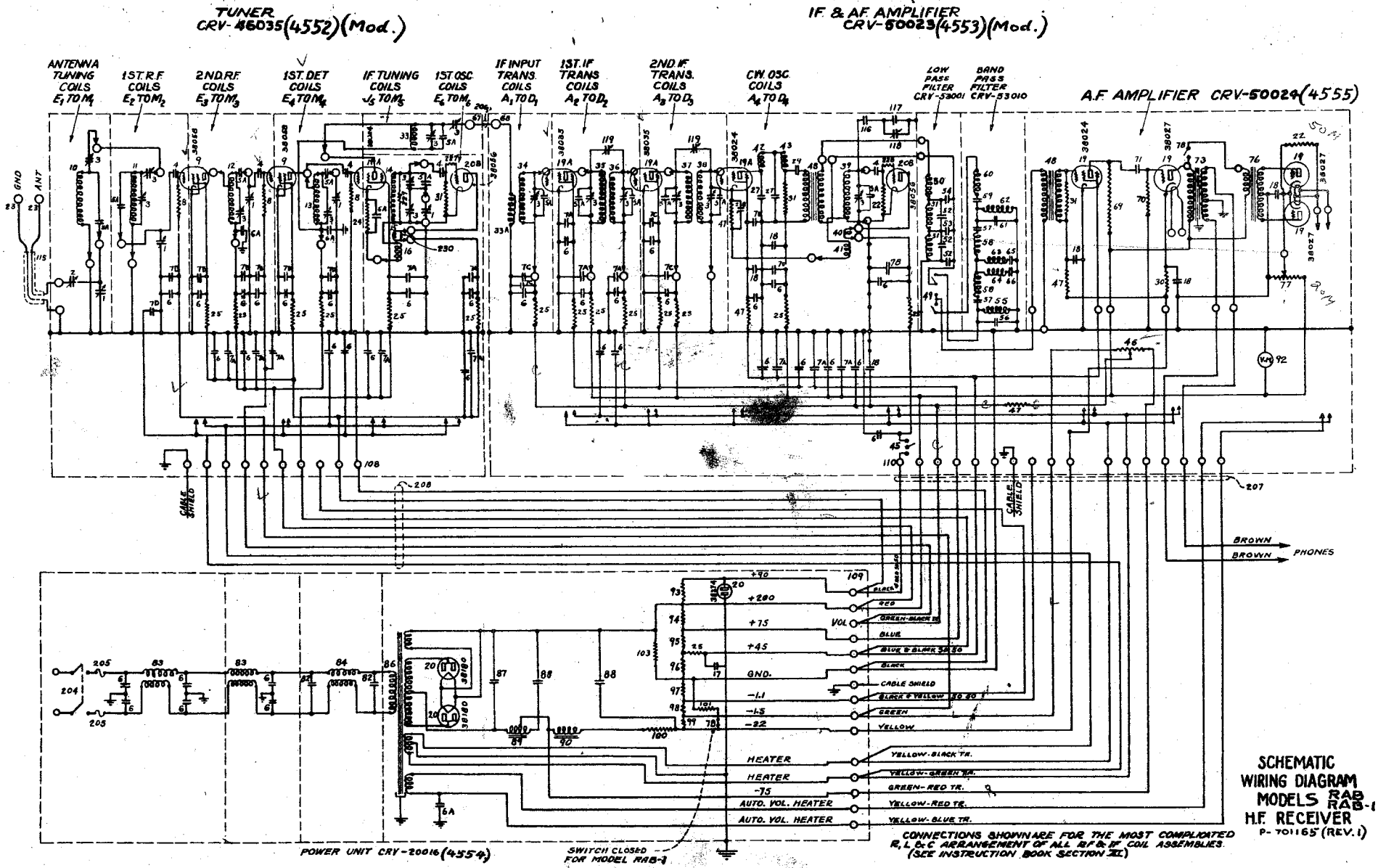
WEIGHTS		
TUNER	CRV-46035	190 LBS.
I.F. & A.F	CRV-50023	155 LBS.
5 P.U.	CRV-20016	110 LBS.



SECTION THRU P.U. MOUNTING.

