JERROLD®

INSTRUCTION MANUAL

435-374.2

CHANNEL COMMANDER

MODEL COM-*

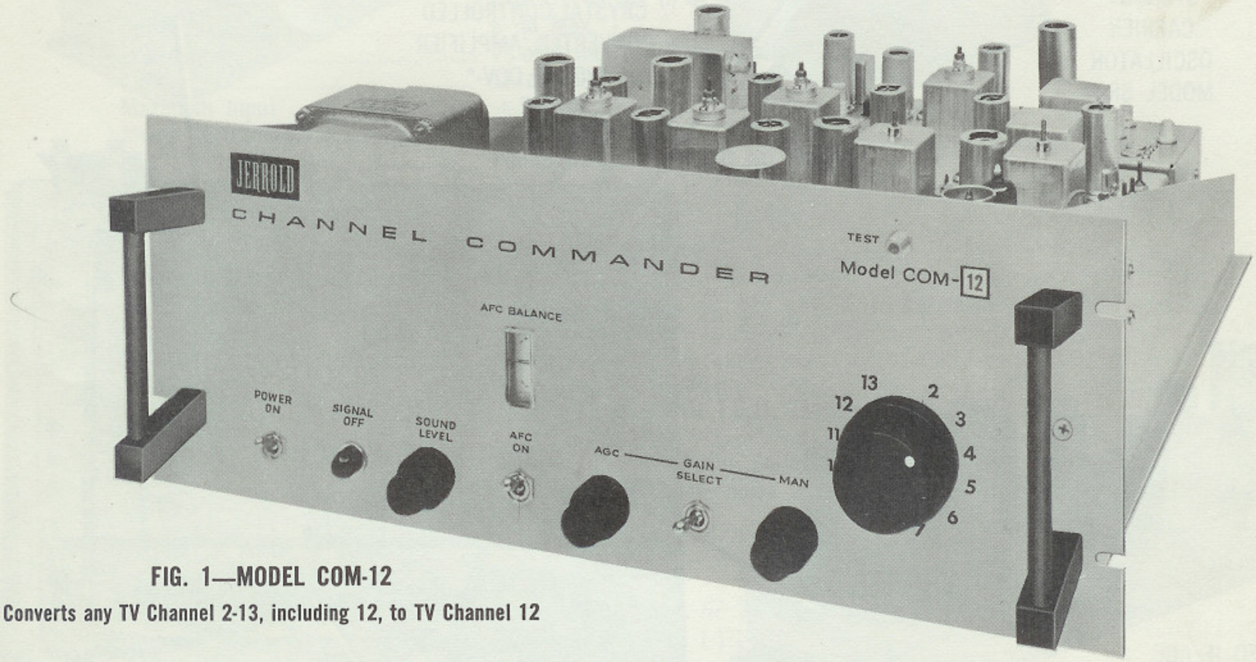


FIG. 1—MODEL COM-12
Converts any TV Channel 2-13, including 12, to TV Channel 12

DESCRIPTION

The Jerrold Channel Commander Model COM-* is a unitized head-end for completely processing any vhf channel (2-13). Channel Commanders process the signals in such a way that adjacent channels on both high and low bands can be fed to the distribution system thus providing a completely-controlled, compact head-end for up to 12 vhf channels.

Model COM-* is compatible with existing system equipment and may be used to supply an additional vhf channel, to replace obsolete equipment, or as a spare head-end for any vhf channel. Modular construction of the unit makes it possible to change the output channel simply by exchanging the crystal-controlled converter module. Hence, only additional converter units are required to provide spares for different channels.

The basic unit comprises a main chassis with a built-in power supply and five modules: Tuner, VIDEO IF AGC (intermediate frequency amplifier and automatic gain control), SOUND IF AFC (automatic frequency and sound control), and a Standby Carrier Oscillator. Model CCV-*, the crystal-controlled converter/amplifier, the fifth plug-in module, provides the particular output channel desired.

CONTENTS OF PACKAGE

Carton No. 1

1 Model COM-* Ser. No. ....
4 Screws
3 Male Connectors Model F-59A
1 Spare Model PIP-* Plug-in Pad
1 Warranty Card 435-258

Carton No. 2

1 Unit Model CCV-*
1 Unit LPF-50 (Channels 4, 5, and 6 only)
1 6″ Cable (Channels 4, 5, and 6 only)

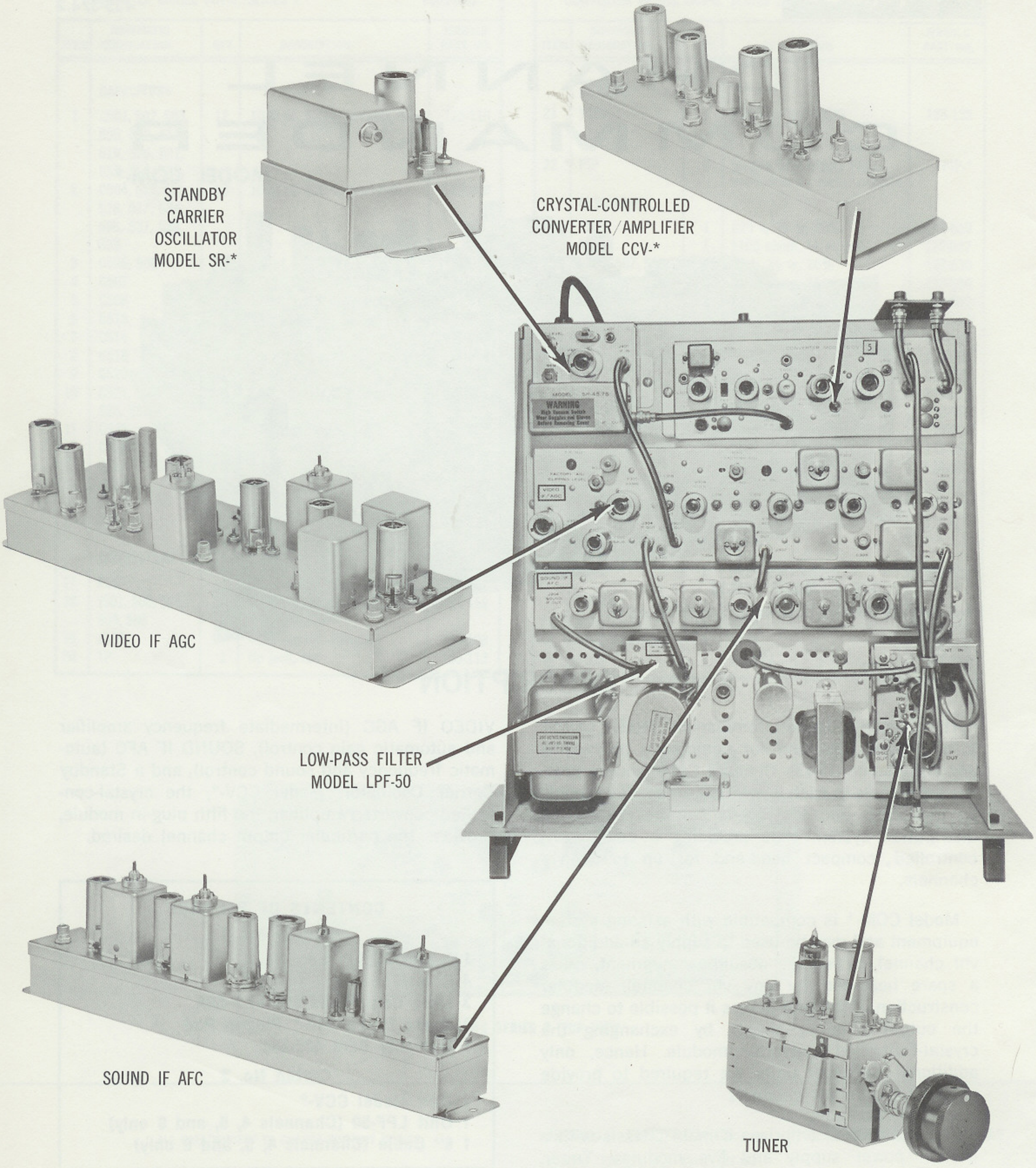


FIG. 2—MODEL COM-* AND ITS MODULES

SPECIFICATIONS

OVERALL

Sensitivity	100 uv (—20 dbj)* input for 57 dbj output
AGC Sensitivity	Maximum $\pm\frac{1}{2}$ db output change for input change of 200 uv (—14 dbj) to 64,000 uv (+36 dbj)

TUNER

Frequency Range	INPUT: VHF Channels 2 to 13 (one spare position) OUTPUT: 41 mc to 47 mc
Noise Figure	6 db Max.
Impedance	75-ohm input — 75-ohm output, at VSWR 1.1:1
Gain	17 db minimum
Maximum Input	+36 dbj
Image Rejection	50 db minimum
AFC	Pull-in Range of $\pm$250 kc minimum

VIDEO IF AMP & AGC

Bandwidth	41.6 mc to 46.5 mc
IF Response Flatness	Within ¼ db
Video Carrier	45.75 mc
Sound Carrier	41.25 mc
Adjacent Carrier Rejection	50 db minimum
Gain Control	Manual or automatic
Impedance	75-ohm input (VSWR 1.2:1); 75-ohm output (VSWR 1.2:1)
Gain	46 db minimum
Operational IF Output	Video IF Carrier 40 dbj; Sound IF Carrier 25 dbj
AGC	Sync Tip Referenced, noise immune

SOUND IF AMP & AGC

Sound IF frequency	41.25 mc
Sound IF Limiting	10 db limiting min. @ 25 dbj output with 100 uv input to tuner
Sound IF Output	75 ohms at VSWR 1.1:1
AFC IF	4.473 mc
AFC Audio	25 mv rms across 100 k ohms, 2% harmonic distortion

STANDBY CARRIER OSCILLATOR

Delay (Off)	20 sec. approximate
Delay (On)	2 sec.
Range	Adjusted to operate at Station-Off-Air Condition
Input	Output of IF amplifier
Output	45.75 mc carrier adjustable and Xtal-controlled
Impedance	75-ohm input VSWR =1.12:1; 75-ohm output VSWR = 1.12:1
Insertion Loss	½ db maximum

CONVERTER/AMPLIFIER

Frequency range	input: 41 mc to 47 mc; output; any single VHF Channel 2 to 13
Input Impedance	75 ohms, VSWR 1.2:1
Output Impedance	Dual 75 ohms, VSWR 1.2:1
Gain	17 db minimum
Minimum Input	43 dbj
Maximum Output	57 dbj
Oscillator	(1) self-contained crystal controlled; (2) tuner oscillator controlled for on-channel operation
Gain Control	Model PIP

POWER SUPPLY

Type	Self-contained with line voltage regulating transformer
Power Requirements	90 v to 130 v, 60 cps, 110 watts

*0 dbj = 1000 microvolts across 75 ohms.

TECHNICAL DESCRIPTION

POWER SUPPLY

A line-regulating supply powers all modules. Additional voltage regulation is provided for stable operation of AFC and AGC circuits.

TUNER

The tuner will receive any vhf channel according to the position of the channel selector switch. The tuning control circuitry incorporates a balance meter which gives visual indication that the tuner is set to the exact frequency. The automatic frequency control insures that the tuner will remain locked-in precisely on frequency. A special AGC circuit maintains the best possible noise figure on weak antenna signals and prevents overloading on strong (up to 64,000 microvolts) signals. Finally, the tuner amplifies and changes the received signals to relatively low intermediate frequencies.

VIDEO IF AGC

The highly-selective i-f amplifier incorporates specially-designed traps and filters to eliminate adjacent channel interference. This circuitry assures minimum phase delay for the best reproduction of the incoming color and black and white signals. Sync pulse reference AGC has a noise clipping circuit which provides constant output levels not affected by power line or ignition noises. The fast action of this AGC minimizes airplane flutter.

SOUND IF AFC

The automatic frequency control circuitry provides the correction voltage for the tuner. Precise automatic sound control circuitry provides limiting action at relatively low intermediate frequencies to control the on-channel sound carrier. Once set, the desired difference between sound and video carrier levels for the channel is precisely maintained.

STANDBY CARRIER OSCILLATOR

When a station goes off the air, a time delay device is automatically energized and triggers a crystal-controlled oscillator to provide a replacement carrier after 20 seconds. A warning light indicates that the station is off-the-air.

CRYSTAL CONTROLLED CONVERTER/AMPLIFIER

The converter uses a crystal-controlled oscillator to change the intermediate frequencies to any desired TV channel output. In the event that on-channel conversion (e.g., Ch. 2 to 2, 9 to 9, etc.) is desired, the converter oscillator is switched out of the circuit to permit the tuner oscillator to be used for both down and up conversion. Since the same oscillator is now used for both conversions, co-channel interference cannot be generated internally. The converted signal is fed via an amplifier stage to dual outputs with an output capability of one volt each. These dual outputs have an excellent match (VSWR 1.2:1) simplifying mixing with other COM-* units or other existing equipment.

LOW-PASS FILTER

For channel 4, 5 and 6 conversion, a special low-pass filter network (Model LPF-50) is shipped with the converter unit. The network is designed to suppress 82.5 mc second harmonics generated in the sound i-f module.

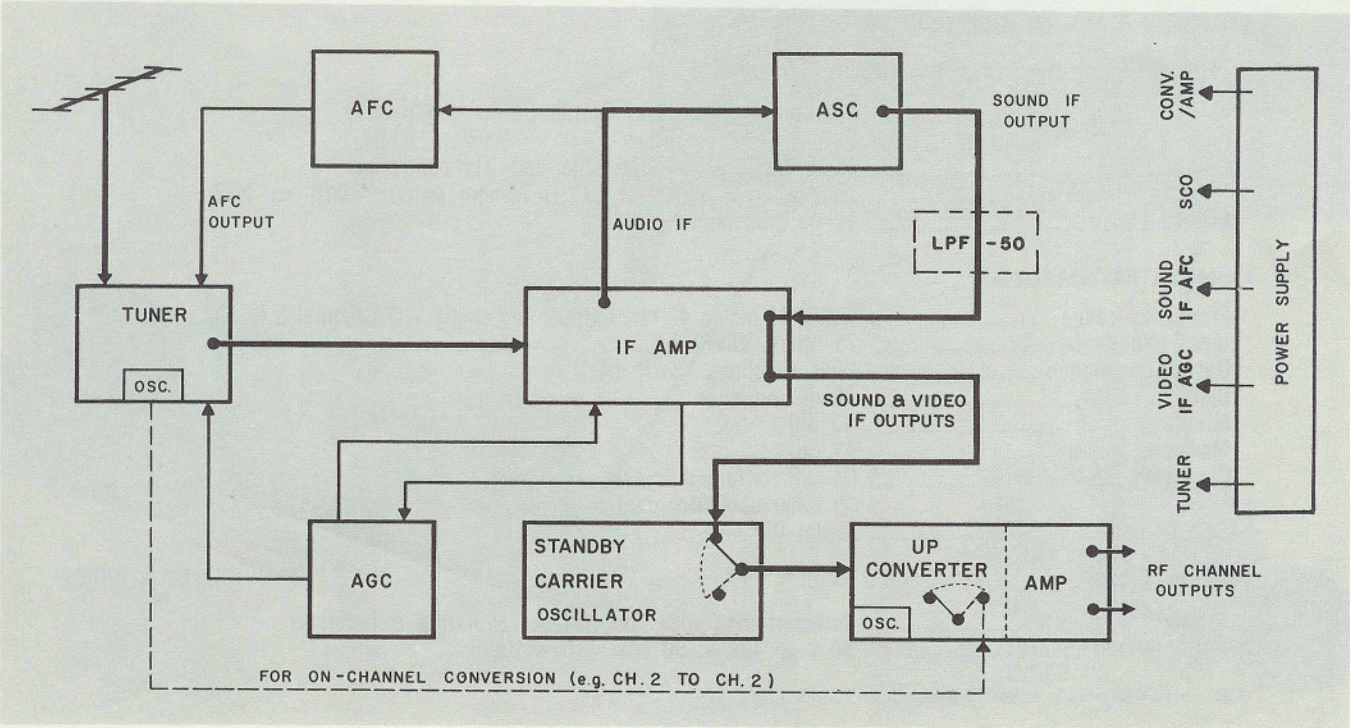


FIG. 3—FUNCTIONAL BLOCK DIAGRAM

INSTALLATION

A. INSTALLATION OF LOW-PASS-FILTER MODEL LPF-50 FOR CONVERSION OF CHANNELS 4, 5, AND 6

For conversion of channels 4, 5 or 6, a low-pass filter is required to be installed in Models COM-4, 5, or 6. The filter is shipped with each Model CCV-4, CCV-5 and CCV-6 respectively.

