DU MONT MODEL 247

FREQUENCY RESPONSE
Vertical Amplifier Flat, 2 cps to 100 kc
Horizontal Amplifier Flat, 1 cycle to 30 kc
Sweep Circuit ½ cycle to 50 kc

DEFLECTION FACTORS
Vertical Amplifier 0.05 rms volts/inch
Vertical-Deflection Plates 25 rms volts/inch
Horizontal Amplifier 0.5 rms volts/inch
Horizontal-Deflection Plates 21 rms volts/inch

LINE RATING 115-230 volts, 40-60 cps

TUBE COMPLEMENT

Type	*Function*
6J5 (V1)	Input Stage Cathode Follower
6SH7 (V2)	Vertical Voltage Amplifier
6J5 (V3)	Cathode-Follower Driver
6AG7 (V4, V5)	Vertical Push-Pull Deflection Amplifier
5CP1 (V6)	Cathode-Ray Tube
6SN7GT (V7, V8)	Grid Signal Input Voltage Amplifier and Polarity Changer
6SN7GT (V9, V10)	Blanking Amplifier
6AG7 (V11)	Z-Axis Amplifier
6SN7GT (V12)	Blanking Control
6SN7GT (V13, V14)	Sync Amplifier
6SL7GT (V15, V16)	Diode Control and Polarity Changer
6Q5G (V17)	Sweep Oscillator
6SN7GT (V18, V21)	Cathode Follower and Vertical Amplifier Input
6SN7GT (V19, V20)	Diode Control and Blanking Amplifier
6SN7GT (V22, V23)	External Sync and Blanking Control Amplifier (Sweep Linearity Compensation)
6SL7GT (V24, V25)	Differential Amplifier
6AG7 (V26, V27)	Push-Pull Horizontal-Deflection Amplifier
VR90/30 (V28)	Neon Tube Voltage Regulator
VR150 (V29)	Voltage Regulator
6SL7GT (V30, V31)	Regulator Control Tube
6SL7GT (V32, V33)	Regulator Control
2X2 (V34, V35)	Half-Wave Rectifiers
6X5 (V36, V37)	Negative Rectifiers
5U4G (V38)	Positive Rectifier
6V6GT (V39, V40)	Series Voltage Regulator

The schematic circuit diagram of Model 247 is shown in Fig. 22-12.

Amplifier System

There is a direct d-c path from the plates of vertical amplifiers *V1, V2,* and *V3,* to the grid of *V4* which permits, in this section of the circuit, Y-axis or vertical position control of the spot on the screen of the cathode-ray tube by means of control *R19. C12,* a 50-μf capacitor, and *C13* (2,500 $\mu\mu f$) keep the impedance of the *R19* section of the circuit at a low value.

The horizontal-deflection amplifier is similar to the vertical amplifier. The d-c horizontal positioning is controlled by *R164.* Note that the *V26* grid is connected to the *V8* plate circuit and a source of positive potential through *R163, R164,* and *R166,* so that the *V26* grid may be made more or less positive as desired for positioning.

The Beam Control Circuit

A special circuit is used to vary the beam intensity in accordance with the sweep when used on single or repetitive sweep. Through its use, the cathode-ray-tube screen is made dark when the sweep is operating. Basically, this circuit uses a d-c amplifier which is connected to the cathode of the cathode-ray tube. The amplifier is driven by a pulse obtained from the sweep circuit which permits raising the beam intensity for the duration of the sweep cycle.

When switching from recurrent to single sweep, the voltage change cuts the cathode-ray-tube electron beam off. When the single sweep is begun, the beam returns to its former intensity. This is determined by the intensity-control setting and does not change during the sweep cycle. The intensity-control setting and the operation of the beam-control circuit are entirely independent.

Gas Triode (6Q5G) Operation

In the operation of this beam-control circuit, the gas triode *V17* is so biased that a higher plate potential is required to cause current conduction than is the case during recurrent operation. The 6Q5G is stopped from reaching the breakdown potential by the electronic control action of diode *V19.* The bias on this diode determines the actual potential on the 6Q5G plate.

