

SWITCHES

S1A&B CH1 DC-GND-AC SELECTOR

S2A-C CH1 ATTENUATOR

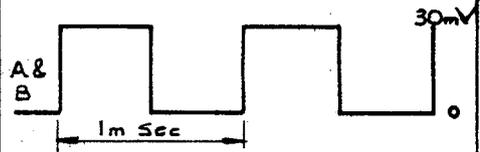
S51A&B CH2 DC-GND-AC SELECTOR

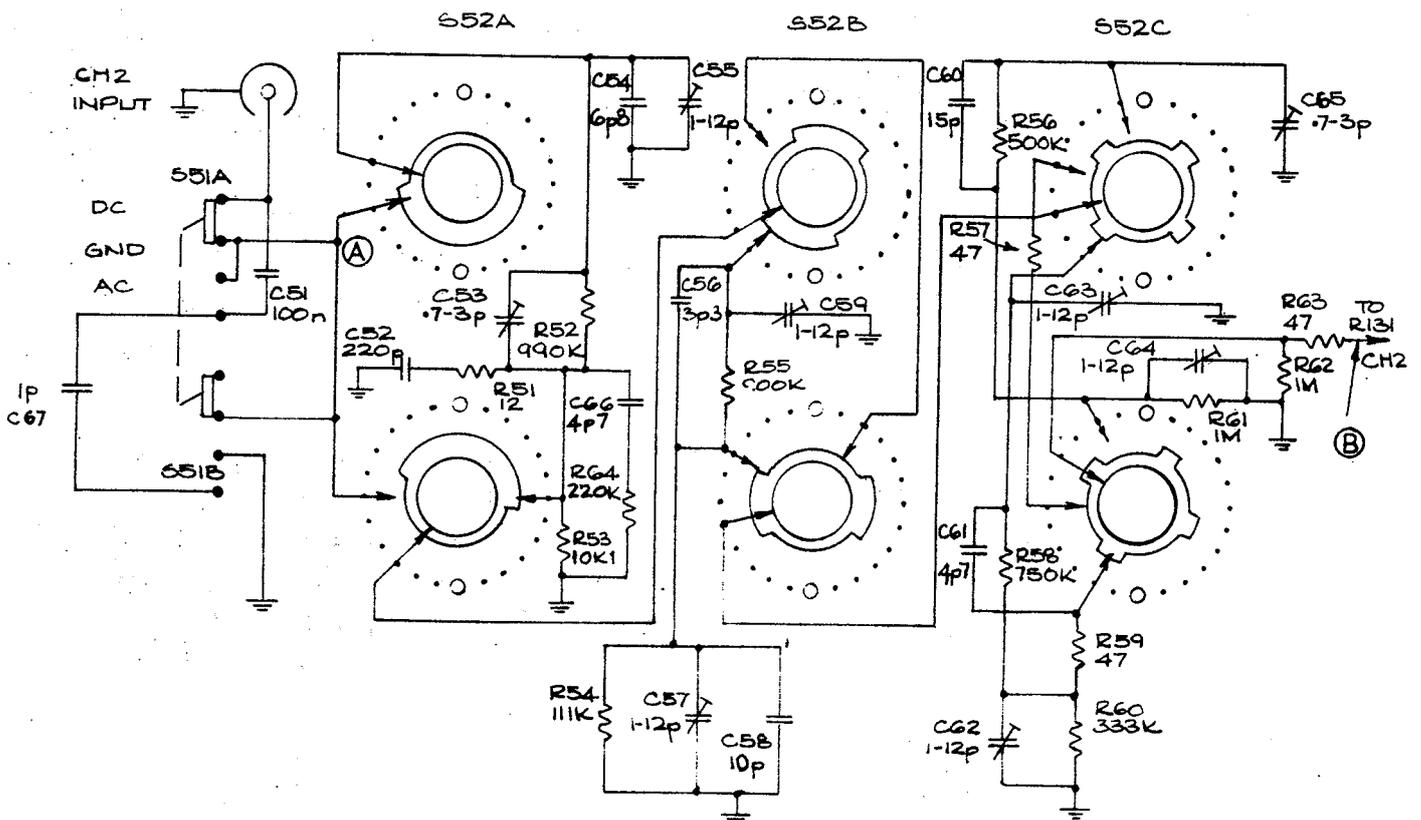
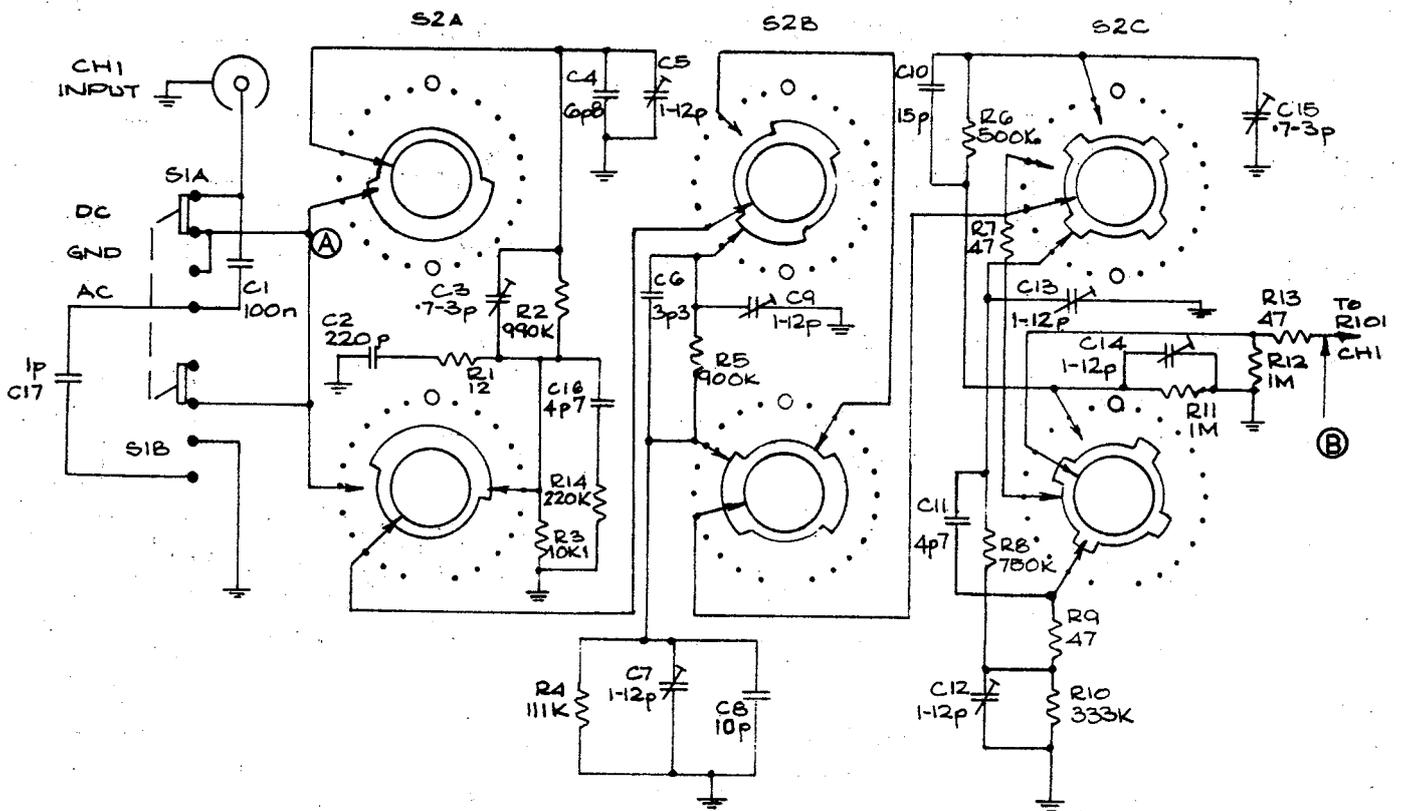
S52A-C CH2 ATTENUATOR

