STABILIZING AMPLIFIER

TA-5C

RADIO CORPORATION OF AMERICA
ENGINEERING PRODUCTS DEPARTMENT CAMDEN, N. J.

IB-36056-2

TA-5C

STABILIZING AMPLIFIER

MI-26160-C

INSTRUCTIONS

RADIO CORPORATION OF AMERICA
RCA VICTOR DIVISION

Manufactured by

RADIO CORPORATION OF AMERICA
ENGINEERING PRODUCTS DEPARTMENT

Camden, New Jersey, U.S.A.

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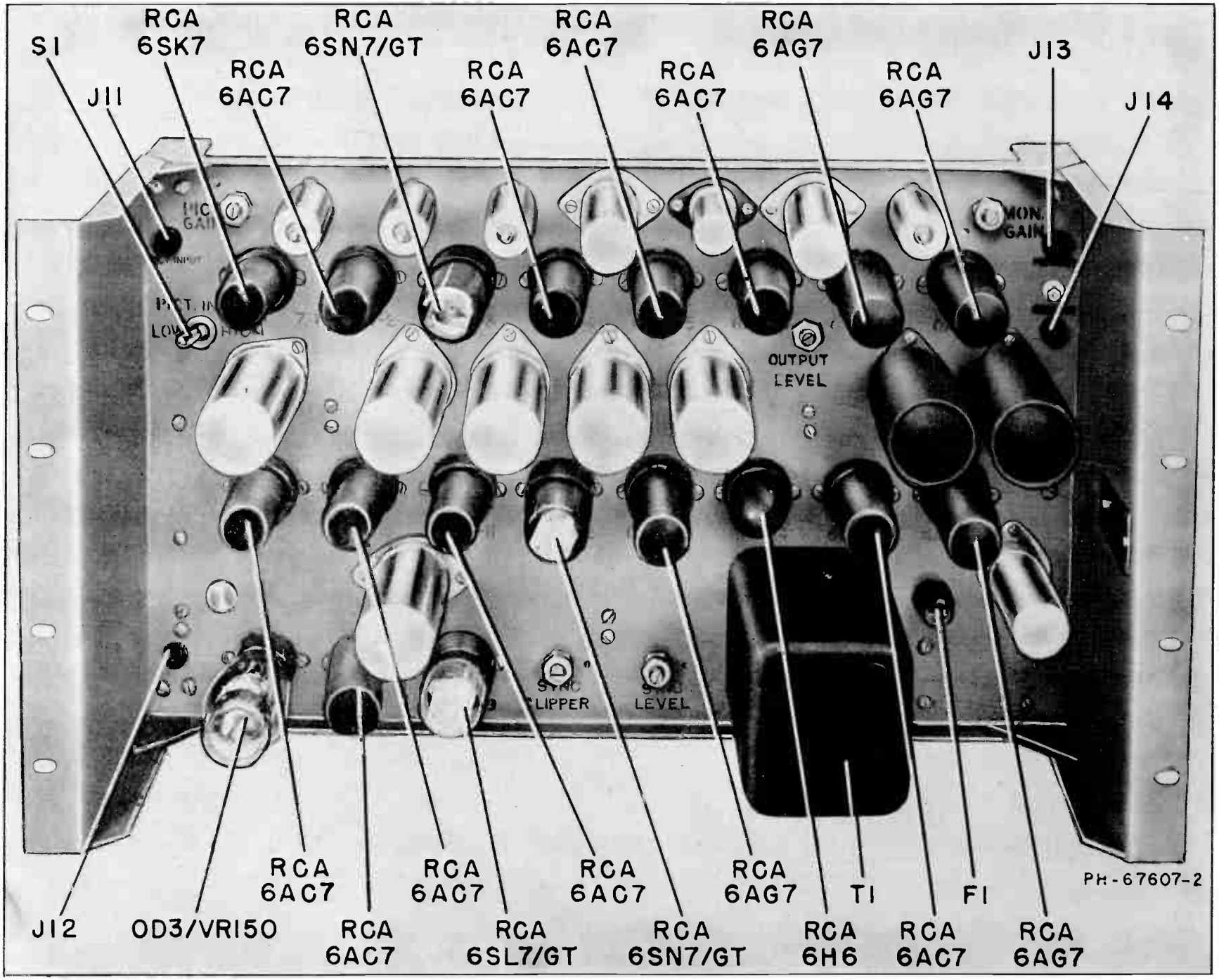

Figure 1—TA-5C Stabilizing Amplifier, Front View

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TECHNICAL SUMMARY

Electrical Characteristics

Power Requirements:

- Heater Supply ..... 117 volts 50/60 cycles 55 watts
- Plate Supply. (regulated) ..... 280 volts, 320 milliamperes d-c

Impedances

- Input
  - Picture and Synchronization ..... 75 ohms
- Output
  - Picture ..... 75 ohms
  - Monitor ..... High
  - Synchronizing ..... High
- Termination
  - Picture ..... 75 ohms
  - Monitor ..... 75 ohms
  - Synchronizing ..... High

Input Signal Requirements:

- Picture and Synchronizing (black negative) ..... 0.20 volt peak-to-peak minimum
- Synchronizing Amplitude (minimum) ..... 18 per cent of composite signal
- Local Synchronizing Signal ..... 3.5 to 5.0 volts negative peak-to-peak

Output Signal Values

- Picture Component ..... 0.75 to 1.5 volts, peak-to-peak
- Synchronizing component of composite signal ..... 0 to 1.5 volts peak-to-peak
- Synchronizing Output (negative) ..... 4.0 volts, peak-to-peak

Frequency Response

Uniform ±10% for video signals containing frequencies between 60 cycles and 7 megacycles.

Tube Complement

Symbol	Type	Function
V1	RCA-6SK7	Picture Amplifier
V2	RCA-6AC7	Picture Amplifier
V3	RCA-6SN7GT	Picture Amplifier and Voltage Regulator
V4	RCA-6AC7	Clamped Amplifier
V5	RCA-6AC7	Picture Amplifier
V6	RCA-6AC7	Sync Mixer
V7	RCA-6AG7	Picture Output
V8	RCA-6AG7	Picture Output
V9	RCA-6AC7	Picture Amplifier

Symbol	Type	Function
V10	RCA-6AC7	Sync Separator
V11	RCA-6AC7	Clipper and Sync Output
V12	RCA-6SN7GT	Pulse Former
V13	RCA-6AG7	Keying Amplifier
V14	RCA-6H6	Clamper
V15	RCA-6AC7	Sync Mixer Cathode Follower
V16	RCA-6AG7	Monitor Output
V17	RCA-OD3	Voltage Regulator
V18	RCA-6AC7	Sync Amplifier
V19	RCA-6SL7GT	Sync Amp. and Transient Suppressor

Mechanical Specifications

Dimensions

Width ..... 19 inches

Depth (over-all) ..... 9 inches

Height ..... 10½ inches

Weight (approximate) ..... 20 pounds

Accessory Equipment

(Available on separate order)

