

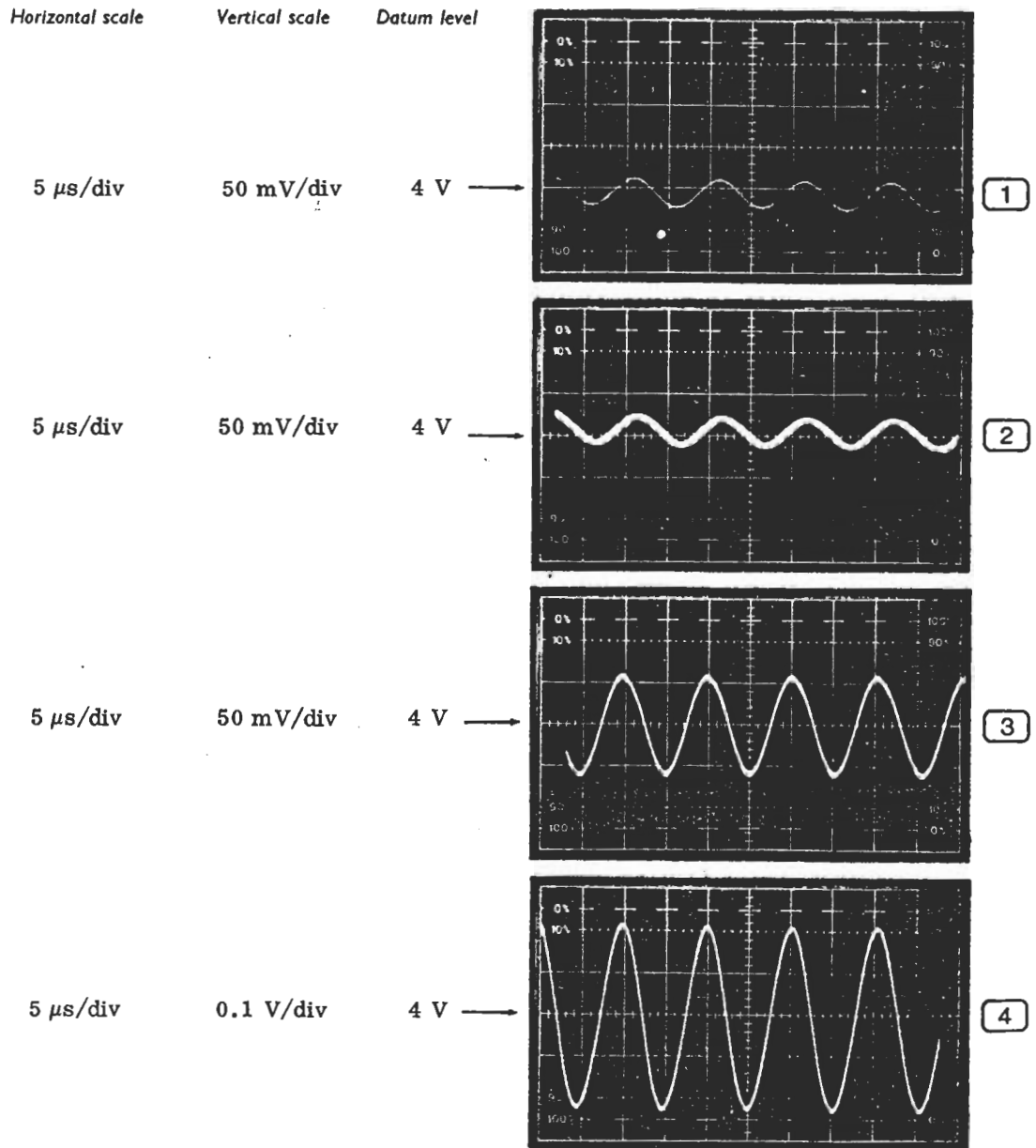
Waveforms for AD1 and AD2

TF 2370 controls - SWEEP MODE : AUTO

FILTER BANDWIDTH : NORMAL

VERTICAL SCALE RANGE : 10 dB/DIV

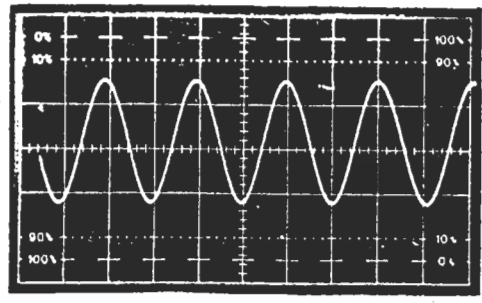
Feed a 100 kHz 33 mV p-p signal to pin 32 on AD1 with the wire to this pin disconnected.



5 μ s/div

0.5 V/div

4 V \rightarrow

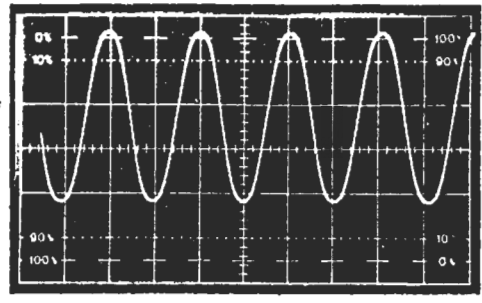


5

5 μ s/div

1 V/div

4 V \rightarrow

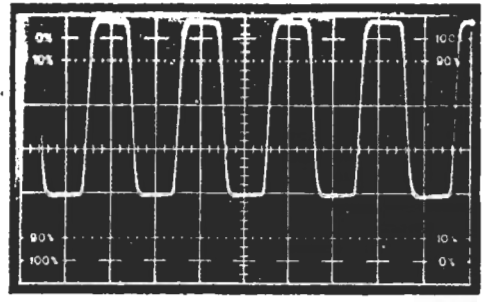


6

5 μ s/div

1 V/div

4 V \rightarrow

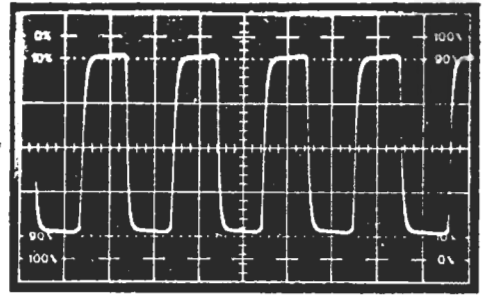


7

5 μ s/div

1 V/div

4 V \rightarrow

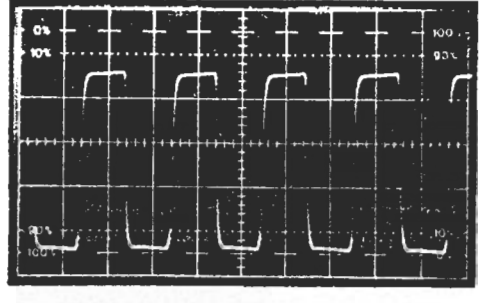


8

5 μ s/div

1 V/div

4 V \rightarrow

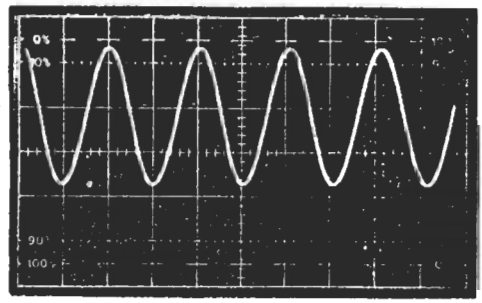


9

5 μ s/div

1 V/div

4 V \rightarrow

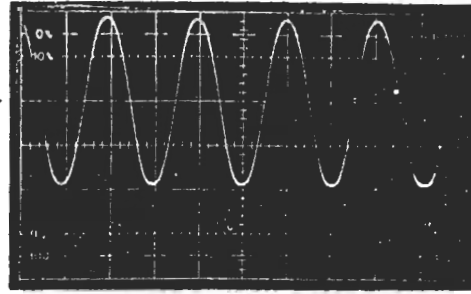


10

5 $\mu\text{s}/\text{div}$

1 V/div

4 V \longrightarrow

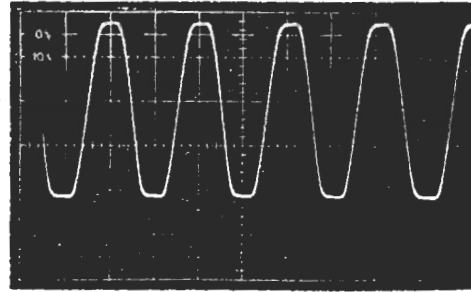


11

5 $\mu\text{s}/\text{div}$

1 V/div

4 V \longrightarrow

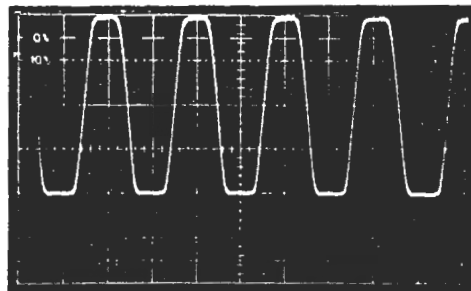


12

5 $\mu\text{s}/\text{div}$

1 V/div

4 V \longrightarrow

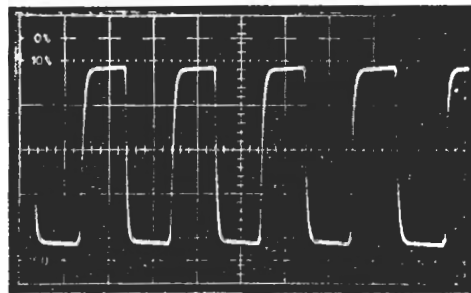


13

5 $\mu\text{s}/\text{div}$

1 V/div

4 V \longrightarrow

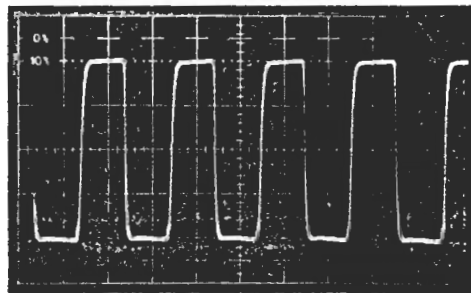


14

5 $\mu\text{s}/\text{div}$

1 V/div

4 V \longrightarrow

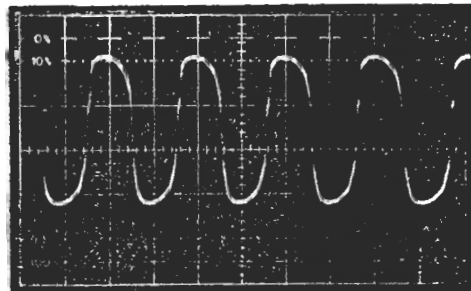


15

5 $\mu\text{s}/\text{div}$

0.5 V/div

3 V \longrightarrow

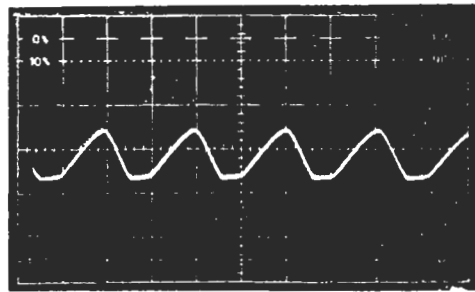


16

5 μ s/div

50 mV/div

0 V \rightarrow

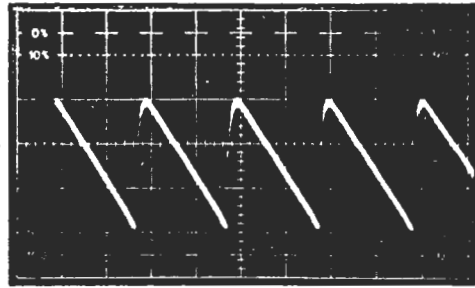


17

5 μ s/div

50 mV/div

0.9 V \rightarrow

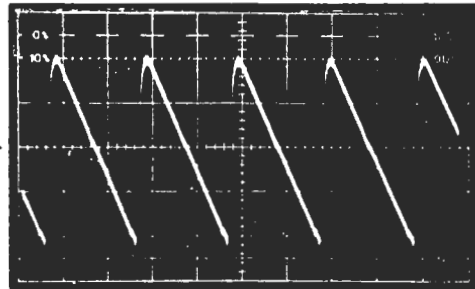


18

5 μ s/div

50 mV/div

1.2 V \rightarrow

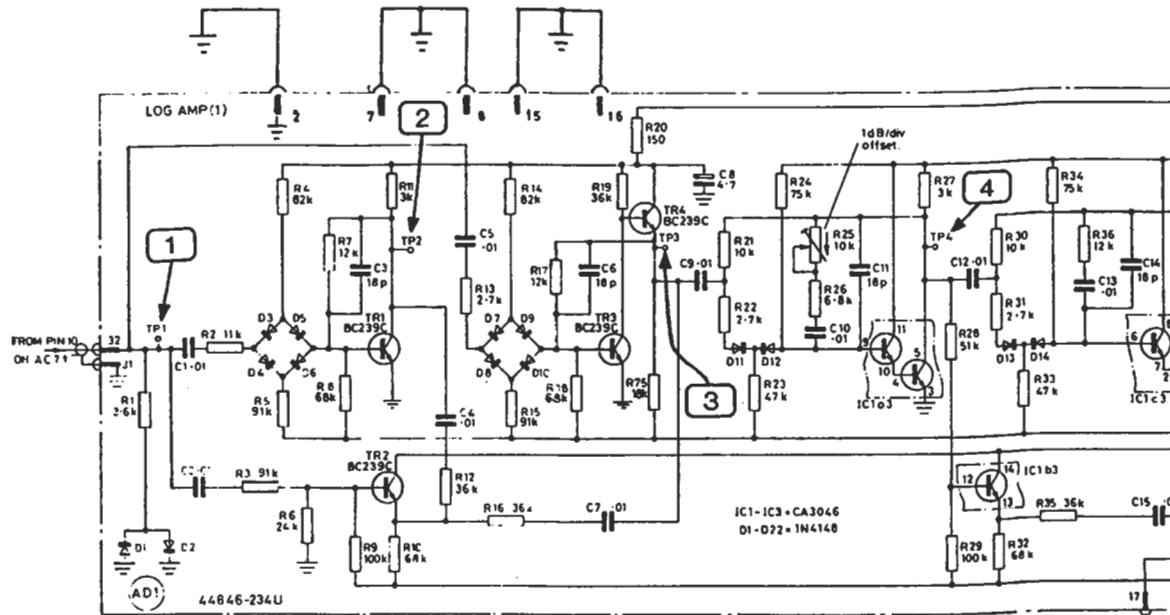


19

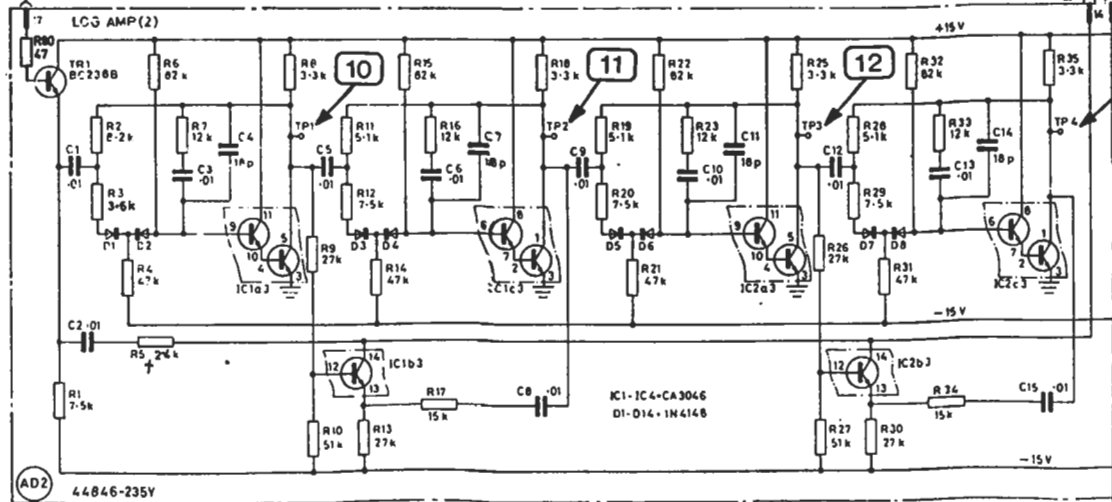
17

18

19



↑ INDICATES LEAD ROUTED VIA REAR PANEL PL 8 SK
SEE AO1 P1 1



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AD2

74 76 75

64

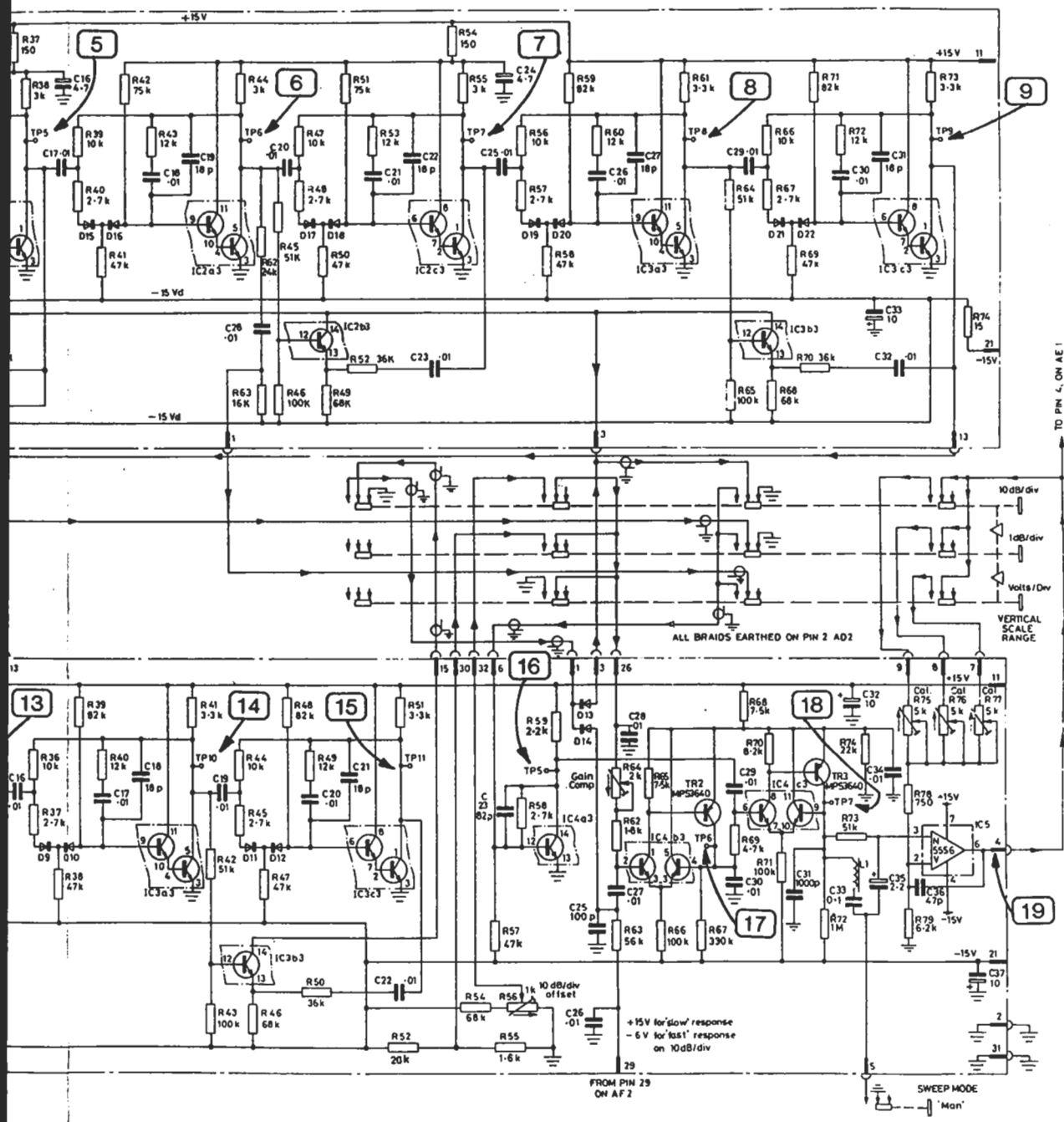


Fig. 7.18 Logarithmic amplifier AD1 and AD2

Waveforms for AE1

TF 2370 controls - SWEEP MODE : AUTO

HORIZONTAL SCALE and RANGE : (1) to (10) 0.5 MHz/DIV
(11) to (22) to 10 MHz/DIV

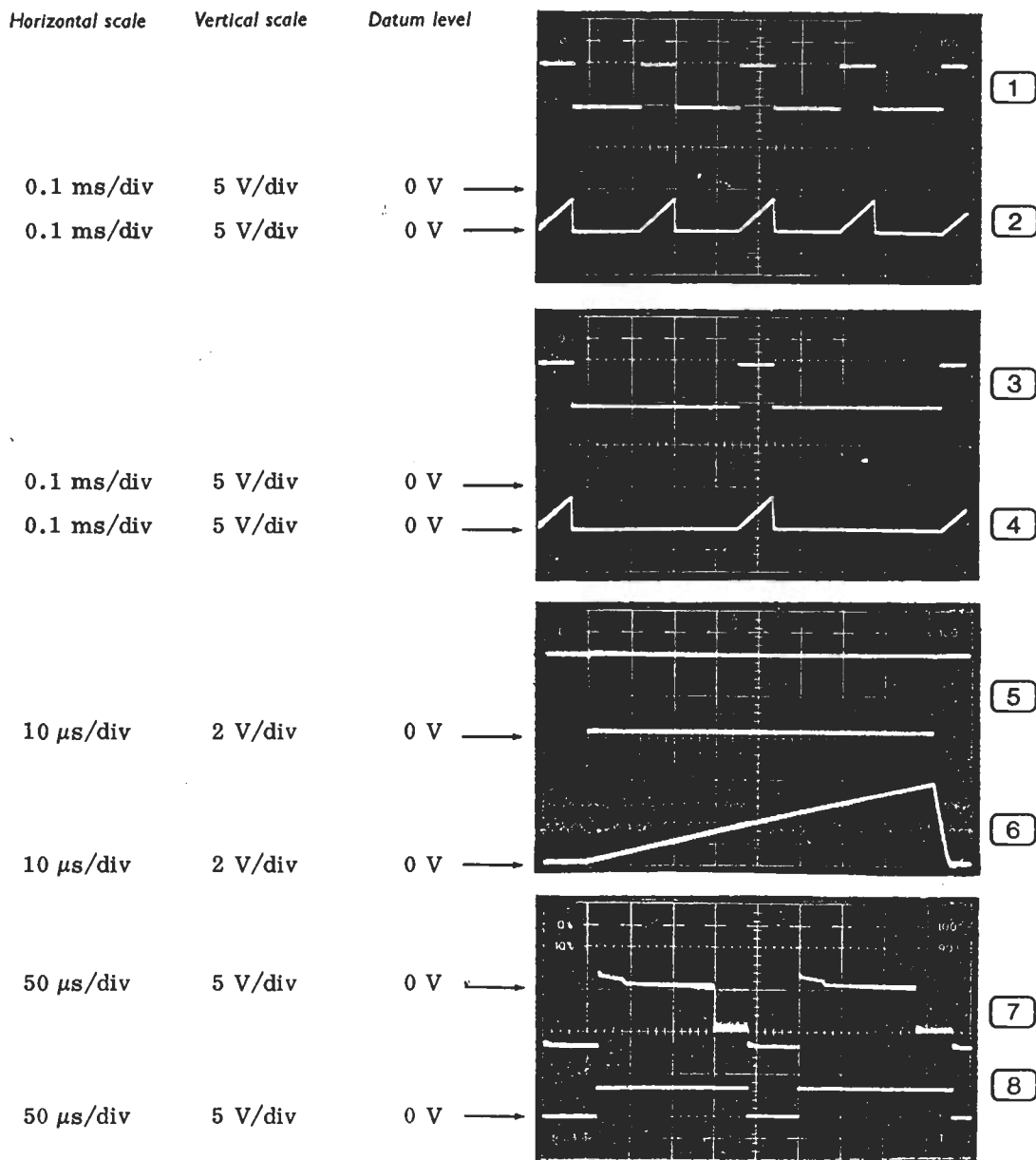
FILTER BANDWIDTH : (1) to (10) NORMAL
(11) to (22) WIDE

VERTICAL SCALE and RANGE : 0 dBm 10 dB/DIV

STORE and DISPLAY : (1), (2) and (5) to (22) HIGH DEFN
(3) and (4) A

For (1) to (10), connect the TRACKING GENERATOR OUTPUT to the INPUT.

