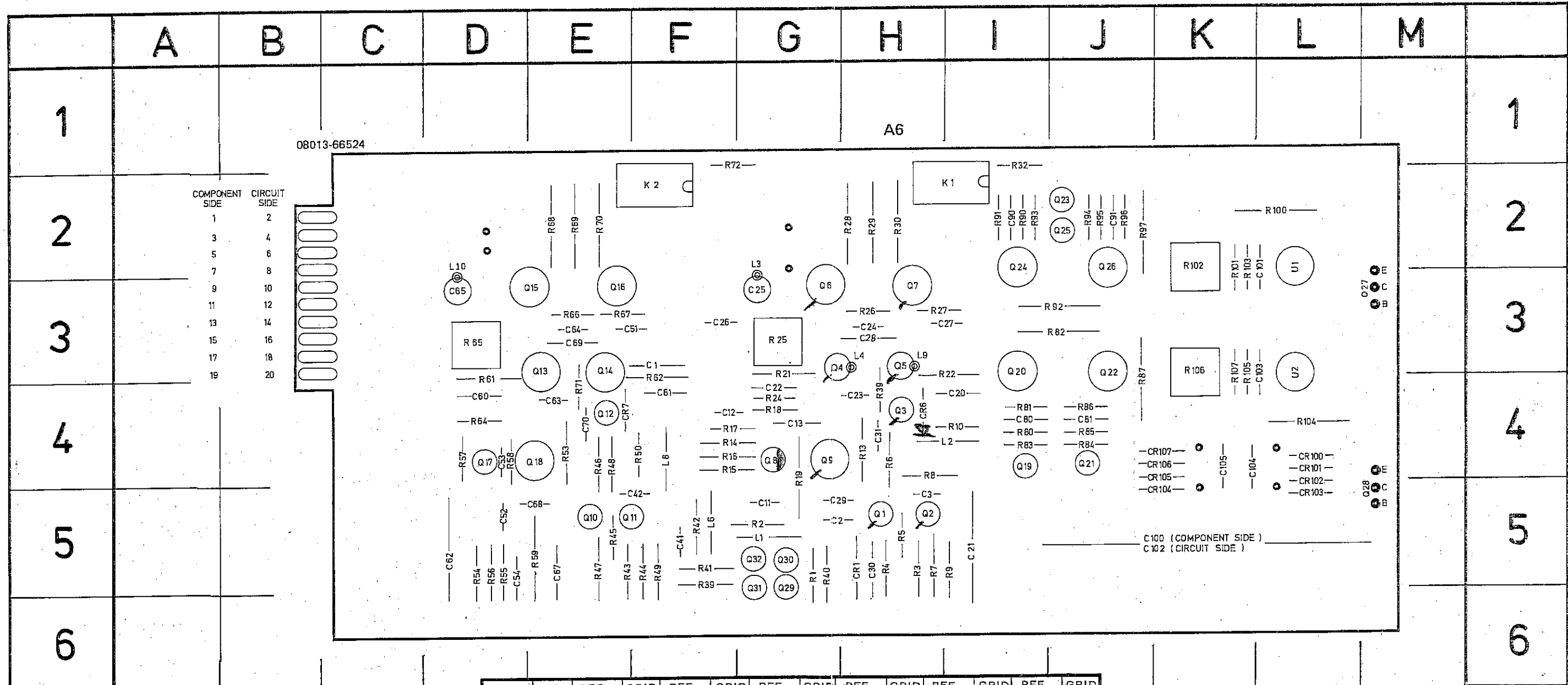


Figure 6-1. Assembly Diagram



REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
C1	F-3	C62	D-5	CR103	L-5	Q13	F-3	R7	H-5	R43	E-5	R80	I-4
C2	G-5	C63	F-4	CR104	K-5	Q14	F-3	R8	H-4	R44	F-5	R81	I-4
C3	H-5	C64	F-3	CR105	K-4	Q15	D-3	R9	I-5	R45	E-5	R82	J-3
C11	G-5	C65	D-3	CR106	K-4	Q16	F-3	R10	I-4	R46	F-4	R83	I-4
C12	F-4	C66	D-3	CR107	K-4	Q17	D-4	R11	I-4	R47	E-5	R84	J-4
C13	G-4	C67	E-5			Q18	E-4	R12	H-4	R48	F-4	R85	J-4
C20	I-4	C68	E-5			Q19	I-4	R13	H-4	R49	F-5	R86	J-4
C21	I-5	C69	F-3			Q20	I-3	R14	F-4	R50	F-4	R87	J-4
C22	G-4					Q21	J-4	R15	F-4	R51	F-4	R88	J-4
C23	H-4					Q22	J-3	R16	F-4	R52	E-4	R89	I-2
C24	H-3	C70	F-4			Q23	J-3	R17	F-4	R53	F-4	R90	I-2
C25	G-3	C80	I-4			Q24	J-2	R18	G-4	R54	D-5	R91	I-2
C26	F-3	C81	J-4			Q25	J-2	R19	G-4	R55	D-5	R92	J-3
C27	H-3	C82	L-2			Q26	J-2	R20	G-4	R56	D-5	R93	I-2
C28	H-3	C83	L-2			Q27	J-2	R21	G-3	R57	D-4	R94	J-2
C29	G-5	C84	K-5			Q28	H-3	R22	H-3	R58	D-4	R95	J-2
C30	I-5	C85	K-5			Q29	M-3	R23	G-4	R59	E-5	R96	J-2
C31	H-4	C86	L-2			Q30	M-3	R24	G-4	R60	D-3	R97	J-2
C41	F-5	C87	L-3			Q31	G-5	R25	H-3	R61	F-3	R100	L-2
C42	F-5	C88	L-3			Q32	G-5	R26	H-3	R62	F-3	R101	K-2
C51	F-3	CR1	H-5					R27	H-3	R63	D-4	R102	K-2
C52	E-5	CR6	H-4					R28	H-2	R64	D-3	R103	K-2
C53	D-4	CR7	E-4					R29	H-2	R65	E-3	R104	L-4
C54	D-5	CR100	L-4					R30	H-2	R66	E-3	R105	K-3
C60	D-4	CR101	L-4					R31	H-2	R67	E-3	R106	K-3
C61	D-4	CR102	L-5					R32	I-2	R68	E-2	R107	K-3
								R33	H-2	R69	E-2	U1	L-2
								R34	H-2	R70	E-2	U2	L-3
								R35	H-2	R71	F-4		
								R36	H-2	R72	F-2		

Figure 6-3. Component Layout - Board A6

NOTES

1. All d.c. voltages were measured with the following pulse settings unless otherwise stated.

PULSE PERIOD 2	EXT(+)
VERNIER 3	CCW
PULSE DOUBLE/NORMAL 4	NORM
PULSE DELAY 5	35n-1μ
VERNIER 6	CCW
PULSE WIDTH 7	10n-1μ
VERNIER 8	CCW
AMPLITUDE 9	5.0-2.0
VERNIER 10	CW
OFFSET vernier 11	-
OFFSET switch 12	OFF
AMPLITUDE 13	5.0-2.0
VERNIER 14	CW
OFFSET vernier 15	-
OFFSET switch 16	OFF
NORM/COMPL switch 19	NORM
INT LOAD 20	IN
EXT WIDTH/NORM/RZ switch 25	NORM

No external input signal

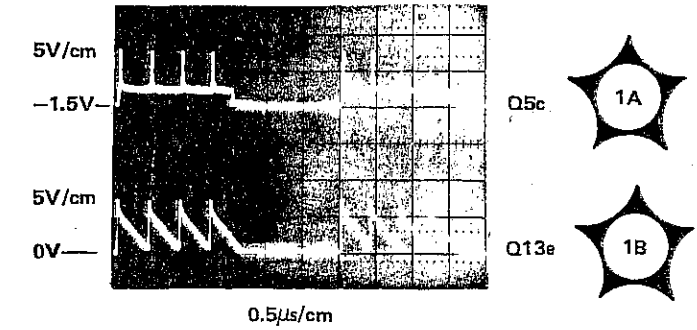
2. A model 3440A digital voltmeter with a 3444A plug-in was used for the d.c. measurements.

3. A model 180C oscilloscope with 1801A and 1821A plug-ins was used for the waveform measurements.

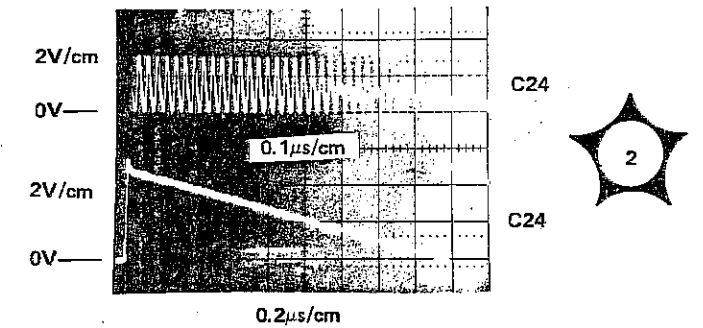
4. A model 8015A pulse generator was used to provide the external input signals.