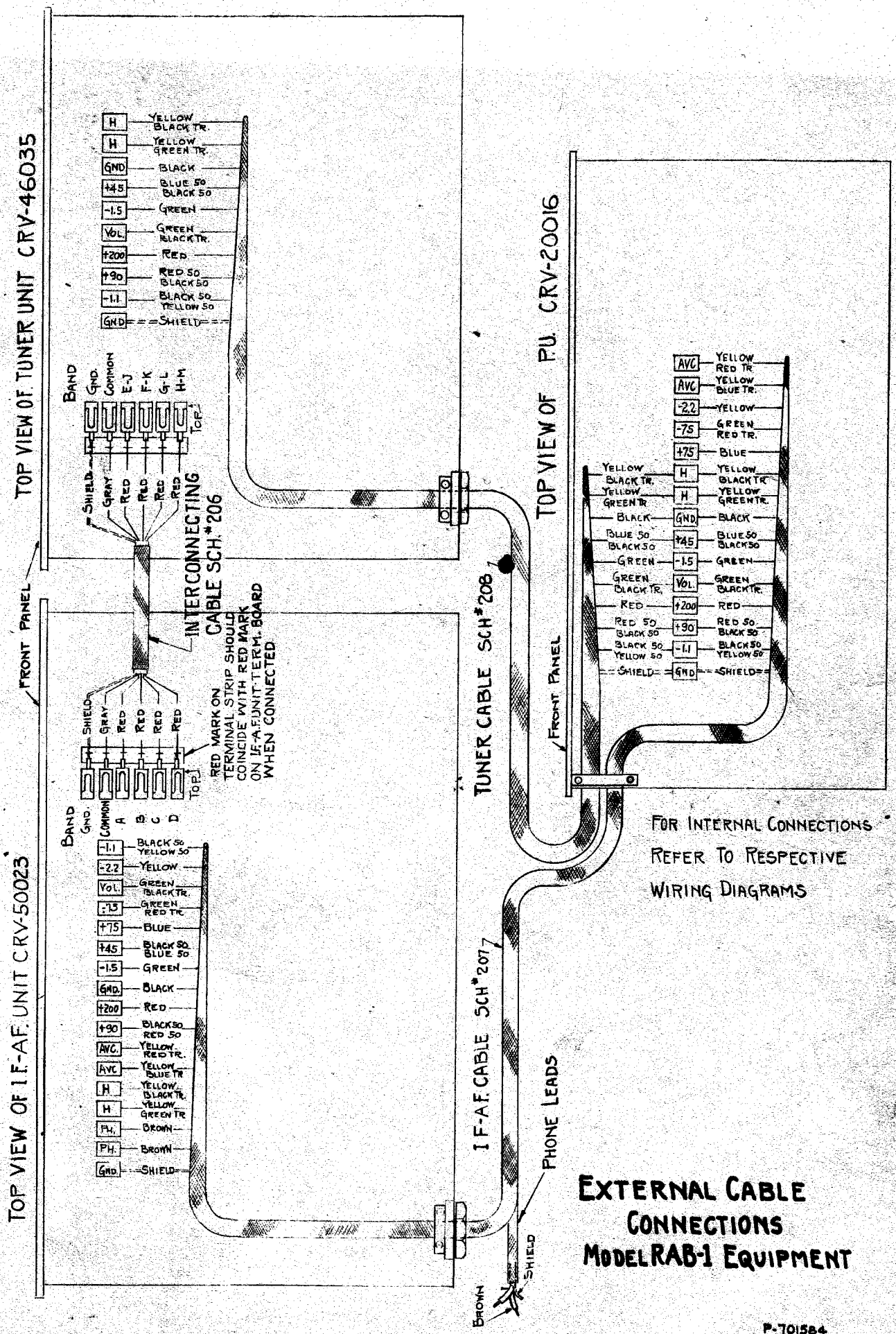
P-701352

P-701352



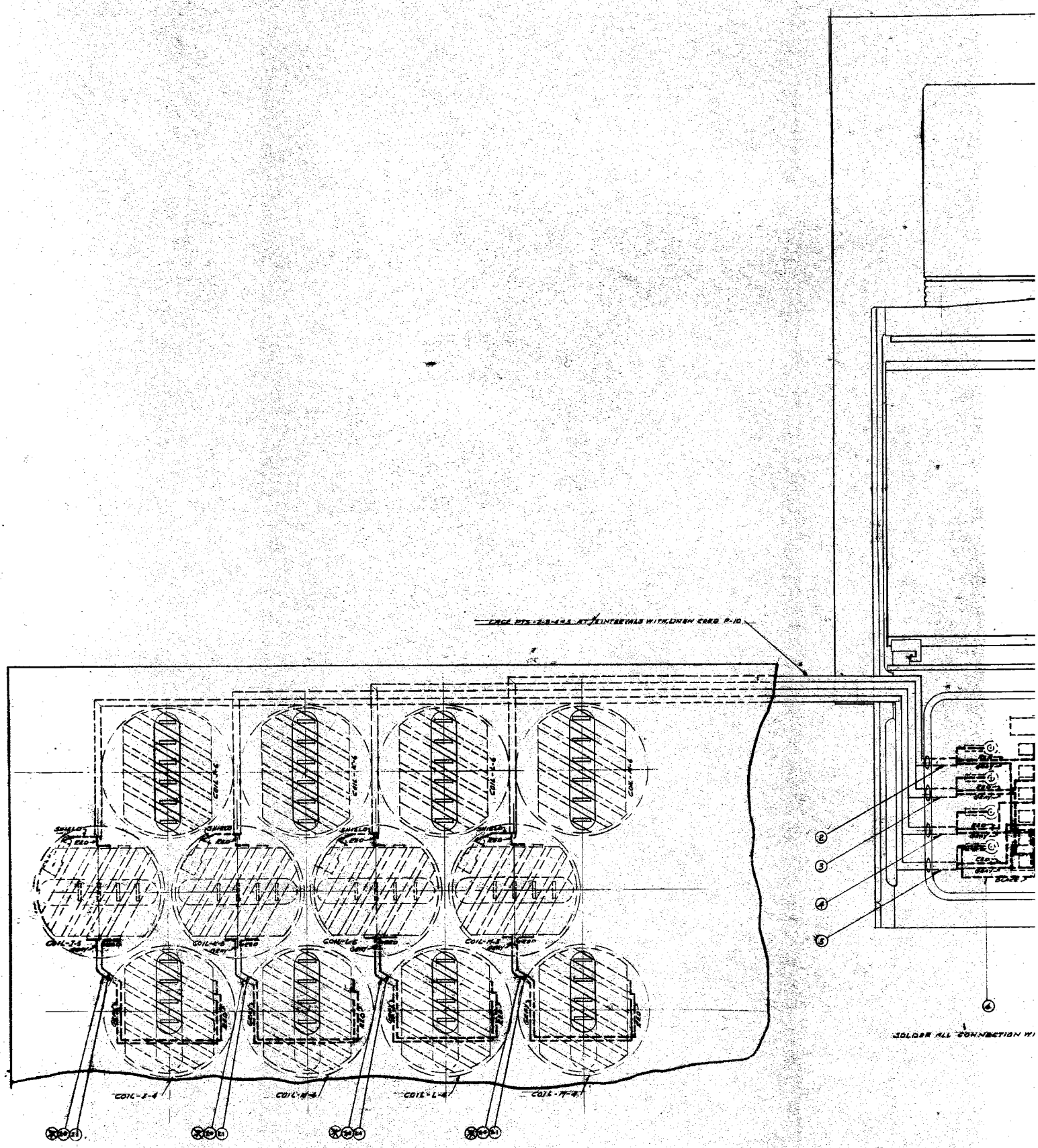
SCHEMATIC WIRING DIAGRAM MODELS RAB RAB-1 H.F. RECEIVER

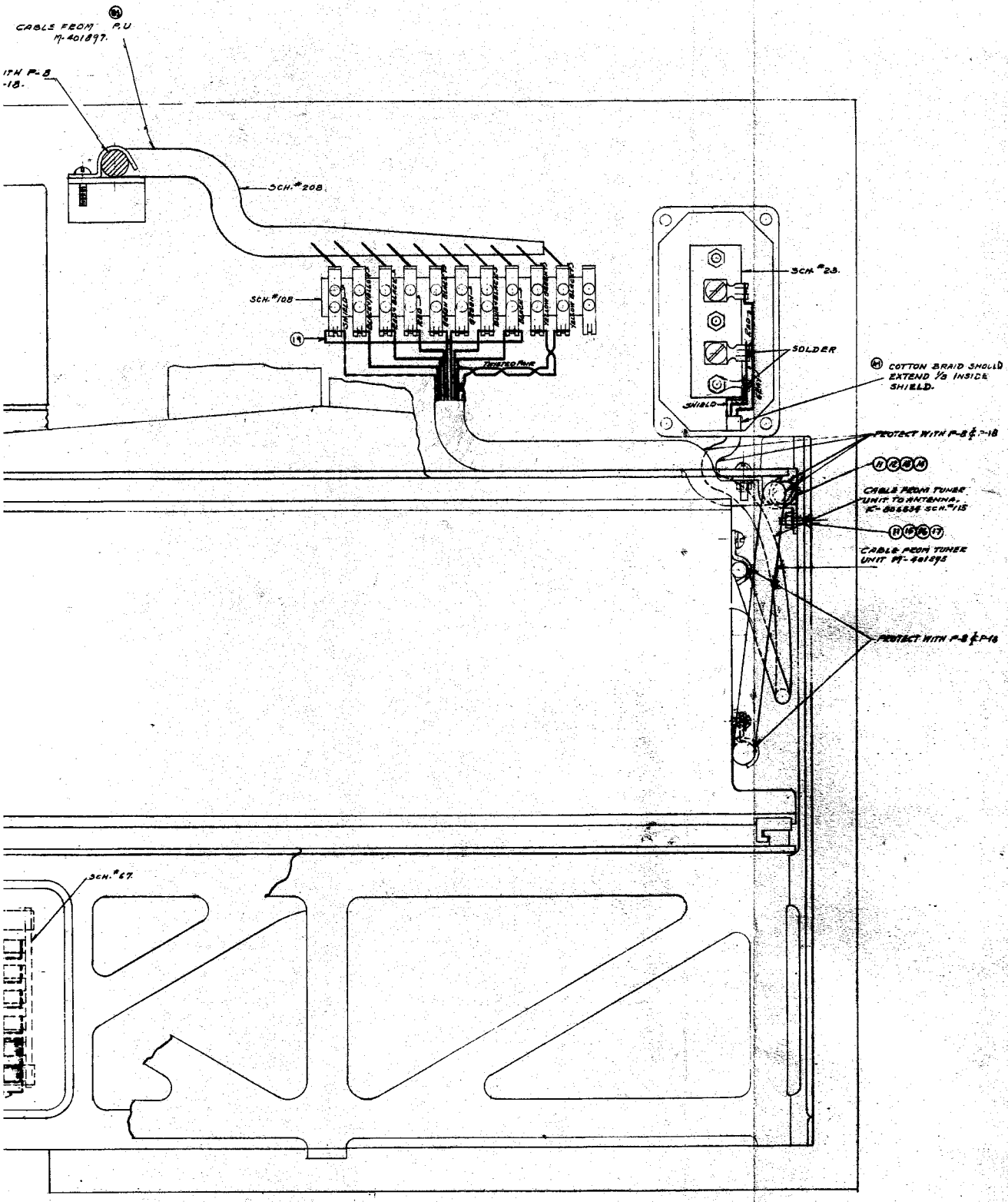
P-701165 (REV. 1)



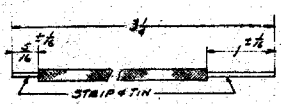
EXTERNAL CABLE CONNECTIONS MODEL RAB-1 EQUIPMENT

P-701584


PROTECT WITH
& P-18.
CAGE PTS-2,3,4,5 AT 1/2 INTERVALS WITH LINEN CORD P-10
SHIELD
COIL-1-A
COIL-2-A
COIL-3-A
COIL-4-A
COIL-1-B
COIL-2-B
COIL-3-B
COIL-4-B
2
3
4
5
SOLDER ALL CONNECTION WI



WITH P-9.