580-D Regulated Power Supply MI-21523-C

Remote Control Panel MI-26250-A

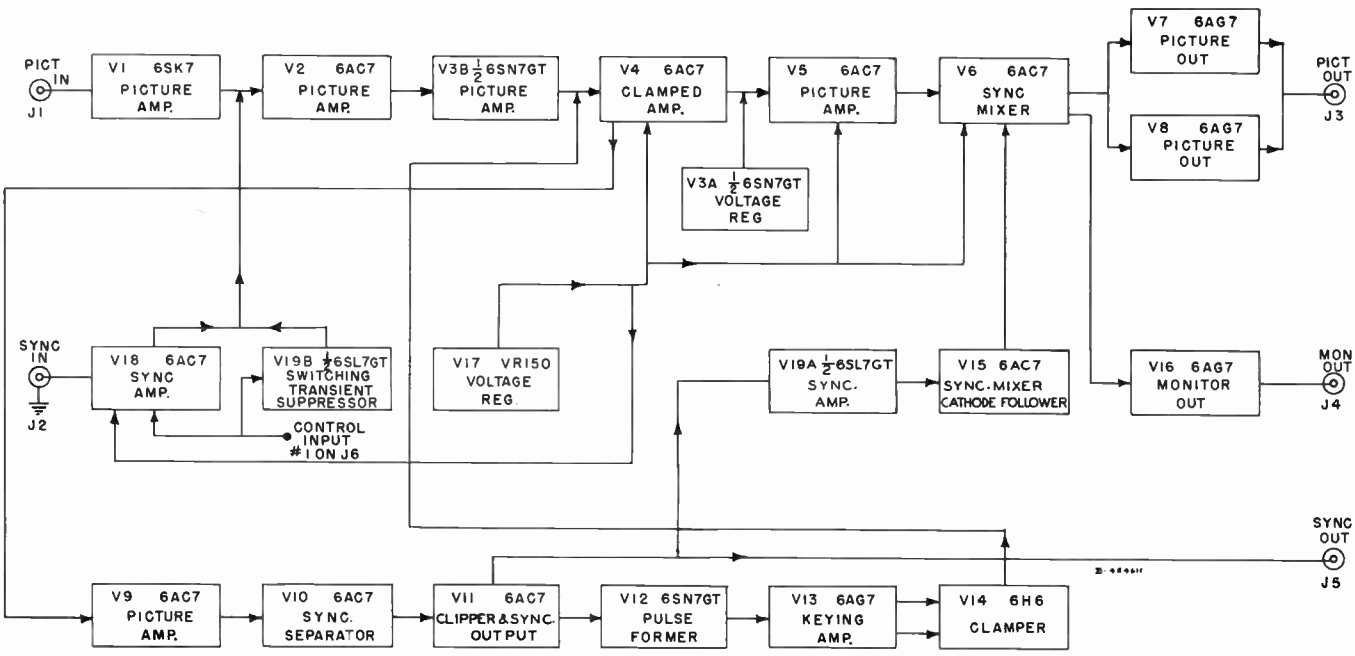


Figure 2—TA-5C Stabilizing Amplifier, Block Diagram

DESCRIPTION

The RCA type TA-5C Stabilizing Amplifier is intended for use in minimizing high frequency noise components; removing low frequency distortion; restoring and/or amplifying the synchronizing pulse in a composite signal should that pulse become sub-standard before reaching the amplifier input circuit.

The stabilizing amplifier is constructed on a recessed type chassis which may be installed in a standard 19 inch relay rack.

An a-c source of 109 to 125 volts 50 or 60 cycles is required for tube filament operation and a 280 volt regulated d-c supply is required for plate voltage.

The frequency response of the amplifier is uniform (± ten per cent) for video signals containing frequencies between 60 cycles and seven megacycles, allowing maximum utilization of a 525 line television system.

A composite signal is fed through the video amplifier tubes (V1 to V8 inclusive) which function in frequency compensated, cascade amplifying stages.

A composite signal of 0.12 volt peak-to-peak is introduced on the grid of V1 from the input jack, J1, through the divider network R1, R2, and R3. This network and the PICT GAIN control, R4, serve in conjunction with the HIGH-LOW switch, S1, to reduce the voltage to this value at the grid of V1. If the input signal at J1 is less than 1.2 volts, the switch should be in the LOW position; if more than 1.2 volts, in the HIGH position. Adjustment of the PICT GAIN control, R4, for 1.5 volts of picture output will automatically place 0.1 volt of picture signal on the grid of V1. Minimum composite signal on J1 should be 0.2 volt peak-to-peak for proper functioning of the amplifier.

If synchronizing signals are not present on the video signal, they may be introduced into the SYNC INPUT jack, J2, and after amplification at V18, they are then mixed with the video signal in the plate circuit (R13 and L1) of V1. An RCA type 6SK7 tube V1 is used in the first amplifier stage to minimize microphonic troubles.

The composite signal from V1 is amplified in V2 and fed into V3B a cathode follower for low impedance input into V4. The grid bias on V4 is adjustable by the SYNC CLIPPER control, R90, so that the germanium crystal, CR1, in the plate circuit of V4 is conductive only when the signal extends in a positive direction (toward a white picture) from the blanking or black level. When the signal swings below the blanking level or into the sync region (which is going positive on V4 plate) the cathode of CR1 becomes more positive than the anode and the crystal ceases to conduct. A second crystal, CR2, with its anode connected to the plate of V4 is biased so that it conducts only when positive excursions from black level occur. This eliminates any sharp transients from appearing on the edges of blanking by shunting them to ground through the crystal. V3A serves as the voltage regulator in this circuit maintaining the proper voltage relationships on the crystals and V4.

Further amplification takes place in V5 and V6. The cathode of V6 contains an OUTPUT LEVEL control, R127. After the PICT GAIN control, R4, has been set to give 1.5 volts peak-to-peak video signal at J3, the OUTPUT LEVEL control may be used to lower the video level. The plate output circuit of V6 then drives V7 and V8, connected in parallel to provide an output of 1.5 volts peak-to-peak of video, plus from zero to 50 per cent of synchronizing voltage across a total impedance of 37.5 ohms. (When coaxial line from J3 is terminated in 75 ohms at its far end or at the input to external station equipment.)

Output from V6 also feeds the grid circuit of the monitor output tube V16, and a signal is available for monitoring purposes at the MON OUT jack, J4.

The composite signal taken from the cathode of V4, is further amplified through V9, whose output is then fed to the synchronizing separator, V10, where the video portion of the signal is removed. The synchronizing pulses at the plate of V10 are then fed to clipper stages, V11 and V19A, for reshaping.

The output from V19A, is fed to a cathode follower stage, V15. The output of V15 is connected to the movable contact on the SYNC LEVEL control (R49). Since R49 is also part of the cathode circuit for the sync mixer tube (V6) the reshaped sync pulse is returned to the video signal at this point.

A negative synchronizing pulse is coupled from the cathode of V11 to the SYNC OUTPUT jack, J5. This is a high impedance output and should not be terminated. This pulse may be used to synchronize the local sync generator with a remote generator or to feed any equipment requiring a sync signal.

A positive synchronizing pulse from the plate of V11, passes through an RC network (C24, R75), differentiating the pulse fed to the input of V12A where this pulse is amplified and inverted. V12B inverts again and clips the negative portion of the incoming pulse which corresponds to the leading edge of the synchronizing pulse. Remaining at the plate of V12B is a negative pulse whose leading edge is coincident with the trailing edge of the synchronizing pulse. This negative pulse is fed to the grid of V13 as a clamp keying pulse. V13 has equal impedances in its plate and cathode across which clamping pulses of equal amplitude and opposite polarity are developed during the "back porch" interval of

blanking by the timing relationship previously described.

These pulses are coupled to the clamp diode, V14, for establishment of a fixed reference potential on the grid of V4. Adjustment of R90, the SYNC CLIPPER control fixes this potential.

If a video signal, minus synchronizing pulses is inserted at the PICT INPUT jack, J1, local synchronizing pulses are inserted at J2, and the two are mixed at the common plate load of V1.