Pulse settings as for d.c. measurements (see note 1) except for:

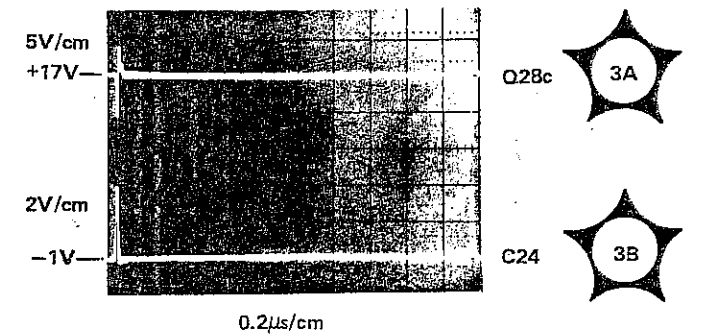
EXTERNAL GATE INPUT (21) 330KHz
 PULSE PERIOD (2) 20n-1μ
 VERNIER (3) Center



PULSE PERIOD (2) 20n-1μ
 VERNIER (3) CCW
 VERNIER (3) CW



PULSE PERIOD (2) EXT (+)
 EXTERNAL TRIGGER INPUT (23) sine wave ≈ 500 KHz



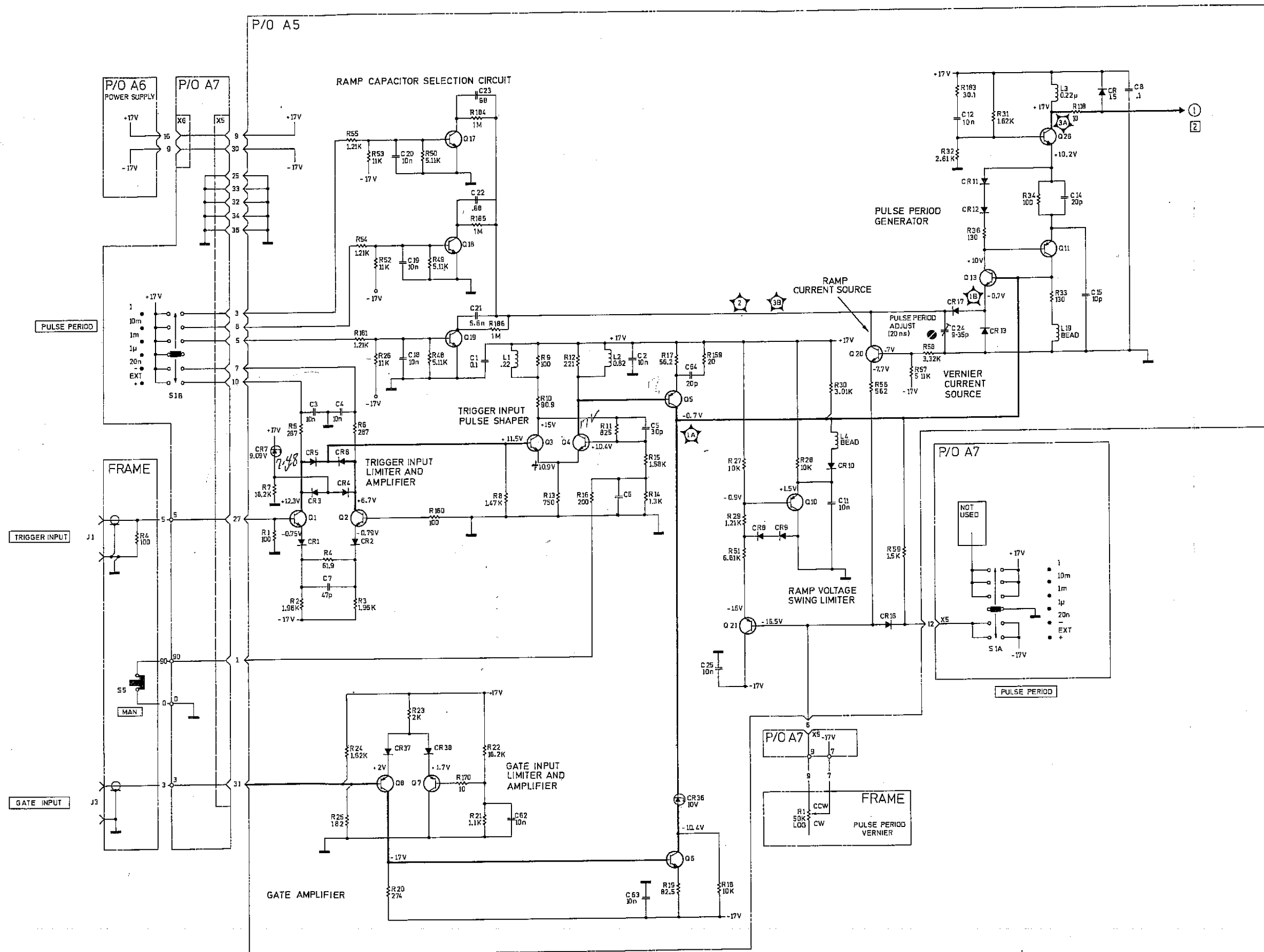


FIGURE 6-6. REP RATE GENERATOR 8013B

NOTES

1. All d.c. voltages were measured with the following pulse settings unless otherwise stated.

PULSE PERIOD 2	EXT(+)
VERNIER 3	CCW
PULSE DOUBLE/NORMAL 4	NORM
PULSE DELAY 5	35n-1μ
VERNIER 6	CCW
PULSE WIDTH 7	10n-1μ
(but set to SQUARE WAVE for voltages marked SW).	
VERNIER 8	CCW
AMPLITUDE 9	5.0-2.0
VERNIER 10	CW
OFFSET vernier 11	-
OFFSET switch 12	OFF
AMPLITUDE 13	5.0-2.0
VERNIER 14	CW
OFFSET vernier 15	-
OFFSET switch 16	OFF
NORM/COMPL switch 19	NORM
INT LOAD 20	IN
EXT WIDTH/NORM/RZ switch 25	NORM
(but set to RZ and EXT WIDTH for voltages marked RZ and EXT WIDTH respectively).	

No external input signal required

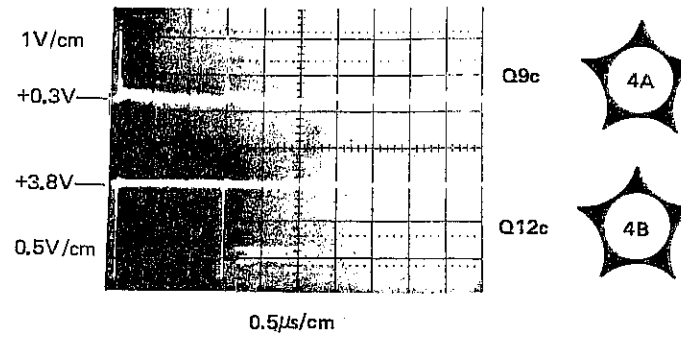
2. A model 3440A digital voltmeter with a 3444A plug-in was used for the d.c. measurements.

3. A model 180C oscilloscope with 1801A and 1821A plug-ins was used for the waveform measurements.

4. A model 8015A pulse generator was used to provide the external input signals.

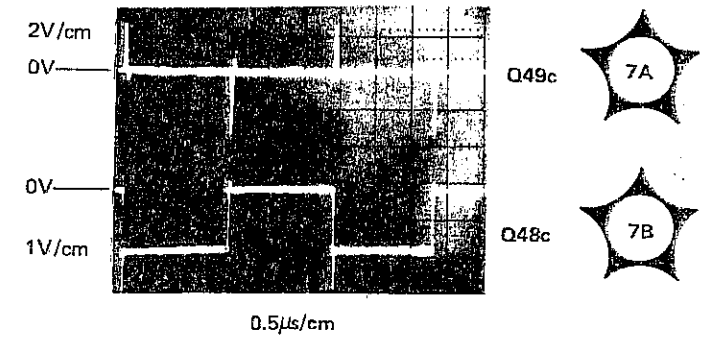
Pulse settings as for d. c. measurements (see note 1) except for:

PULSE PERIOD ② 20n-1μ
VERNIER ③ CW

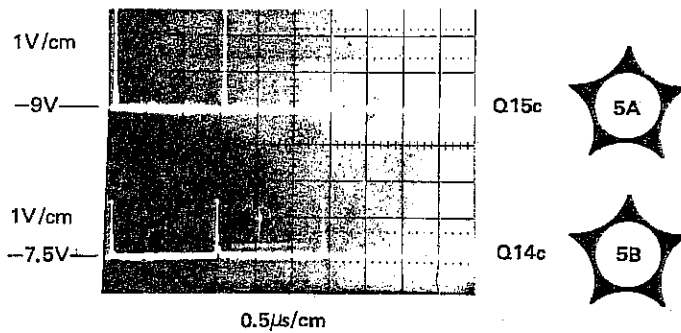


Pulse settings as for d. c. measurements (see note 1) except for:

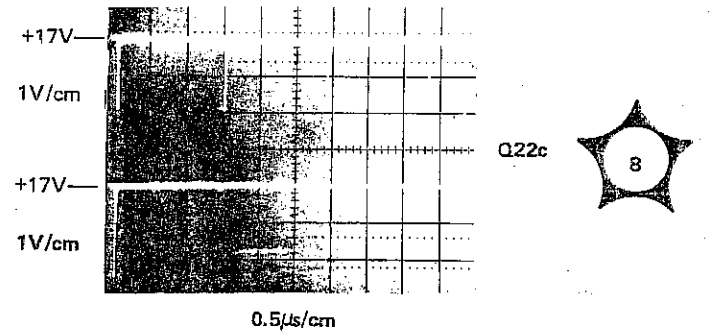
PULSE PERIOD ② 20n-1
VERNIER ③ CW
PULSE WIDTH ⑦ SQUARE WAVE



PULSE PERIOD ② 20n-1μ
VERNIER ③ CW
PULSE WIDTH ⑦ SQUARE WAVE

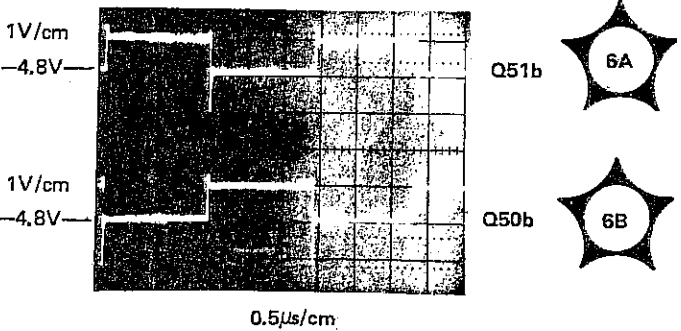


PULSE PERIOD ② 20n-1μ
VERNIER ③ CW



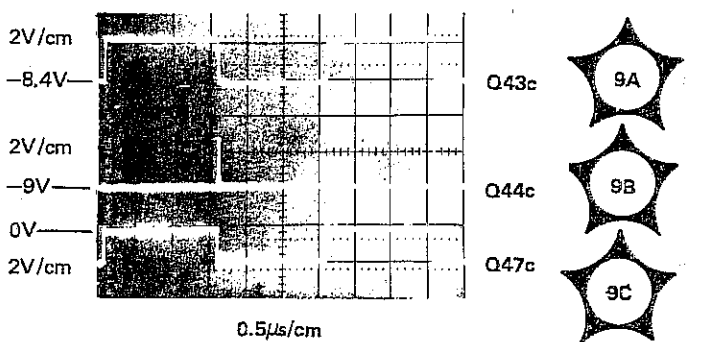
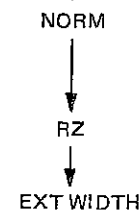
PULSE PERIOD ② 20n-1μ
VERNIER ③ CW
PULSE WIDTH ⑦ SQUARE WAVE