WAVE FORMS

INPUT 30 m V P-P

1 KHz SQUARE WAVE





SWITCHES

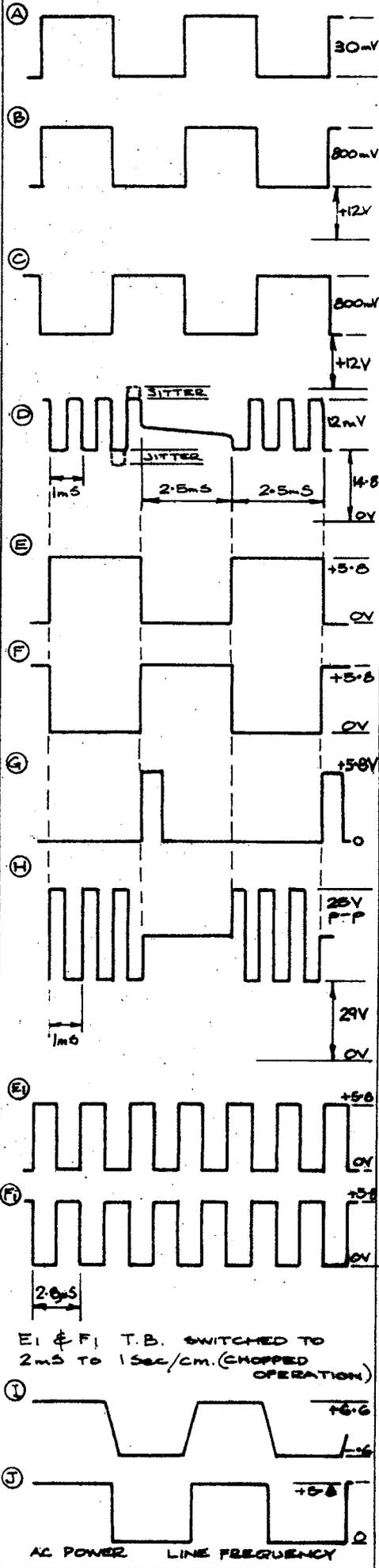
S131A & B CH2 OFF (REAR RV134)  
 S161A - D DUAL TRACE / DIFFERENTIAL