When a composite video signal is present at the PICT INPUT jack, J1, it is necessary to eliminate the local synchronizing pulses introduced at SYNC INPUT jack, J2. This is accomplished by supplying plus 200 volts (through pin 1, on J6) to a voltage divider, R101 and R103, which supplies the voltage required to place V18 beyond cut-off.

The RCA type TS-10A Studio Switching Equipment supplies this control voltage automatically to the Stabilizing Amplifier when a composite video signal is applied to the PICT INPUT jack, J1. If studio equipment is used other than the TS-10A, this voltage should be supplied and controlled externally when changing from a video signal (less sync) to a composite video signal.

With V18 biased beyond cut-off the switching transient suppressor tube, V19B, conducts and there is no d-c change in the plate circuit of V1 when switching between remote (composite) and local (video only) signals.

Additional jacks, J11, J12, J13, J14, and J15, are provided on the front of the recessed type chassis to facilitate test measurements of input and output signal levels.

INSTALLATION

Install the TA-5C in a standard 19 inch relay rack. Power input connections should be made to the proper terminals on the 8 contact plug supplied with the equipment. Terminals 7 and 8 are used for the a-c supply line to filament transformer, T1. A plate supply of 280 volts regulated d-c should be connected to terminal 6 (+) and 2 (−). Terminals 3, 4, and 5 are for remote control of the unit. Terminal number 1 should be connected to terminal 11 in the TS-10A Studio Camera Switching Equipment where 200 volts d-c is available for the control of the switching transient suppressor circuit.

It is suggested that one side of the a-c line to the stabilizing amplifier be connected through the interlock section of the main power switch on the RCA type 580-C Regulated Power Supply. If some other type of power supply is used, a similar arrangement may be used. In this manner one switch will control both the a-c and d-c supply to the amplifier.

The primary winding of the filament transformer, T1, is tapped for operation as shown in the table which follows:

Line Voltage	Primary Taps Used
109	1 - 2
117	1 - 3
125	1 - 4

This transformer is connected at the factory for operation from a 117 volt line (taps 1 and 3).

When this equipment is installed, measure the line voltage. If the voltage measured differs from that for which the equipment is wired, reconnect to the primary terminal indicated for the voltage which most nearly agrees with the measured value.

INITIAL ADJUSTMENTS

1. Introduce a composite video signal at the PICT INPUT jack, J1. An alternative method is to introduce a video signal (without synchronizing pulse) at J1, and synchronizing signal only (4 volts peak-to-peak, black negative) at the SYNC INPUT jack, J2.

2. Terminate the output of PICT OUT jack, J3, and MON OUT jack, J4, in 75 ohm loads. Do not terminate the SYNC OUTPUT jack, J5.

3. Rotate the SYNC LEVEL control, R49, to minimum (counterclockwise) position and SYNC CLIPPER control, R90, to midposition.

4. Apply power and adjust B+ voltage to 280 volts.

5. Connect a calibrated oscilloscope to the output terminal, J13 (small pin jack).

6. Operate S1 to the LOW position.

7. Rotate the OUTPUT LEVEL control to its maximum clockwise position.

8. Adjust the PICT GAIN control, R4, to provide 1.5 volts, peak-to-peak of picture and blanking at the output jack, J13. If it is necessary to adjust the control to a point within the first quarter of its operating range (at the low end) operate switch, S1, to the HIGH position and readjust the PICT GAIN control, R4, to give the proper output. (1.5 volts, peak-to-peak of picture and blanking signals.)

9. Adjust the SYNC CLIPPER control, R90, so that the composite picture is clipped just at the black level. A clean blanking pulse will appear on the oscilloscope connected at J13.

10. Repeat step 8 then adjust the SYNC LEVEL control to provide whatever synchronizing pulse amplitude is required at the output jack, J13.

11. Connect the oscilloscope to J14, then adjust the MON GAIN control, R93, to obtain the same peak-to-peak value as that obtained at J13.

12. For lower output levels, adjust the OUTPUT LEVEL control.

When the stabilizing amplifier is used with the RCA type TS-10A Studio Camera Switching Equipment to switch between remote (composite) and local (picture only) signals, a coaxial line from the local synchronizing generator must be connected to the SYNC INPUT jack, J2, and the following adjustment made.

1. Connect a 0 to 10 milliampere meter across the plate load resistor, R13, of tube V1.

2. Connect the AUX 5 or AUX 6 input of the RCA type TS-10A Studio Camera Switching Equipment to a source of remote picture signal.

3. The current through the milliammeter should remain constant when switching from either AUX 5 or AUX 6 input to some other input. If the meter reading varies during input switching, adjust R107, by moving the sliding tap until there is no variation in current.

4. Disconnect the meter from R13.

If equipment is available for phasing a local synchronizing generator with a remote synchronizing generator, the Stabilizing Amplifier may be used in the following manner:

1. Feed the remote signal into J1 on the TA-5C and adjust the amplifier for 1.5 volt peak-to-peak picture signal with no sync.

2. The sync output (from J5) is connected to the phasing equipment through a short length of unterminated coaxial cable (RG62/U about 5 feet long). This feeds the remote sync to be compared to the local sync at the phasing equipment.

3. Once the local sync generator is locked into the remote signal, the output of the TA-5C may be considered a local signal and may be fed into the switching console as such.

OPERATING ADJUSTMENTS

Some readjustments of controls may be necessary under the following conditions:

CHANGE IN LEVELS—

Should the amplitude of the picture component or synchronizing pulse change, minor adjustment of the PICT GAIN control, R4, or SYNC LEVEL control, R49, may be necessary to keep the output constant at the required level.

EXCESSIVE NOISE ON BLANKING PULSE—

When the blanking pulse has excursions, or overshoot extending in a positive direction toward the white region, it will be necessary to adjust the SYNC

CLIPPER control, R90, until these defects in the signal are clipped. This adjustment will destroy "setup". However, it should be possible to obtain an extra amount of "setup" from the signal source in order for the stabilizing amplifier to deliver its proper output.

CAUTION: ***Care must be observed in the operation of the units of the system ahead of the stabilizing amplifier to prevent the black portion of the signal from extending into the synchronizing portion of the signal. If this condition exists the stabilizing amplifier treats these portions of the signal as synchronizing pulses and clamps on them causing a tear-out in the picture.***

SPECIAL OPERATING CONDITIONS—

In some applications it may be desirable to use the stabilizing amplifier to control the signal level fed to a succeeding part of the system such as a transmitter, or to operate at lower signal levels so that over-all system linearity is improved.

The OUTPUT LEVEL control can be used to satisfy these requirements. This control is in the cathode of V6, therefore it does not affect the signal level at the grid of the clamped amplifier tube, V4. The level at the grid of V4 is very important for proper operation since too much or too little signal will affect the clamping action.

In order to get proper level at the grid of V4, set the OUTPUT LEVEL control at maximum output position, full clockwise, and set up the amplifier for 1.5 volt picture across a 75 ohm termination on J3. This will automatically establish the correct peak-to-peak signal voltage at the grid of V4. Once this condition has been established the output level may be varied by use of the OUTPUT LEVEL control.

REMOTE OPERATION—

As the stabilizing amplifier is not usually mounted near a picture monitor, it is often desirable to be able to adjust the operation of the amplifier from a remote location where the effect of the adjustments can be observed on a picture monitor and oscilloscope.

Before remote operation can be accomplished the following changes must be made in the stabilizing amplifier:

a. Remove the wire which short-circuits section "B" of capacitor C2. Capacitor C2 is located between the resistor boards at the input jack end of the chassis.

b. Remove the jumper which joins the end of R122 to the end of R116. Counting from the end nearest the output jacks this wire is connected between the fourth and sixth terminals on the outer edge of the long resistor board.

