JERROLD
Texscan

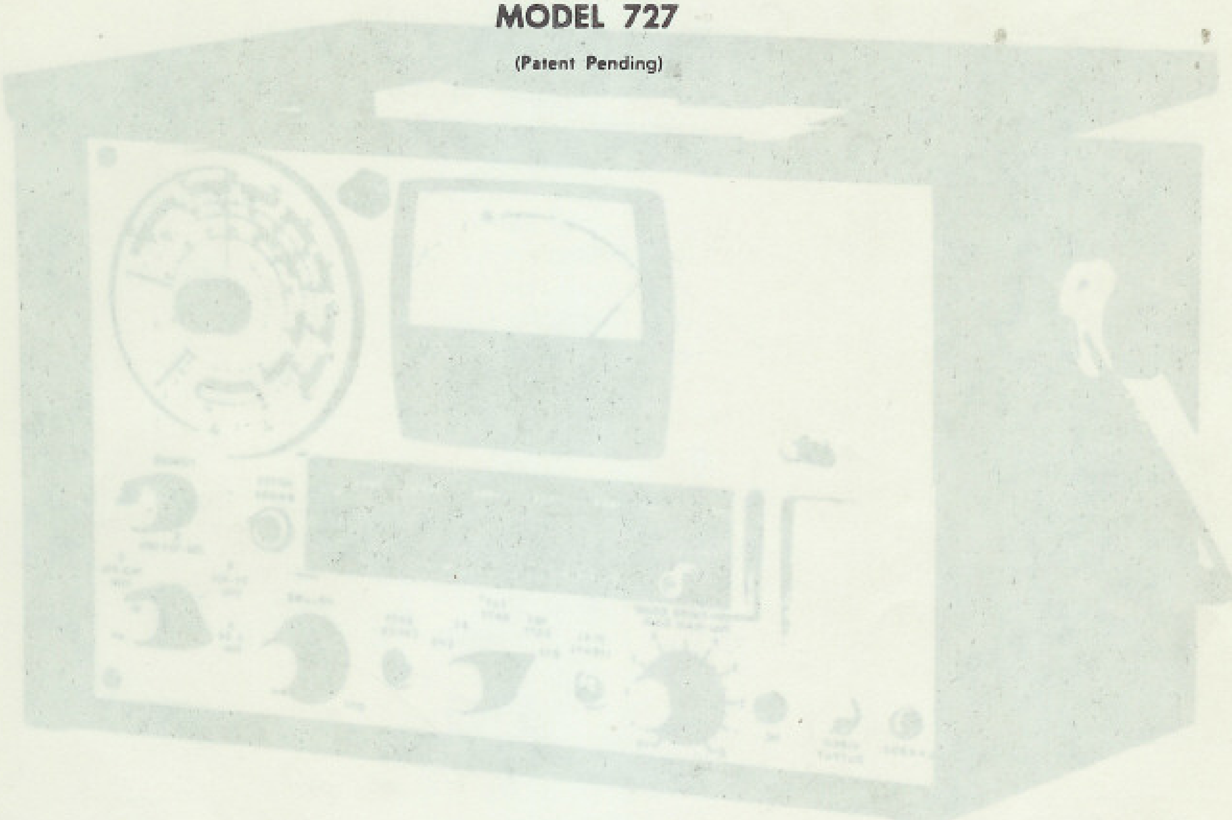
INSTRUCTION MANUAL

435-267-03

FIELD STRENGTH METER

MODEL 727

(Patent Pending)



JERROLD ELECTRONICS CORPORATION

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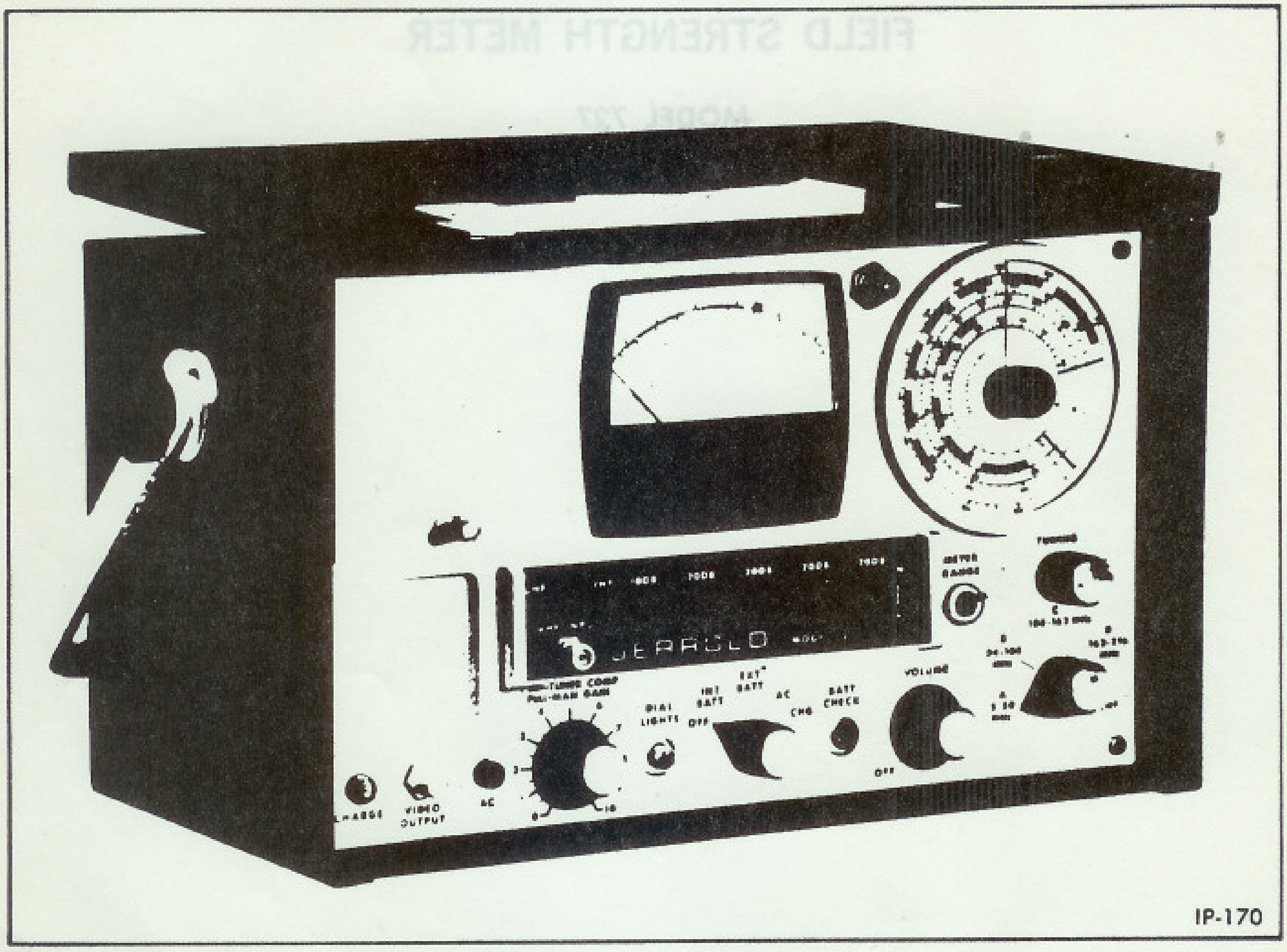

Fig. 1-1. Model 727

IMPORTANT NOTICE

HANDLE WITH CARE

THIS ELECTRONIC INSTRUMENT WAS DESIGNED FOR NORMAL OPERATING AND STORAGE CONDITIONS ENCOUNTERED IN FIELD USE. IT SHOULD BE HANDLED AND TRANSPORTED WITH CARE TO AVOID DAMAGE TO DELICATE COMPONENTS AND CIRCUITS. PERSONNEL UNFAMILIAR WITH ELECTRONIC INSTRUMENTS SHOULD BE INSTRUCTED TO AVOID DROPPING, THROWING, BOUNCING, STRIKING, OR OTHERWISE MISHANDLING THE UNIT. WHEN TRANSPORTING THE UNIT IN A VEHICLE, CARE SHOULD BE TAKEN TO CUSHION IT AGAINST SEVERE SHOCKS THAT MIGHT OCCUR.

CAUTION:

Units shipped from the factory are identified for operation from the proper input power source. Note the following:

(1) 230-volt rms, 50/60 Hz, single-phase power source.

A RED label marked "230V" is wrapped around the power cord within six inches (15 cm) of the polarized power plug. A RED label marked "230V" is also attached to the rear panel of the unit above the line-cord grommet.

(2) 115 volt rms, 50/60 Hz, single-phase power source.

A YELLOW label marked "115V" is wrapped around the power cord within six inches (15 cm) of the polarized power plug. A YELLOW label marked "115V" is also attached to the rear panel of the unit above the line-cord grommet.

Dammage to any unit which is connected to a 230-volt power source, but which is wired internally for 115-volt operation constitutes "misuse", and is not covered by the TEXSCAN warranty. Consult the TEXSCAN instruction manual for the proper internal power-source connection if there is any question about the intended use. NOTE: The line fuse(s) must also be checked for the correct rating and type.

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LIST OF ILLUSTRATIONS

FIELD STRENGTH METER
MODEL 727

ADDENDUM
435-267-91

INTRODUCTION

This addendum updates information contained in Instruction Manual 435-267-03, covering Field Strength Meter Model 727.

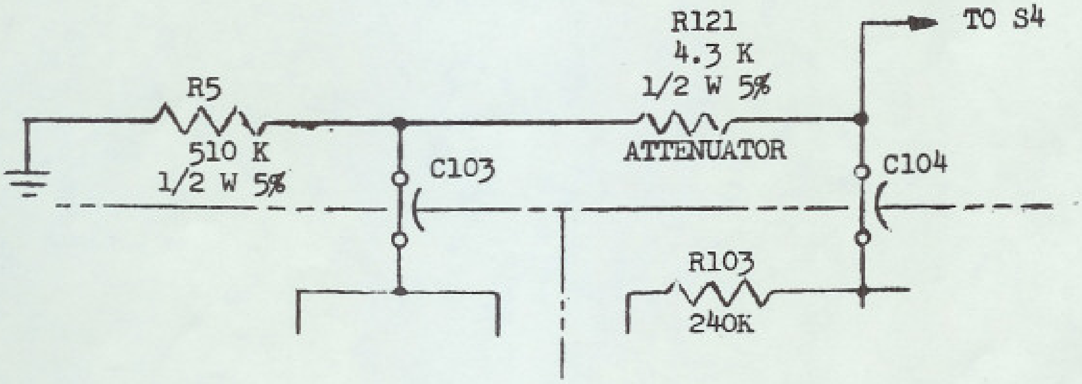
CHANGES

1. Change the following Replacement Parts List items.

ITEM	SCHEMATIC DESIGNATION	QTY.	DESCRIPTION	JERROLD PART NO.
			Page 25, I-F Amplifier	
26	R210/S201	1	400 Ω, potentiometer with spst switch	S118-236-01
			Page 26, VHF Tuner	
13	R401	1	820 Ω, 5%, 1/4 W	112-976
17A(Add)	R410	1	300 Ω, 5%, 1/4 W	112-096
			Page 26, Power Supply	
14	Q602,603	2	2N3905	130-168
			Page 26, Attenuator	
2	C102	1	0.22 pF, 10%, 500 V	122-093
13	S101	1	Spdt, slide	S162-251
14	S102-106	5	Dpdt, slide	S162-250
			Page 26, Front Panel	
11	R2	1	180 Ω, 5%, 1/2 W	112-266

2. Change schematic diagrams C861-779 and E861-829 to reflect the changes indicated above.

3. On Schematic diagram E861-829, move connection to S4 from junction of R5, C103, and R121 to junction of R121 and C104 (see below).



DESCRIPTION AND SPECIFICATIONS

1.1 DESCRIPTION

Model 727 is a tunable r-f voltmeter designed for measuring signal levels between 10 microvolts and 3 volts in the frequency range from 5 to 216 MHz.

An accessory plug-in converter is available on special order for extending the operating range into the 470 to 890 MHz UHF band.

The instrument consists essentially of a tuner/local oscillator unit, a balanced mixer, an i-f amplifier, and a peak detector measuring circuit. A step attenuator in the input circuit permits setting the measurement range. Frequencies can be tuned in four switch-operated ranges.

The 727 also includes a video detector whose output is available at a front panel terminal. A discriminator, an audio amplifier, and a loudspeaker are incorporated to help in the identification of interfering signal sources. The metered signal current is also available at a rear panel phone jack for application to a strip chart recorder or similar device.

Special sampling circuitry permits identification of the meter scale from which to take a reading, simply by depressing a front panel switch.

Model 727 may be powered from a 115V or 230V, or 50 Hz or 60 Hz line source, from an external 12 to 15 volt battery, or from its own internal, rechargeable, nickel-cadmium battery. Each instrument is accompanied by a calibration chart inserted in a special holder in the lid; the compensator calibration points are factory-inserted on the chart.

1.2 SPECIFICATIONS

The specifications of Model 727 are listed in Table 1-1.

TABLE 1-1. SPECIFICATIONS

FREQUENCY RANGE Tuning Range A B C D	5 to 50 MHz, 54 to 216 MHz, in 4 bands 5 to 50 MHz 54 to 108 MHz 108 to 162 MHz 162 to 216 MHz
MEASUREMENT RANGE full scale reading	10 microvolts to 3 volts in 10 ranges: 0.1 mV, 0.3 mV, 1.0 mV, 3.0 mV, 10.0 mV, 30.0 mV, 0.1 V, 0.3 V, 1.0 V, 3.0 V.
ACCURACY OF LEVEL READINGS	±1.5 dB at 25°C, ±3 dB from —18°C to +60°C.
VIDEO OUTPUT CAPABILITY	0.8 V p-p for +10 dBmV input, with compensator control set for no overload.
MAXIMUM SENSITIVITY	10 microvolts.
SELECTIVITY	I-F bandwidth of 0.6 MHz at 3-dB points.
REJECTION OF ADJACENT SOUND CARRIER	46 dB down from level of received video carrier.
INPUT IMPEDANCE AND MATCH above 100 microvolts	75 ohms, VSWR 1.22:1 (20 dB min. return loss); not matched below 100 microvolts.
INTERMEDIATE FREQUENCY	52 MHz.
POWER REQUIREMENTS	A-C Line: 2 W, 115 V or 230 V (±10%), 0.3 A max. Internal Battery: 12 V, 0.6 Ah, 30-40 mA. External Battery: 12—15 V, at least 0.6 Ah.
AMBIENT OPERATING TEMPERATURE RANGE	—18°C to +60°C.
AMBIENT STORAGE TEMPERATURE RANGE	—40°C to +60°C.
NET WEIGHT	15 lbs.
DIMENSIONS	8½" H x 13¼" W x 8¼" D.

OPERATION

2.1 OPERATING CONTROLS AND CONNECTIONS

The operating controls and connections of Model 727 are listed in Table 2-1.