1. Mount Model LPF-50 on top of the COM-* chassis, in the area bounded by the power transformer, the electrolytic capacitor, and the SOUND IF AFC module. Mount the LPF-50 so that the silkscreened label is adjacent to the SOUND IF AFC module. Two snap plugs are provided for fastening through ¼" holes stamped out in the chassis (see fig. 2).
2. Disconnect the jumper from the J204 SOUND IF OUT fitting on the SOUND IF AFC module; then connect the jumper to the LPF-50 fitting near tube V101.
3. A 6" jumper is shipped with each LPF-50. Connect this jumper between J204 SOUND IF OUT fitting on the SOUND IF AFC module and the LPF-50 fitting near the transformer.

B. INSTALLATION OF MODEL CCV FOR OFF-CHANNEL CONVERSION (ch. 2 to ch. 3, etc.)

1. Mount Model CCV at rear of chassis (compare fig. 2) so that its plug engages the chassis-mounted socket; turn spring lock fasteners 90° clockwise.
2. Connect orange-coded cable from IF OUT fitting on standby carrier oscillator module to J502 IF IN fitting on Model CCV.
3. Remove cap from J506 RF T.P. fitting on Model CCV and connect the blue-coded jumper in its stead.
4. Connect brown-coded jumpers to J504 RF OUT 1 and J505 RF OUT 2 fittings on Model CCV.
5. Disconnect and remove the grey-coded jumper from the OSC OUT fitting on the tuner. Cover the fitting with the cap removed in step 3.
6. Set OSCILLATOR INT EXT switch on Model CCV to INT position.

C. INSTALLATION OF MODEL CCV FOR ON-CHANNEL CONVERSION (ch. 2 to ch. 2, etc.)

1. For channels 4, 5 and 6 install Model LPF-50 as under A.
2. Install Model CCV as under B steps 1 to 4.
3. Remove cap from J501 OSC IN fitting on Model CCV; connect grey-coded jumper to J501.
4. Set OSCILLATOR INT EXT switch on CCV to EXT position.

D. INSTALLING THE CHANNEL COMMANDER

GENERAL

1. Mounting of Channel Commanders in standard 19" relay racks should be done so that most convenient mixing of their outputs can be effected. Use double-shielded cable for construction of mixing jumpers; jumper lengths are non-critical. In many cases the RF OUT terminal bracket can be removed and connections be made directly to the fittings on the CCV chassis.
2. Units in the same rack should have 5 to 7 inches of vertical spacing between them for proper ventilation and ease of servicing.
3. Channel Commanders can be used with any 75-ohm antenna arrays or other 75-ohm source such as preamplifiers (e.g., Model TPR-*).
4. As output mixing determines the arrangement in the relay racks, we shall discuss this matter first.

OUTPUT CONNECTION

1. Mixing the output of a single COM-* unit with outputs of compatible equipment (such as Model DPM-*): connect the RF OUT fittings at chassis rear of the COM-* in the same manner as the outputs of a single-channel amplifier.
2. Mixing the outputs of several COM-* units: mixing should be done separately for low-band and high-band channels. Non-adjacent channels in each band can be mixed directly; so can **two** adjacent channels in either band. Where more than two channels in the low-band or the high-band are to be mixed, mix non-adjacent channels directly in two groups and combine both groups in a mixer such as Model 1592. The mixed low-band and the mixed high-band can then be combined in a further network such as Model LHS-76 to obtain an all-band, single trunk line input.
3. Mixing should be done with the signal flow directed from the lowest channel unit to the highest channel unit in each group, terminating unused output terminals in the lowest channel units with Models TR-72F (see block diagram).
4. After mounting the COM-* units according to the above criteria, measure the lengths of mixing jumpers that will be required, construct the jumpers and interconnect the COM-* units.

INPUT CONNECTION

1. At the end of each antenna down lead install an F-59A connector, as described in Jerrold instruction book 435-345. Where other than RG-59/U type cable is used, install appropriate adapter fittings.
2. With a Jerrold Field Strength Meter measure the signal strength at the end of each down lead; record the readings for future reference.

   64,000uV

   a. The max. input level should not exceed +36 dbj as specified. The input level measured at channel 6 should not exceed 1000 uv; this is important for proper color reception!

   b. If signal strength is less than 100 uv (—20 dbj), install a mast-mounting preamplifier Model TPR-* for the particular channel.

   c. If signal strength measured on channel 6 is more than 1000 uv (0 dbj), connect an in-line attenuation pad Model PDL** and an F-71 adapter (or a short RG-59/U jumper equipped with F-59A fittings) to the end of the down lead to reduce the signal to approximately 0 dbj.
3. Connect each down lead to the ANT INPUT fitting at the rear apron of the respective COM-* unit.

**Available for 3, 6, 10 and 20 db.

OPERATIONAL PROCEDURE

GENERAL

This step-by-step procedure should be followed for each COM-* unit installed. A level-setting example for a COM-* system is given, with a Model TML-1 as the first amplifier, and with JT-1750 type cable used in the trunk line.

1. Plug line cord of COM-* into 117 vac outlet.
2. Set POWER switch to ON position.
3. Set GAIN SELECT switch to AGC position.
4. Set AFC ON switch to down (off) position.
5. Set small knob of tuner selector switch with white dot to the off-the-air channel assigned to COM-* installed.
6. Slowly tune the fine tuning control (large knob) on the channel selector to obtain zero indication on the AFC BALANCE meter; there should be a decided plus and minus indication about the zero point during tuning.

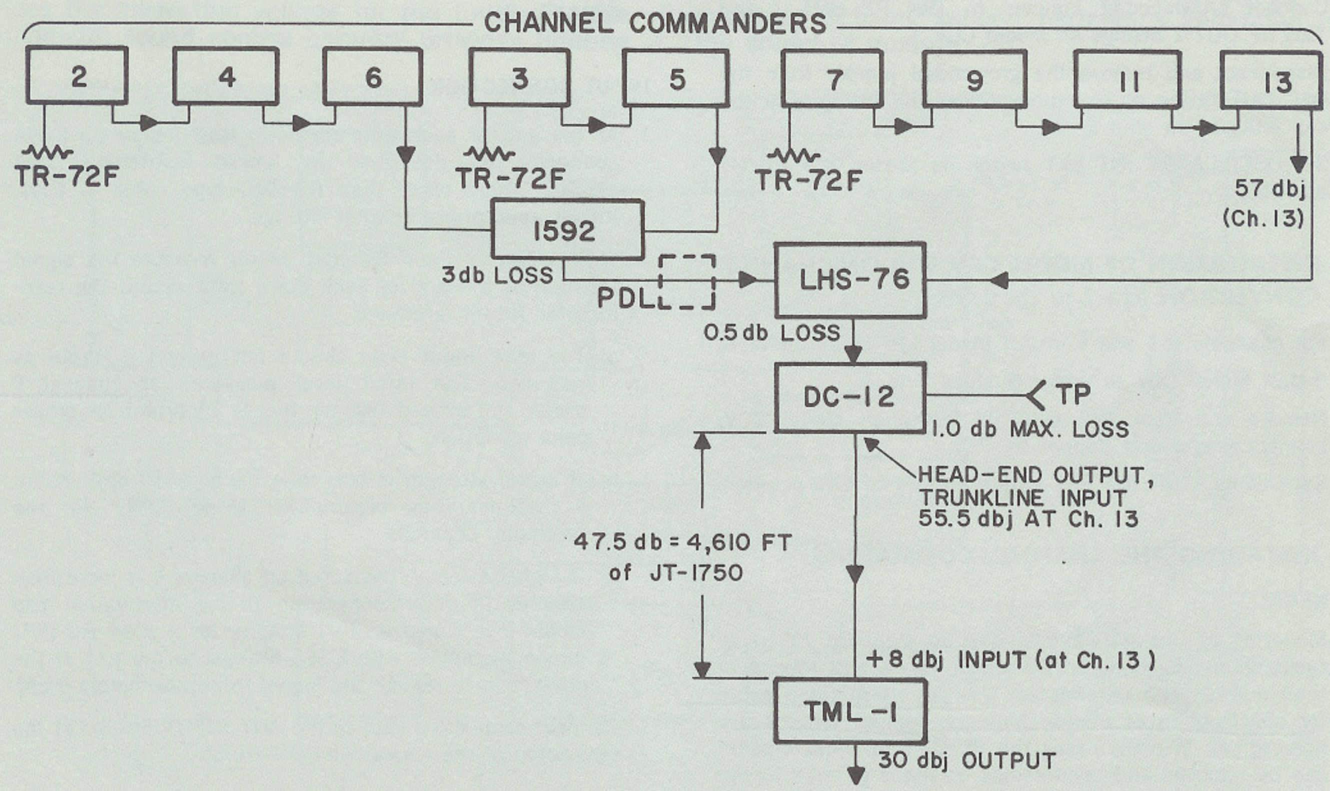
   NOTE: The tuner oscillator may possibly convert a strong but undesired adjacent video carrier to 41.25 mc. To find out whether the unit is properly tuned to the desired channel, connect a tv receiver to the TEST fitting on the front panel. If a good clear picture shows, the unit is tuned properly. If a faded or distorted picture shows, retune the unit.
7. Set AFC ON switch to ON position.
8. If the COM-* is installed for operating an additional channel, or replacing a single-channel amplifier, use a Jerrold Field Strength Meter for measuring the signal strength of the video and sound r-f carriers of the particular channel at the trunk line input; then set the output to the desired level at the new channel, or to the same level as that of the previous unit.

NOTE: Each COM-* has been factory-equipped with plug-in pads of proper value (Models PIP-3, 6, etc.) to provide a video carrier level of 57 ± 1 dbj and a sound carrier level of 42 ± 1 dbj at each RF OUT terminal.

EXAMPLE OF A COM-* SYSTEM

1. Systems normally require a flat output from the first repeater amplifier. As cable characteristics vary with frequency, this requires "tilting" the output of the head-end (or trunk line input).
2. Let us assume a typical 9-channel head-end using COM-2, 3, 4, 5, 6, 7, 9, 11 and 13; the low-band groups (channels 2, 4, 6) are mixed (with 3 & 5) in a Model 1592 with a loss of 3 db; the low-band is mixed with the high-band in a Model LHS-76 with a loss of 0.5 db; a directional coupler (Model DC-12) is used for introducing a permanent test point incurring a max. loss of 1 db; the first repeater amplifier is a Model TML-1 with a recommended input level of +8 dbj and is equalized for 22 db of cable (both at ch. 13). See block diagram.
3. a. Operating the COM-13 at maximum output of 57 dbj at ch. 13 to achieve longest possible cable run to the TML-1, we calculate: 57 less losses in: (a) LHS-76, (b) DC-12, and (c) less input to TML-1 = 57 — (0.5 + 1.0 + 8) = 47.5 db.

   b. Using JT-1750 type cable, having a nominal attenuation of 1.03 db/100 ft. at channel 13 and at a mean temperature of 70°F, we can achieve a cable run of $\frac{47.5 \times 100}{1.03} = 4{,}610$ ft.



Block Diagram—Typical 9-Channel Head-End with JT-1750 Trunk and TML-1 First Repeater Amplifier

c. The chart below gives the nominal attenuation per 100 ft. of JT-1750 cable, at 70°F, for each video carrier.

ch. 2 ....0.49 db	ch. 8 ....0.92 db
ch. 3 ....0.52 db	ch. 9 ....0.95 db
ch. 4 ....0.54 db	ch. 10 ....0.98 db
ch. 5 ....0.58 db	ch. 11 ....1.00 db
ch. 6 ....0.60 db	ch. 12 ....1.02 db
ch. 7 ....0.89 db	ch. 13 ....1.03 db

We can thus calculate the attenuation for each of our video carriers in our cable of 4,610 ft.; at channel 2 the attenuation is $\frac{0.49 \times 4{,}610}{100} = 22.5$ db,

and for all channels in our system:

ch. 2 ....22.5 db	ch. 7 ....41.0 db
ch. 3 ....24.0 db	ch. 9 ....44.0 db
ch. 4 ....25.0 db	ch. 11 ....46.0 db
ch. 5 ....26.5 db	ch. 13 ....47.5 db
ch. 6 ....27.5 db	

d. Our TML-1 being equalized for 22 db = 2,140 ft. of JT-1750 cable at ch. 13 and requiring an input of + 8 dbj, we calculate the TML-1 input levels for all video carriers in our system; for ch. 2 the level is

$$22 + 8 - \frac{0.49 \times 2{,}140}{100} = 19.5 \text{ dbj},$$

and for all channels in our system:

ch. 2 ....19.5 dbj	ch. 7 ....11 dbj
ch. 3 ....19.0 dbj	ch. 9 ....10 dbj
ch. 4 ....18.5 dbj	ch. 11 .... 9 dbj
ch. 5 ....17.5 dbj	ch. 13 .... 8 dbj
ch. 6 ....17.0 dbj	

e. Adding the figures derived in d to those in c, we get the levels required at the trunk line input in our example:

ch. 2 ....42.0 dbj	ch. 7 ....52.0 dbj
ch. 3 ....43.0 dbj	ch. 9 ....54.0 dbj
ch. 4 ....43.5 dbj	ch. 11 ....55.0 dbj
ch. 5 ....44.0 dbj	ch. 13 ....55.5 dbj
ch. 6 ....44.5 dbj	

f. Operating the TML-1 with block-tilt of 3 db in the low-band, we can set our low-band channels to the following trunk line input levels:

ch. 2 ....39.0 dbj	ch. 5 ....41.0 dbj
ch. 3 ....40.0 dbj	ch. 6 ....41.5 dbj
ch. 4 ....40.5 dbj	

Inserting an appropriate PDL after the low-band mixer (Model 1592) will operate the individual COM-* units near optimum rated output.

4. Measure the level of each video carrier at the trunk line input. Adjust the front panel AGC control to come as close as possible to the level arrived at in 3 e and f respectively. If necessary exchange the PIP plug-in pad on the CCV-* module for one of higher attenuation. Then record the trunk line input levels for future reference.