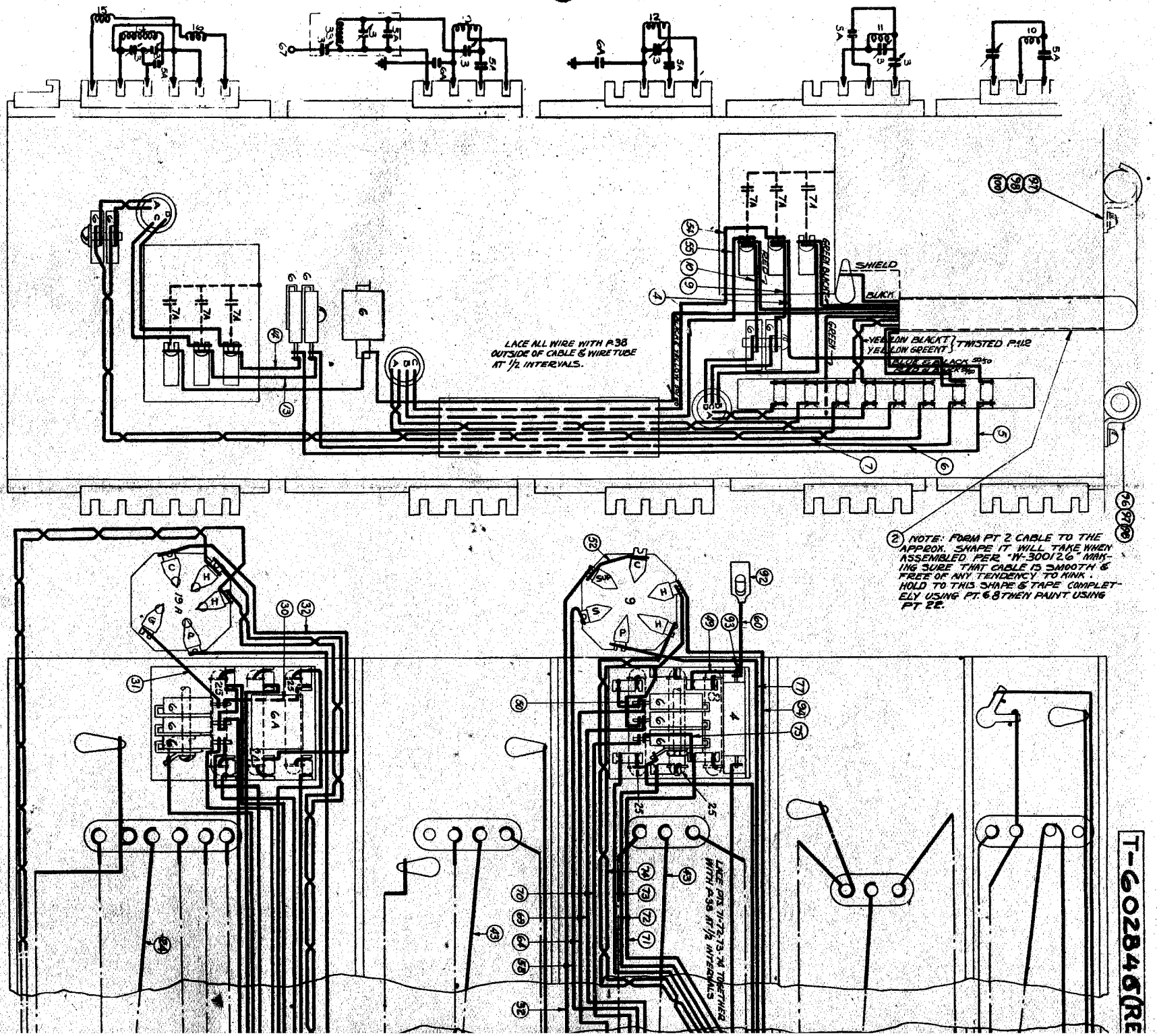


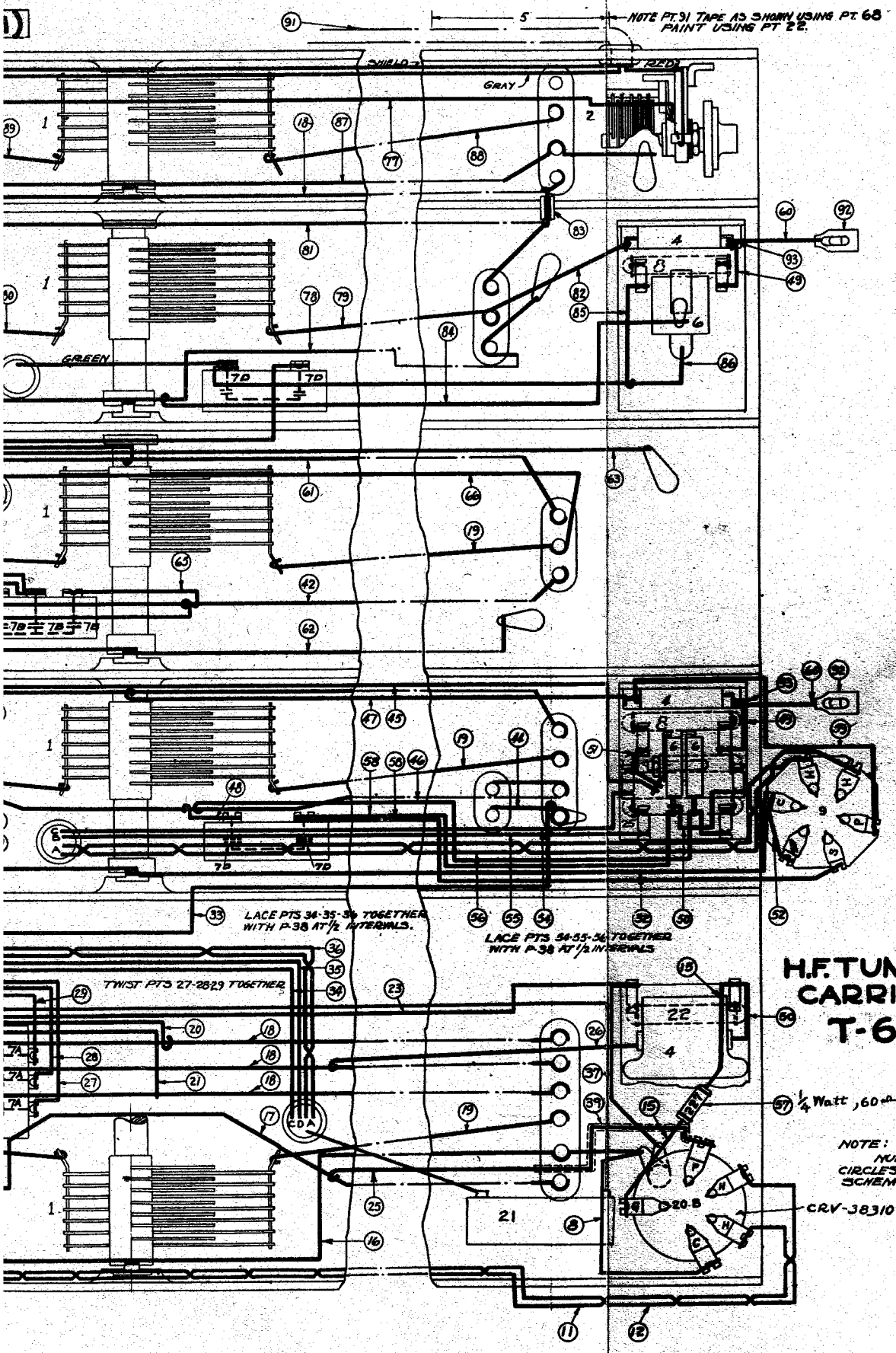
(6) BLACK

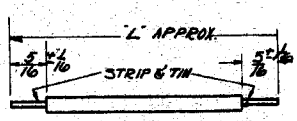
(1)

WIRING CRV-46035 H.F. TUNER ASSEMBLY.