TABLE 2-1. OPERATING CONTROLS AND CONNECTIONS

LOCATION	NAME	TYPE AND SCHEMATIC DESIGNATION	POSITION	FUNCTION
FRONT PANEL	CHARGE	Lamp, DS2	—	Indicates unit is operating to charge internal battery.
	VIDEO OUTPUT	Coaxial fitting, J5	—	For connection of an oscilloscope.
	AC	Neon lamp, DS1	—	Indicates unit is operating from a-c line.
	PUSH—TUNER COMP	Potentiometer and switch, R210/S201	Pushed in, 0-10	Permits calibration of unit over its frequency range.
	PULL—MAN GAIN		Pulled out	Provides uncalibrated 27 dB range gain control for the i-f amplifier; the meter readings are relative with the control in this position.
	Power Selector	Rotary switch, S1-A/S1-B	OFF INT BATT EXT BATT CHG	De-energizes the instrument. Connects internal battery. Connects external battery. Permits charging int. battery from a-c line.
	DIAL LIGHTS	Pushbutton switch, S2	—	Controls tuning dial lights and meter lights.
	UHF/VHF	Slide switch, S101	UHF	Connects the UHF converter output for measurement
			VHF	Connects the VHF input for measurement.
	VHF INPUT	Coaxial fitting, J801		For connecting VHF signal source.
	10 dB, 20 dB	Slide switches, S102 thru S106	IN	Insert attenuation for selection of measurement range.
			OUT	Remove attenuation.
	METER RANGE	Toggle switch, spring-loaded, S4	Down	Connects sampling network into metering circuit to indicate meter range.
	Meter	0-200 μA meter M1	0-300 and 0-100 scales, black	Indicate voltage levels.
			—10 to +10 dB scale, red	Indicates dB levels.
			VOLTS/MILLIVOLTS scale, black	Indicates measurement range in volts.
			BATT mark, red	Indicates full charge on internal or external battery when BATT CHECK switch is pressed.
	TUNING	Inductive, L402, L405, L408, L411	Clockwise and counter-clockwise	Permits tuning to desired frequencies.
		Dial	A, B, C, and D scales	Indicate tuning ranges; black bands indicate ranges between video and sound carriers of each VHF TV channel.
	BATT CHECK	Pushbutton switch, S5	Depressed	Permits checking charge on internal or external battery, and output voltage of internal power supply when unit is connected to a-c line.
	VOLUME	Potentiometer and spst switch, R7/S6	OFF	De-energizes audio amplifier.
			—	Controls audio volume.
	Frequency Range Selector	Rotary switch, S701	A/5-50 MHz	Selects 5- 50 MHz range.
			B/54-108 MHz	Selects 54-108 MHz range.
			D/108-162 MHz	Selects 108-162 range.
			C/162-216 MHz	Selects 162-216 MHz range.
			UHF	Selects operation with UHF adapter.
REAR PANEL	RECORDER	Phone jack, J1	—	Permits connection of a recording device.
	FUSE 0.5 A	3AG, F1	—	Protects instrument against surge currents.
	—(BLK) EXT +(RED) BATT	Tip jack, black, J4 Tip Jack, red, J3	— —	Permits connection of instrument to external battery.
	115/230 VAC 50/60	Recessed, 3-prong male jack, J1	—	Accepts female plug of line cord
INTERNAL	Power Selector (115/230)	Slide switch, S7	115	Permits operating unit from 115 V a-c line.
			230	Permits operating unit from 230 V a-c line

2.2 SETTING THE MEASUREMENT RANGE

Table 2-2 lists all the measurement ranges obtainable from settings of the 727 attenuator switches.

Each measurement range can be checked and identified simply by pressing the METER RANGE switch. Note that the "1" ranges are on the lower (0-100) mV scale and the "3" ranges are on the upper (0-300) mV scale. The dBmV figures in the table indicate the signal level for a 0 (zero) reading on the dB scale.

TABLE 2-2. MEASUREMENT RANGES

ATTEN. SETTING dB	MEASUREMENT RANGE		USE mV SCALE	
	mV or V	dBmV		
0	0.1 mV	—30	0-100	100
10	0.3 mV	—20	0-300	300
20	1.0 mV	—10	0-100	1000
30	3.0 mV	0	0-300	3000
40	10.0 mV	+10	0-100	10000
50	30.0 mV	+20	0-300	30000
60	0.1 V	+30	0-100	100,000
70	0.3 V	+40	0-300	300,000
80	1.0 V	+50	0-100	1.0V
90	3.0 V	+60	0-300	3.0 V

2.3 USING THE dB AND dBmV SCALES

Model 727 is calibrated to read signal levels directly in microvolts rms; however, dB and dBmV scales are included for applications where signal level is more conveniently expressed in these terms.

For example, assume a 600-microvolt signal is being measured with the 727 operating in the 1 mV/−10 dBmV measurement range. A 600 μV reading corresponds to a +5.5 dB reading on the dB scale. Adding algebraically −10 and +5.5 we get −4.5 dBmV for the signal level.

2.4 MEASURING VHF SIGNAL LEVELS

1. Set the power selector switch according to the power source to be used.
2. If an a-c line source is to be used, remove the line cord from its compartment at the rear of the instrument and connect the cord there to the recessed 3-prong jack.
3. If an external battery is to be used, connect the battery leads to the red (positive) and black (negative) tip jacks at the rear of the instrument. Take care in observing polarity and heed the caution on the label.
4. When using an internal or external battery, press the BATT CHECK switch to see that the meter needle points to the red BATT mark on the meter scale. This check will also indicate the correctness of the internal power supply output voltage when the instrument is operated from the a-c line.
5. Connect the VHF signal source to the VHF INPUT terminal on the front panel.
6. Set the UHF/VHF switch to VHF.
7. Set the tuning range selector switch as required.
8. Push in the compensator control and turn it to the setting indicated on the calibration chart in the lid of the 727 for the frequency nearest that of the signal under test.
9. Tune the 727 back and forth past the signal frequency, adjusting the attenuator until the meter indicates between 0 and +10 on the dB scale when the 727 is tuned for maximum reading (this condition will not be attainable for readings below 30 microvolts).
10. Press the METER RANGE switch and note the measurement range indicated by the meter needle.
11. Release the switch and read the signal level.

2.5 OPERATION FROM A 230V A-C LINE

The meter is shipped from the factory with the Power Selector switch set to 115. To operat the unit from a 230 V line, first remove the chassis from the cabinet by removing the four binding-head screws at the rear of the cabinet and pulling the chassis out from the front. Then set the switch, located at the rear of the chassis near the lower right corner, to the 230 V position. Return the chassis to the cabinet.

2.6 RECHARGING THE INTERNAL BATTERY

The 727 is equipped with a rechargeable nickel cadmium battery. Because the state of charge of the battery when the instrument is received by the customer cannot be known, Jerrold recommends that the battery be charged for 14 to 24 hours before the instrument is operated on battery power.

When a nickel cadmium battery with series connected cells, such as the one used in the 727, is discharged too deeply, the weak cells are reverse-charged by the stronger ones. If recharging of the battery is attempted under this condition, the reverse-charged cells will be damaged by the charging current. For this reason, it is essential that the battery not be allowed to discharge too deeply.

Jerrold recommends that for cases where the meter is operated only occasionally on battery power, a 14 to 24 hour charge be given every two weeks. Where the unit is battery-operated frequently, it should be left on charge every night.

The battery is charged as follows.

1. Use the line cord to connect the instrument to an a-c source.
2. Open the lid.

Note

The lid must remain open during the charging period: when the lid is closed, an interlock switch disconnects the battery.

3. Set the power selector switch to CHG.

4. The initial charge should extend over a period of from 15 to 20 hours. Since the charging current flows through the CHARGE lamp, the lamp will glow brightly at first and grow dimmer gradually as the battery approaches full charge. If the lamp does not light the battery is not charging.

5. After this initial charge, follow the procedure outlined on the line cord compartment lid, remembering to keep the front lid open during the charging period.

APPLICATIONS

3.1 GENERAL

Model 727 has application where measurements of relative or absolute r-f signal levels are to be made. In addition, the video detector in the unit allows application in the measurement of a detected signal on a calibrated oscilloscope. This section of the manual describes how to use the instrument for various kinds of r-f measurements.

3.2 FIELD INTENSITY SURVEYS

Model 727 can be used together with a 75-ohm resonant dipole for plotting detailed field intensity contour maps necessary for choosing antenna sites for CATV systems. For these measurements the 727 and the antenna are moved about in a vehicle and signal strength readings are plotted on an area map. These readings are then converted to field strength indications using the following equation:

$E=0.021\ fV$; where E is the field strength in $\mu V/m$ (microvolts per meter),
f is the signal frequency in MHz, and
V is the 727 reading in μV.

Table 3-1 is the result of using this equation to obtain conversion factors (C) for the video carrier frequency of every VHF television channel. Using these factors, the above equation reduces to: $E = CV$.

TABLE 3-1. CONVERSION FACTORS FOR FIELD INTENSITY SURVEYS

CHANNEL	C	CHANNEL	C
2	1.20	8	3.84
3	1.32	9	3.97
4	1.45	10	4.10
5	1.66	11	4.22
6	1.79	12	4.35
7	3.72	13	4.47

If an antenna other than a resonant dipole is used for making the measurements, the gain factor (G) of the antenna must be taken into account (for example, for an antenna with 20 dB of gain, the gain factor $G = 10$) and the equations become:

$$E = \frac{0.021fV}{G} \text{ and } E = \frac{C\,V}{G}$$

3.3 ORIENTING ANTENNAS

Model 727 can be employed for orienting antennas for best reception. The antenna down lead is connected to the VHF INPUT terminal (if necessary, through a matching transformer) and the antenna is then oriented for maximum reading of the video carrier signal on the 727.

For the case of a single-channel antenna, the 727 is tuned to the video carrier of the channel and the antenna is oriented according to the reading on the 727.

For the case of broadband antennas, the 727 reading is maximized for the video carrier of each channel to be received, noting the reading and orientation for each channel. A compromise orientation is then selected on the basis of these readings and orientations. Readings are repeated for each channel with the antenna in the compromise orientation to assure that adequate signal strength is available for each channel. The procedure for f-m antennas is the same as that for broadband antennas.

3.4 MEASUREMENT OF GAIN AND LOSS

For measuring gain or loss of a circuit at specific frequencies proceed as follows:

1. Set up the equipment as shown in Fig. 3-1.
2. Tune the 727 and the signal generator to the test frequency.
3. Measure and record the signal level at the input to the circuit under test.
4. Measure and record the signal level at the output of the circuit under test.
5. The gain or loss is the difference between the two readings obtained. For example, if the

input signal level is 5 dBmV and the output signal level is 1 dBmV, the circuit has a loss of 4 dB. If the output level is 40 dBmV for an input level of 5 dBmV, the circuit has a gain of 35 dB.

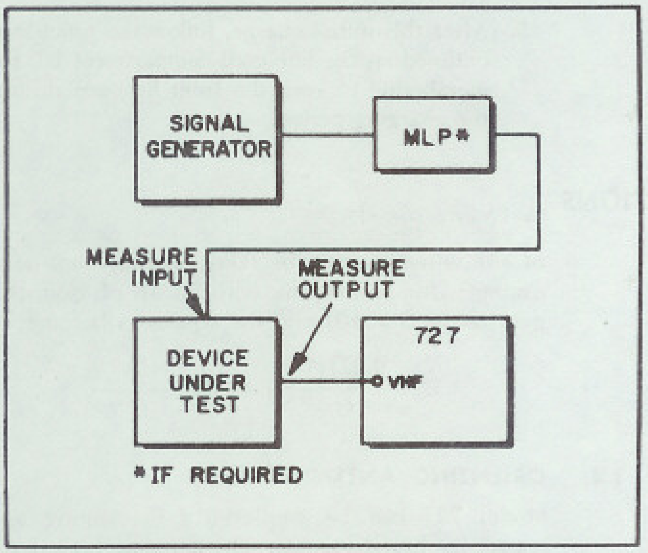


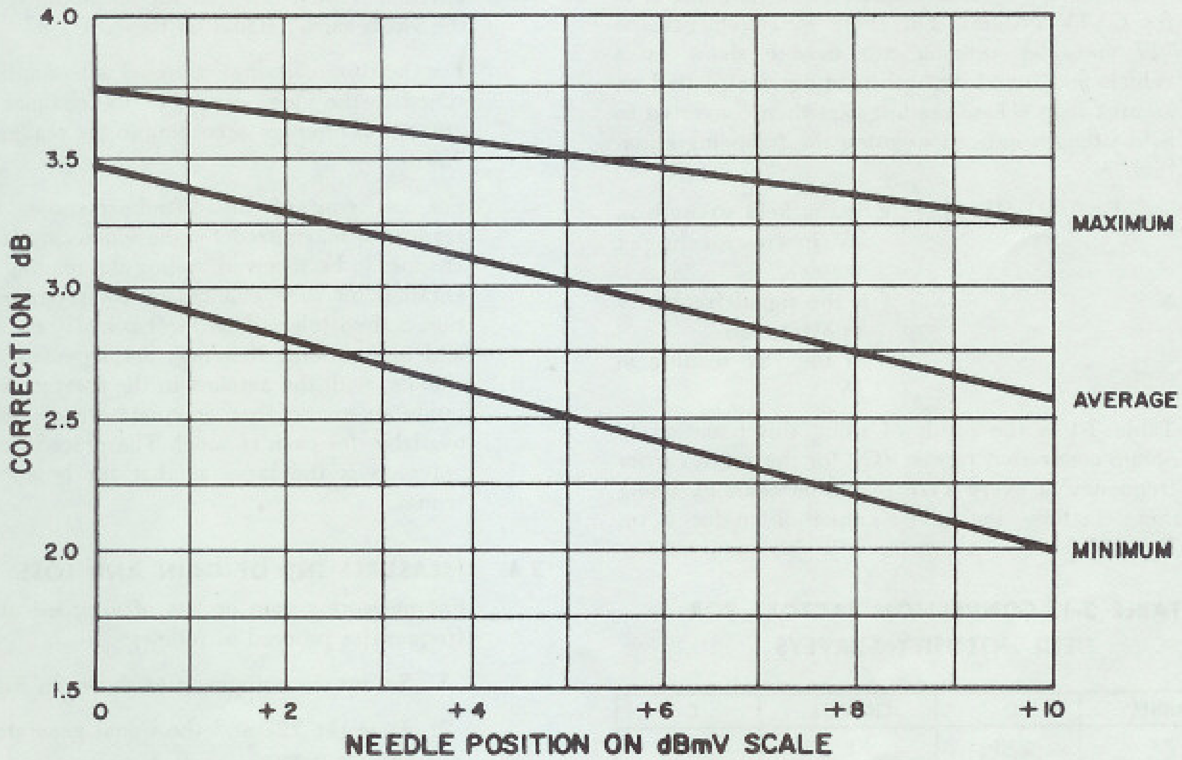
Fig. 3-1. Setup for Gain and Loss Measurements

6. Readings are obtained at a number of points across the passband of the circuit and the results are plotted to obtain an approximation of the response curve.

3.5 MEASUREMENT OF NOISE LEVELS

Although the 727 meter scale is not calibrated for noise level readings, with proper correction of readings taken the instrument can be used for measuring noise levels in CATV systems. The corrections are necessary for two reasons: First, since noise levels in CATV systems are usually specified for a bandwidth of 4 MHz while the i-f bandwidth of the 727 is only 0.6 MHz, the meter readings would be about 8 dB low (noise power is proportional to bandwidth, hence a power ratio of 4:0.6 equals 6.7 which corresponds to 8.2 dB).

The second error source, having an effect opposite to that above, is the response to noise of the peak detector in the 727. Since the detector is designed to respond to the peak of the television picture signal, the instrument indicates peak noise rather than rms noise. As noise has a higher peak-to-rms ratio than a c-w signal, the detected output reads high, reducing the correction required.



To obtain noise levels for 4-MHz bandwidth:

a. Measure noise level as if it were signal level.

b. To meter reading add the average correction shown opposite needle position.

Fig. 3-2. Correction Curves for Noise Level Measurements

However, at reduced output levels the efficiency of the detector decreases and the detected noise reading is closer to rms; hence more total correction is needed for readings taken at the low end of the meter scale.

With these considerations in mind, noise calibration tests were made on a number of Models 727 chosen at random. The resulting correction curves are shown in Fig. 3-2. The curves indicate the maximum and minimum corrections found necessary for the tested units and the resultant average curve. The latter is sufficient for corrections of noise level measurements where an accuracy of plus or minus 0.75 dB is acceptable. For greater accuracy, the individual instrument would have to be calibrated from an accurately known noise source (Section 3.6).

For using the average curve in determining, for example, the S/N ratio in a trunk line, proceed as follows:

1. Connect the output of the last trunk line amplifier to the VHF INPUT terminal on the 727.
2. Disconnect the head-end output from the input to the first amplifier in the trunk line; but do not disconnect the standby carrier signal, which is needed for normal AGC operation.
3. Tune the 727 to the highest and the lowest channel carried on the system and record the meter readings as if a signal were measured.
4. Obtain the correct noise levels for both channels by adding the corrections taken from the average curve; or, for greater accuracy, from the noise calibration record of the particular Model 727.
5. Subtract the corrected noise levels from the signal levels of both channels at the output of the last amplifier to obtain the S/N ratio at that point.

3.6 NOISE CALIBRATION OF A MODEL 727

This section describes a convenient method of calibrating a 727 by using an amplifier whose noise figure is accurately known. Fig. 3-3 shows the equipment setup. The input to the amplifier with known noise figure is terminated accurately in 75 ohms and its output is connected through a variable attenuator to the input of a second amplifier. The output of the latter is then connected to the VHF INPUT terminal of the field strength meter.

Calibration is done as follows:

1. Tune the 727 to a convenient channel having no local signal. Set the 727 step attenuator to 10 dB for a full-scale indication of −10 dBmV (0.3 mV) then adjust the tuner compensator to the calibrated point.
2. Adjust the variable attenuator for full-scale reading on the meter.