The action of the gas triode is such that if its grid is driven by a positive pulse the bias on it is reduced and the tube becomes conductive. For pulses of shorter time duration than the time allowed for sweep, the tube returns to its former condition and is prepared for the succeeding cycle of its operation.

Current flows through the control diode *V19,* determined by *R98* and *R99,* during the time the 6Q5G is nonconductive. Conversely, no current flows through *V19* during the period the 6Q5G gas triode is conducting and during the time the sweep capacitor is charging up to the diode conducting potential. Consequently, a current flows through the resistance in series with the diode cathode which is virtually of constant value for a given control setting, except during the sweep cycle. At that time the cathode will be at its bias potential. The developed pulse controls the potential of the cathode-ray-tube cathode, and therefore, the cathode-ray-tube bias and intensity of the electronic light beam.

By varying the diode circuit resistance in proportion as the 6Q5G plate circuit resistance changes, the voltage across the resistance in the diode electronic control circuit is made substantially constant and is independent of the actual current flow.

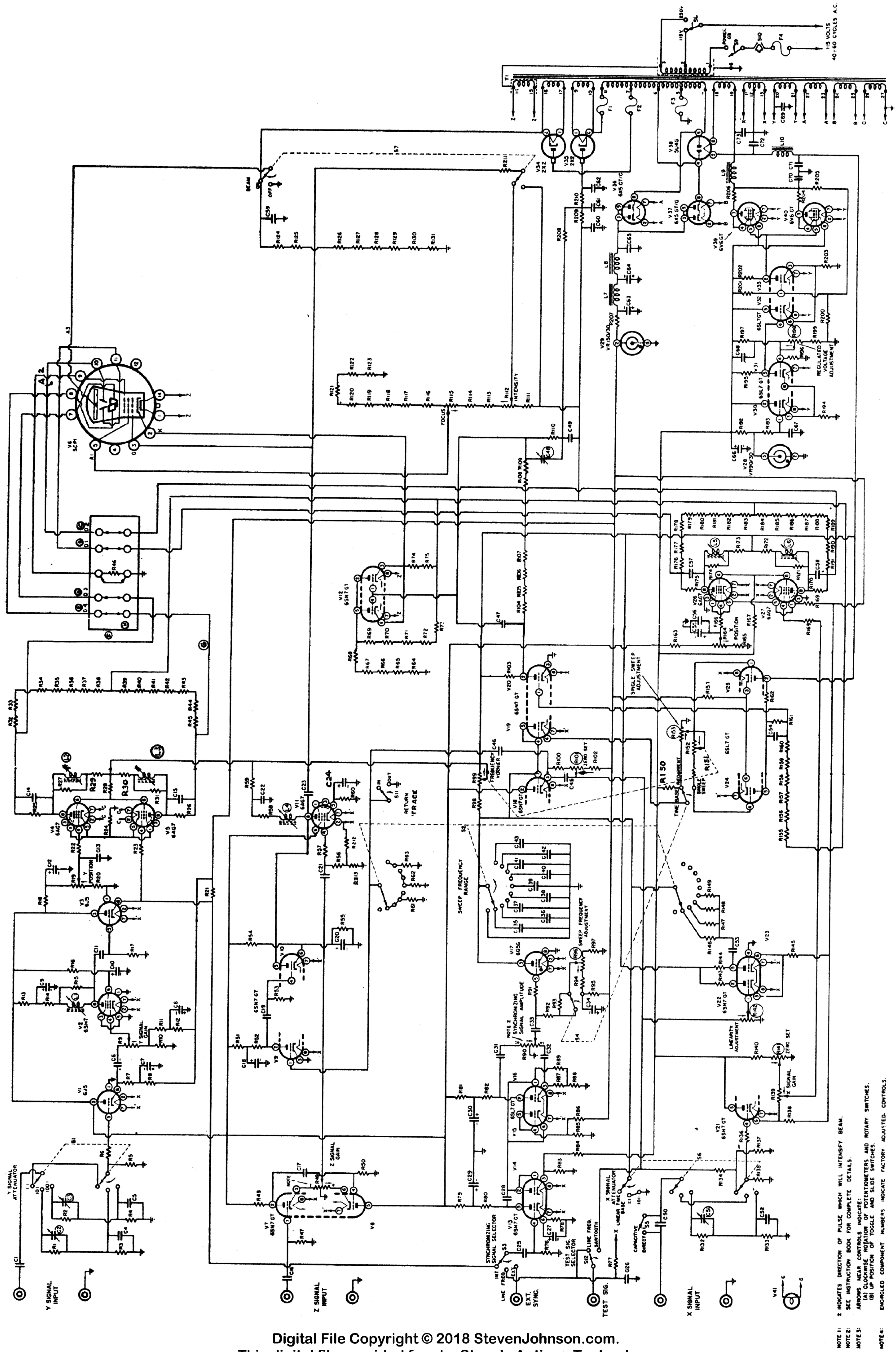
Differential Amplifier

The tube 6SL7GT (*V24* and *V25*) is used as a differential amplifier to amplify only the potential differences across the diode load resistor (*R151* and *R152*) so that the setting of the diode bias voltage (single sweep adjustment) control *R153* does not affect the d-c operating levels of the following stages.

The output of the differential amplifier, amplified and reversed in phase from the input, is attenuated to zero level with respect to ground and fed directly to the grid of the following stage (*V20* one section of type 6SN7GT). The pulse level at this point is sufficient to operate the grid of *V20* between zero bias and cutoff, so that the plate potential of *V20* varies between very wide limits, from approximately 50 to 400 volts. A wide voltage variation is required for *V20,* since the signal must be attenuated up to the high negative potential at which the cathode of the cathode-ray tube operates, while still permitting the tube to swing from zero bias to cutoff.