CONTROLS

RV101	CH1 DC BALANCE
RV102	CH1 VERNIER
RV103	CH1 SET 5mV CAL
RV104	CH1 POSITION
RV105	CH1 SET 2mV CAL
RV106	CH1 HF RESPONSE
RV107	SET DIFFERENTIAL DC CURRENT
RV108	CH 1 CENTREING
RV131	CH2 DC BALANCE
RV132	CH2 VERNIER
RV133	CH2 SET 5mV CAL
RV134	CH2 POSITION
RV135	CH2 SET 2mV CAL
RV136	SET X POSITION (X-Y OPERATION)
RV137	CH2 HF RESPONSE
RV138	CH2 CENTREING
RV161	SET 1V CAL OUTPUT
RV221	} REAR PANEL
RV222	

WAVEFORMS

(INPUT 1KHz SQUAREWAVE 6cm DEFLECTION)  
 T.B. TO 1in/Sec/cm. DUAL TRACE

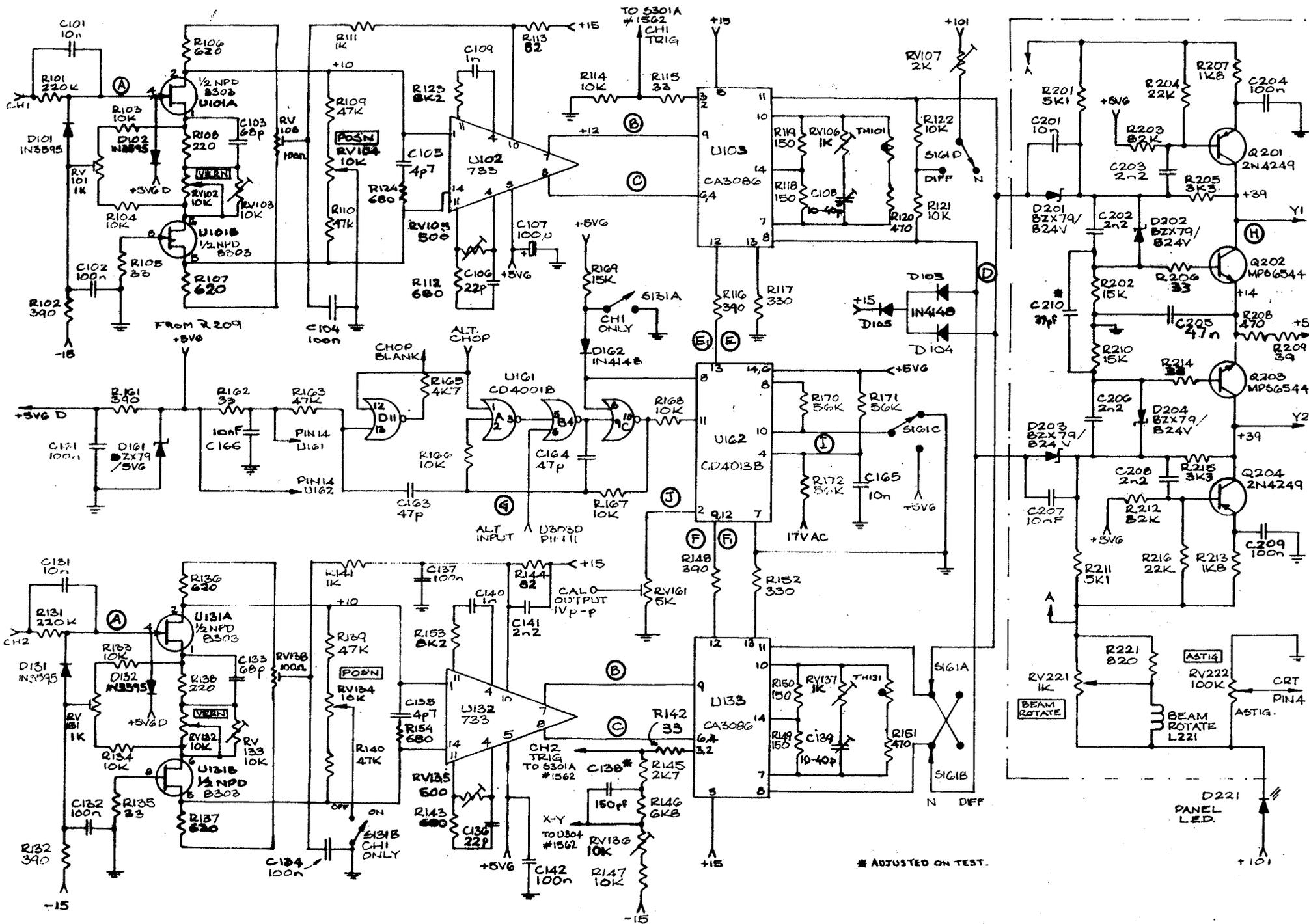


BWD 820

VERTICAL

AMBIFFERS

DDA NL 18A1-D



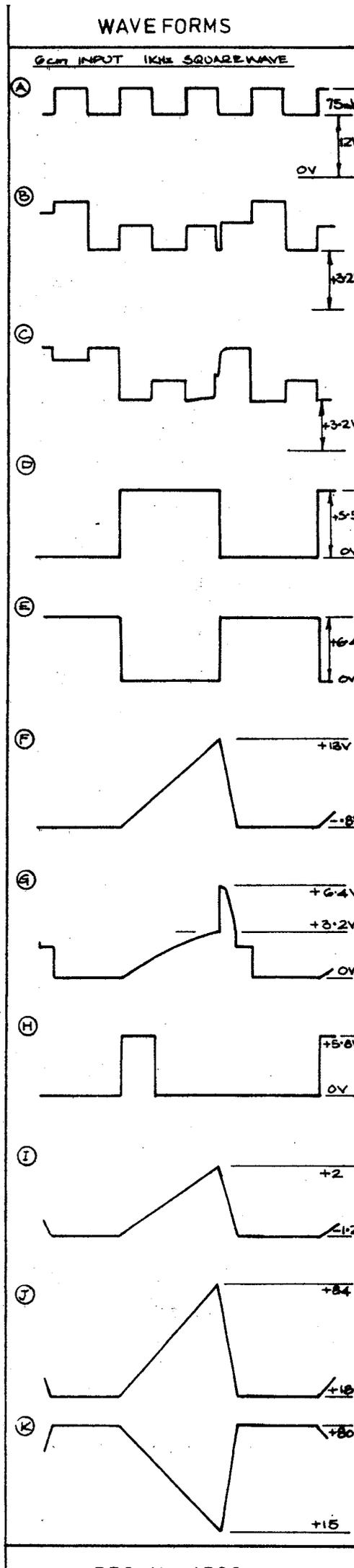
\* ADJUSTED ON TEST.

## SWITCHES

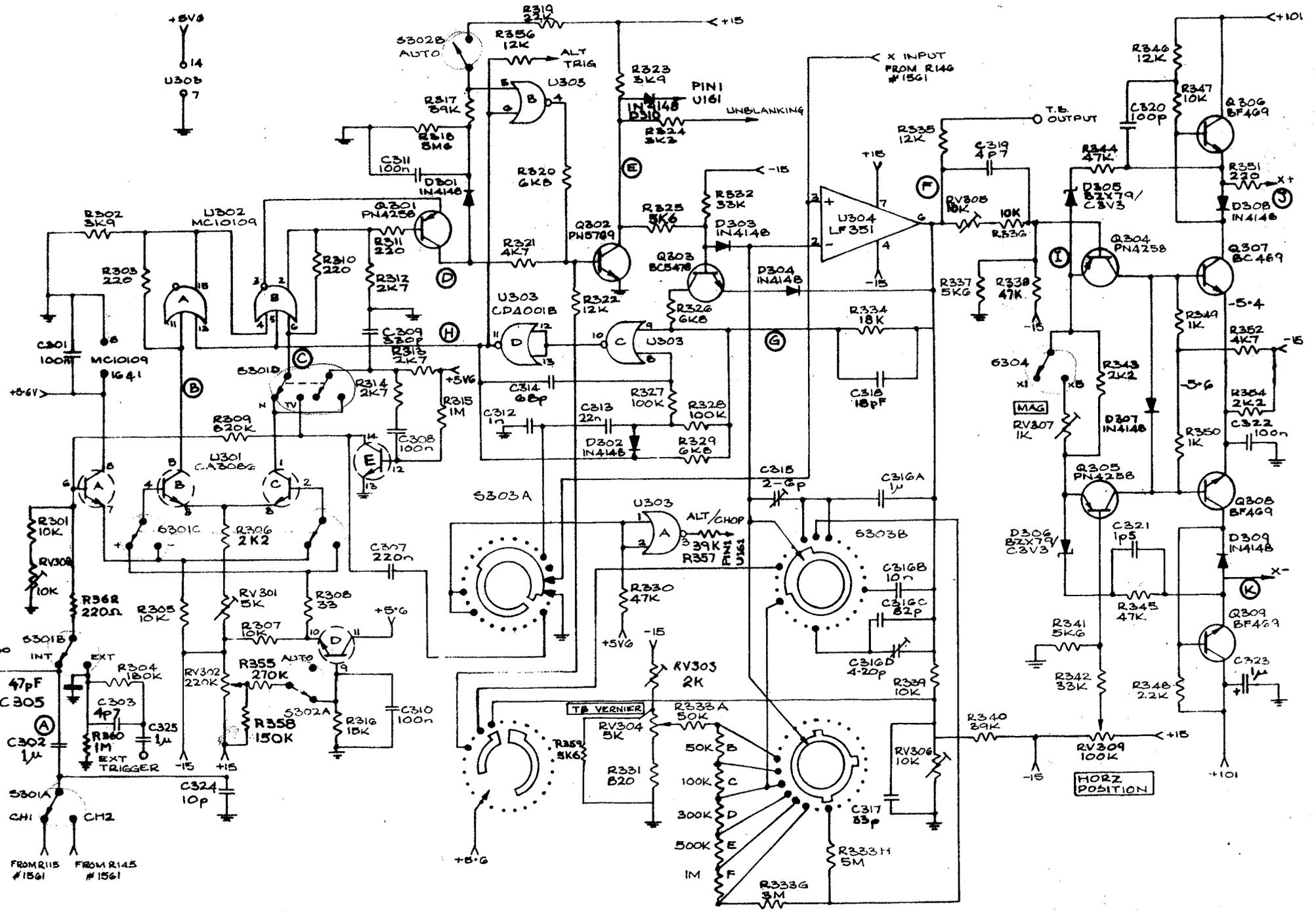
- S301A CH1 or CH2 TRIG. SELECT
- S301B INT. or EXT. TRIG. SELECT
- S301C + or - TRIG. SELECT
- S301D N or TV TRIG. SELECT
- S302A&B AUTO or LEVEL SELECT (REAR RV302)
- S303A&B T. B. RANGE
- S304 X1 or X5 MAGNIFICATION (REAR RV309)