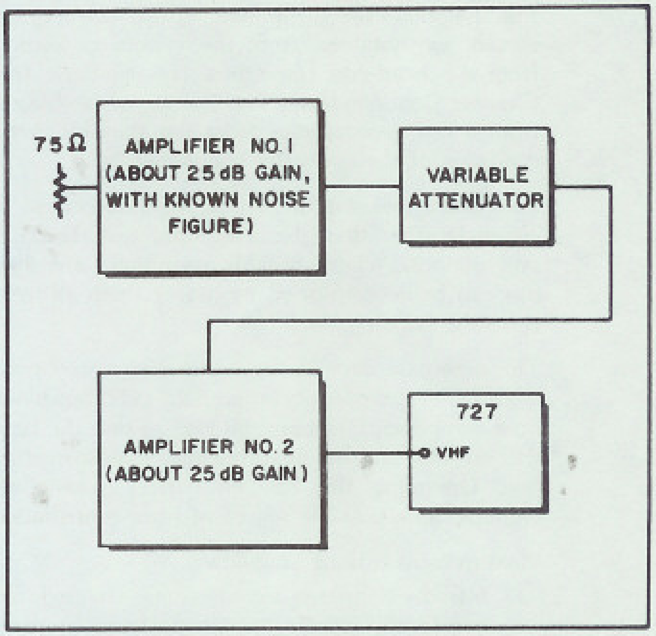


Fig. 3-3. Setup for Noise Calibration of a 727

3. Now measure the gain from the input to the first amplifier to the output of the second amplifier, then measure the noise figure at the input of the first amplifier. If the net gain from the input of the first amplifier to the input of the second amplifier is over 15 dB, it is safe to assume that the noise figure of the combination is the same as that of the first amplifier.
4. As the minimum noise level in any 75-ohm system is −59.2 dBmV, the noise output of the combination into the field strength meter is: −59.2 + N.F. + Gain. If, for example, the noise figure measured were 8.4 dB and the net gain measured were 44.5 dB, the noise output of the combination would be: −59.2 + 44.5 + 8.4 = −6.3 dBmV.
5. The correction for the 727 at full scale is the number of dB that must be added to the reading to equal this calculated noise level. In our example: −6.3 = −10 + X, and X = 10 −6.3 = 3.7 dB.
6. Find the corrections required at other points of the scale by adding attenuation in 1 dB steps, noting after each step how far below the dB marks the meter needle reads.

3.7 MEASUREMENT OF PERCENT CROSS-MODULATION

Model 727 can be employed in a simple test setup for making reasonably accurate percent cross-modulation measurements in the field, using the signals available in a TV distribution system. While the method described here is sensitive enough for measurements in an operating distribution amplifier, it is not sensitive enough for measurements in individual trunk line amplifiers operating at their normal system levels.

Fig. 3-4 shows the equipment set-up. The required signals are obtained from the system or directly from the head-end converters (for example from Channel Commanders). The c-w signal is obtained from a c-w generator or from the standby carrier condition of the converter concerned.

To obtain meaningful results, modulation on all channels other than the one under test should be synchronous. Where tunable converters are used, this can be accomplished by tuning them all to receive the same channel.

The high-pass filter in the set-up passes any cross-modulation components (around 15 kHz) but blocks hum components (around 60 Hz) so that the latter will not obscure the measurement of cross-modulation. Operating the 727 on battery power will eliminate one possible source of hum contribution.

Measurement is done as follows:

1. Introduce the c-w signal on one channel, and interfering signals on other channels as required, through the input attenuator to the input terminal of the distribution amplifier, or the first trunk line amplifier of the system under test.

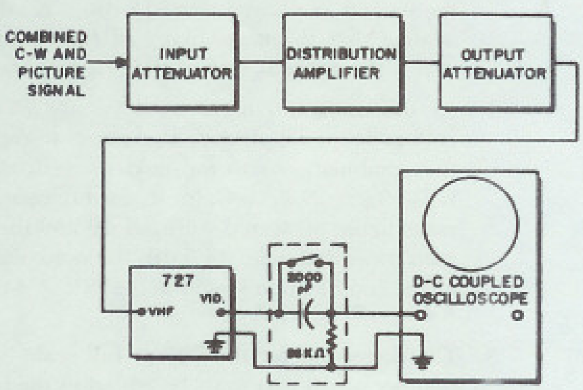


Fig. 3-4. Setup for Percent Cross-Modulation Measurements

2. Connect the 727 through a second attenuator to the output of the distribution amplifier, or the last trunk line amplifier of the system; set the channel levels and the input attenuator to give rated output on each channel; note the meter reading.

3. Tune the 727 to the c-w signal frequency. Reduce the attenuation in the output attenuator by 20 dB and set the 727 manual gain control to obtain the same meter reading as in step 2.

4. Close the filter bridging switch. Set the oscilloscope for operation in the d-c mode and in the 0.1V/cm vertical sensitivity range. Position the reference trace on the bottom line of the oscilloscope screen and increase the input to the 727 by reducing attenuation in the output attenuator until reference signal and c-w signal differ by 0.8 V; the 727 manual gain control can be used for fine adjustment.

5. Switch the oscilloscope to the next higher sensitivity range and adjust the oscilloscope gain until the c-w trace is 10 divisions above the reference trace; each division now represents 10% cross-modulation.

6. Open the filter bridging switch and change the oscilloscope to a-c operation, increase the vertical sensitivity 10 times; one division on the screen now represents 1% cross-modulation. The c-w trace can now be observed for exhibiting any modulation due to the presence of other channels in the system.

With one interfering channel, or when all interfering channels have a common sync source, the indicated cross-modulation will vary somewhat with the degree of white in the interfering picture signal. Exact percentage of cross-modulation is therefore determined by observing the oscilloscope until a maximum of cross-modulation is seen; this will occur when there is maximum variation in the interfering signal.

When the interfering signals derive their sync from various sources, their horizontal line frequencies will differ slightly so that relative timing of the various horizontal sync pulses will change constantly. In this case, maximum cross-modulation will occur when a number of sync pulses coincide; it will be necessary to observe the oscilloscope for a longer period to see this happen and to arrive at a reasonably exact percent cross-modulation corresponding to this condiiton.

To be sure that there is no cross-modulation in the 727 circuits or in the mixing networks in which the various input signals are combined, it is advisable to test for cross-modulation first without the amplifier or system in the circuit. Adjust for equal levels at the 727 input, tune to the c-w signal and then measure for cross-modulation as above.

Note

The video output of the 727 is specified at 0.8 volt p-p at full-scale meter indication. When using an oscilloscope with a sensitivity of 1 mV/cm, the gain can generally be increased up to 25 times for a maximum sensitivity of 0.4% cross-modulation per division.

When picture signals are not available, the signals from laboratory signal generators with sine-wave modulation can be used for measuring cross-modulation. Because of the different form of modulation, corrections must be made if the results of this measurement method are to agree with those obtained when using television signals.

Table 3-2 lists the corrections to be applied and Fig. 3-5 diagrams the test set-up.

Test Procedure:

1. Tune one signal generator to the picture carrier of channel 2 (55.25 MHz), the other to that of channel 13 (211.25 MHz).
2. Combine the outputs of the two generators in a Jerrold Model LHS-76 high-band/low-band mixer to prevent cross-modulation between the two bands.
3. Apply the LHS-76 output to the input of a variable attenuator, the output of this attenuator to the input of the amplifier under test, the output of the amplifier to the input of a second variable attenuator and the output of this attenuator to the VHF INPUT terminal on the 727; finally the VIDEO OUT terminal of the 727 is connected to the vertical input of the oscilloscope.
4. Preferably use the 727 on internal battery power to avoid hum pick-up. If the instrument has to be used on a-c power, use a 2-pin adapter on the 727 line cord plug.
5. Set the oscilloscope to operate in the d-c mode.
6. Apply a modulation of 1 kHz to the 55.25 MHz signal, then set the input attenuator for 10 dB and the output attenuator for 20 dB.

TABLE 3-2. CORRECTIONS FOR CROSS-MODULATION MEASUREMENTS

On Interfering Signal		To Obtain Cross-Mod. Corresponding to TV Signal Modulation:	
% Modulation (for symmetrical Mod.)	Modulation Ratio $\frac{E\ min}{E\ max}$	Multiply Indicated % Cross-Mod. by	or Add dB to Indicated Cross-Mod.
10	0.818	2.97	9.5
20	0.666	1.77	4.9
30	0.538	1.39	2.9
40	0.429	1.21	1.7
50	0.333	1.11	0.9
60	0.250	1.06	0.5
70	0.177	1.02	0.2
77.8**	0.125	1.00	0.0
80	0.111	1.00	0.0
90	0.053	0.99	—0.1
100	0.000	0.99	—0.1

*The derivation of the correction figures is explained in TECHNICAL HANDBOOK FOR CATV SYSTEMS by Ken Simons.

**Corresponding to full modulation of a TV signal.

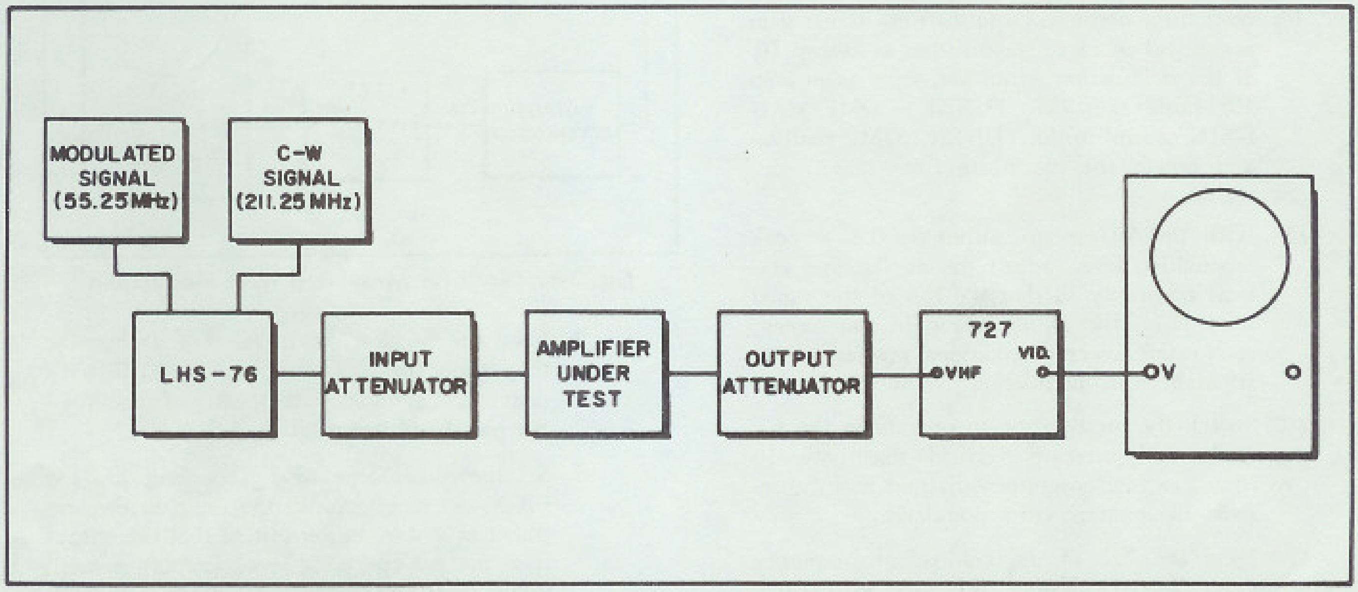


Fig. 3-5. Setup for Cross-Modulation Measurements When Using Signal Generators With Sinewave Modulation

7. Adjust the generator outputs for rated output levels of the amplifier at both frequencies, taking into consideration the attenuation in the output attenuator.

8. Disconnect the oscilloscope input signal and set the oscilloscope vertical sensitivity and centering controls so that 0 signal reference is on the bottom line of the screen.

9. Reconnect the oscilloscope input signal and tune the 727 to the modulated signal (55.25 MHz); then adjust the oscilloscope vertical gain control so that the top of signal trace is at the top of the screen (an oscilloscope with a 10 cm grid is assumed).

10. Select a convenient percent modulation figure from Table 3-2; e.g. 30%. Adjust the modulation control on the 55.25 MHz generator so that the bottom of the signal trace is 5.4 divisions (for 30% modulation) above the reference trace, while keeping the top of the signal at the 10th division by adjusting the oscilloscope vertical gain control.

11. Maintain the general output levels as in step 7 while adjusting the modulation control on the 55.25 MHz generator. Then remove 20 dB from the 727 step attenuator, pull the 727 TUNER COMP/MAN GAIN control to the MAN GAIN position and set it for the same meter reading as in step 7.

12. Set the oscilloscope vertical sensitivity to the calibrated 0.1V/cm range, remove the oscilloscope input signal and reset the vertical centering to place the 0 signal reference on the bottom line of the screen. Then reconnect the oscilloscope input signal.

13. Remove attenuation from the output attenuator until the 727 video output reads 0.8 V on the oscilloscope; fine adjustment can be made with the 727 MAN GAIN control.

14. Switch the oscilloscope to the next higher gain range and check for modulation as in step 10. If the modulation is not the same as in step 10, push the 727 TUNER COMP/MAN GAIN control to the TUNER COMP position and repeat the procedure from step 7 onwards.

15. With the 727 video output at 0.8 V peak modulation level, adjust the oscilloscope vertical sensitivity so that the top of the signal trace is on the 10th division of the screen; each major screen division now represents 10% apparent cross-modulation.

16. Switch the oscilloscope to operate in the a-c mode and increase vertical sensitivity 10 times; each major screen division now represents 1% apparent cross-modulation.

17. Tune the 727 to the c-w signal frequency (211.25 MHz); since the 727 meter will now read off scale, tune for maximum deflection of the oscilloscope display.

18. Obtain true percent cross-modulation by multiplying the measured apparent cross-modulation by the correction factor for the percent modulation of the interfering (modulated) signal. Hence, for our example true percent cross-modulation is 0.8% x 1.39 = 1.1%.

3.8 MEASUREMENT OF HUM MODULATION

Since most r-f amplifiers are powered with 60 Hz a-c, the possibility exists that power supply ripple will modulate the signal passing through the amplifier. To measure this type of modulation with the 727 proceed as follows:

1. Connect the equipment as diagrammed in Fig. 3-6. Use a General Radio Type 274-MB twin banana plug at the vertical input of the oscilloscope and insert a 20,000 pF capacitor between the input and the oscilloscope chassis ground for filtering out noise. Also, to minimize stray hum loops, be certain that there is no ground connection to the oscilloscope chassis other than the input cable shield. If the oscilloscope has a 3-pin plug on its line cord, attach a 2-pin adapter. Operate the 727 on battery power, eliminating the possibility of the meter itself contributing hum.

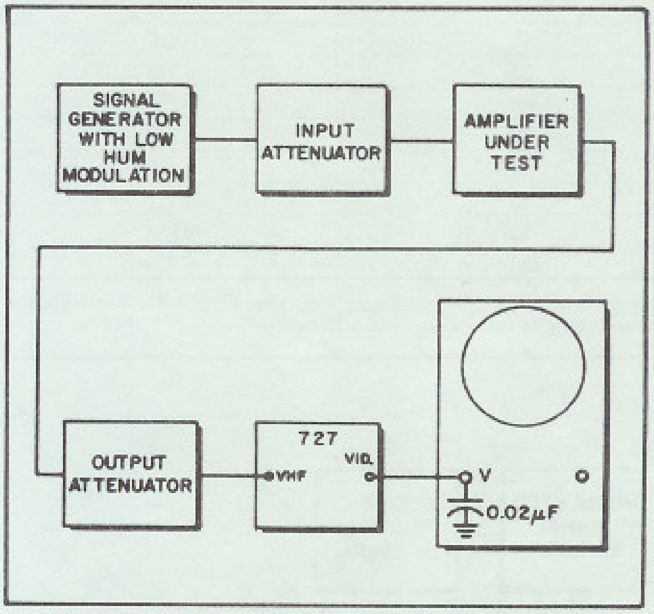


Fig. 3-6. Setup for Measuring Hum Modulation

2. Sync the oscilloscope to the line frequency, then tune the generator and the 727 to a convenient frequency; the center of the amplifier pass band is a good choice.

3. Set the oscilloscope to d-c coupling and the 0.1 V/cm range. Adjust the input to the amplifier or system under test so that the output is at normal operating level, keeping a minimum of 10 dB in the 727 step attenuator.

4. Remove 20 dB from the output attenuator, then pull the TUNER COMP/MAN GAIN control to the MAN GAIN position and set it for the same meter reading as in step 3.

5. Remove the oscilloscope input signal and adjust vertical centering so that the 0 signal trace is displayed on the bottom line of the screen.

6. Reconnect the oscilloscope input signal and remove attenuation from the output attenuator until the trace of the modulated signal is 8 divisions above the reference trace, indicating 0.8 V (assuming a 10 cm grid on the screen); fine adjustment can be made with the 727 MAN GAIN control. If appreciable modulation is present, center the trace on the 8th grid line.

