JERROLD

INSTRUCTION SHEET

PREAMPLIFIER MODEL 401A (*) AND 406A (*)

Reference TD 511 **435-241**

R. F. TELEVISION PREAMPLIFIERS

featuring

LOW NOISE INPUT

HIGH R. F. OUTPUT

HIGH GAIN

The Ultimate for Color Reception

THE JERROLD PRE-AMPLIFIERS — models 401 and 406 — are low noise, high output RF amplifiers designed for those applications where it is desired to raise a weak TV signal to a predetermined value (input level to converters, line amplifiers, TV receivers and other electronic TV equipment) without the introduction of noise or other forms of distortion.

* Desired Channel Number

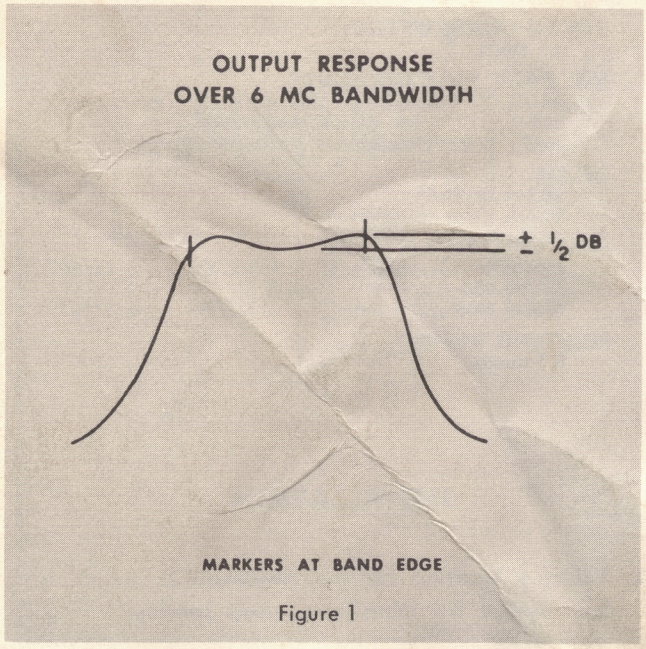


Figure 1

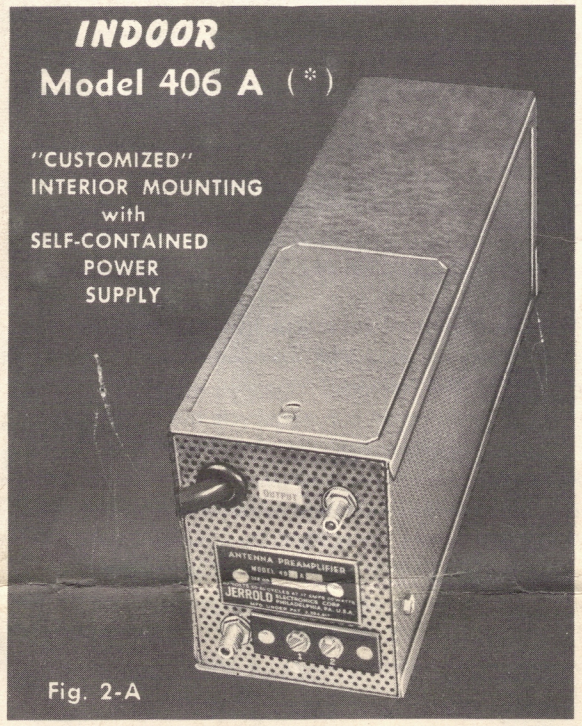


Fig. 2-A

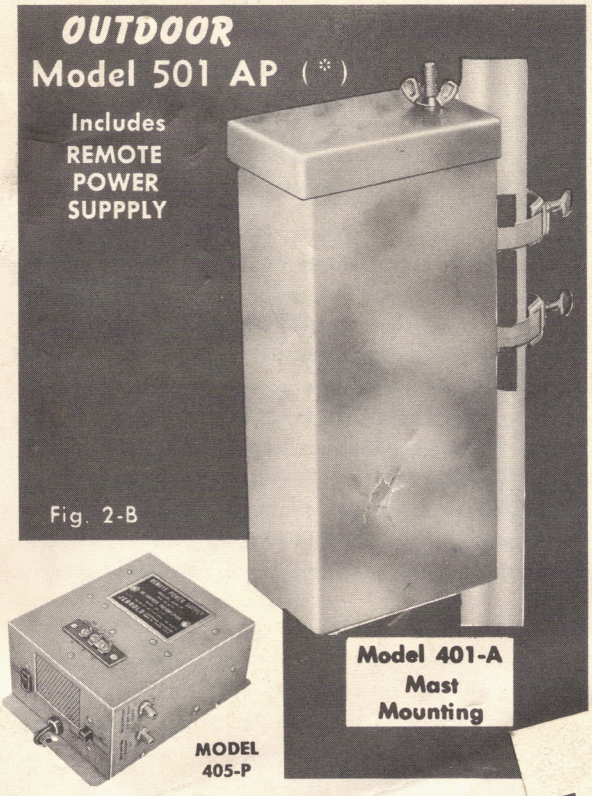


Fig. 2-B

GENERAL DESCRIPTION

Jerrold Models 401 (A*) and 406 (A-*) are single-channel RF preamplifiers, designed primarily for low-noise preamplification of weak, fringe-area signals. These preamplifiers are supplying snow-free signals in thousands of fringe-area community and building systems where signal strength falls below the minimum level required by conventional "head-end" equipment. An extremely low-noise, "cascode" input stage makes it possible for the Jerrold RF preamplifiers to produce useable outputs from antenna signals as low as 50 microvolts. After pre-amplification by these units, the signals may be fed to high quality distribution amplifiers or conversion equipment. (Jerrold manufactures a full line of head-end equipment for all types of Master Antenna Systems.)

The versatile, Jerrold "400" series provides a pre-amplifier for a wide range of purposes and conditions common to television distribution systems, including options on (1) indoor or antenna-mast mounting; (2) 24 V remote or 117 V local operation and (3) 75 or 300 ohm inputs.

Each particular model is available for low-noise pre-amplification of any VHF television channel from 2 through 13. The frequency response of the units is flat within ± ½ db across a 6 megacycle bandwidth making the units especially suitable for the reception of N.T.S.C. color signals. All achieve a minimum gain of 28 db, along with a maximum, undistorted output of 0.5 V rms, through the use of only two tubes. Both the input and output are matched to a VSWR of less than 1.4. Careful engineering of the "400" series preamplifiers, characterized by the above specifications, is responsible for the clean amplification, without deterioration of signal-to-noise ratio.