W-900126


LACE ALL WIRE WITH P.38 OUTSIDE OF CABLE & WIRE TUBE AT 1/2 INTERVALS.
SHIELD
BLACK
GREEN
YELLOW BLACK
YELLOW GREEN
TWISTED P.112
NOTE: FORM PT 2 CABLE TO THE APPROX. SHAPE IT WILL TAKE WHEN ASSEMBLED PER "W-300126" MARKING SURE THAT CABLE IS SMOOTH & FREE OF ANY TENDENCY TO KINK. HOLD TO THIS SHAPE & TAPE COMPLETELY USING PT. 68 THEN PAINT USING PT 22.
LACE PTS 71-72-73-74 TOGETHER WITH P.38 AT 1/2 INTERVALS
T-602846(RE

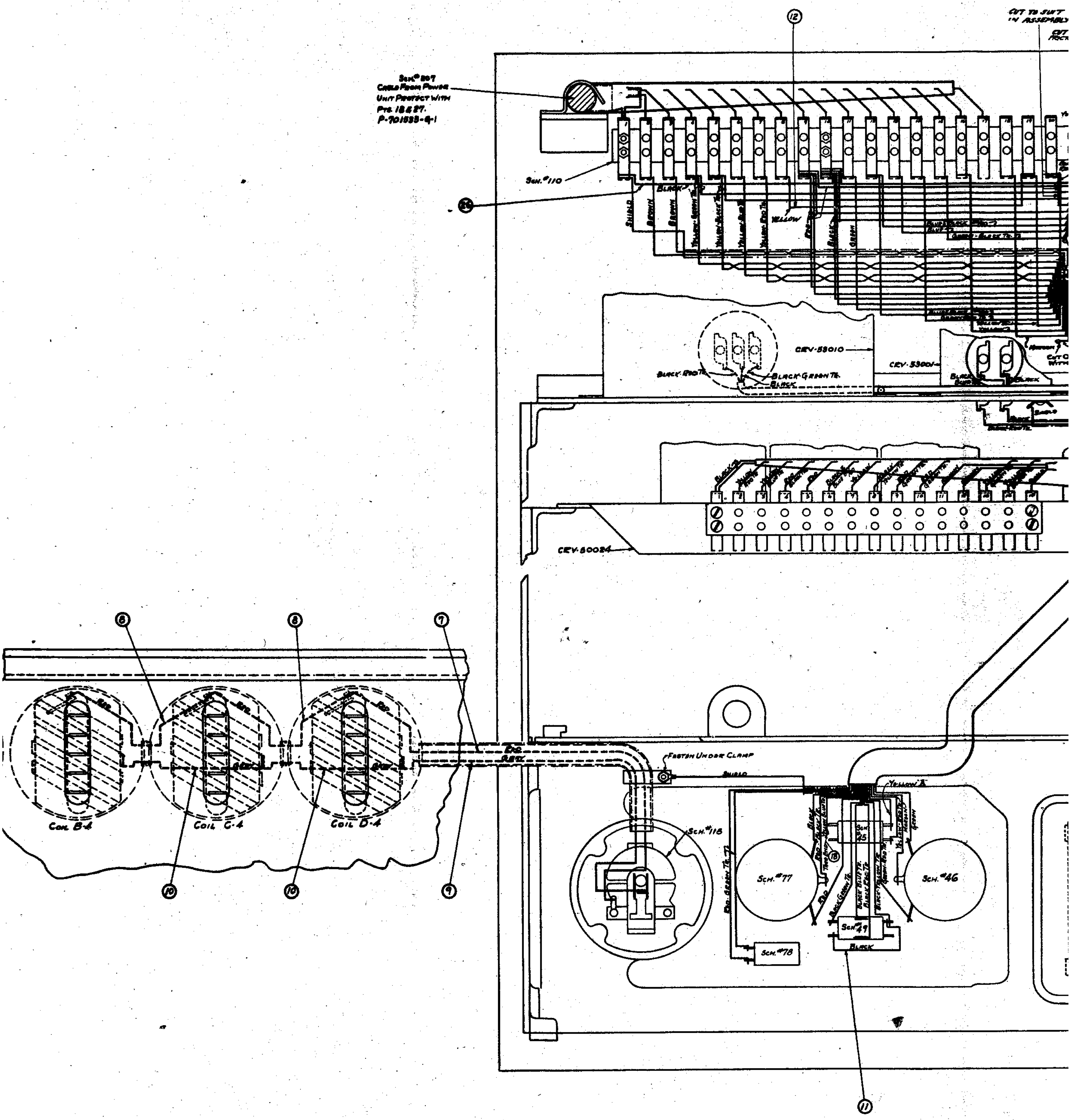




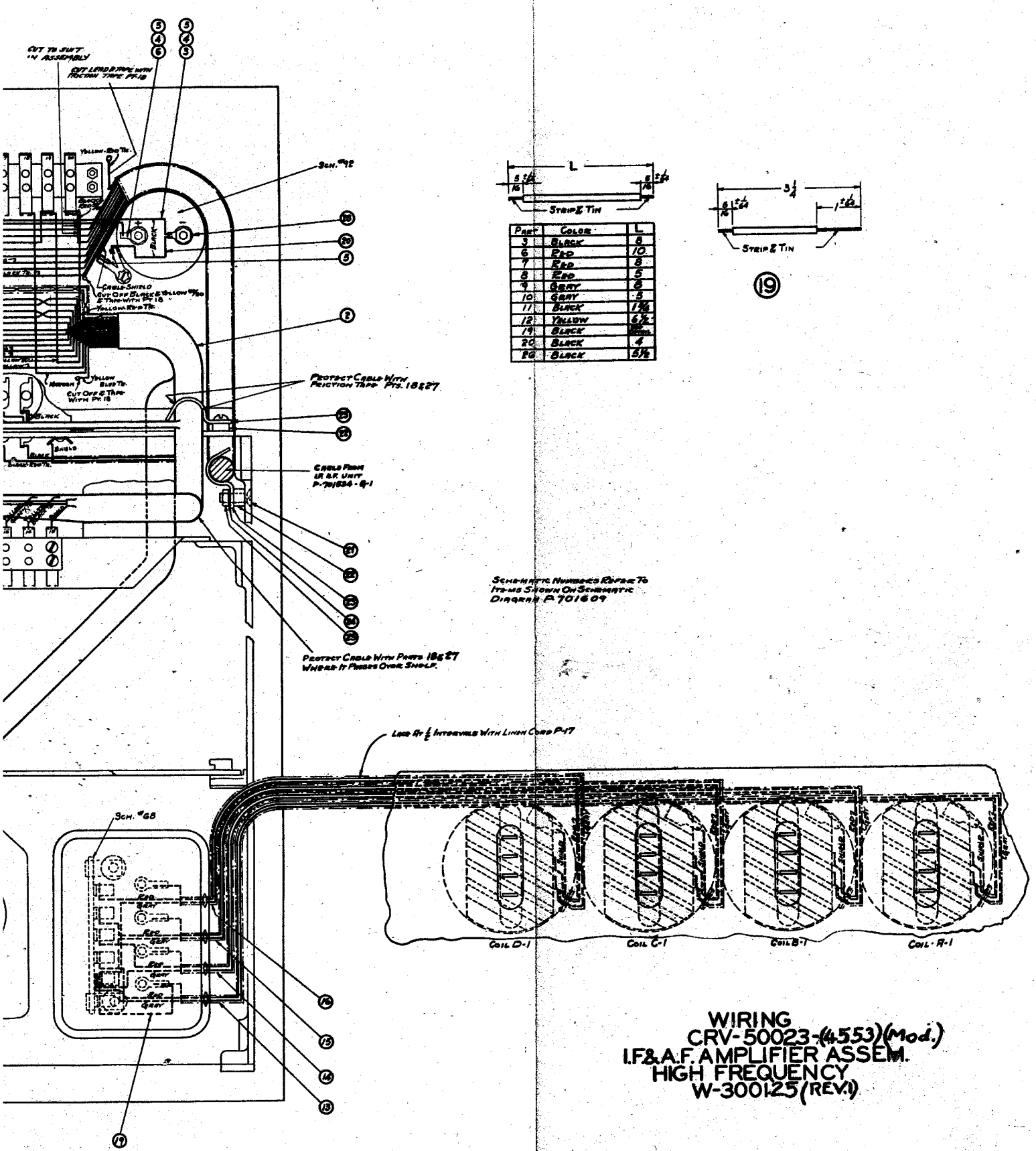
PART	COLOR	LG.
4	BLACK & RED	5½
5	BLACK & BLUE	12½
6	BLACK & RED	12
7	YELLOW-GREEN TR. TWD YELLOW-BLACK TR. PR.	17
8	BLACK	14
9	BLACK & RED	2½
10	RED	2½
11	YELLOW-GREEN TR.	10
12	YELLOW-BLACK TR.	8½
13	BLACK & RED	2½
14	BLACK & BLUE	12
27	BLACK & RED	8
28	BLACK & BLUE	8
30	BLACK & BLUE	2½
31	BLACK & BLUE	3
32	BLACK	4
33	RED	9
34	BLACK & RED	10½
35	BLACK & BLUE	11
36	YELLOW-GREEN TR. TWD YELLOW-BLACK TR. PR.	10
37	BLACK	3
54	BLACK & RED	15
55	RED	16
56	YELLOW-GREEN TR. TWD YELLOW-BLACK TR. PR.	20
58	BLACK & RED	4
59	RED	5
60	YELLOW	2½
67	BLACK & RED	4½
70	GREEN-BLACK TR.	5½
71	GREEN-BLACK TR.	13
72	BLACK & RED	8½
73	RED	8½
74	YELLOW-GREEN TR. TWD YELLOW-BLACK TR. PR.	12½
75	GREEN-BLACK TR.	2
77	RED	4
94	YELLOW-BLACK TR.	10