7. Switch the oscilloscope vertical sensitivity to the next higher range and remove the oscilloscope input signal. Then adjust vertical centering to reset the 0 signal trace on the bottom line of the screen.

8. Reconnect the oscilloscope input signal and adjust the oscilloscope gain until the modulated signal trace is centered on the 10th grid line. Then set the oscilloscope for a-c coupling and center the trace for convenient measurement of the peak-to-peak amplitude. Each major division on the screen now represents 5% modulation (or 26 dB down from a 100% modulated signal), since a 5% modulated signal has a 5% excursion in both directions from its zero modulation level.

9. For example, if the peak-to-peak amplitude of the trace covers 1.5 major screen divisions, the hum modulation is 1.5 x 5% = 7.5% (or 22.5 dB down from a 100% modulated signal).

10. If the modulation is less than 5%, increase the oscilloscope vertical sensitivity 10 times; each major division on the screen now represents 0.5% modulation (or 46 dB down from a 100% modulated signal). By a further sensitivity increase of 5 times, modulation as low as 0.1% can be displayed on the screen.

3.9 MEASUREMENT OF SYNC CLIPPING

The normal sync signal accounts for approximately 25% of the total amplitude of a composite television video signal. Determining whether or not an amplifier or system of amplifiers is clipping the sync signal can be done with the 727 as follows:

1. Connect the equipment as diagrammed in Fig. 3-7.

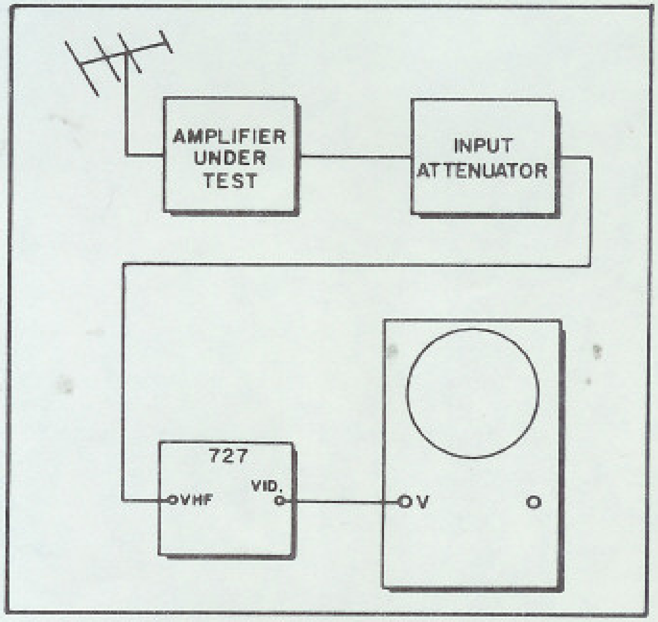


Fig. 3-7. Setup for Measuring Sync Clipping

2. Tune the 727 to the video carrier of a TV channel and adjust the amplifier or system for normal operational output.

3. Set the oscilloscope for d-c coupling and vertical sensitivity to calibrated 0.1 V/cm.

4. Increase the input to the 727 by removing attenuation from the input attenuator and by fine adjustment of the 727 MAN GAIN control until the meter reads the same as in step 2.

5. Increase the signal input to the 727 by adjusting the input attenuator until the sync pulse tips are 8 divisions above the reference trace, corresponding to 0.8 V.

6. Insert 2.5 dB in the input attenuator and note the position of the sync tip on the screen; it represents 25% amplitude.

7. Set the input attenuator to 0 dB and observe the position of the sync pedestal back porch on the screen. If the back porch falls appreciably above the line noted in step 6, the sync signal is being compressed.

CIRCUIT DESCRIPTIONS

4.1 GENERAL

The signal to be measured is applied to the front panel VHF INPUT terminal. With the UHF/VHF switch in the VHF position, the signal passes through the switch contacts to a multi-step attenuator which serves to adjust the measurement range of the unit (Fig. 4-1).

From the attenuator the signal passes through one of four bandpass filters, selected by the frequency range selector switch. The signal is then applied to a balanced mixer circuit where it beats with the signal from one of the tuner oscillators to give the i-f signal. The tuner assembly consists of four oscillators, one for each tuning range. The appropriate oscillator is energized through the frequency range selector switch.

The mixer output is applied through contacts of the frequency range selector switch to the i-f amplifier. The input and the output of the first amplifier stage are sharply tuned with 52 MHz coaxial resonator bandpass filters. The signal is passed through two additional amplification stages and then takes two paths.

Part of the signal is amplified, detected, and then fed to the front panel VIDEO OUTPUT terminal. The other portion of the signal is detected by a phase discriminator and then amplified to drive a small panel-mounted speaker. A-m as well as f-m signals pass through the discriminator so that sync buzz and intelligible a-m transmissions can be heard.

The signal at the input of the discriminator is also fed to a peak detector circuit. The detected signal drives the 727 meter and is brought out to a rear panel phone jack for application to a recording device if desired. The COMP control in the i-f amplifier calibrates the unit across its frequency range, when in the pushed-in position, and acts as a manual gain control for sync compression and hum measurements when in the pulled-out position.

The 727 may be powered from its own rechargeable 12 V battery, from an external 12-15 battery, or from a 115 V or 230 V a-c line. The power source is selected with a front panel switch which also provides for recharging the internal battery at a 10% rate from the 115 V or 230 V line; the battery is trickle-charged while the unit is operating from the line.

4.2 ATTENUATOR (See Dwg. 861-829.)

The VHF input signal is applied through the VHF INPUT terminal J101 and the UHF/VHF switch S101 to the attenuator. The attenuator consists of one 10 dB pad and four 20 dB pads switched into or out of the signal path by switches S102 through S106, thus giving the attenuator a range of 0-90 dB in 10 dB steps. The attenuator settings determine the level of the signal applied to the measuring circuit and thus the measurement range of the unit.

In addition, the step attenuator with its built-in sampling network operates in conjunction with the METER RANGE switch S4 to provide an indication on the meter of the measurement range for which it is set. When S4 is pressed, −10 V is applied across the meter M1 and the sampling network in the attenuator. The deflection of M1 is then determined by the attenuator setting so that the measurement range is indicated by the position of the meter needle on the meter range scale.

The signal from the attenuator is applied through contacts of the frequency range selector switch S701 to one of four bandpass filters.

4.3 BANDPASS FILTERS

The 727 employs four bandpass filters, one for each of the VHF tuning ranges. Selection of one of the filters is done by setting the frequency range selector switch S701 which passes the output signal of the selected filter through J801 on to the mixer.

4.4 VHF TUNER (See Dwg. 861-779.)

The VHF tuner consists of four permeability-tuned Colpitts oscillators, one for each tuning range. They are energized by −10 V applied through contacts of S701. The oscillators operate at 52 MHz above the associated tuning frequency to give a 52 MHz i-f signal at the mixer.

Oscillator tuning is accomplished by changing the position of the iron cores in L402, L405, L408, and L411. The cores are mounted on a bracket and are moved through the coils by a rack and pinion mechanism. The cores are attached to flexible, threaded shafts, which permit individual adjustment of each core and compensate for any misalignment between the core mounting bracket and the coils.

Each oscillator has three alignment adjustments: trimmers C405, C412, C419, and C425 tune the low-frequency ends of the oscillator ranges; coils L403, L406, L409, and L412 adjust the high-frequency ends; coils L402, L405, L408, and L411 also serve to adjust scale tracking.

The oscillator output signals are coupled through C406, C413, C420, and C426 to a common feedthrough on the mixer module.

4.5 MIXER (See Dwg. 861-829.)

The signals from the bandpass filters and the VHF tuner are transformer-coupled to a balanced mixer employihg diodes CR801, CR802, CR803, and

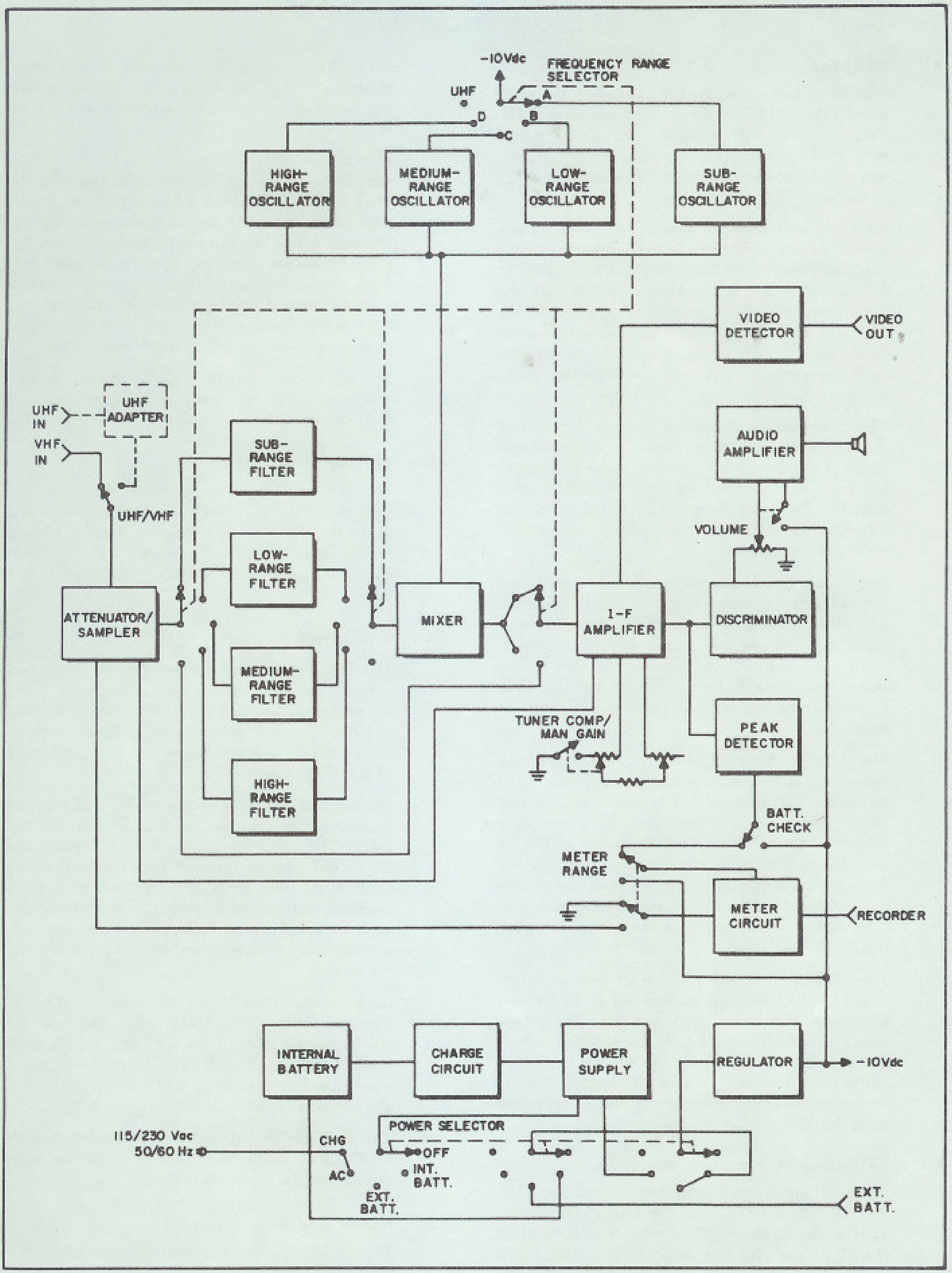


Fig. 4-1. Model 727 Functional Block Diagram

CR804 where they beat to give the 52 MHz i-f signal. The mixer output is coupled to J802 and from there through J201 to the i-f amplifier.

4.6 I-F AMPLIFIER

The i-f amplifier input signal is applied to a low-pass filter consisting of L201, L202, L203, C201, and C202, which provides input match and attenuates unwanted signals above 52 MHz. From the input circuit the signal is passed through a 52 MHz coaxial resonator filter to the first amplifier stage, employing Q201 in a neutralized, common-emitter, single-tuned circuit. Neutralization is controlled by trimmer C201; tuning is accomplished through trimmer C211. The amplified signal is coupled to another 52 MHz coaxial resonator filter. It is the bandwidth of these two filters that chiefly determines the bandwidth and adjacent-channel rejection of the i-f stages.

The signal from the second filter is amplified by two common-base, single-tuned stages Q202 and Q203. Tuning is accomplished through L214 and L215 respectively. The input level at Q203 is adjusted with potentiometer R238 and the COMP control R210/S201. With the COMP knob pushed in, S201 is open and the control acts with R238 to calibrate the 727 over its operating frequency range by adjusting the gain of the i-f amplifier at specific frequencies across the range. With the knob pulled out, S201 is closed and the COMP control functions as an uncalibrated gain control. The output of Q203 is coupled to Q205 in the video detector circuit and to Q204 in the discriminator circuit.

4.7 VIDEO DETECTOR

The signal from the i-f stages is amplified by Q205 and coupled to the video detector CR201. The detected signal is coupled to J204 and then, through a jumper, to the VIDEO OUTPUT terminal J5. The amplifier stage Q205 is tuned to 52 MHz through L218.

4.8 DISCRIMINATOR

The other portion of the i-f signal is amplified by Q204 and coupled to discriminator CR202/CR203 where the f-m signals are detected. The amplifier output is tuned through the primary, L216-A, of the discriminator transformer.

The audio signal developed by the discriminator is fed through J205 and P205 to an audio amplifier. The undetected output of Q204 is coupled through C224 to a peak detector.

4.9 AUDIO AMPLIFIER

The audio amplifier input signal is applied across VOLUME control R7. The audio signal is passed through four stages of amplification, including the push-pull output stage which drives the panel-mounted speaker. The amplifier is energized through switch S6 mounted on the volume control shaft.

4.10 PEAK DETECTOR

The undetected signal from Q204 is amplified by Q206 and coupled through C236 to a peak detector/current amplifier Q207/Q208. Meter M1 is made part of the collector circuit of Q208 through J205, P205, S5, and S4 so that it indicates the current passing through the transistor. Resistor R237 limits the maximum overload current through the meter to 100 percent. Potentiometer R234 determines the current through the meter with no input signal to the 727 and thereby determines the meter calibration. Diodes CR204 and CR205 compensate for changes in current through the detector caused by temperature variations. The current through M1 is made available at jack J1 for operation of a recording device.

4.11 POWER SUPPLY

Power for the 727 may be selected by switch S1 for one of three sources. With S1 in INT BATT position, the negative terminal of the internal battery is connected through the interlock switch S3 and contacts of S1 to the DIAL LIGHTS switch S2 and regulator Q601, Q602, and Q603. Potentiometer R604 in the regulator circuit sets the supply output at −10 V. The interlock switch helps to prevent accidental discharge or overchange of the internal battery when the panel cover is closed.

In the EXT BATT position, S1 connects the negative terminal of the external battery to S2 and to the regulator. The external battery connections are made at J3 (positive terminal) and J4 (negative terminal) at the rear of the 727.

With S1 in the AC position, the primary circuit of transformer T1 is complete, and the voltage generated across the secondary is applied to the full-wave rectifier CR601, CR602. The rectified voltage is filtered by C603 and applied through contacts of S1 to the regulator. In addition, the unregulated −18 V at the junction of CR601 and CR602 is coupled through CR1, R2, and S3 to the negative terminal of the internal battery to trickle-charge the battery. The AC lamp DS1 indicates that the unit is under power from the a-c line. Power selector switch S7 permits operation from a 115 V or 230 V a-c line.

The fourth position of S1, CHG, is provided to permit charging the internal battery. The contacts of S1 apply −18 V to the battery through the CHARGE lamp DS2, and through R3 and S3.

MAINTENANCE

5.1 GENERAL

This section contains procedures for minor realignment of the i-f section and for recalibrating the instrument. In addition, a replacement parts list and schematic diagrams are included as aids for the maintenance of the unit.

If for some reason repairs cannot be made in the field, the unit may be returned to Jerrold Electronics, Service Dept., 15th and Lehigh Ave., Philadelphia, Penna. After notifying Jerrold of your intention to return the unit for repair, carefully pack the unit and ship it (with freight and insurance prepaid) together with a note stating the serial number of the unit and listing the difficulties encountered. Repairs will be made free of charge under conditions of the warranty; otherwise nominal charges will be invoiced.

Because alignment of the tuner requires special test fixtures, the procedure for this module is not given here. If the tuner requires realignment or if the i-f section becomes grossly misaligned, the 727 should be returned to Jerrold for realignment.

Recalibration should be performed routinely at six-month intervals or when the calibration is suspect. The i-f section should be realigned whenever a transistor is replaced.