   NOTE: Our example gives approximate level settings before total system alignment begins. In modern installation practice, with 2-way voice communication facilities available, the fastest and most accurate way of level setting is to fine-adjust the individual COM-* units following instructions given by an observer reading the output levels at the first trunk line amplifier.

5. Check each COM-* for internally generated standby-carrier signal:

   a. Disconnect the antenna input-lead from the COM-*; after about 20 seconds the SIGNAL OFF indicator on COM-* front panel should light up. If the time interval is too short, slightly adjust the SEN (sensitivity) control clockwise and repeat test. If the time interval is too long, slightly adjust the control counter-clockwise and repeat test. For this test, the COM-* should have been in operation at least 1 hour.

   b. Adjust OSC LEVEL control on standby-carrier oscillator of each COM-* to obtain the same output level as recorded under 4.

   c. Reconnect antenna lead; SIGNAL OFF indicator light should go off in about 2 seconds.

   d. If the light does **not** go off in about 2 seconds, slowly advance the SEN control on the standby-carrier module clockwise until light goes off. Then repeat steps 5 a to c.

6. After all operation checks have been made, wrench-tighten all jumper connectors not more than 1/6 of a turn.

MAINTENANCE

MODULE REPLACEMENT

Model COM-* is designed to give long, trouble-free service. Its modular construction permits quick replacement of a sub-assembly with a spare at the infrequent times when servicing becomes necessary. Down-time of the channel involved during replacement is kept to not more than a minute or two.

For multi-channel systems Jerrold recommends the following spare equipment:

1. One complete COM unit less CCV module.
2. One CCV module for each channel in operation.

TUBE REPLACEMENT

Replacement tubes must be of the same type as specified in the parts list. After tube replacement, check the output levels and compare the readings with those previously recorded. If tube replacement requires re-alignment of a module, follow the alignment procedures given here. If lack of test equipment prevents proper alignment in the field, send the sub-assembly to the factory while keeping the channel in operation with the spare equipment. Carefully pack the module and ship it, with freight and insurance charges prepaid, to Jerrold's Service Department. Include a letter quoting the channel involved and listing the difficulties encountered.

ALIGNMENT PROCEDURES

A. EQUIPMENT REQUIRED

1. Sweep Generator—Jerrold Models 601, 890, 900A.
2. Oscilloscope—Commercial type with 5" screen, calibrated vertical amplifier.
3. Detector—Jerrold Model D-86.
4. Two Attenuators—Jerrold Model AV-75.
5. VTVM—Commercial type with high input impedance.
6. Field Strength Meter—Jerrold Model 704-B.

7. Marker Generator—Jerrold Model CM-6, for oscillator frequencies of 39.75 mc, 41.25 mc, 41.6 mc, 45.75 mc, 46.5 mc, and 47.25 mc.
8. Marker Generator—Variable type, Weston or RCA.
9. Band Filter—Jerrold Model FCO-47.
10. Attenuation Pad—Jerrold Model PDL-6.
11. Low-capacity Probe—10:1 Divider type.
12. 75-ohm Termination—Jerrold Model TR-72F.
13. Jig Shield—Jerrold Model AJ-106.
14. RF-Bridge—Jerrold Model KSB-7F (fixed 75 ohms).
15. Coaxial Switch—Jerrold Model FD-30 or TC-3.
16. Spare Amplifier—Jerrold Model TML-1 or SCA-213.
17. —3.5 volt bias supply.

B. TUNER ALIGNMENT

1. Set up equipment as shown in fig. 4.
2. Set power switch on COM-* front panel to POWER ON position and allow 5 minutes warm-up.
3. Set AFC ON switch to off position (down); set GAIN SELECT switch to MAN position.
4. Tune sweep generator to the mid-frequency of the channel concerned; set marker generator to provide markers at the video and sound carrier frequencies of the channel concerned.
5. Observe the oscilloscope for flatness and band-pass; adjust C12 and C13 for flat response (±½ db), with video and sound carriers on top of the curve.

C. VIDEO I-F ALIGNMENT

The video i-f stage should not ordinarily require alignment in the field, even after tube replacement. However, in case of emergency and where a spare unit is not available, proceed as follows:

1. Ascertain that Model COM-* is de-energized.
2. Set up test equipment as shown in fig. 4.
3. Place jig Model AJ-106 over tube V304 in video i-f module.
4. Connect a 6 db pad to J303; terminate J304 with a Model TR-72F. Connect sweep output to AJ-106, and FCO-47 input to the 6 db pad.
5. Observe response and adjust L317 and L318 for flatness from 41 to 47 mc.
6. Energize Model COM-*; allow 5 minutes warm-up.
7. Transfer AJ-106 from V304 to V303.
8. Set GAIN SELECT switch to MAN position; set MAN gain control at minimum (maximum counter-clockwise position).
9. Adjust T304 and R316 for maximum attenuation at 41.25 mc.
10. Adjust L312, L315, and L316 for response shown in fig. 5.

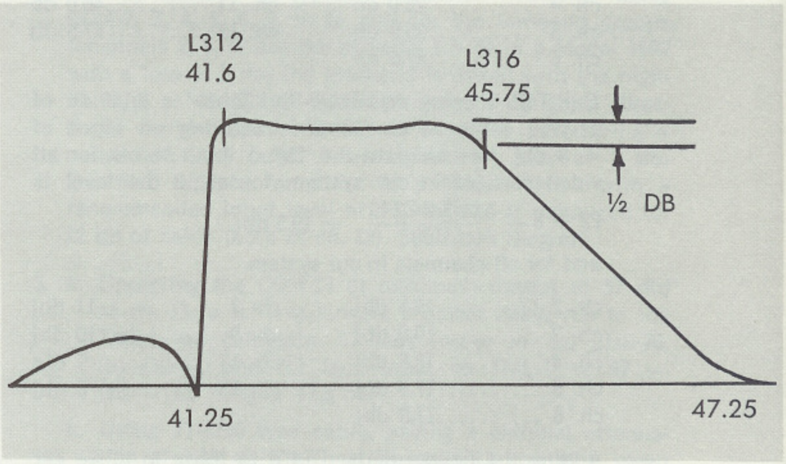


Fig. 5—Response Curve (L312, 315, and 316 adjustment)

11. Connect a VTVM to test point TP301 and adjust MAN gain control for a reading of —3.0 volts.
12. Transfer AJ-106 from V303 to V302; adjust T303 for maximum attenuation at 47.25 mc; be sure this trap is on frequency before aligning this interstage. Now adjust

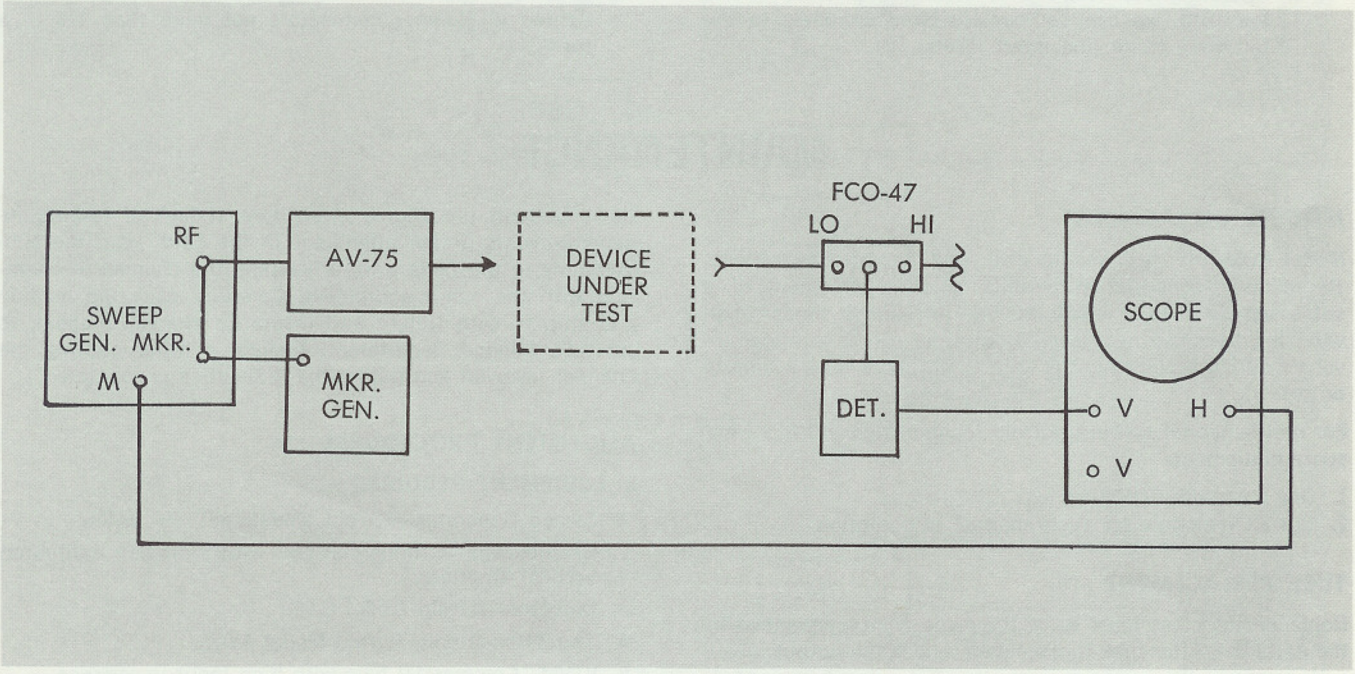


Fig. 4—Test Set-up

L308 and L311 for the response shown in fig. 6; then recheck the trap frequency and, if necessary, readjust the bandpass circuit. Remove AJ-106.

13. Connect sweep input to IF IN terminal J301; adjust C306 for maximum attenuation at 39.75 mc; adjust C308 for maximum attenuation at 47.25 mc.

14. Adjust T301, T302 and L307 for response shown in fig. 7. Continuously monitor the trap frequencies while aligning this interstage. It may be necessary to touch-up the other stages to achieve an overall flatness of ± ¼ db. DO NOT adjust L301, L302 and L303 in the input stage, nor L317, L318 and L320 in the output stage!

D. SOUND I-F ALIGNMENT

With COM-* in operating condition tuned to the assigned channel:

1. Disconnect the jumper at the IF IN terminal J301 on the VIDEO IF AGC module.
2. Connect an AV-75 attenuator to that terminal; connect a CM-6 generator, capable of delivering a 41.25 and a 45.75 mc signal, to the AV-75.
3. Connect a field strength meter to one RF OUT terminal at the rear apron of the COM-*.
4. Turn SOUND LEVEL control maximum clockwise.
5. Tune the field strength meter for maximum indication of sound carrier level for the assigned channel. Attenuate the input signal to J301 sufficiently to stay below limiting level.
6. Now adjust T203 and T204 for maximum output; then turn SOUND LEVEL control maximum counter-clockwise and adjust T304 and R316 on the VIDEO IF AGC chassis for maximum attenuation at the sound carrier.
7. Connect a VTVM to test point TP201 on the SOUND IF AFC chassis and adjust L201 for maximum negative voltage. Then back up the adjustment ½ turn counter-clockwise.
8. Disconnect VTVM; connect a low-capacity probe in its stead; connect the other side of the probe via a D-86 detector to an oscilloscope; insert a sweep generator between the marker generator and the AV-75; set sweep for 40.5 to 42 mc. This set-up is similar to that in fig. 4.

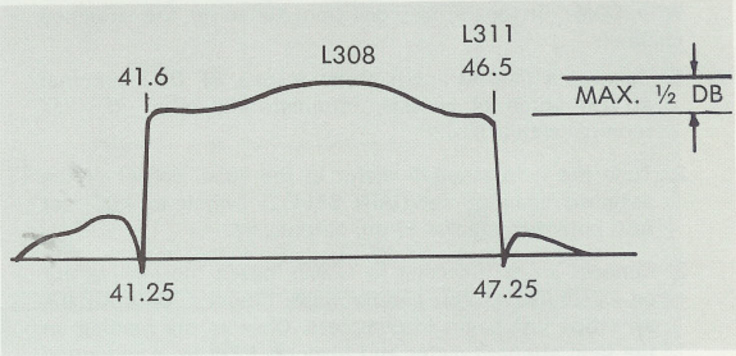


Fig. 6—Response Curve (L308 and 311 adjustment)

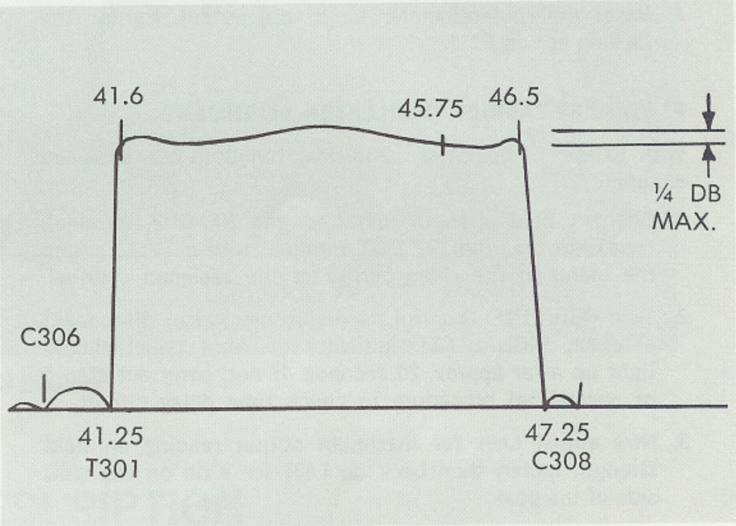


Fig. 7—Response Curve (T301 and 302 and L307 adjustment)

9. Now adjust C221 and top and bottom of T202 for response curve shown in fig. 8; keep the sweep input to a level so as to maintain a 2-volt deflection on the oscilloscope; the flat portion of the curve should vary not more than 0.2 volts (approx. 1 db).
10. Disconnect probe from TP201; remove D-86; connect probe directly between AUDIO output terminal J201 and oscilloscope.
11. Now adjust top and bottom of T201 for response curve shown in fig. 9; adjust for maximum amplitude with equal displacement above and below the base line.

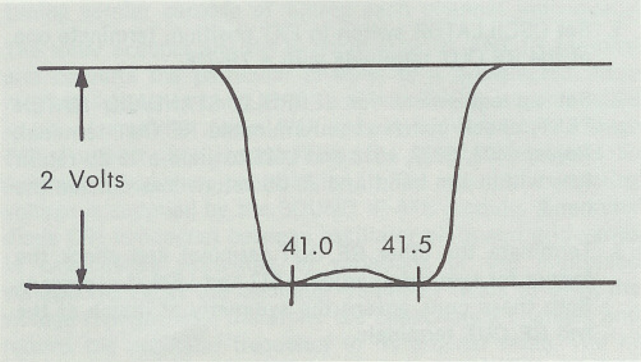


Fig. 8—Response Curve (C221 and T202 adjustment)

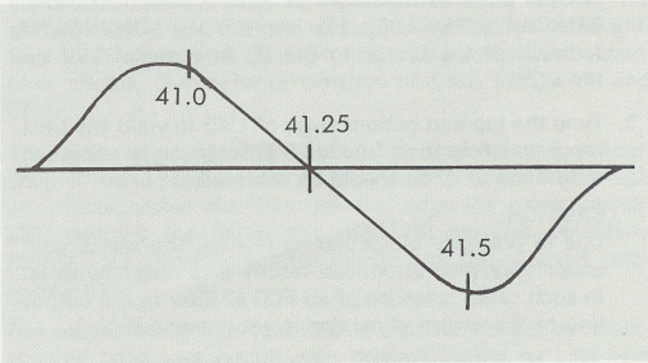


Fig. 9—Response Curve (T201 adjustment)

E. CLIPPING LEVEL ALIGNMENT

With COM-* in operating condition, tuned to the assigned channel:

1. Connect a field strength meter to one RF OUT terminal at rear apron of chassis; terminate the other RF OUT terminal with a TR-72F.
2. Tune the field strength meter to the video carrier of the assigned channel; set GAIN SELECT switch to AGC; set AGC potentiometer for 57 dbj output.
3. Connect an oscilloscope to TP302; loosen the locking nut on CLIPPING LEVEL control R338; adjust R338 until the sync tips just begin to compress. Observe the reading on the field strength meter and back off R338 for a reduction of 2 db.
4. Reset AGC potentiometer for 57 dbj output; tighten the locking nut on R338.