A description of each model follows:

MODEL 401-A (*) is equipped with an "Iridite" finished weatherproof cabinet, and is operated from a remote 24 Volt a-c power supply (Model 405P) making it possible to mount this unit directly at the antenna where full advantage can be taken of the antenna signal before incurring transmission line losses.

Model 405P is a remote 24 Volt a-c power supply for the Model 401-A preamplifier. The unit contains a variable (tapped) output supplying 24 to 32 Volts a-c to compensate for the voltage drop in the coaxial cable connecting the power supply to the preamplifier. It is not necessary to run a separate power line between the preamplifier and the power supply as the power is inserted on the same coaxial cable that carries the RF television signal. In both the preamplifier and the power supply, bypassing and filtering provide the necessary isolation of the television signal from the a-c power.

For home installations Model 405P power supply is equipped with a "set-controlled"—"Continuous" switch making it possible to operate the power supply and preamplifier from the television set.

Model 501 A.P. (*) is a package unit containing a Model 401-A preamplifier and a Model 405P power supply.

MODEL 406-A (*) is equipped with a light gauge, sturdy, perforated steel housing (which is readily removable and contains a trap door for easy access to tubes and alignment slugs) and is designed for continuous indoor service. The unit contains its own internal power supply for use at 117 Volts a-c. This unit is U.L. approved for indoor applications.

Weather Housing for Model 406—Jerrold Part No. 1683
This is the same weatherproof cabinet as used with the Model 401. It is available as a separate unit with the necessary hardware for outdoor antenna mounting of the 406 where the required 117 Volts a-c is available at the antenna.