Note

The location of calibration and alignment adjustments and test points is shown in Figs. 5-8 and 5-9.

5.2 CALIBRATION

5.2.1 EQUIPMENT REQUIRED

The equipment required to calibrate Model 727 is listed below. A discussion of the requirements of the equipment follows the list.

1. An r-f signal generator.
2. A power meter, Hewlett-Packard Model 431A or B, with Model 478A thermistor mount.
3. A 6 dB splitter, Jerrold Model 1502.
4. One or two 50/75-ohm minimum loss pads, Jerrold Model MLP 50/75F, or two matching pads (Fig. 5-1).
5. A vacuum-tube voltmeter.

A good quality r-f signal generator with a calibrated output attenuator is required for calibrating the 727. Generators that meet these requirements include: General Radio Model 1021-AV, Measurements Model 80, Hewlett-Packard Model 608A, and Boonton Radio Model 202B.

The preferred "power meter" method uses a Hewlett-Packard Model 431A or B power meter with a Model 478A thermistor mount and the 6 dB splitter.

For accurate calibration it is important that the output impedance of the signal generator be 75 ohms. Where an r-f signal generator with an output impedance of 50 ohms is used, a 50/75-ohm minimum loss pad must be inserted between the generator and the splitter (Fig. 5-2). As the input impedance of the HP power meter is 50 ohms, a similar minimum loss pad is required for the power meter method. Fixed 7.78 dB matching pads may be used in place of the minimum loss pads, bearing in mind that the signal attenuation will differ. (The circuit for a "do-it-yourself" pad is given in Fig. 5-1.) In the calibration procedure, wherever level settings depend on the type of pad employed, the settings for both types are given.

Furthermore, keep in mind that most r-f signal generators are calibrated working into an open circuit. When the generator is working into a matched load, the signal level at the load is half the level indicated at the generator (Table 5-1).

5.2.2 SETTING THE REGULATED VOLTAGE LEVEL

1. Open the line cord compartment and remove the cord.
2. Remove the four screws at the rear of the cabinet.
3. Slide the chassis out through the front of the cabinet.
4. Set the power selector switch to INT BATT (be certain that the battery is fully charged).
5. Connect the vtvm between the hot terminal of the VOLUME control and ground. If necessary, adjust R604 on the power supply so that the meter reads −9.9 to −10.0 V.
6. Press the BATT CHECK switch and see that the meter needle points to the red BATT mark.

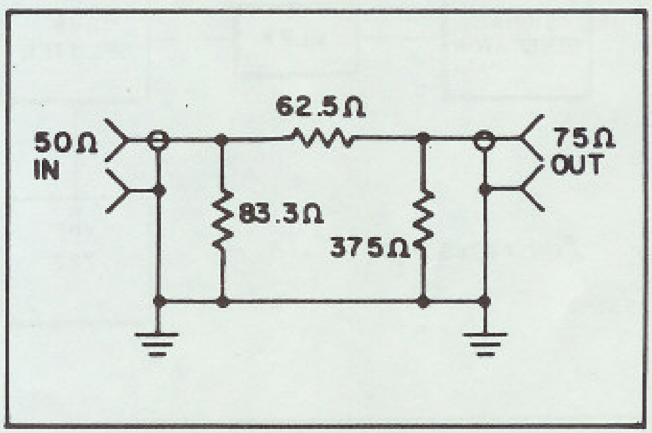


Fig. 5-1. Circuit of 7.78 dB Pad

5.2.3 TUNER COMPENSATOR CALIBRATION (POWER METER METHOD)

1. Power the 727 from the a-c line.
2. Set the power selector switch to AC.
3. Set the UHF/VHF switch to VHF.
4. Set the frequency range switch to UHF.
5. Push in the COMP control and turn it to the UHF setting listed on the calibration chart.
6. Switch 70 dB into the 727 attenuator.
7. Connect equipment as shown in Fig. 5-2.
8. Tune the signal generator to 52 MHz; the 727 meter should show maximum deflection.
9. Adjust the generator output level to give a power meter reading of −13.43 dBm (−15.51 dBm when using 7.78 dB pads).
10. Adjust R238 on the i-f chassis for full-scale deflection on the 727 meter; this adjustment is made with a small screwdriver inserted through the hole in the i-f chassis bottom cover.
11. Increase the 727 attenuator setting by 10 dB and then 10 dB more, observing that the meter reads first 0 and then −10 on the dB scale.
12. If the meter reads off these marks, loosen the lock-nut on the zero-adjust control (R234 on the i-f chassis) and adjust it to bring the meter pointer toward these marks.
13. Return the 727 attenuator setting to 70 dB and readjust R238 for full scale meter deflection.
14. Repeat steps 11, 12, and 13 until best agreement is obtained between the meter pointer and the 0 and −10 dB marks; then tighten the lock-nut on R234.
15. Record the COMP control setting next to UHF on the calibration chart.
16. Set the frequency range switch to B.
17. Tune the generator and the 727 to the center frequency of TV channel 2.
18. Adjust the COMP control for full-scale meter deflection while the power meter reads −4.43 dBm (−6.51 dBm if 7.78 dB pads are used); be certain that the generator is tuned for maximum deflection on the 727 meter.

    At this point, repeat step 11, observing the meter readings. If there is a significant difference between these readings and those first obtained in step 11, readjust R234 for a compromise setting. Use the COMP control, not R238, for making full-scale adjustments.

    If the setting of R234 is changed, it will be necessary to repeat steps 5 thru 10, 16, 17, and 18.
19. Record the COMP control setting next to CH 2 on the calibration chart.
20. Repeat steps 17, 18, and 19, tuning the 727 and the generator to all of the calibration points in the B, C, and D ranges.
21. Set the 727 frequency range switch to A.
22. If necessary, replace the signal generator with one that will cover this range.
23. Repeat steps 17, 18, and 19 for all A-range calibration points except 5 MHz.
24. Set the COMP control to the position determined for 10 MHz, and tune the 727 and the generator to 10 MHz.
25. Calibrate the generator and observe the setting of its attenuator when the 727 meter reads full scale.

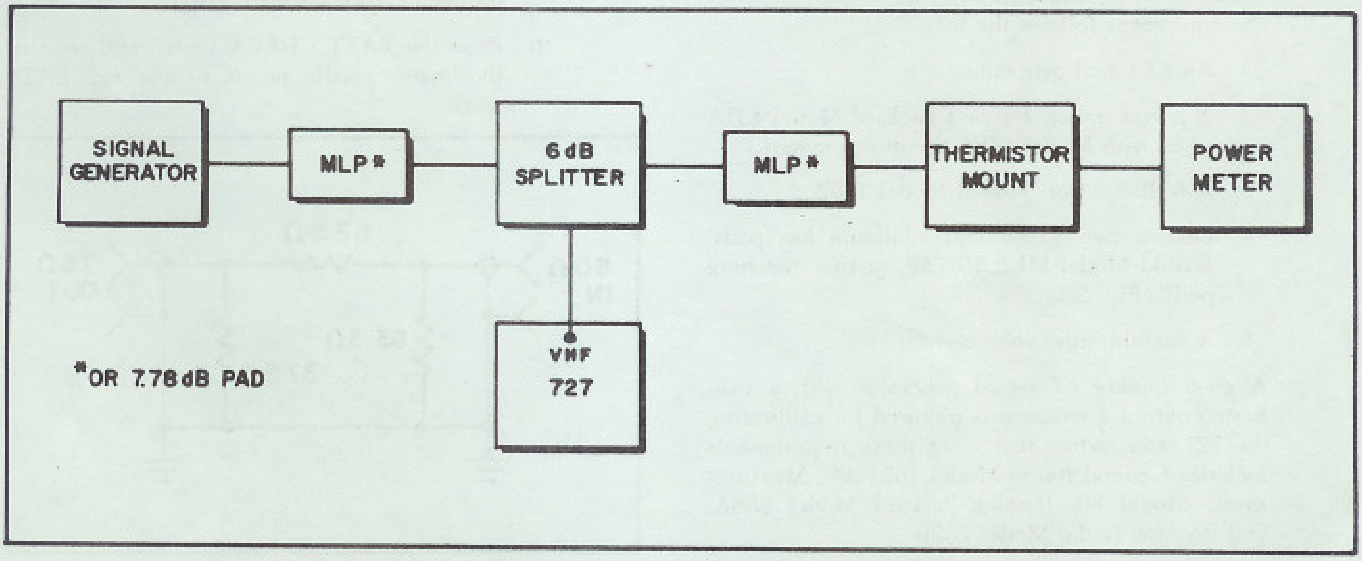


Fig. 5-2. Setup for Tuner Compensator Calibration by the Power Meter Method

26. Tune the 727 and the generator to 5 MHz.
27. Calibrate the generator and adjust its attenuator to the same reading as in step 25.
28. Adjust the COMP control for full-scale deflection in the 727 meter.
29. Record the control setting next to 5 MHz on the calibration chart.
30. Disconnect the line cord from the unit.
31. Return the chassis to the cabinet and fasten it with the four screws.

5.2.4 TUNER COMPENSATOR CALIBRATION (SIGNAL GENERATOR METHOD)

1. Power the 727 from the a-c line.
2. Set the power selector switch to AC.
3. Set the UHF/VHF switch to UHF.
4. Set the frequency range switch to UHF.
5. Push in the COMP control and set it to the UHF check point COMP figure on the factory-supplied calibration chart.
6. Switch 40 dB into the 727 attenuator.
7. Connect equipment as shown in Fig. 5-3.
8. Tune the signal generator to 52 MHz; the 727 meter should show maximum deflection.
9. Calibrate the generator and set its output level at 0.355 times the level listed in Table 5-1 for 40 dB attenuation and the appropriate generator.
10. Adjust R238 on the i-f chassis for full-scale deflection on the 727 meter; this adjustment is made with a small screwdriver inserted through the hole in the i-f chassis bottom cover.
11. Increase the 727 attenuator setting by 10 dB and then 10 dB more, observing that the meter reads first 0 and then −10 on the dB scale.
12. If the meter reads off these marks, loosen the lock-nut on the zero-adjust control (R234 on the i-f chassis) and adjust the control to bring the pointer toward these marks.
13. Return the 727 attenuator to 40 dB and re-adjust R238 for full-scale meter deflection.
14. Repeat steps 11, 12, and 13 until best agreement is obtained between the meter pointer and the 0 and −10 dB marks; then tighten the lock-nut on R234.
15. Record the COMP control setting next to UHF on the calibration chart.
16. Set the frequency range switch to B.
17. Tune the generator and the 727 to the center frequency of TV channel 2.
18. Calibrate the generator and set its output at the level listed in Table 5-1 for 40 dB in the 727 attenuator.
19. Adjust the COMP control for full-scale meter deflection; be certain that the generator is tuned for maximum deflection on the meter.

At this point, repeat step 11, observing the meter readings. If there is a significant difference between these readings and those first obtained in step 11, readjust R234 for a compromise setting. Use the COMP control, not R238, for making full scale adjustments.

If the setting of R234 is changed, it will be necessary to repeat steps 4, 5, 6, 8, 9, 10, and 16 thru 19.

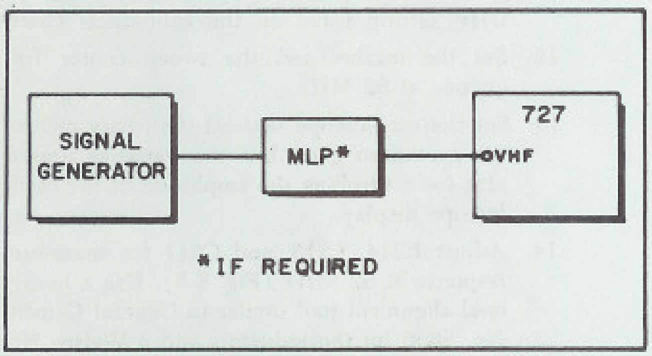


Fig. 5-3. Setup for Tuner Compensator Calibration by the Signal Generator Method

TABLE 5-1. SIGNAL GENERATOR OUTPUT LEVELS

dB in 727 Att.	GENERATOR OUTPUT*				FULL SCALE 727 METER READINGS
	MATCHED 75-OHM	UNMATCHED 75-OHM	MATCHED 50-OHM	UNMATCHED 50-OHM	
10	300 μV	600 μV	600 μV	1200 μV	300
20	1000 μV	2000 μV	2000 μV	4000 μV	100
30	3000 μV	6000 μV	6000 μV	12 mV	300
40	10 mV	20 mV	20 mV	40 mV	100
50	30 mV	60 mV	60 mV	120 mV	300
60	100 mV	200 mV	200 mV	400 mV	100
70	300 mV	600 mV	600 mV	1.2 V	300
80	1.0 V	2.0 V	2.0 V	4.0 V	100
90	3.0 V	6.0 V	6.0 V	12.0 V	300

* 1. If a Model MLP (5.7 dB) is used instead of a 7.78 dB pad, the voltage listed for 50-ohm output must be multiplied by 0.785 for the appropriate full scale readings.

2. For the UHF position of meter range switch, all tabulated voltages must be multiplied by 0.355. If a Model MLP (5.7 dB) pad is used instead of a 7.78 pad, all voltages listed for 50-ohm output must be multiplied by 0.279.

20. Record the COMP control setting next to CH 2 on the calibration chart.
21. Repeat steps 17 thru 20, tuning the generator and the 727 to all of the calibration points in the B, C, and D ranges.
22. Set the frequency range switch to A.
23. If necessary, replace the signal generator with one that will cover this range.
24. Repeat steps 17 thru 20 for all A-range calibration points.
25. Disconnect the line cord from the unit.
26. Return the chassis to the cabinet and fasten it with the four screws.

5.3 I-F SECTION ALIGNMENT

5.3.1 GENERAL

The need for realigning the i-f amplifier is indicated when, in attempting to calibrate the unit, it is noted that the COMP settings have moved appreciably toward the high end of the control range. Complete realignment of the i-f amplfiier requires test equipment not normally available in the field.

For this reason, if the section is grossly misaligned, the unit should be returned to Jerrold for realignment. However, it is possible to perform minor realignment (or to determine if factory realignment is necessary) with satisfactory results by using relatively common items of test equipment. The procedure for this minor realignment is described below.

Note that two procedures for aligning the discriminator are also described. The first (sweep generator) method is the preferred one. After aligning the i-f amplifier, it will be necessary to align the discriminator and then calibrate the unit.

5.3.2 EQUIPMENT REQUIRED

1. An r-f sweep generator, Jerrold Model SS-300 or equivalent.
2. A crystal-calibrated marker generator, RCA Model WR-99A or equivalent.
3. A variable attenuator, Jerrold Model AV-75 or equivalent.
4. An oscilloscope.

5.3.3 I-F AMPLIFIER ALIGNMENT

1. Open the line cord compartment and remove the cord.
2. Remove the four screws at the rear of the cabinet.
3. Slide the chassis out through the front of the cabinet.
4. Power the 727 from the a-c line.
5. Set the power selector switch to AC.
6. Set the UHF/VHF switch to VHF.
7. Set the frequency range switch to UHF.
8. Switch 30 dB into the 727 attenuator.
9. Set up equipment as shown in Fig. 5-4; test point no. 2 is accessible through a hole in the chassis real panel near the lower left corner (Fig. 5-8).
10. Check that the index mark on the COMP control knob points to 10 when the control is in its maximum clockwise position; if it does not, loosen the setscrew and set the index mark on 10.
11. Push in the COMP control and turn it to the UHF setting listed on the calibration chart.
12. Set the marker and the sweep center frequency at 52 MHz.
13. Set the oscilloscope vertical sensitivity control for maximum gain. Use the variable attenuator for controlling the amplitude of the oscilloscope display.
14. Adjust L214, L215, and C211 for maximum response at 52 MHz (Fig. 5-5). Use a hexagonal alignment tool similar to General Cement No. 8606 for the inductors and a Walsco No. 2519 tool for the trimmer.