WARNING: This lead must be disconnected before the remote control panel is connected.

c. Remove the jumper which joins terminal 3 on X1 to the end of R7. Counting from the end nearest X1, the R7 end of this wire is at the third terminal on the inner edge of the long resistor board.

After the changes in the stabilizing amplifier have been completed; connect an external remote control panel (such as the RCA MI-26250-A) as shown on Figure 4.

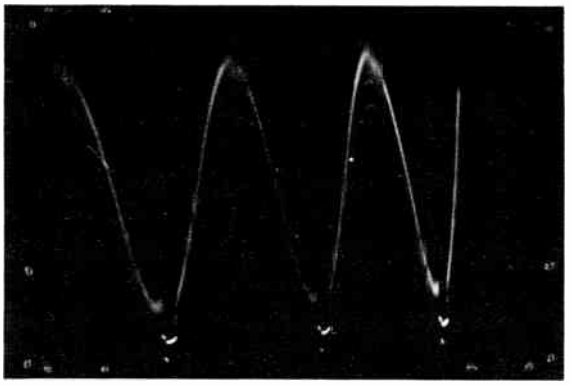
If an external remote control unit is not available, or an existing one not easily converted, one may be assembled by mounting three potentiometers on a small panel, and marking them as shown on Figure 4.

After remote controls have been installed, initial adjustments should be made with the remote GAIN and SYNC CLIPPER controls turned to their maximum counterclockwise position and the remote SYNC LEVEL control at its maximum clockwise position. The procedure given under Initial Adjustments may now be followed. This assures that the amplifier itself is functioning properly. Adjustment of the operating ranges of the remote controls should be accomplished as follows:

1. Turn the REMOTE GAIN control to mid-position (REMOTE CONTROL PANEL).
2. Turn the OUTPUT LEVEL control to its maximum clockwise position.
3. Readjust the PICT GAIN control, R4, to obtain the normal 1.5 volt peak-to-peak of picture and blanking as measured on terminated output.
4. Rotate the SYNC LEVEL control, R49, to its maximum counterclockwise position.
5. Turn the REMOTE SYNC CLIPPER control to mid-position.
6. Readjust the SYNC CLIPPER control, R90, to a point where the synchronizing pulses are completely clipped.
7. Set the remote SYNC LEVEL control to its maximum clockwise position.
8. Readjust the SYNC LEVEL control, R49, to the position at which the synchronizing pulse level is approximately 1.0 volts.
9. Readjust the REMOTE SYNC LEVEL control to provide the required amount of synchronization at PICT OUT jack, J3.

The three remote controls when adjusted as previously described provide a reasonable range of control in both directions from the nominal values required. Remote PICT GAIN control has a limited range compared to the PICT GAIN control, R4, in the Stabilizing Amplifier, however, the range is sufficient to compensate for normal fluctuations in signal level.

When switching programs, it may be necessary to readjust the PICT GAIN control, R4, at the amplifier if the change in signal level is large.



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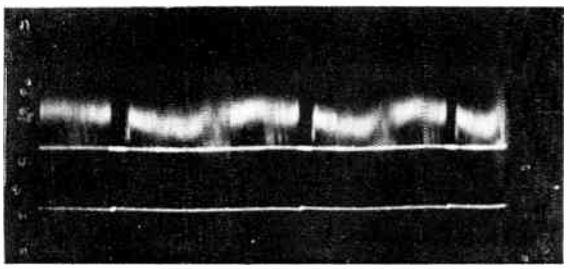

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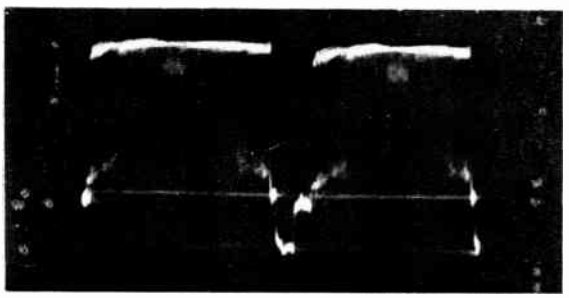

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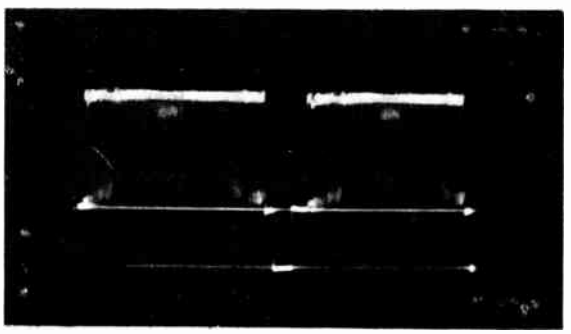

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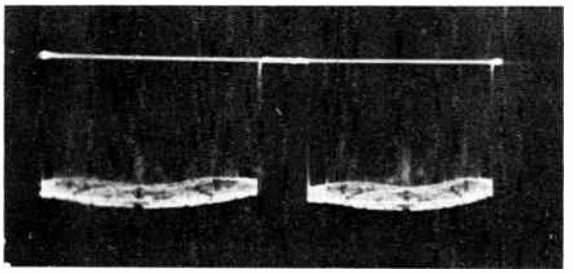

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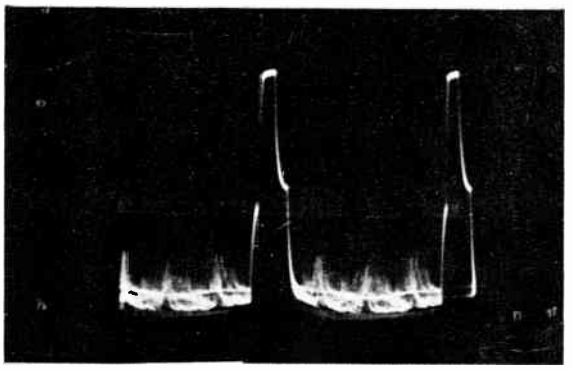

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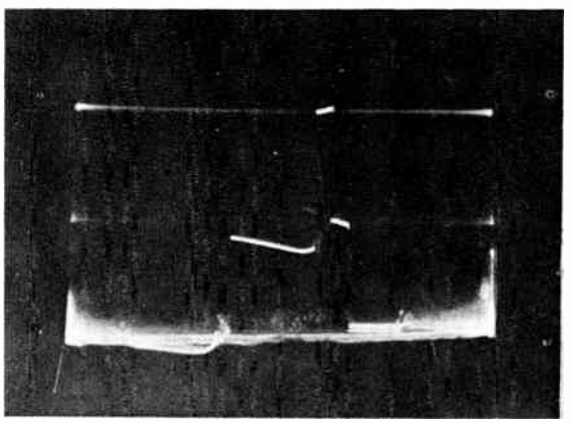

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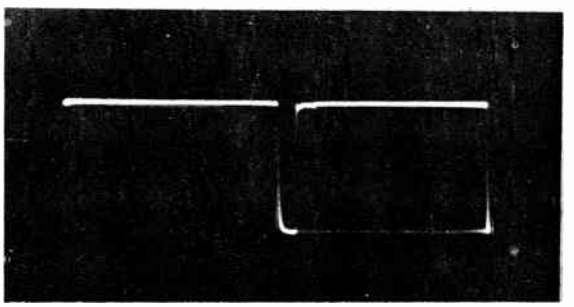

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Figure 3—Typical Wave Forms

(See Text for Description)

The Stablizing Amplifier is designed to correct certain faults which almost inevitably creep into the signal generated in television pickup and transmission systems. It does not, and cannot correct every fault that may be encountered. It will, however, minimize or eliminate power supply and switching surges or hum picked up from low frequency power systems and added to the picture signal ahead of the stabilizing amplifier.