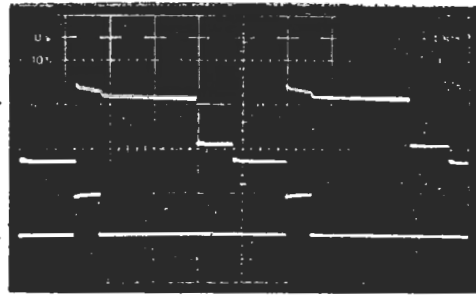
For (11) to (22), use a pulse generator triggered from pin 26 on AE1. Connect the pulse generator to pin 4 on AE1, disconnecting the wire from pin 4 on AD2. Set the pulse width to 5 μ s with a rise time of 1 μ s. Trigger the oscilloscope (a.c. positive) from the sync output of the pulse generator. Adjust the output level of the pulse generator to give a display on the CATHODE RAY TUBE of 3 divisions high. Set the pulse generator to a delay of 20 μ s for (11) to (14) and 60 μ s for (15) to (22).



50 $\mu\text{s}/\text{div}$

5 V/div

0 V \longrightarrow



9

50 $\mu\text{s}/\text{div}$

5 V/div

0 V \longrightarrow

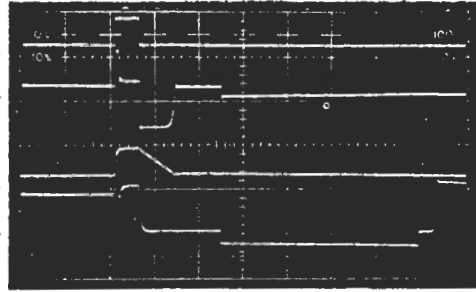


10

10 $\mu\text{s}/\text{div}$

1 V/div

0 V \longrightarrow

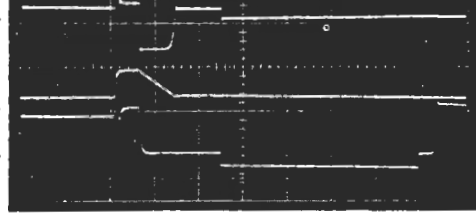


11

10 $\mu\text{s}/\text{div}$

5 V/div

0 V \longrightarrow

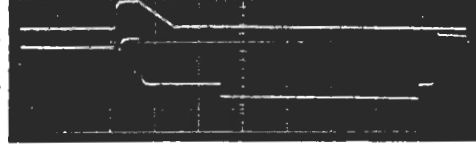


12

10 $\mu\text{s}/\text{div}$

1 V/div

0 V \longrightarrow

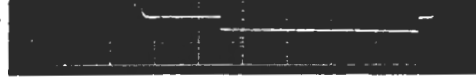


13

10 $\mu\text{s}/\text{div}$

5 V/div

-5 V \longrightarrow

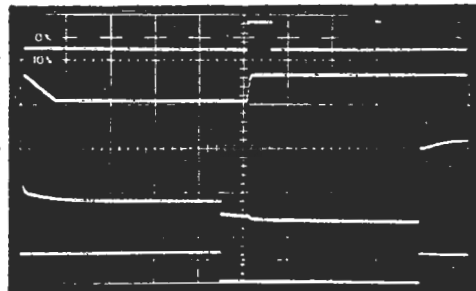


14

10 $\mu\text{s}/\text{div}$

1 V/div

0 V \longrightarrow

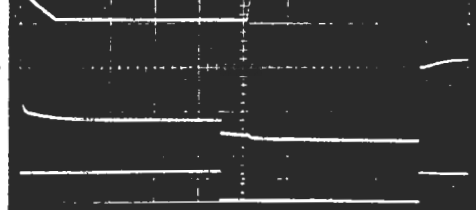


15

10 $\mu\text{s}/\text{div}$

1 V/div

0 V \longrightarrow

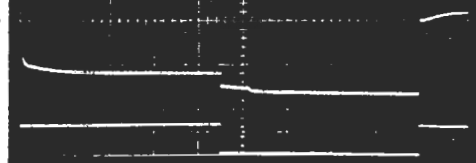


16

10 $\mu\text{s}/\text{div}$

5 V/div

0 V \longrightarrow



17

10 $\mu\text{s}/\text{div}$

5 V/div

0 V \longrightarrow

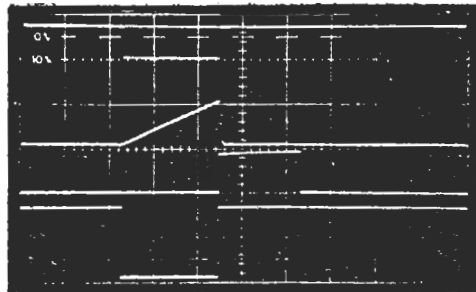


18

20 $\mu\text{s}/\text{div}$

5 V/div

0 V \longrightarrow

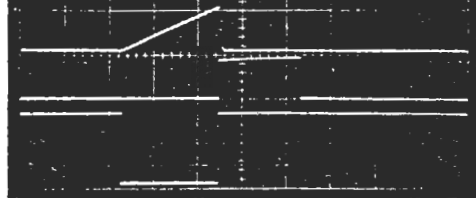


19

20 $\mu\text{s}/\text{div}$

2 V/div

0 V \longrightarrow

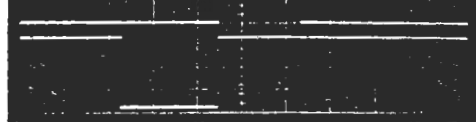


20

20 $\mu\text{s}/\text{div}$

5 V/div

0 V \longrightarrow



21

20 $\mu\text{s}/\text{div}$

2 V/div

0 V \longrightarrow



22

9

10

11

12

13

14

15

16

17

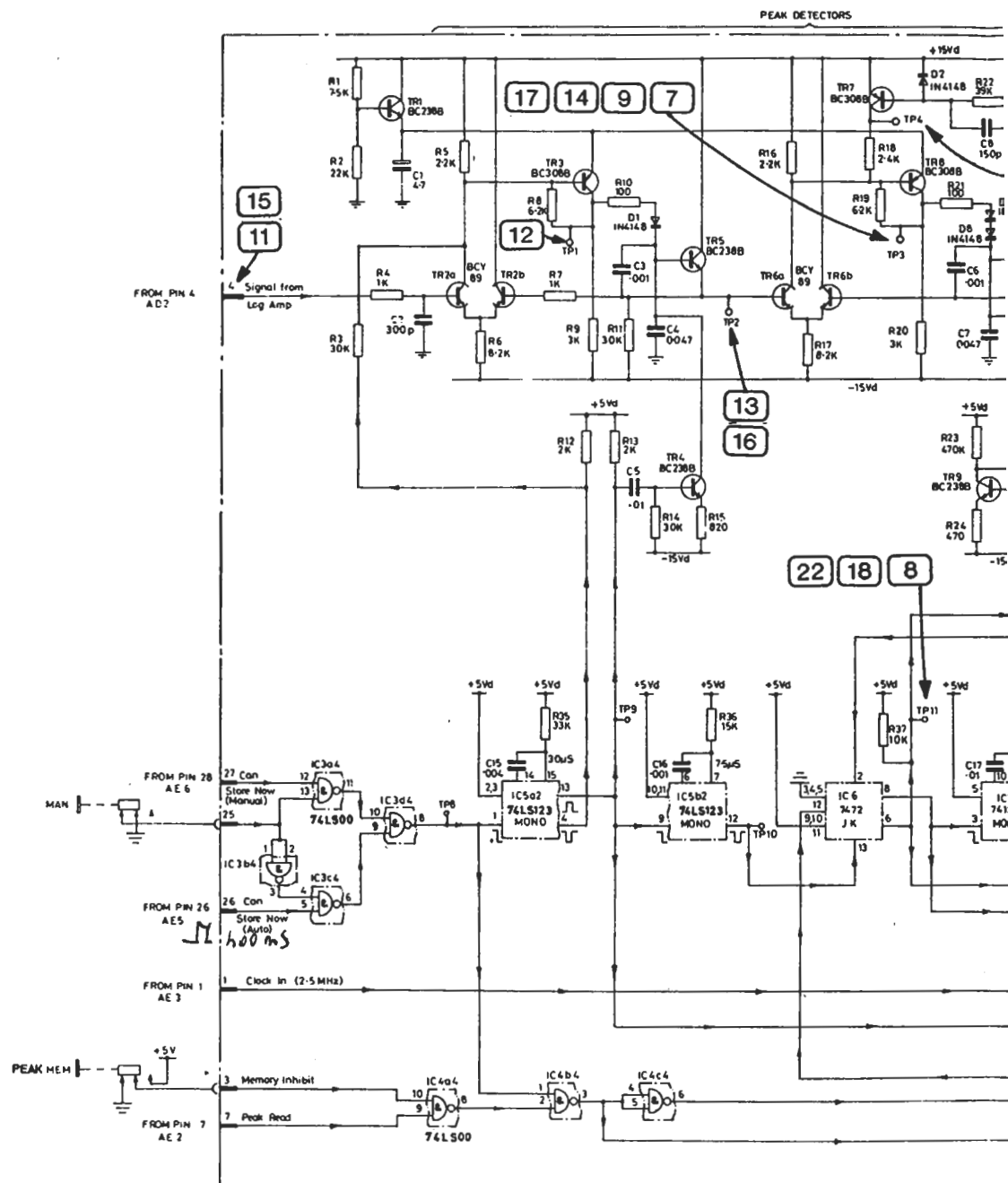
18

19

20

21

22



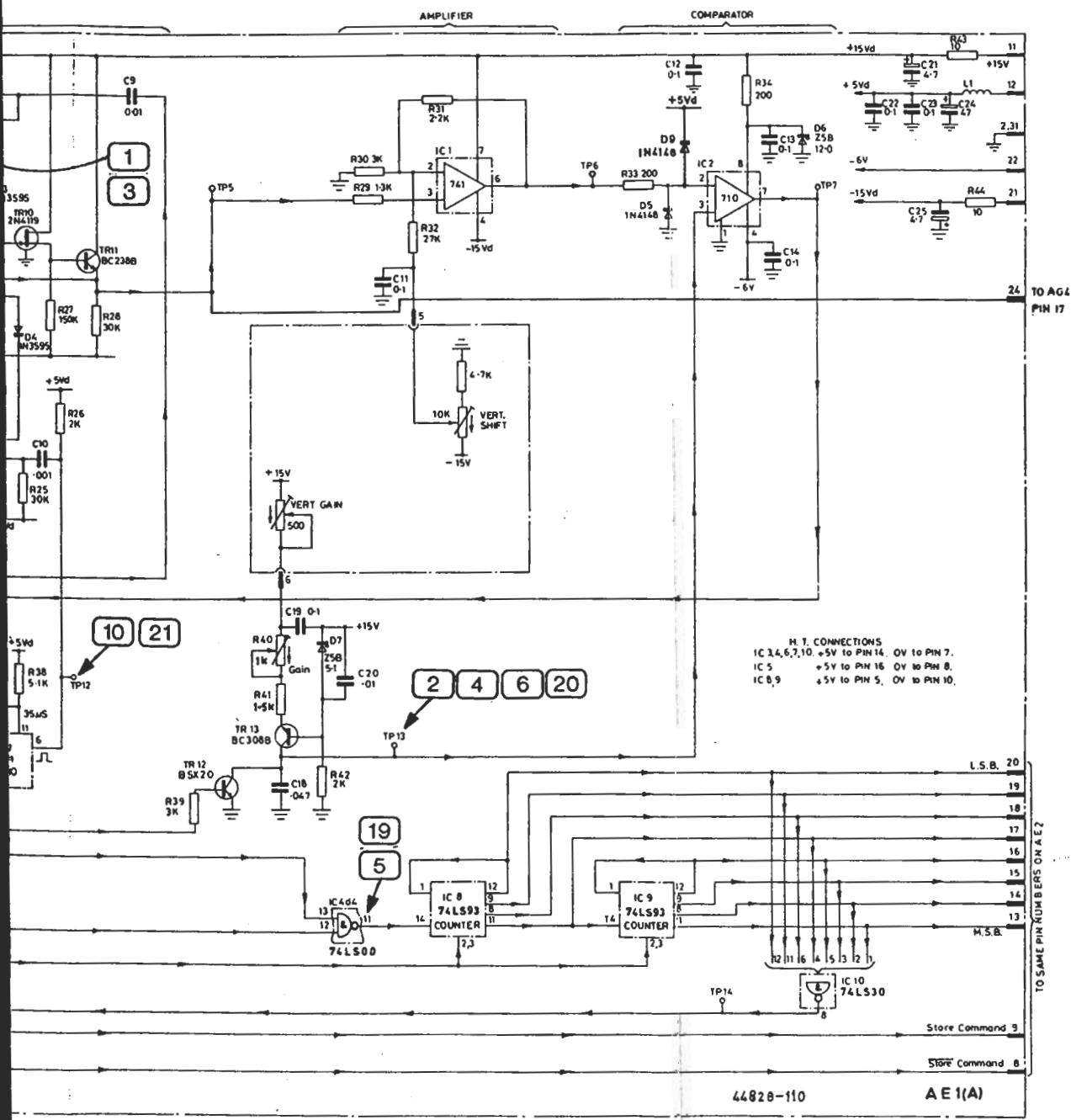


Fig. 7.19 Peak detector and analogue to digital converter AE1

Waveforms for AE2

TF 2370 controls - SWEEP MODE : (1) to (6) AUTO
(7) SINGLE

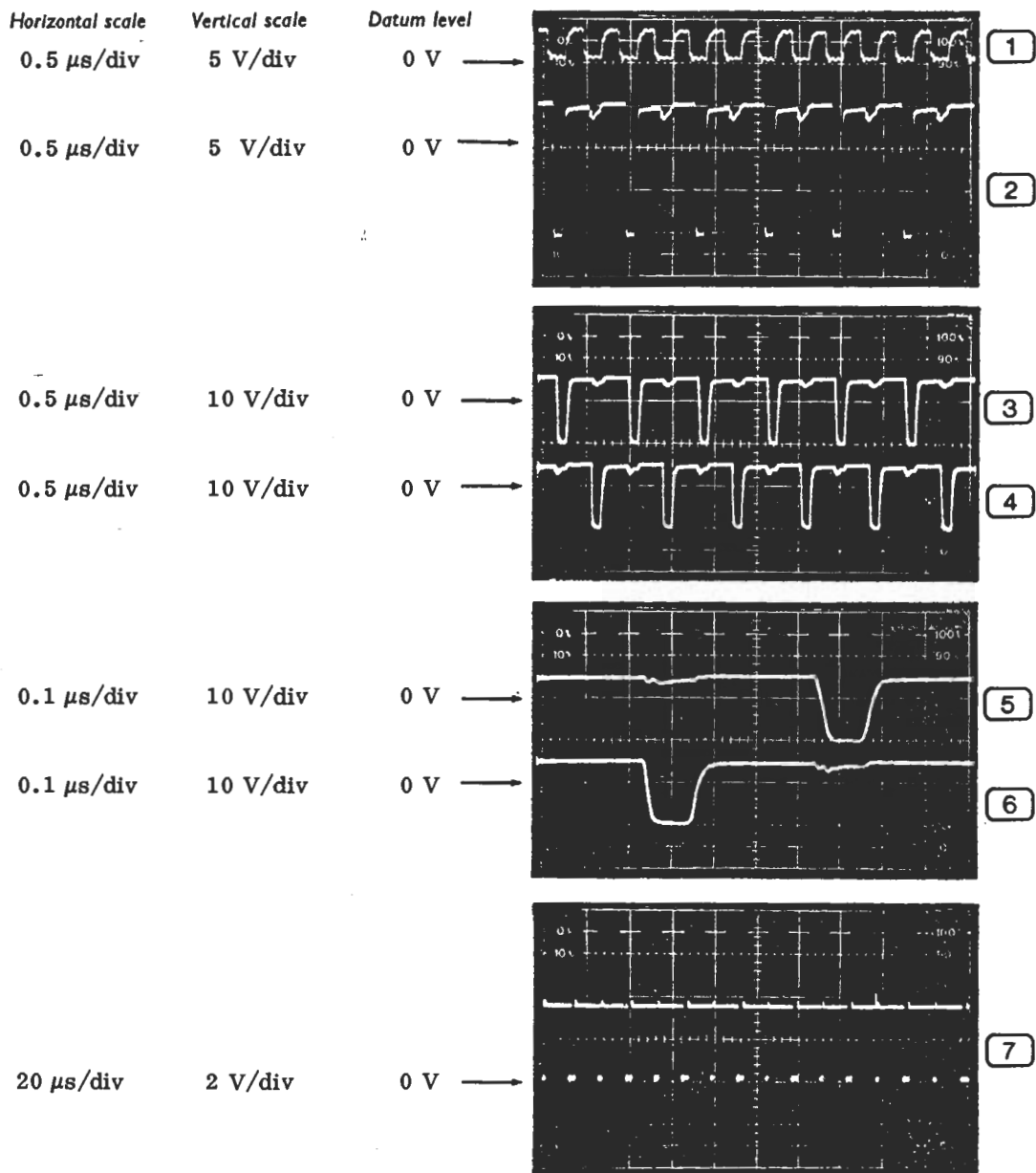
HORIZONTAL SCALE and RANGE : 0.2 MHz/DIV

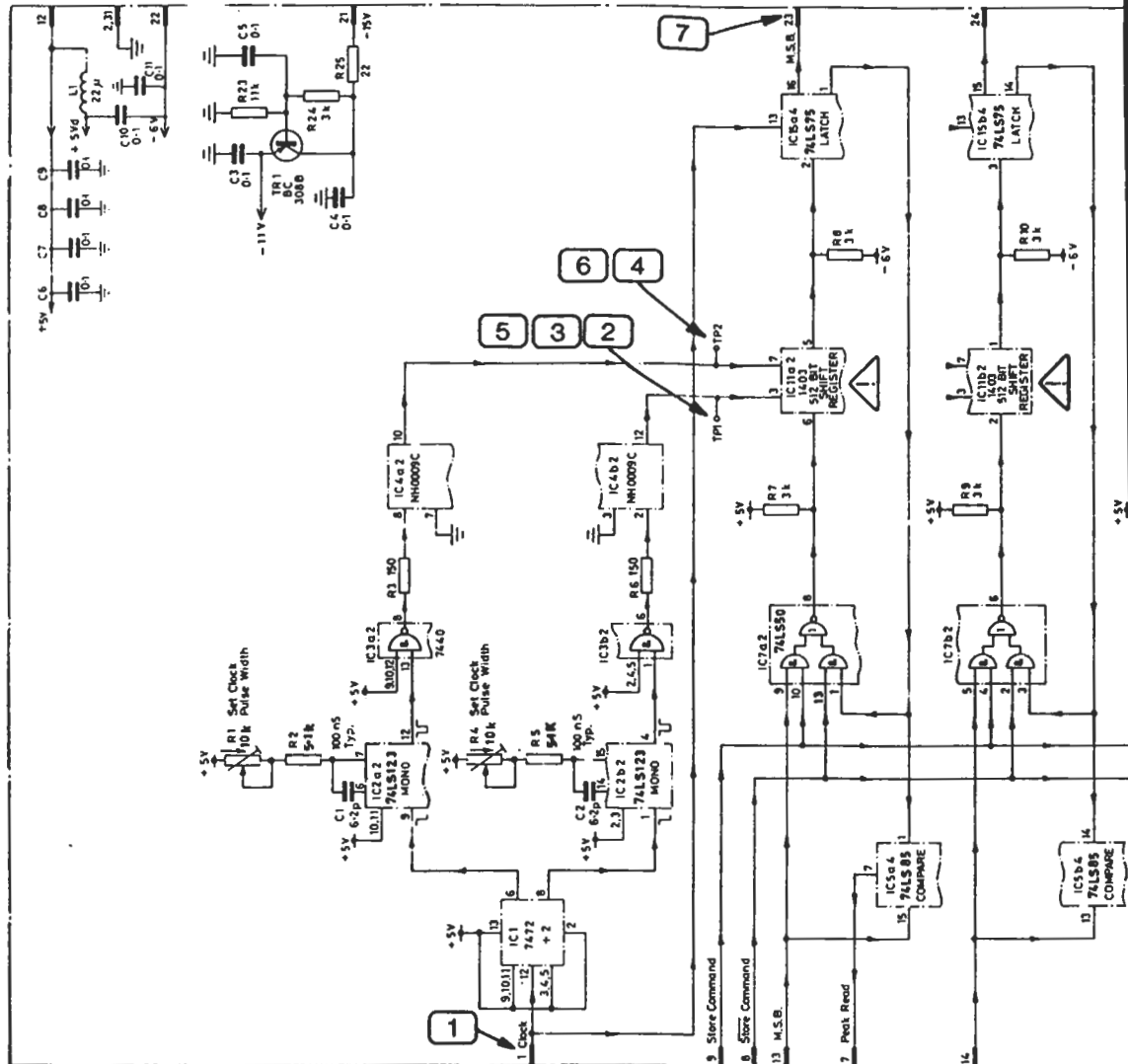
FILTER BANDWIDTH : NORMAL

VERTICAL SCALE and RANGE : 0 dBm 10 dB/DIV

For (7), connect the STANDARD 10 MHz OUTPUT to the INPUT. Adjust the REFERENCE FREQUENCY so that the 10 MHz display is at the centre of the CATHODE RAY TUBE.