F. STANDBY-CARRIER OSCILLATOR ALIGNMENT

With COM-* in operating condition, tuned to the assigned channel:

1. Connect field strength meter to one RF OUT terminal; terminate the other RF OUT terminal with a TR-72F; tune the meter to the video carrier of the assigned channel.
2. Turn OSC LEVEL control maximum clockwise; disconnect antenna; SIGNAL OFF indicator on front panel should light up after approx. 20 seconds. If not, carry out step 5 of operational procedure to check time delay circuit.
3. Now adjust L401 for maximum output reading on field strength meter; then back up L401 for 2 db on the slow side of the peak.
4. Adjust OSC LEVEL control for 57 dbj output.

G. CONVERTER ALIGNMENT

With COM-* in operating condition, tuned to assigned channel:

a) Alignment for input match:

1. Set OSCILLATOR switch to EXT position.
2. Apply a —3.5-volt bias to feed-through capacitor C512 located between V503 and L505 on the CCV chassis.
3. Where the originally supplied PIP plug-in pad has been replaced with one of different attenuation value, re-insert the original PIP into socket J503.
4. Set up test equipment for JERROLD STANDARD MATCH TEST as described in Jerrold Technical Newsletter Vol. 2, No. 1, fig. 14a; connect the "UNKNOWN" terminal of the bridge to the IF IN terminal J502 on the CCV.
5. Tune the top and bottom slugs of L505 to yield the best input match in the i-f band of 41 to 47 mc; a minimum return loss of 20 db should be achieved.

   CAUTION:
   Due to presence of second harmonics, the sweep generator may give erroneous return loss measurements. In such cases insertion of an FCO-47 filter in the output line of the sweep generator is recommended.

b) Alignment of oscillator for off-channel operation:

1. Remove —3.5-volt bias from C512; connect VTVM to C512.
2. Terminate IF IN terminal J502 with a TR-72F.
3. Set OSCILLATOR switch to INT position.
4. Adjust L501 for peak value; peak L504. For low-band channels adjust C534, for high-band channels adjust C503, to indicate —3.9 volts. Then reset L501 for —3.5 volts on the slow side. This will generally yield maximum conversion gain. Gain will deviate 1 db with a bias variation from —2.5 to —5.0 volts.

c) Alignment of oscillator for on-channel operation:

1. Carry out steps 1 and 2 as under b.
2. Interconnect OSC OUT terminal on tuner and OSC IN terminal J501 on CCV by coaxial jumper.
3. Set OSCILLATOR switch to EXT position.
4. Adjust C506 (accessible through hole in chassis, near J501) for —3.5 volt bias.

d) Alignment of oscillator response:

1. Set up equipment as in fig. 4 but omit FCO-47 from circuit.
2. Terminate RF OUT 1 terminal J504 with a TR-72F; set OSCILLATOR switch to INT position.
3. Checking the output at J505, adjust L506, L507, L510 and L511 to yield a response as shown in fig. 10 (see note).
4. Terminate the RF OUT 2 terminal J505; check the response at J504; if it is tilted, adjust the response at J505 to give a min. flatness of ½ db. Minimum gain should be 17 db, maximum gain should be 23 db.
5. On low-channel (particularly ch. 2, 3 and 4) converters, L506 and L507 may have to be detuned slightly to yield the desired response, since the coupling capacitor C512 has a fixed value.
6. On high-channel units (particularly ch. 11, 12 and 13) the outer poles can be sharpened by very slightly increasing the inductance of L509. This adjustment is very critical! Too much inductance of L509 may mismatch the output!

   NOTE:
   The overall i-f band of interest is 41 to 47 mc. The COM-* actually shapes this to the required band of 41.25 to 46.25 mc. Therefore the CCV can be aligned to a flat-top at maximum bandwidth or to one at minimum bandwidth. The bandwidth is established by the tolerances of C515, C516, R516, and by tube characteristics.

e) Oscillator output match:

1. Set OSCILLATOR switch to EXT position; terminate one of the RF OUT terminals with a TR-72F.
2. Set up equipment for JERROLD STANDARD MATCH TEST; check match at unterminated RF OUT terminal. Adjust C521, C522, L512 and L528 to yield a 15 db return loss within the band and 20 db return loss outside the band.
3. Terminate the other RF OUT terminal and check the former for symmetry; adjust L512 and L528 if necessary. Both these coils govern the symmetry of match at the two RF OUT terminals.
4. Recheck both response (with OSCILLATOR switch set to INT) and match (with OSCILLATOR switch set to EXT).

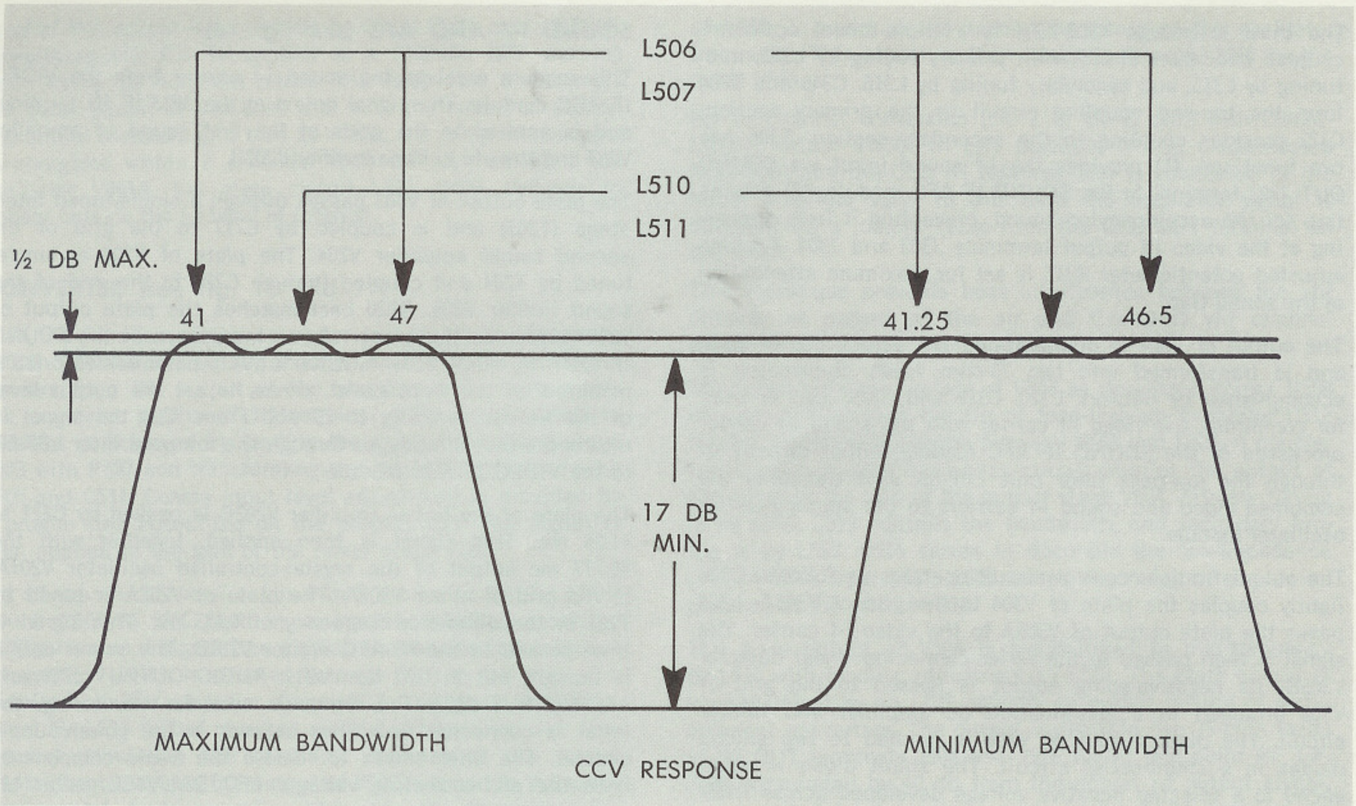


Fig. 10—CCV Response

CIRCUIT DESCRIPTION

POWER SUPPLY (compare fig. 11)

The built-in power supply operates on 90-130 vac, 60 cps. It employs a line-regulating transformer T101, silicon rectifiers CR101, CR102 and CR103, a filter network, and a voltage regulating tube V101. The power supply provides positive and negative 150 vdc voltages and 6.3 vac.

Except for the tuner, all modules are powered and connected to operating controls via plugs and sockets. The tuner is powered via a 6-conductor cable.

TUNER (compare fig. 12)

The tuner is a modified Standard-Kollsman unit. It has a 13-position selector switch with a coaxially mounted fine-tuning vernier capable of tuning each channel individually.

The tuner accepts any vhf tv channel at its ANT IN terminal and converts the particular channel to a preselected intermediate frequency band of 41 to 47 mc. This is accomplished in an r-f amplifier stage (V1) and an oscillator-mixer stage (V2). For best oscillator stability, the tuner incorporates an automatic frequency control circuit. The required correcting voltage is supplied by the SOUND IF AFC module. A varactor diode CR1 connected between oscillator plate and grid varies in capacitance according to variations of the impressed voltage. Hence, as the oscillator frequency tends to shift, the voltage changes and, therefore, the capacitance changes and returns the oscillator frequency to its original value. The i-f band is passed via IF OUT terminal to the VIDEO IF AGC module.

For on-channel operation of the COM-*, the tuner oscillator replaces the oscillator in the CCV module. This maintains station frequency assignments and prevents co-channel interference in systems.

VIDEO I-F AMPLIFIER AND AGC (compare fig. 13)

This module accepts the i-f band from the tuner with the video carrier at 45.75 mc, the sound carrier at 41.25 mc, and the color sub-carrier at 42.17 mc. Special traps reject frequencies outside the band of interest with particular emphasis on the adjacent video carrier of 39.75 mc, the adjacent sound carrier at 47.25 mc, and the adjacent color sub-carrier at 48.17 mc.

The signal enters at the IF IN terminal J301. The input is matched to 75 ohms for the 41-47 mc band by loading the grid of V301 with R301 and transforming the resultant grid load to 75 ohms in a double-tuned, optimum-coupled, band-pass circuit. This network consists of C301, L301, L302 and L303.

The first interstage V301-V302 is a double-tuned, under-coupled band-pass circuit. Primary tuning is on T301 which also incorporates the trap for the adjacent video carrier. L307 controls the bandwidth and T302 provides secondary tuning. T302 also incorporates the trap for the adjacent color sub-carrier.

The second interstage V302-V303 is a double-tuned, optimum-coupled band-pass circuit with primary tuning by L308 and secondary tuning by L311. C312 and T303 form the top-end coupling circuit with T303 acting as trap for the adjacent sound carrier.

E. CLIPPING LEVEL ALIGNMENT

With COM-* in operating condition, tuned to the assigned channel:

1. Connect a field strength meter to one RF OUT terminal at rear apron of chassis; terminate the other RF OUT terminal with a TR-72F.
2. Tune the field strength meter to the video carrier of the assigned channel; set GAIN SELECT switch to AGC; set AGC potentiometer for 57 dbj output.
3. Connect an oscilloscope to TP302; loosen the locking nut on CLIPPING LEVEL control R338; adjust R338 until the sync tips just begin to compress. Observe the reading on the field strength meter and back off R338 for a reduction of 2 db.
4. Reset AGC potentiometer for 57 dbj output; tighten the locking nut on R338.

F. STANDBY-CARRIER OSCILLATOR ALIGNMENT

With COM-* in operating condition, tuned to the assigned channel:

1. Connect field strength meter to one RF OUT terminal; terminate the other RF OUT terminal with a TR-72F; tune the meter to the video carrier of the assigned channel.
2. Turn OSC LEVEL control maximum clockwise; disconnect antenna; SIGNAL OFF indicator on front panel should light up after approx. 20 seconds. If not, carry out step 5 of operational procedure to check time delay circuit.
3. Now adjust L401 for maximum output reading on field strength meter; then back up L401 for 2 db on the slow side of the peak.
4. Adjust OSC LEVEL control for 57 dbj output.

G. CONVERTER ALIGNMENT

With COM-* in operating condition, tuned to assigned channel:

a) Alignment for input match:

1. Set OSCILLATOR switch to EXT position.
2. Apply a —3.5-volt bias to feed-through capacitor C512 located between V503 and L505 on the CCV chassis.
3. Where the originally supplied PIP plug-in pad has been replaced with one of different attenuation value, re-insert the original PIP into socket J503.
4. Set up test equipment for JERROLD STANDARD MATCH TEST as described in Jerrold Technical Newsletter Vol. 2, No. 1, fig. 14a; connect the "UNKNOWN" terminal of the bridge to the IF IN terminal J502 on the CCV.
5. Tune the top and bottom slugs of L505 to yield the best input match in the i-f band of 41 to 47 mc; a minimum return loss of 20 db should be achieved.

   CAUTION:
   Due to presence of second harmonics, the sweep generator may give erroneous return loss measurements. In such cases insertion of an FCO-47 filter in the output line of the sweep generator is recommended.

b) Alignment of oscillator for off-channel operation:

1. Remove —3.5-volt bias from C512; connect VTVM to C512.
2. Terminate IF IN terminal J502 with a TR-72F.
3. Set OSCILLATOR switch to INT position.
4. Adjust L501 for peak value; peak L504. For low-band channels adjust C534, for high-band channels adjust C503, to indicate —3.9 volts. Then reset L501 for —3.5 volts on the slow side. This will generally yield maximum conversion gain. Gain will deviate 1 db with a bias variation from —2.5 to —5.0 volts.

c) Alignment of oscillator for on-channel operation:

1. Carry out steps 1 and 2 as under b.
2. Interconnect OSC OUT terminal on tuner and OSC IN terminal J501 on CCV by coaxial jumper.
3. Set OSCILLATOR switch to EXT position.
4. Adjust C506 (accessible through hole in chassis, near J501) for —3.5 volt bias.

d) Alignment of oscillator response:

1. Set up equipment as in fig. 4 but omit FCO-47 from circuit.
2. Terminate RF OUT 1 terminal J504 with a TR-72F; set OSCILLATOR switch to INT position.
3. Checking the output at J505, adjust L506, L507, L510 and L511 to yield a response as shown in fig. 10 (see note).
4. Terminate the RF OUT 2 terminal J505; check the response at J504; if it is tilted, adjust the response at J505 to give a min. flatness of ½ db. Minimum gain should be 17 db, maximum gain should be 23 db.
5. On low-channel (particularly ch. 2, 3 and 4) converters, L506 and L507 may have to be detuned slightly to yield the desired response, since the coupling capacitor C512 has a fixed value.
6. On high-channel units (particularly ch. 11, 12 and 13) the outer poles can be sharpened by very slightly increasing the inductance of L509. This adjustment is very critical! Too much inductance of L509 may mismatch the output!

