

CHASSIS—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably with a test pattern.

Set the horizontal hold control to the center of its range.

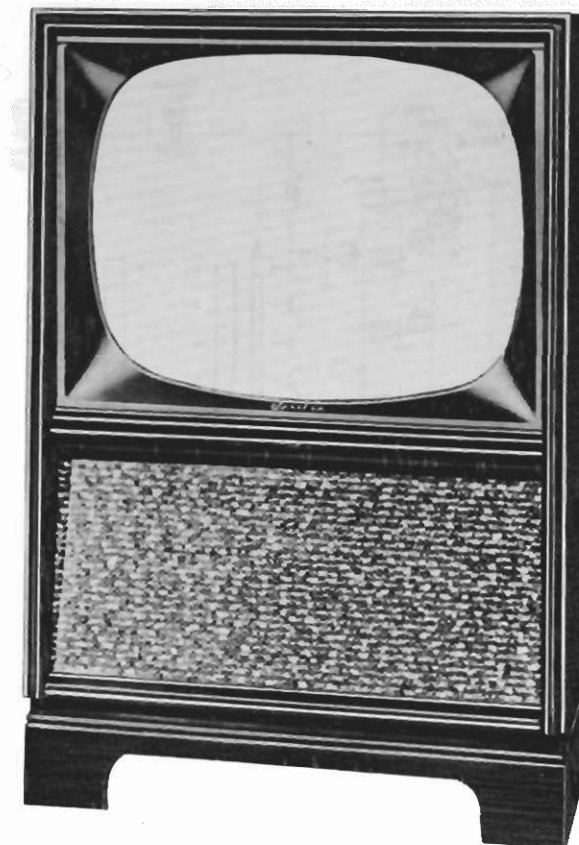
Turn the horizontal frequency slug (B1) slowly clockwise while switching off and on channel until the picture loses sync.

Turn B1 slowly counter clockwise until the picture regains sync, then continue one-half turn in the same direction.

The picture should hold sync at both extreme settings of the horizontal hold control.

If necessary, readjust B1 SLIGHTLY and test for sync pull-in as above.

Adjust the width slug (B2) for a picture SLIGHTLY wider than necessary to fill the picture mask horizontally.



TRADE NAME	Spartan	CHASSIS
		CMUA487DC, ED, CMUA490DC, CMUA491DC, CMUA499DC, ED, CMUA501DC, CMUD495DC, CMUE493DC, CTA487DC, ED, CTA490DC, CTA491DC, CTA499DC, ED, CTA501DC, CTD495DC, CTE493DC (117 Series)
MANUFACTURER	Spartan Div., The Magnavox Co., Fort Wayne 4, Indiana	
TYPE SET	Television Receiver	
TUBES	Twenty	
POWER SUPPLY	110-120 Volts AC, 60 Cycle	RATING 190 Watts, 1.7 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)	

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustment of the VHF oscillator is possible by removing the channel selector and fine tuning knobs. Set the fine tuning at the center of its range. The adjustments (located in a circle around the shaft) should be made in sequence from the highest to the lowest channel in the area. Adjust for best picture and sound.

FOCUS

Adjust the ion trap for the best focus consistent with maximum brightness.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

For adjustment of the horizontal oscillator, it is necessary to remove the rear cover and supply power to set. Set the horizontal hold at the center of its range and adjust the horizontal frequency slug (B1) until the picture syn-

chronizes horizontally. (For location, see tube placement chart).

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the discriminator secondary (A13) located on top of the chassis.

FUSES

One fuse is used for horizontal sweep circuit protection. (For location, see tube placement chart).

CENTERING

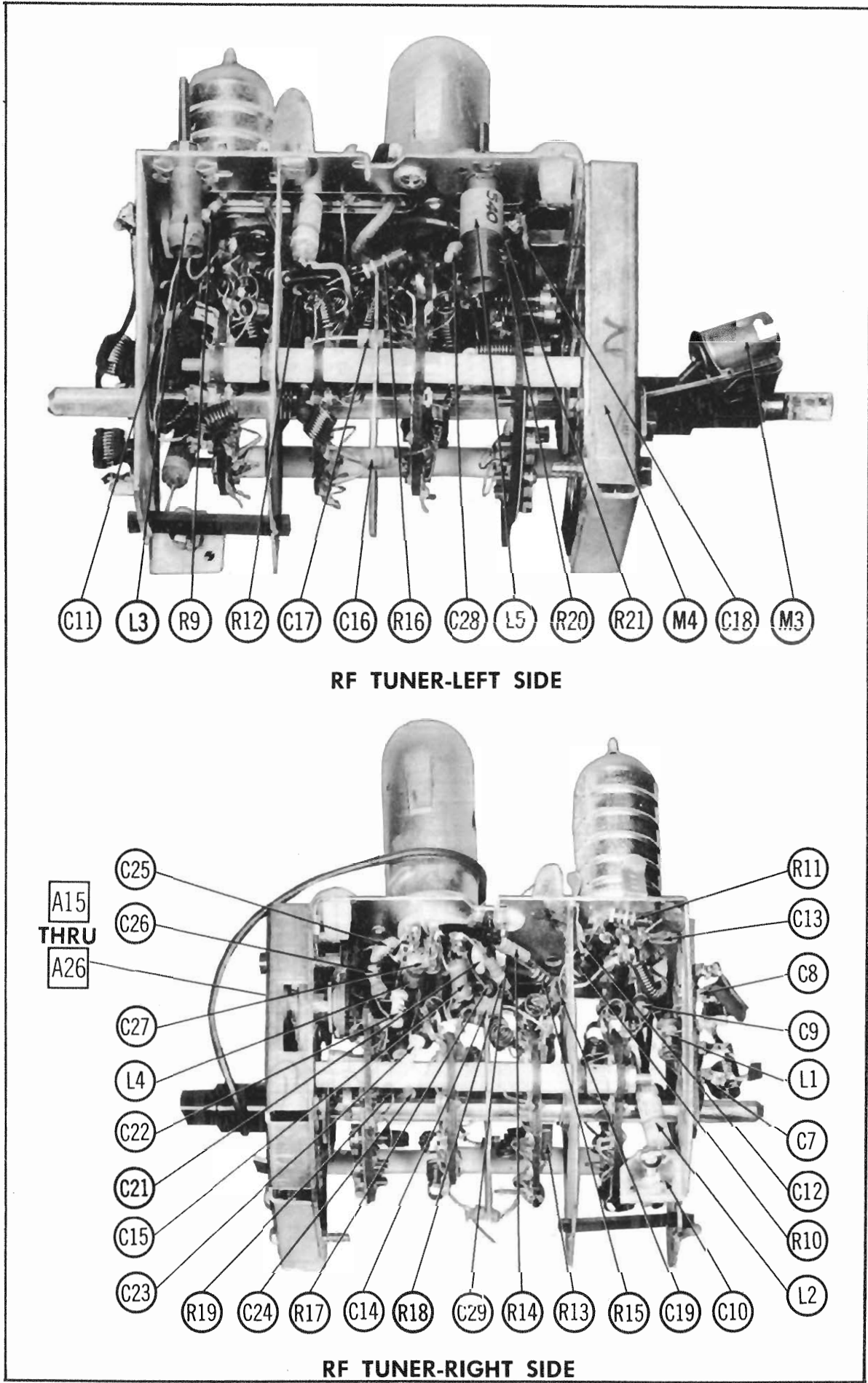
Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube. Rotate the two rings around the neck of the tube until the picture is properly centered.