Oscilloscope triggering - (7) from pin 18 on AE3 (d. c. negative).



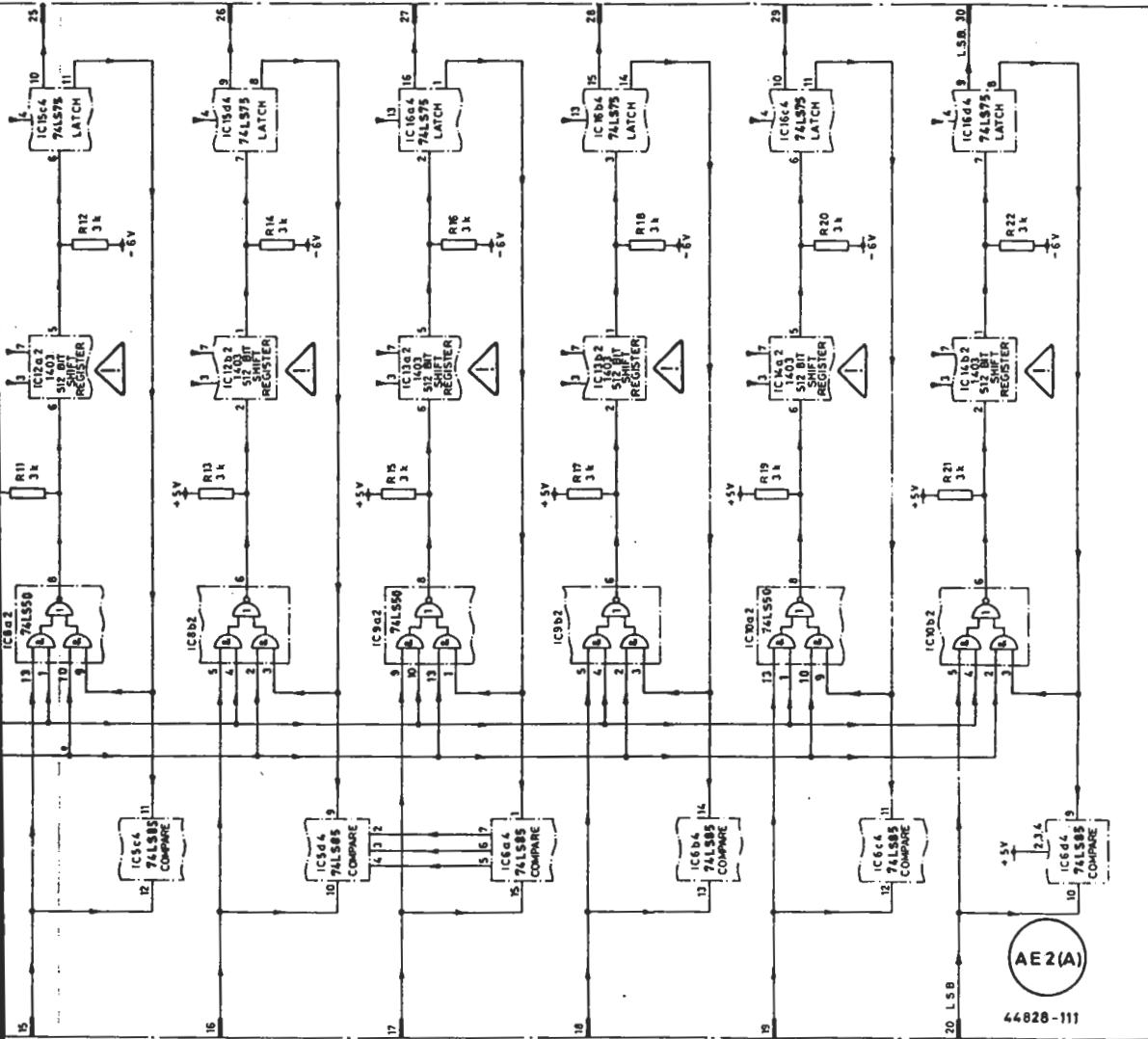


* Note...
 CONNECTIONS FOR ALTERNATIVE
 PACKAGING OF IC11 TO 14 INCLUSIVE.

METAL CAN (SHOWN ABOVE)	PIN 1	"	"	"	"	"	"	PLASTIC DIL	PIN 5	"	"	"	"	"	"
	PIN 1	"	"	"	"	"	"	PIN 5	"	"	"	"	"	"	"
	" 2	"	"	"	"	"	"	" 6	"	"	"	"	"	"	"
	" 3	"	"	"	"	"	"	" 7	"	"	"	"	"	"	"
	" 4	"	"	"	"	"	"	" 8	"	"	"	"	"	"	"
	" 5	"	"	"	"	"	"	" 1	"	"	"	"	"	"	"
	" 6	"	"	"	"	"	"	" 2	"	"	"	"	"	"	"
	" 7	"	"	"	"	"	"	" 3	"	"	"	"	"	"	"
	" 8	"	"	"	"	"	"	" 4	"	"	"	"	"	"	"

IC 1
 IC 2
 IC 3
 * IC 4
 IC 5

- 1
- 2
- 3
- 4
- 5
- 6
- 7



- M.I. CONNECTIONS**
- 7, 8, 9, & 10 +5V to PIN 14, E to PIN 7, & 16
 - +5V to PIN 7, E to PIN 12, 5, & 6
 - +5V to PIN 16, 0V to PIN 8
 - 2, 13, & 14 +5V to PIN 4, -6V to PIN 8
 - +5V to PIN 11 -11V to PIN 5.

CAUTION - THE CASES OF ICs 11, 12, 13, & 14 ARE INTERNALLY CONNECTED SHORTING THE CASE MAY DESTROY THE DEVICE

 This symbol indicates Static Sensitive Component.

Fig. 7.20 Shift register store AE2

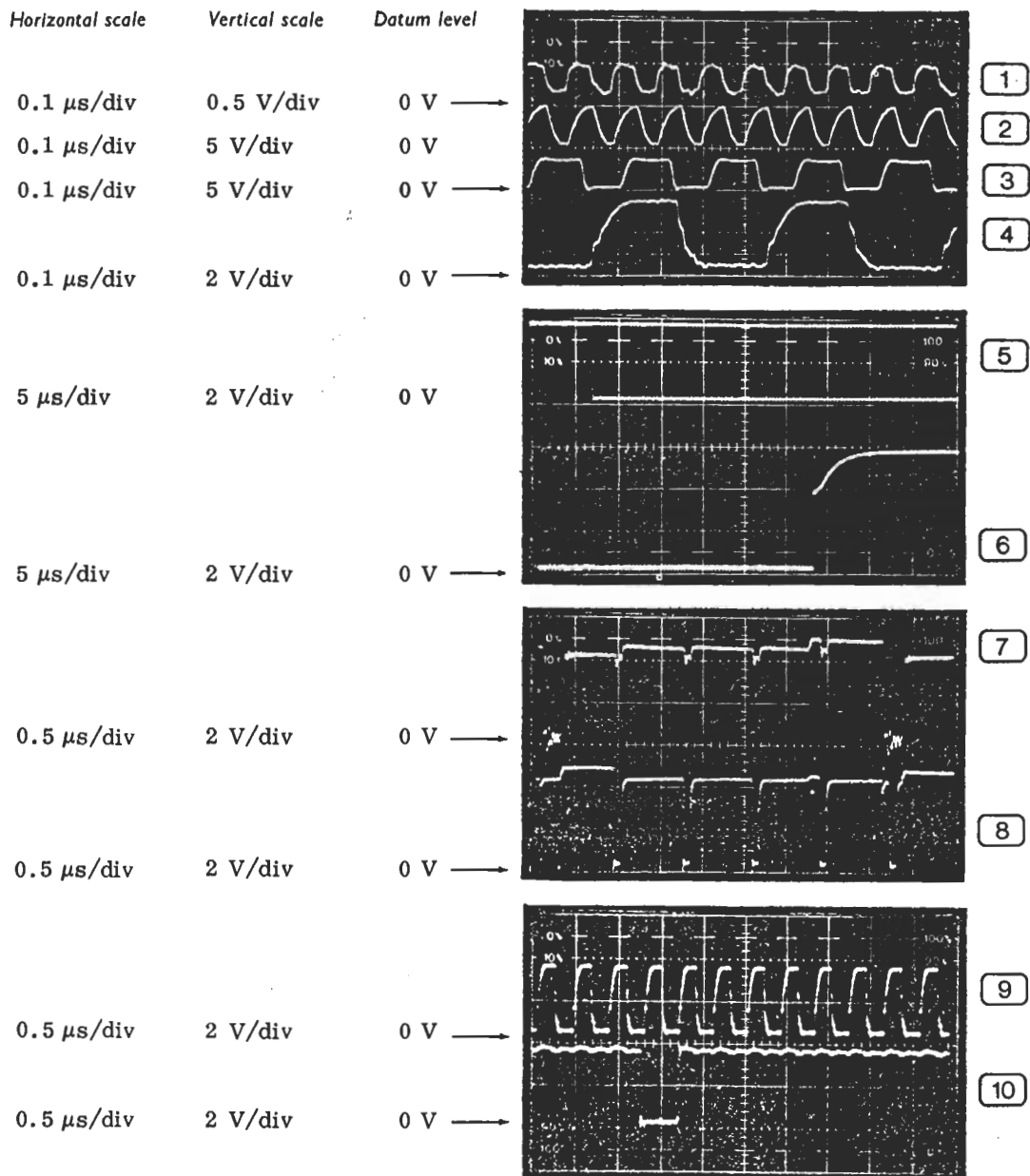
Waveforms for AE3

TF 2370 controls - SWEEP MODE : (1) to (8) AUTO
 (9) to (15) SINGLE
 HORIZONTAL SCALE and RANGE : 10 MHz/DIV
 FILTER BANDWIDTH : WIDE
 VERTICAL SCALE and RANGE : 0 dBm 10 dB/DIV
 STORE and DISPLAY : HIGH DEFN
 VERTICAL GRATICULE SHIFT : CAL

Oscilloscope triggering - (1) to (3) from pin 1 on AE2 (a.c. negative)
 (5) and (6) from TP4 (a.c. positive)
 (7) and (8) from TP6 (a.c. negative)
 (13) to (15) from pin 13 (a.c. positive)

For (10) and (11), adjust the oscilloscope delay as necessary.

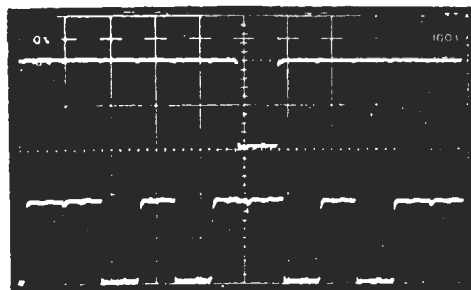
For (13) to (15), adjust the oscilloscope delay so that a pulse of (13) coincides with a falling edge of (14) to give a falling edge on (15) as shown.



0.5 μ s/div

2 V/div

0 V →

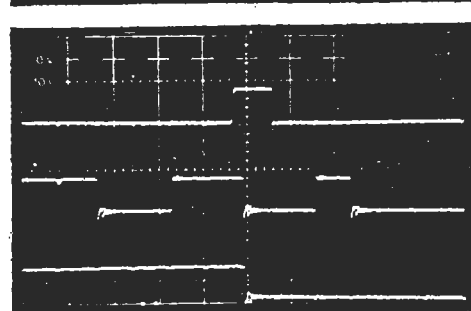


11

0.5 μ s/div

2 V/div

0 V →

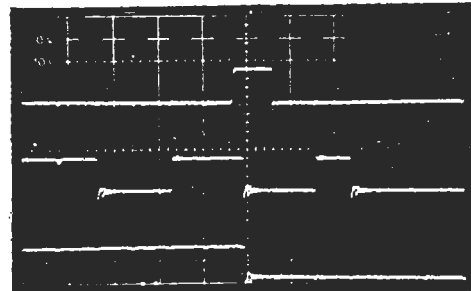


12

0.5 μ s/div

5 V/div

0 V →

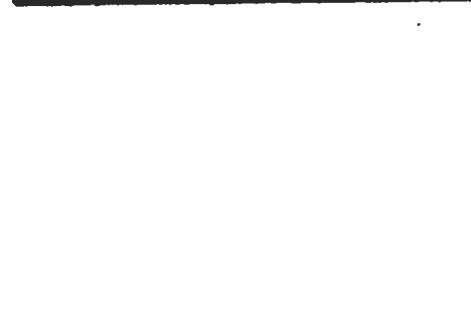


13

0.5 μ s/div

5 V/div

0 V →



14

0.5 μ s/div

5 V/div

0 V →



15

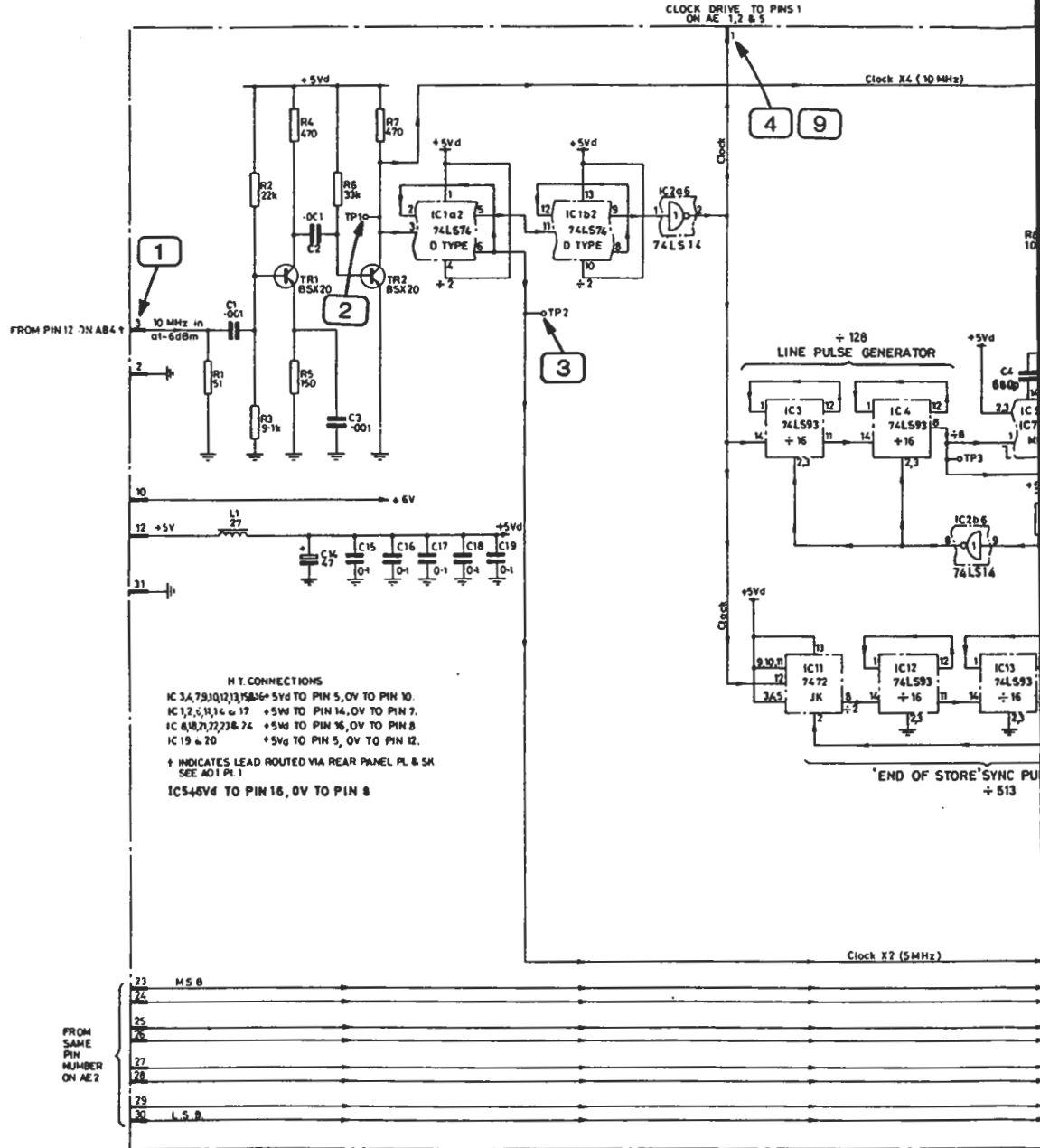
11

12

13

14

15



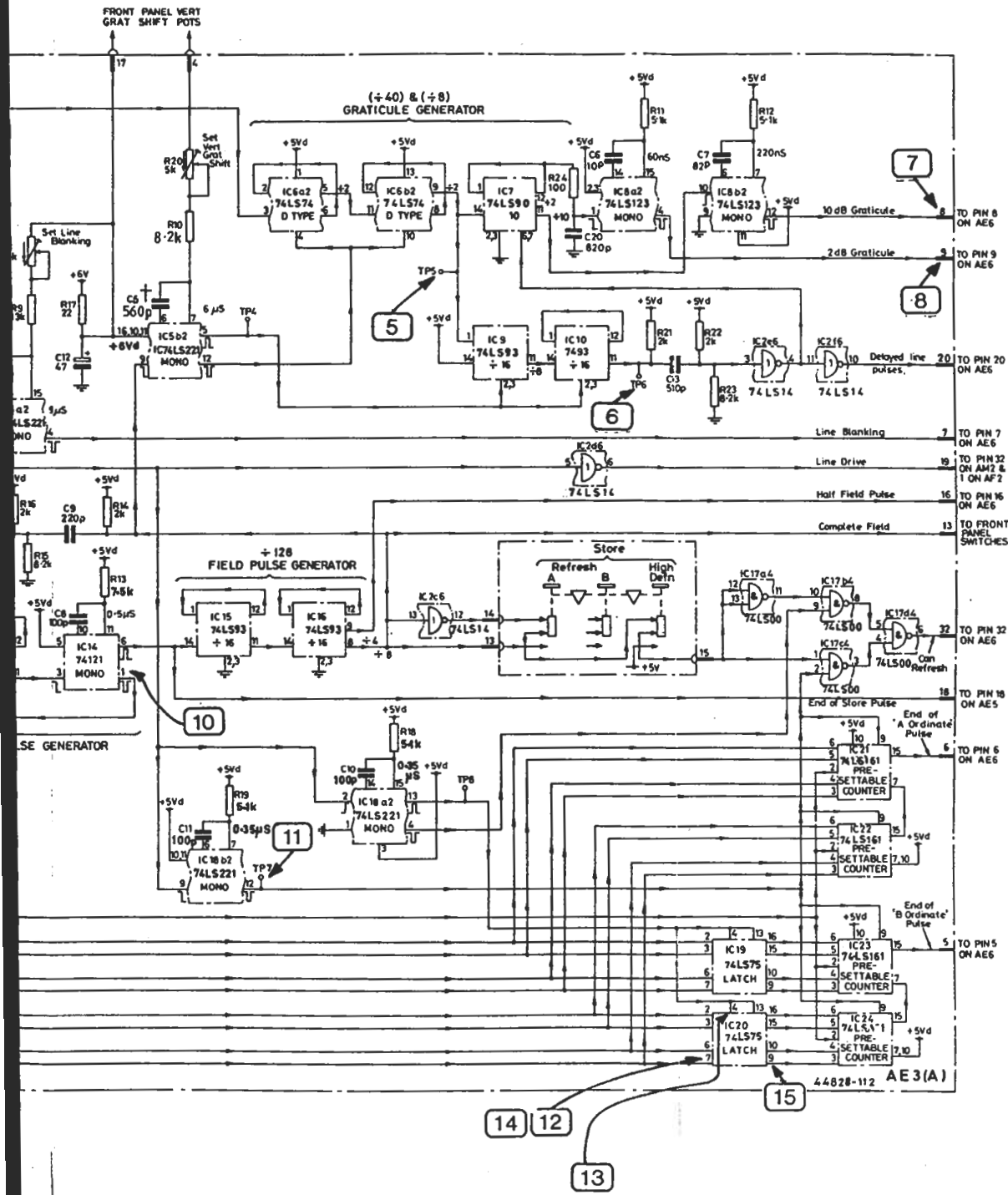
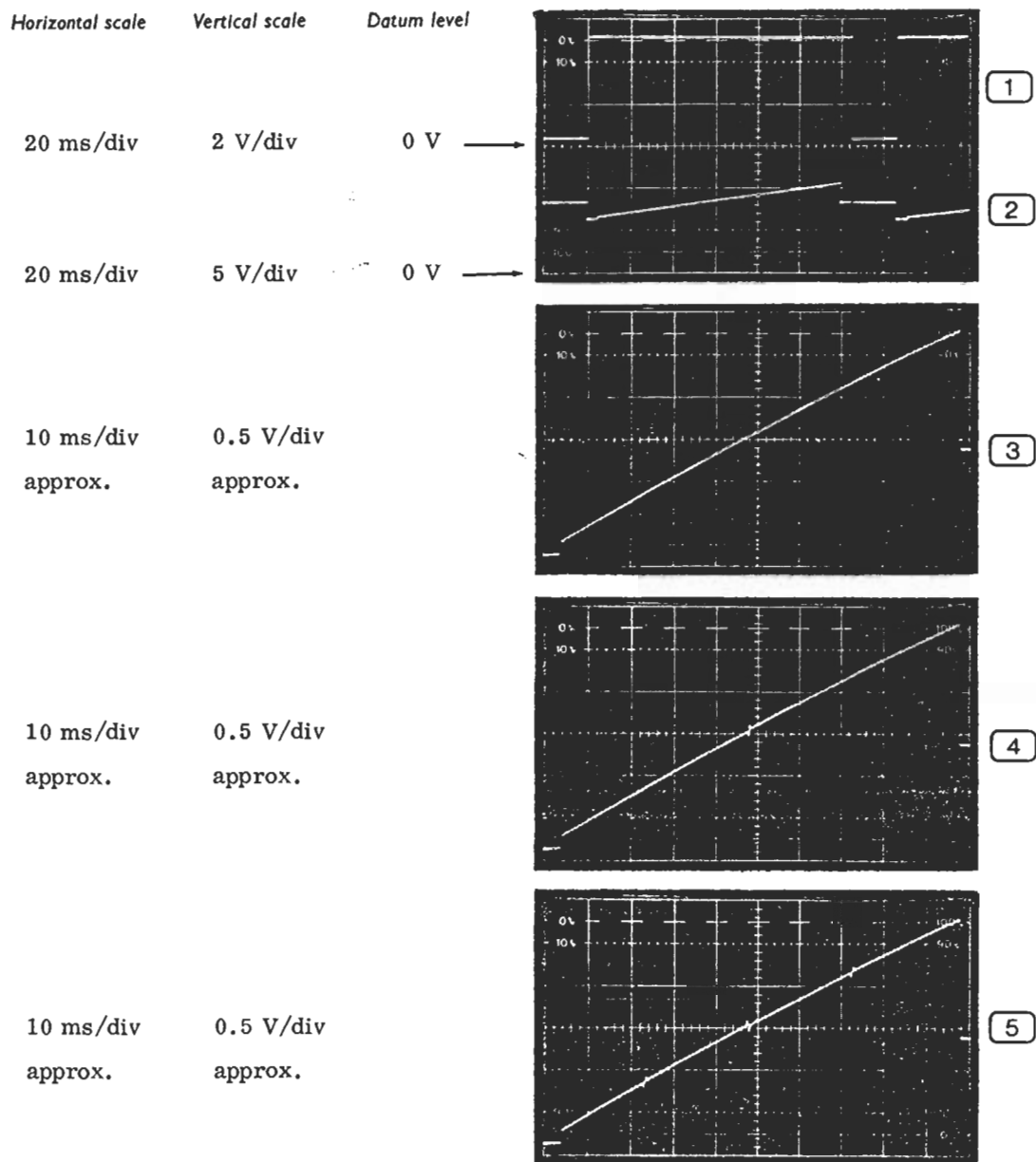


Fig. 7.21 Read-out waveforms generator AE3

Waveforms for AE4

TF 2370 controls - SWEEP MODE : AUTO
 HORIZONTAL SCALE and RANGE : 10 kHz/DIV
 FILTER BANDWIDTH : WIDE
 STORE and DISPLAY : HIGH DEFN

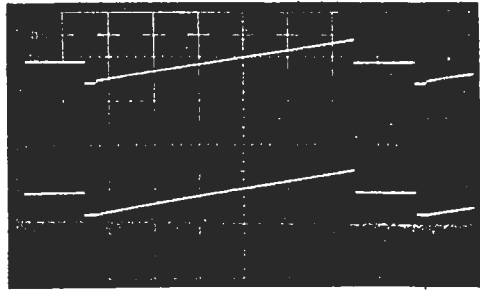
For (3) to (5), adjust the oscilloscope to give ramps between the corners of the tube.
 (3) is the required waveform. (4) is obtained when R31 is incorrectly set. (5) is
 obtained when R27 is incorrectly set.