In order to illustrate better some of the amplifiers' functions, several simulated troubles were introduced. An oscilloscope was used to check the input and output circuits of the amplifier, under these, and normal conditions.

A composite video signal, containing 60 cycle sine wave modulation of great amplitude (see Figure 3A), was introduced at the PICT INPUT jack, J1. This spurious low frequency hum was eliminated upon passing through the stabilizing amplifier. See Figure 3B.

An example of a composite signal with degraded blanking and synchronizing pulses is shown in Figure 3C which is a photograph of a signal taken from a standard television receiver.

After passing through the stabilizing amplifier, the blanking and synchronizing pulse appears clean and sharply defined as shown in Figure 3D. The oscilloscope is connected at J3.

The pattern obtained at the grid of V5, is shown in Figure 3E. This pattern illustrates the clipping action (removal of synchronizing pulse) of the crystal, CR1, in the plate circuit of V4.

The composite pattern obtained at the plate of V9 is illustrated at F and G in Figure 3.

The pattern in Figure 3F was obtained by adjusting the sweep on the external oscilloscope to 7875 cycles. Pattern G, was obtained by setting the sweep to 60 cycles per second.

The synchronizing pulse from the cathode of V11 is shown in Figure 3H as it appears at the SYNC OUTPUT jack, J5. (External oscilloscope sweep set for 7875 cycles.)

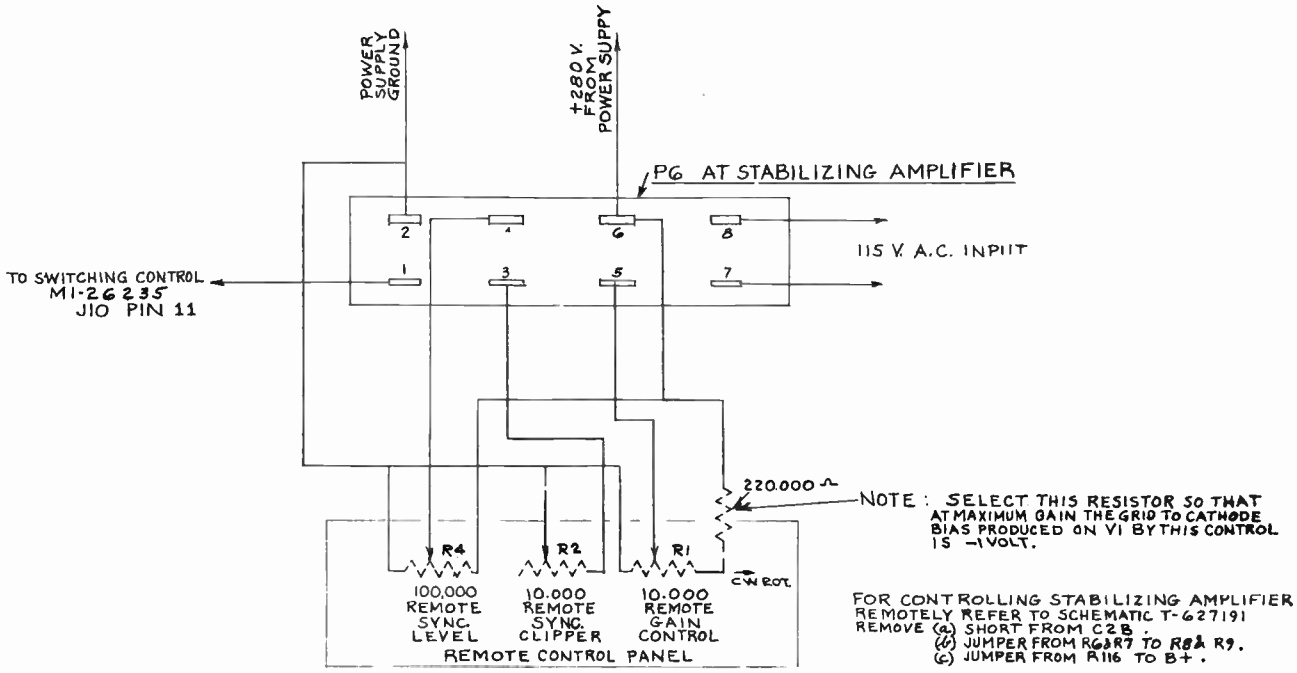

Figure 4—Remote Control Connections

MAINTENANCE

CAUTION: ***MAKE CERTAIN ALL POWER TO THE AMPLIFIER IS OFF AND CONDENSERS DISCHARGED BEFORE TOUCHING ANY COMPONENT FOR INSPECTION OR REPAIR.***

The TA-5C Stabilizing Amplifier has been conservatively designed for continuous operation. With ordinary care a minimum of service will be required to keep the equipment in satisfactory operation. To avoid interruptions during operation, a regular schedule of inspection should be established.

All cable connections should be checked periodically and tightened when necessary. Make certain all ground connections are tight.

A regular check should be made of all tubes in this unit. As far as possible, tube failure should be anticipated by keeping a log of tube life. Tube tester meter readings should be made of all tubes and compared with previously taken readings. Spare tubes should be within instant reach of the operator to enable replacement in the event of a failure.

The most frequent cause of improper operation is improperly adjusted controls. Always make certain the correct signal voltages are available at the input jack.

In the event of faulty operation, check each stage to determine which circuit is at fault.

As an aid in checking the amplifier for any deviations from normal operation, typical tube socket voltages and oscilloscope waveforms are given on the schematic diagram.

If the amplifier output is low, the tubes in the picture amplifier stages should be checked for low emission. When the synchronizing output voltage does not cover the full range, tubes V11, V15, and V19 should be tested. Make certain that J5 is not terminated.

Instability and defective clamping may be caused by a failure of V9, V10, V11, V12, or V14.

To check these circuits for defects other than faulty tubes, it is necessary to remove V14 from its socket. Shunt C9 with a large value capacitor (approximately 0.1 mfd.) and connect a one-half megohm resistor from the grid of V4 to ground. Apply a composite video signal of sufficient amplitude for rated output. The voltage and waveform at each tube should be checked and compared with those given on the schematic diagram, Figure 7.

ROUTINE MAINTENANCE SCHEDULE

DAILY—A general inspection should be made immediately after shut-down. Check for signs of overheating in all parts of the unit.

WEEKLY

1. Clean the internal and external parts of the unit.
2. Inspect and tighten all cable connections.
3. Check adjustment of the equipment controls and readjust if necessary.

MONTHLY

1. Check all tubes in the equipment, and record tube tester readings on previously prepared forms.
2. Inspect and clean thoroughly the internal components of the unit.
3. Check and record all cable socket voltages.

PARTS LIST

When ordering replacement parts, please give RCA Stock Number. Symbol Number, Description, and Drawing Number will be helpful in further identifying the desired part.

The part which will be supplied against an order for a replacement item may not be an exact duplicate of the original part, however, it will be a satisfactory replacement, differing only in minor mechanical or electrical characteristics. Such differences will in no way impair the operation of the equipment.