PARTS LIST FOR DU MONT MODEL 247

C1	0.5 μf.	600 V.
C2	3-12 μμf.	500 V.
C3	3-12 μμf.	500 V.
C4	100 μμf.	500 V.
C5	0.001 μf.	500 V.
C6	100 μι.	50 V. elec.
C7	24 μf.	350 V. elec.
C8	24 μf.	350 V. elec.
C9	16 μf.	450 V. elec.
C10	4 μf.	450 V. elec.
C11	0.5 μf.	600 V.
C12	50 μf.	25 V. elec.
C13	2200 μμf.	500 V.
C14	0.5 μf.	600 V.
C15	0.5 μf.	600 V.
C16	0.25 μf.	600 V.
C17	0.25 μf.	600 V.
C18	8 μf.	450 V. elec.
C19	0.25 μf.	600 V.
C20	100 μf.	50 V. elec.
C21	0.25 μf.	600 V.
C22	4 μf.	600 V.
C23	0.05 μf.	3000 V.
C24	100 μf.	50 V. elec.
C25	0.25 μf.	600 V.
C26	0.25 μf.	600 V.
C27	100 μf.	50 V. elec.
C28	0.05 μf.	400 V.
C29	8 μf.	450 V. elec.
C30	8 μf.	450 V. elec.
C31	0.25 μf.	600 V.
C32	0.25 μf.	600 V.
C33	0.25 μf.	600 V.
C34	50 μf.	25 V. elec.
C35	8 μf.	600 V.
C36	4 μf.	600 V.
C37	1 μf.	600 V.
C38	0.2 μf.	400 V.
C39	0.05 μf.	400 V.
C40	0.01 μf.	400 V.
C41	2200 μμf.	500 V.
C42	680 μμf.	500 V.
C43	220 μμf.	500 V.
C44	Omitted	
C45	47 μμf.	500 V.
C46	100 μμf.	500 V.
C47	47 μμf.	2500 V.
C48	60-240 μμf.	300 V.
C49	0.5 μf.	600 V.
C50	0.5 μf.	600 V.
C51	3-12 μμf.	500 V.
C52	100 μμf.	500 V.
C53	0.5 μf.	600 V.
C54	150 μμf.	500 V.
C55	50 μf.	25 V. elec.
C56	2200 μμf.	500 V.
C57	0.5 μf.	600 V.
C58	0.5 μf.	600 V.
C59	0.1 μf.	3000 V.
C60	1 μf.	2000 V.
C61	0.5 μf.	3000 V.
C62	0.5 μf.	3000 V.
C63	16 μf.	450 V. elec.
C64	16 μf.	450 V. elec.
C65	0.5 μf.	1500 V.
C66	24 μf.	350 V. elec.
C67	0.5 μf.	600 V.
C68	0.05 μf.	400 V.
C69	0.005 μf.	600 V.
C70	4 μf.	600 V.
C71	4 μf.	600 V.
C72	4 μf.	1000 V.
C73	4 μf.	1000 V.
F1	50 ma. fuse,	2500 V.
F2	50 ma. fuse,	2500 V.
F3	1 amp. fuse,	250 V.
F4	5 amp. fuse,	250 V.
L1	150-500 μh.	
L2	800-2500 μh.	
L3	800-2500 μh.	
L4	150-500 μh.	
L5	7½-19 mh.	±3%
L6	7½-19 mh.	±3%