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of G943R

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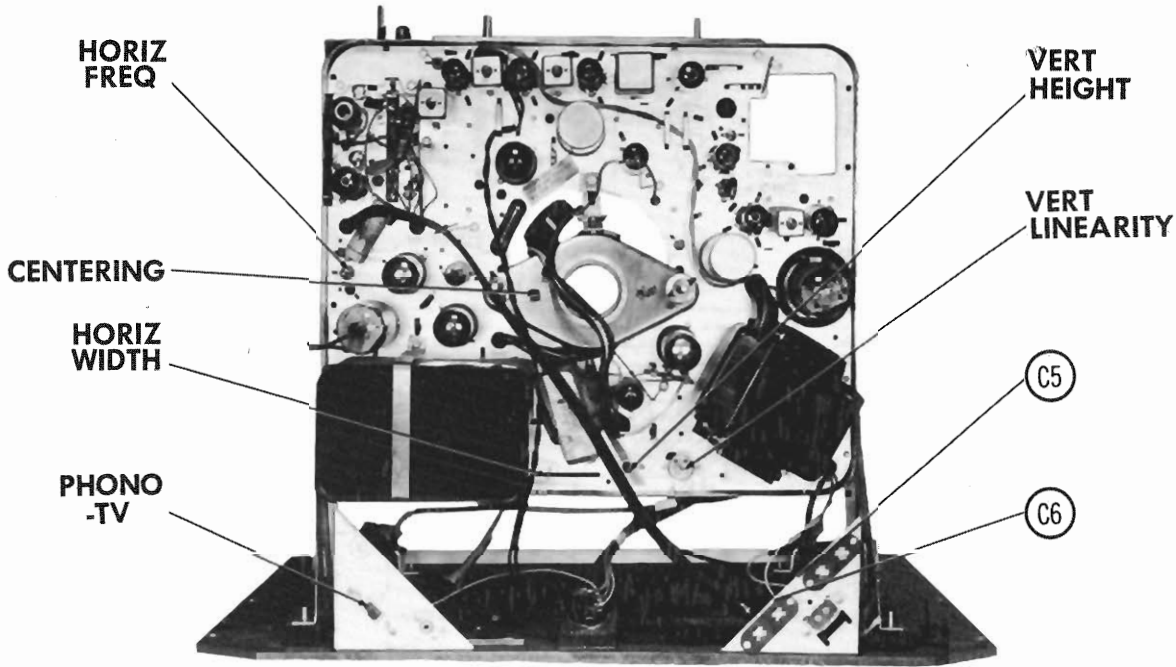
SPARTAN CHASSIS CMUA/CTA487DC, ED, CMUA/CTA490DC, CMUA/CTA491DC, CMUA/CTA499DC, ED, CMUA/CTA501DC, CMUE/CTE493DC, CMUD/CTD495DC (117 Series)



RF TUNER-LEFT SIDE

RF TUNER-RIGHT SIDE

FOLDER 4



CHASSIS-REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably with a test pattern.

Set the horizontal hold control to the center of its range.

Turn the horizontal frequency slug (R1) slowly clockwise while switching off and on channel until the picture loses sync.

Turn B1 slowly counter clockwise until the picture regains sync, then continue one-half turn in the same direction.

The picture should hold sync at both extreme settings of the horizontal hold control.

If necessary, readjust SLIGHTLY and test for sync pull-in as above.

Adjust the width slug (R2) for a picture SLIGHTLY wider than necessary to fill the picture mask horizontally.

TRADE NAME	Sp
MANUFACTURER	Sp
TYPE SET	Te
TUBES	Tv
POWER SUPPLY	110
TUNING RANGE	Ch

TUNER OSCILLATOR

Touch-up adjustment removing the channel in the fine tuning at the center of the range. Adjust for best picture.

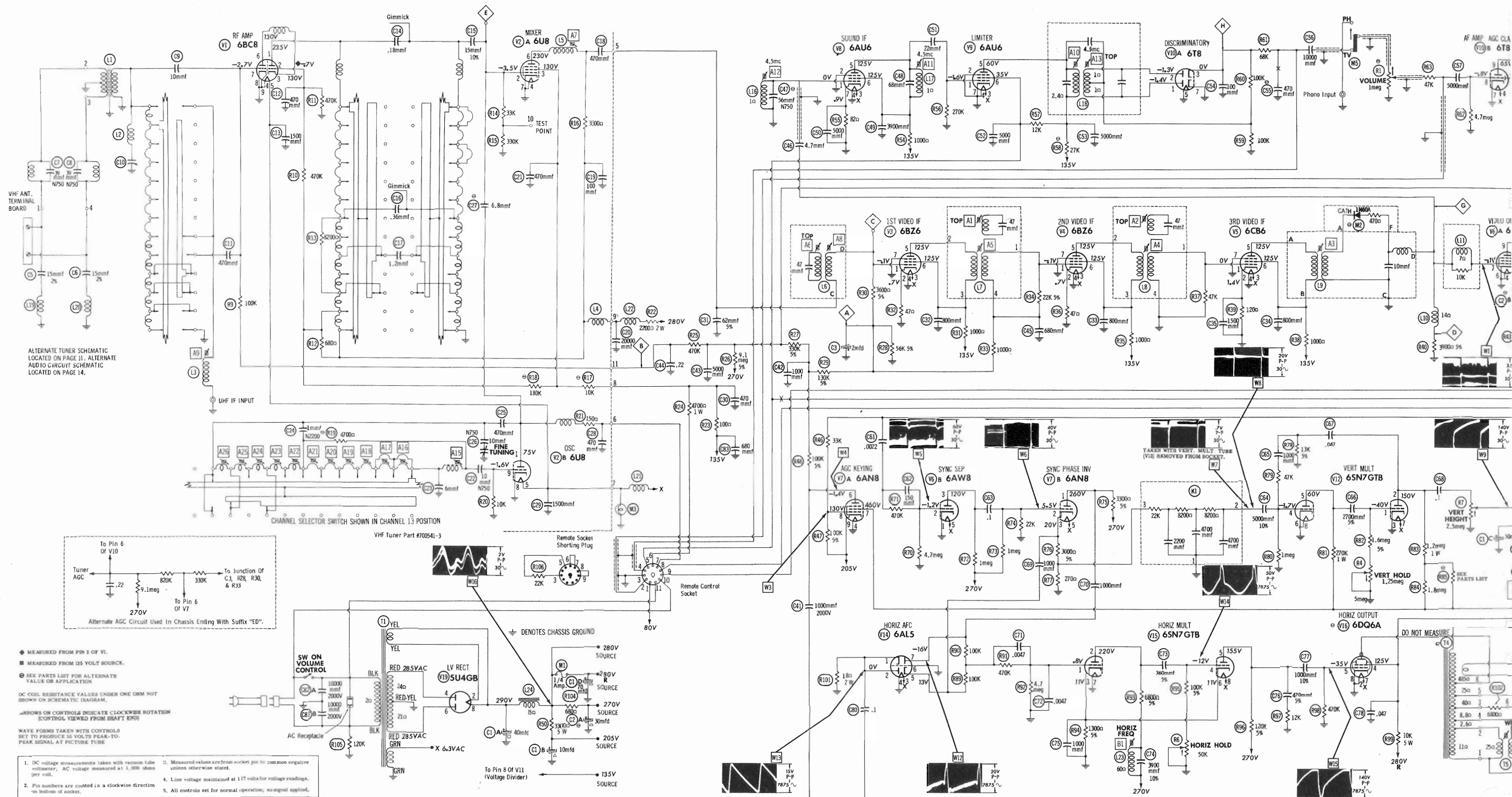
FOCUS

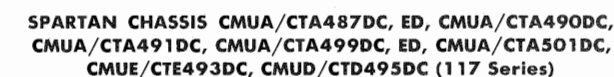
Adjust the ion trap for maximum brightness.