20 ms/div

5 V/div

0 V →



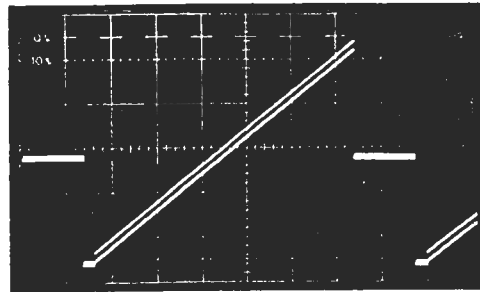
6

7

20 ms/div

5 V/div

0 V →



8

9

20 ms/div

1 V/div

10 V } →

20 ms/div

1 V/div

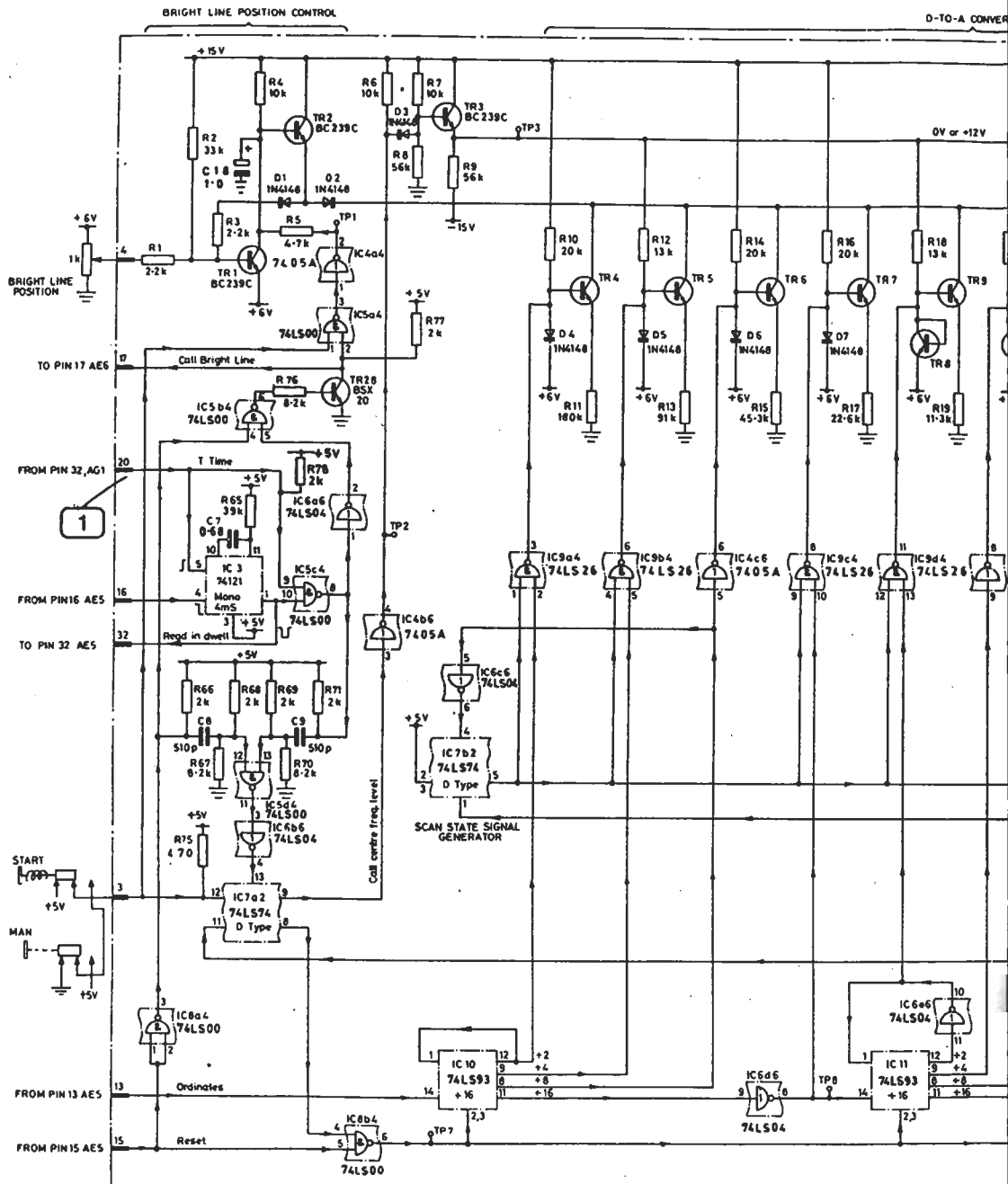
10 V }

6

7

8

9



Org. No. Z 44828-113F ISSUE 6

COUNTER

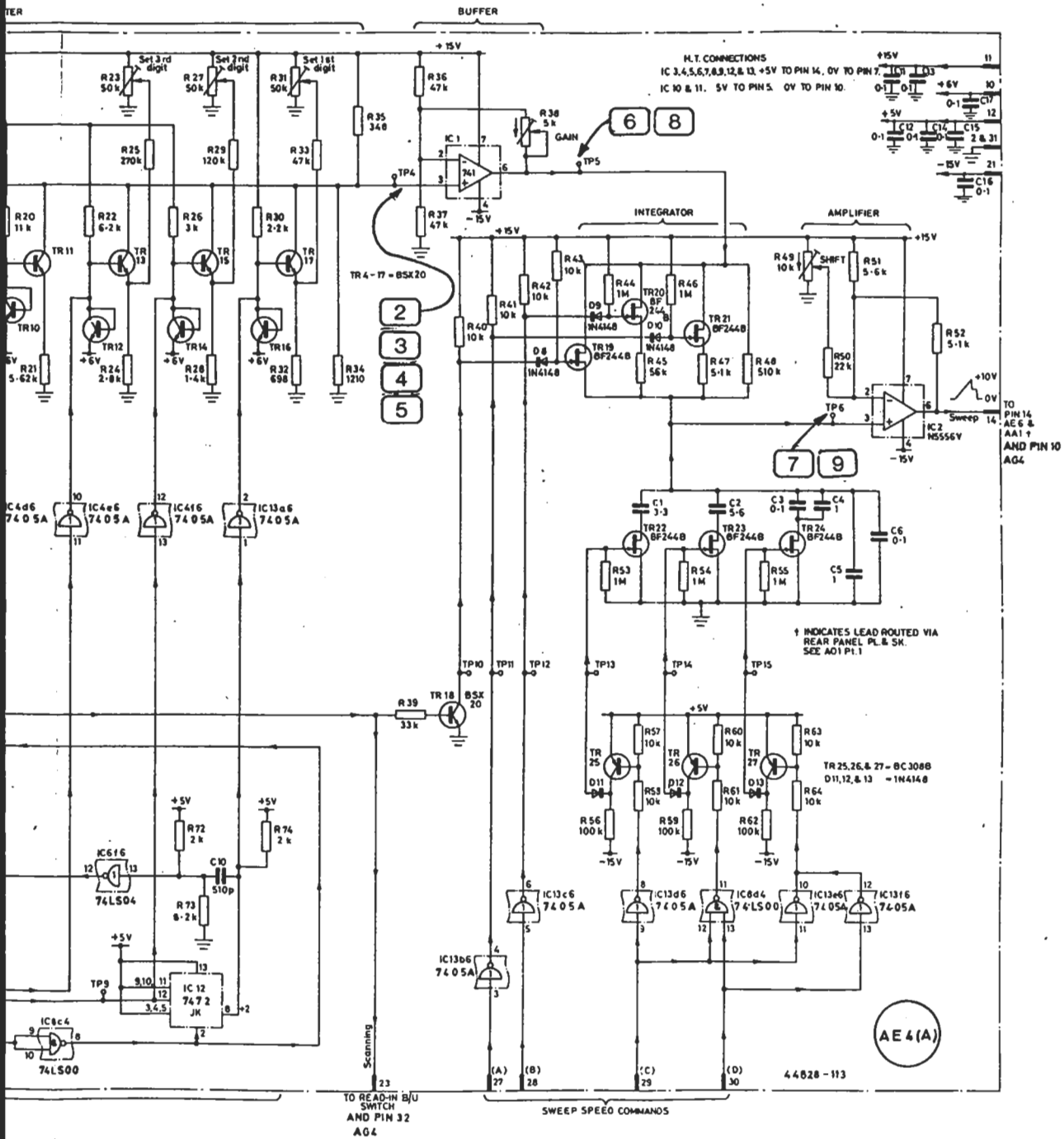
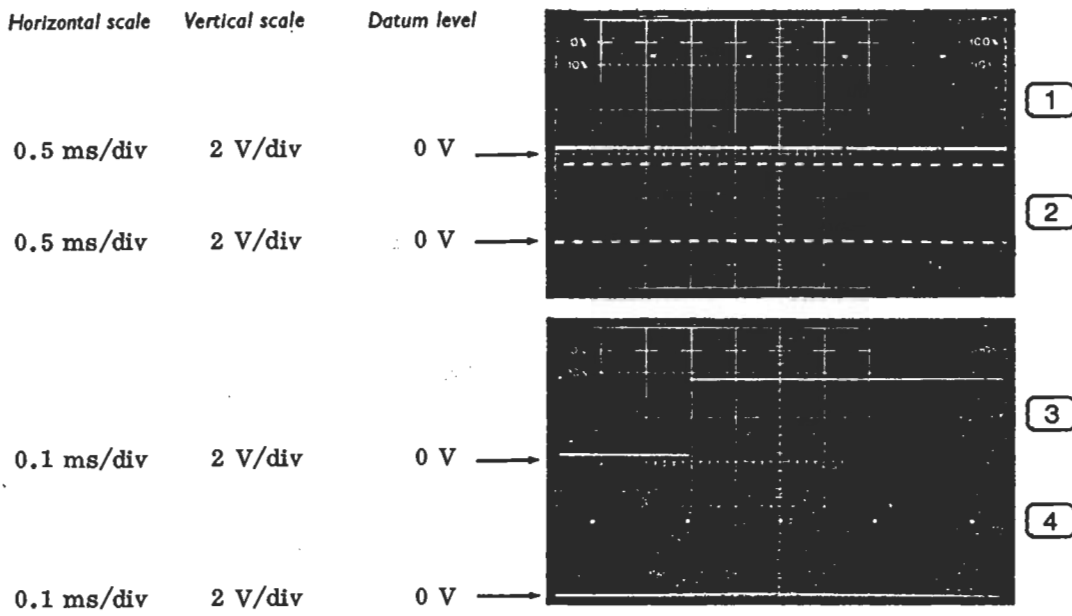
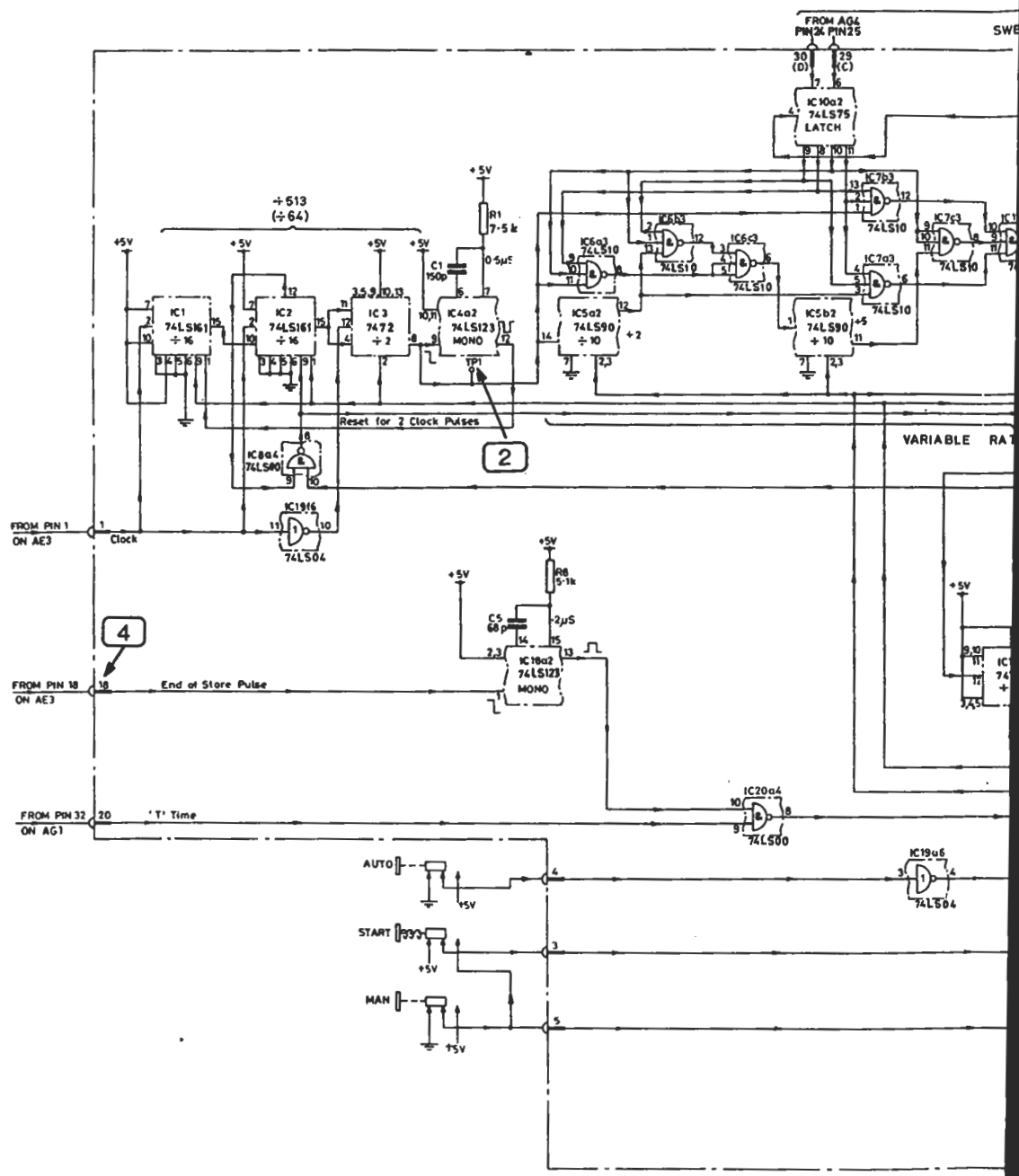


Fig. 7.22 Digital scan generator AE4

Waveforms for AE5

TF 2370 controls - SWEEP MODE : AUTO
 HORIZONTAL SCALE and RANGE : 0.5 MHz/DIV
 FILTER BANDWIDTH : (1) and (2) NARROW
 (3) and (4) WIDE
 STORE and DISPLAY : HIGH DEFN
 Oscilloscope triggering - (4) from TP5 (a.c. negative).





- 1
- 2
- 3
- 4

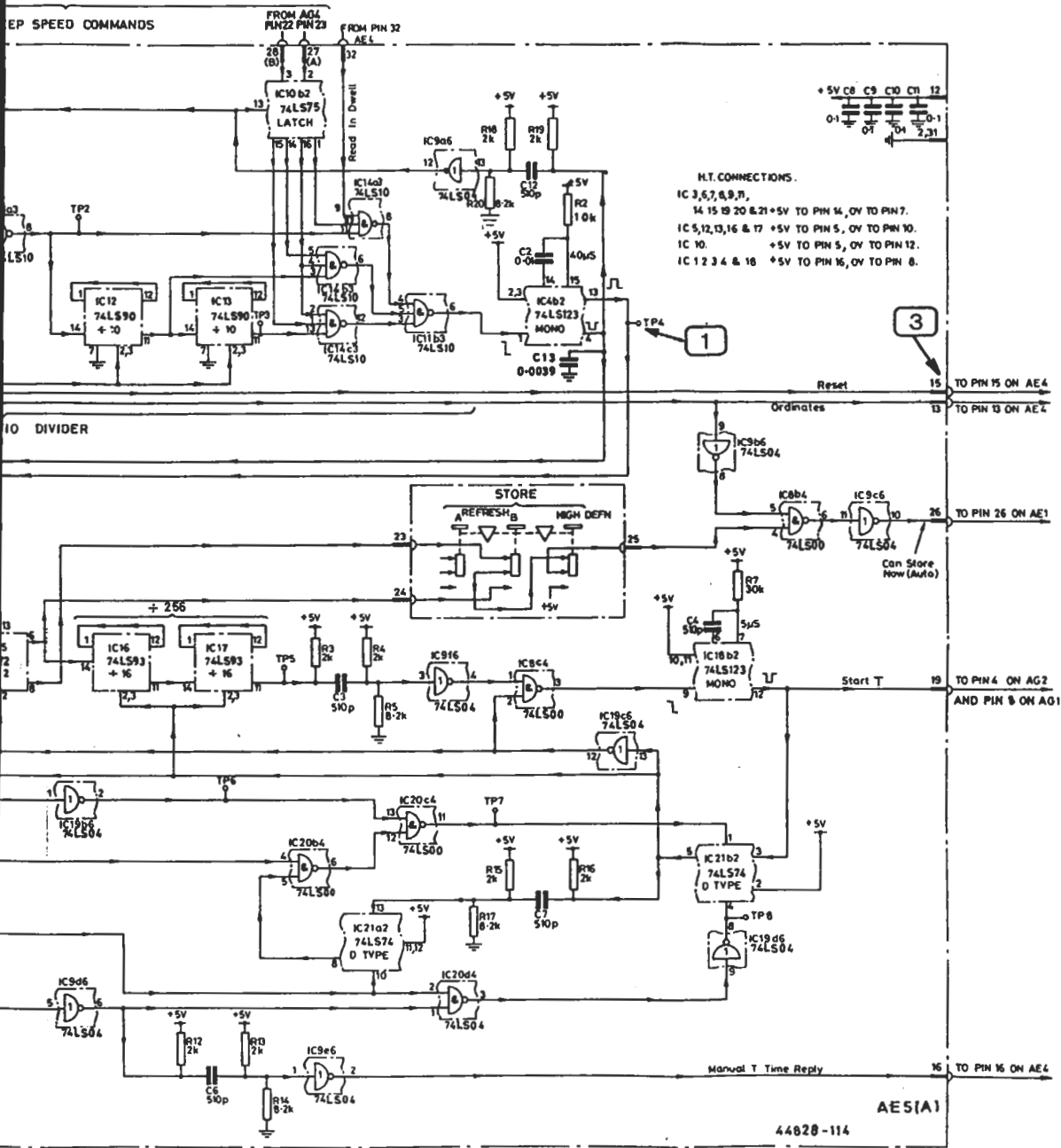


Fig. 7.23 Read-in sequence controller AES

Waveforms for AE6

TF 2370 controls - SWEEP MODE : (1) to (6), (9) and (10) AUTO
(7) and (8) SINGLE

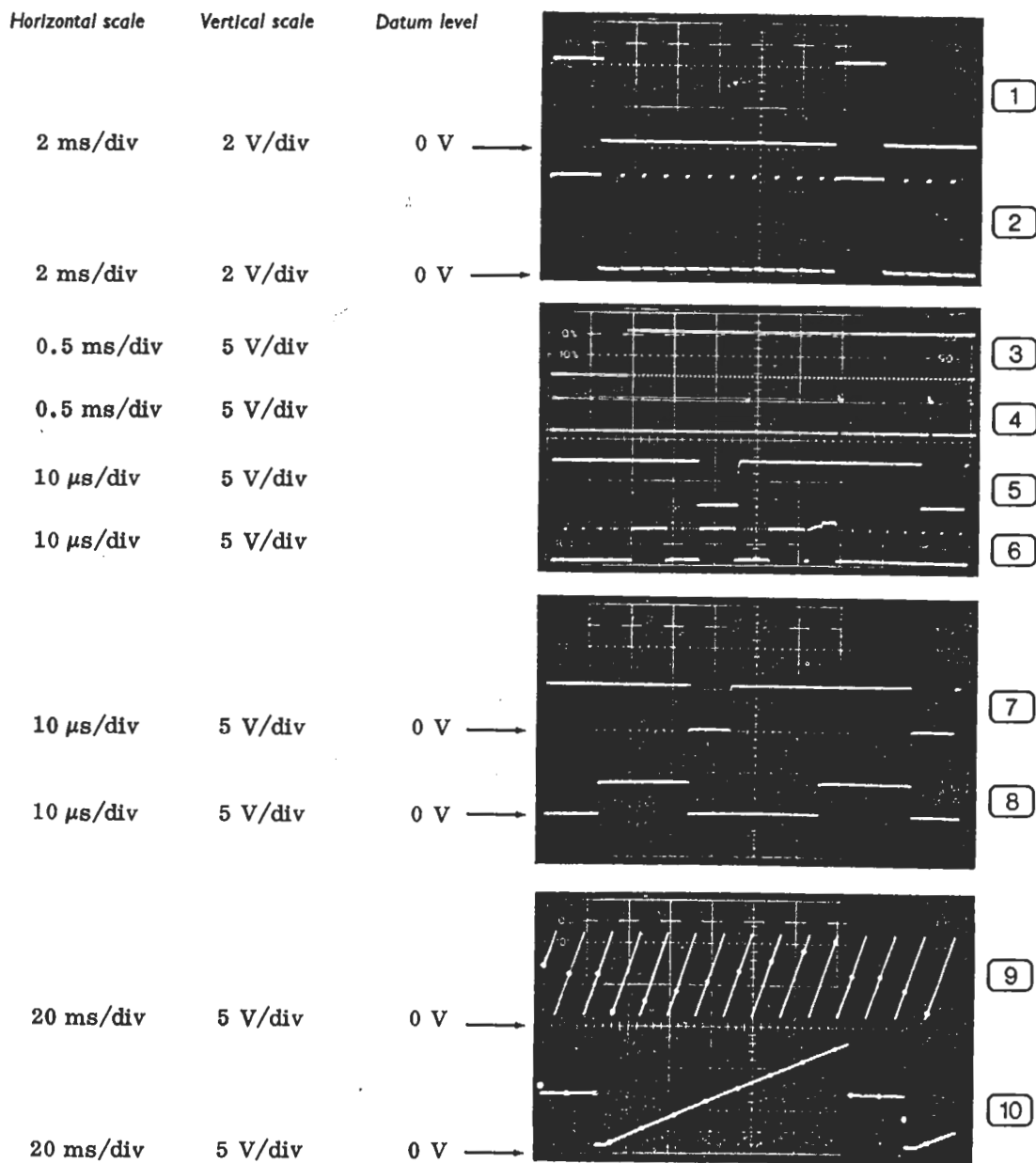
HORIZONTAL SCALE and RANGE : (9) and (10) 10 kHz/DIV
 FILTER BANDWIDTH : (9) and (10) WIDE
 STORE and DISPLAY : HIGH DEFN
 VERTICAL GRATICULE SHIFT : CAL
 HORIZONTAL GRATICULE SHIFT : CAL
 HORIZONTAL GRATICULE GAIN : CAL

For (7) and (8), connect the TRACKING GENERATOR OUTPUT to the INPUT.