   NOTE:
   The overall i-f band of interest is 41 to 47 mc. The COM-* actually shapes this to the required band of 41.25 to 46.25 mc. Therefore the CCV can be aligned to a flat-top at maximum bandwidth or to one at minimum bandwidth. The bandwidth is established by the tolerances of C515, C516, R516, and by tube characteristics.

e) Oscillator output match:

1. Set OSCILLATOR switch to EXT position; terminate one of the RF OUT terminals with a TR-72F.
2. Set up equipment for JERROLD STANDARD MATCH TEST; check match at unterminated RF OUT terminal. Adjust C521, C522, L512 and L528 to yield a 15 db return loss within the band and 20 db return loss outside the band.
3. Terminate the other RF OUT terminal and check the former for symmetry; adjust L512 and L528 if necessary. Both these coils govern the symmetry of match at the two RF OUT terminals.
4. Recheck both response (with OSCILLATOR switch set to INT) and match (with OSCILLATOR switch set to EXT).

The third interstage V303-V304 is a triple-tuned, optimum-coupled band-pass circuit with primary tuning by L312, mid-tuning by L315, and secondary tuning by L316. C345 and T304 form the top-end coupling circuit in the primary section; C322 provides coupling in the secondary section. T304 has two functions: (1) provides the i-f sound input via SOUND OUT J302 terminal to the SOUND IF AFC module; (2) acts as trap for the accompanying sound, preventing it from appearing at the video i-f output terminals J303 and J304. Factory-adjusted potentiometer R316 is set for maximum attenuation of the sound trap.

The output of V304 is double-tuned flat across the i-f band and is transformed into two 75-ohm loads. Backmatch is accomplished by network L320, C328 and C329. J303 is used for combining the video i-f carrier with the sound i-f carrier processed in the SOUND IF AFC module, either directly or through the low-pass filter unit LPF-50. J304 transmits the combined video and sound i-f carriers to the standby-carrier oscillator module.

The automatic gain control circuit operates as follows: C326 lightly couples the plate of V304 to the grid of V305A. L323 peaks the plate output of V305A to the video i-f carrier. The signal is then passed to the series-connected linear detector V305B; its negative-going output is passed to the grid of V306 arranged in a combination dc amplifier and limiter circuit. The plate output of V306 is applied to two silicon diodes in a shunt-series circuit. The shunt diode is referenced to a selected negative voltage developed across R329. This circuit yields excellent noise limiting and clipping at sync tip level.

The signal then passes to the second dc amplifier V307A, a cathode follower with a short time constant effected by R332 and C338. The positive-going output is then applied to the final dc amplifier V307B which develops the negative-going AGC voltage across a relatively low load.

This AGC bias is applied to two separate control areas: (1) directly to the i-f amplifier control grids (V301, V302 and V303); (2) indirectly to the tuner r-f amplifier control grid (V1).

The circuit design for (2) is based on the following:

> For any antenna signal other than that which would require maximum gain, the AGC amplifier will develop negative bias. This would then reduce the gain of V1 and increase the noise figure of the tuner, which is not desirable at low r-f antenna signal levels.

A "bucking voltage" circuit R111 and R115 has therefore been incorporated in the power supply chassis. This circuit determines the point at which AGC bias will be applied to the grid of V1. At low r-f signal levels, R109 and R110 establish the required minimum grid bias for V1. Clamp CR104 prevents positive voltage excursions. At high r-f signal levels, AGC bias is applied to V1 at twice the rate of that applied to the i-f amplifier; this prevents overloading V1 and considerably extends the dynamic range of the tuner without degrading its characteristics under weak signal level conditions.

For automatic gain control, the threshold of the video carrier output level is adjustable by AGC potentiometer R119 which references the cathode of V305A to ground.

For manual gain control the GAIN SELECT switch S102 applies control bias to R333 and R334 via MAN potentiometer R112.

The cathode of V307B is referenced to negative bias via R337, R338 and R339. Potentiometer R338 serves to position sync tips at or near clipping level. Grid control bias can be monitored at TP-301; clipping level can be monitored at TP-302.

SOUND I-F AND AFC (see fig. 14)

This module receives the sound i-f carrier from the VIDEO IF AGC module. The signal enters at the J203 IF IN terminal and is applied to the grids of the first sound i-f amplifier V203 and the afc buffer amplifier V202B.

The plate output of V203 passes through a single-tuned interstage (T203) and is coupled by C217 to the grid of the second sound amplifier V204. The plate of V204 is single-tuned by T204 and coupled through C224 to the grid of the sound limiter V205. R220 back-matches the plate output of V205 to provide the proper source impedance at the SOUND IF OUT terminal J204. SOUND LEVEL potentiometer R108, mounted on the front panel, serves to set the output level of the limiter normally to 25 dbj. From J204 the signal is returned either directly, or through the low-pass filter LPF-50, to the VIDEO IF AGC module.

The plate of the buffer amplifier V202B is peaked by C221 to 41.25 mc. This signal is then applied, together with the 36.777 mc output of the crystal-controlled oscillator V201A, to the grid of mixer V202A. The plate of V202A is tuned by T202 to the difference frequency of 4.473 mc. This signal is then passed to the IF AFC limiter V201B. The sound output is brought out to two terminals: AUDIO OUTPUT J201 and AFC OUTPUT J202. The former is used for monitoring, the latter is connected to a filter network in the power supply chassis. The filter serves to remove the audio components from the afc correcting voltage. AFC BALANCE meter M1 serves to monitor the correcting voltage, which is then applied through AFC ON switch S103 to the varactor diode circuit in the tuner.

The use of a 4.473 mc afc intermediate frequency instead of the 4.5 mc standard is based on the following considerations:

At the IF IN terminal we have a very low level 45.75 mc carrier. This produces a low level 4.5 mc carrier at the output of the mixer V202A. This carrier in turn would generate an interfering beat with the desired 4.5 mc carrier produced by conversion of the 41.25 mc. By off-setting the afc carrier from 4.5 mc to 4.473 mc, a 27 kc beat is generated which is outside the audible range. The resultant dc component of the undesired 4.5 mc carrier is negligible.

STANDBY-CARRIER OSCILLATOR (see fig. 15)

The function of this unit is to provide a video i-f carrier signal for routine maintenance and servicing during station-off periods. The circuit consists of a crystal-controlled oscillator activated by a tube-controlled reed relay.

The signal from the VIDEO IF AGC module enters at the IF IN terminal J401 and is applied to contacts on relay K401. Relay action is controlled by tube V401B which samples the grid bias voltage through R407. The level of this voltage is set by the chassis-mounted SEN (sensitivity) control R409. V401B is arranged in a delay circuit employing network C405, R404 and R405 between grid and plate, with the B+ voltage maintaining a charge on C405. In normal (station-on) condition, V401B does not conduct and K401 contacts are held "open" to pass the signal via an artificial 75-ohm line to the IF OUT terminal J402.

In station-off condition the grid bias on V401B approaches zero and V401B conducts. The delay circuit effects a time delay of approximately 20 seconds, after which the relay will become energized. The IF IN terminal J401 becomes disconnected and B+ is applied to the crystal-controlled oscillator V401A, which produces a 45.75 mc signal. This output is then coupled through C403 to the IF OUT terminal J402. The level of this output is adjustable by OSC LEVEL control R403. Simultaneously, B+ is applied to a SIGNAL OFF warning light DS101 on the front panel. The relay also disconnects the delay circuit at V401B so that with the return of station signal and therefore grid bias at V401B, the relay will become de-energized within 2 seconds. With B+ cut off from the oscillator V401A, the plate circuit L401, C403, detunes to appear outside the i-f band of interest.

CONVERTER (see fig. 16 and 17)

It is the function of the converter to convert the incoming i-f band to the desired vhf channel. The i-f video and sound carriers from the output of the standby-carrier unit enters the converter at the IF IN terminal J502. Input match to 75 ohms is achieved by loading the grid of the mixer stage V503 with R507 and transforming the resultant grid load with L505 and C511. Coarse input level adjustment is provided by a plug-in pad accessible on the chassis top. The signal is then applied to the grid of the mixer stage V503.

For off-channel conversion (ch. 2 to 3, etc.) with OSCILLATOR switch C501 in INT position, a crystal-controlled oscillator V501 generates a signal (see crystal frequencies tabulated on schematics) which is coupled through C503 to the grid of a doubler or buffer amplifier stage V502. The plate of V502 is tuned by L504 to the required converter frequency. For low-channel conversion the oscillator operates at the fundamental frequency and the output of V502 is tuned to the same fundamental frequency. For high-channel conversion the oscillator operates at a preselected frequency and the output of V502 is tuned to the second harmonic of the oscillator frequency. This signal is then coupled through C510 to the mixer V503.

For on-channel conversion (ch. 2 to ch. 2, etc.) with OSCILLATOR switch SW501 in EXT position, B+ is disconnected from V501 and the OSC IN terminal J501 is connected to the buffer amplifier V502. In this case the oscillator signal is obtained via a jumper cable from the OSC OUT terminal on the tuner.

This technique prevents beat interference between the vhf channel as picked off the air and the same vhf channel assigned to the COM-* in the system.

The mixer injection voltage of V503 as developed across R508 can be monitored at the tip of feed-through capacitor C512 located on the CCV chassis between V503 and L505. A double-tuned, over-coupled band-pass circuit couples the output of the mixer to the grid of the output stage V504. Primary tuning is by L506; C515 controls the bandwidth, and secondary tuning is by L507. C516 serves to decouple the low-impedance grid of V504 from L507. L509 raises the resultant input impedance at the grid of V504.

The plate output of V504 is single-tuned to mid-frequency by L510 with loading adjustment by L511. The plate circuit is back-matched by an LCR network to permit mixing of semi-adjacent converters. The output works into two 75-ohm loads at RF OUT terminals J504 and J505. An r-f test point RF T.P. J506, attenuated by 40 db from the actual r-f output signal, is connected by a coaxial jumper to the TEST terminal on the COM-* front panel.

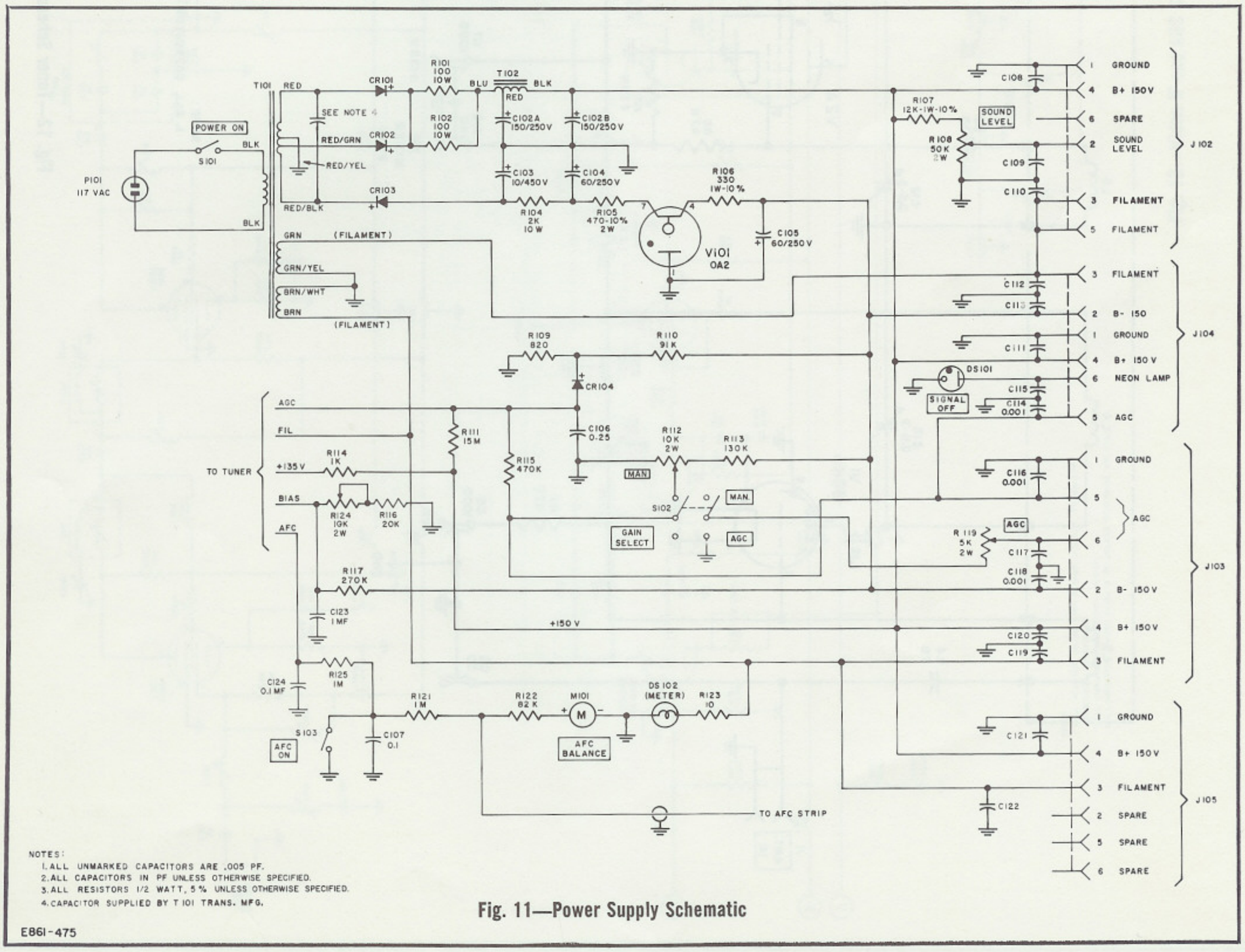
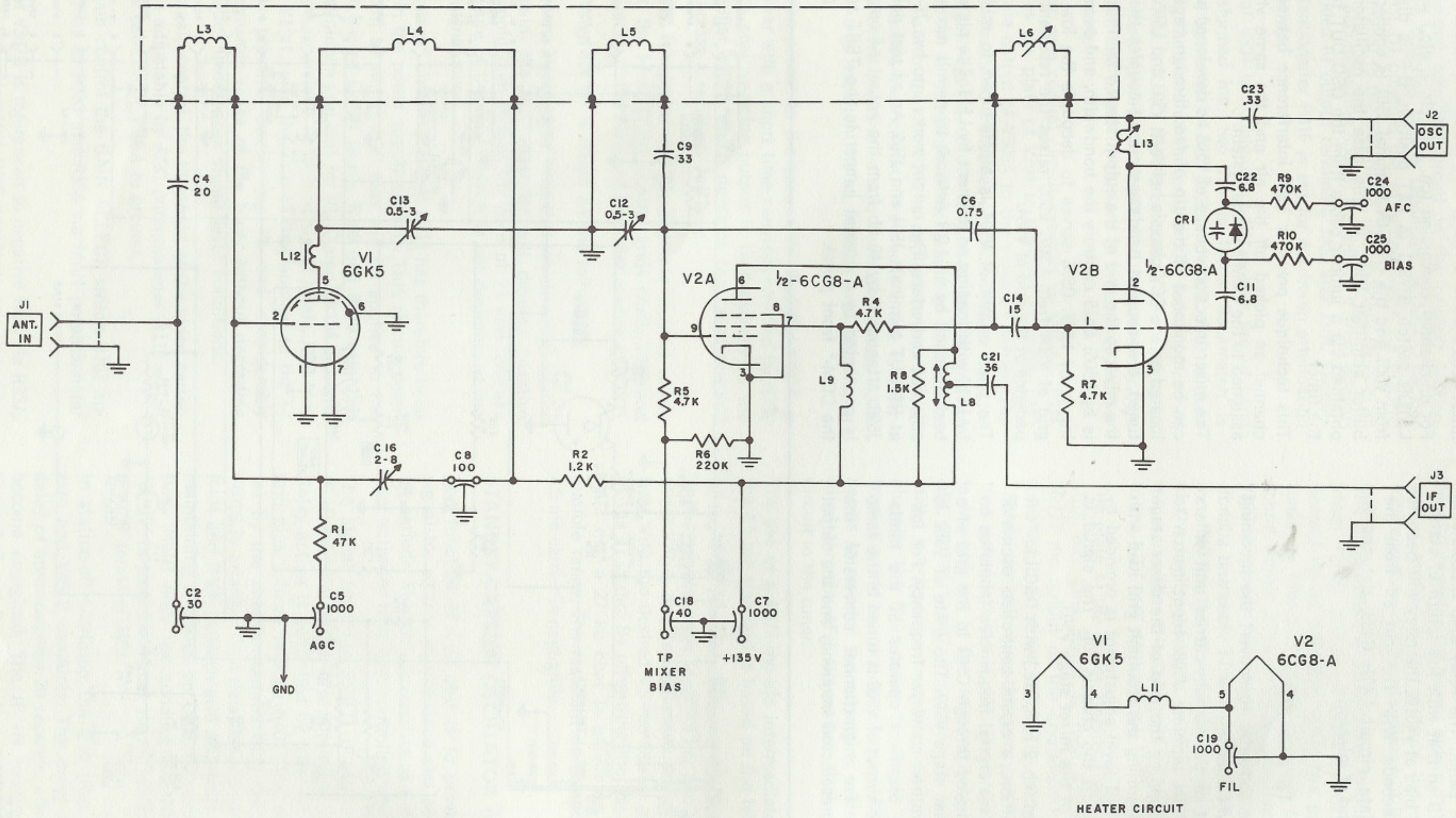