## CONTROLS

- RV 301 SET SENSITIVITY
- RV302 TRIGGER LEVEL
- RV 303 T. B. CAL SET
- RV 304 T. B. VERNIER
- RV 305 SET X1 TRACE LENGTH
- RV 306 SET X-Y CAL
- RV 307 SET X5 MAGNIFICATION



BWD 820 TIME BASE & HORIZ AMPLIFIER DRG. NO. 1562-9



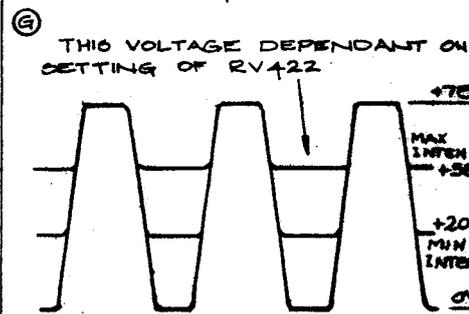
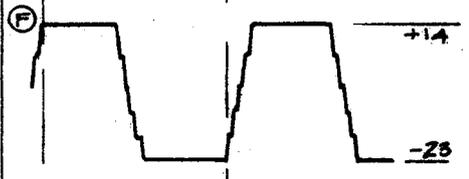
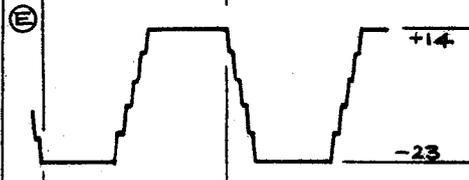
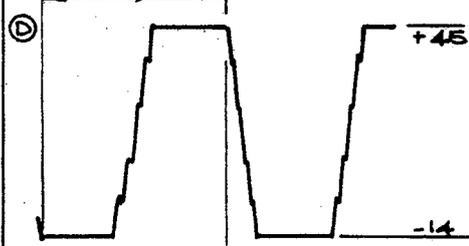
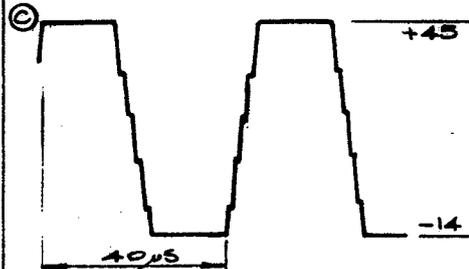
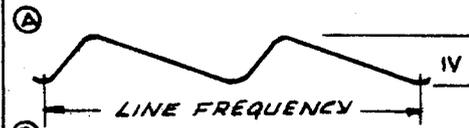
SWITCHES

S401 AC POWER (REAR RV425)