Oscilloscope triggering - (3) to (6) from TP8 (a.c. negative).

For (3) to (6), adjust the oscilloscope delay as necessary.

For (9) and (10), set the oscilloscope to 'chop'. Connect TP11 through an a.c. coupling to the intensity modulation input of the oscilloscope.

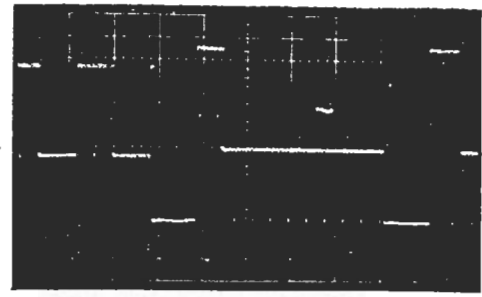


5

10 μ s/div

1 V/div

3 V \rightarrow



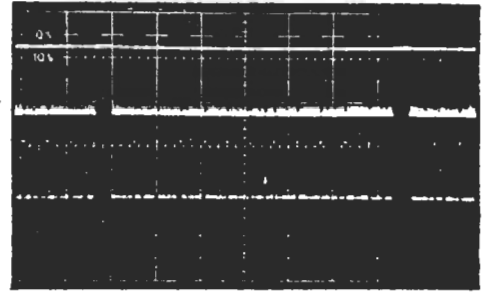
11

6

2 ms/div

10 V/div

70 V \rightarrow



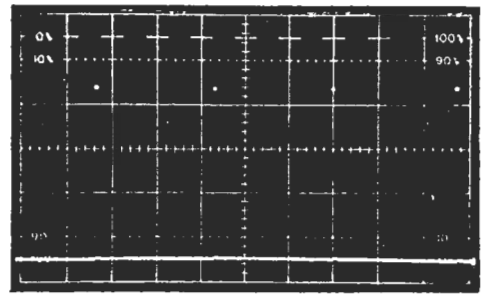
12

7

5 ms/div

1 V/div

0 V \rightarrow



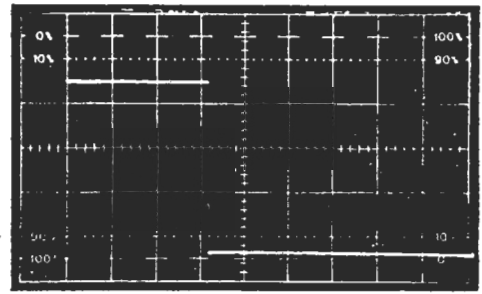
13

8

50 μ s/div

1 V/div

0 V \rightarrow



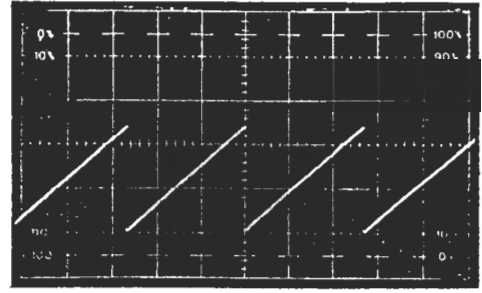
14

9

5 ms/div

5 V/div

0 V



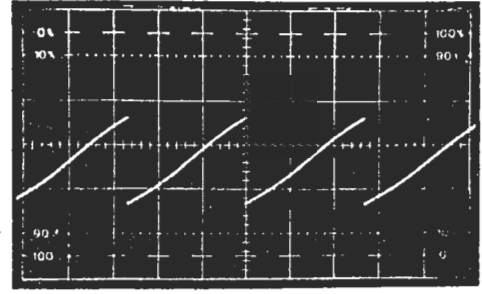
15

10

5 ms/div

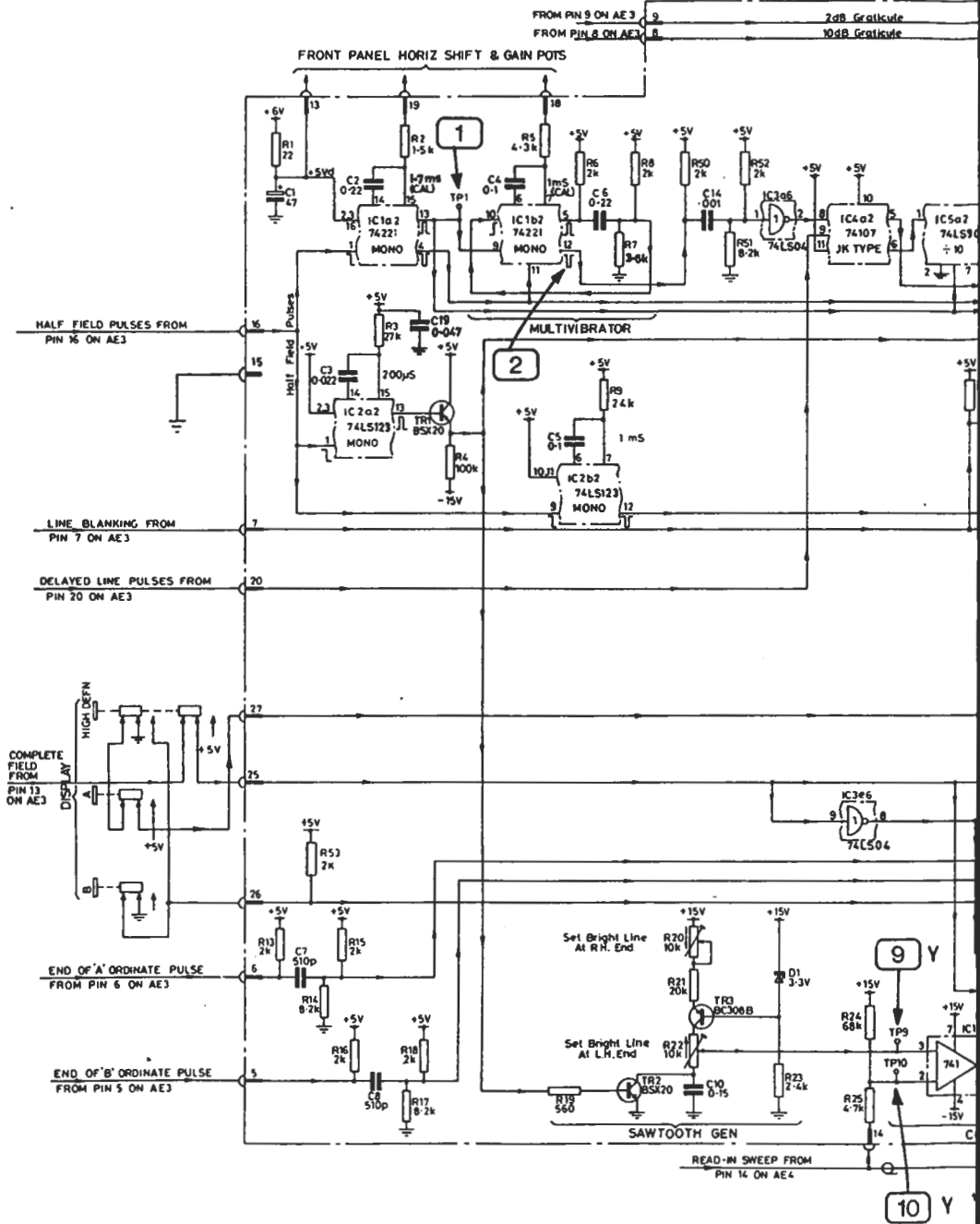
5 V/div

0 V \rightarrow



16

coupling



DRG. No. Z44828 -115V ISSUE 5

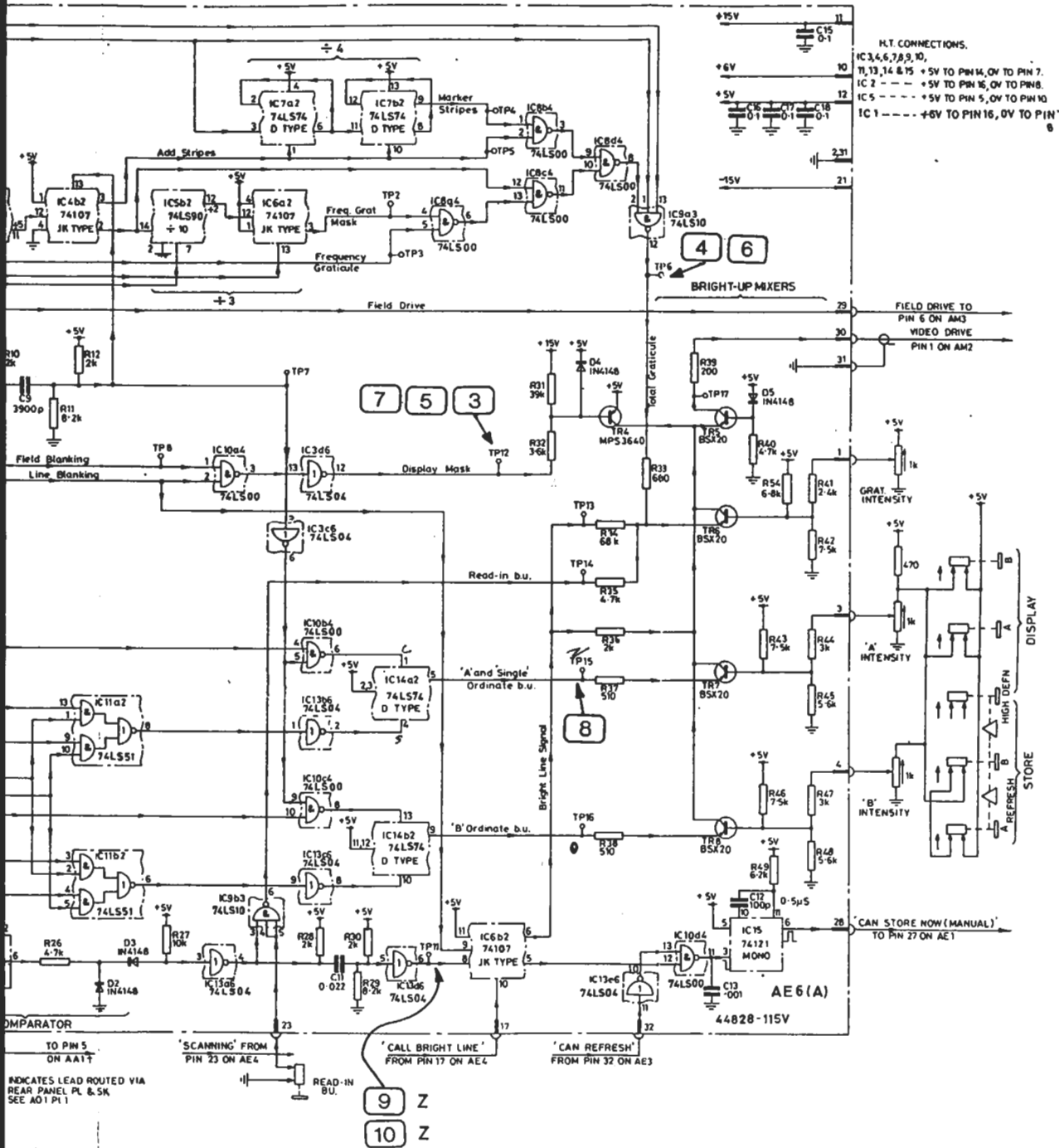
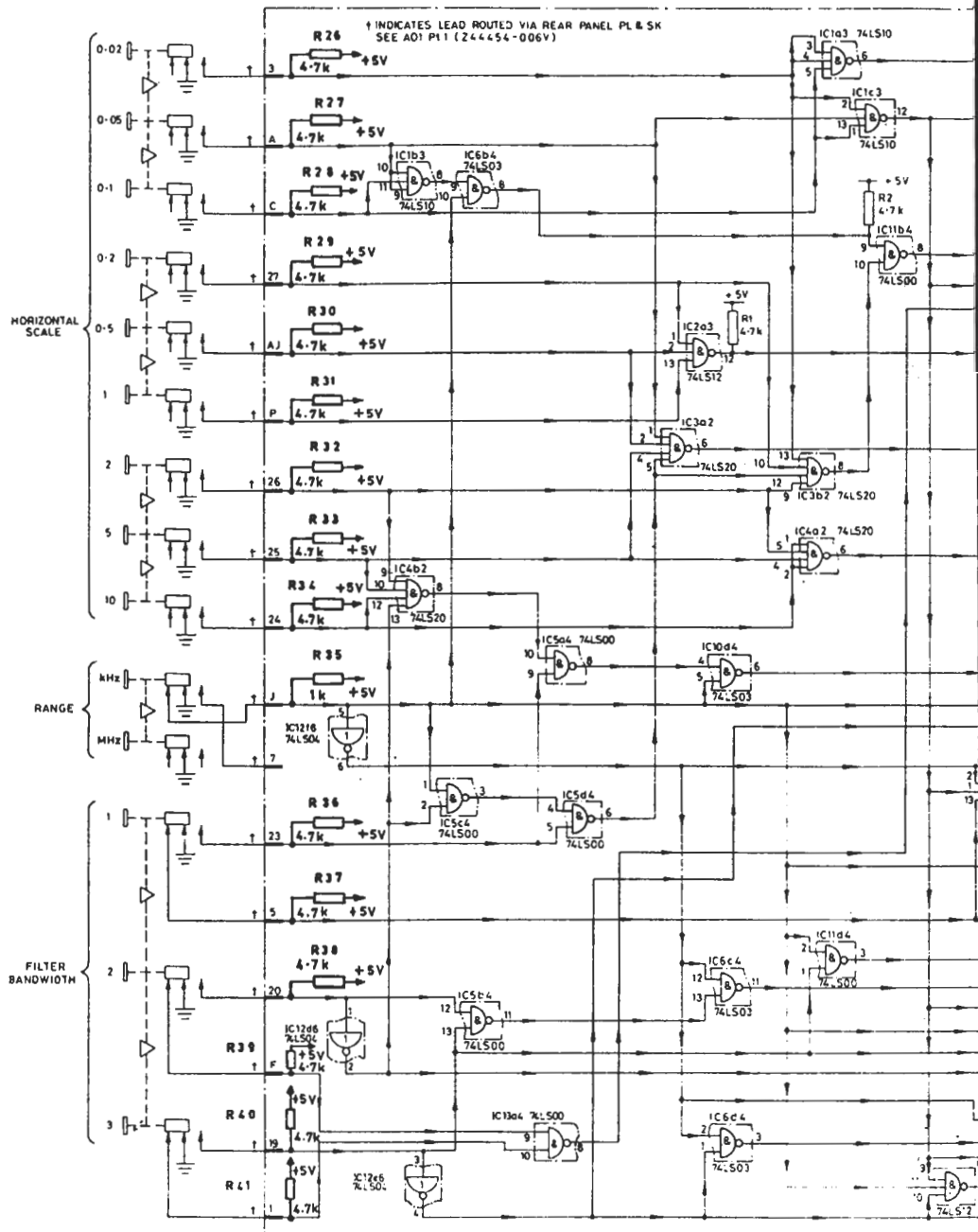