PULSE PERIOD ② 20n-1μ
VERNIER ③ CW
PULSE WIDTH ⑦ SQUARE WAVE



External input to EXT. WIDTH/NORM/RZ connector ②⑤ on rear panel ≈ 330 KHz

EXT WIDTH/NORM/RZ switch ②⑤



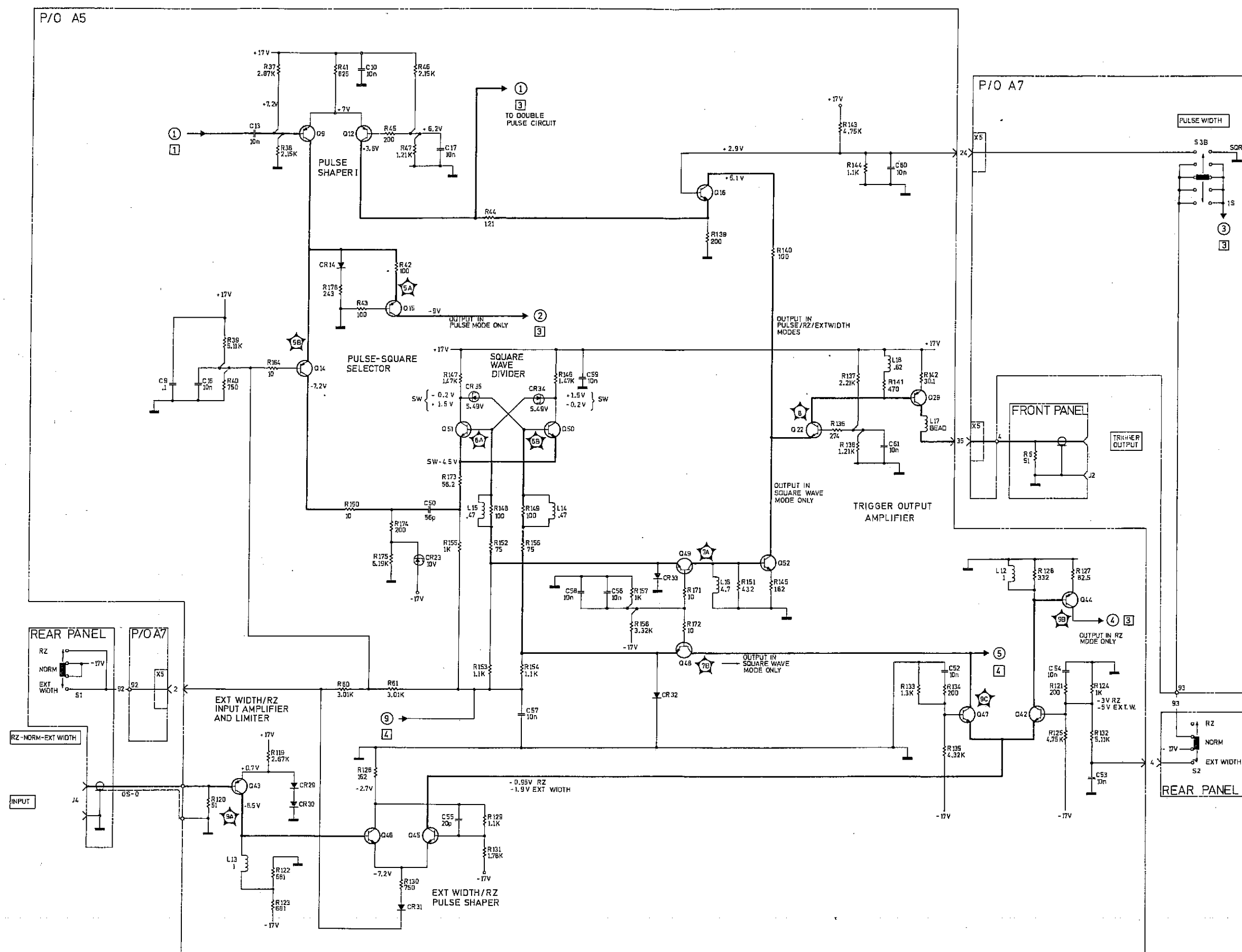


FIGURE 6-7. MODE SELECTOR, TRIGGER AMPLIFIER, EXT. INPUT AND SQUARE WAVE CIRCUITS 8013B

NOTES

1. All d.c. voltages were measured with the following pulse settings unless otherwise stated.

PULSE PERIOD	2	EXT(+)
VERNIER	3	CCW
PULSE DOUBLE/NORMAL	4	NORM
PULSE DELAY	5	35n-1 μ
VERNIER	6	CCW
PULSE WIDTH	7	10n-1 μ
VERNIER	8	CCW
AMPLITUDE	9	5.0-2.0
VERNIER	10	CW
OFFSET vernier	11	-
OFFSET switch	12	OFF
AMPLITUDE	13	5.0-2.0
VERNIER	14	CW
OFFSET vernier	15	-
OFFSET switch	16	OFF
NORM/COMPL switch	19	NORM
INT LOAD	20	IN
EXT WIDTH/NORM/RZ switch	25	NORM

No external input signal

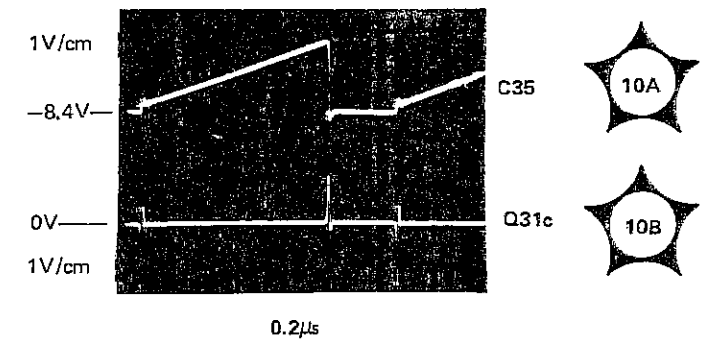
2. A model 3440A digital voltmeter with a 3444A plug-in was used for the d.c. measurements.

3. A model 180C oscilloscope with 1801A and 1821A plug-ins was used for the waveform measurements.

4. A model 8015A pulse generator was used to provide the external input signals.

Pulse settings as for d. c. measurements (see note 1) except for:

PULSE PERIOD	②	20n-1 μ
VERNIER	③	CW
PULSE DELAY	⑤	35n-1 μ
VERNIER	⑥	Center



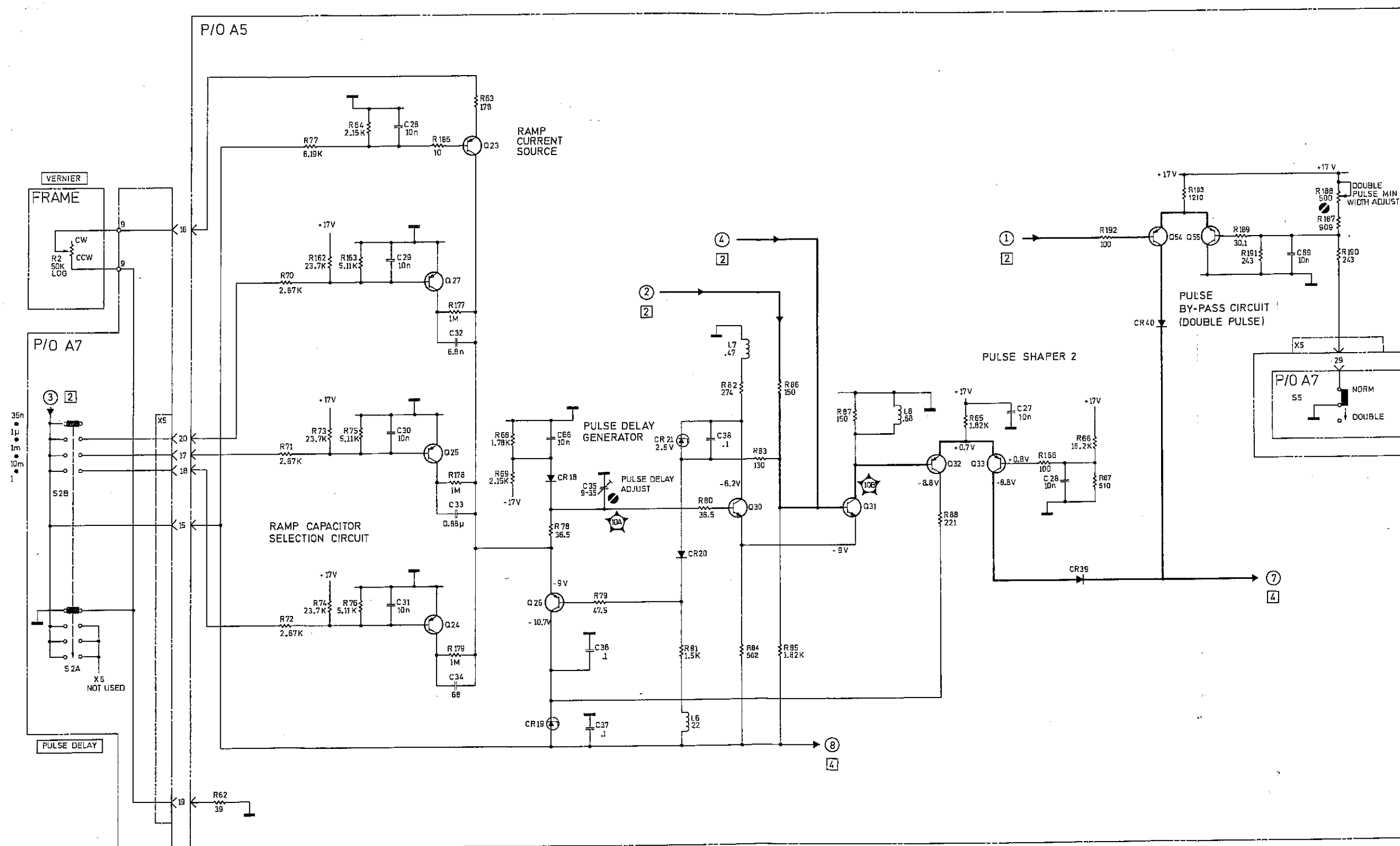


FIGURE 6-8. DELAY GENERATOR 8013B

NOTES

1. All d.c. voltages were measured with the following pulse settings unless otherwise stated.

PULSE PERIOD	2	EXT(+)
VERNIER	3	CCW
PULSE DOUBLE/NORMAL	4	NORM
PULSE DELAY	5	35n-1 μ
VERNIER	6	CCW
PULSE WIDTH	7	10n-1 μ
VERNIER	8	CCW
AMPLITUDE	9	5.0-2.0
VERNIER	10	CW
OFFSET vernier	11	-
OFFSET switch	12	OFF
AMPLITUDE	13	5.0-2.0
VERNIER	14	CW
OFFSET vernier	15	-
OFFSET switch	16	OFF
NORM/COMPL switch	19	NORM
INT LOAD	20	IN
EXT WIDTH/NORM/RZ switch	25	NORM