HORIZONTAL OSCILLATOR

For adjustment of the ion trap to remove the red line. Set the horizontal hold control for the horizontal frequency.

The listing of any available parts in this manual is not a guarantee of availability. The listing of parts is for information only and suitability of such parts for use in this set has been determined by Howard W. Sams & Co. G943R

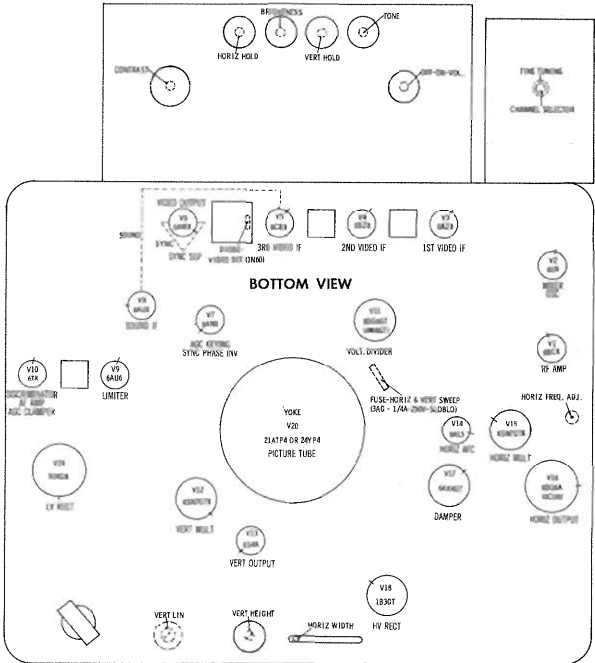




RESISTANCE MEASUREMENTS

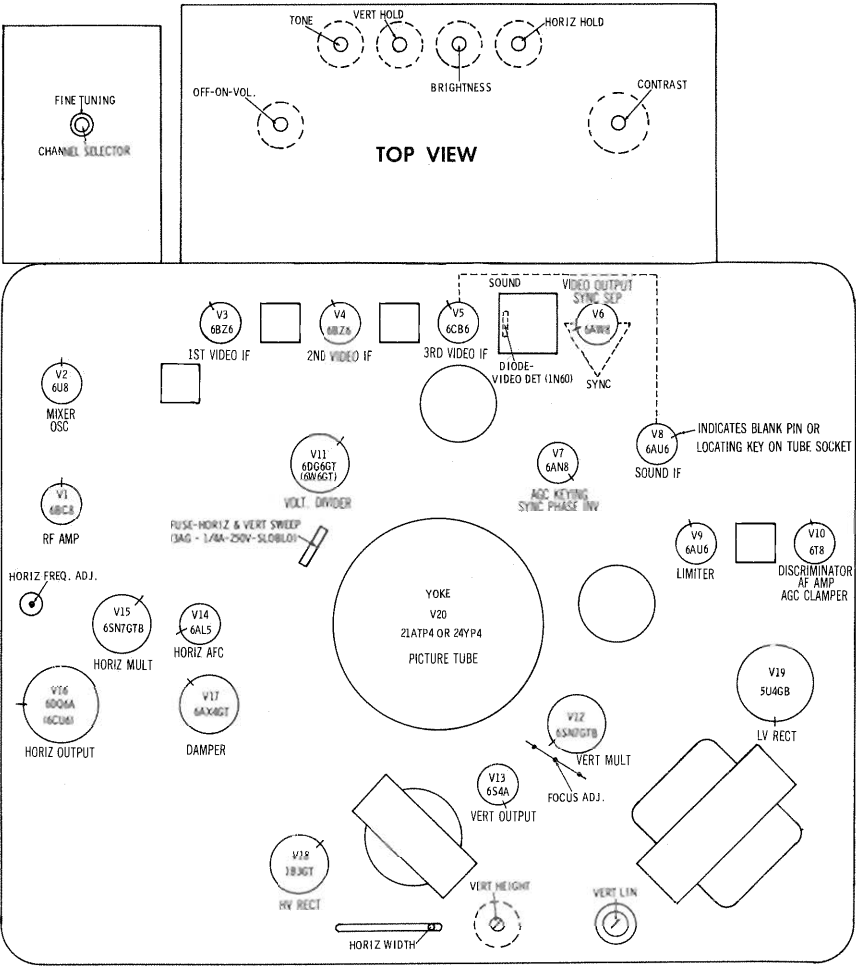
ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6BC8	† 2200Ω	230K	INF	0Ω	.1Ω	INF	1Meg	0Ω	0Ω
V2	6U8	■ 4800Ω	360K	■ 10K	0Ω	.1Ω	† 6500Ω	0Ω	0Ω	10K
V3	6BZ6	60K	47Ω	.1Ω	0Ω	■ 1000Ω	■ 1000Ω	0Ω		
V4	6BZ6	57K	47Ω	.1Ω	0Ω	■ 1000Ω	■ 1000Ω	0Ω		
V5	6CB6	.1Ω	120Ω	.1Ω	0Ω	■ 1000Ω	■ 1000Ω	0Ω		
V6	6AW8	0Ω	4.7Meg	† 1Meg	0Ω	.1Ω	0Ω	3900Ω	† 12K	† 7500Ω
V7	6AN8	† 3800Ω	22K	3300Ω	0Ω	.1Ω	280K	† 1500Ω	† 35K	† 3300Ω
V8	6AU6	1Ω	0Ω	.1Ω	0Ω	■ 1000Ω	■ 1000Ω	82Ω		
V9	6AU6	270K	0Ω	.1Ω	0Ω	■ 27K	■ 39K	0Ω		
V10	6T8	100K	100K	200K	.1Ω	0Ω	460K	0Ω	4.7Meg	† 470K
V11	6DG6GT	NC	.1Ω	† 35Ω	† 35Ω	1Meg	TP	0Ω	¶	
V12	6SN7GTB	• 1.8Meg	† 1.7Meg	0Ω	1Meg	† 270K	0Ω	.1Ω	0Ω	
V13	6S4A	NC	• 2100Ω	• 1.1Meg	0Ω	.1Ω	• 1.1Meg	NC	NC	† 2800Ω
V14	6AL5	18Ω	18Ω	.1Ω	0Ω	5.3Meg	0Ω	5.3Meg		
V15	6SN7GTB	4.7Meg	† 7800Ω	1300Ω	• 110K	† 120K	1300Ω	0Ω	.1Ω	
V16	6DQ6A	TP	0Ω	TP	† 10K	470K	TP	.1Ω	0Ω	TOP CAP † 23Ω
V17	6AX4GT	NC	NC	¶	NC	† 35Ω	NC	.1Ω	0Ω	
V18	1B3GT		PINS 1 THRU 8		HAVE	INFINITE	RESISTANCE			TOP CAP † 510Ω
V19	5U4GB	NC	¶	NC	24Ω	TP	21Ω	NC	¶	
V20	21ALP4A B	0Ω	0Ω	Pin 6 † 1500Ω	Pin 10 † 270K	Pin 11 260K	Pin 12 .1Ω			

TP TIE POINT
NC NO CONNECTION.
† MEASURED FROM PIN 8 OF V19.
• THIS READING WILL VARY CONTROL SET FOR NORMAL OPERATION.
■ MEASURED FROM 135V SOURCE.
† MEASURED FROM PIN 3 OF V17.
¶ THIS READING CAN VARY GREATLY, (10K MINIMUM), DUE TO THE CONDITION OF THE ELECTROLYTIC CAPACITOR CONNECTED IN THE ASSOCIATED CIRCUIT.