SYMBOL NO.	DESCRIPTION	DWG. NO.	STOCK NO.
C1	Capacitor, 0.047 mfd, 600 volt	735715-271	73592
C2A, C2B	Capacitor, 0.25-0.25 mfd, 600 volt	8887707-374	56073
C3A, C3B	Capacitor, 1000-1000 mfd, 15 volt	442900-40	59757
C4A, C4B	Capacitor, 10-80 mfd, 400 volt	442900-33	59758
C5	Capacitor, same as C1		
C6A, C6B	Capacitor, 20-20 mfd, 450 volt	95695-39	34889
C7	Capacitor, same as C1		
C8A, C8B	Capacitor, same as C4A, C4B		
C9	Capacitor, 1500 mmfd, 600 volt	735715-253	73802
C10	Capacitor, 25 mfd, 25 volt	442901-47	52518
C11, C12	Capacitor, 0.5 mfd, 600 volt	8887708-13	56863
C13	Capacitor, 220 mmfd, 500 volt	727856-131	39670
C14	Capacitor, same as C11		
C15A, C15B	Capacitor, same as C6A, C6B		
C16A, C16B	Capacitor, same as C4A, C4B		
C17A, C17B	Capacitor, same as C3A, C3B		
C18	Capacitor, 125 mfd, 350 volt	442900-32	93406
	Mounting Plate, bakelite, for C18, C30	85558-3	18469
C19	Capacitor, 8200 mmfd, 300 volt	727866-169	54347
C20A, C20B	Capacitor, same as C4A, C4B		
C21	Capacitor, 0.01 mfd, 600 volt	735715-263	73565
C22	Capacitor, 0.033 mfd, 400 volt	735715-169	73552
C23	Not used		
C24	Capacitor, 12 mmfd, 500 volt	727856-103	39606
C25	Capacitor, 270 mmfd, 500 volt	727856-133	39638
C26	Capacitor, same as C21		
C27, C28	Capacitor, same as C1		
C29A, C29B	Capacitor, same as C6A, C6B		
C30	Capacitor, same as C18		
C31	Capacitor, 0.25 mfd, 600 volt	8887707-12	55999
C32	Capacitor, 470 mmfd, 500 volt	727856-139	65399
C33	Capacitor, 0.1 mfd, 400 volt	735715-175	73551
C34	Capacitor, 0.5 mfd, 600 volt	8887707-13	57601
C35	Capacitor, 225 mfd, 15 volt	86028-8	54406
	Mounting Plate, bakelite, for C35	85558-1	19820
C36, C37	Capacitor, 1000 mmfd, 300 volt	727856-47	53300
C38	Capacitor, same as C25		
C39	Capacitor, 56 mmfd, 500 volt	727856-117	50399
F1	Fuse, 1 ampere, Slo-Blo	8851771-3	53447
	Fuse Holder (XF1)	99088-1	48551
J1 to J5	Connector, coaxial cable	255223-1	51800
J6	Connector, power cable, 8 contact	727969-7	55806
J7 to J10	Not Used		
J11 to J15	Tip Jack	845648-1	18348
L1, L2	Coil Assembly	739772-506	51907
L3	Coil Assembly	739772-507	52454
L4	Coil Assembly	739772-505	51906
P1 to P5	Connector, coaxial	252868-1	66344
P6	Connector, power, 8 contact	727969-8	55808
R1	Resistor, 10 ohm, 1 watt	90496-38	69640
R2	Resistor, 120 ohm, 1 watt	90496-51	30936
R3	Resistor, 68 ohm $\pm 5\%$, 1 watt	90496-131	36976
R4	Resistor, variable, 200 ohm, 2 watt	433196-31	52438
R5	Resistor, 100 ohm, $\frac{1}{2}$ watt	82283-50	34765

SYMBOL NO.	DESCRIPTION	DWG. NO.	STOCK NO.
R6	Resistor, 1 megohm, ½ watt	82283-98	30652
R7	Resistor, 220,000 ohm, 1 watt	90496-90	54449
R8	Resistor, 47 ohm, ½ watt	82283-46	30732
R9	Resistor, 560 ohm, ½ watt	82283-59	5164
R10	Resistor, 47,000 ohm, 2 watt	99126-82	44211
R11	Resistor, 4700 ohm ±5%, ½ watt	82283-175	30494
R12	Resistor, 1000 ohm ±5%, ½ watt	82283-159	34766
R13	Resistor, 47 ohm, 1 watt	90496-46	45884
R14	Resistor, 5000 ohm, 10 watt	844908-24	19660
R15	Resistor, same as R5		
R16	Resistor, 560,000 ohm, ½ watt	82283-95	30653
R17	Resistor, 82 ohm, ½ watt	82283-49	13961
R18	Resistor, 56,000 ohm, 1 watt	90496-83	17440
R19	Resistor, 5600 ohm, ½ watt	82283-177	30734
R20	Resistor, 1300 ohm ±5%, ½ watt	82283-162	33572
R21	Resistor, 10,000 ohm, 2 watt	99126-74	44294
R22	Resistor, same as R5		
R23	Resistor, same as R16		
R24	Resistor, same as R9		
R25	Resistor, 8200 ohm, 2 watt	99126-73	43493
R26	Resistor, same as R5		
R27	Not Used		
R28	Resistor, 27,000 ohm, 2 watt	99126-79	44213
R29	Resistor, 330 ohm, ½ watt	82283-56	8063
R30	Resistor, same as R5		
R31	Resistor, same as R11		
R32	Resistor, 510 ohm ±5%, ½ watt	82283-152	3383
R33	Resistor, 4700 ohm, 1 watt	90496-70	71987
R34	Resistor, 150,000 ohm, ½ watt	82283-88	30493
R35	Resistor, 100 ohm, 1 watt	90496-50	31215
R36	Resistor, same as R14		
R37	Resistor, 15,000 ohm, 10 watt	844908-35	52016
R38, R39	Resistor, same as R5		
R40	Resistor, same as R16		
R41	Not Used		
R42	Resistor, same as R5		
R43	Not Used		
R44	Resistor, same as R5		
R45	Resistor, same as R16		
R46	Resistor, 33 ohm, ½ watt	82283-44	30789
R47, R48	Not Used		
R49	Resistor, same as R4		
R50	Resistor, same as R5		
R51	Resistor, same as R11		
R52	Resistor, same as R12		
R53	Resistor, same as R21		
R54	Resistor, same as R5		
R55	Resistor, 330,000 ohm, ½ watt	82283-92	14983
R56	Resistor, same as R17		
R57	Resistor, same as R5		
R58	Resistor, 2000 ohm, 10 watt	428781-11	45721
R59	Resistor, 75 ohm ±5%, 1 watt	90496-132	91942
R60	Resistor, 150 ohm, ½ watt	82283-52	30880
R61	Resistor, same as R18		
R62	Resistor, 33,000 ohm, ½ watt	82283-80	30685
R63	Resistor, 5600 ohm, 1 watt	90496-71	38886
R64	Resistor, same as R29		
R65	Resistor, 1.5 megohm, ½ watt	82283-100	31449
R66	Resistor, 27,000 ohm, 1 watt	90496-79	71990
R67	Resistor, 10 ohm, ½ watt	82283-38	34761
R68	Resistor, 2200 ohm, ½ watt	82283-66	34767
R69	Resistor, 100,000 ohm, 1 watt	90496-86	72635
R70	Resistor, same as R16		