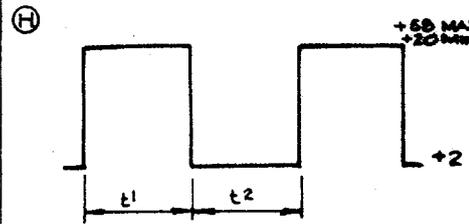
CONTROLS

RV421 SET EHT  
 RV422 SET INTENSITY RANGE  
 RV423 FOCUS  
 RV424 GEOMETRY  
 RV425 INTENSITY

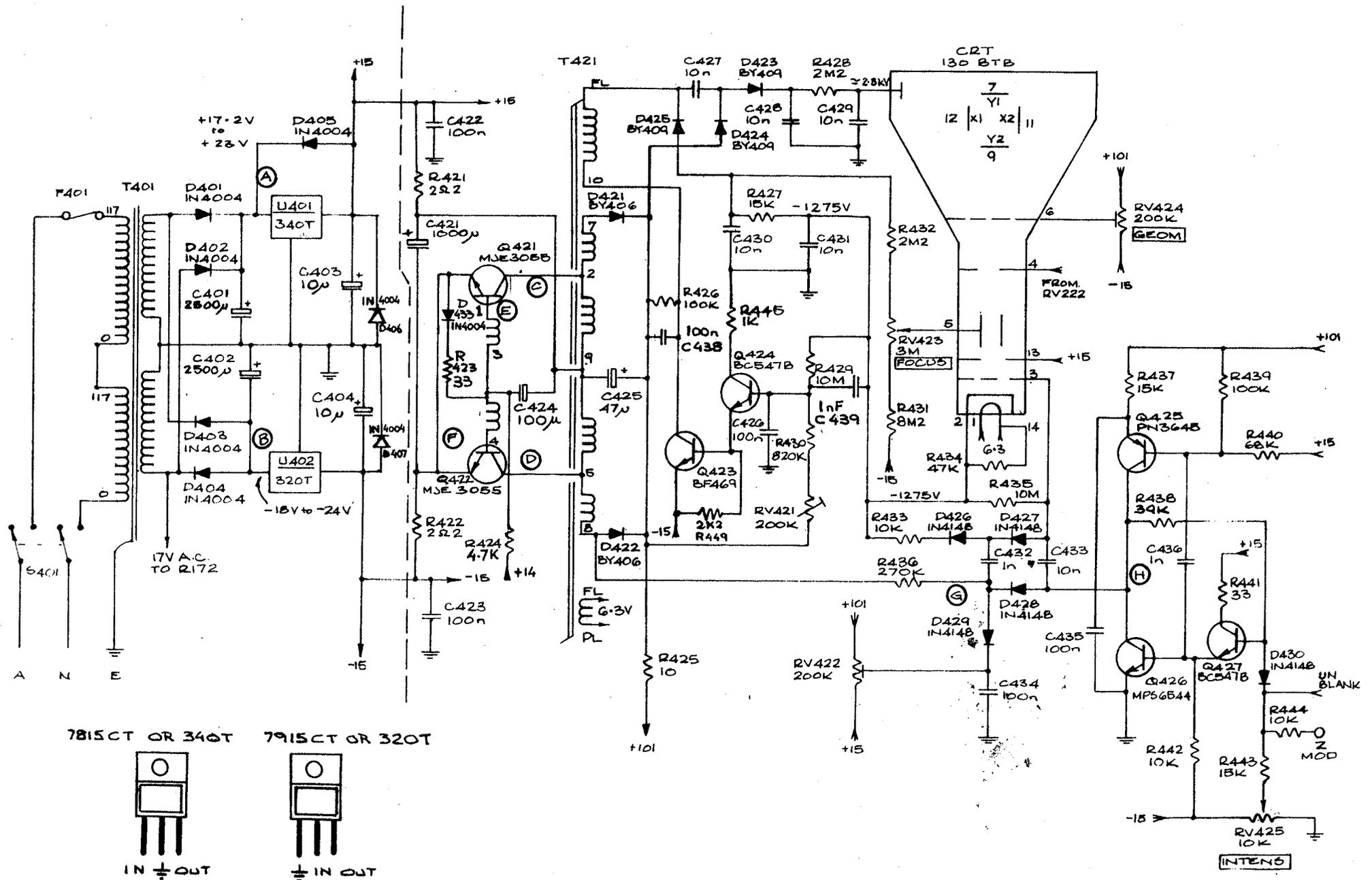
WAVEFORMS



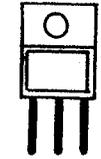
MAX. INT. +58V  
 MIN. INT. +20V



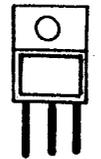
t1 & t2 DEPENDANT ON TIME BASE SWEEPING RATE.



7815CT OR 340T      7915CT OR 320T



IN  $\neq$  OUT



$\neq$  IN OUT

REGULATOR PINOUT

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MANUAL CHANGE INFORMATION FOR MODEL BWD 820

FROM SERIAL NO.	ISSUE	DATE	FROM SERIAL NO	ISSUE	DATE
44774	2	8.4.80			

Issue	Sect.	Page	Cct.	AMENDMENT
2	2	2 & 3		Guide brought into line with Specification.
2	3-1	0		CMRR was >20db DC to 10MHz. Now DC to 5MHz.
2	3-1	0		Max CMR Input was 10cm deflection. Now 8cm.
2	3-3	1		TRIG Sen Int AUTO was >1cm 5Hz-20MHz. Now 10Hz-20MHz.
2	3-3	1		TRIG Sen Int AUTO was >2cm 5Hz-30MHz. Now 10Hz-30MHz.
2	3-3	1		TRIG Sen Int Select was >1cm 3Hz to 25MHz. Now 5Hz-25MHz.
2	3-3	1		TRIG Sen Int Select was >2cm 3Hz to 40MHz. Now 5Hz-40MHz.
2	3-3	1		TRIG Sen Ext AUTO >2V 3Hz to 25MHz REMOVED.
2	3-3	1		TRIG Sen Ext Select 1V to 10V was 2Hz to 40MHz. Now 5Hz to 40kHz.
2	8-6	2		Para 2 (below) replaced. See page 8-2 this book.  U161 quad NOR gate sections A B & C are connected as a free running 250kHz oscillator, producing a square wave at pin 10 of gate C. In this condition, pin 1 of gate A is held LO. However, from 1mSec to 200nSec wafer S303A of the time-base switch grounds the inputs to gate A of U303, forcing its output HI.
2	9-12	6		Line 1 <10Hz to 20MHz. Was 5Hz to 20MHz.
2	11	2		R142 68Ω 5% 1/4W MF added.
2	11	5		R446 10MΩ 5% 1/2W VR37 REMOVED.
2	11	5		R357 39K 5% 1/4W MF added.
2	11	5		R358 150K 5% 1/4W MF added.
2	11	7		C303 was 1pF 10%. Now 4p7 10% cap.
2	11	7		C305 was 2n2 20%. Now 47pF 5% cap.
2	11	8		C323 was 47μF 160V electro. Now 1μF 250V 10% Elna Type N.
2	11	9		C438 100nF 400V cap added.
2	11	9		C439 1nF 2K cap added.
2	11	13		D310 IN4148 diode added.
2	11	13		D431 IN4004 diode removed.
2			1561	R142 68Ω added between pin 2 & 3 of U133 & R145.
2			1562	C305 removed from between C324 & 5303A and replaced between R304 and ground. Value was 2n2. Now 47pF.