TUBE PLACEMENT CHART

TUBE PLACEMENT CHART

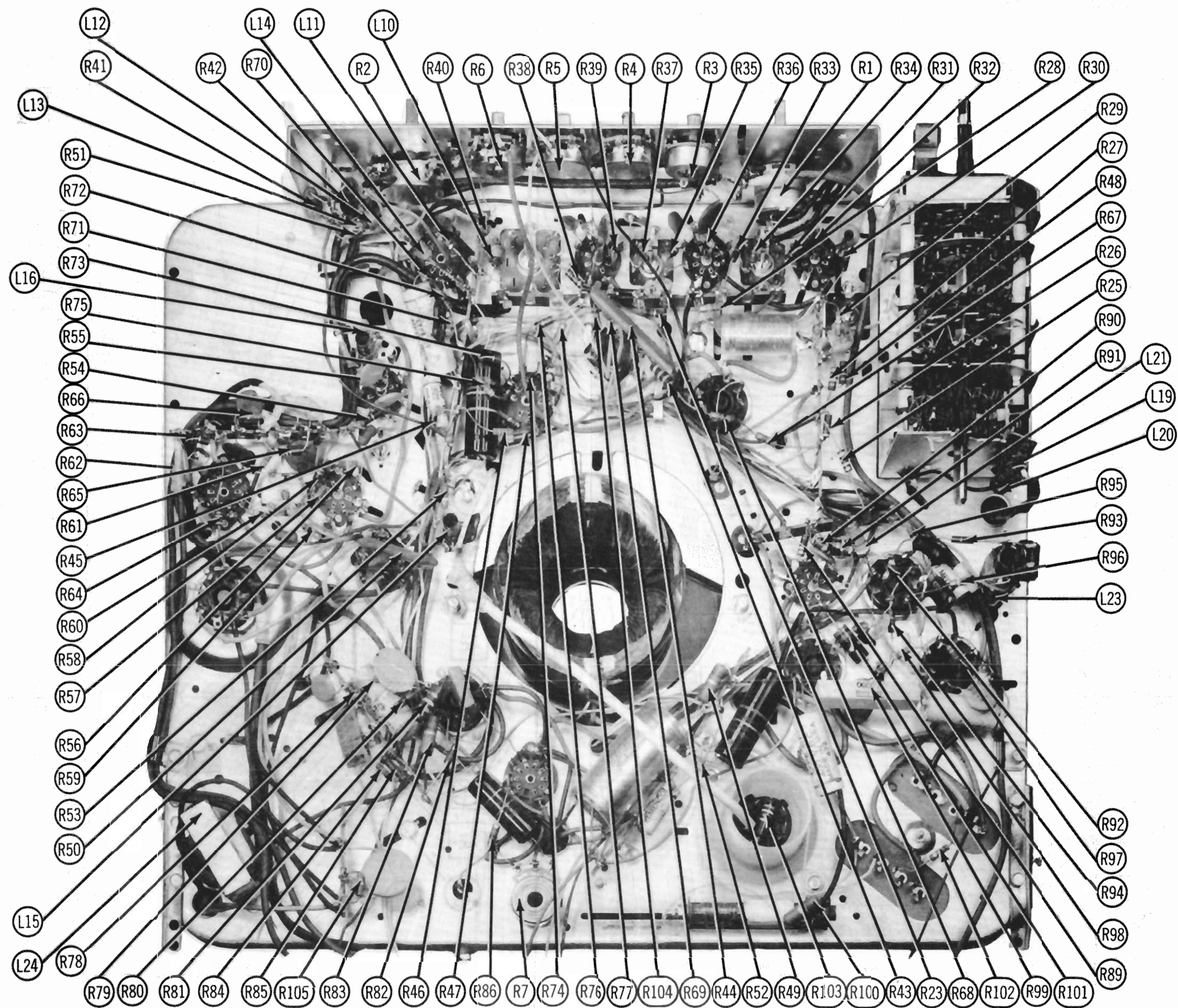


TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

- POWER SUPPLY FAILURE**
No raster, no sound - V19
- LOSS OF PICTURE OR SOUND**
No pic, no sound, has raster - V3, V4, V5, Diode (M2), V11
No pic, no sound, has snow - V1, V2, V3, V11
No pic, has sound, has raster - V6, V20
Has pic, no sound - V8, V9, V10, V11
Overloaded picture - V7
- SYNC FAILURE**
No vert. sync - V6, V7
No horiz. sync - V6, V7, V14
No vert. or horiz. sync - V6, V7
- SWEEP FAILURE**
No raster, has sound - Fuse (M1), V14, V15, V16, V17, V18, V20
No vertical deflection - V12, V13
Poor vert. linearity or foldover - V12, V13
Poor horiz. linearity or foldover - V15, V16, V17
Narrow picture - V15, V16, V17, V19
Vert. off freq. - V12
Horiz. off freq. - V15

SPARTAN CHASSIS CMUA/CTA487DC, ED, CMUA/CTA490DC,
CMUA/CTA491DC, CMUA/CTA499DC, ED, CMUA/CTA501DC,
CMUE/CTE493DC, CMUD/CTD495DC (117 Series)



CHASSIS BOTTOM VIEW-RESISTOR AND INDUCTOR IDENTIFICATION

SPARTAN CHASSIS CMUA/CTA487DC, ED, CMUA/CTA490DC,
CMUA/CTA491DC, CMUA/CTA499DC, ED, CMUA/CTA501DC,
CMUE/CTE493DC, CMUD/CTD495DC (117 Series)

FOLDER 4

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The High Voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.

VIDEO IF ALIGNMENT

Connect the negative lead of a 3 volt bias supply to point \diamond . Positive to chassis.
Connect the negative lead of a 1.5 volt bias supply to point \diamond . Positive to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Use only enough sweep generator output to provide a usable pattern on scope.

DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1. 1000MMF	High side to point \diamond . Low side to chassis.	43.0MC (10MC Swp)	47.25MC	Any non-interfering channel	Vert. Amp. thru 10K to point \diamond . Low side to chassis.	A1, A2	Adjust sweep so that 47.25MC trap is visible. Adjust A1 and A2 to place marker in trap notch as in Fig. 1. This may be done with slugs at two different positions. Use position with slugs farthest out of coil forms.
2. "	"	"	42.25MC 45.0MC 45.75MC	"	"	A3, A4, A5	Adjust for response similar to Fig. 2. Adjust A3 for maximum gain, A4 to place 45.75MC marker at 50% on curve and A5 to place 42.25MC at 50% on opposite side of curve. Recheck 47.25MC traps.
3. "	High side to point \diamond . Low side to chassis.	"	41.25MC	"	"	A6	Adjust sweep so that 41.25MC trap notch is visible. Adjust A6 to place marker in trap notch as in Fig. 3. This may be done with slug in two positions. Use the one with slug farthest from coil.
4. "	"	"	41.25MC 42.25MC 45.0MC 45.75MC 47.25MC	"	"	A7, A8	Adjust A7 for maximum gain with 45.75MC marker at 50% as in Fig. 2. Adjust A8 for maximum gain and proper tilt. It may be necessary to repeat these two adjustments. Recheck step 3.
5. 1000 Ω Carbon Resistors	High side to point \diamond . Low side to chassis.	"	"	UHF	"	A9	Adjust for response similar to Fig. 2 with MINIMUM tilt.