-46035 MOD.
H.F. TUNER CRV-4552 MOD.
CARRIAGE WIRING
T-602846 (REV. 1)

NOTE:
NUMBERS ON PARTS (NOT IN CIRCLES) REFER TO ITEMS ON SCHEMATIC WIRING P-701165 (Rev. 1)



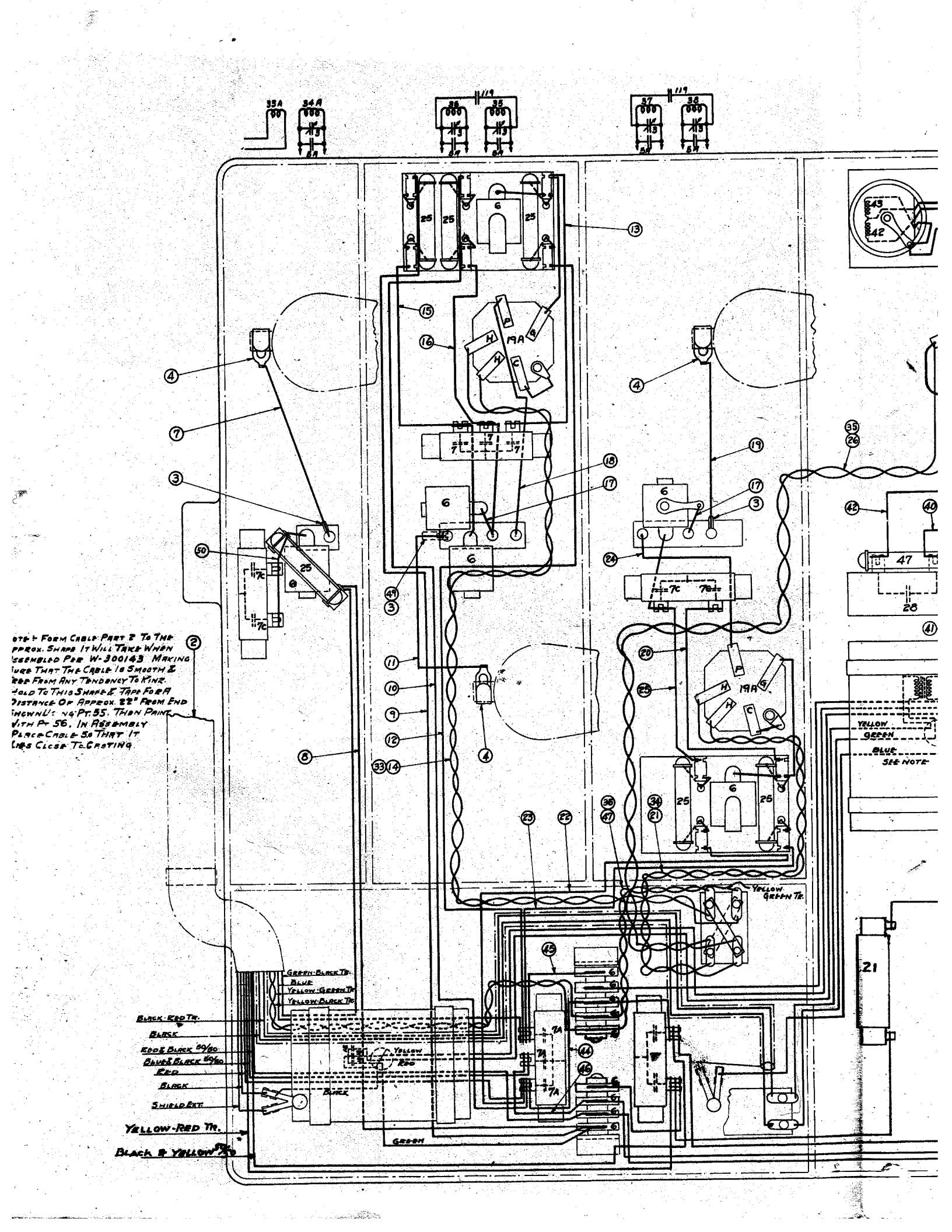
CABLE FROM POWER
UNIT PROTECT WITH
PTS. 18 & 27.
SCH. #110
CEV-53010
CEV-53001
BLACK-GREEN TR.
BLACK
CEV-50024
FASTEN UNDER CLAMP
SHIELD
YELLOW
COIL B-4
COIL C-4
COIL D-4
SCH. #118
SCH. #77
SCH. #46
SCH. #78
SCH. #49
SCH. #45