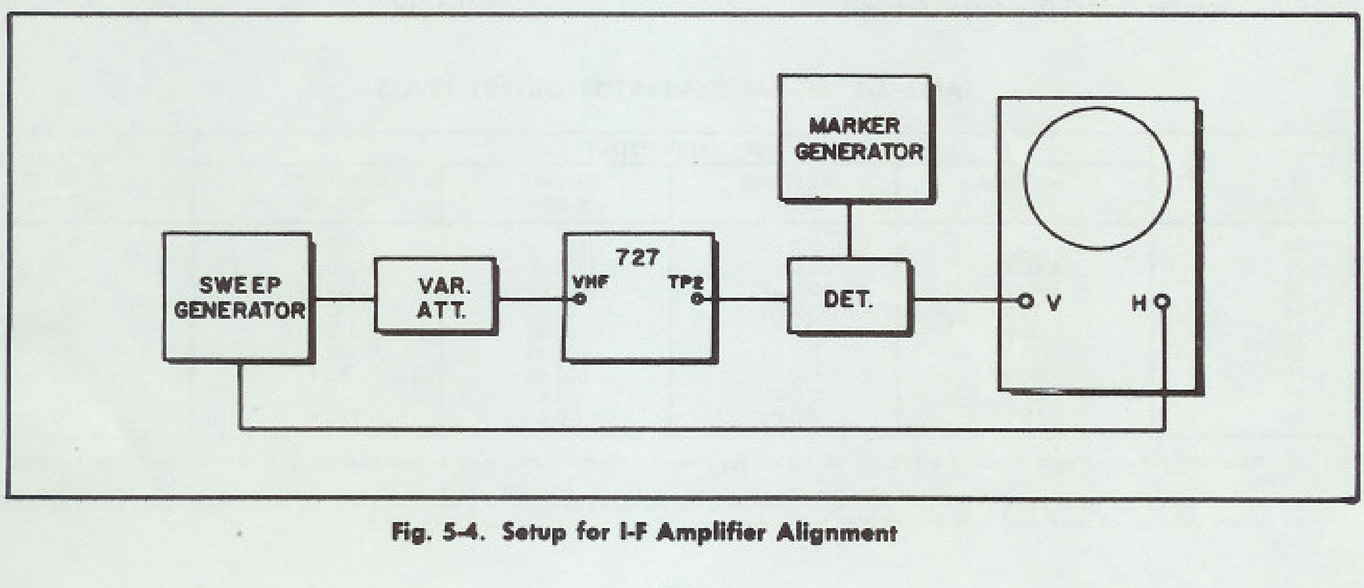


Fig. 5-4. Setup for I-F Amplifier Alignment

Note

All adjustments are accessible through holes in the bottom cover of the i-f chassis (Fig 5-9).

15. Trimmers C240/C241 and C242/C243 form double-tuned pairs, but the bandwidth of the i-f amplifier is so narrow that they too are tuned for maximum response at 52 MHz.

16. If a response similar to that shown in Fig. 5-5 cannot be obtained with the adjustments in steps 14 and 15, C201, C202, C205, and C214 may be adjusted; however, since these trimmers affect the input match of the amplifier, they should be disturbed only as a last resort. If one or more of these trimmers is obviously misaligned, adjust one at a time, being careful to return the adjustment screw to its original position if no improvement on the response is seen.

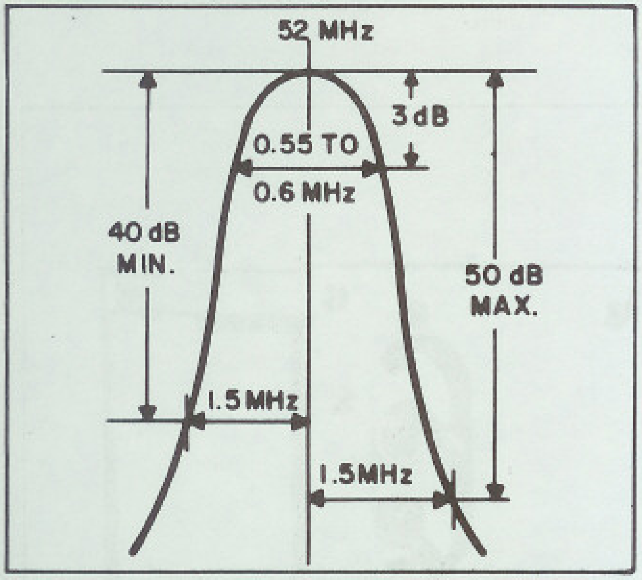


Fig. 5-5. Response of I-F Amplifier at Test Point No. 2

5.3.4 VIDEO AMPLIFIER/DETECTOR ALIGNMENT

1. Connect equipment as shown in Fig. 5-6.
2. Adjust the amplitude of the oscilloscope display with the variable attenuator, not with the oscilloscope vertical sensitivity control.
3. Adjust L218 for maximum response at 52 MHz.

5.3.5 DISCRIMINATOR ALIGNMENT (SWEEP GENERATOR METHOD)

1. Connect equipment as shown in Fig. 5-7.
2. Set the sweep width as narrow as possible so that the generator output is essentially at one frequency.
3. Set the sweep center frequency at 52 MHz, as indicated by maximum deflection on the 727 meter.
4. Adjust the variable attenuator for a reading of 4 dB on the 727 meter.
5. The discriminator coil windings are on opposite ends of a common coil form. The tuning core of the primary winding, L216-A, is positioned toward the chassis hole and the tuning core of the secondary winding, L216-B, is positioned in the top of the coil form. To adjust L216-B, use a hexagonal tool that will pass through the core of L216-A.

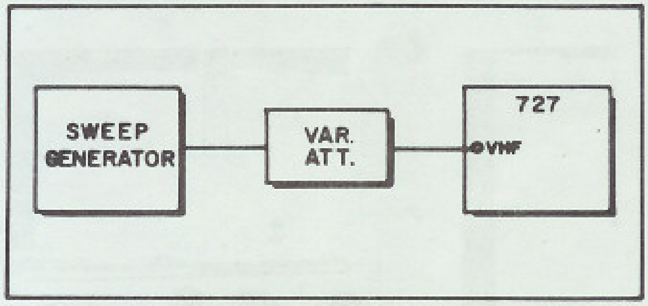


Fig. 5-7. Setup for Discriminator Alignment

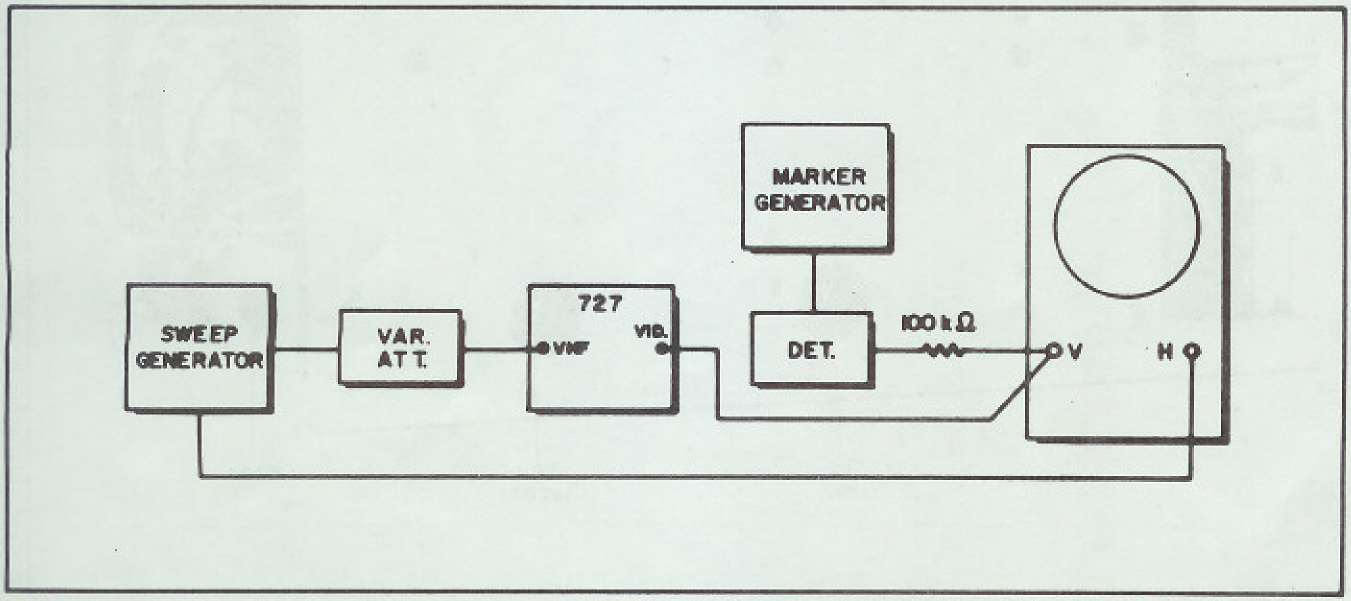


Fig. 5-6. Setup for Video Amplifier/Detector Alignment

6. Tune L216-A for maximum indication on the meter, readjusting the variable attenuator as necessary to keep the maximum reading at 4 dB.

7. Tune L216-B to the null point: the point where turning the core in either direction increases the meter deflection.

5.3.6 DISCRIMINATOR ALIGNMENT (AIR-SIGNAL METHOD)

1. If a steady television signal is available it can be used for aligning the discriminator. Apply the signal through the variable attenuator to the VHF INPUT terminal on the 727.

2. Tune the 727 to a carrier (video or sound) of the signal and adjust the variable attenuator for a 4 dB reading on the meter.

3. Switch on the 727 audio amplifier.

4. The discriminator coil windings are on opposite ends of a common coil form. The tuning core of the primary winding, L216-A, is positioned toward the chassis hole and the tuning core of the secondary winding, L216-B, is in the top of the coil form. To adjust L216-B, use a hexagonal tool that will pass through the core of L216-A.

5. Tune L216-A for a maximum indication on the meter, readjusting the variable attenuator as necessary to keep the maximum meter reading at 4 dB.

6. Tune L216-B to the null point; the point where turning the core in either direction increases the meter deflection. This should correspond to the point where minimum sync buzz is heard, when a video carrier is the signal source, or where best quality sound is heard, when a sound carrier is the signal source.

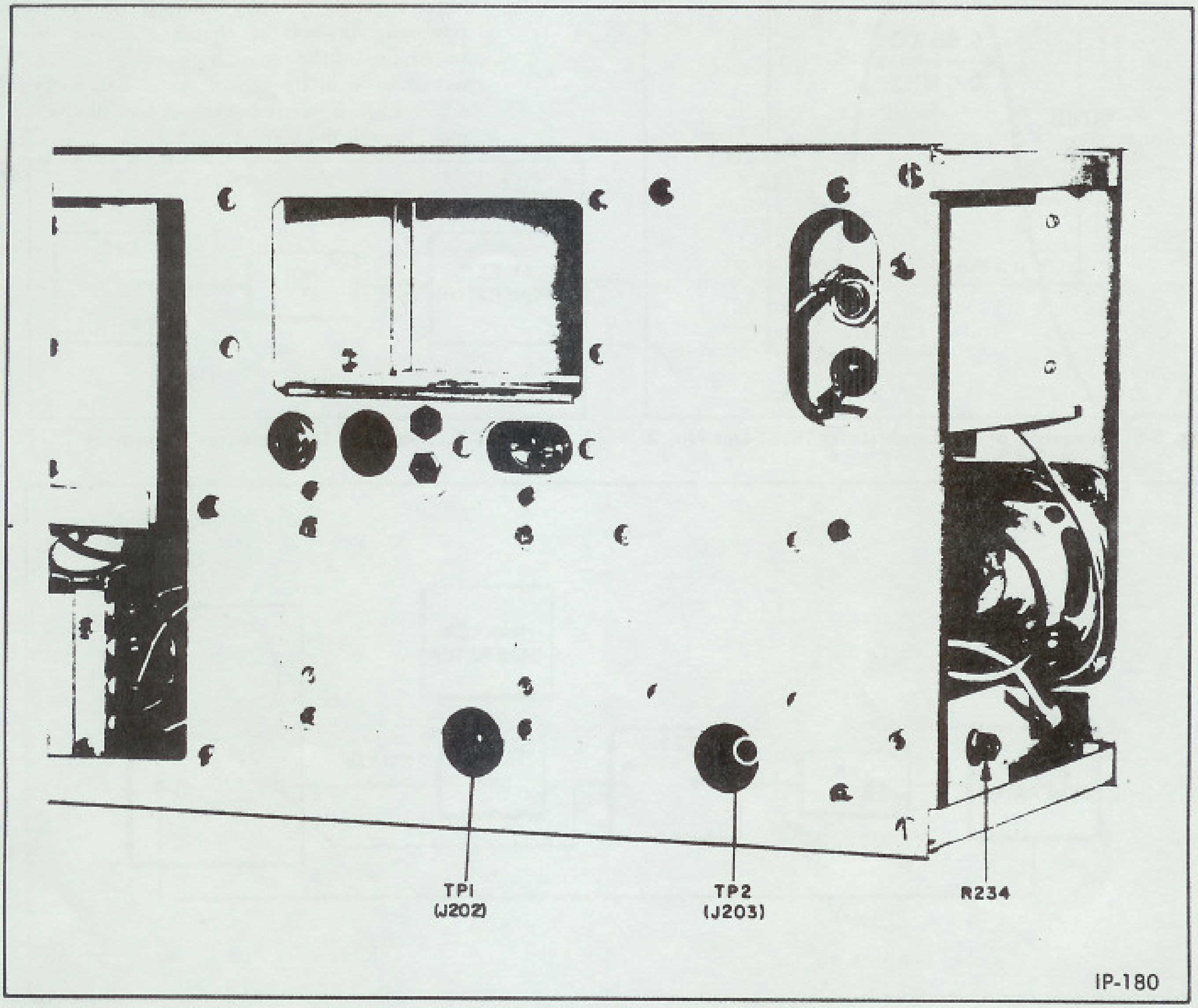


Fig. 5-8. Location of R234, TP1, and TP2

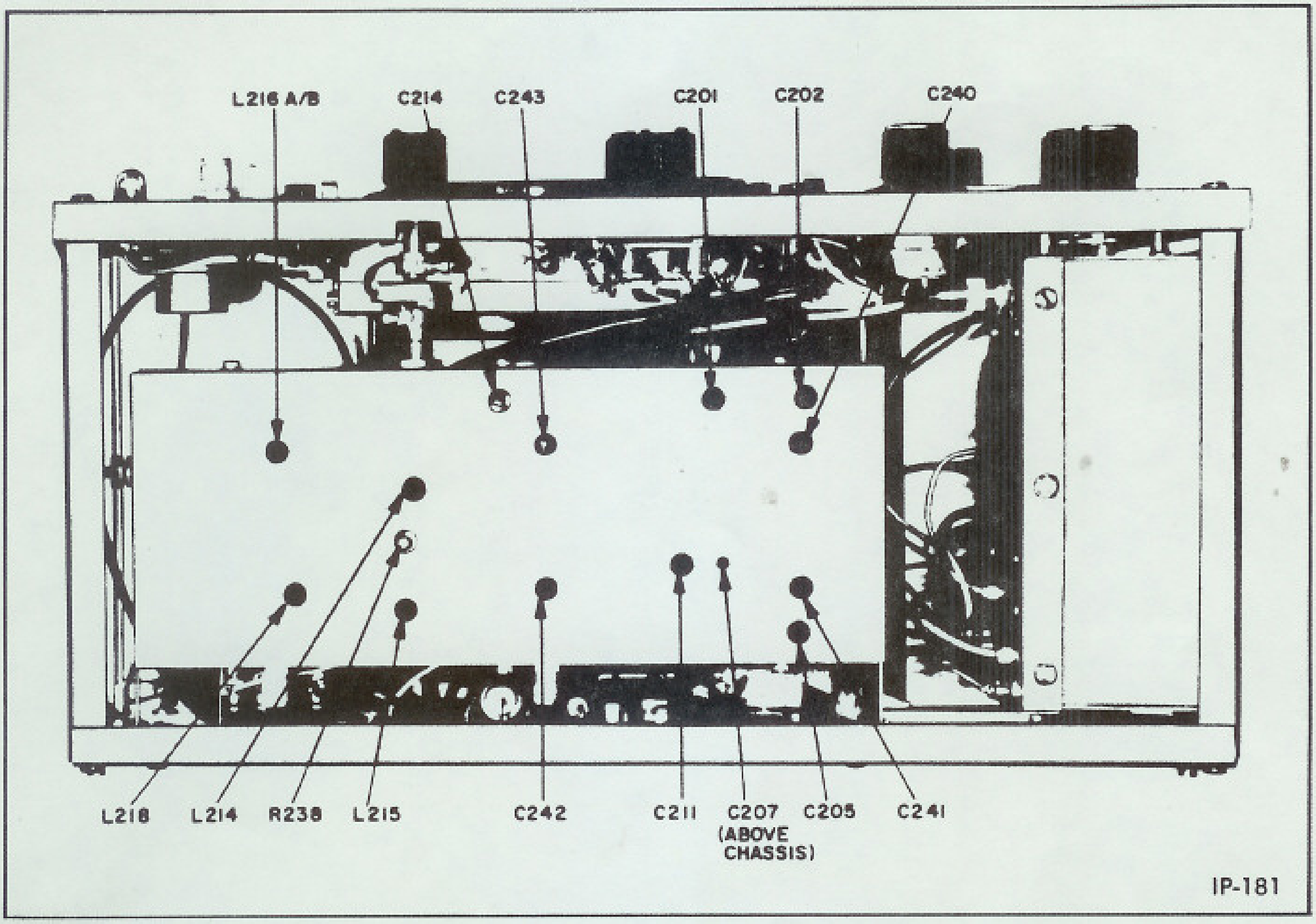


Fig. 5-9. Location of Calibration and Alignment Adjustments on Bottom of I-F Section