SOUND IF ALIGNMENT

DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
6. .005MFD	High side to point \diamond . Low side to chassis.	4.5MC (Unmod)	Any non-interfering channel	DC probe to point \diamond . Low side to chassis.	A10, A11, A12	Adjust for maximum deflection. Use only enough sweep generator output to provide a usable indication on VTVM.
7. "	"	"	"	"	A13	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

4.5MC TRAP ALIGNMENT

Tune in a TV station and tune the fine tuning slowly clockwise until 4.5MC beat interference becomes visible in the pattern. Adjust A14 until the horizontal scanning lines are smooth and continuous.

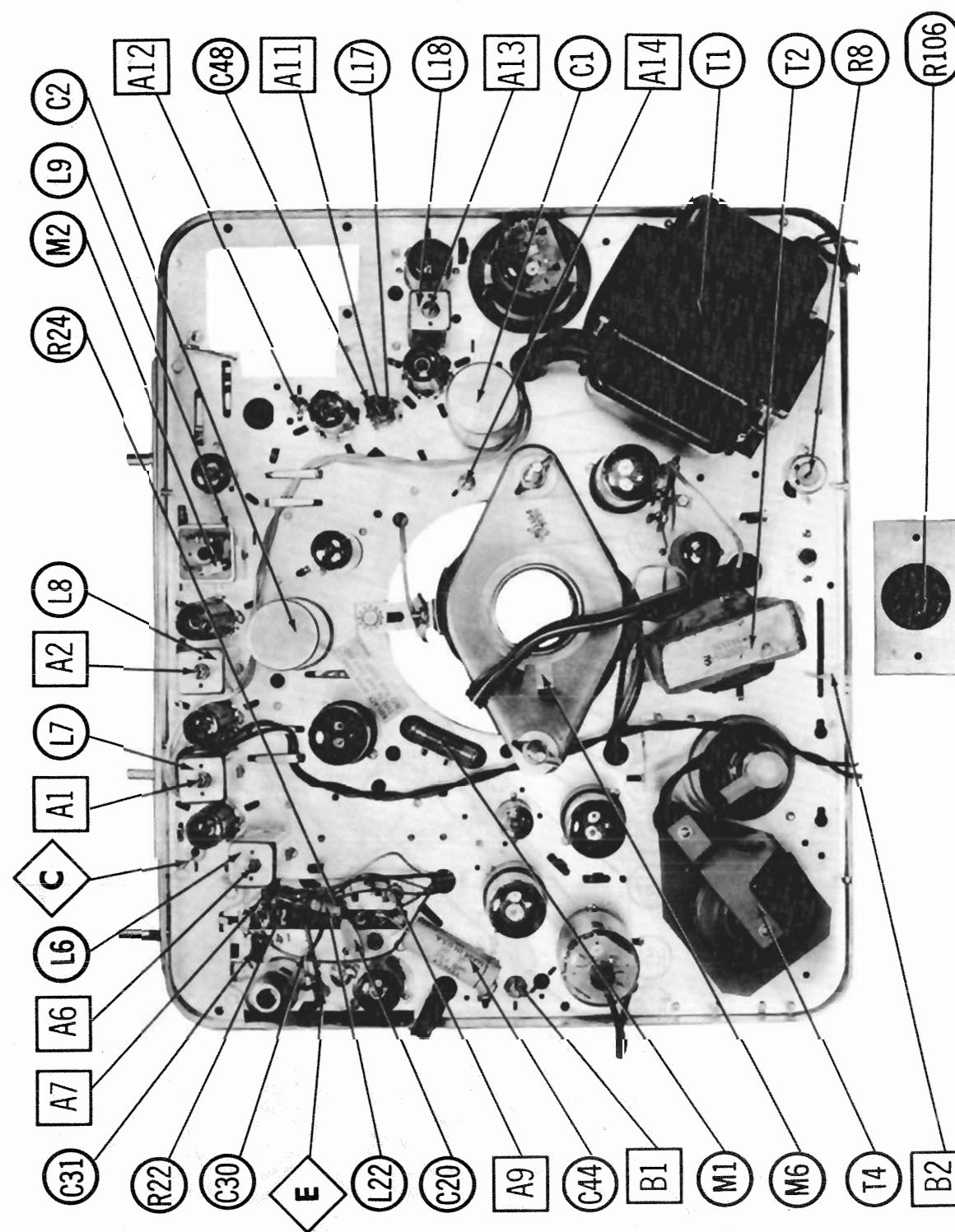
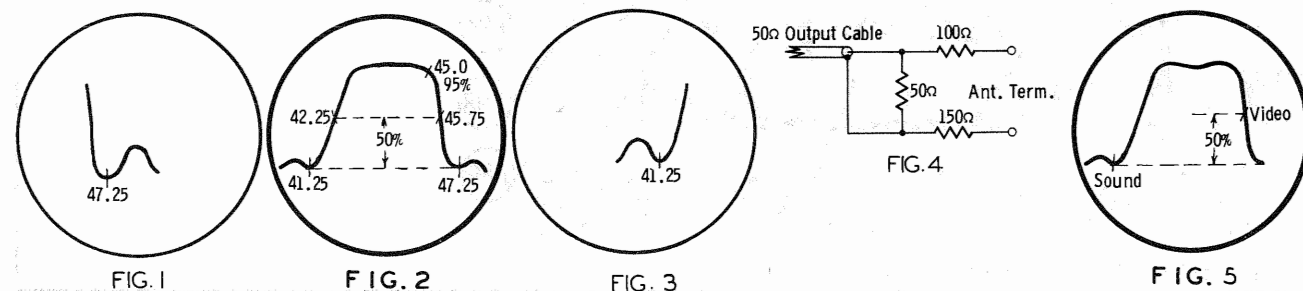
VHF OSCILLATOR ALIGNMENT

Connect bias as under "Video IF Alignment".
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Set the fine tuning control to the center of its range.
Use only enough sweep generator output to provide a usable pattern on scope.

DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8. Fig. 4	Across VHF antenna terminals thru matching network (Fig. 4).	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 47K to point \diamond . Low side to chassis.	A15	Adjust to place sound marker in trap notch as in Fig. 5. Video marker should fall at 50%.
		207MC (10MC Swp)	205.25MC 209.75MC	12		A16	
		201MC (10MC Swp)	199.25MC 203.75MC	11		A17	
		195MC (10MC Swp)	193.25MC 197.75MC	10		A18	
		189MC (10MC Swp)	187.25MC 191.75MC	9		A19	
		183MC (10MC Swp)	181.25MC 185.75MC	8		A20	
		177MC (10MC Swp)	175.25MC 179.75MC	7		A21	
		171MC (10MC Swp)	169.25MC 173.75MC	6		A22	
		165MC (10MC Swp)	163.25MC 167.75MC	5		A23	
		159MC (10MC Swp)	157.25MC 161.75MC	4		A24	
		153MC (10MC Swp)	151.25MC 155.75MC	3		A25	
		147MC (10MC Swp)	145.25MC 149.75MC	2		A26	

UHF TUNER AND VHF RF AND MIXER ALIGNMENT

This portion of the receiver has been properly aligned at the factory and is very stable. Alignment of this portion should not be required in the field.