*Desired channel number

Specifications:

BANDWIDTH:
6 Megacycles (VHF-TV Channel)

NOISE FIGURE:
Low VHF Channel — 5 db
High VHF Channel — 8 db

FREQUENCY RESPONSE:
± ½db across 6 Megacycles

GAIN:
28 db Minimum

OUTPUT:
Low VHF Channel — 0.6 V rms
High VHF Channel — 0.5 V rms

IMPEDANCE:
Input — Balanced 300 ohms or Unbalanced 75 ohms
Output — Unbalanced 75 ohms

TUBE COMPLEMENT:
Low VHF, 1—6BQ7A, 1—6CB6
High VHF, 1—6BQ7A, 1—6AK5

POWER SUPPLY:
401A — Remote (405P)
406A — Self-Contained

POWER CONSUMPTION:
15 Watts

VOLTAGE REQUIREMENTS:
401-A, 24 Volts, 60 Cycles a-c
406-A, 117 Volts, 60 Cycles, a-c
405P, Power Supply, 117 Volts, 60 Cycles a-c

FINISH:
401-A, Iridite
406-A, Gray Hammertone

DIMENSIONS:

Model 401-A...	H 3-7/8"	W 3-5/8"	D 9-11/16"
Model 406-A...	H 4"	W 3"	D 9-1/4"
Model 405P....	H 2-3/4"	W 5-1/4"	D 6-3/16"

SHIPPING WEIGHT:
5 Pounds

INSTALLATION

1. Select a location for the preamplifier which is best suited for installation and service.

2. **MODEL 401-A:** To operate from remote 24 volt supply, Model 405P, connect coaxial cable from preamp output to terminal on 405P marked "Antenna Preamp". Observe instructions supplied with Model 405P. Since both RF and 24 volts a-c are on one cable, care should be taken not to short cable connector, which may blow fuse in 24 volt power supply. First connect cable at preamplifier, then to remote power supply. Power switch should be in "OFF" position.

   MODEL 406-A: Recommended for installation in enclosed areas having higher ambient temperatures. Simply plug into 117 V, 60 cps, a-c outlet.

3. **Antenna Input Connection:** A short length of 300 ohm line may be used to connect a 300 ohm antenna to an antenna mounted preamplifier. Connect the 300 ohm line to screw terminals 1 and 2.

   Coaxial cable is preferred to unshielded line in noisy locations or where heavy ice-loading occurs. A male connector is provided for RG-59/U. Refer to Jerrold Technical Bulletin No. 106C for the construction of a "Balun" to match unbalanced 75 ohm coaxial cable to a 300 ohm balanced antenna.

4. The **Model 405P,** Series 2 Remote Power Supply may be mounted in the vertical or horizontal position and is equipped with three mounting holes in the bottom plate for wall mounting. No special considerations are necessary in choosing the mounting location other than ventilation and protection from the weather.

   Either 470 ohm open wire line, 300 ohm twin-lead, or 75 ohm coaxial cable may be connected between the preamplifier and the power supply. Open wire line and twin-lead, if used, require Model TO-374 a-c passing, matching transformer. Refer to Technical Data Sheet #507 for further information.

MAINTENANCE

TUBE REPLACEMENT

All tube replacements should be made by the direct substitution method while observing the response of the amplifier. Some retouching of the alignment may be necessary when tubes are replaced. It is not recommended that tubes be replaced unless the new tube gives at least 3 db more gain than the old.

Refer to Schematics No. A-574C and No. A-1006 for operating voltages, components and general circuitry. In the event that this unit cannot be repaired through normal field procedures, return the unit to the factory.

ALIGNMENT PROCEDURE

GENERAL

The following alignment procedure is complete and should be attempted only by those who have a thorough knowledge of high frequency circuit alignment techniques and the proper test equipment. If the proper test equipment is not available or any difficulty is experienced during alignment, the equipment should be returned to the factory.