Fig. 7.24 Frequency graticule generator, and bright-up processing AE6



DRG No. Z44828 - 362 ISSUE 1

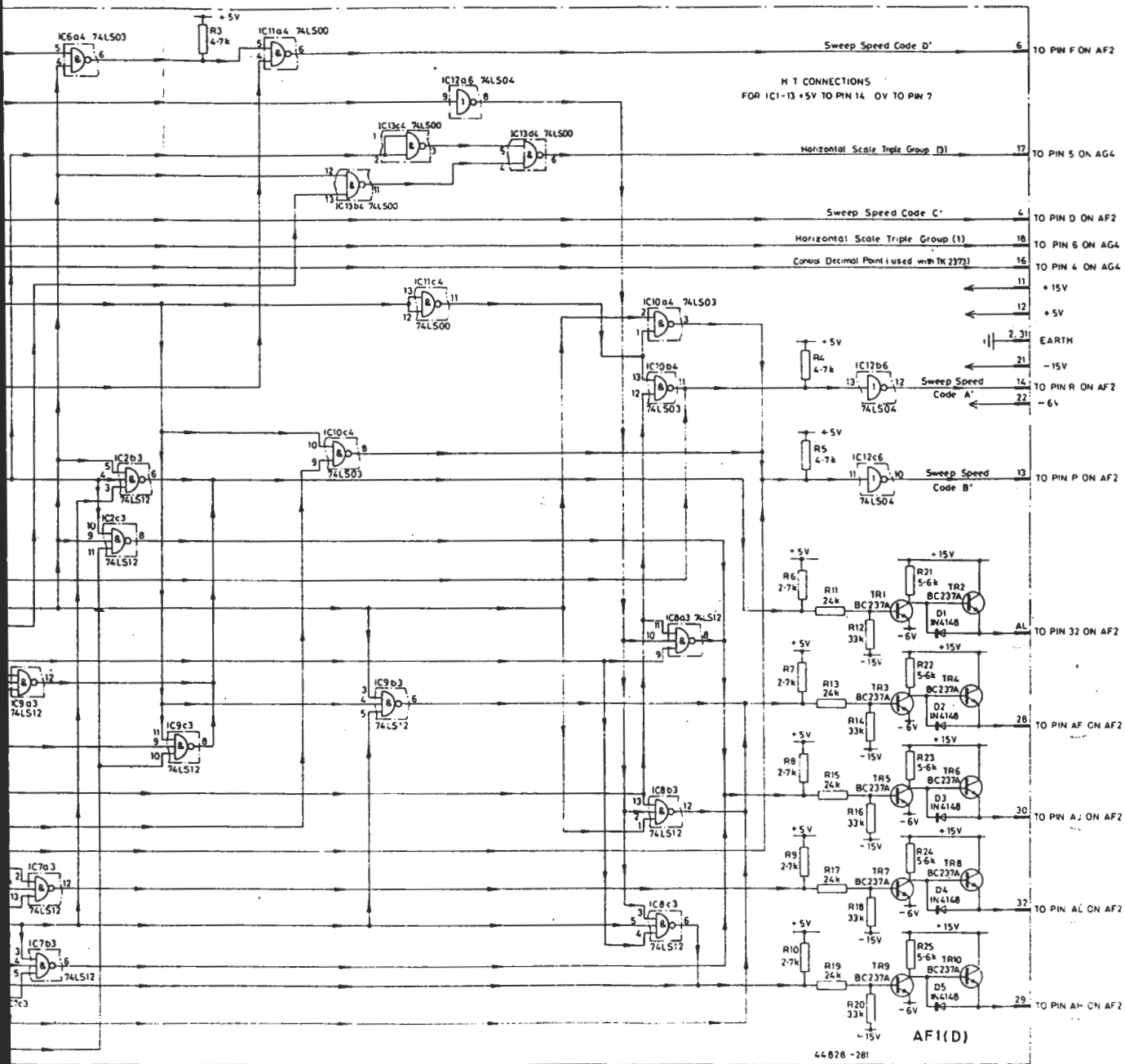
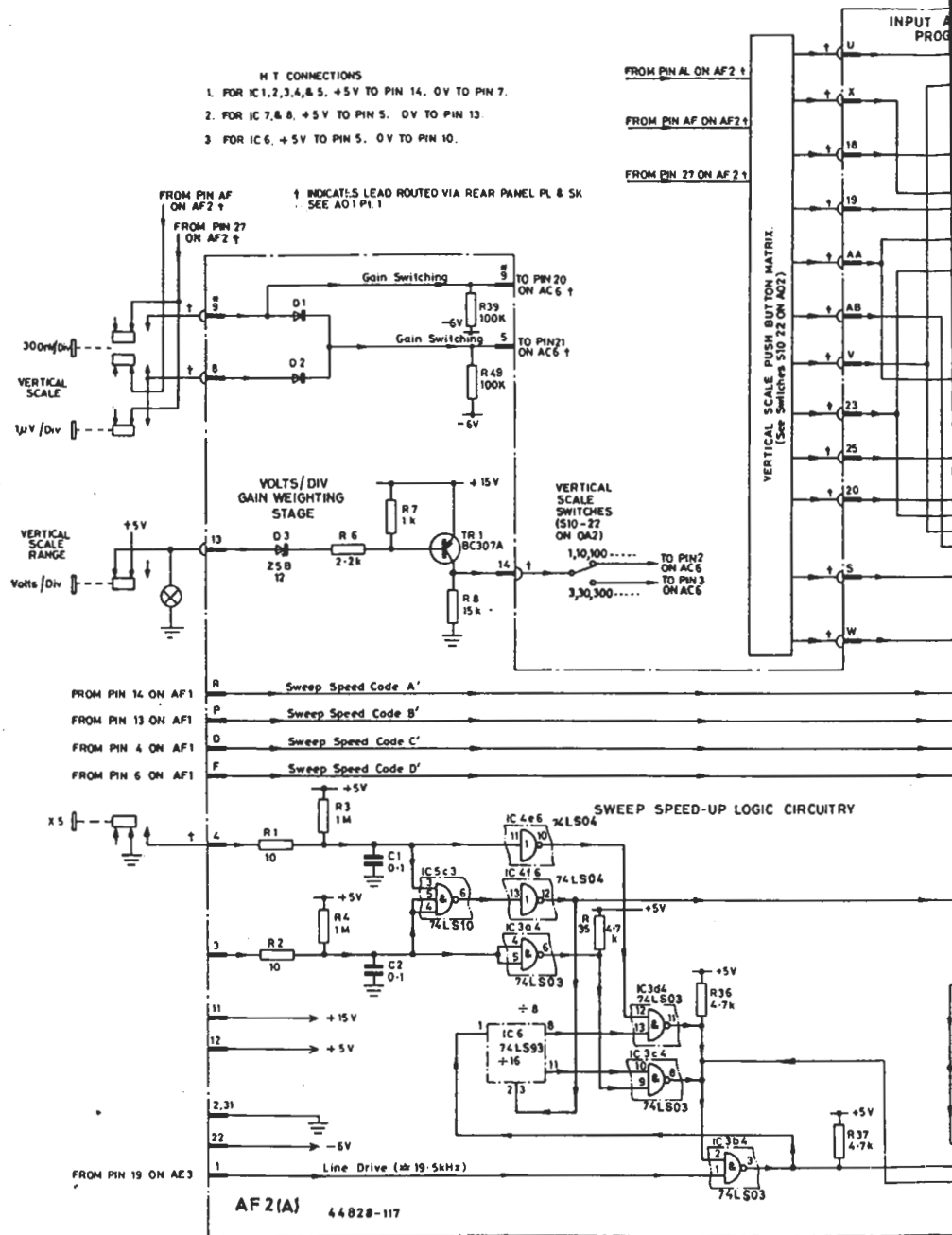
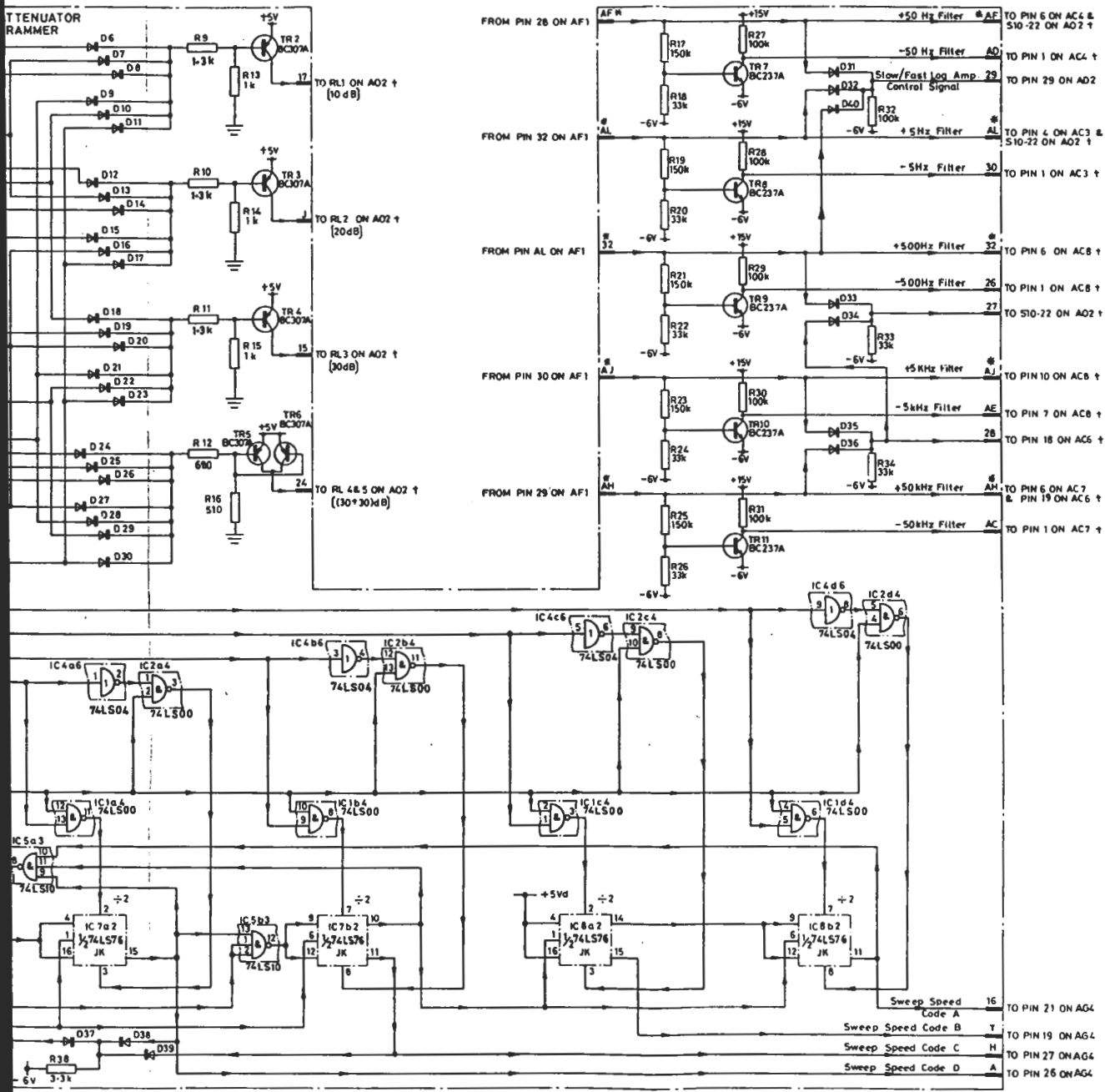


Fig. 7.25 System control logic (1) AF1



DRG. No. Z44828 -117W ISSUE 2



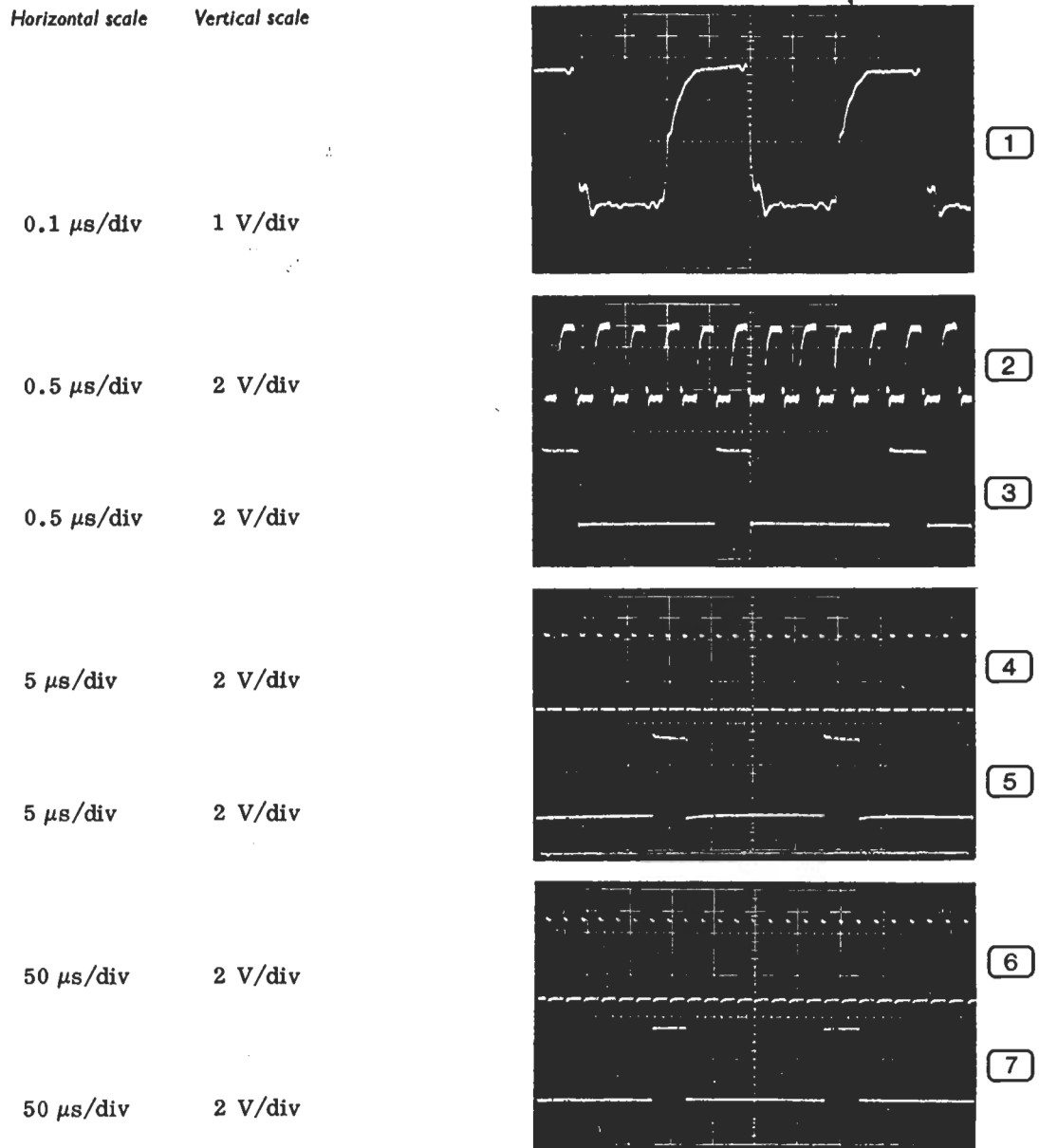
All diodes (except D3) are 1N4148 types

Fig. 7.26 System control logic (2) AF2

Waveforms for AG4

TF 2370 controls - HORIZONTAL SCALE : (26),(27),(32),(33),(38) and (39) .02, .05 or .1
 (30),(31),(36) and (37) .2, .5 or 1
 (24),(25),(28),(29),(34) and (35) 2, 5 or 10
 HORIZONTAL RANGE : (12) to (14),(17) to (19) and (28) to (33) kHz/DIV
 (15),(16),(20) to (27) and (34) to (39) MHz/DIV

Remove board AE5.
 For (1) to (27), also connect a shorting link across R9 on AG4.

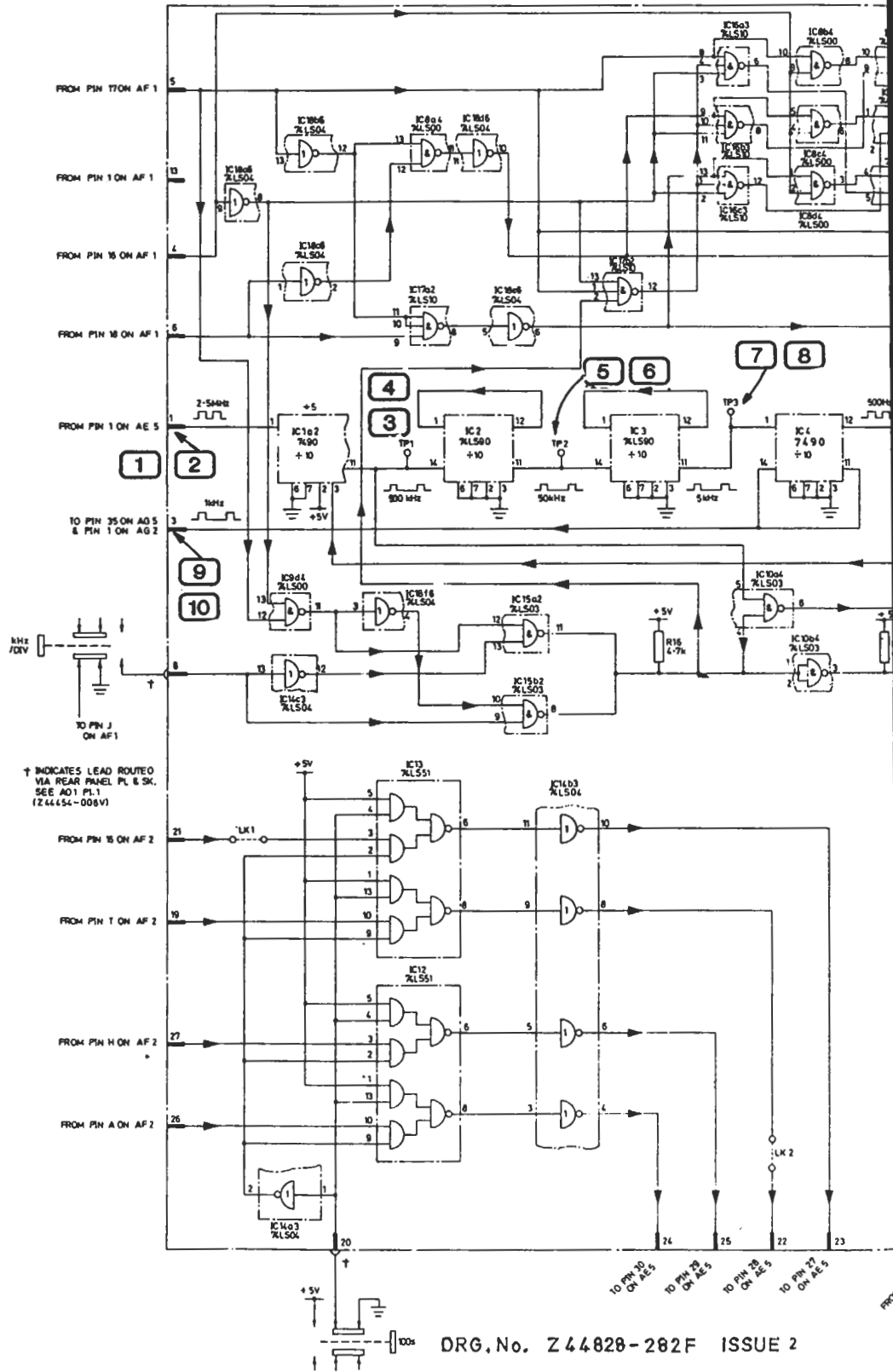


36

37

38

39



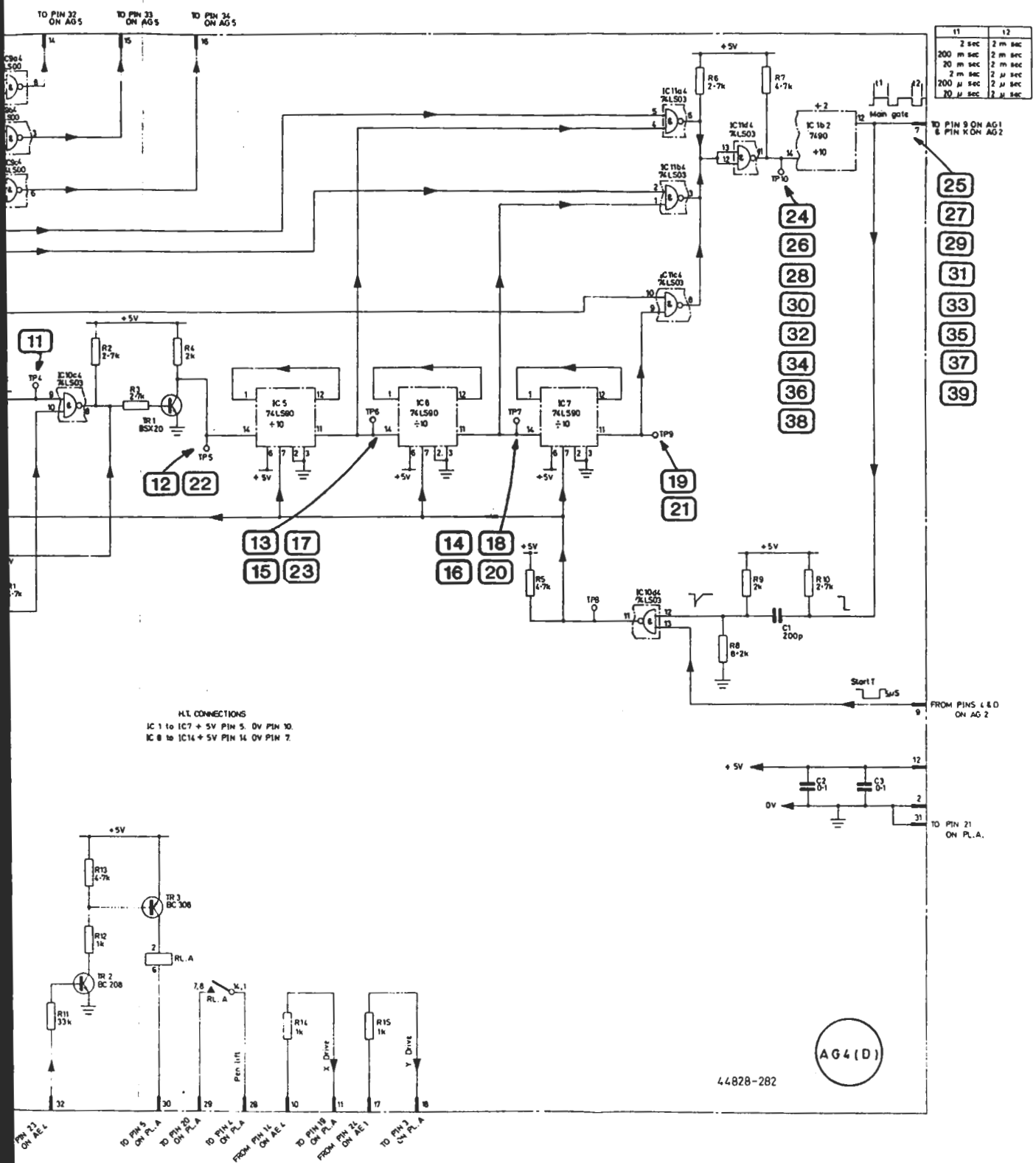


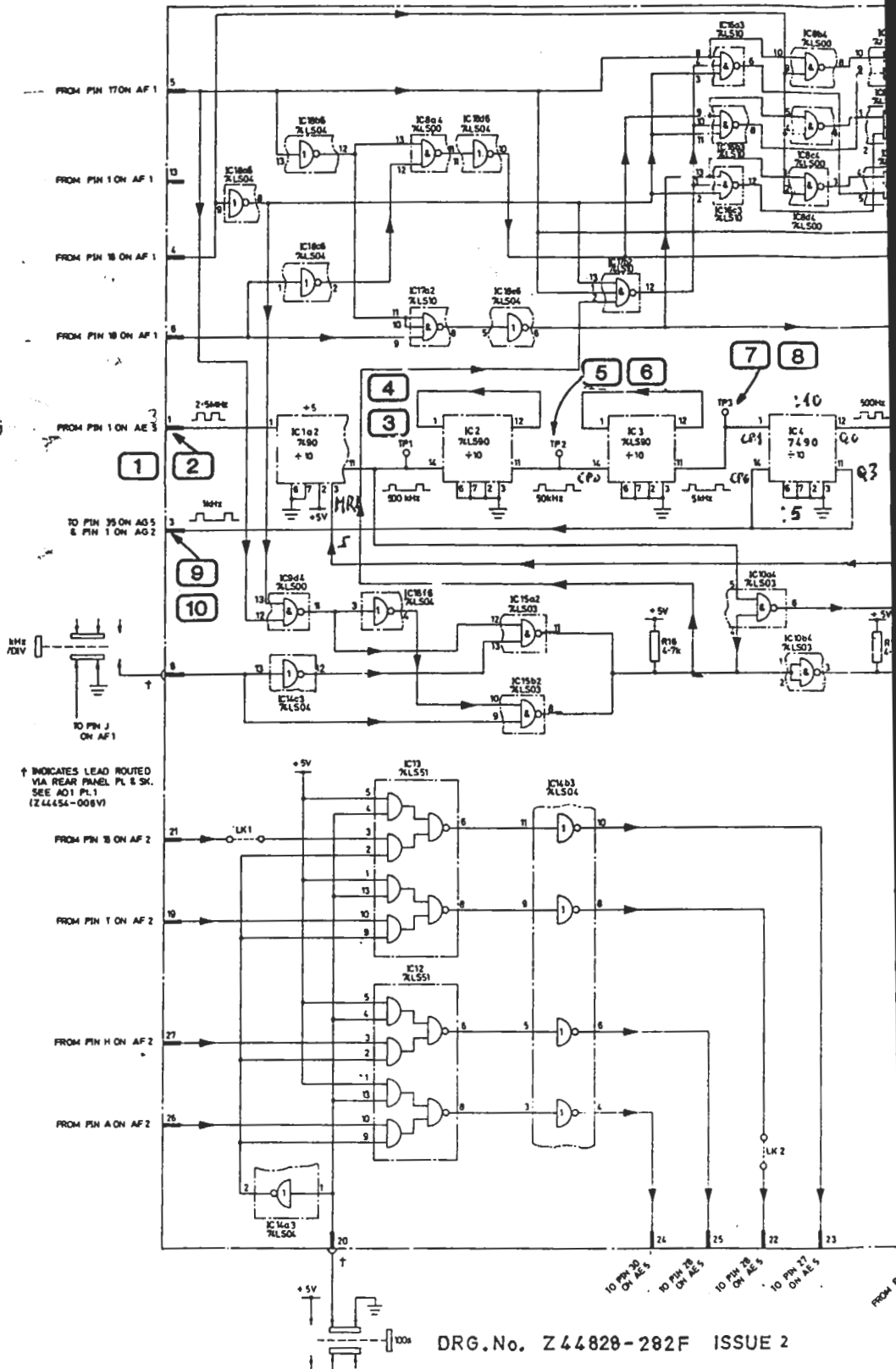
Fig. 7.27 Counter time base and X-Y recorder output AG4