SPARTAN CHASSIS CMUA/CTA487DC, ED, CMUA/CTA490DC,
CMUA/CTA491DC, CMUA/CTA499DC, ED, CMUA/CTA501DC,
CMUE/CTE493DC, CMUD/CTD495DC (117 Series)

CHASSIS TOP VIEW

FOLDER 4

PARTS LIST AND DESCRIPTIONS (Continued)
COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	SPARTAN PART No.	REPLACEMENT DATA
K1	Vertical Integrator	2200MMF, 4700MMF, 4700MMF 22K, 8200Ω, 8200Ω	250186-1	Sprague Centralab V-1 PC-100

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			SPARTAN PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG	1/ 4A 125V S/ B	180157-30		313, 250 (3AG 1/ 4A S/B	357001	MDL 1/ 4	4405

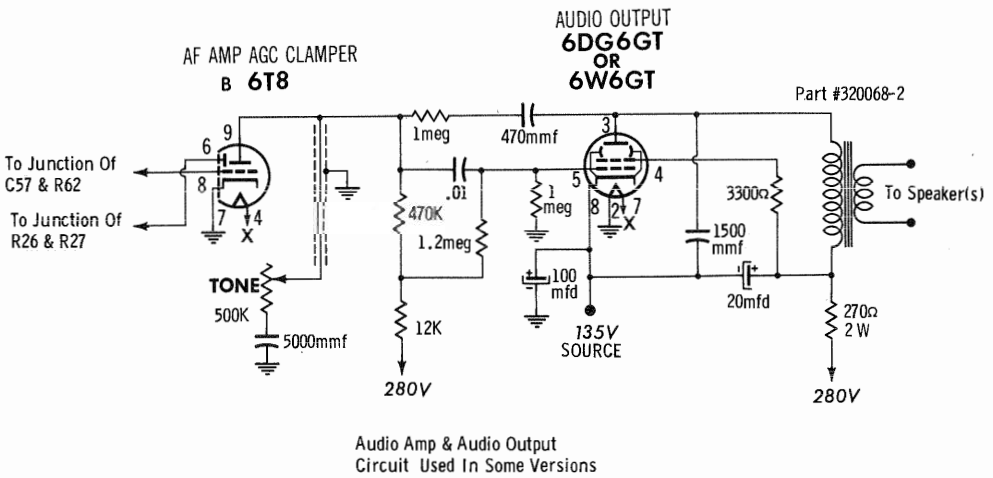
CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		SPARTAN PART No.	CBS PART No.	SYLVANIA PART No.	
M2	1N60 *	1N60	1N60	1N60	Video Det. (Pigtail)

* A 1N64 may be used in some versions.

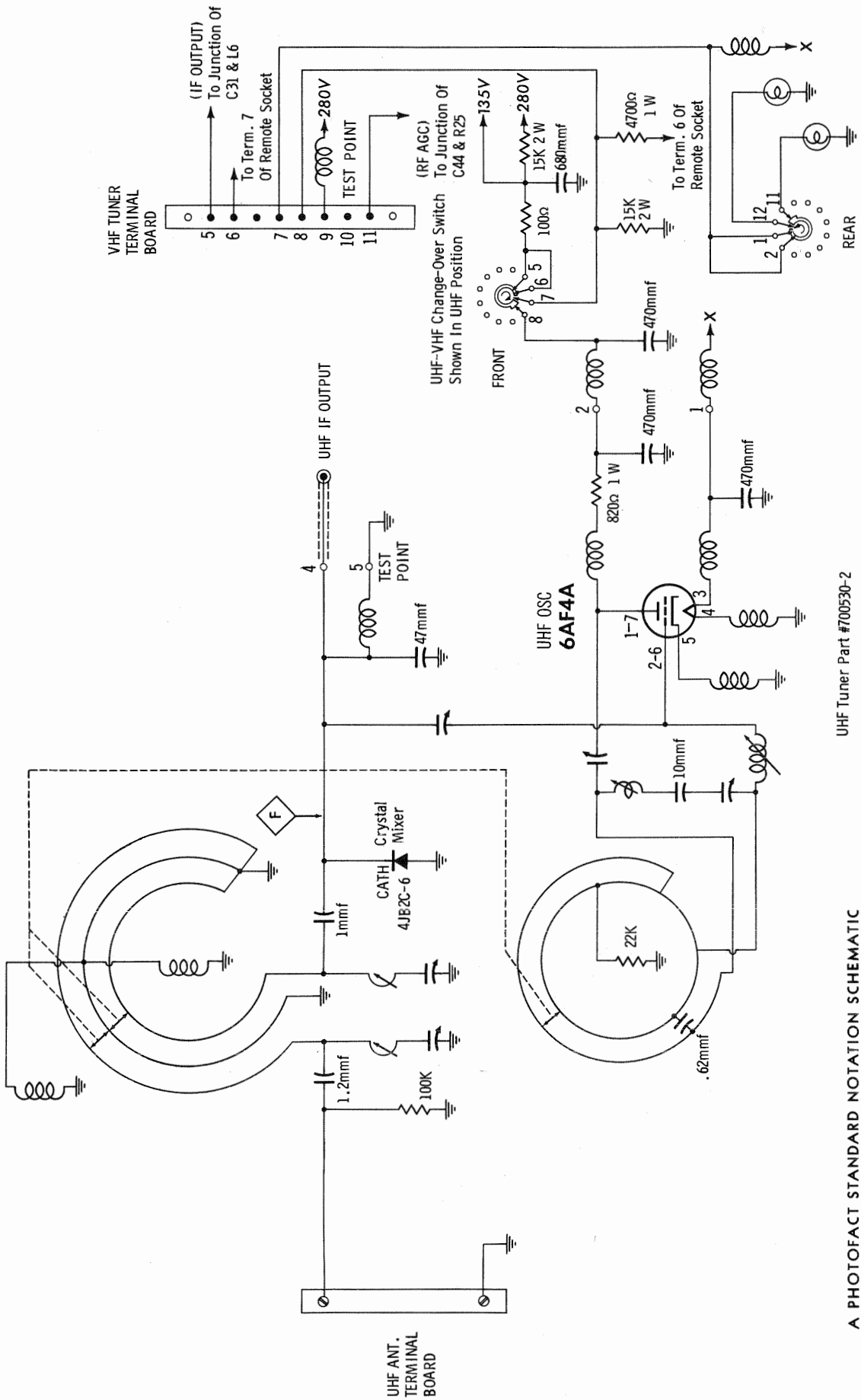
MISCELLANEOUS

ITEM No.	PART NAME	SPARTAN PART No.	NOTES
M3	Pilot Light	700541-3	VHF
M4	Tuner	700530-2	UHF
M5	Switch	160232-1	Phono-TV Slide Type (DPDT) Ch. CTD/CMUD 495DC
M6	Switch	160229-1	Phono-TV Slide Type (DPDT) Ch. CTA/CMUA 501DC
M7	Centering Device	635116-1	
M7	Ion Trap	360492-7 360492-5	Chassis CTA/CMUA491DC, CTD/CMUD495DC Chassis CTA/CMUA487DC, ED, 490DC, 499DC, ED, 501DC, CTE/CMUE493DC