No external input signal

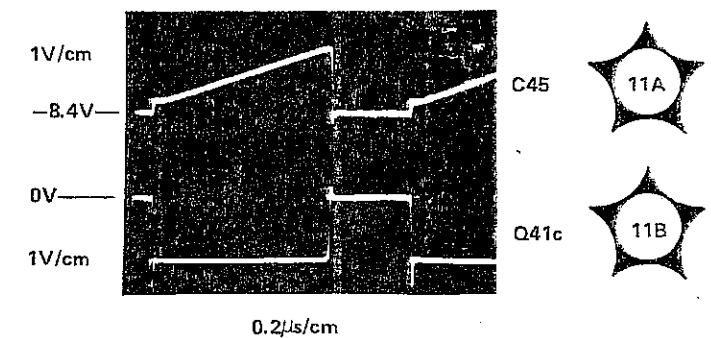
2. A model 3440A digital voltmeter with a 3444A plug-in was used for the d.c. measurements.

3. A model 180C oscilloscope with 1801A and 1821A plug-ins was used for the waveform measurements.

4. A model 8015A pulse generator was used to provide the external input signals.

Pulse settings as for d.c. measurements (see note 1) except for:

PULSE PERIOD	②	20n-1 μ
VERNIER	③	CW
PULSE WIDTH	⑦	10n-1 μ
VERNIER	⑧	Center

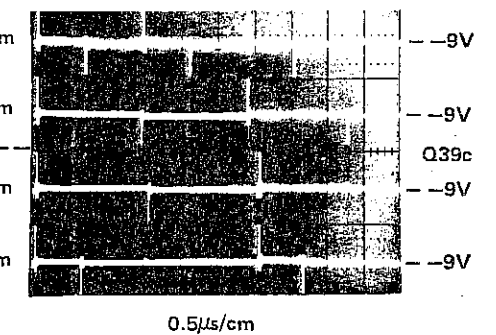


PULSE PERIOD	②	20n-1 μ
VERNIER	③	CW
PULSE WIDTH	⑦	10n-1 μ
VERNIER	⑧	Center

PULSE PERIOD	②	20n-1 μ
VERNIER	③	CW
PULSE WIDTH	⑦	SQUARE WAVE

External input to
EXT WIDTH/NORM/RZ
connector ②⑥ on rear
panel \approx 330 KHz

EXT WIDTH 2V/cm
RZ 2V/cm
EXT WIDTH/NORM/RZ
switch ②⑤



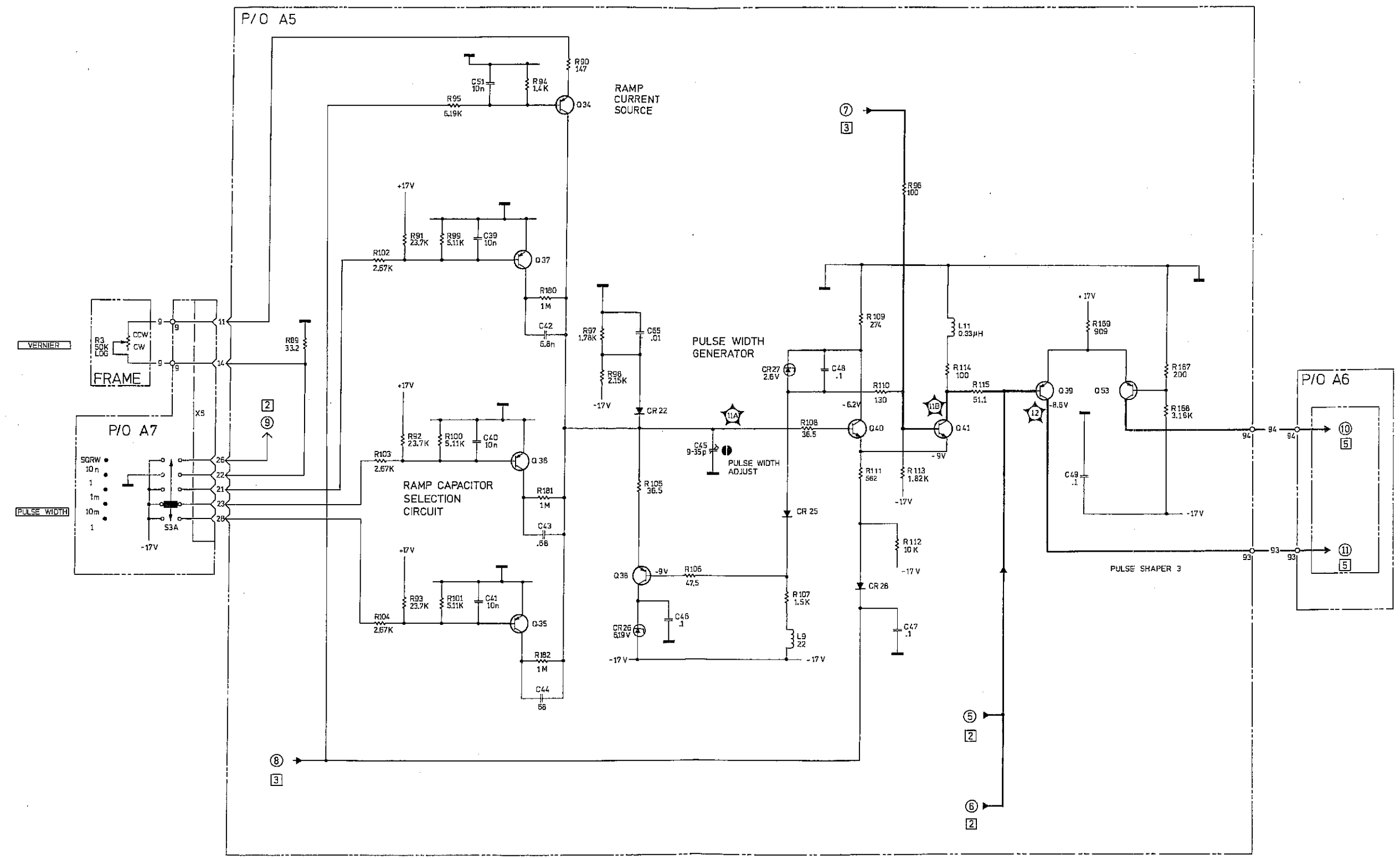


FIGURE 6-9. WIDTH GENERATOR 8013B

NOTES

1. All d.c. voltages were measured with the following pulse settings unless otherwise stated. Press and release the MAN button (1) to change from one d.c. voltage level to the other.

PULSE PERIOD 2	EXT(+)
VERNIER 3	CCW
PULSE DOUBLE/NORMAL 4	NORM
PULSE DELAY 5	35n-1μ
VERNIER 6	CCW
PULSE WIDTH 7	SQUARE WAVE
VERNIER 8	CCW
AMPLITUDE 9	5.0-2.0
VERNIER 10	CW
OFFSET vernier 11	-
OFFSET switch 12	OFF
AMPLITUDE 13	5.0-2.0
VERNIER 14	CW
OFFSET vernier 15	-
OFFSET switch 16	OFF
NORM/COMPL switch 19	NORM
INT LOAD 20	IN
EXT WIDTH/NORM/RZ switch 25	NORM

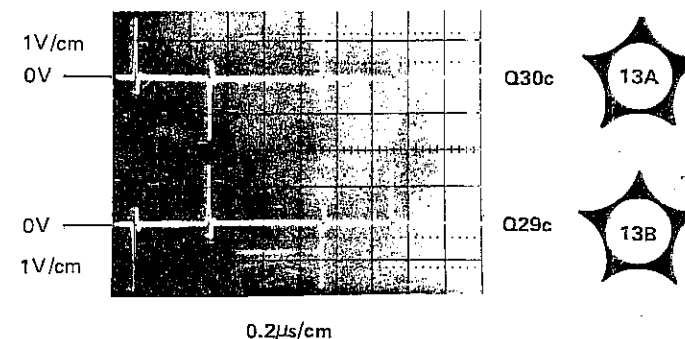
Q6 Q7
Q5

No external input signal

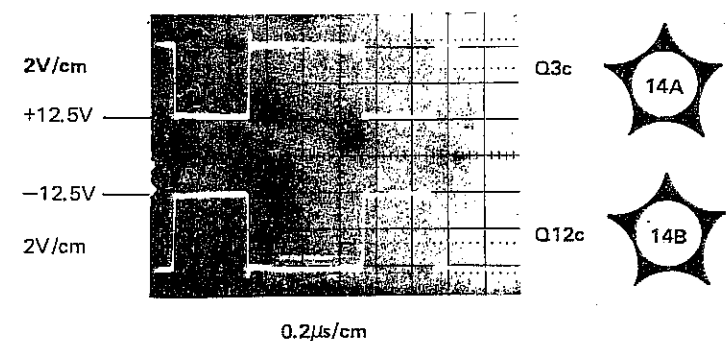
2. A model 3440A digital voltmeter with a 3444A plug-in was used for the d.c. measurements.
3. A model 180C oscilloscope with 1801A and 1821A plug-ins was used for the waveform measurements.
4. A model 8015A pulse generator was used to provide the external input signals.