Fig. 11—Power Supply Schematic



NOTE:
1. ALL CAPACITOR VALUES ARE IN PF.

Fig. 12—Tuner Schematic

D 861-479-B

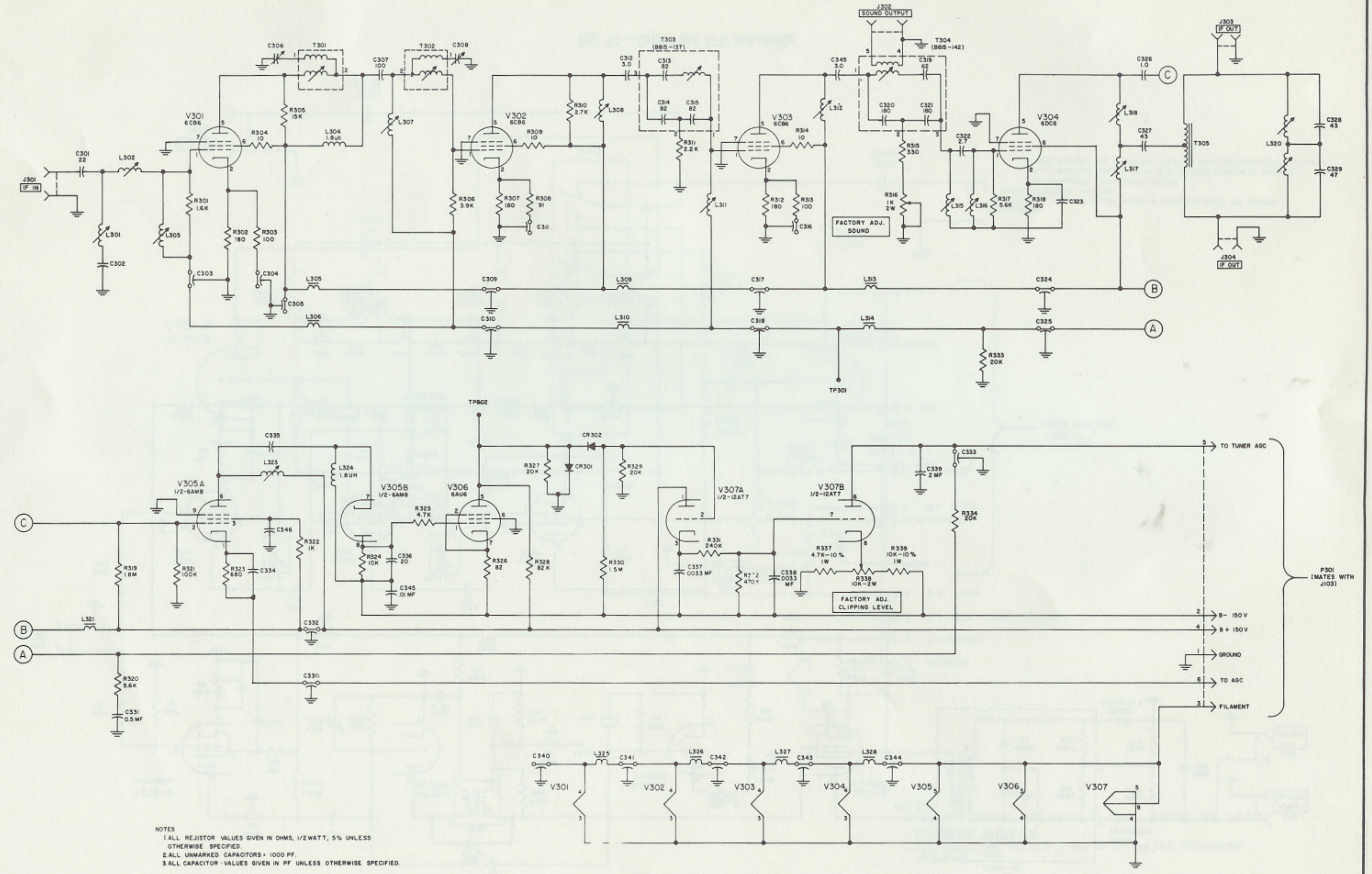
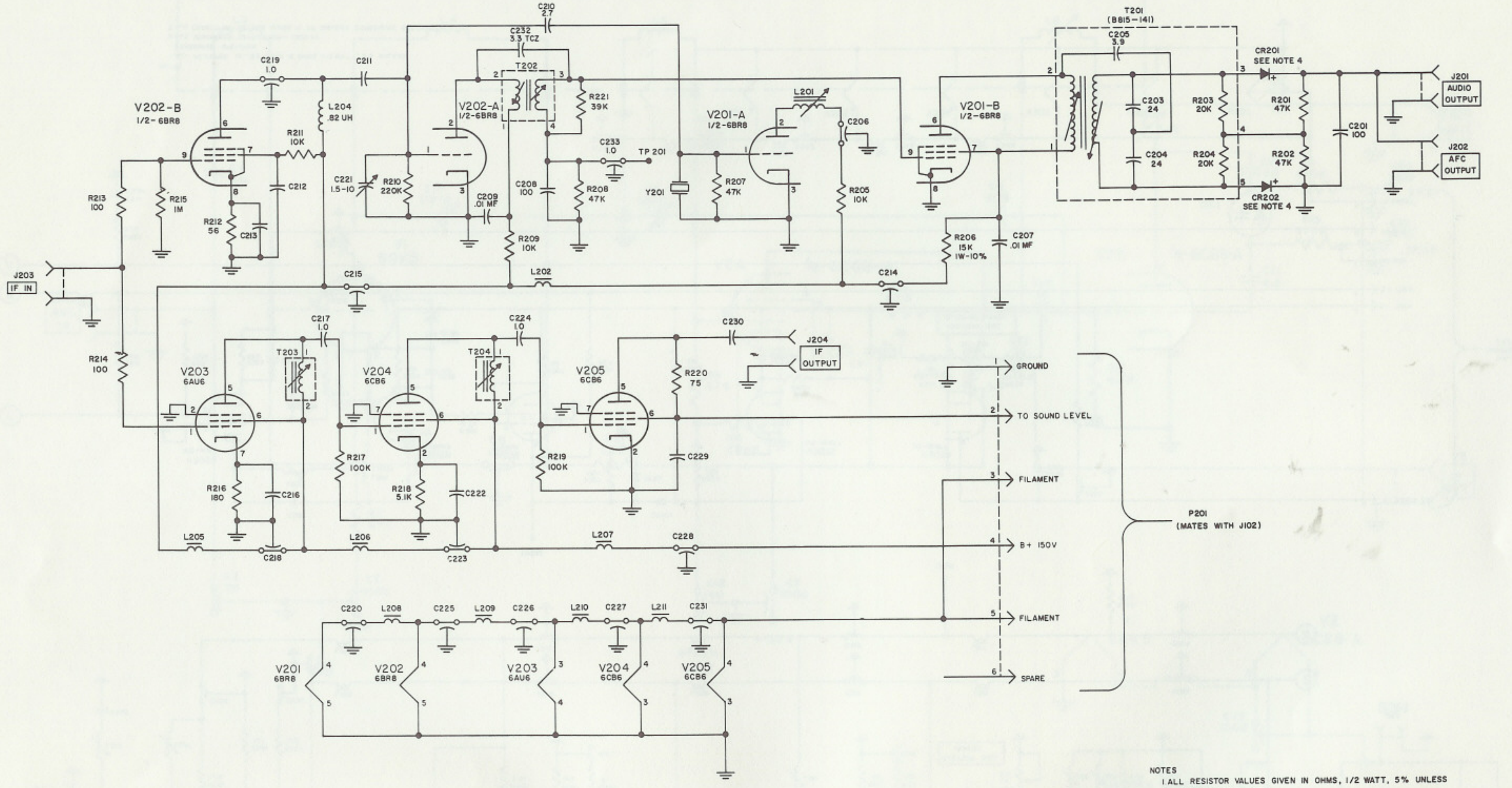


Fig. 13—Video IF and AGC Schematic

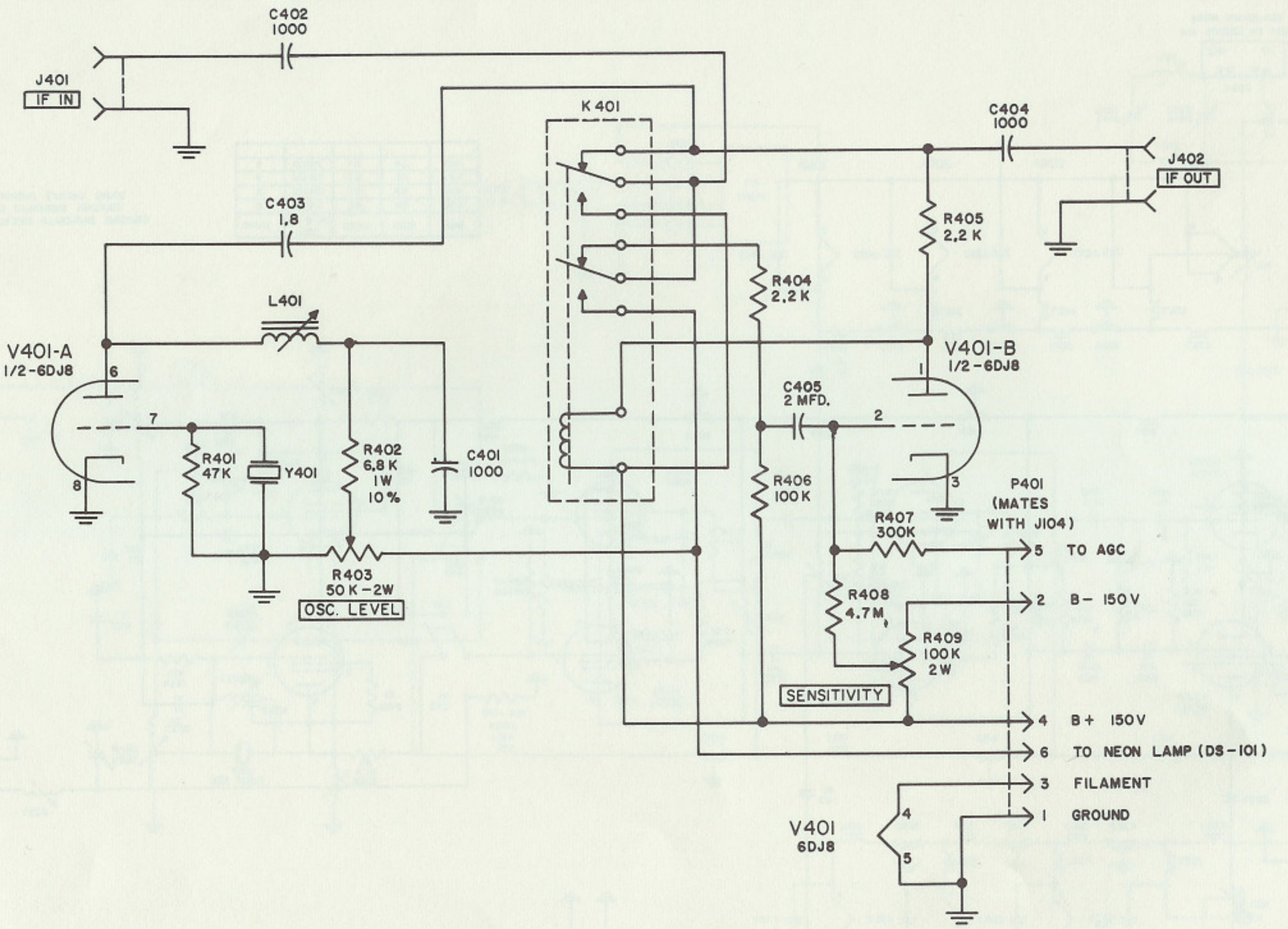
E861-476-D



NOTES
1. ALL RESISTOR VALUES GIVEN IN OHMS, 1/2 WATT, 5% UNLESS OTHERWISE SPECIFIED.
2. ALL UNMARKED CAPACITORS = 1000PF.
3. ALL CAPACITOR VALUES GIVEN IN PF UNLESS OTHERWISE SPECIFIED.
4. CR201 & CR202 ARE A MATCHED PAIR OF IN541, OR EQUIVALENT TO IN542.