MODEL FSM-727

REPLACEABLE PARTS LIST

CIRCUIT REF. NO.	TEXSCAN PART NO.	DESCRIPTION
	SUB-ASSEMBLY A204-806 FRONT PANEL	
		CAPACITORS
C4	A012-323	Fixed, 330 uF, 16 V
C5	A012-016	Fixed, 100 uF, 25 V
		DIODES
CR1	025-007	Rectifier
		RESISTORS
R2	046-078	Fixed, 180 Ω, 1/2 W, 5%
R3	046-074	Fixed, 150 Ω, 1/2 W, 5%
R5	046-224	Fixed, 510 K Ω, 1/2 W, 5%
R6	047-555	Fixed, 71.5 K Ω, 1/2 W, 1%
R7/S6	048-216	Variable, 100 K Ω, 1/2 W, 20%
R8	046-036	Fixed, 18 Ω, 1/2 W, 5%
		SWITCHES
S1	C057-162	Wafer
S2	057-163	Push Button
S3	057-164	Pushbutton
S4	057-166	Pushbutton
S5	057-165	Pushbutton
	SUB-ASSEMBLY A204-791 ATTENUATOR	
		CAPACITORS
C101	012-005	Disc., .01 uF, 500 V
C102	012-314	Fixed, 1.2 pF, .22 pF, 500 V, 10%
C103	012-001	1000 pF, Feedthru
C104	012-001	1000 pF, Feedthru
C105	012-354	Fixed, .33 pF, 500 V, 10%
		RESISTORS
R101	045-824	Fixed, 510 K Ω, 1/4 W, 5%
R102	045-810	Fixed, 240 K Ω, 1/4 W, 5%
R103	045-810	Fixed, 240 K Ω, 1/4 W, 5%
R104	045-810	Fixed, 240 K Ω, 1/4 W, 5%
R105	045-810	Fixed, 240 K Ω, 1/4 W, 5%
R106	047-553	Fixed, 144 Ω, 1/4 W, 1%

Sub-Assembly A204-791 Attenuator - continued

Resistors - continued

CIRCUIT REF. NO.	TEXSCAN PART NO.	DESCRIPTION
R107	047-552	Fixed, 107 Ω, 1/2 W, 1%
R108	047-553	Fixed, 144 Ω, 1/4 W, 1%
R109	047-551	Fixed, 91 Ω, 1/2 W, 2%
R110	047-550	Fixed, 371 Ω, 1/2 W, 1%
R111	047-551	Fixed, 91 Ω, 1/2 W, 2%
R112	047-551	Fixed, 91 Ω, 1/2 W, 2%
R113	047-550	Fixed, 371 Ω, 1/2 W, 1%
R114	047-551	Fixed, 91 Ω, 1/2 W, 2%
R115	047-551	Fixed, 91 Ω, 1/2 W, 2%
R116	047-550	Fixed, 371 Ω, 1/2 W, 1%
R117	047-551	Fixed, 91 Ω, 1/2 W, 2%
R118	047-551	Fixed, 91 Ω, 1/2 W, 2%
R119	047-550	Fixed, 371 Ω, 1/2 W, 1%
R120	047-551	Fixed, 91 Ω, 1/2 W, 2%
R121	046-136	Fixed, 4.3 K Ω, 1/2 W, 5%

SWITCHES

S101	A057-161	Slide DPDT
S102	A057-160	Slide DPDT
S103	A057-160	Slide DPDT
S104	A057-160	Slide DPDT
S105	A057-160	Slide DPDT
S106	A057-160	Slide DPDT

SUB-ASSEMBLY A204-797 BANDPASS FILTER

CAPACITORS

C728	012-001	Fixed, 1000 pF
C729	012-001	Fixed, 1000 pF
C730	012-001	Fixed, 1000 pF
C731	012-001	Fixed, 1000 pF
C732	012-001	Fixed, 1000 pF
C733	012-001	Fixed, 1000 pF

SUB-ASSEMBLY A204-810 DIVIDER #1

CAPACITORS

C701	012-347	Fixed, 47 pF, 5%
C702	012-342	Fixed, 5.6 pF, 5%
C710	012-345	Fixed, 560 pF, 5%
C711	012-339	Fixed, 22 pF, 2%
C716	012-339	Fixed, 22 pF, 2%

CIRCUIT REF. NO.	TEXSCAN PART NO.	DESCRIPTION

SUB-ASSEMBLY A204-811 DIVIDER #2

CAPACITORS

C703	012-230	Fixed, 68 pF, 5%
C704	012-340	Fixed, 30 pF, 2%
C705	012-348	Fixed, 62 pF, 5%
C706	012-339	Fixed, 22 pF, 2%
C707	012-341	Fixed, 36 pF, 2%
C708	012-345	Fixed, 560 pF, 5%
C709	012-349	Fixed, 270 pF, 500 V, 5%
C712	012-346	Fixed, 51 pF, 5%
C713	012-135	Fixed, 15 pF, 500 V, 5%
C714	012-337	Fixed, 3.3 pF, .25%
C715	012-346	Fixed, 51 pF, 5%

SUB-ASSEMBLY A204-812 DIVIDER #3

CAPACITORS

C717	012-344	Fixed, 3.6 pF, .25%
C718	012-337	Fixed, 3.3 pF, .25%
C719	012-338	Fixed, 4.7 pF, ±.5 pF
C720	015-033	Trimmer, 2-8 pF
C721	012-338	Fixed, 4.7 pF, ±.5 pF
C722	012-337	Fixed, 3.3 pF, .25%
C723	012-344	Fixed, 3.6 pF, .25%
C724	012-343	Fixed, 3.9 pF, .25%
C725	012-343	Fixed, 3.9 pF, .25%
C726	012-343	Fixed, 3.9 pF, .25%
C727	012-343	Fixed, 3.9 pF, .25%

SUB-ASSEMBLY A204-809 CHASSIS

CAPACITORS

C401	012-001	Fixed, 1000 pF
C402	012-322	Fixed, 56 pF, 1000 V, 5%
C403	012-001	Fixed, 1000 pF
C404	012-318	Fixed, 4.7 pF, + .25 pF, 500 V
C405	015-032	Trimmer 0.7-3 pF
C406	012-317	Fixed, 3.3 pF + .25 pF, 500 V
C407	012-001	Fixed, 1000 pF
C408	012-320	Fixed, 10 pF, 500 V, 5%
C409	012-001	Fixed, 1000 pF
C410	012-316	Fixed, 2.2 pF, + .25 pF, 500 V
C411	012-317	Fixed, 3.3 pF, + .25 pF, 500 V
C412	015-032	Trimmer 0.7-3 pF

Sub-Assembly A204-809 Chassis - continued

Capacitors - continued

CIRCUIT REF. NO.	TEXSCAN PART NO.	DESCRIPTION
C413	012-334	Fixed, 1.5 pF
C414	012-001	Fixed, 1000 pF
C415	012-319	Fixed, 6.8 pF, 600 V, 5%
C416	012-001	Fixed, 1000 pF
C417	012-315	Fixed, 1.5 pF + .25 pF
C418	012-317	Fixed, 3.3 pF + .25 pF, 500 V
C419	015-032	Trimmer 0.7-3 pF
C420	012-330	Fixed, 1.0 pF
C421	012-001	Fixed, 1000 pF
C422	012-321	Fixed, 39 pF, 500 V, 5%
C423	012-001	Fixed, 1000 pF
C424	012-318	Fixed, 4.7 pF + .25 pF, 500 V
C425	015-032	Trimmer 0.7-3 pF
C426	012-316	Fixed, 2.2 pF, + .25 pF, 500 V
C427	012-001	Fixed, 1000 pF
C428	012-316	Fixed, 2.2 pF + .25 pF, 500 V

RESISTORS

R401	045-706	Fixed, 820 Ω, 1/4 W, 5%
R402	045-730	Fixed, 3.3 K Ω, 1/4 W, 5%
R403	045-751	Fixed, 10 K Ω, 1/4 W, 5%
R404	045-691	Fixed, 360 Ω, 1/4 W, 5%
R405	045-730	Fixed, 3.3 K Ω, 1/4 W, 5%
R406	045-751	Fixed, 10 K Ω, 1/4 W, 5%
R407	045-694	Fixed, 430 Ω, 1/4 W, 5%
R408	045-730	Fixed, 3.3 K Ω, 1/4 W, 5%
R409	045-751	Fixed, 10 K Ω, 1/4 W, 5%
R410	045-687	Fixed, 300 Ω, 1/4 W, 5%
R411	045-730	Fixed, 3.3 K Ω, 1/4 W, 5%
R412	045-751	Fixed, 10 K Ω, 1/4 W, 5%

TRANSISTORS

Q401	062-093	S1140
Q402	062-093	S1140
Q403	062-093	S1140
Q404	062-093	S1140

CIRCUIT REF. NO.	TEXSCAN PART NO.	DESCRIPTION
	SUB-ASSEMBLY A204-807 REAR PANEL	
	CAPACITORS	
C1	C012-332	Fixed, 1000 pF, 20%
C2	C012-332	Fixed, 1000 pF, 20%
C3	A012-323	Fixed, 330 uF, 16V
	RESISTOR	
R4	046-074	Fixed, 150 Ω, 1/2 W, 5%
	SWITCH	
S7	057-147	Switch
	SUB-ASSEMBLY A204-789 AUDIO AMPLIFIER	
	CAPACITORS	
C301	012-309	Fixed, .02 uF, 25 V
C302	012-353	Fixed, 10 uF, 16 V, CW
C303	012-309	Fixed, .02 uF, 25 V
C304	012-352	Fixed, 4 uF, 10 V, CW
C305	012-350	Fixed, 125 uF, 16 V
C306	012-291	Fixed, 1 uF, 35 V
C307	012-350	Fixed, 125 uF, 16 V
C308	012-009	Fixed, 1000 pF
	RESISTORS	
R301	045-779	Fixed, 47 K Ω, 1/4 W, 5%
R302	045-747	Fixed, 7.5 K Ω, 1/4 W, 5%
R303	045-772	Fixed, 33 K Ω, 1/4 W, 5%
R304	045-758	Fixed, 15 K Ω, 1/4 W, 5%
R305	045-694	Fixed, 430 Ω, 1/4 W, 5%
R306	045-800	Fixed, 150 K Ω, 1/4 W, 5%
R307	045-751	Fixed, 10 K Ω, 1/4 W, 5%
R308	045-649	Fixed, 36 Ω, 1/4 W, 5%
R309	045-734	Fixed, 3.9 K Ω, 1/4 W, 5%
R310	045-790	Fixed, 82 K Ω, 1/4 W, 5%
R311	045-772	Fixed, 33 K Ω, 1/4 W, 5%
R312	045-737	Fixed, 4.7 K Ω, 1/4 W, 5%
R313	045-667	Fixed, 100 Ω, 1/4 W, 5%
R314	045-680	Fixed, 200 Ω, 1/4 W, 5%
R315	045-793	Fixed, 100 K Ω, 1/4 W, 5%

CIRCUIT REF. NO.	TEXSCAN PART NO.	DESCRIPTION
		TRANSISTORS
Q301	062-096	2N3905
Q302	062-096	2N3905
Q303	062-096	2N3905
Q304	062-096	2N1309
Q305	062-094	2N1308

SUB-ASSEMBLY A204-790 POWER SUPPLY

		CAPACITORS
C601	012-005	Fixed, .01 uF, 500 V
C602	012-005	Fixed, .01 uF, 500 V
C603	012-312	Fixed, 250 uF, 25 V
C604	012-310	Fixed, .005 uF, 600 V
C605	012-313	Fixed, 25 uF, 25 V
		DIODES
CR601	025-007	Rectifier
CR602	025-007	Rectifier
CR603	025-093	Zener 1N711
CR604	025-007	Rectifier
		RESISTORS
R601	045-719	Fixed, 1.6 K Ω, 1/4 W, 5%
R602	046-144	Fixed, 6.8 K Ω, 1/2 W, 5%
R603	046-109	Fixed, 1 K Ω, 1/2 W, 5%
R604	048-217	Variable, 1 K Ω, 1 W, 20%
R605	046-123	Fixed, 2.2 K Ω, 1/2 W, 5%
R606	045-719	Fixed, 1.6 K Ω, 1/4 W, 5%
		TRANSISTORS
Q601	062-097	2N456A
Q602	062-096	2N3905
Q603	062-096	2N3905

CIRCUIT REF. NO.	TEXSCAN PART NO.	DESCRIPTION

SUB-ASSEMBLY A204-796 IF AMPLIFIER

CAPACITORS

C201	015-031	4-12 pF
C202	015-031	4-12 pF
C205	015-030	9-5 pF
C206	012-009	Fixed, 1000 pF, 500 V
C207	015-029	Trimmer .35-1.37 pF
C208	012-309	Fixed, .02 uF, 25 V, 20%
C209	012-309	Fixed, .02 uF, 25 V, 20%
C210	012-309	Fixed, .02 uF, 25 V, 20%
C211	015-032	.7-3 pF
C214	015-030	9-5 pF
C215	012-009	Fixed, 1000 pF, 500 V
C218	012-009	Fixed, 1000 pF, 500 V
C221	012-009	Fixed, 1000 pF, 500 V
C222	012-009	Fixed, 1000 pF, 500 V
C228	012-009	Fixed, 1000 pF, 500 V
C232	012-309	Fixed, .02 uF, 25 V, 20%
C233	012-309	Fixed, .02 uF, 25 V, 20%
C235	012-309	Fixed, .02 uF, 25 V, 20%
C237	012-309	Fixed, .02 uF, 25 V, 20%
C238	012-309	Fixed, .02 uF, 25 V, 20%
C241	012-309	Fixed, .02 uF, 25 V, 20%
C244	012-324	Fixed, 5.0 pF
C245	012-329	Fixed, .004 uF, 200 V, 10%

CONNECTORS

J201	020-208	Panel Mount
J202	020-222	Connector F61A
J203	020-222	Connector F61A
J204	020-208	Panel Mount

RESISTORS

R201	045-741	Fixed, 5.6 K Ω, 1/4 W, 5%
R202	045-748	Fixed, 8.2 K Ω, 1/4 W, 5%
R204	045-688	Fixed, 330 Ω, 1/4 W, 5%
R205	045-642	Fixed, 24 Ω, 1/4 W, 5%
R210/S201	A048-213-01	Variable, 400 Ω, 10%
R211	045-642	Fixed, 24 Ω, 1/4 W, 5%
R216	045-642	Fixed, 24 Ω, 1/4 W, 5%
R222	045-733	Fixed, 3.6 K Ω, 1/4 W, 5%
R223	045-667	Fixed, 100 Ω, 1/4 W, 5%
R227	045-751	Fixed, 10 K Ω, 1/4 W, 5%
R234	048-215	Variable, 10 K Ω, 1/4 W, 20%
R237	045-758	Fixed, 15 K Ω, 1/4 W, 5%
R238	048-214	Variable, 500 Ω, 1/4 W, 20%
R240	045-730	Fixed, 3.3 K Ω, 1/4 W, 5%

CIRCUIT REF. NO.	TEXSCAN PART NO.	DESCRIPTION
		TRANSISTORS
Q201	A062-095	36479
		MISCELLANEOUS
T201	B061-037-00	Transformer

SUB-ASSEMBLY A204-793 VIDEO DETECTOR BOARD

		CAPACITORS
C229	012-309	Fixed, .02 uF, 25 V, 20%
C230	012-309	Fixed, .02 uF, 25 V, 20%
C231	012-325	Fixed, 10 pF, + .5 pF
		DIODES
CR201	025-095	1N34
		RESISTORS
R224	045-748	Fixed, 8.2 K Ω, 1/4 W, 5%
R225	045-720	Fixed, 1.8 K Ω, 1/4 W, 5%
R226	045-688	Fixed, 330 Ω, 1/4 W, 5%
		TRANSISTOR
Q205	A062-093	S1140