SYMBOL NO.	DESCRIPTION	DWG. NO.	STOCK NO.
R71	Resistor, 820 ohm, ½ watt	82283-61	30158
R72	Resistor, 5600 ohm, ½ watt	82283-71	30734
R73	Resistor, same as R69		
R74	Resistor, 15,000 ohm, 2 watt	99126-76	68935
R75	Resistor, 1.8 megohm, ½ watt	82283-101	11769
R76	Resistor, same as R67		
R77	Resistor, same as R33		
R78	Resistor, 18,000 ohm, 2 watt	99126-77	39158
R79	Resistor, 680,000 ohm, ½ watt	82283-96	30562
R80	Resistor, 10,000 ohm, ½ watt	82283-74	3078
R81	Resistor, 1000 ohm, 1 watt	90496-62	71916
R82	Resistor, 12,000 ohm, 10 watt	844908-37	50749
R83	Resistor, same as R35		
R84	Resistor, same as R16		
R85	Resistor, 470 ohm ±5%, ½ watt	82283-151	30499
R86	Not Used		
R87	Resistor, same as R29		
R88	Resistor, 470 ohm ±5%, 1 watt	90496-151	37278
R89	Resistor, 470,000 ohm, ½ watt	82283-94	30648
R90	Resistor, variable, 250,000 ohm, 2 watt	433196-21	51589
R91	Resistor, 470,000 ohm, 1 watt	90496-94	72521
R92	Resistor, same as R16		
R93	Resistor, same as R4		
R94	Resistor, same as R17		
R95	Resistor, same as R78		
R96	Resistor, 3000 ohm, 5 watt	428781-50	51629
R97	Resistor, same as R80		
R98	Resistor, same as R59		
R99	Resistor, same as R5		
R100	Resistor, same as R16		
R101	Resistor, 1000 ohm, 2 watt	99126-62	37496
R102	Resistor, same as R5		
R103	Resistor, 10,000 ohm, 10 watt	844908-26	51869
R104	Resistor, same as R72		
R105	Resistor, same as R80		
R106	Resistor, same as R69		
R107	Resistor, 2000 ohm, 10 watt	8888580-1	55674
R108	Resistor, same as R68		
R109	Resistor, same as R69		
R110	Resistor, same as R16		
R111	Resistor, same as R5		
R112	Resistor, 2.2 megohm, ½ watt	82283-102	30649
R113	Resistor, same as R9		
R114	Resistor, same as R69		
R115	Resistor, same as R63		
R116	Resistor, same as R18		
R117	Resistor, same as R80		
R118	Resistor, 1.0 megohm, 1 watt	90496-98	71993
R119	Not Used		
R120	Resistor, same as R5		
R121	Resistor, same as R60		
R122	Resistor, same as R103		
R123	Resistor, 5000 ohm, 5 watt	443853-17	53650
R124	Not Used		
R125	Resistor, 15,000 ohm, ½ watt	82283-76	36714
R126	Resistor, same as R5		
R127	Resistor, variable, 500 ohm, 2 watt	737829-5	59762
R128	Resistor, 180 ohm ±5%, ½ watt	82283-141	30618
R129	Resistor, 430 ohm ±5%, ½ watt	82283-150	19781
R130	Resistor, 750 ohm ±5%, ½ watt	82283-156	19785
R131	Resistor, same as R128		
S1	Switch, toggle, SPDT	95559-7	52452
T1	Transformer	450031-2	58310
X1 to X19	Socket, tube, octal, saddle type	99390-1	54414
Y1 to Y3	Crystal, germanium, 1N48		54374