A PHOTOFACT STANDARD NOTATION SCHEMATIC
Howard W. Sams & Co., Inc. 1957

ALTERNATE AUDIO CIRCUIT



A PHOTOFACT STANDARD NOTATION SCHEMATIC
Howard W. Sams & Co., Inc. 1957

ALTERNATE TUNER SCHEMATIC

SPARTAN CHASSIS CMUA/CTA487DC, ED, CMUA/CTA490DC,
CMUA/CTA491DC, CMUA/CTA499DC, ED, CMUA/CTA501DC,
CMUE/CTE493DC, CMUD/CTD495DC (117 Series)

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES	ITEM No.	USE	TYPE	NOTES
V1	RF Amplifier	6BC6		V10	Discriminator-AF Amp.	6T8	
V2	Mixer-Osc.	6U8		V11	AGC Clamper	6DG6GT	Note 1
V3	1st. Video IF Amp.	6BZ6		V12	Voltage Divider	6SN7GTB	
V4	2nd. Video IF Amp.	6BZ6		V13	Vert. Mult.	6SA4	
V5	3rd. Video IF Amp.	6C6B		V14	Horiz. AFC	6AL5	
V6	Video Output - Sync Sep.	6AW8		V15	Horiz. Mult.	6SN7GTB	
V7	AGC Keying-Sync Phase Inverter	6AN8		V16	Horiz. Output	6DQ6A	Note 2
V8	Sound IF Amp.	6AU6		V17	Damper	6AX4GT	
V9	Limiter	6AU6		V18	HV Rectifier	1B3GT	
				V19	LV Rectifier	5U4GB	

Note 1. Some versions may use a 6W8GT in this application.
Note 2. Some versions may use a 6CU6 or 6DQ6 in this application.

PICTURE TUBE

ITEM No.	REPLACEMENT DATA	NOTES
SPARTAN PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.
V20	21ATP4	21ATP4A/21ATP4①
	24YP4	24YP4 ①
		24YP4 ②

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	SPARTAN PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	■40	350	270021-52	RE1008	DO450	FP385.5 TC39	TMQ-60	Q-012	TVL-4631
B	▲10	350			BR4035		TD-40-350	MT-4510	
C	50	350							
D	70	350							
C2A	■30	350	270021-57 Note 1	AFH4-56-93.4	CO860	FP420.33		T-735	TVL-4634.7
B	45	350			BRI045			MT-4504	
C	100	200							
D	100	200							
C3	2	50	270027-22	SRE50V2	BBR2-50	TC302	TD-2-50	MT-0502	TVA-1301
C4	10	350	270027-26 †	PRS350VNP	BR2045	TC35		MT-4520	R2327 * †
				10 †	BR2045	TC65		MT-4520	

Note 1. Chassis ending in suffix "ED" use a 30-20-5MFD @ 350V and 100MFD @ 200V (part #270021-64) in this application.
Note 2. Not used in chassis ending with suffix "ED".
† Non-polarized unit.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		SPARTAN PART No.	AEROVOX PART No.	CENTRALAB PART No.	REPLACEMENT DATA		NOTES
	CAP.	VOLT				CORNELL-DUBILIER PART No.	ERIE PART No.	
C5	15		250207-84		TCZ-15			2%
C6	15		250207-84		TCZ-15			2%
C7	39		250175-20	N750-SI 39	TCN-39	C10Q39U	TC7-39	N750
C8	39		250175-20	N750-SI 39	TCN-39	C10Q39U	TC7-39	N750
C9	10		250221-127	SI 10	D6-100	L76Q1	GP-10	
C10			250188-6				UC-441	5GA-Q1
C11	470		250175-8	BPD-00047	DD-471	BYA10T47	ED-470	5GA-T47
C12	470		250175-8	BPD-00047	DD-471	BYA10T47	ED-470	5GA-T47
C13	1500		250175-10	BPD-0015	DD-152	BYA10D15	ED-1500	5HK-D15
C14	.18		250216-4				DC5215	
C15	.15		250207-5	NPO-SI 15	TCZ-15	C10Q15C	TCO-15	5TCC-Q15
C16	.36		250216-5					
C17	1.2		250221-115	NPO-SI 1.0	TCZ-1	CTA6V15C	TCO-1	
C18	470		250175-24	BPD-00047	DD-471	BYA10T47	ED-470	5GA-T47
C19	100		250175-24	BPD-0001	DD-101	L10T1	ED-100	5GA-T1
C20	20000		250175-34	BPD-02	DD-203	BYB6S2	ED-02	5HK-S2
C21	470		250175-8	BPD-00047	DD-471	BYA10T47	ED-470	5GA-T47
C22	10		250088-136	N750-SI 10	TCN-10	CTA6QU	TC7-10	5TCU-Q1
C23	6		250088-143				NT-541	N750
C24	1		250088-144					N330
C25	470		250175-8	BPD-00047	DD-471	BYA10T47	ED-470	N2200
C26	10		250088-136	N750-SI 10	TCN-10	CTA6QU	TC7-10	
C27	6.8		250221-125	NPO-SI 6.8	TCZ-68B	CTA6V68C	TCO-6.8	5TCCB-V68
C28	470		250175-8	BPD-00047	DD-471	BYA10T47	ED-470	5GA-T47
C29	1500		250175-10	BPD-0015	DD-152	BYA10D15	ED-1500	5HK-D15
C30	470		250175-8	BPD-00047	DD-471	BYA10T47	ED-470	5GA-T47
C31	62		250226-325	1469-000062	TCZ-62	22R5Q62	TCO-62	5GA-T47
C32	800		250218-14	BPD-0008	DD-801	L10T8	ED-0008	5%
C33	800		250218-14	BPD-0008	DD-801	L10T8	ED-0008	
C34	800		250218-14	BPD-0008	DD-801	L10T8	ED-0008	
C35	1500		250218-18	BPD-0015	DD-152	BYA10D15	ED-0015	
C36	47		250226-422	NPO-SI 47	TCZ-47	C10Q47C	TCO-47	
C37	.22	400	P488N-22		CUB6P22			
C38	10000		250175-2	BPD-01	DD-103	BYA6S1	ED-01	GEM-4022
C39	100		250229-530	1468-0001	DD-101	22R5T1	ED-100	DC511
C40	.0033	600	250101-4	CI 3300	D6-3300	CUB6D33	GP-3300	MC-235
C41	1000	2000	250175-27	HVD-30-1000	DD30-102		HD3-1000	1FM-S1
C42	1000		250175-26	BPD-001	DD-102	BYA6D1	ED-001	6TM-D33
C43	5000		250175-30	BPD-005	DD-502	BYA6D5	ED-005	20HKB-D1
C44	.22	200	250201-15	P288N-22		CUB6P22		5HK-D1
C45	680		250218-4	BPD-00068	DD-681	BYA10T68	ED-680	5HK-D5
C46	4.7		250221-123	NPO-SI 4.7	TCZ-47C	C10V47C	TCO-4.7	2TM-P22
C47	56		250218-23	N750-SI 56	TCN-56	C10Q56U	TC7-56	5GA-T68
C48	68		250218-7	BPD-00068	DD-680	L10Q68	ED-68	5TCCB-V47
C49	3900		250175-31	BPD-004	DD-402	L10D39	ED-004	
C50	5000		250175-1	BPD-005	DD-502	BYA10D5	ED-005	5GA-Q68
C51	22		250207-42	SI 22	D6-220	L76Q22	GP-22	5GA-D39
C52	5000		250175-1	BPD-005	DD-502	BYA10D5	ED-005	5HK-D5
C53	5000		250175-1	BPD-005	DD-502	BYA10D5	ED-005	5HK-S1
C54	100		250207-46	SI 100	D6-101	L76T1	GP-100	5HK-D5
C55	470		250218-15	BPD-00047	DD-471	BYA10T47	ED-470	5GA-T1
C56	10000		250175-2	BPD-01	DD-103	BYA6S1	ED-01	5GA-T47
C57	5000		250175-1	BPD-005	DD-502	BYA10D5	ED-005	5HK-S1
C58	5000		250175-30	BPD-005	DD-502	BYA10D5	ED-005	5HK-D5
C59	10000		250175-2	BPD-01	DD-103	BYA6S1	ED-01	5HK-D5
C60	2000		250218-16	BPD-002	DD-202	BYA10D2	ED-002	5HK-T1
C61	.0022	400	250218-3	SI 2200	D6-222	CUB6V22	GP-2200	5HK-D2
C62	150		250229-534	BPD-00015	DD-151	W5W15	ED-150	6TM-4D22
C63	.1	400	250218-13	P488N-1	DF-104	CUB4P1		1FM-S15
C64	5000		250218-13	1464-005	IDR5D5		GEM-401	4TM-P1
C65	1000		250218-8	BPD-001	DD-102	BYA6D1	ED-001	DC521