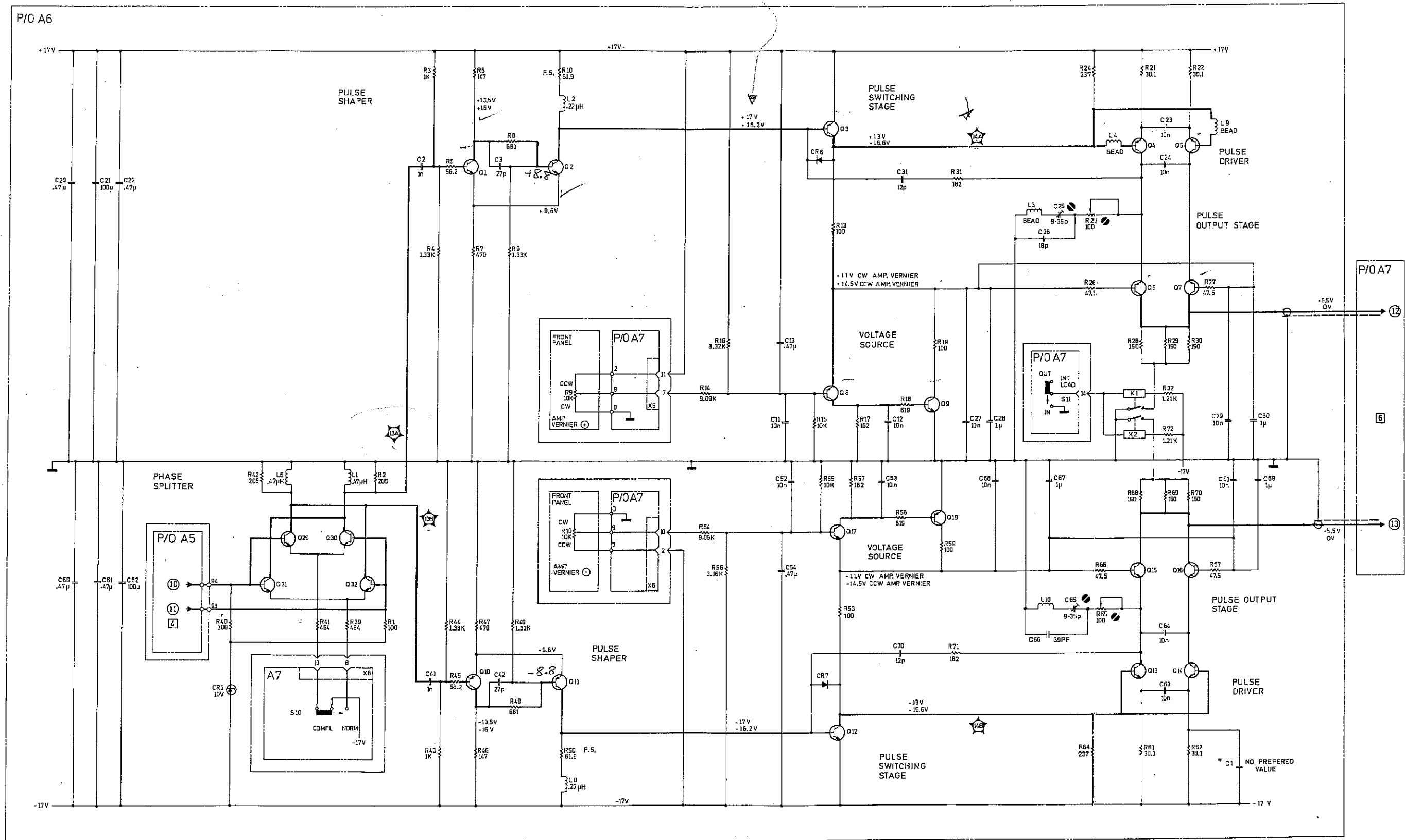
Pulse settings as for d.c. measurements (see note 1) except for:

PULSE PERIOD 2	20n-1μ
VERNIER 3	CW
PULSE WIDTH 7	10n-1μ
VERNIER 8	Center



PULSE PERIOD 2	20n-1μ
VERNIER 3	CW
PULSE WIDTH 7	10n-1μ
VERNIER 8	Center





≈ 15V

11

FIGURE 6-10. OUTPUT AMPLIFIERS 8013B

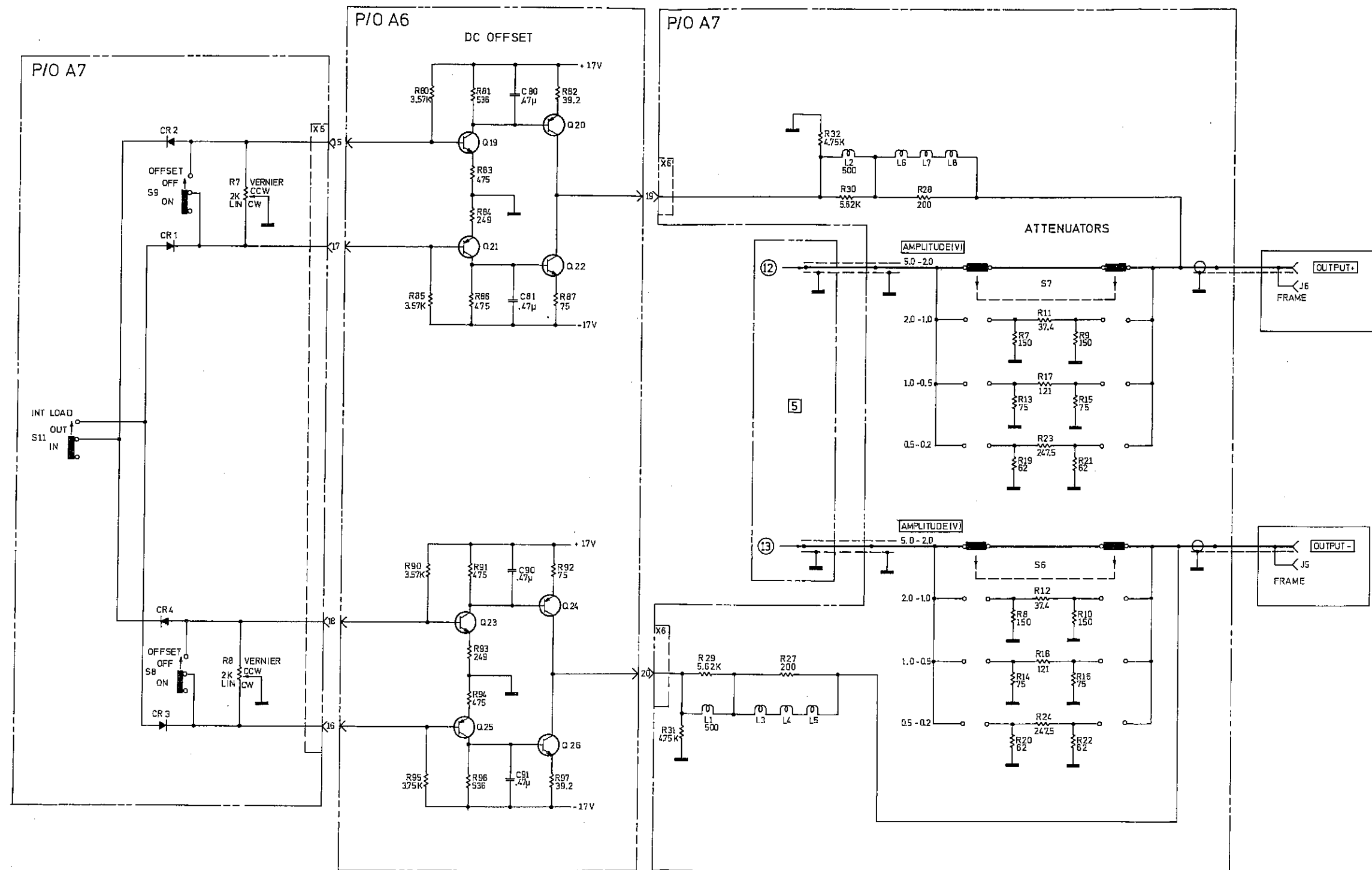
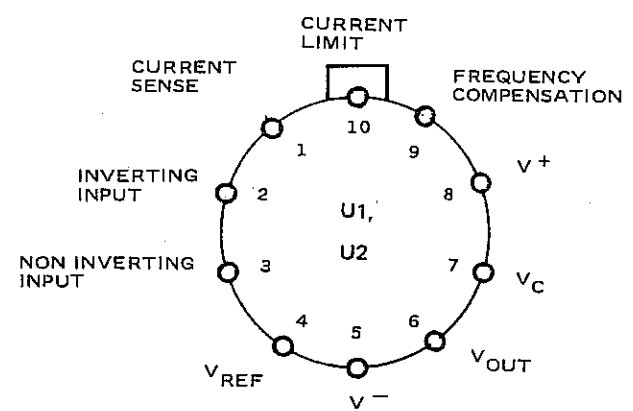
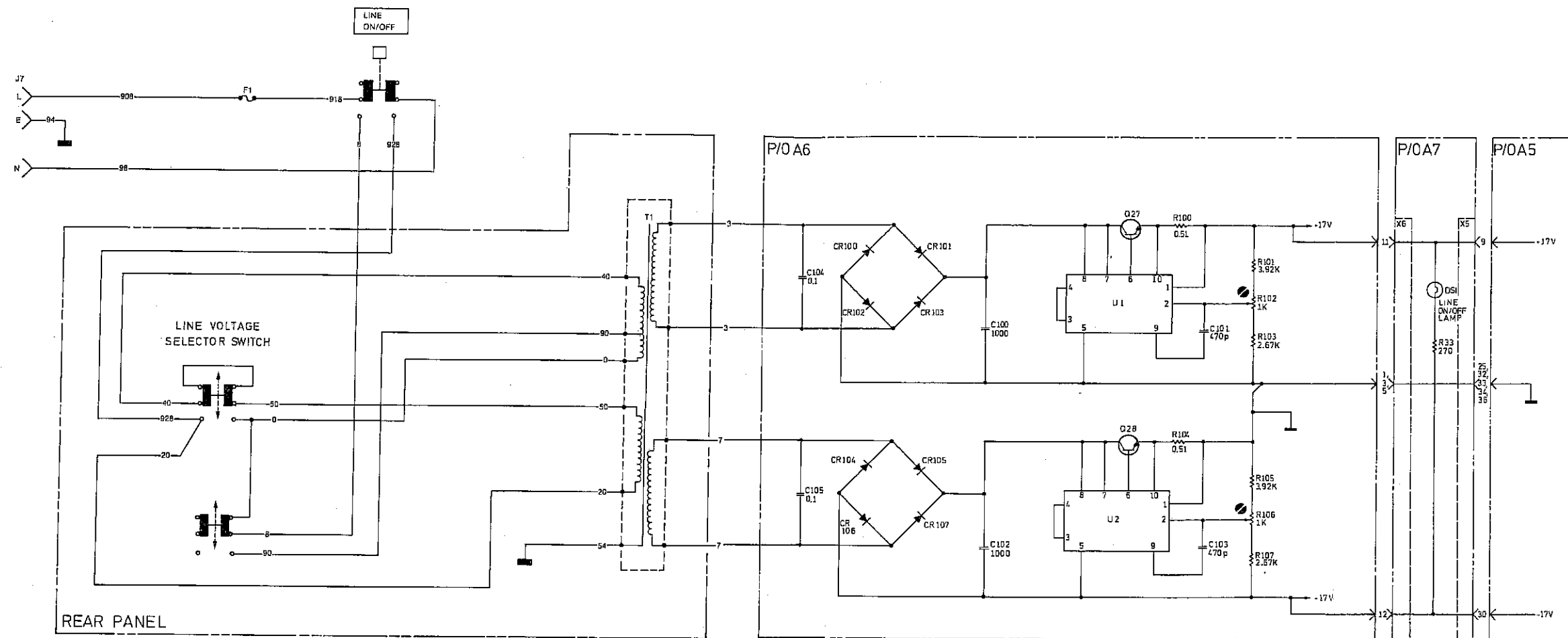
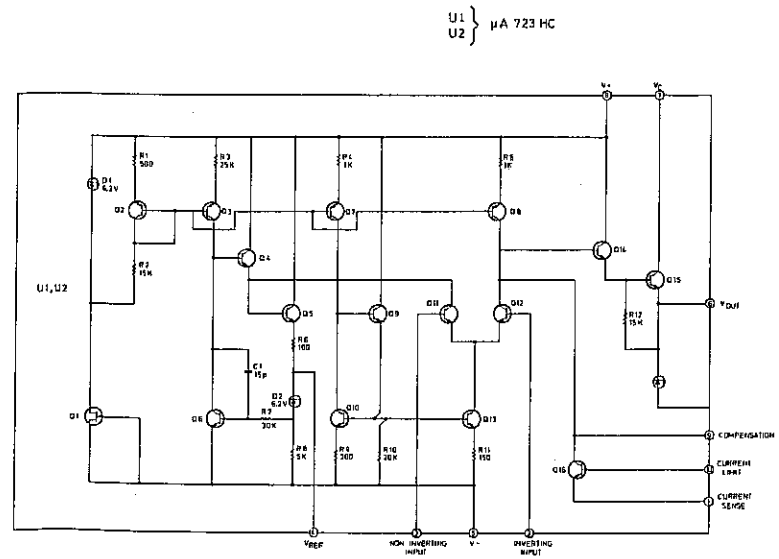