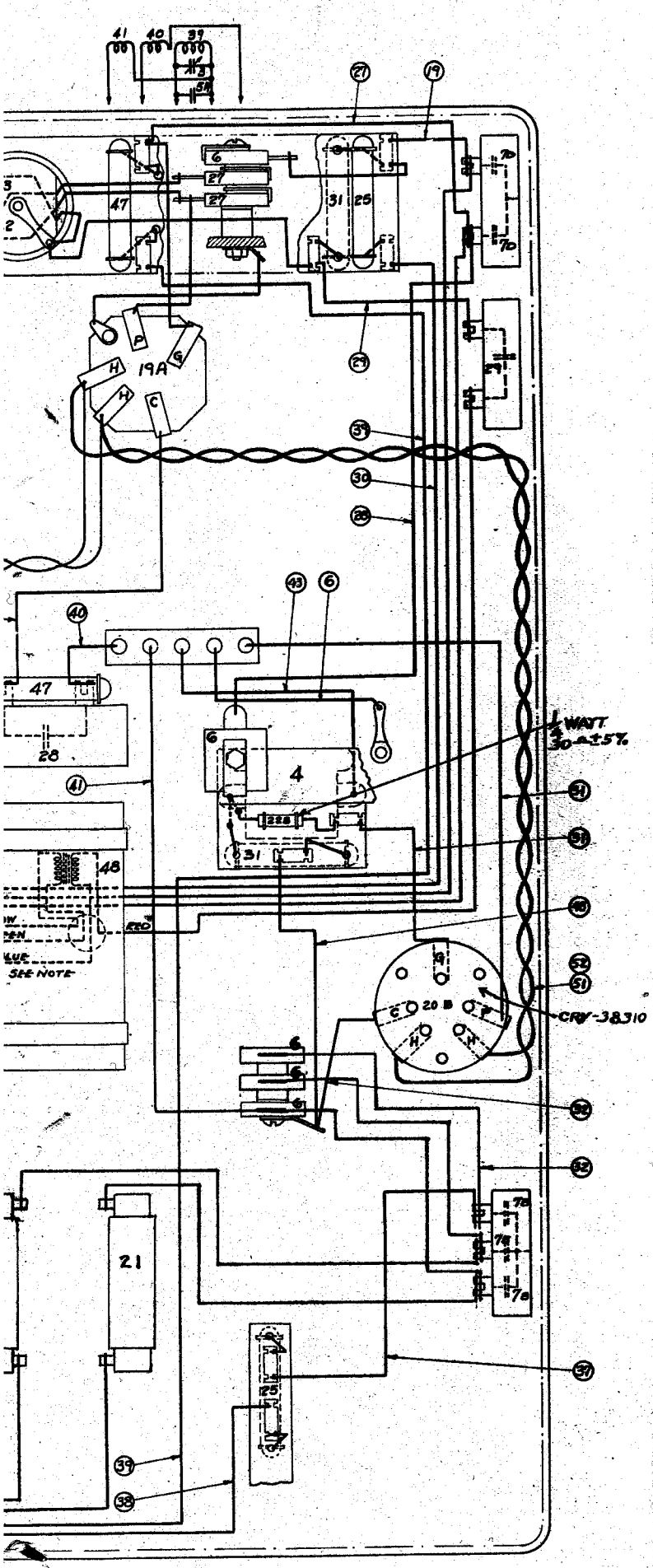


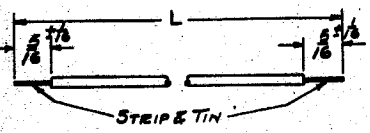
PART	COLOR	L
3	BLACK	8
6	RED	10
7	RED	8
8	RED	5
9	GRAY	8
10	GRAY	8
11	BLACK	1 7/16
12	YELLOW	6 1/2
19	BLACK	
20	BLACK	4
FG	BLACK	8 1/2

(19)

WIRING CRV-50023-(4553)(Mod.) I.F.&A.F. AMPLIFIER ASSEM. HIGH FREQUENCY W-300125 (REV.1)


Form Cable Part 2 To The
Approx. Shape It Will Take When
Assembled Per W-300143 Making
Sure That The Cable Is Smooth &
Free From Any Tendency To Kink.
Hold To This Shape & Tape For A
Distance Of Approx. 22" From End
Shown As Pt. 55. Then Paint
With Pt. 56. In Assembly
Place Cable So That It
Lies Close To Casting.
Green-Black Tr.
Blue
Yellow-Green Tr.
Yellow-Black Tr.
Black-Red Tr.
Black
Red & Black 80/20
Blue & Black 80/20
Red
Black
Shield Ext.
Yellow-Red Tr.
Black & Yellow 80/20
Yellow
Red
Black
Green
Yellow Green Tr.
Yellow
Green
Blue
See Note



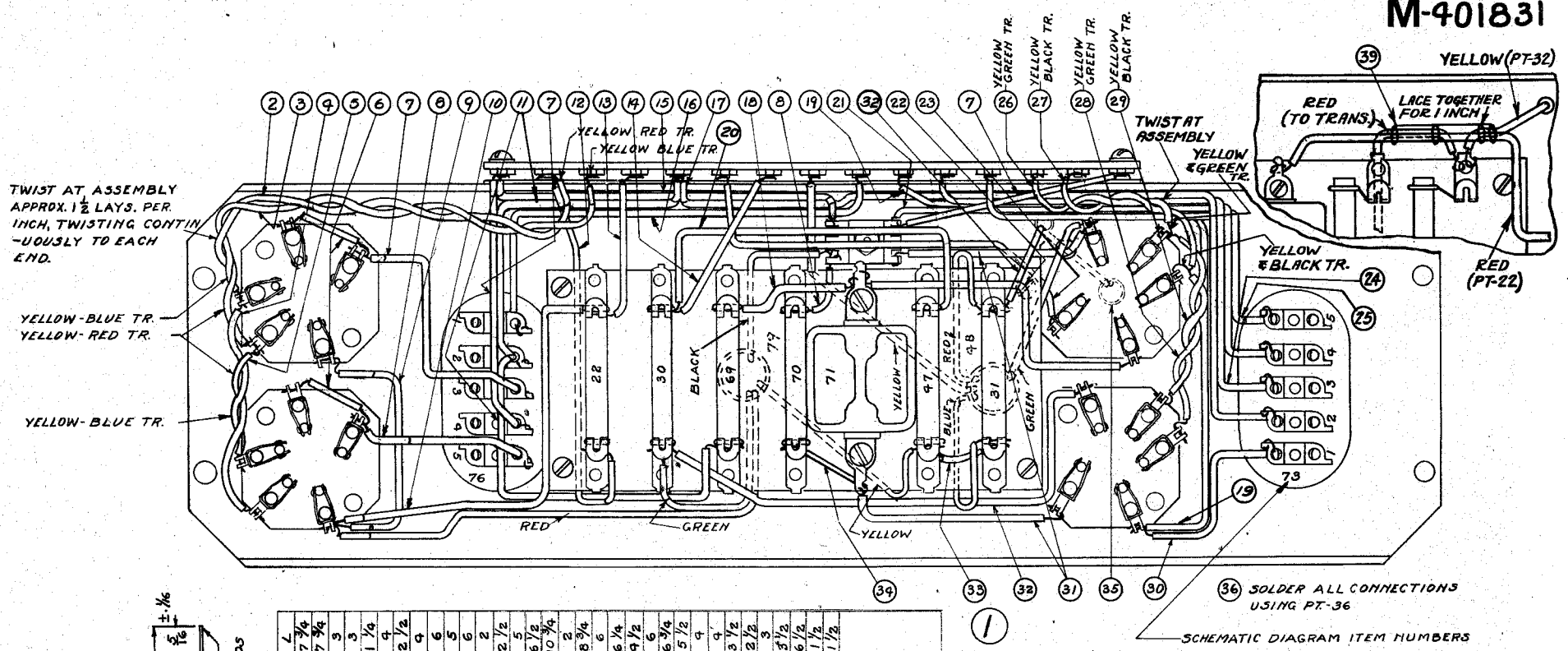


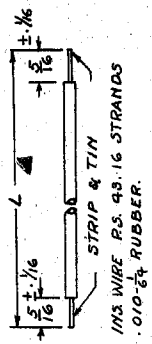
PART	COLOR	L
7	YELLOW	2½
8	GREEN-BLACK TR.	8½
9	GREEN-BLACK TR.	12½
10	RED	15½
11	YELLOW	3
12	BLUE	7
13	BLUE	4
14	YELLOW-BLACK TR.	12
19	YELLOW	1½
20	GREEN	2
21	[illegible]	7½
22	RED	10½
23	BLUE	8
26	YELLOW-BLACK TR.	13
27	[illegible]	9½
28	[illegible]	2
29	[illegible]	2
30	RED	14
33	YELLOW-GREEN TR.	12
34	YELLOW-GREEN TR.	7½
35	YELLOW-GREEN TR.	13
36	YELLOW-GREEN TR.	5½
37	[illegible]	9½
38	[illegible]	8
39	[illegible]	14
44	RED	4½
45	BLUE	2
46	[illegible]	3
47	YELLOW-BLACK TR.	2
51	YELLOW-GREEN TR.	4¼
52	YELLOW-BLACK TR.	4¾

I.F. & A.F. AMPLIFIER CRV (4553 (Mod.) / 50023 (Mod.)
CARRIAGE WIRING
T-601296 (Rev. 1)

NUMBERS ON PARTS NOT IN CIRCLES REFER TO ITEMS ON SCHEMATIC WIRING DWG. P-601165 (Rev. 1)
ALL CAPACITORS ITEM 6 HAVE ONE SIDE GROUNDED THRU MOUNTING.