Equipment Required for Alignment:

- **A.** Jerrold Model 601 Sweep Generator (or equivalent)
- **B.** Marker Generator—Frequency Range 20-220 MC, capable of calibration to within 100 KC.
- **C.** Jerrold D-86 Detector (or equivalent)
- **D.** Jerrold A-72 Variable Attenuator (or equivalent)
- **E.** Oscilloscope—5", 0.025 Volts (rms) per inch sensitivity and capable of good 60 cycle square wave response.
- **F.** Jerrold TR-72F terminating unit (or equivalent)
- **G.** Alignment Tool—ICA 6161 (or equivalent)

ALIGNMENT

Refer to Pole Diagrams and Test Set-ups.

Allow a 30 minute warm-up period for all equipment before attempting alignment. Calibrate the marker generator at all frequencies to be used in alignment—Lower band edge, Mid and Upper band edge.

Figure 3 **MATCH TEST SET-UP**

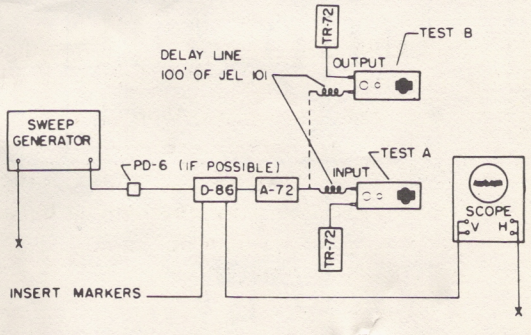
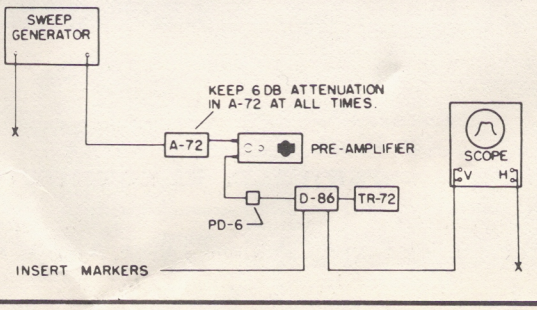


Figure 4 **ALIGNMENT TEST SET-UP**



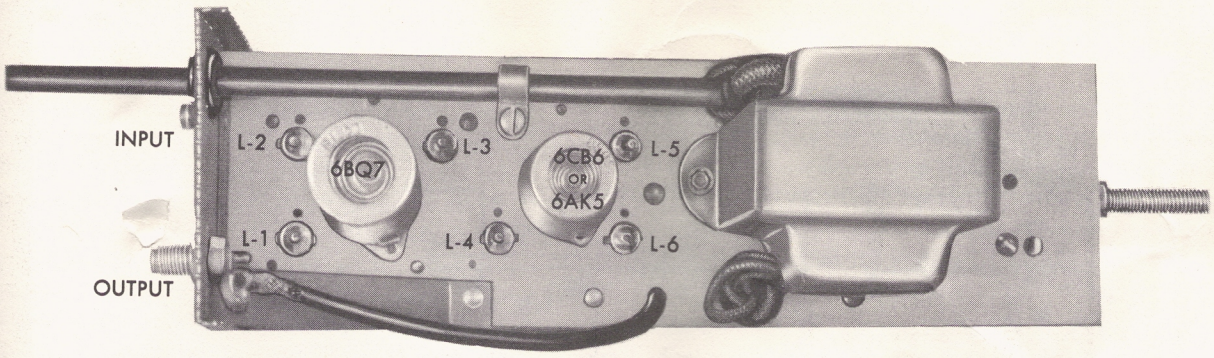


Figure 5

POLE DIAGRAM

STEPS

1. With the test set-up as shown in Figure 4, roughly align the amplifier for the desired output response, shown in Figure 6, as follows:

   High Band (Channels 7-13)—Align L-1, L-5 and L-6 to the Mid of the channel. Align L-2 and L-3 to Video Carrier band edge. Align L-4 to Sound Carrier band edge. The response curve should be flat within 1 db over a bandwidth of 5½ to 6 megacycles. If difficulty is experienced in obtaining the desired bandwidth adjust interstage split-ring coupling capacitor on L-3. Move the ring away from the coil of L-3 to decrease the bandwidth and towards the coil to increase the bandwidth.