L7	10 h. 50 ma.	} dual
L8	10 h. 50 ma.	} dual
L9	19 h. 150 ma.	
L10	19 h. 150 ma.	
R1	2 meg.	½W.±5%
R2	2 meg.	½W.±5%
R3	240 K	½W.±5%
R4	20 K	½W.±5%
R5	2.2 meg.	½W.
R6	47 ohm	½W.
R7	100 K	1W.
R8	22 K	1W.
R9	10 K pot.	
R10	1.1 K	½W.±5%
R11	27 K	1W.
R12	47 K	1W.
R13	15 K	1W.
R14	4.7 K	1W.
R15	10 K	½W.
R16	100 K	1W.
R17	2.2 meg.	½W.
R18	100 K	1W.
R19	5 K pot.	
R20	1.8 K	½W.
R21	100 K	1W.
R22	47 ohm	½W.
R23	47 ohm	½W.
R24	270 ohm	5W.NI±5%
R25	1 meg.	1W.
R26	1 meg.	1W.
R27	10 K	½W.
R28	30 K	10W.±5%
R29	10 K	20W.±5%
R30	8 K	20W.±5%
R31	10 K	½W.
R32	1 meg.	1W.
R33	1 meg.	1W.
R34	1 meg.	1W.
R35	1 meg.	1W.
R36	1 meg.	1W.
R37	1 meg.	1W.
R38	1 meg.	1W.
R39	1 meg.	1W.
R40	1 meg.	1W.
R41	1 meg.	1W.
R42	1 meg.	1W.
R43	1 meg.	1W.
R44	1 meg.	1W.
R45	1 meg.	1W.
R46	10 meg.	½W.
R47	1 meg.	½W.
R48	1 K	1W.
R49	2 K C.T. pot.	
R50	1 meg.	½W.
R51	22 K	1W.
R52	10 K	1W.
R53	1 meg.	½W.
R54	15K	10W.±5%
R55	2.2 K	1W.
R56	47 K	½W.
R57	47 ohm	½W.
R58	3 K	10W.NI±5%
R59	5 K	10 W.±5%
R60	180 ohm	1W.
R61	100 K	½W.
R62	47 K	½W.
R63	10 K	½W.
R64	100 K	1W.
R65	100 K	1W.
R66	100 K	1W.
R67	100 K	1W.
R68	100 K	1W.
R69	100 K	1W.
R70	100 K	1W.
R71	100 K	1W.
R72	100 K	1W.
R73	100 K	1W.
R74	180 K	1W.
R75	180 K	1W.
R76	1 meg.	½W.
R77	15 K	½W.
R78	10 K	1W.
R79	22 K	1W.
R80	47 K	1W.
R81	10 K	1W.
R82	10 K	1W.
R83	1.8 K	½W.
R84	180 K	1W.
R85	1.8 K	½W.
R86	150 K	1W.
R87	1.8 K	½W.
R88	8.2 K	1W.
R89	2.2 meg.	½W.
R90	200 K C.T. Pot.	
R91	47 K	½W.
R92	100 K	½W.
R93	100 K	½W.
R94	470 ohm	½W.
R95	150 K	1W.
R96	2 K pot.	
R97	3.3 K	½W.
R98	470 K	1W.
R99	4 meg. pot.	} dual
R152	100 K pot.	} dual
R100	15 K	1W.
R101	10 K pot.	
R102	100 K	1W.
R103	100 K	3W.
R104	470 K	1W.
R105	470 K	1W.
R106	820 K	1W.
R107	820 K	1W.
R108	820 K	1W.