PARTS LIST AND DESCRIPTIONS

CAPACITORS (cont)

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	SPARTAN PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C66	2700		250160-1048	1464-0027		IR5D27			MS-227	5%
C67	.047	400	250212-7	BPD-05	DF-503	CUB4S47			4TM-S47	
C68	.1	400	250211-3	P488N-1	DF-104	CUB4P1			GEM-4147	4TM-P1
C69	1000		250216-8	BPD-001	DD-102	BYA6D1	ED-001	DC521	5HK-D1	
C70	1000		250218-8	BPD-001	DD-102	BYA6D1	ED-001	LC521	5HK-D1	
C71	.0047	400	250212-4	SI 4700	DE-472	CUB6D47	GP-4700	GEM-6247	6TM-D47	
C72	.0047	200	250212-5	SI 4700	DE-472	CUB6D47	GP-4700	GEM-6247	6TM-D47	
C73	380		250229-343	1469-00036		5R5T36			MS-336	5%
C74	3900		250229-468	1464-0039		1R5D39			MS-239	10%
C75	1000		250218-8	BPD-001	DD-102	BYA6D1	ED-001	DC521	5HK-D1	
C76	470		250229-346	1464-00047		5R5T47			MS-347	5%
C77	1000		250218-8			1R5D1	GP-1000	MCB251		10%
C78	.047	400	250211-11	BPD-05	DF-05	CUB4S47			GEM-4147	4TM-S47
C79	.047	400	250211-11	BPD-05	DF-503	CUB4S47			GEM-4147	4TM-S47
C80	.1	600	250201-13	P688N-1	DD-104	CUB6P1			GEM-601	6TM-P1
C81	68	4000	250175-23							
C82A	10000	2000	250219-3	P2084CM-01					20HKD-S1	
B	10000	2000		P2084CM-01					20HKD-S1	
C83	680		250218-4	BPD-00056	DD-681	BYA10T68	ED-680	UC-5368	5GA-T68	10% Note 5

Note 1. Chassis with tuners 700541-2 and 700541-4 use a 6MMF N330 capacitor in this application.
Note 2. Chassis ending with suffix "ED" use a 68MMF (Part #250218-7) in this application.
Note 3. Not used in Ch. CTA/CMUA487, 491, 499, 501. Ch. CTA/CMUA490 use a 100MMF (Part #250207-46) in this application.
Note 4. Ch. CTA/CMUA use a 1000MMF (Part #250175-33) in this application.
Note 5. Chassis ending with suffix "ED" use a 47MMF @ 4000V (Part #250175-32) in this application.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA						INSTALLATION NOTES
	RESIST- ANCE	WATTS	SPARTAN PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.		
R1A	1Meg	½	220135-1	B-70	A47-1Meg-Z	Q13-137	U53	Volume	
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.		
C	Switch			KB-1	SWE-12	76-1	US-26		
R1A	1Meg	½	220126-46	B-70	A47-1Meg-Z	Q13-137	U53	Volume - Note 1	
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.		
C	Switch			KB-1	SWE-12	76-1	US-26		
R2	18K	1	220131-7					Contrast Tap@ 12K Tone	
R3A	500K	½	220132-4	B-60	A47-500K-Z	Q13-133	TA55A		
B	Shaft			Not Req.	FKS-1/4	Not Req.	Not Req.		
R4A	1.25Meg	½	220132-3	BX-742	A47-L5Meg-S	Q11-138	TA155L	Vert Hold	
B	Shaft			Not Req.	FKS-1/4	Not Req.	Not Req.		
R5A	200K-S	½	220132-2	BX-46	A47-200K-S	Q11-129	U43	Brightness	
B	Shaft			Not Req.	FKS-1/4	Not Req.	Not Req.		
R6A	50K	½	220132-1	BX-31	A47-50K-S	Q11-123	TA54L	Horiz. Hold	
B	Shaft			Not Req.	FKS-1/4	Not Req.	Not Req.		
R7A	2.5Meg	½	220146-2	B-83	A47-2.5Meg-S	Q11-239	TA255L	Vert Height	
B	Shaft			Not Req.	FKS-1/4	Not Req.	Not Req.		
R8A	300Ω	2	220120-3		39-3000		FL-4K	Vert Lin. -Wire Wound	

Note 1. Alternate part number used in some versions.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REPLACEMENT DATA	NOTES
OHMS	WATT	SPARTAN PART No.	IRC PART No.
R9	100K	230104-86	BTS-100K
R10	470K	230104-94	BTS-470K
R11	470K	230104-94	BTS-470K
R12	680Ω	230104-60	BTS-680
R13	8200Ω	230104-73	BTS-8200
R14	33K	230104-80	BTS-33K
R15	330K	230104-93	BTS-330K
R16	3300Ω	230104-68	BTS-3300
R17	10K	230104-74	BTS-10K
R18	180K	230104-89	BTS-180K
R19	4700Ω	230104-70	BTS-4700
R20	10K	230104-74	BTS-10K
R21	150Ω	230104-52	BTS-150
R22	2200Ω	230106-66	BTS-2200
R23	100Ω	230104-50	BTS-100
R24	4700Ω	230105-70	BTA-4700
R25	470K	230104-94	BTS-470K
R26	9.1Meg 5%	230094-254	
R27	330K 5%	230094-259	
R28	56K 5%	230094-201	BTS-56K 5%
R29	130K 5%	230094-201	BTS-130K 5%
R30	3600Ω 5%	230094-172	BTS-3600 5%
R31	1000Ω	230104-62	BTS-1000
R32	47Ω	230104-46	BTS-47
R33	1000Ω	230104-62	BTS-1000
R34	22K 5%	230094-191	BTS-22K 5%
R35	1000Ω	230104-62	BTS-1000
R36	47Ω	230104-46	BTS-47