36

37

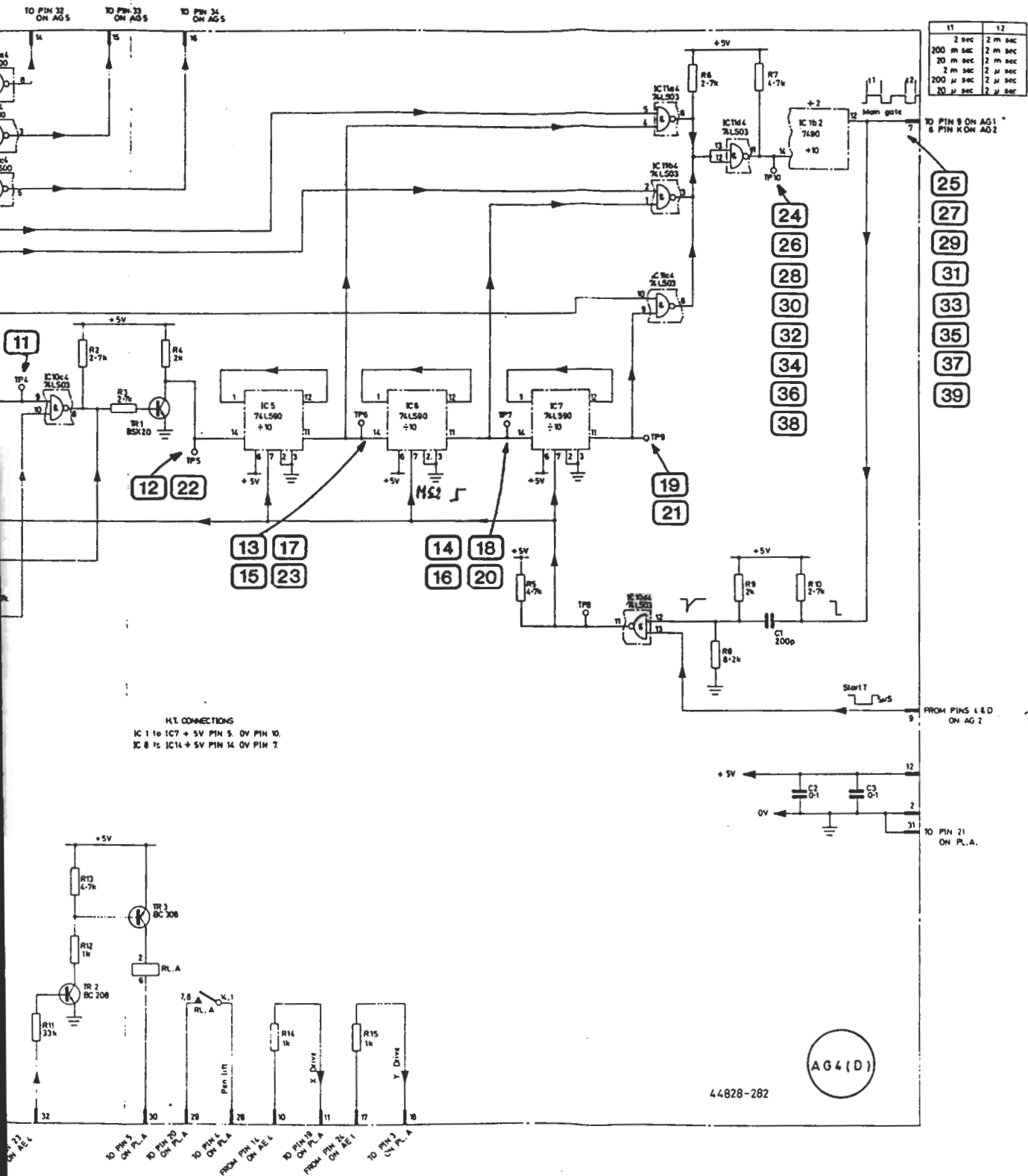
38

39



52320-015

18 IC



11	12
2 sec	2 m sec
200 m sec	2 m sec
20 m sec	2 m sec
2 m sec	2 μ sec
200 μ sec	2 μ sec
20 μ sec	2 μ sec

H.T. CONNECTIONS
 IC 1 to IC 7 + 5V PIN 5, 0V PIN 10.
 IC 8 to IC 14 + 5V PIN 14, 0V PIN 7.

FROM PINS 1 & D ON AG 2

18 AGS

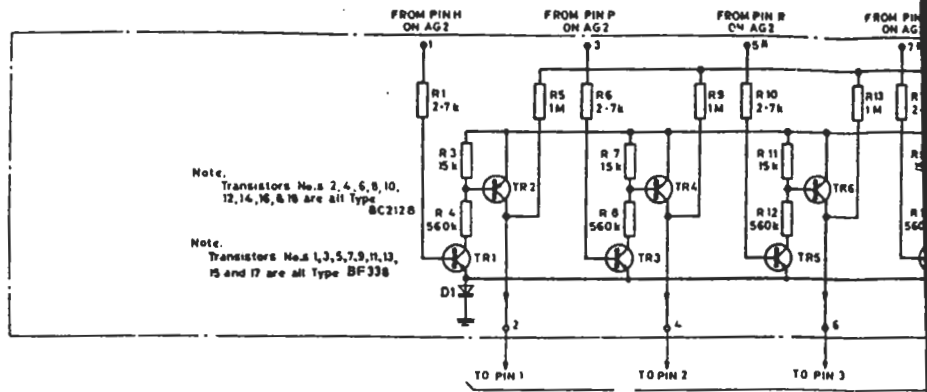
AG4(D)

44828-282

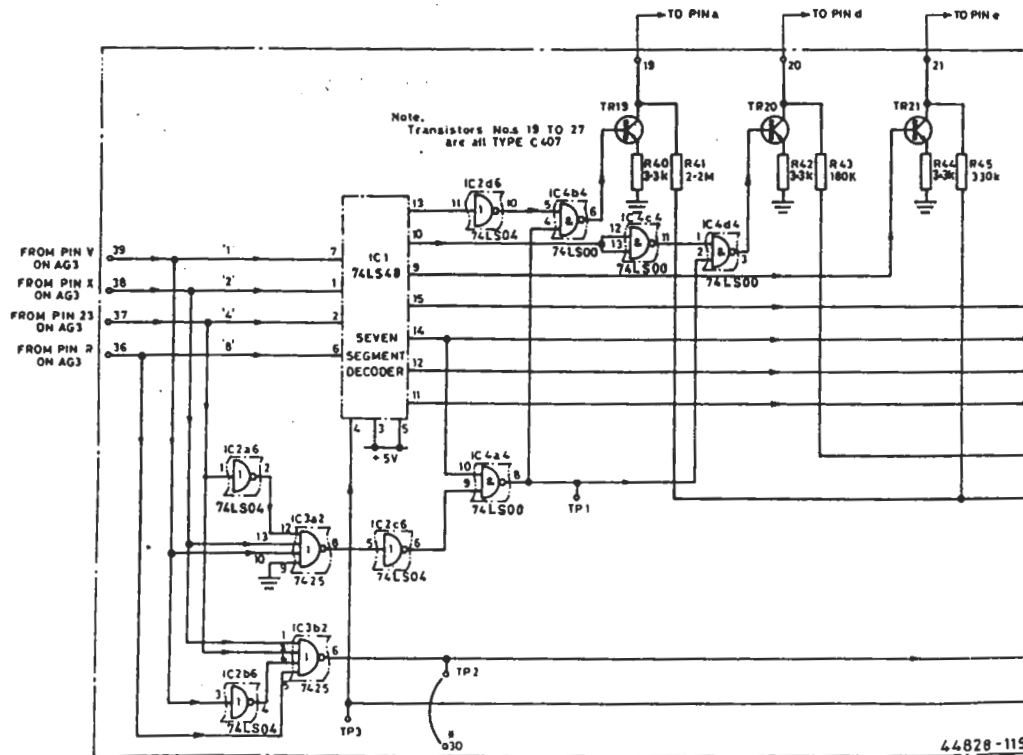
- CP1 41 V140 EPC
- HR1 02 130
- HR2 03 120 Q0
- 04 110 Q3
- 05 100 Q0
- MS1 06 40 Q1
- MS2 02 80 Q2

24LS90

Fig. 7.27 Counter time base and X-Y recorder output AG4



View on front of display of one of the nine digits showing segment arrangement.



DRG. No. Z44828-119T ISSUE 4

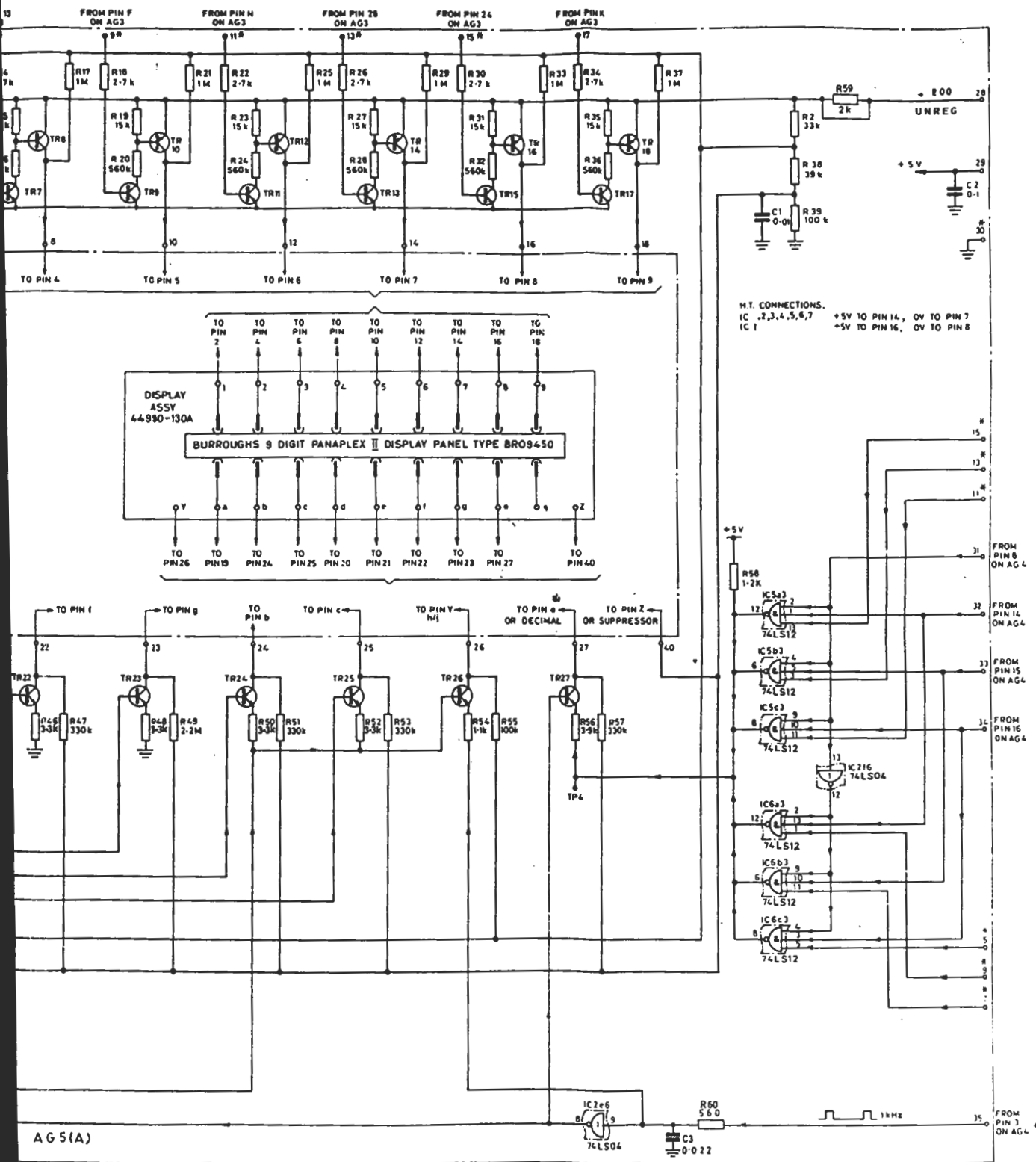
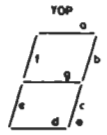
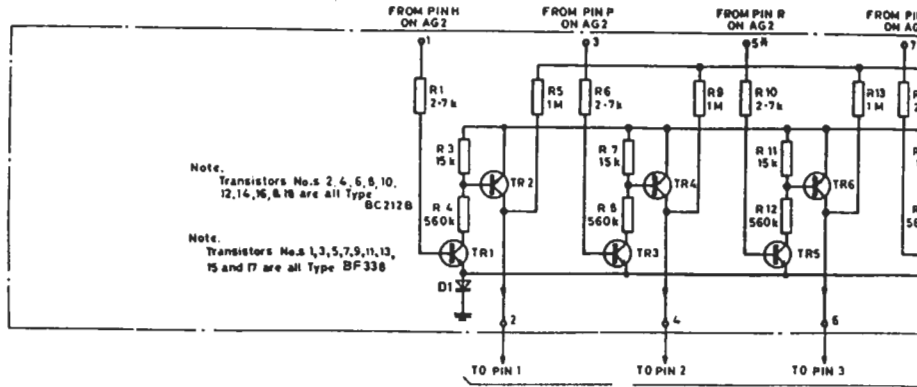
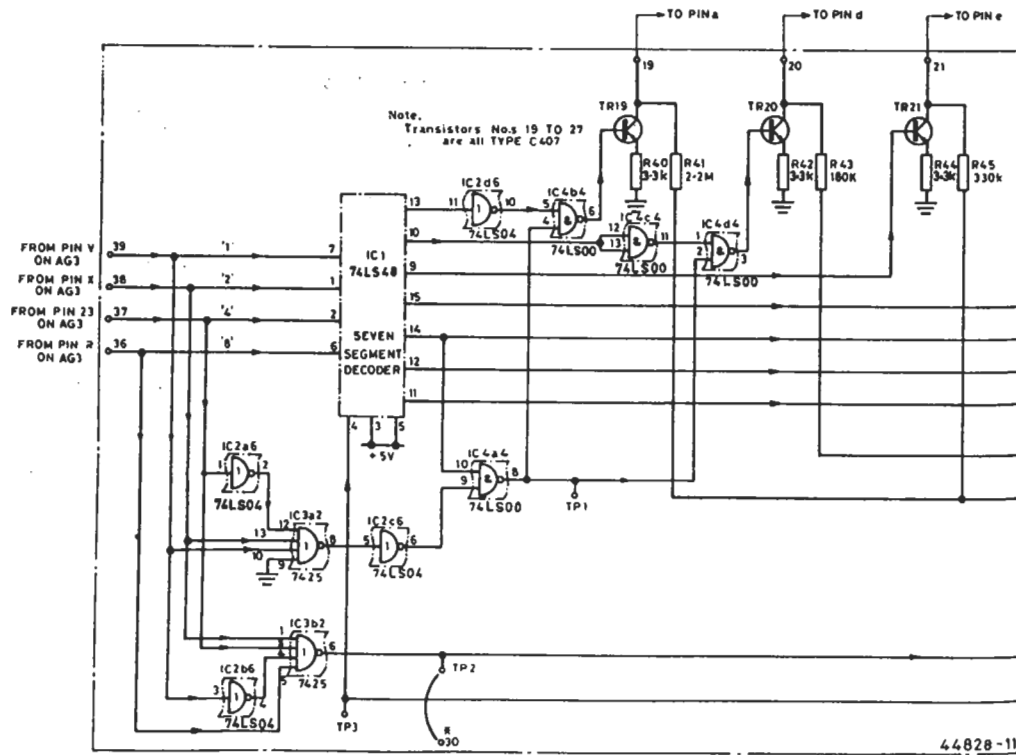


Fig. 7.28 Counter display AG5



View on front of display of one
of the nine digits showing segment
arrangement.



44828-11

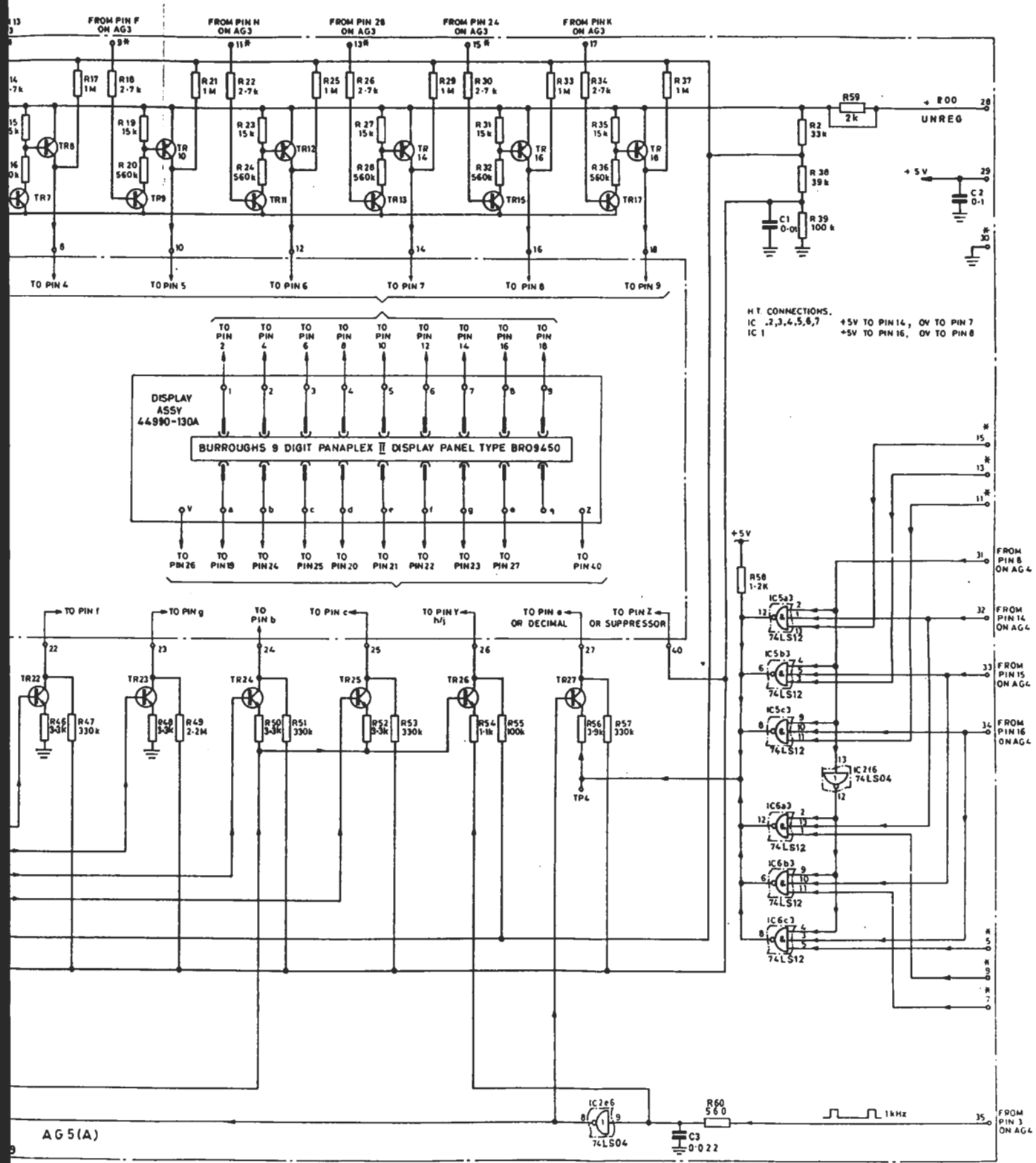


Fig. 7.28 Counter display AG5

Waveforms for AG1

TF 2370 controls - SWEEP MODE : MANUAL
 HORIZONTAL SCALE and RANGE : 5 MHz/DIV
 FILTER BANDWIDTH : NORMAL
 COUNTER FREQUENCY : (1) to (20) BRIGHT LINE
 (21) to (24) DIFF

For (1) to (12), remove boards AE5 and AG4. Also adjust REFERENCE FREQ and/or BRIGHT LINE controls to obtain a 2 MHz signal at pin 1 of AG1. Disconnect the wire to pin 30 on AG1 and connect pin 5 on AG1 to earth. Momentarily connect to earth pin 15 of IC4 on AG1 for (5) to (8) and pin 4 of IC4 on AG1 (i.e. pin 30 on AG1) for (9) to (12).