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MANUAL CHANGE INFORMATION FOR MODEL BWD 820

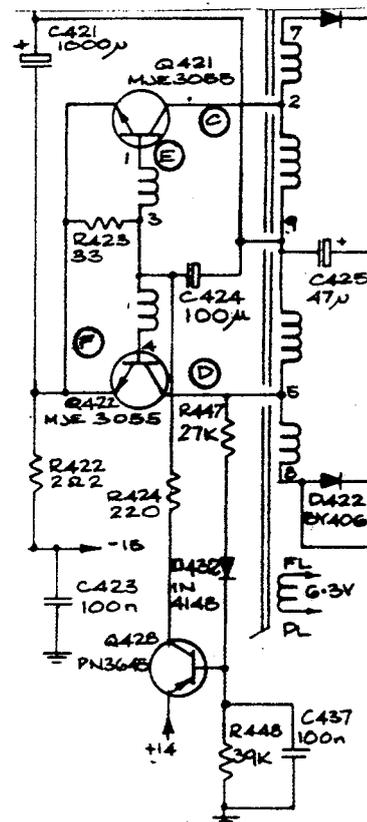
FROM SERIAL NO.	ISSUE	DATE	FROM SERIAL NO.	ISSUE	DATE
44774	2	8.4.80			
45524	3	12.5.80			
44774	4	17.7.80			

Issue	Sect.	Page	Cct.	AMENDMENT
2			1562	C340 was 1pF. Now 4p7.
2			1562	R355 was 150K. Now 270K.
2			1562	R358 added across RV302.
2			1562	D310 added between Q302 collector and U161 pin 1.
2			1562	R357 added between R357 and U161 pin 1 & 12.
2			1562	C323 was 47µF 160V. Now 1µF 250V.
2			1563	D431 1N4004 removed. Replaced by C438 100nF 400V cap.
2			1563	R446 10MΩ in parallel with R430 removed.
2			1563	C439 1nF 2KV cap added across R429.
3			1561	C166 10nF 63V added
3	11	9	1561	RV101 & 131 WERE 500Ω
3	11	2	1561	R142 was 68Ω. R143 was 330Ω
3	11	10	1562	RV305 was 5k
3	11	8	1562	C318 was 27pF
3	11	5	1562	R355 was 150k
3	11	5	1562	R353 22k in parallel with R354 removed
3	11	4	1562	R338 was 39k
3	11	8	1562	C321 was 1pF
4				<u>NOTE: The following changes apply to ALL models after Serial No. 44774</u>
4	8	1		Change Q101A & B to read U101A & B. Change U101 to U102. Change U102 to U103.
4	8	2		Change U132 to U133, change U102 to U103.
4	11	11		U101A & B was Q101A & B, U102 was U101, U103 was U102. U131A & B was Q131A & B, U132 was U131, U133 was U132.
4			1561	U101A & B was Q101A & B, U102 was U101, U103 was U102, U131A & B was Q131A & B, U132 was U131, U133 was U132.
4	9	6E		1st Line 10Hz to 20MHz was 5Hz to 20MHz
4	9	2		Bottom view photograph. Channel 1. Atten C Numbers C12, 13 & 14 were interchanged with C14, 15 & 7. Channel 2. Atten C Numbers C62, 63 & 59 were interchanged with C64, 65 & 57.