FIGURE 6-11. OFFSET AND ATTENUATOR 8013B



NOTE: Pin 5 connected to case.

U1 } μ A 723HC
 U2 }



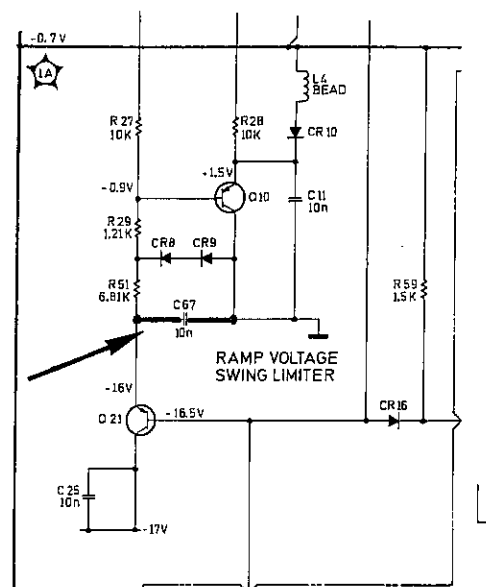
VOLTAGE REGULATOR IC's - BOARD A6

FIGURE 6-12. POWER SUPPLIES 8013B

Table 6-4. Add the following component

A5 C67 0150 - 0093 C-F .01 μ F 100V

Schematic 1. Add C67 as shown below.



CHANGE 3 (for serial numbers 1412G00101 to 1412G00330) Replace figure 6-5, Component Layout, Board A5 with figure 7-1.

CHANGE 4 (for serial numbers 1412G00330 to 1441A10001)

REPLACEABLE PARTS

Make the following changes to the Replaceable Parts Tables.

Table	Assembly	Change
6-4	Frame	Replace with table 7-2.
6-5	A5	Replace with table 7-3.
6-6	A6	Replace with table 7-4.
6-7	A7	Replace with table 7-5.

COMPONENT LAYOUTS

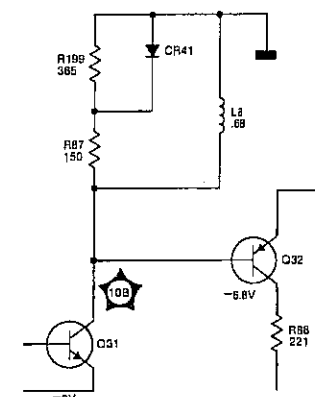
Make the following changes to the Component Layout Figures.

Figure	Assembly	Change
6-1	Assembly Diagram	Replace with figure 7-2.
6-2	A5	Replace with figure 7-3.
6-3	A6	Change board part number to 08013-66504.
6-4	A7 (Front)	Change board part number to 08013-66505.
6-5	A7 (Rear)	Change board part number to 08013-66505.

SCHEMATICS

Make the following changes to the Schematics.

Figure	Schematic	Change
6-7	2	A5R139: Change value to 162 ohms. A5R141: Change value to 301 ohms.
6-8	3	A5R84: Change value to 560 ohms A5R193: Change value to 1.27K. A5R199 and A5CR41: Add as follows:



6-9	4	A5RL11: Change value to 0.22 UH. A5R111: Change value to 562 ohms.
6-10	5	A6C66: Delete capacitor. A6R53: Change value to 120 ohms. A6R64: Change value to 287 ohms.
6-12	7	Replace with Figure 7-4.