M-401831





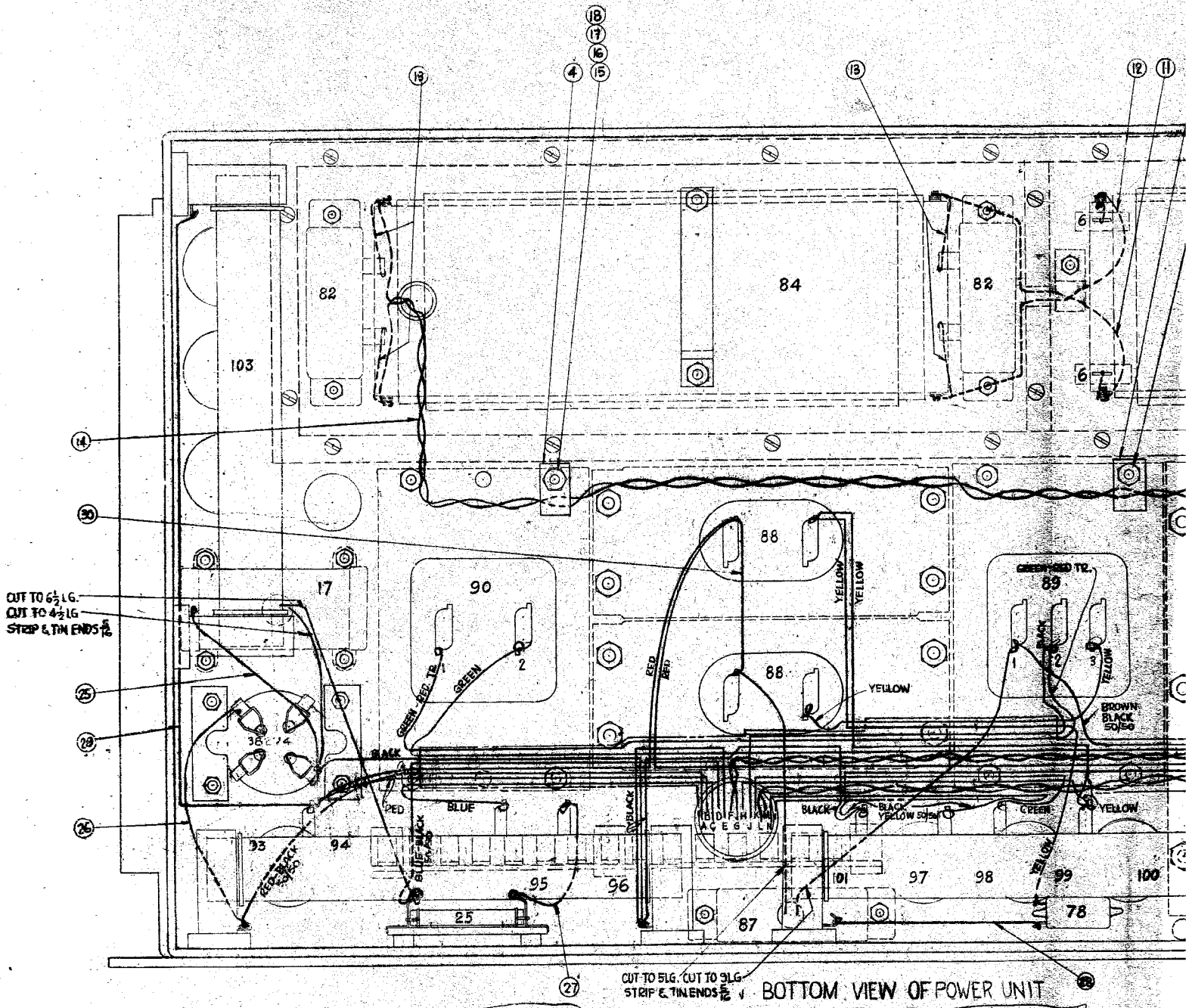
PART	COLOR	L
2	YELLOW - RED TR.	7 3/4
3	YELLOW - BLUE TR.	7 3/4
4	YELLOW - BLUE TR.	3
5	YELLOW - RED TR.	3
6	BLACK	1 1/4
7	BLACK	4
8	BLACK	2 1/2
9	YELLOW - RED TR.	9
10	RED - BLACK TR.	6
11	RED	5
12	YELLOW - RED TR.	6
13	RED - BLACK TR.	2
14	YELLOW	2 1/2
15	BLACK	5
16	RED - GREEN TR.	6 1/2
17	RED	10 3/4
18	RED	2
19	RED - GREEN TR.	8 3/4
20	YELLOW	6
21	BLACK	6 1/4
22	RED	9 1/2
23	BLACK & BLUE 50/50	6
24	BROWN	6 3/4
25	BROWN	5 1/2
26	YELLOW - GREEN TR.	9
27	YELLOW - BLACK TR.	9
28	YELLOW - GREEN TR.	3 1/2
29	YELLOW - BLACK TR.	2 1/2
30	RED	3
31	BLACK	3 1/2
32	YELLOW	6 1/2
33	YELLOW	1 1/2
34	BLACK	1 1/2