MANUAL CHANGE INFORMATION FOR MODEL BWD 820

FROM SERIAL NO.	ISSUE	DATE	FROM SERIAL NO.	ISSUE	DATE
46261	5 & 6	17.7.80			
46261	7	30.9.80			
47041	8	20.10.80			

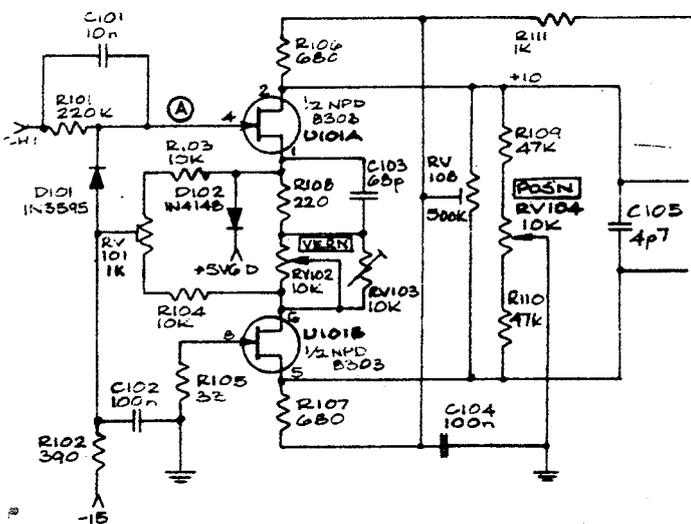
Issue	Sect.	Page	Cct.	AMENDMENT
5	11	12	1561	D103 & 104 added.
6	11	12	1561	D105 added.
6	11	1 & 2	1561	R123 was 1W.
6	11	3	1562	R300 added.
6	5	0		117V & 235V nominal added to transformer diagram.
6	11	8		Full Part No. added to C315 & C316D.
6	11	10		Note added. Q201 & 204 matched pair.
6	11	11		Note added. Q421 & 422 matched pair.
6	11	13		D221 parts list error, was FLV304.
6	11	14		Part No's added to S1, S2, S52, S57, S161, S301 & S303.
6	11	15		F401 Fuse size was 3AG.
6	11	5	1563	R449 added across base-emitter Q423.
6	11	13	1563	D406 & 7 added across + & -15V rails.
6	11	6	1560	C17 & C67 ADDED.
6	11	7 & 8	1562	C302 Moved. C325 Added.
6	11	5	1562	R360 Added.
6	8	4		Para 12. Add 'C325' after via end of line 2.
				Para 12. Remove 'AC coupled via C302' and insert 'applied' in line 4.
7	All	All	All	Handbook upgraded.
8	11	5, 9, 11, 13	1563	Q428, C437, D432, R447 and R448 removed. R424 changed to 4k7 1W and taken to +14V as starting circuit not needed when D433 is added in series with R423.



MANUAL CHANGE INFORMATION FOR MODEL BWD 820

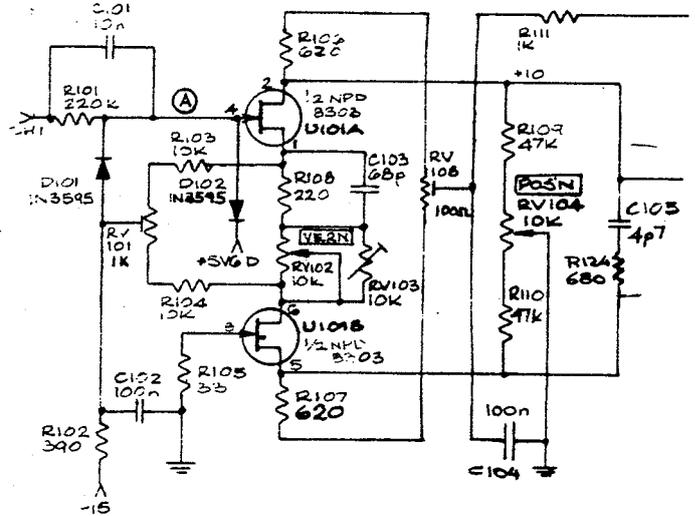
FROM SERIAL NO.	ISSUE	DATE	FROM SERIAL NO.	ISSUE	DATE
47041	8	20.10.80			
47241	9	30.11.80			

Issue	Sect.	Page	Cct.	AMENDMENT
8				Main PCB No. 160-313D
8	11	9	1561	RV108 & RV138 changed from 500K.
8	11	12	1561	D102 was IN4148.
8	11	12	1561	D132 was IN4148.
8	11	1 & 2	1561	R106, R107, R136 & R137 were 680Ω.
8	11	2	1561	R124 & R154 ADDED in series with C105 & C135.



NOTE: CH1 shown, CH2 similar.

Circuit applicable up to Serial No. 47040



Circuit applicable from Serial No. 47041

8	11	7	1561	C205 was 22n.
8	11	3	1561	R206 & R214 were 22Ω.
8	11	7	1561	C210 was 22pF C211 removed.
8	11	6 & 7	1561	C106 & C136 were 33P.
8	11	2	1561	R112 was 330Ω.
8	11	2	1561	R113 & R144 were 33Ω.
8	11	5 & 6	1560	C8 & C58 were 15P.
8	11	6	1561	C108 was C108A 4-20pF & C108B 10P
8	11	7	1561	C139 was C139A 4-20P & C139B 10P
8	11	4	1562	R306 was 3K3.
8	11	5	1562	R362 ADDED.
8	11	4	1562	R325 was 4k7.
8	11	5	1562	R359 ADDED.
9	11	5	1561	Larger beam rotation coil fitted.

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MANUAL CHANGE INFORMATION FOR MODEL BWD

FROM SERIAL NO.	ISSUE	DATE	FROM SERIAL NO.	ISSUE	DATE
47241	9	30.11.80			

Issue	Sect.	Page	Cct.	AMENDMENT
9	5	0	-	117V - 235V transformer connections redrawn. RV136 was 5k on drg. only. R334 was 22k, R336 was 12k. C138 & C210 "ADJUSTED ON TEST" ADDED.
9	-	-	1561	
9	11	4	1562	
9	11	7	1561	