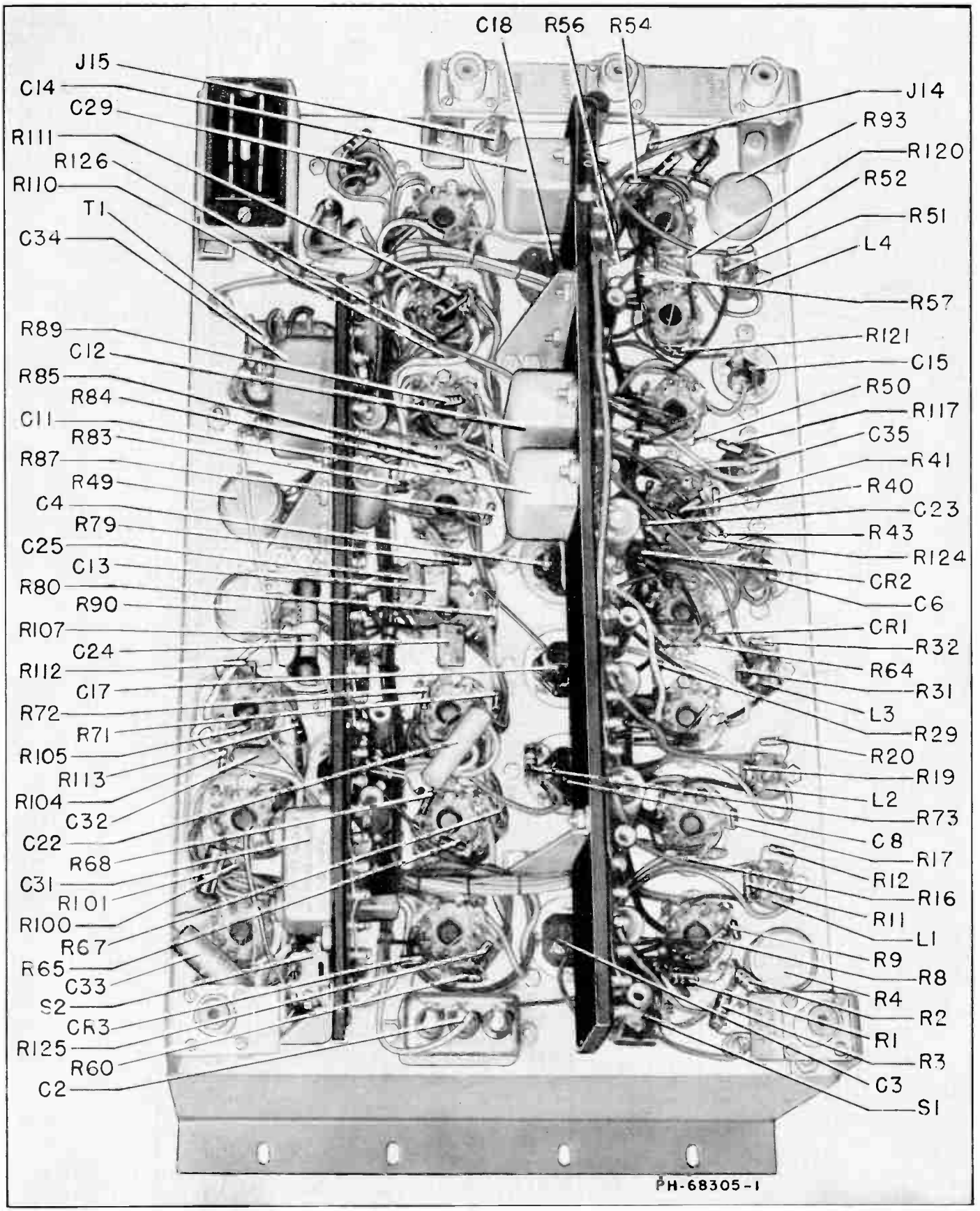

Figure 5—TA-5C Stabilizing Amplifier, Rear View

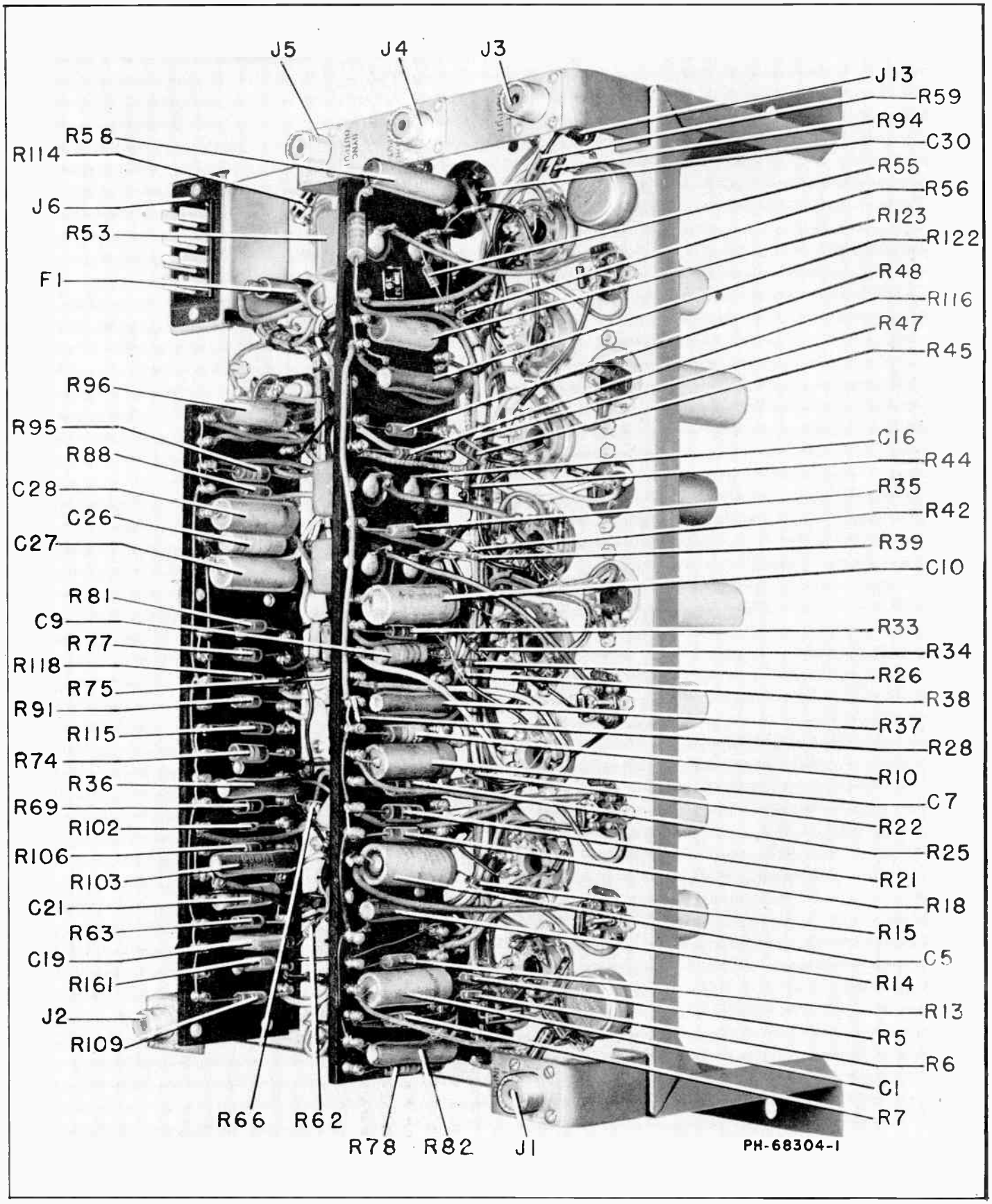

Figure 6—TA-5C Stabilizing Amplifier, Rear Oblique View

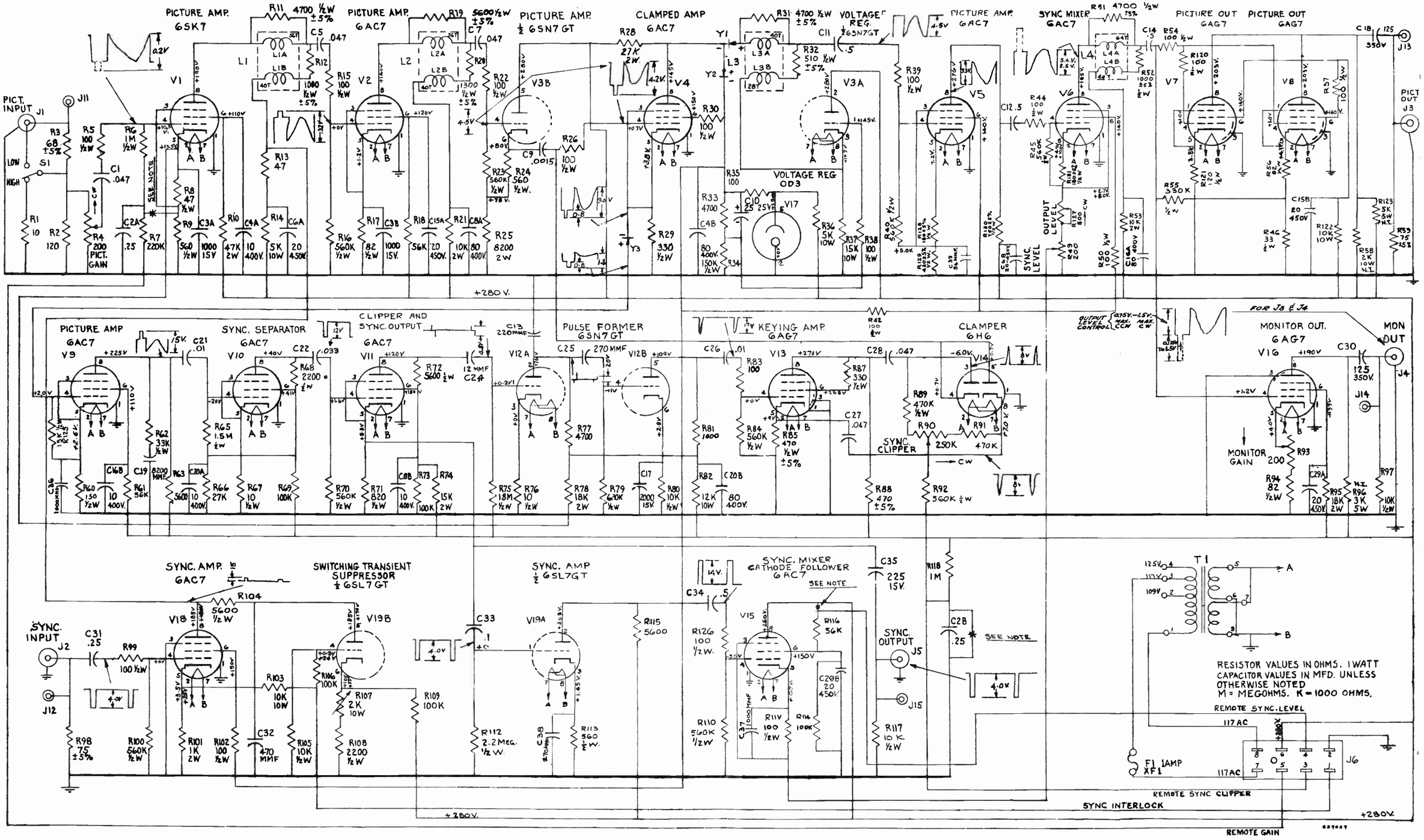

Figure 7—TA-5C Stabilizing Amplifier Schematic Diagram

NOTE: REMOVE (A) SHORT FROM C2B
(B) JUMPER FROM R6 & R7 TO R8 & R9.
(C) JUMPER FROM R116 TO B+.

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ENGINEERING PRODUCTS DEPARTMENT CAMDEN, N. J.