   Low Band (Channels 05, 03 and 2-6)—Align L-1, 1-2, L-5 and L-6 to the Mid of the channel. Align L-4 to the Video Carrier band edge. Align L-3 to the Sound Carrier band edge. The response curve should be flat within 1 bd over a bandwidth of 5½ to 6 megacycles. The desired bandwidth may be obtained by adjustment of the split-ring coupling capacitor on L-3. Refer to the above.

2. **Change test set-up to that as shown in Figure 3B. (Refer to Technical Bulletin No. 142 for the Delay Line method of determining match.) Output match is established with power removed from the amplifier. Align L-5 and L-6 to match the output to 75 ohms within a −20 db coefficient of reflection (10 db attenuation in the A-72) across a 6 megacycle bandwidth. Bandwidth may be adjusted by varying the split-ring coupling capacitor on L-5. Moved away from L-5 the bandwidth is reduced; moved towards L-5 the bandwidth is increased.**

3. **Change test set-up to that as shown in Figure 3 A. Input match is established with power applied to the amplifier. Align L-1 and L-2 to match the input to either 300 or 75 ohms within a −14 db coefficient of reflection (7 db attenuation in the A-72). In aligning the input match to 300 ohms use a 300/75 ohm matching transformer and make certain that the 300 ohm transmission line is dressed away from the chassis of the amplifier.**

4. **Change test set-up to that as shown in Figure 3B. Recheck output match. If necessary, touch up with L-5 and L-6.**

5. **Change test set-up to that as shown in Figure 3 A. Recheck input match. If necessary, touch up with L-1.**

6. **Change test set-up to that as shown in Figure 4. Recheck overall response of the amplifier, referring to Figure 6. If necessary, touch up with L-3 and L-4.**

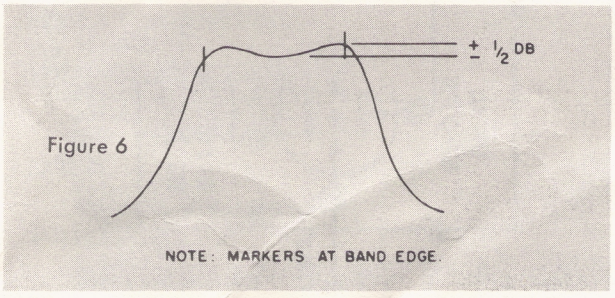
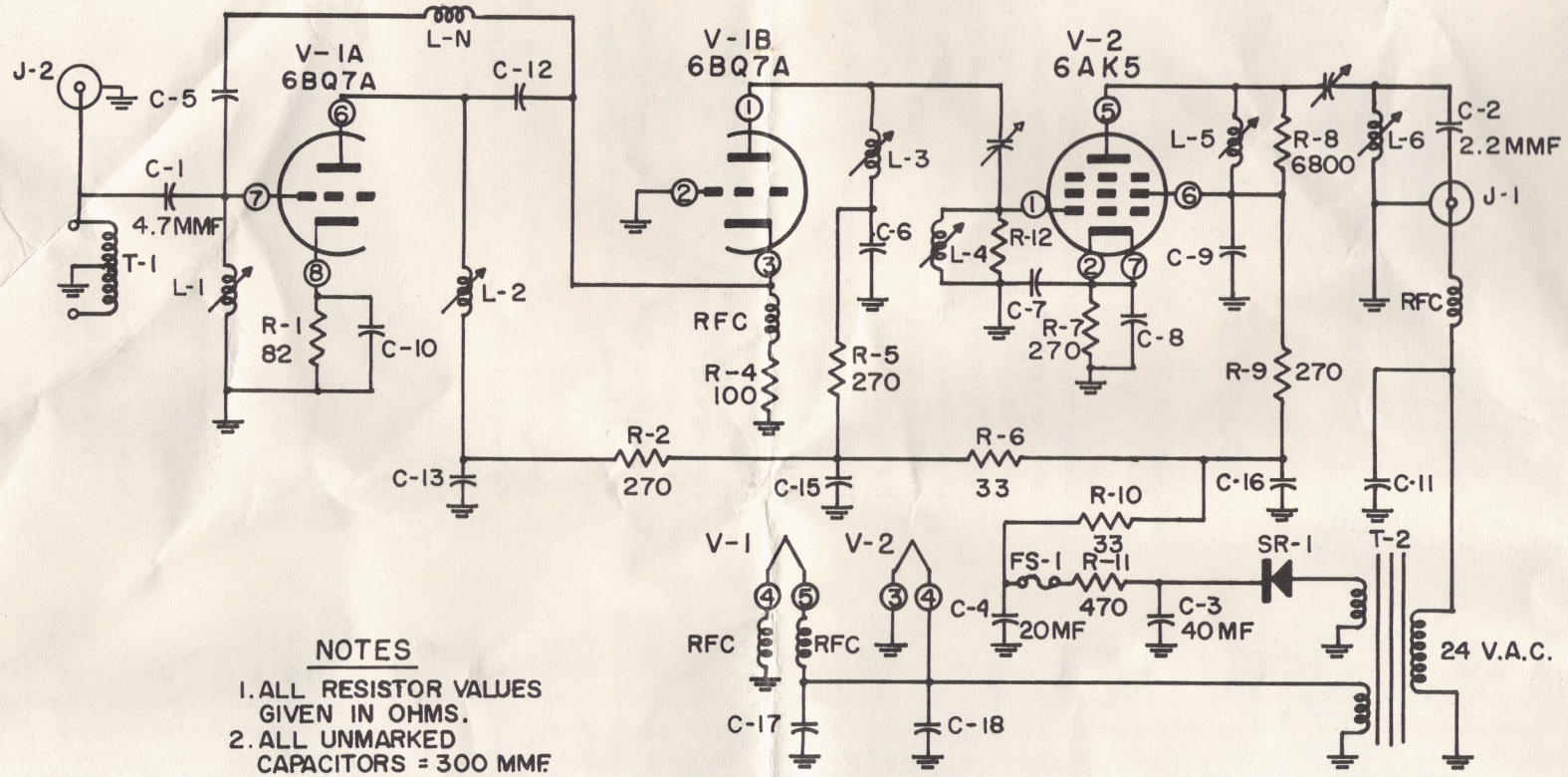