R109	820 K	1W.
R110	820 K	1W.
R111	47 K	1W.
R112	50 K pot.	
R113	47 K	1W.
R114	47 K	1W.
R115	100 K pot.	
R116	47 K	1W.
R117	47 K	1W.
R118	47 K	1W.
R119	47 K	1W.
R120	47 K	1W.
R121	47 K	1W.
R122	47 K	1W.
R123	47 K	1W.
R124	1 meg.	1W
R125	1 meg.	1W.
R126	1 meg.	1W.
R127	1 meg.	1W.
R128	1 meg.	1W.
R129	1 meg.	1W.
R130	1 meg	1W.
R131	1 meg.	1W.
R132	2 meg.	½W.±5%
R133	240 K	½W.±5%
R134	10 K	½W.
R135	2.2 meg.	½W.
R136	47 ohm	½W.
R137	10 K	½W.
R138	100 K	1W.
R139	25 K pot.	
R140	22 K	3W.
R141	2 K pot.	
R142	500 K pot.	
R143	270 K	1W.
R144	270 K	1W.
R145	150 K	1W.
R146	270 K	½W.
R147	470 K	½W.
R148	1 meg.	½W.
R149	2.2 meg.	½W.
R150	22 K	3W.
R151	12 K	1W.
R152	See R99	
R153	10 K pot.	
R154	100 K	1W.
R155	1 meg.	1W.
R156	1 meg.	1W.
R157	1 meg.	1W.
R158	1 meg.	1W.
R159	820 K	1W.
R160	470 K	1W.
R161	1 meg.	1W.
R162	100 K	1W.
R163	91 K	1W.±5%
R164	5 K pot.	
R165	1.5 K	½W.
R166	47 ohm	½W.
R167	39 K	3W.
R168	47 ohm	½W.
R169	10 K	10W.±5%
R170	1 meg.	1W.
R171	10 K	½W.
R172	30 K	10W.±5%
R173	30 K	10W.±5%
R174	10 K	½W.
R175	1 meg.	1W.
R176	1 meg.	1W.
R177	1 meg.	1W
R178	1 meg.	1W.
R179	1 meg.	1W.
R180	1 meg.	1W.
R181	1 meg.	1W.
R182	1 meg.	1W.
R183	1 meg.	1W.
R184	1 meg.	1W.
R185	1 meg.	1W.
R186	1 meg.	1W.
R187	1 meg.	1W.
R188	1 meg.	1W.
R189	1 meg.	1W.
R190	1 meg.	1W.
R191	1 meg.	1W.
R192	10 K	3W.
R193	2.2 meg.	½W.
R194	82 K	1W.
R195	470 K	1W.
R196	100 K	1W.
R197	100 K	1W.
R198	500 K pot.	
R199	100 K	1W.
R200	47 K	1W.
R201	27 K	1W.
R202	470 K	1W.
R203	150 K	1W.
R204	47 ohm	½W.
R205	1 meg.	1W.
R206	47 ohm	½W.
R207	5 K	25W.±5%
R208	100 K	1W.
R209	39 K	3W.
R210	39 K	3W.
R211	1 meg.	½W.
R212	2 K	½ W.±5%
R213	100 ohm	½W.±5%



Courtesy Du Mont Labs.

Fig. 22-12.—Schematic of Du Mont Model 247.