SUB-ASSEMBLY A204-794 COMPONENT AMP. BOARD

		CAPACITORS
C216	012-309	Fixed, .02 uF, 25 V, 20%
C217	012-309	Fixed, .02 uF, 25 V, 20%
C219	012-309	Fixed, .02 uF, 25 V, 20%
C220	012-309	Fixed, .02 uF, 25 V, 20%
		RESISTORS
R207	045-720	Fixed, 1.8 K Ω, 1/4 W, 5%
R208	045-748	Fixed, 8.2 K Ω, 1/4 W, 5%
R209	045-761	Fixed, 16 K Ω, 1/4 W, 5%
R213	045-720	Fixed, 1.8 K Ω, 1/4 W, 5%
R214	045-748	Fixed, 8.2 K Ω, 1/4 W, 5%
R215	045-761	Fixed, 16 K Ω, 1/4 W, 5%

CIRCUIT REF. NO.	TEXSCAN PART NO.	DESCRIPTION
		TRANSISTORS
Q201	A062-093	S1140
Q203	A062-093	S1140

SUB-ASSEMBLY A204-795-00 CHASSIS RIGHT BAND

CAPACITORS

C203	012-335	Fixed, 100 pF, 250 V, 2%
C204	012-335	Fixed, 100 pF, 250 V, 2%

SUB-ASSEMBLY A204-795-01 CHASSIS LEFT BAND

CAPACITORS

C212	012-335	Fixed, 100 pF, 250 V, 2%
C213	012-335	Fixed, 100 pF, 250 V, 2%

SUB-ASSEMBLY A204-799 DISCRIMINATOR

CAPACITORS

C223	012-309	Fixed, .02 uF, 25 V, 20%
C224	012-009	Fixed, 1000 pF, 500 V
C225	012-330	Fixed, 1.0 ± .25 pF
C226	012-326	Fixed, 15 pF, 2%
C227	012-333	Fixed, 100 pF
C234	012-309	Fixed, .02 uF, 25 V, 20%
C236	012-309	Fixed, .02 uF, 25 V, 20%
C239	012-309	Fixed, .02 uF, 25 V, 20%
C240	012-309	Fixed, .02 uF, 25 V, 20%

DIODES

CR202	025-095	1N34
CR203	025-095	1N34
CR204	A025-094	S-2069
CR205	A025-094	S-2069

RESISTORS

R219	045-748	Fixed, 8.2 K Ω, 1/4 W, 5%
R220	045-793	Fixed, 100 K Ω, 1/4 W, 5%
R221	045-793	Fixed, 100 K Ω, 1/4 W, 5%
R228	045-737	Fixed, 4.7 K Ω, 1/4 W, 5%
R229	045-762	Fixed, 18 K Ω, 1/4 W, 5%

Sub-Assembly A204-799 Discriminator - continuted

Resistors - continued

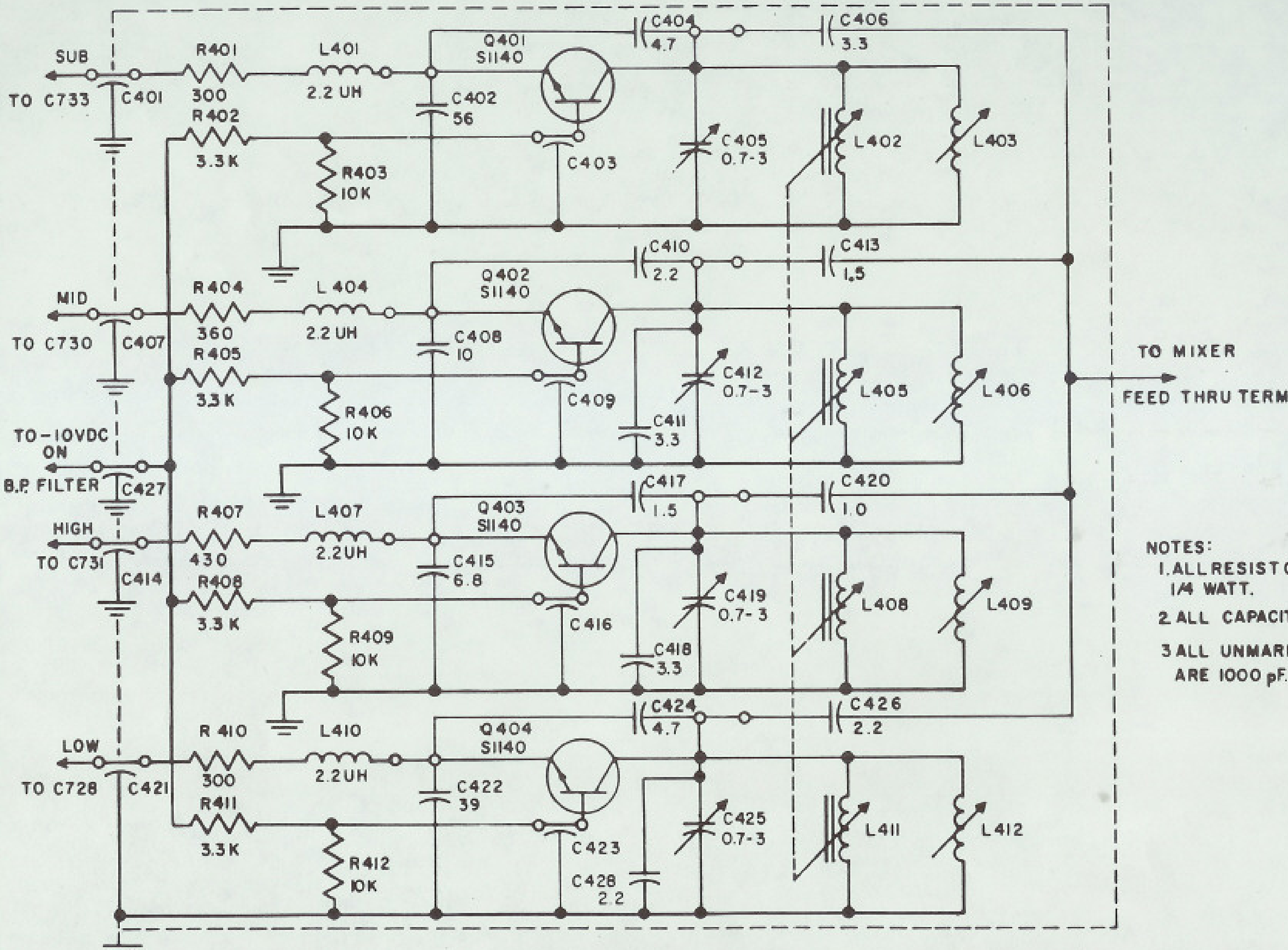
CIRCUIT REF. NO.	TEXSCAN PART NO.	DESCRIPTION
R230	045-695	Fixed, 470 Ω, 1/4 W, 5%
R231	045-727	Fixed, 2.7 K Ω, 1/4 W, 5%
R232	045-779	Fixed, 47 K Ω, 1/4 W, 5%
R233	045-736	Fixed, 4.3 K Ω, 1/4 W, 5%
R235	045-733	Fixed, 3.6 K Ω, 1/4 W, 5%
R236	045-737	Fixed, 4.7 K Ω, 1/4 W, 5%
R239	045-758	Fixed, 15 K Ω, 1/4 W, 5%

TRANSISTORS

Q204	A062-093-00	S1140
Q206	A062-093-00	S1140
Q207	A062-093-01	S1140
Q208	A062-093-01	S1140

SCHEMATIC

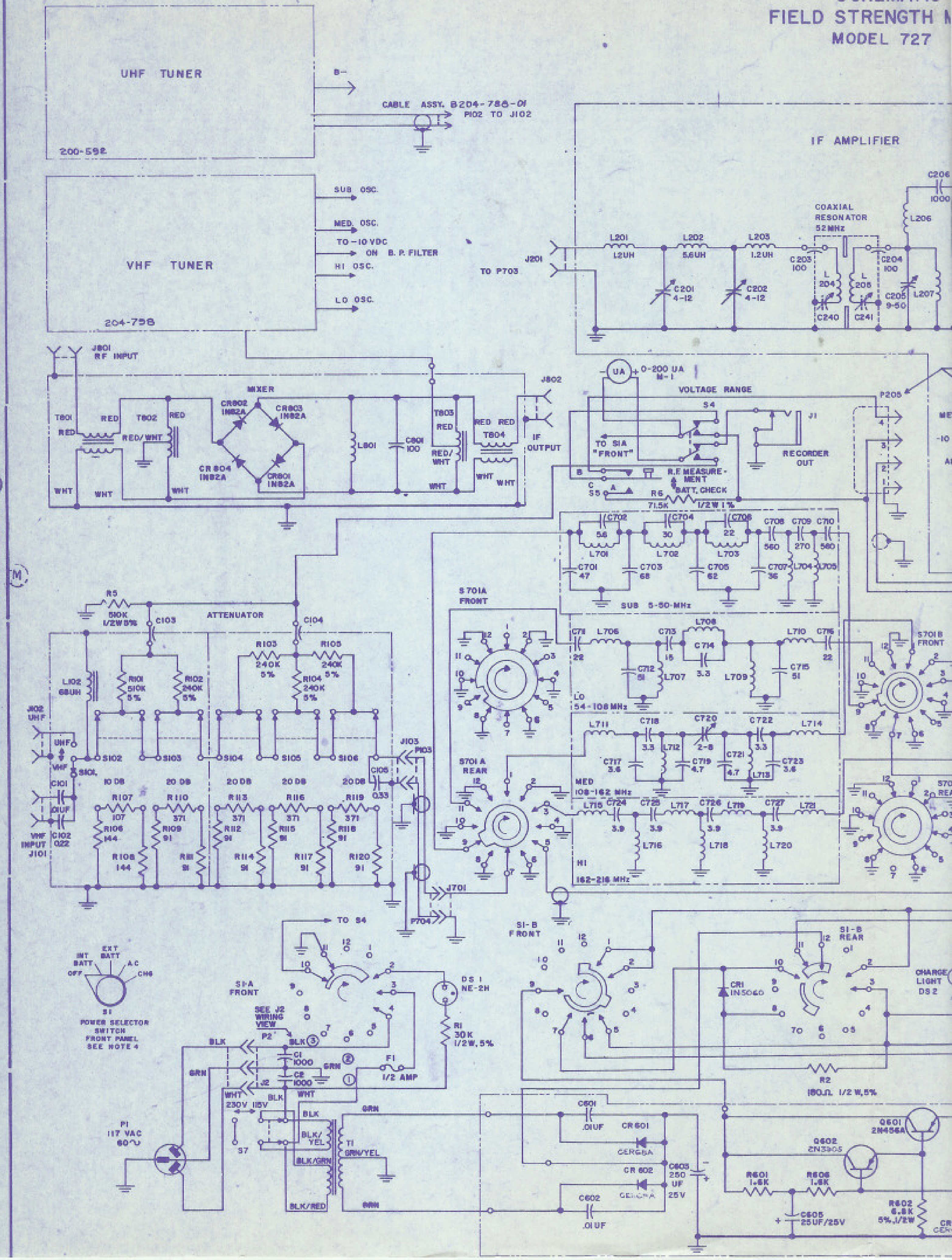
VHF TUNER FOR MODEL 727



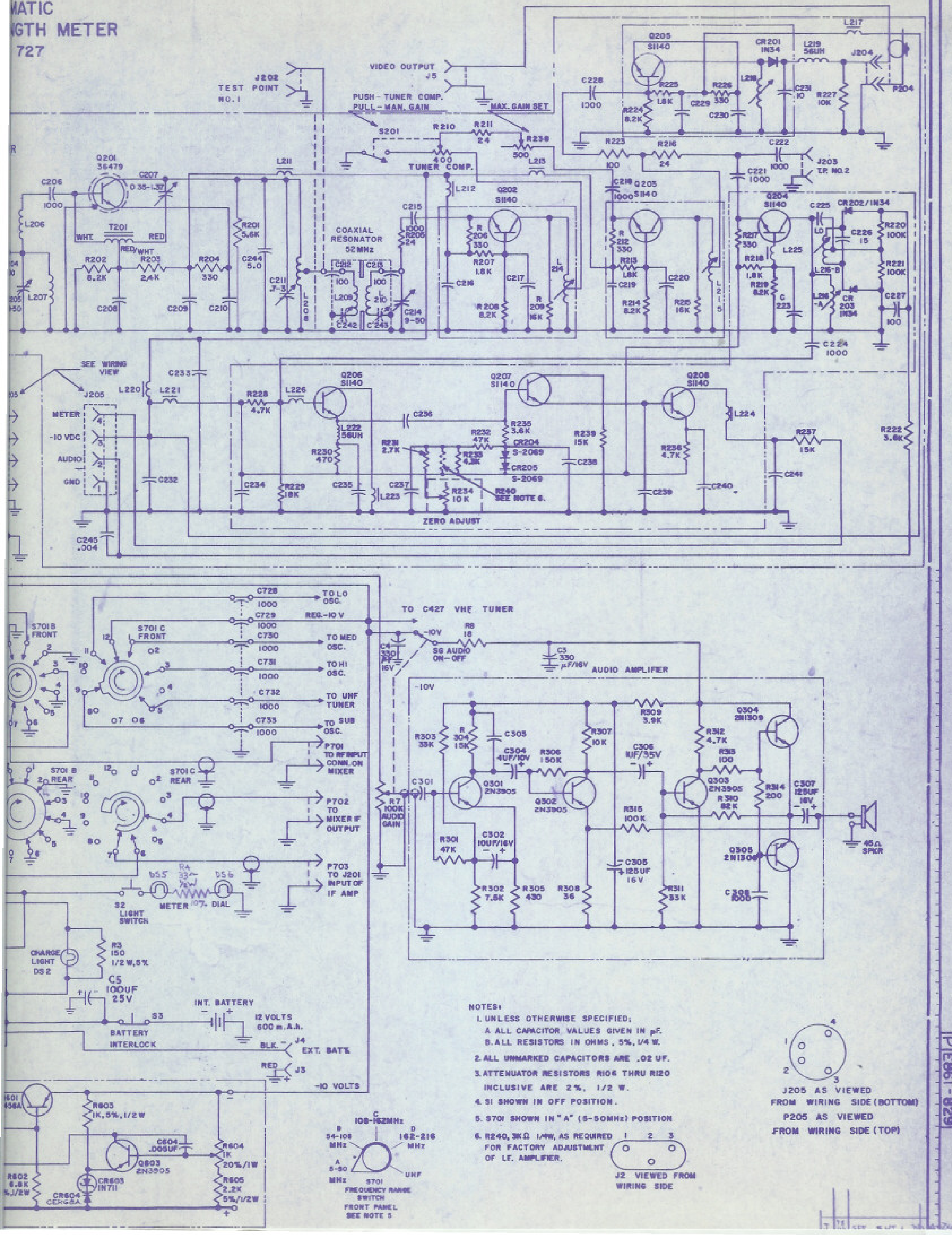
NOTES:

1. ALL RESISTORS ARE 5%, 1/4 WATT.
2. ALL CAPACITORS ARE IN pF.
3. ALL UNMARKED CAPACITORS ARE 1000 pF.

SCHEMATIC
FIELD STRENGTH M
MODEL 727



...MATIC
...NGTH METER
... 727



NOTES:
1. UNLESS OTHERWISE SPECIFIED;
   A. ALL CAPACITOR VALUES GIVEN IN pF.
   B. ALL RESISTORS IN OHMS, 5%, 1/4 W.
2. ALL UNMARKED CAPACITORS ARE .02 UF.
3. ATTENUATOR RESISTORS R106 THRU R120 INCLUSIVE ARE 2%, 1/2 W.
4. S1 SHOWN IN OFF POSITION.
5. S701 SHOWN IN "A" (5-50MHz) POSITION
6. R240, 3KΩ 1/4W, AS REQUIRED FOR FACTORY ADJUSTMENT OF I.F. AMPLIFIER.

WARRANTY

Texscan Corporation warrants that each part of this product (except vacuum tubes and batteries) will be free from defects in material and workmanship under normal use and service. Texscan Corporation's obligation under this warranty shall be limited to repairing or replacing, F.O.B. Indianapolis, Indiana, each part of the product (except vacuum tubes and batteries) which is defective, provided that buyer gives Texscan written notice of such defect within a period of one year commencing with the delivery of the product by Texscan Corporation. The remedy set forth herein shall be the only remedy available to the buyer for breach of this warranty, and in no event shall Texscan Corporation be liable for incidental or consequential damages for such breach. This warranty shall not apply to any part of the product which, without fault of Texscan Corporation, has been subject to alteration, failure caused by a part not supplied by Texscan Corporation, accident, fire or other casualty, negligence or misuse, or to any part rather than as a result of defect.

Except for warranties set forth above, and the warranties, if any, available to the buyer from the persons who supply Texscan Corporation any vacuum tubes or batteries contained in the product, there are no warranties, express or implied (including, without implied limitation, any implied warranties of merchantability or fitness), with respect to the condition of the product or their suitability for the use intended for them by the buyer or by a purchaser from the buyer.

REV. 9/2/76