Fig. 14—Sound and AFC Schematic

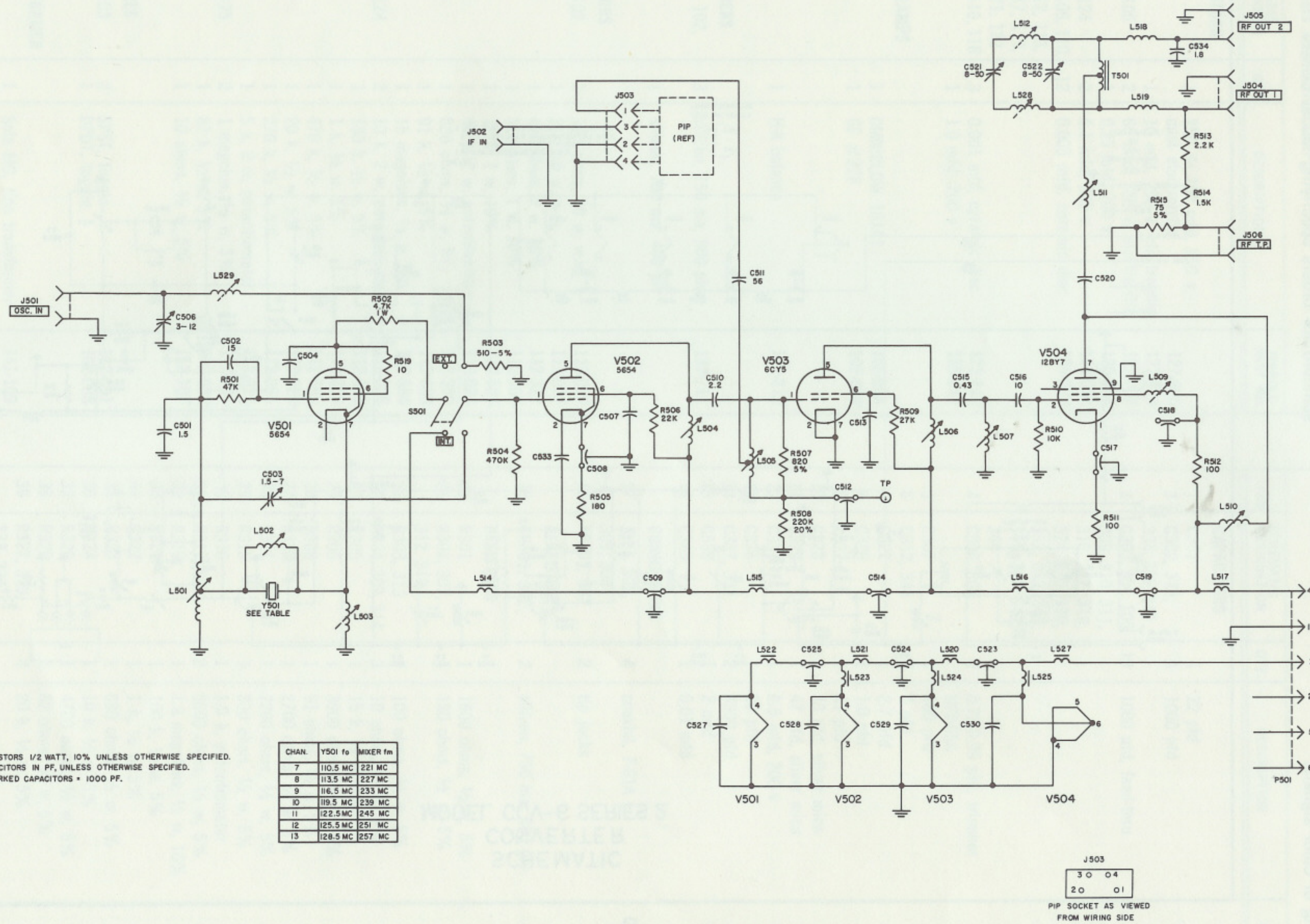
E861-477-D



NOTES
1. ALL RESISTOR VALUES GIVEN IN OHMS, 1/2 WATT, 5%, UNLESS OTHERWISE SPECIFIED.
2. ALL CAPACITOR VALUES GIVEN IN PF UNLESS OTHERWISE SPECIFIED.

Fig. 15—Standby Carrier Oscillator Schematic

D861-478-C



NOTES
1. ALL RESISTORS 1/2 WATT, 10% UNLESS OTHERWISE SPECIFIED.
2. ALL CAPACITORS IN PF, UNLESS OTHERWISE SPECIFIED.
3. ALL UNMARKED CAPACITORS = 1000 PF.

CHAN.	Y501 fo	MIXER fm
7	110.5 MC	221 MC
8	113.5 MC	227 MC
9	116.5 MC	233 MC
10	119.5 MC	239 MC
11	122.5 MC	245 MC
12	125.5 MC	251 MC
13	128.5 MC	257 MC

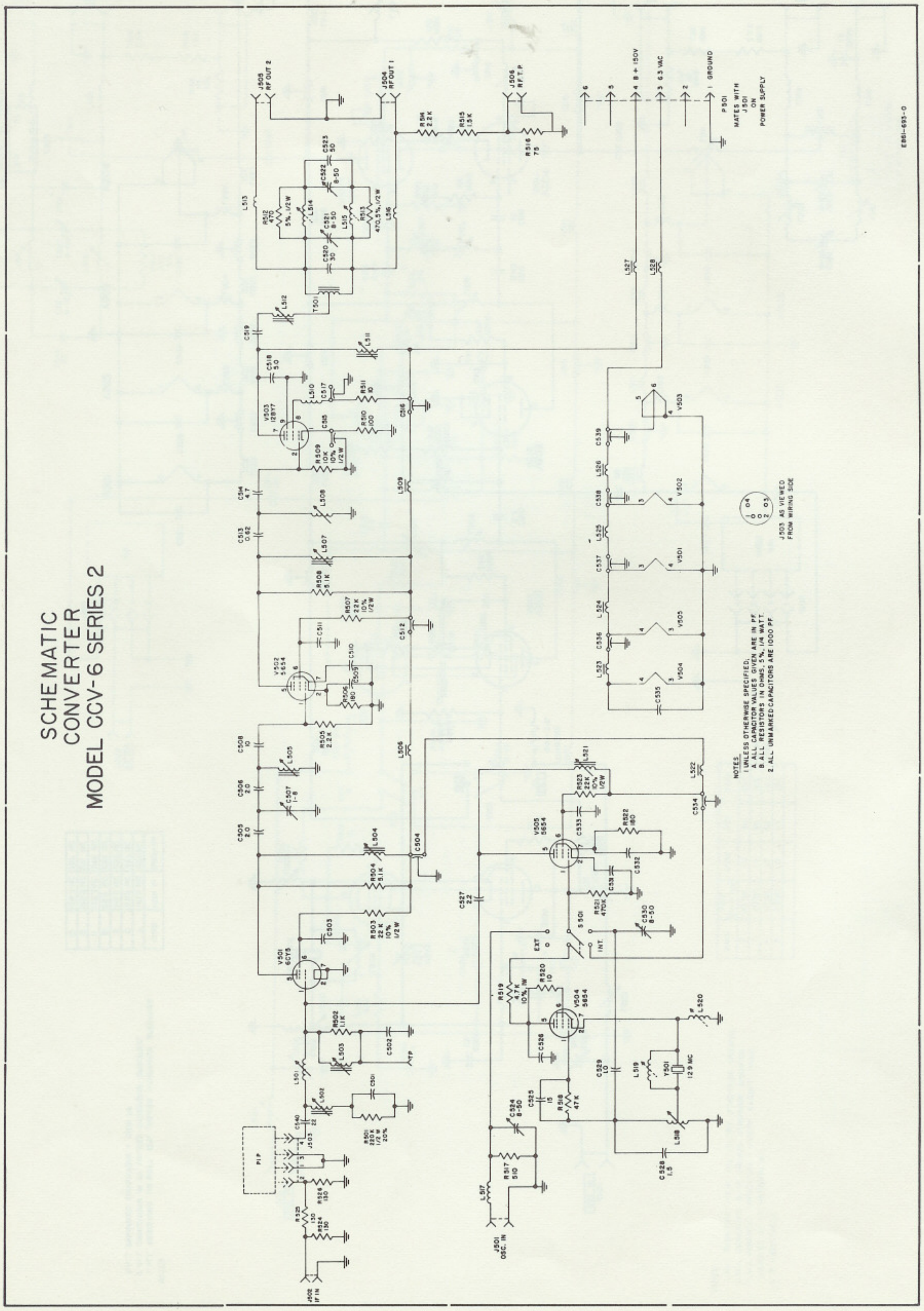
Fig. 17—Model CCV (High Channels) Schematic

E861-510-A

CONVERTER AMPLIFIER MODEL CCV-6, SERIES 2

Series 2 of this converter (used in converting the i-f of the Channel Commander to distribution channel 6) represents a modified version of Model CCV-6 designed for improved processing of color signals.

Whenever replacement of a channel 6 converter is intended, Model CCV-6 SERIES 2 should be ordered. Effective from June 1, 1965, the modified converter will be supplied as standard for orders specifying Model COM-6.



REPLACEMENT PARTS LIST — MODEL COM-*

ASSEMBLY: MAIN CHASSIS AND POWER SUPPLY — REF. DWG. NO.: E861-475

ITEM	SCHEMATIC DESIGNATION	QTY.	DESCRIPTION	JERROLD PART NO.
	CAPACITORS			
1	C102	1	150 + 150 mfd, 250 v, dual electrolytic	127-600
2	C103	1	10 mfd, 250 v, electrolytic	127-024
3	C104, 105	2	60 mfd, 250 v, electrolytic	127-007
4	C106	1	0.25 mfd, 200 v	125-008
5	C107, 124	2	0.1 mfd, 200 v	125-002
6	C108, 109, 110, 111, 112, 113, 115, 117, 119, 120, 121, 122	12	0.005 mfd, ceramic disc	124-029
7	C114, 116, 118	3	0.001 mfd, ceramic disc	123-115
8	C123	1	1.0 mfd, 200 v	125-019
	PILOT LAMPS			
9	DS101	1	OMNIGLOW 101A1	102-504
10	DS102	1	GE #328	102-004
	METER			
11	M101	1	H-K balance	171-212
	RECTIFIERS			
12	CR101, 102, 103	3	silicon, 750 ma, 800 piv	137-711
13	CR104	1	silicon, 750 ma, 400 piv	
	RESISTORS			
14	R101, 102	2	100 ohms, 10 w, w.w.	113-017
15	R104	1	2 k, 10 w, w.w.	113-007
16	R105	1	470 ohms, 2 w, 10%	112-322
17	R106	1	330 ohms, 1 w, 10%	112-300
18	R107	1	12 k, 1 w, 10%	112-501
19	R108	1	50 k, 2 w, potentiometer	118-024
20	R109	1	820 ohms, ½ w, 5%	112-350
21	R110	1	91 k, ½ w, 5%	112-608
22	R111	1	15 megohms, ½ w, 5%	112-884
23	R112, 124	2	10 k, 2 w, potentiometer	118-026
24	R113	1	130 k, ½ w, 5%	112-629
25	R114	1	1 k, ½ w, 5%	112-359
26	R115	1	470 k, ½ w, 5%	112-695
27	R116	1	20 k, ½ w, 5%	112-524
28	R117	1	270 k, ½ w, 5%	112-665
29	R119	1	5 k, 2 w, potentiometer	118-023
30	R121, 125	2	1 megohm, ½ w, 5%	112-737
31	R122	1	82 k, ½ w, 5%	112-602
32	R123	1	10 ohms, ½ w, 5%	112-107
	SWITCHES			
33	S101, 103	2	SPST, toggle	162-001
34	S102	1	DPDT, toggle	162-008
	TRANSFORMER			
34	T101	1	Sola MC, line transformer	141-109
	TUBE			
35	V101	1	OA2, voltage regulator	132-100

ASSEMBLY: VIDEO IF AND AGC — REF. DWG. NO.: E861-476

ITEM	SCHEMATIC DESIGNATION	QTY.	DESCRIPTION	JERROLD PART NO.
	CAPACITORS			
1	C301	1	22 pfd	121-015
2	C302, 323, 334, 335, 346	5	1000 pfd	123-115
3	C303, 304, 105, 309, 310, 311, 316, 317, 318, 324, 325, 330, 332, 333, 340, 341, 342, 343, 344	19	1000 pfd, feed-thru	129-200
4	C306, 308	2	0.75-0.95 pfd, trimmer HFT-65A	821-141
5	C307	1	100 pfd	123-105
6	C312, 345	2	3 pfd	121-065
7	C322	1	2.7 pfd	121-040
8	C326	1	1.0 pfd	121-058
9	C327	1	43 pfd	121-023
10	C328	1	43 pfd, silver mica	126-054
11	C329	1	47 pfd, silver mica	126-068
12	C331	1	0.5 mfd, 200 v	125-050
13	C336	1	20 pfd	121-014
14	C337, 338	2	3300 pfd	124-026
15	C339	1	2 mfd	125-040
16	C345	1	0.01 mfd	124-031
	CONNECTORS			
17	J301, 302, 303, 304	4	coaxial, F-61A	C821-155
18	TP301, 302	2	tip jacks	185-104
	RECTIFIERS			
19	CR301, 302	2	silicon, 750 ma, 400 piv	137-712
	RESISTORS			
20	R301	1	1600 ohms, ½ w, 5%	112-389
21	R302, 307, 312, 318	4	180 ohms, ½ w, 5%	112-266
22	R303, 313	2	100 ohms, ½ w, 5%	112-233
23	R304, 309, 314	3	10 ohms, ½ w, 5%	112-107
24	R305	1	15 k, ½ w, 5%	112-506
25	R306	1	3900 ohms, ½ w, 5%	112-434
26	R308	1	91 ohms, ½ w, 5%	112-230
27	R310	1	2700 ohms, ½ w, 5%	112-413
28	R311	1	2200 ohms, ½ w, 5%	112-401
29	R315	1	330 ohms, ½ w, 5%	112-296
30	R316	1	1.0 k, potentiometer	118-039
31	R317, 320	2	5600 ohms, ½ w, 5%	112-455
32	R319	1	1.8 megohms, ½ w, 10%	112-773
33	R321	1	100 k, ½ w, 5%	112-611
34	R322	1	1 k, ½ w, 5%	112-359
35	R323	1	680 ohms, ½ w, 5%	112-338
36	R324	1	10 k, ½ w, 5%	112-485
37	R326	1	4700 ohms, ½ w, 5%	112-443
38	R326	1	82 ohms, ½ w, 5%	112-224
39	R327, 329, 333, 334	4	20 k, ½ w, 5%	112-524
40	R328	1	82 k, ½ w, 5%	112-602
41	R330	1	1.5 megohms, ½ w, 5%	112-758
42	R331	1	240 k, ½ w, 5%	112-662

REPLACEMENT PARTS LIST (Continued)

ASSEMBLY: VIDEO IF AND AGC — REF. DWG. NO.: E861-476

ITEM	SCHEMATIC DESIGNATION	QTY.	DESCRIPTION	JERROLD PART NO.
43	R332	1	470 k, ½ w, 5%	112-695
44	R337	1	4700 ohms, 1 w, 10%	112-447
45	R338	1	10 k, 2 w, potentiometer	118-026
46	R339	1	10 k, 1 w, 10%	112-489
	TUBES			
47	V301, 302, 303	3	6CB6	131-313
48	V304	1	6DC6	131-349
49	V305	1	6AM8	131-304
51	V306	1	6AU6	131-308
52	V307	1	12AT7	131-400