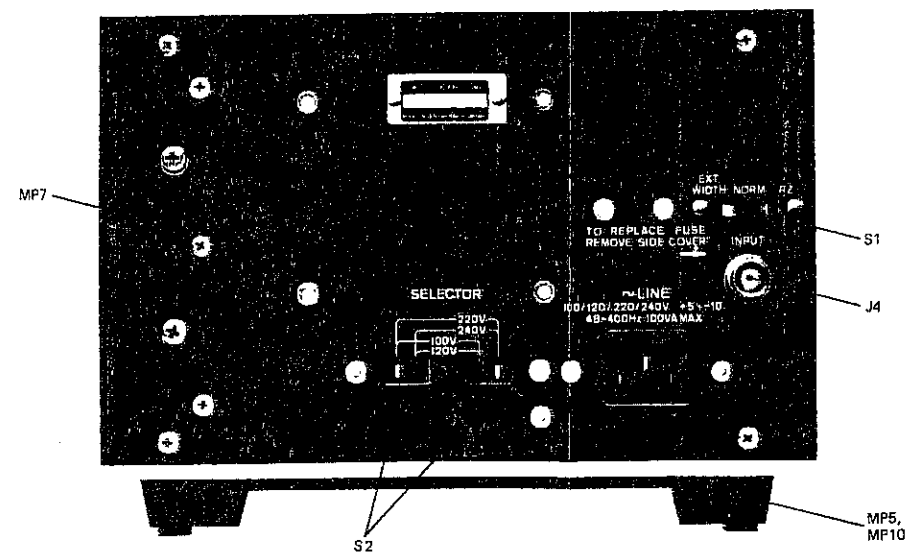
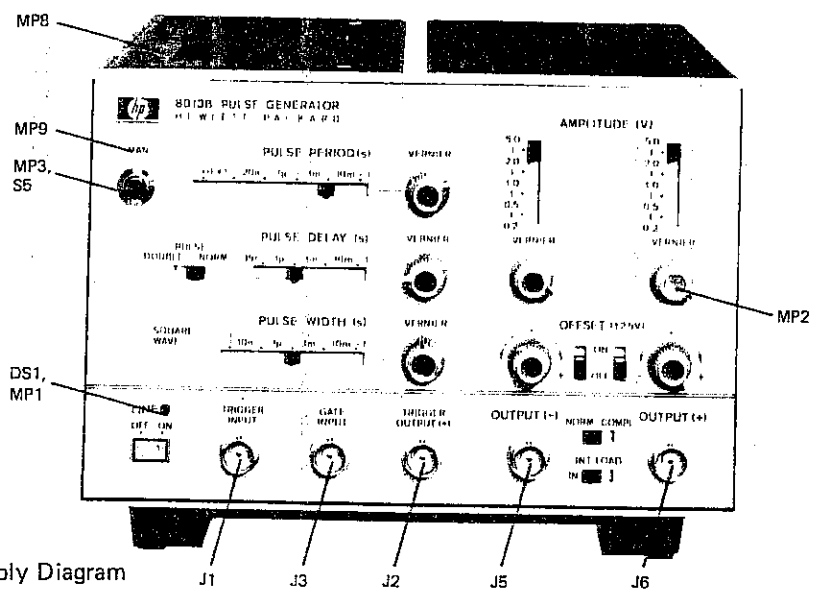
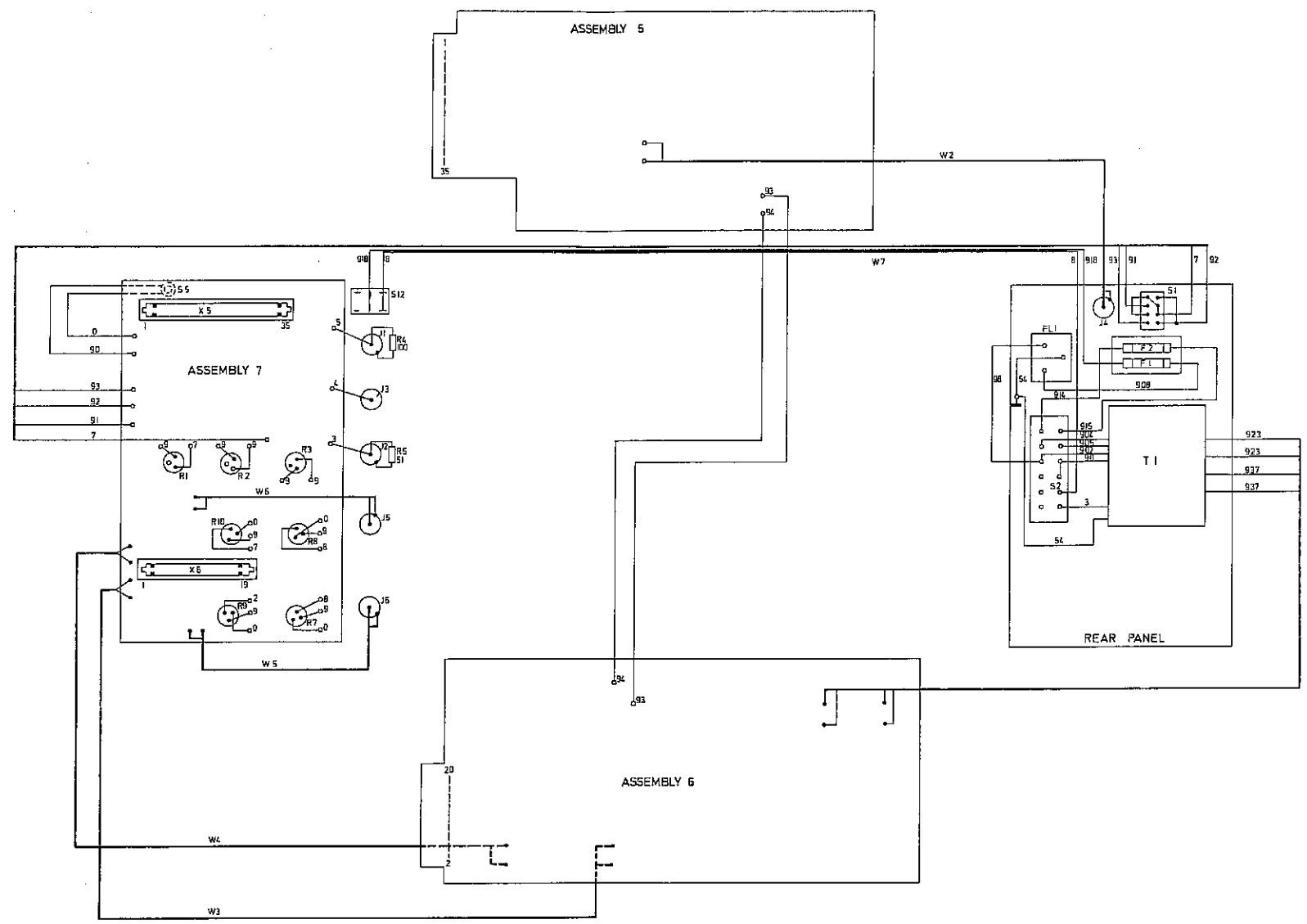
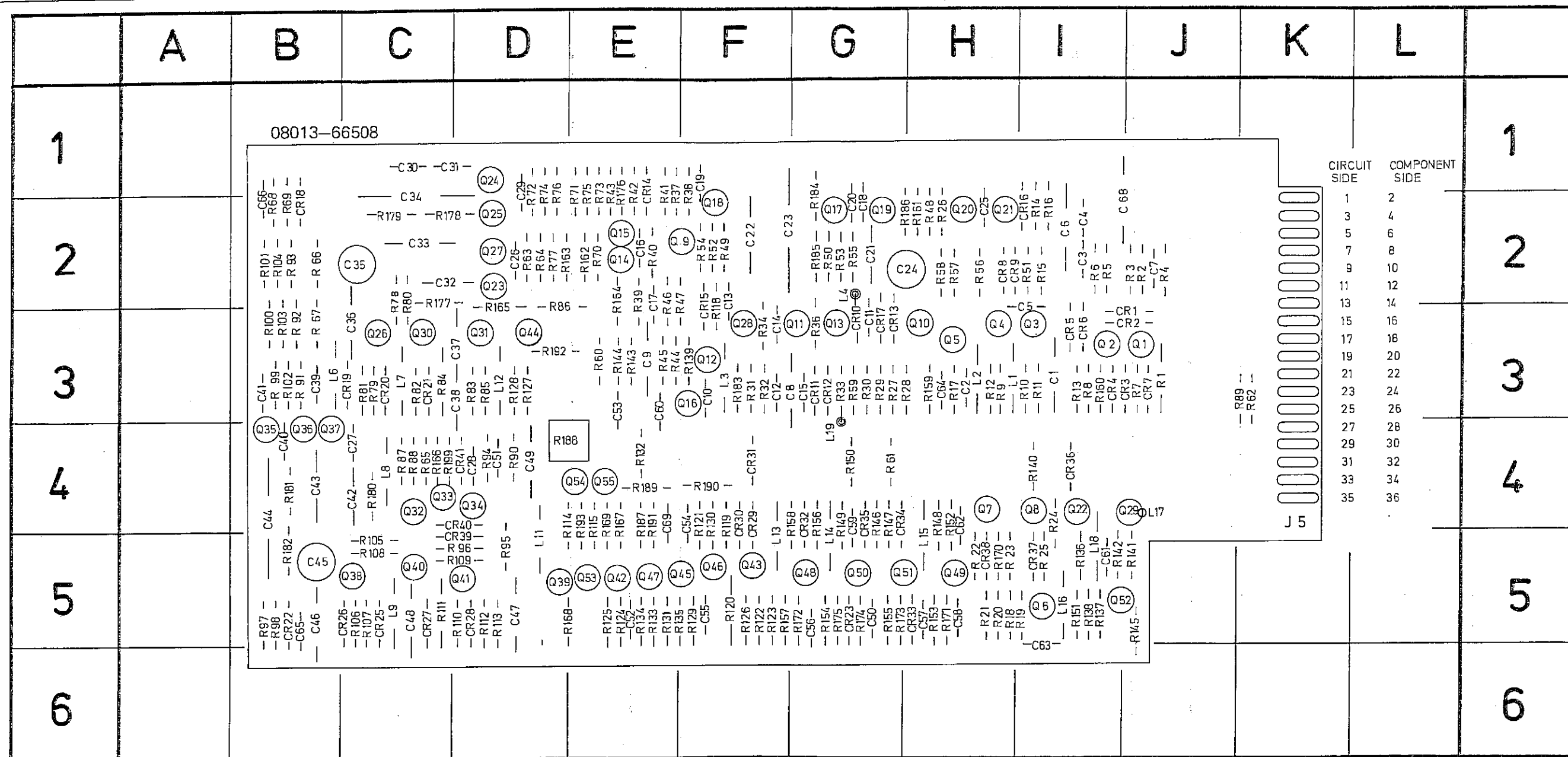
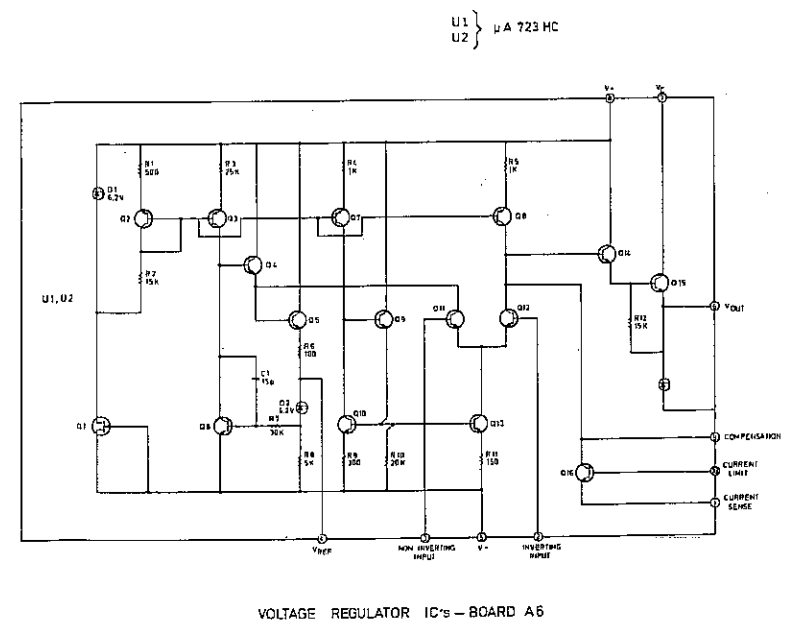
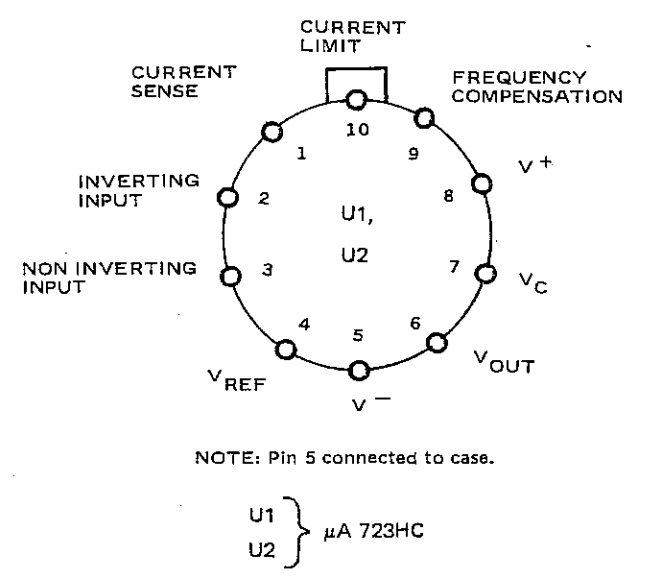
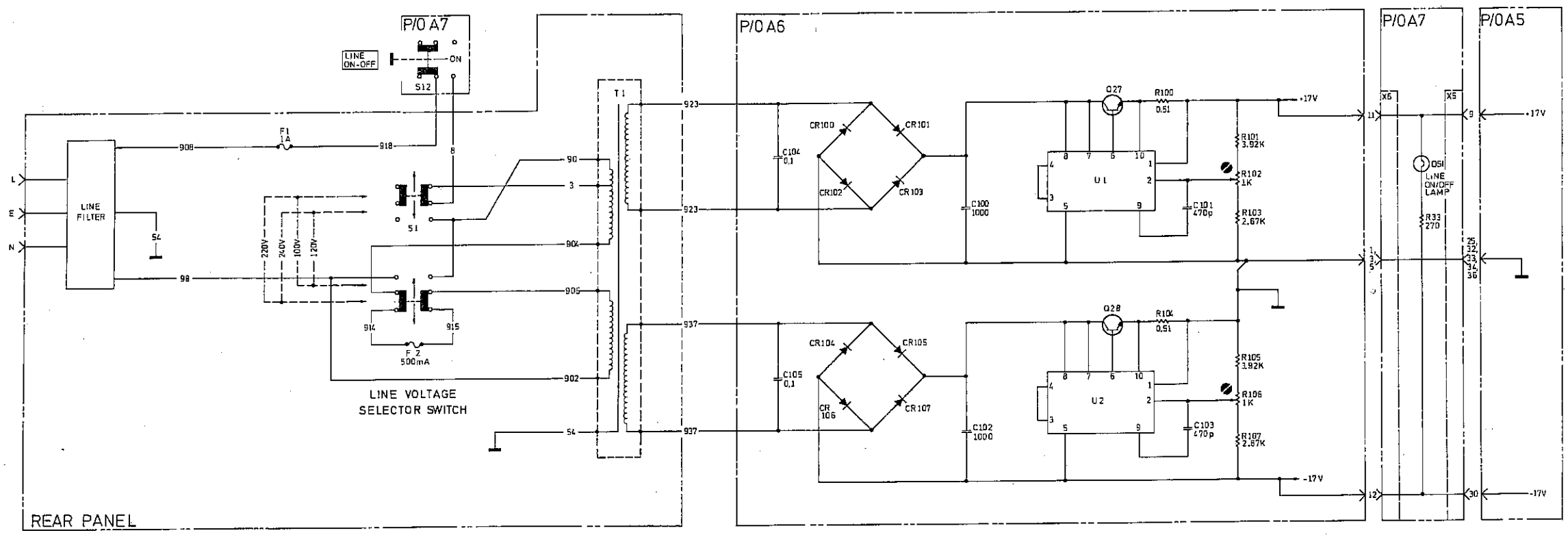