Figure 6

7. **With test set-up as shown in Figure 4. Check the gain of the aligned amplifier as follows: with 6 db attenuation in the A-72 bypass the amplifier (connecting the A-72 directly to the D-86 detector) and establish a convenient reference level on the scope. Insert the amplifier between the A-72 and the D-86 detector. Insert attenuation in the A-72 until the preset reference is again established on the scope. The total attenuation minus the original 6 db in the A-72 represents the gain of the amplifier. The minimum gain should be 28 db.**



NOTES

1. ALL RESISTOR VALUES GIVEN IN OHMS.
2. ALL UNMARKED CAPACITORS = 300 MMF.
3. C-11 OMITTED IN MODEL 403A.
4. T-2 IS 117 V.A.C. TRANSFORMER IN MOD. 403A, PRIMARY FUSED WITH $\frac{1}{4}$ A. SLO BLO(FS-2
5. FS-1 TO BE $\frac{1}{16}$ A. SLO BLO.

CHANNEL	R-12
7,8,9,10,11	2200
12	3300
13	4700

Figure 7 **SCHEMATIC FOR HIGH CHANNEL PREAMPLIFIERS 401A AND 406A** DWG. NO. A-574B

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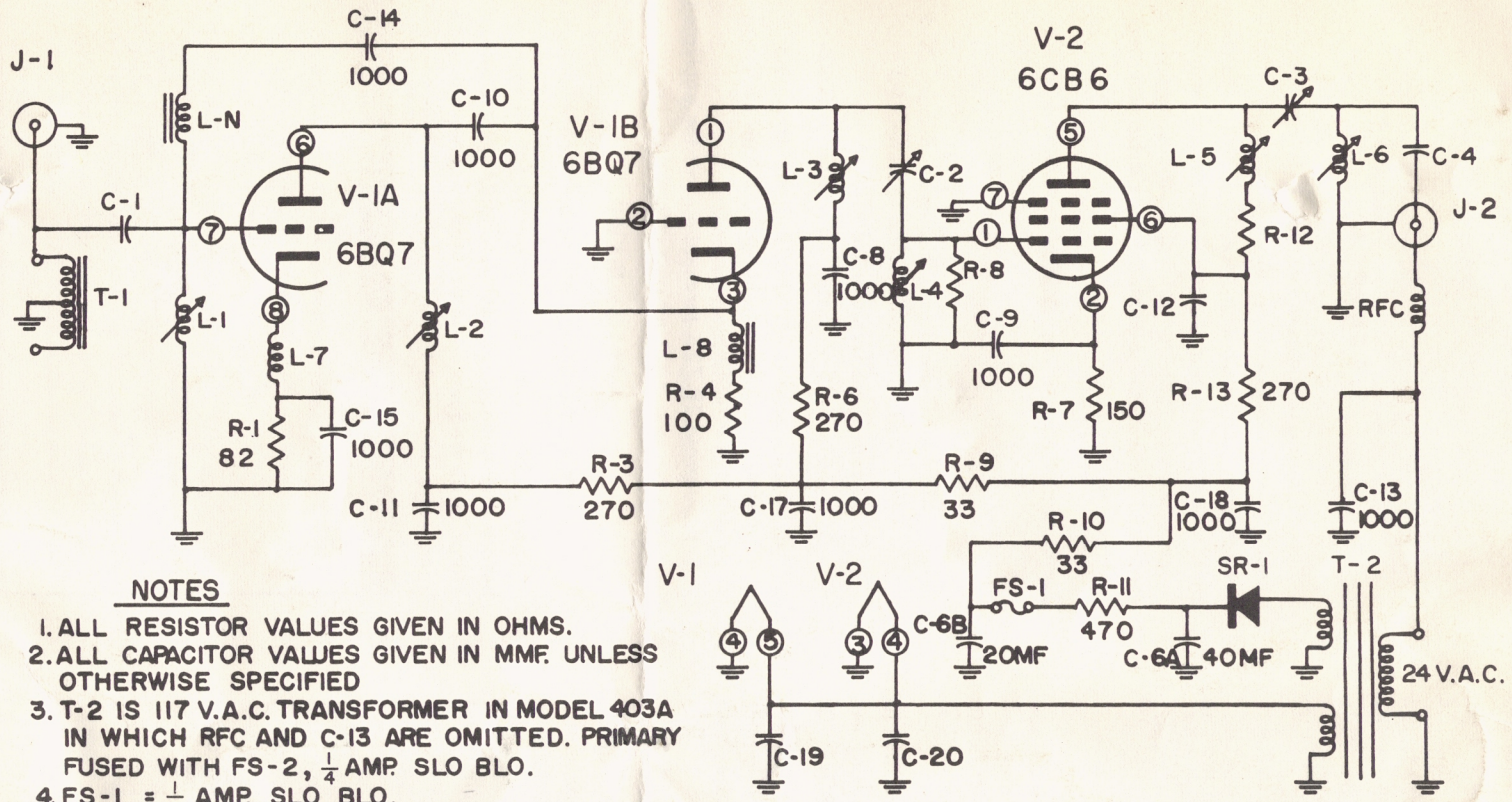

NOTES

1. ALL RESISTOR VALUES GIVEN IN OHMS.
2. ALL CAPACITOR VALUES GIVEN IN MMF. UNLESS OTHERWISE SPECIFIED
3. T-2 IS 117 V.A.C. TRANSFORMER IN MODEL 403A IN WHICH RFC AND C-13 ARE OMITTED. PRIMARY FUSED WITH FS-2, $\frac{1}{4}$ AMP. SLO BLO.
4. FS-1 = $\frac{1}{16}$ AMP. SLO BLO.

COMPONENT	CHANNEL				
	2	3	4	5	6
C-1 (MMF)	12	10	10	10	10
* C-2 "	1	0.68	0.68	0.5	0.5
* C-3 "	1	1	0.68	0.68	0.68
C-4 "	10	10	6.8	6.8	6.8
R-8 (OHMS)	1800	2200	2700	3300	3300
R-12 (OHMS)	47	47	33	33	33

* IN PARALLEL WITH SPLIT RING

Figure 8 **SCHEMATIC FOR LOW CHANNEL PREAMPLIFIERS 401A AND 406A** DWG. A-1006