ASSEMBLY: SOUND IF AND AFC — REF. DWG. NO.: E861-477

ITEM	SCHEMATIC DESIGNATION	QTY.	DESCRIPTION	JERROLD PART NO.
	CAPACITORS			
1	C201	1	100 pfd, mica	126-013
2	C202	1	feed-thru, teflon	129-226
3	C206, 215, 215, 218, 220, 223, 225, 226, 227, 228, 231	11	1000 pfd, feed-thru	129-200
4	C207, 209	2	0.01 mfd, ceramic disc	124-031
5	C208	1	100 pfd, ceramic disc	124-101
6	C210	1	2.7 pfd, NPO	121-040
7	C211, 212, 213, 216, 222, 229, 230	7	1000 pfd, ceramic disc	123-115
8	C217, 224	2	1 pfd, ceramic, TCZ	121-058
9	C221	1	1.5-10 pfd, trimmer	128-510
10	C232	1	3.3 pfd, ceramic TCZ	121-006
	CRYSTAL			
11	Y201	1	36.777 mc ± 0.005%	139-146
	CONNECTORS			
12	J201, 202	2	phone jacks	185-116
13	J203, 204	2	coaxial fittings, F-61A	C821-155
	DIODES			
14	CR201, 202	2	IN542, matched pair	139-167
	RESISTORS			
15	R201, 202, 207, 208	4	47 k, ½ w, 5%	112-569
16	R205, 209, 211	3	10 k, ½ w, 5%	112-485
17	R206	1	15 k, 1 w, 10%	112-510
18	R210	1	220 k, ½ w, 5%	112-653
19	R212	1	56 ohms, ½ w, 5%	112-203
20	R213, 214	2	100 ohms, ½ w, 5%	112-233
21	R215	1	1 megohm, ½ w, 5%	112-737
22	R216	1	180 ohms, ½ w, 5%	112-266
23	R217, 219	2	100 k, ½ w, 5%	112-611
24	R218	1	5100 ohms, ½ w, 5%	112-452
25	R220	1	75 ohms, ½ w, 5%	112-221
26	R221	1	39 k, ½ w, 5%	112-560
	TUBES			
27	V201, 202	2	6BR8	131-356
28	V203	1	6AU6	131-308
29	V204, 205	2	6CB6	131-313

ASSEMBLY: STANDBY-CARRIER OSCILLATOR — REF. DWG. NO.: C861-478

ITEM	SCHEMATIC DESIGNATION	QTY.	DESCRIPTION	JERROLD PART NO.
	CAPACITORS			
1	C401, 402, 404	3	1000 pfd, ceramic disc	123-115
2	C403	1	1.8 pfd, ceramic, TCZ	121-039
3	C405	1	2 mfd, 200 v	125-060
	CONNECTORS			
4	J401, 402	2	coaxial fittings, F-61A	C821-155
	CRYSTAL			
5	Y401	1	45.750 mc, ± 0.005%	139-125
	RESISTORS			
6	R401	1	47 k, ½ w, 5%	112-569
7	R402	1	6800 ohms, 1 w, 10%	112-468
8	R403	1	50 k, potentiometer	118-024
9	R404, 405	2	2200 ohms, ½ w, 5%	112-401
10	R406	1	100 k, ½ w, 5%	112-611
11	R407	1	300 k, ½ w, 5%	112-671
12	R408	1	4.7 megohms, ½ w, 5%	112-821
13	R409	1	100 k, potentiometer	118-022
	SWITCH			
14	K401	1	mercury relay switch	160-100
	TUBE			
15	V401	1	6DJ8	131-329

ASSEMBLY: TUNER — REF. DWG. NO.: D861-479

STANDARD-KOLLSMAN MODEL TX-PK-78; MODIFIED COMPONENTS:

ITEM	SCHEMATIC DESIGNATION	QTY.	DESCRIPTION	JERROLD PART NO.
	CAPACITORS			
1	C11, 22	2	6.8 pf, TCZ	121-009
2	C21	1	36 pf, TCZ	121-021
3	C23	1	0.33 pf, ceramic	122-027
	CONNECTORS			
4	J1, 2, 3	3	coaxial, F-61A	C821-155
	DIODE			
5	CR1	1	varactor, Pacific Model Varicap V7	128-214
	RESISTORS			
6	R8	1	1500 ohms, ¼ w, 5%	112-966
7	R9, 10	2	470 k, ¼ w, 5%	112-965

ASSEMBLY: CONVERTER MODELS CCV-* — REF. DWG. NO.: E861-480, E861-510

PARTS COMMON TO ALL MODELS

ITEM	SCHEMATIC DESIGNATION	QTY.	DESCRIPTION	JERROLD PART NO.
	CAPACITORS			
1	C501	1	1.5 pfd, TCZ	121-004
2	C502	1	15 pfd, TCZ	121-013
3	C504, 507, 513, 520, 527, 528, 529, 530, 533	9	1000 pfd, ceramic disc	123-115

REPLACEMENT PARTS LIST (Continued)

ASSEMBLY: CONVERTER MODELS CCV-*			REF. DWG. NO.: E861-480, E861-510	
ITEM	SCHEMATIC DESIGNATION	QTY.	DESCRIPTION	JERROLD PART NO.
4	C508, 509, 512, 514, 517, 518, 519, 523, 524, 525	10	1000 pfd, feed-thru	129-200
5	C510	1	2.2 pfd, TCZ	121-005
6	C511	1	56 pfd, TCZ	121-027
7	C516	1	10 pfd, TCZ	121-011
	CONNECTORS			
8	J501, 502, 504, 505, 506	5	coaxial fittings, F-61A	C821-155
9	J503	1	4-pin socket, female	182-103
10	P501	1	6-pin plug, male	184-004
	PAD			
11	—	1	plug-in pad, Model PIP-* *attenuation val. factory-selected	PIP-*
	RESISTORS			
12	R501	1	47 k, ½ w, 10%	112-572
13	R502	1	4.7 k, 1 w, 10%	112-447
14	R503	1	510 ohms, ½ w, 5%	112-326
15	R504	1	470 k, ½ w, 10%	112-698
16	R505	1	180 ohms, ½ w, 10%	112-269
17	R506	1	22 k, ½ w, 10%	112-530
18	R507	1	820 ohms, ½ w, 5%	112-350
19	R508	1	220 k, ½ w, 20%	112-659
20	R509	1	27 k, ½ w, 10%	112-542
21	R510	1	10 k, ½ w, 10%	112-488
22	R511, 512	2	100 ohms, ½ w, 10%	112-236
23	R513	1	2.2 k, ½ w, 10%	112-404
24	R514	1	1.5 k, ½ w, 10%	112-383
25	R515	1	75 ohms, ½ w, 5%	112-221
26	R519	1	10 ohms, ½ w, 10%	112-110
	SWITCH			
27	S501	1	DPDT slide switch	162-003
	TUBES			
28	V501, 502	2	5654	131-500
29	V503	1	6CY5	131-316
30	V504	1	12BY7A	131-403
	PARTS COMMON TO CCV-2 thru 6			
	CAPACITORS			
31	C506, 534	2	8-50 pfd, trimmer	128-501
32	C515	1	0.47 pfd, QC	122-002
33	C532	1	82 pfd, TCZ	121-031
	RESISTORS			
34	R517, 518	2	470 ohms, ½ w, 5%	112-317
	PARTS COMMON TO CCV-7 thru 13			
	CAPACITORS			
35	C503	1	1.5-7 pfd, NPO, trimmer	128-500
36	C506	1	3-12 pfd, NPO, trimmer	128-520
37	C515	1	0.43 pfd, 10%, ceramic	122-001
38	C534	1	1.8 pfd, NPO	121-039

ASSEMBLY: CONVERTER MODELS CCV-*			REF. DWG. NO.: E861-480, E861-510	
ITEM	SCHEMATIC DESIGNATION	QTY.	DESCRIPTION	JERROLD PART NO.
	GROUP OF PARTS USED IN CCV-2 ONLY			
	CAPACITORS			
39	C503	1	1.5 pfd, TCZ	121-004
40	C531	1	82 pfd, TCZ	121-031
	CRYSTAL			
41	Y501	1	101 mc ± 0.005%	139-151
	RESISTOR			
42	R516	1	20 k, ½ w, 5%	112-524
	GROUP OF PARTS USED IN CCV-3 ONLY			
	CAPACITORS			
43	C503	1	1.5 pfd, TCZ	121-004
44	C531	1	82 pfd, TCZ	121-031
	CRYSTAL			
45	Y501	1	107 mc ± 0.005%	139-152
	RESISTOR			
46	R516	1	16 k, ½ w, 5%	112-515
	GROUP OF PARTS USED IN CCV-4 ONLY			
	CAPACITORS			
47	C503	1	1.5 pfd, TCZ	121-004
48	C531	1	82 pfd, TCZ	121-031
	CRYSTAL			
49	Y501	1	113 mc ± 0.005%	139-153
	RESISTOR			
50	R516	1	16 k, ½ w, 5%	112-515
	GROUP OF PARTS USED IN CCV-5 ONLY			
	CAPACITORS			
51	C503	1	1.0 pfd, TCZ	121-003
52	C531	1	47 pfd, TCZ	121-024
	CRYSTAL			
53	Y501	1	123 mc, ± 0.005%	139-154
	RESISTOR			
54	R516	1	10 k, ½ w, 5%	112-485
	GROUP OF PARTS USED IN CCV-6 ONLY			
	CAPACITORS			
55	C503	1	1.0 pfd, TCZ	121-003
56	C531	1	22 pfd, TCZ	121-015
	CRYSTAL			
57	Y501	1	129 mc, ± 0.005%	139-155
	RESISTOR			
58	R516	1	7.5 k, ½ w, 5%	112-473
	CRYSTALS FOR HIGH-BAND CHANNELS			
59	Y501	1	110.5 mc, ± 0.005%, Ch. 7	139-156
60	Y501	1	113.5 mc, ± 0.005%, Ch. 8	139-157
61	Y501	1	116.5 mc, ± 0.005%, Ch. 9	139-158
62	Y501	1	119.5 mc, ± 0.005%, Ch. 10	139-159
63	Y501	1	122.5 mc, ± 0.005%, Ch. 11	139-160
64	Y501	1	125.5 mc, ± 0.005%, Ch. 12	139-161
65	Y501	1	128.5 mc, ± 0.005%, Ch. 13	139-162

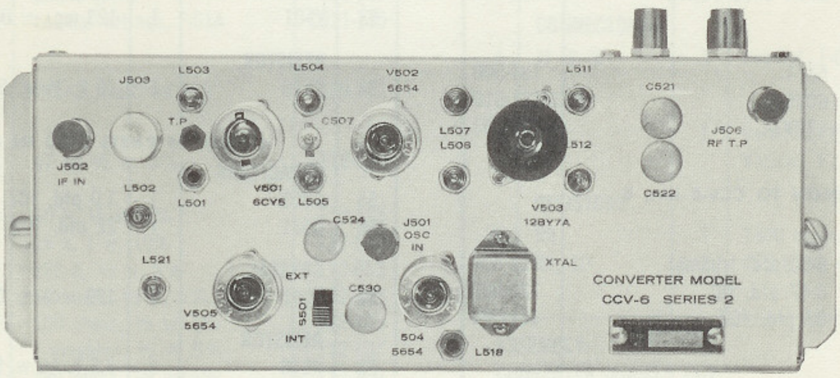
REPLACEMENT PARTS LIST (Continued)

ASSEMBLY: CONVERTER MODEL CCV-6, SERIES 2 — REF. DWG. NO.: E861-693

ITEM	SCHEMATIC DESIGNATION	QTY.	DESCRIPTION	JERROLD PART NO.
	CAPACITORS			
1	C501, 502, 503, 509, 510, 511, 519, 526, 531, 532, 533, 535	12	1000 pf, 500 v, ceramic disc	123-115
2	C504, 512, 515, 516, 517, 534, 536, 537, 538, 539	10	1000 pf, 500 v, feed-thru	129-200
3	C505, 506	2	2.0 pf, 10%, 500 v	122-030
4	C507	1	1.0-8.0 pf, trimmer	128-504
5	C508	1	10 pf, ±0.5 pf, 600 v	121-011
6	C513	1	0.62 pf, 10%, 500 v	122-044
7	C514	1	4.7 pf, ±0.5 pf, 600 v	121-007
8	C518	1	5.0 pf, ±0.5 pf, 600 v	121-008
9	C520	1	30 pf, ±2%, 600 v	121-019
10	C521, 522, 524, 530	4	8-50 pf, 350 v, trimmer	128-501
11	C523	1	50 pf, ±2%, 600 v	121-025
12	C525	1	15 pf, ±2%, 600 v	121-013
13	C527	1	2.2 pf, ±0.25 pf, 600 v	121-005
14	C528	1	1.5 pf, ±0.25 pf, 600 v	121-004
15	C529	1	1.0 pf, ±0.25 pf, 600 v	121-003
16	C540	1	22 pf, ±2%, 600 v	121-015
	CONNECTORS			
17	P501	1	6-pin plug, male	184-004
18	J501, 502, 504, 505, 506	5	coaxial fittings, F-61A	C821-155
19	J503	1	4-pin socket, female	182-103
20	TP	1	tip jack, red	185-112

ASSEMBLY: CONVERTER MODEL CCV-6, SERIES 2 — REF. DWG. NO.: E861-693

ITEM	SCHEMATIC DESIGNATION	QTY.	DESCRIPTION	JERROLD PART NO.
	CRYSTAL			
21	Y501	1	129 mc, ±0.005%	139-155
	PAD			
22	PIP	1	plug-in pad, Model PIP-* *attenuation val. factory-selected	PIP-*
	RESISTORS			
23	R501	1	220 k, ½ w, 20%	112-659
24	R502	1	1100 ohms, ¼ w, 5%	112-927
25	R503, 507, 523	3	22 k, ½ w, 10%	112-530
26	R504, 508	2	5100 ohms, ¼ w, 5%	112-980
27	R505, 514	2	2200 ohms, ¼ w, 5%	112-932
28	R506, 522	2	180 ohms, ¼ w, 5%	112-994
29	R509	1	10 k, ½ w, 10%	112-488
30	R510	1	100 ohms, ¼w, 5%	112-950
31	R511, 520	2	10 ohms, ¼ w, 5%	112-077
32	R512, 513	2	470 ohms, ½ w, 5%	112-317
33	R515	1	1.5 k, ¼ w, 5%	112-966
34	R516	1	75 ohms, ¼ w, 5%	112-954
35	R517	1	510 ohms, ¼ w, 5%	112-929
36	R518	1	47 k, ½ w, 5%	112-569
37	R519	1	4.7 k, 1 w, 10%	112-447
38	R521	1	470 k, ¼ w, 5%	112-965
39	R524, 525, 526	3	130 ohms, ¼ w, 5%	112-997
	SWITCH			
40	S501	1	DPDT slide switch	162-003
	TUBES			
41	V501	1	6CY5	131-316
42	V502, 504, 505	3	5654	131-500
43	V503	1	12BY7A	131-403



MODEL CCV-6 SERIES 2, TOP VIEW

ALL DATA SUBJECT TO CHANGE WITHOUT NOTICE.

JERROLD ELECTRONICS • PHILADELPHIA, PA. 19132
CATV SYSTEMS DIVISION

A subsidiary of THE JERROLD CORPORATION

BM, May 1965
BM, Jan. 1965

Printed in U.S.A.

435-374.2