Figure 7-1. Replacement for Figure 6-1. Assembly Diagram



REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC		
C1	T-3	C22	F-2	C44	B-4	C66	B-2	CR19	C-3	L1	T-3	Q4	T-3	Q26	C-3	Q48	Q-5	R15	I-2	R37	F-1	R59	G-3	R82	C-3	R104	B-2	R127	D-3	R149	G-4	R172	G-5
C2	H-3	C23	F-2	C45	B-5	C68	T-2	CR20	C-3	L2	T-3	Q5	T-3	Q27	D-2	Q49	I-5	R16	I-3	R38	F-1	R60	F-3	R83	C-3	R105	C-5	R128	D-3	R150	G-4	R173	G-5
C3	I-2	C24	H-2	C46	B-5	C69	F-5	CR21	C-3	L3	I-3	Q6	I-5	Q28	D-2	Q50	I-5	R17	I-3	R39	F-2	R61	G-4	R84	C-3	R106	C-5	R129	F-5	R151	I-5	R174	G-5
C4	I-2	C25	H-2	C47	D-5	CR1	J-3	CR22	C-3	L4	I-4	Q7	I-5	Q29	D-3	Q51	I-5	R18	I-3	R40	F-2	R62	D-3	R85	C-5	R107	C-5	R130	F-4	R152	H-4	R175	G-5
C5	I-2	C26	D-2	C48	C-5	CR2	J-3	CR23	C-3	L5	I-4	Q8	I-5	Q30	D-3	Q52	I-5	R19	I-5	R41	F-1	R63	D-3	R86	D-3	R108	C-5	R131	F-4	R153	H-5	R176	F-1
C6	T-3	C27	C-4	C49	D-4	CR3	J-3	CR24	C-3	L6	I-4	Q9	I-5	Q31	D-3	Q53	I-5	R20	I-5	R42	F-1	R64	D-2	R87	C-4	R109	D-5	R132	E-4	R154	G-5	R177	C-2
C7	J-2	C28	D-4	C50	D-5	CR4	J-3	CR25	C-5	L7	I-5	Q10	I-5	Q32	C-4	Q54	F-4	R21	I-5	R43	F-1	R65	D-4	R88	C-4	R110	C-5	R133	E-4	R155	G-5	R178	C-2
C8	T-3	C29	D-1	C51	D-4	CR5	T-3	CR26	C-5	L8	I-5	Q11	I-5	Q33	C-4	Q55	F-4	R22	I-5	R44	F-1	R66	D-3	R89	D-3	R111	C-5	R134	F-5	R156	G-4	R179	C-2
C9	T-3	C30	C-1	C52	F-5	CR6	T-3	CR27	C-5	L9	I-5	Q12	I-5	Q34	D-4	Q56	F-4	R23	I-5	R45	F-1	R67	D-3	R90	D-4	R112	D-5	R135	F-5	R157	F-5	R180	C-4
C10	T-3	C31	C-1	C53	F-5	CR7	T-3	CR28	C-5	L10	I-5	Q13	I-5	Q35	D-4	Q57	F-4	R24	I-4	R46	F-2	R68	B-2	R91	B-3	R113	D-5	R136	F-5	R158	G-4	R181	B-4
C11	T-3	C32	C-2	C54	F-4	CR8	I-2	CR29	C-5	L11	I-5	Q14	I-5	Q36	B-4	Q58	F-4	R25	I-5	R47	F-2	R69	B-2	R92	F-3	R114	D-5	R137	I-5	R159	H-3	R182	B-5
C12	T-3	C33	C-2	C55	F-5	CR9	I-2	CR30	C-5	L12	I-5	Q15	I-5	Q37	B-4	Q59	F-4	R26	I-5	R48	F-2	R70	F-2	R93	B-2	R115	F-4	R138	I-5	R160	I-3	R183	F-3
C13	T-2	C34	C-2	C56	G-5	CR10	H-2	CR31	C-5	L13	I-5	Q16	I-5	Q38	D-4	Q60	F-4	R27	I-2	R49	F-2	R71	F-1	R94	D-4	R116	D-4	R139	F-3	R161	H-2	R184	G-2
C14	T-2	C35	C-2	C57	H-5	CR11	H-2	CR32	C-5	L14	I-5	Q17	I-5	Q39	D-4	Q61	F-4	R28	I-2	R50	F-2	R72	D-1	R95	D-5	R117	D-4	R140	I-4	R162	F-2	R185	G-2
C15	T-2	C36	C-3	C58	G-5	CR12	H-2	CR33	C-5	L15	I-5	Q18	I-5	Q40	D-4	Q62	F-4	R29	I-2	R51	F-2	R73	D-1	R96	D-5	R118	F-2	R141	J-5	R163	D-2	R186	F-2
C16	T-2	C37	D-3	C59	H-4	CR13	H-2	CR34	C-5	L16	I-5	Q19	I-5	Q41	D-4	Q63	F-4	R30	I-2	R52	F-2	R74	D-1	R97	B-5	R119	F-4	R142	I-5	R164	F-2	R187	F-4
C17	T-2	C38	D-3	C60	F-3	CR14	H-2	CR35	C-5	L17	I-5	Q20	I-5	Q42	D-4	Q64	F-4	R31	I-3	R53	F-2	R75	F-1	R98	B-5	R120	F-5	R143	F-3	R165	D-3	R188	F-4
C18	T-2	C39	B-3	C61	I-5	CR15	T-1	CR36	C-5	L18	I-5	Q21	I-5	Q43	D-4	Q65	F-4	R32	I-3	R54	G-2	R76	D-1	R99	B-3	R121	F-4	R144	F-3	R166	C-4	R189	F-4
C19	T-2	C40	B-4	C62	H-4	CR16	T-2	CR37	C-5	L19	I-5	Q22	I-5	Q44	D-4	Q66	F-4	R33	I-3	R55	G-2	R77	D-2	R100	B-3	R122	F-5	R145	J-5	R167	F-4	R190	F-4
C20	G-2	C41	B-3	C63	I-5	CR17	T-2	CR38	C-5	L20	I-5	Q23	I-5	Q45	D-4	Q67	F-4	R34	T-3	R56	I-2	R78	D-2	R101	B-2	R123	F-5	R146	G-4	R168	E-5	R191	F-4
C21	G-2	C42	B-4	C64	H-3	CR18	T-2	CR39	C-5	L21	I-5	Q24	I-5	Q46	D-4	Q68	F-4	R35	I-2	R57	I-2	R79	C-3	R102	B-3	R124	F-5	R147	G-4	R169	E-4	R192	D-3
		C43	B-4	C65	B-5	CR19	B-2	CR40	D-4	L22	I-5	Q25	I-5	Q47	D-4	Q69	F-4	R36	G-3	R58	I-2	R80	C-3	R103	B-3	R125	F-5	R148	H-4	R170	H-5	R193	E-4
						CR41	D-4	CR41	D-4	L23	I-5			Q48	D-4	Q70	F-4					R81	C-3			R126	F-5	R149	H-4	R171	H-5	R194	C-4

Figure 7-2. Replacement for Figure 6-2. Component Layout-Board A5



VOLTAGE REGULATOR IC's - BOARD A6

Figure 7-3. Replacement for Figure 6-12. Power Supplies 8013B