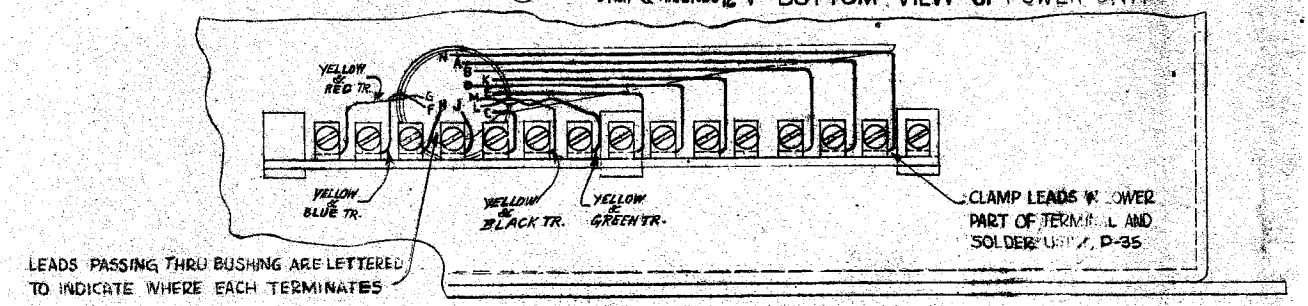
(36) SOLDER ALL CONNECTIONS USING PT-36

WIRING FOR AF AMPLIFIER CRV-50024

M-401831

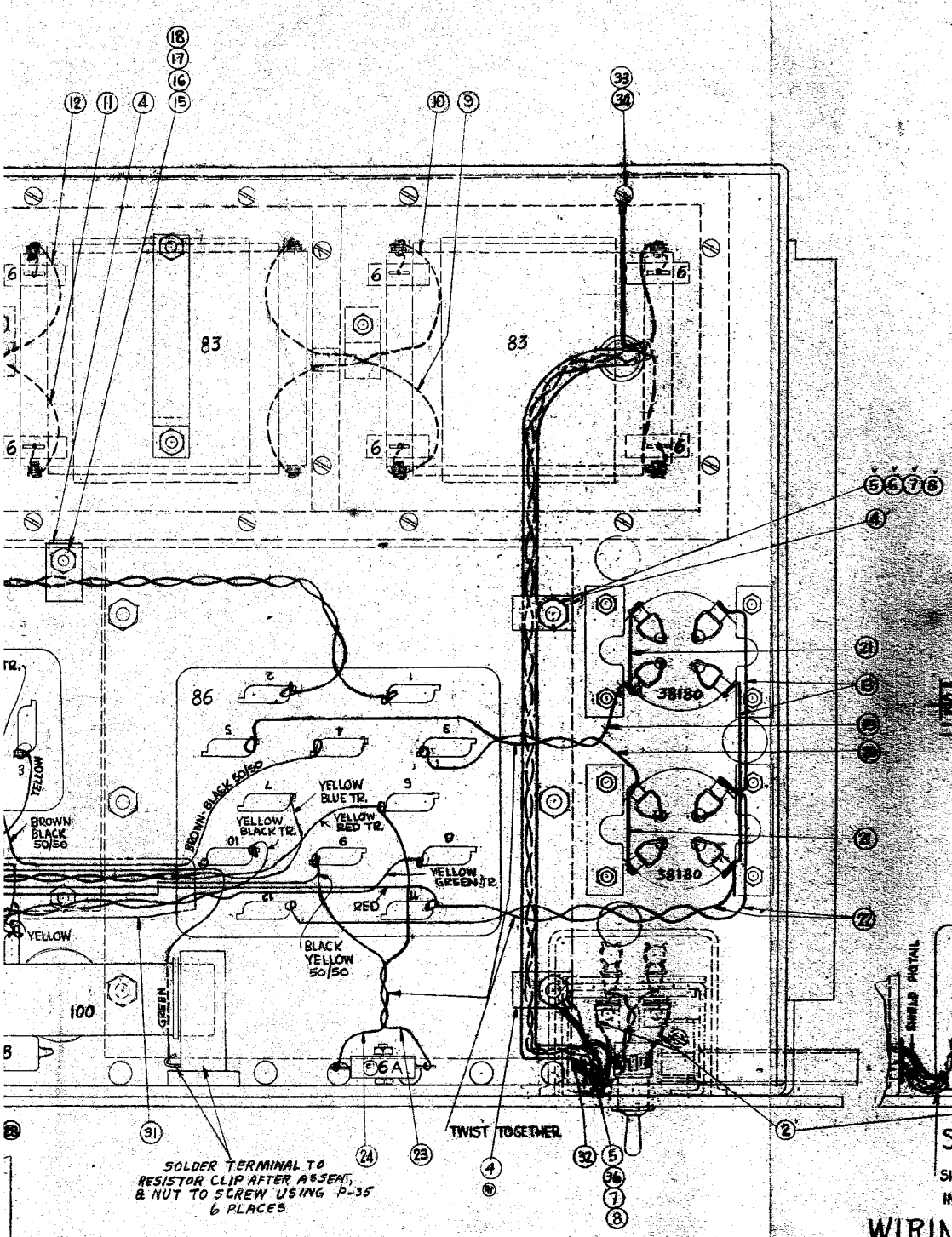
M-401831

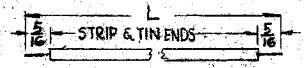




TOP VIEW OF TERMINAL BOARD

T601270



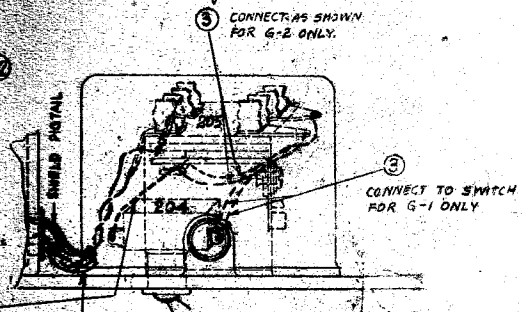


STR. INSUL. WIRE, PS-43

PART	COLOR	L	CONDUCTOR	RUBBER COV.
2	YELLOW-RED TR.	1¾	26/.010	1/32
3	YELLOW-RED TR.	3	26/.010	1/32
9	BLACK	8½	41/.010	1/32
10	BLACK-RED TR	8½	41/.010	1/32
11	BLACK	10	41/.010	1/32
12	BLACK-RED TR.	10	41/.010	1/32
13	BLACK	3¾	41/.010	1/32
19	BROWN	7	16/.010	1/64
20	BROWN	4½	16/.010	1/64
21	BROWN	11½	16/.010	1/64
22	BLACK	8	41/.010	1/32
23	YELLOW-RED TR.	5½	16/.010	1/64
24	YELLOW-BLACK 50/50	4½	16/.010	1/64
25	BLACK	4½	16/.010	1/64
26	BLACK-RED 50/50	6	16/.010	1/64
27	BLUE-BLACK 50/50	5	16/.010	1/64
28	YELLOW	4½	16/.010	1/64
29	MAROON	12½	16/.010	1/64
30	RED	4	16/.010	1/64

TWISTED PR. STR. INS. WIRE, PS-43
41/.010 1/32 RUBBER

PART	COLOR (BOTH ENDS)	L
14	BLACK	25



SIDE VIEW OF FUSE HOLDER

SHIELD CLAMPED BY OPENING IN COVER.

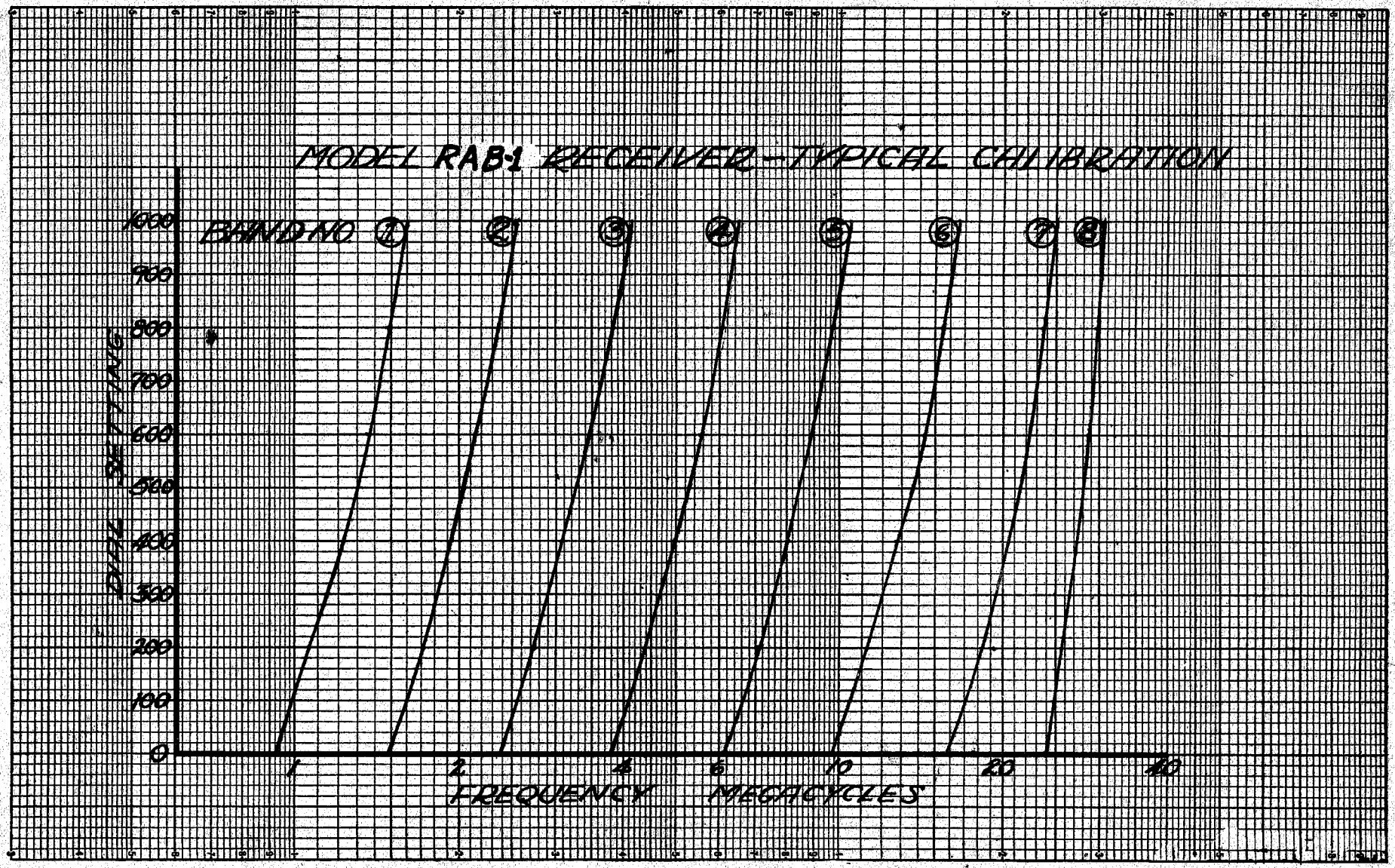
WIRING FOR POWER UNIT

CRV-20016 (G-1)
CRV-46025 (G-2)

T-601270

(1) SOLDER ALL CONNECTIONS USING P35

NOTE: NUMBERS NOT IN CIRCLES REFER TO SCHEMATIC DIAGRAMS T-601075 OR T-701165.


MODEL RAB-1 RECEIVER — TYPICAL CALIBRATION
BAND NO
1
2
3
4
5
6
7
8
1000
900
800
700
600
500
400
300
200
100
0
RELATIVE RESPONSE
1
2
4
6
10
20
40
FREQUENCY MEGACYCLES

S-813371