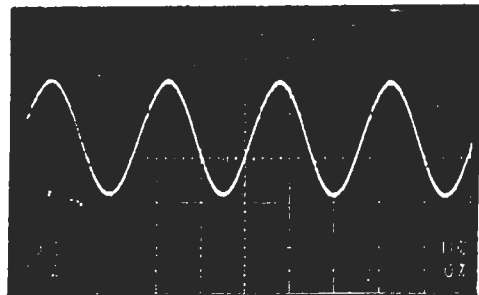
Oscilloscope triggering - (5) to (12) from pin 28 on AG1 (a.c. positive)
 (13) to (16) from pin 9 on AG1 (a.c. negative)
 (17) to (24) from pin 8 on AG1 (a.c. negative)

Horizontal scale Vertical scale Datum level

0.2 μ s/div

0.5 V/div

6 V

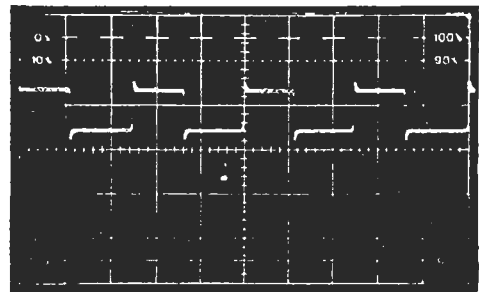


1

0.2 μ s/div

1 V/div

0 V

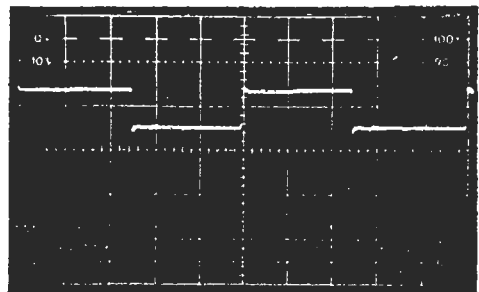


2

0.2 μ s/div

1 V/div

0 V

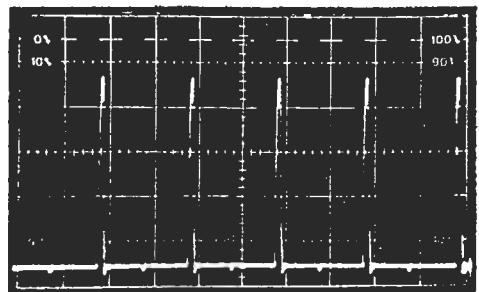


3

0.5 μ s/div

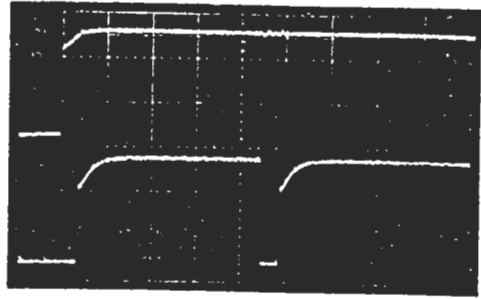
1 V/div

0 V



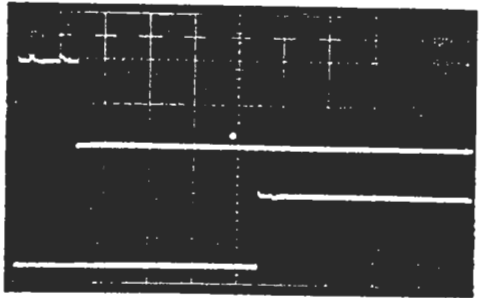
4

5 μ s/div 2 V/div



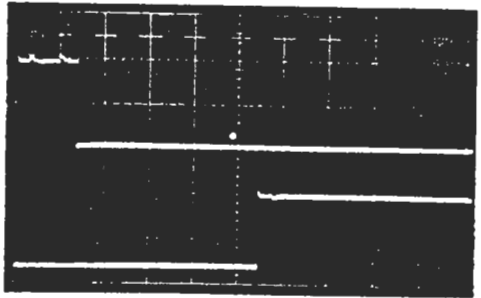
17

5 μ s/div 2 V/div



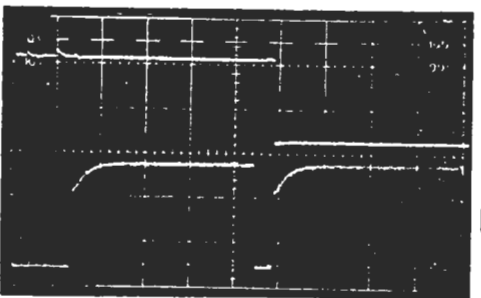
18

5 μ s/div 2 V/div



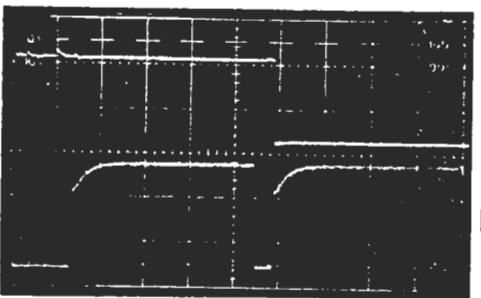
19

5 μ s/div 2 V/div



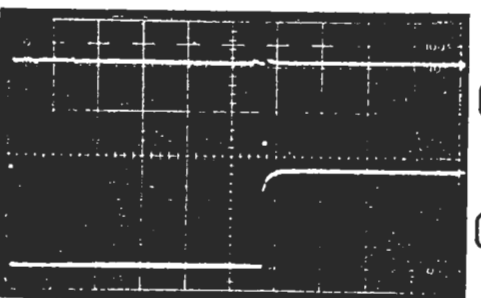
20

5 μ s/div 2 V/div



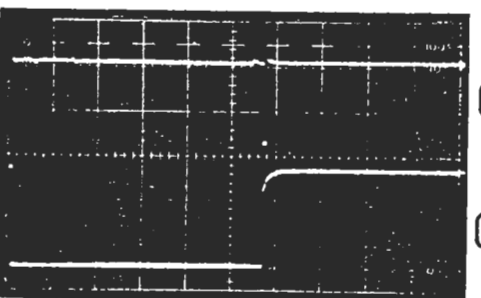
21

5 μ s/div 2 V/div



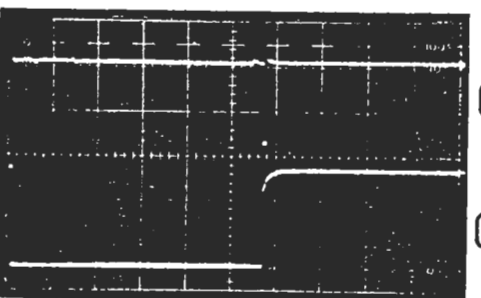
22

5 μ s/div 2 V/div



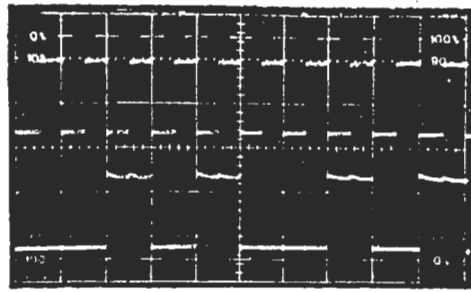
23

5 μ s/div 2 V/div



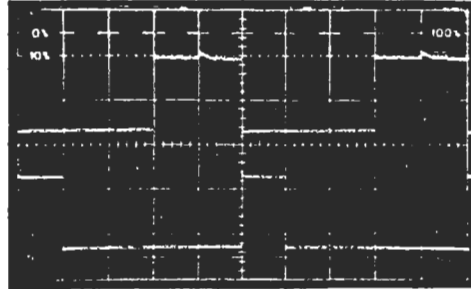
24

2 $\mu\text{s}/\text{div}$ 2 V/div



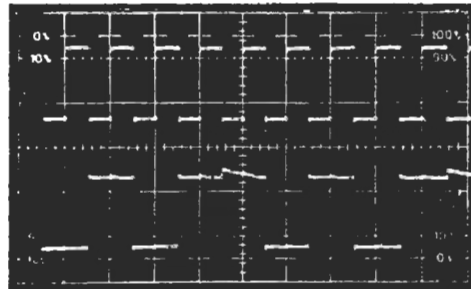
5

2 $\mu\text{s}/\text{div}$ 2 V/div



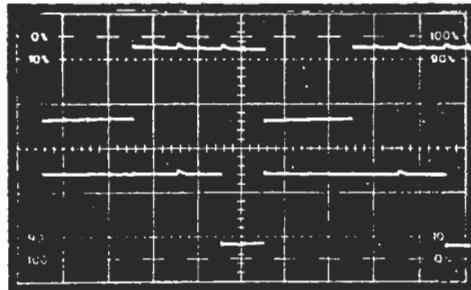
6

2 $\mu\text{s}/\text{div}$ 2 V/div



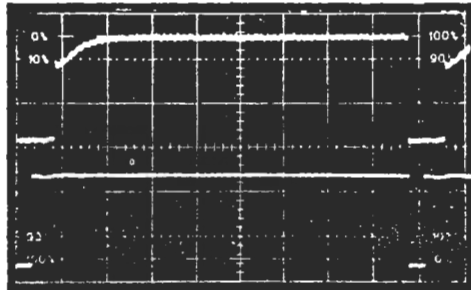
7

2 $\mu\text{s}/\text{div}$ 2 V/div



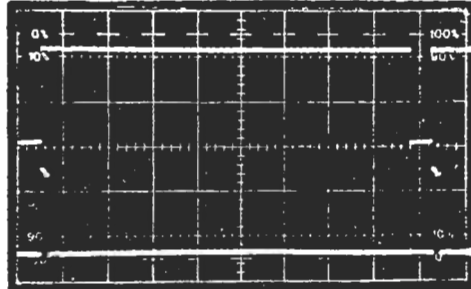
8

2 $\mu\text{s}/\text{div}$ 2 V/div



9

2 $\mu\text{s}/\text{div}$ 2 V/div



10

2 $\mu\text{s}/\text{div}$ 2 V/div



11

2 $\mu\text{s}/\text{div}$ 2 V/div



12

2.5 $\mu\text{s}/\text{div}$ 2 V/div



13

2.5 $\mu\text{s}/\text{div}$ 2 V/div



14

2.5 $\mu\text{s}/\text{div}$ 2 V/div

15

2.5 $\mu\text{s}/\text{div}$ 2 V/div

16

17

18

19

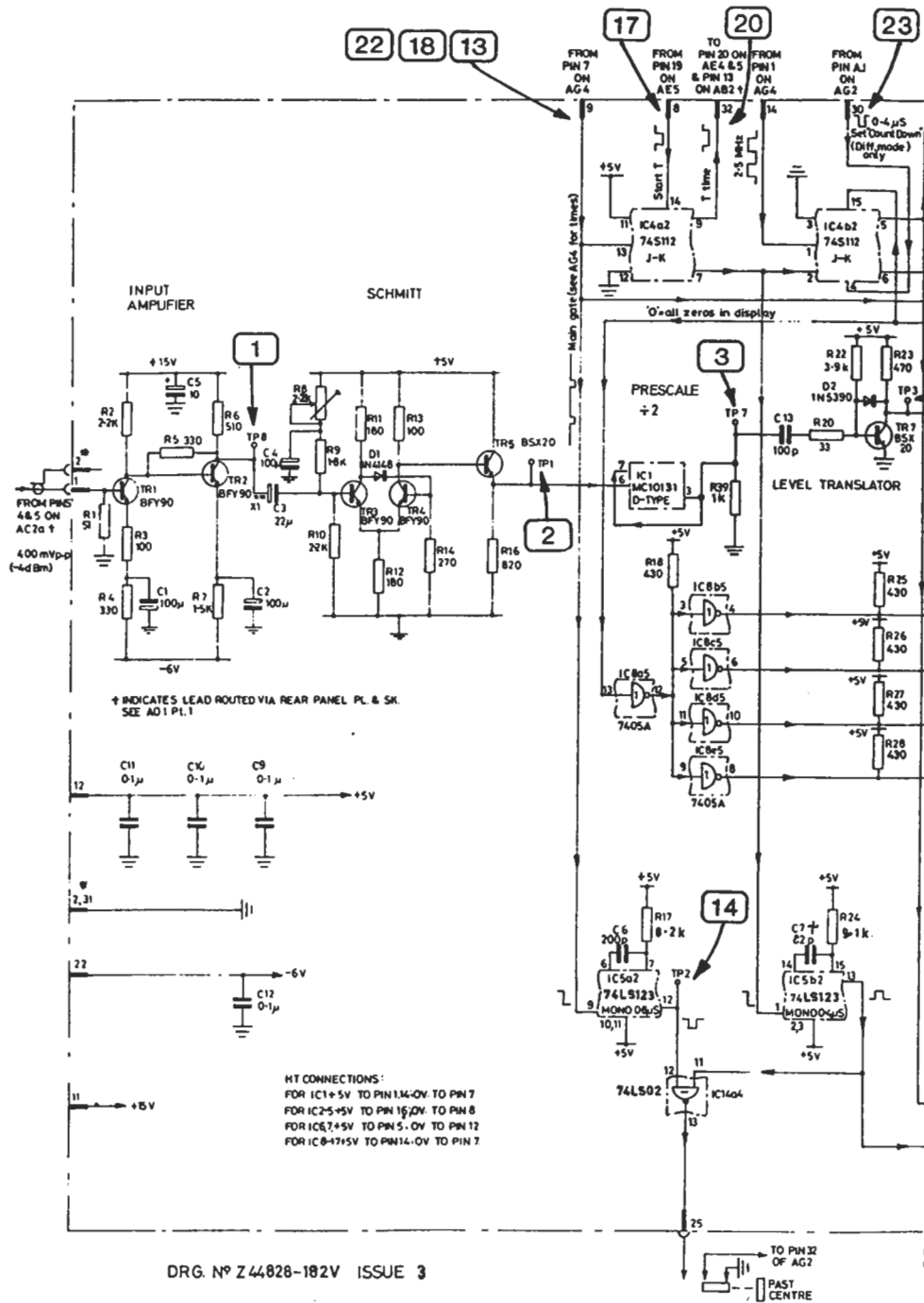
20

21

22

23

24



22 18 13

17

20

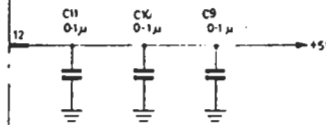
23

1

2

3

14



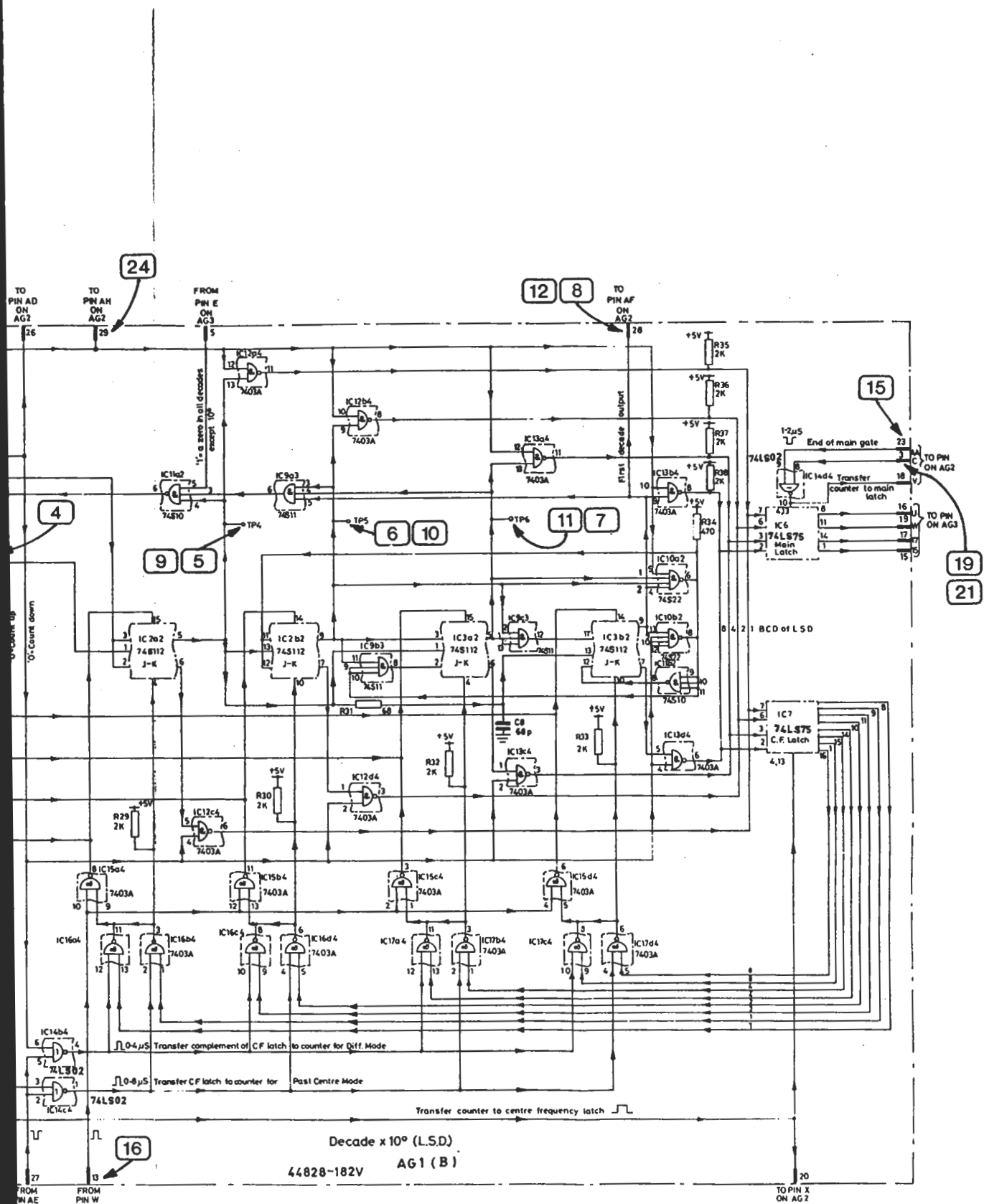


Fig. 7.29 Counter front end AG1

17

18

19

20

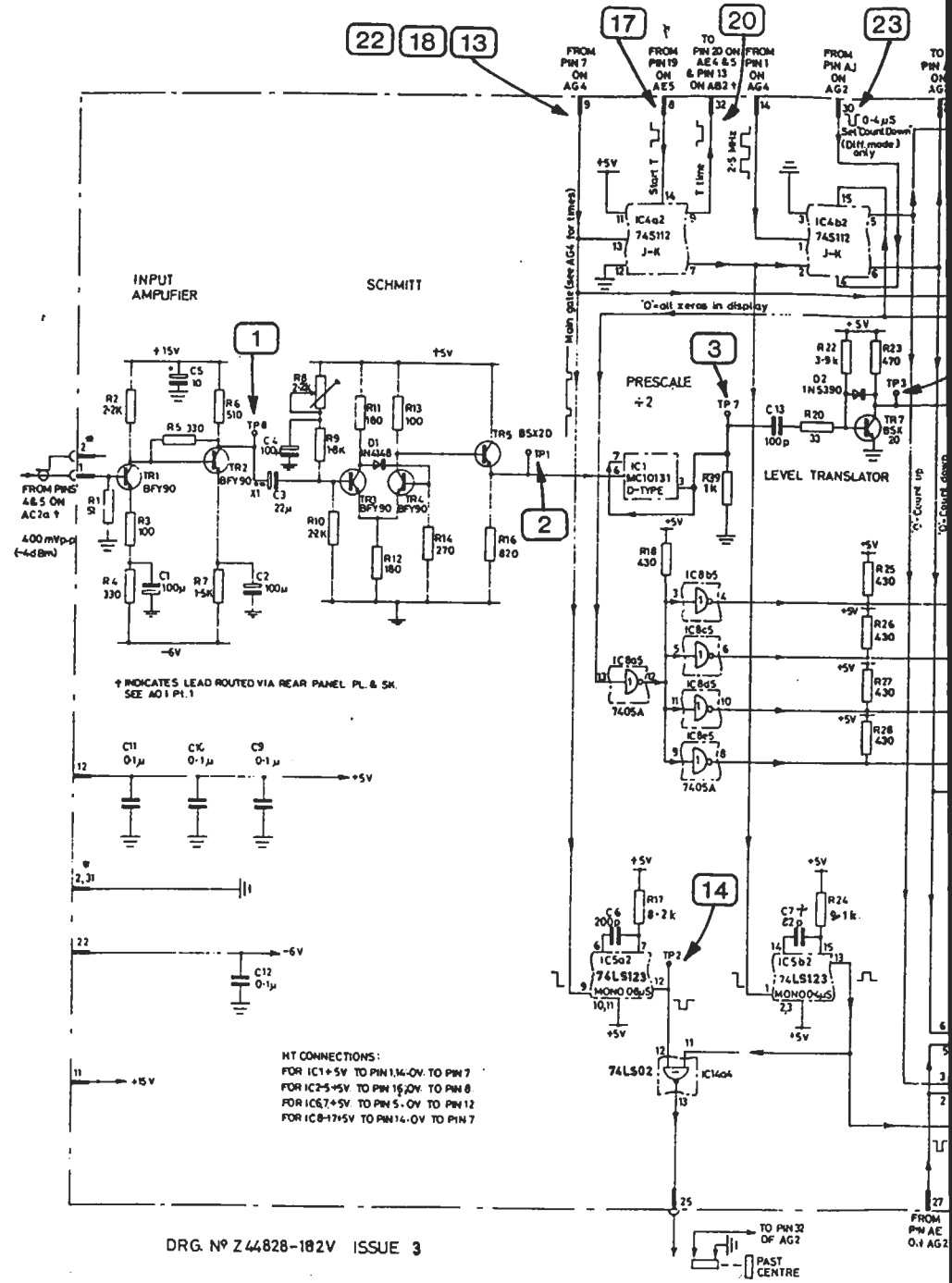
21

22

23

24

HC 1024 = MC 1024



DRG. N° Z44828-102V ISSUE 3

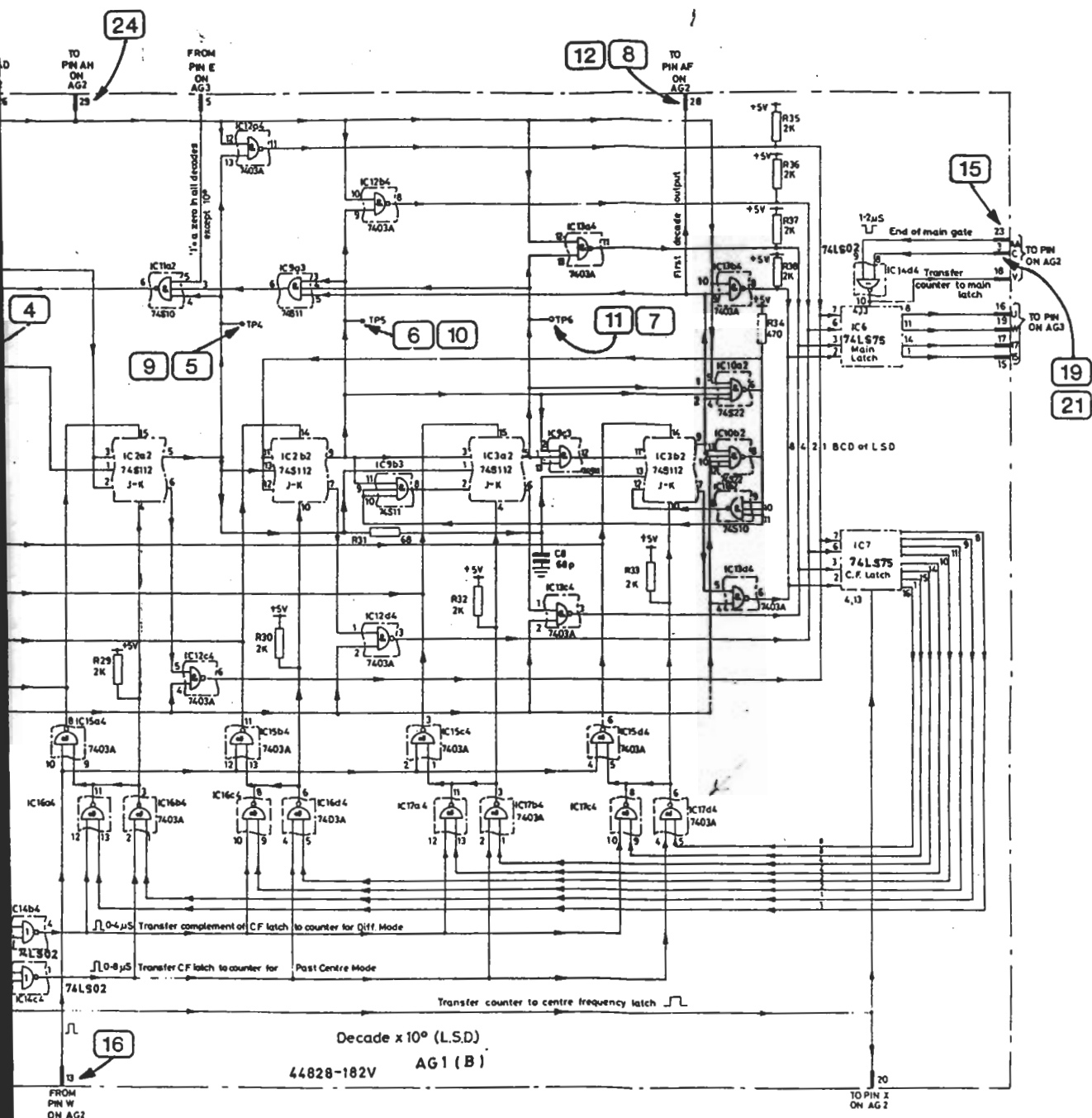
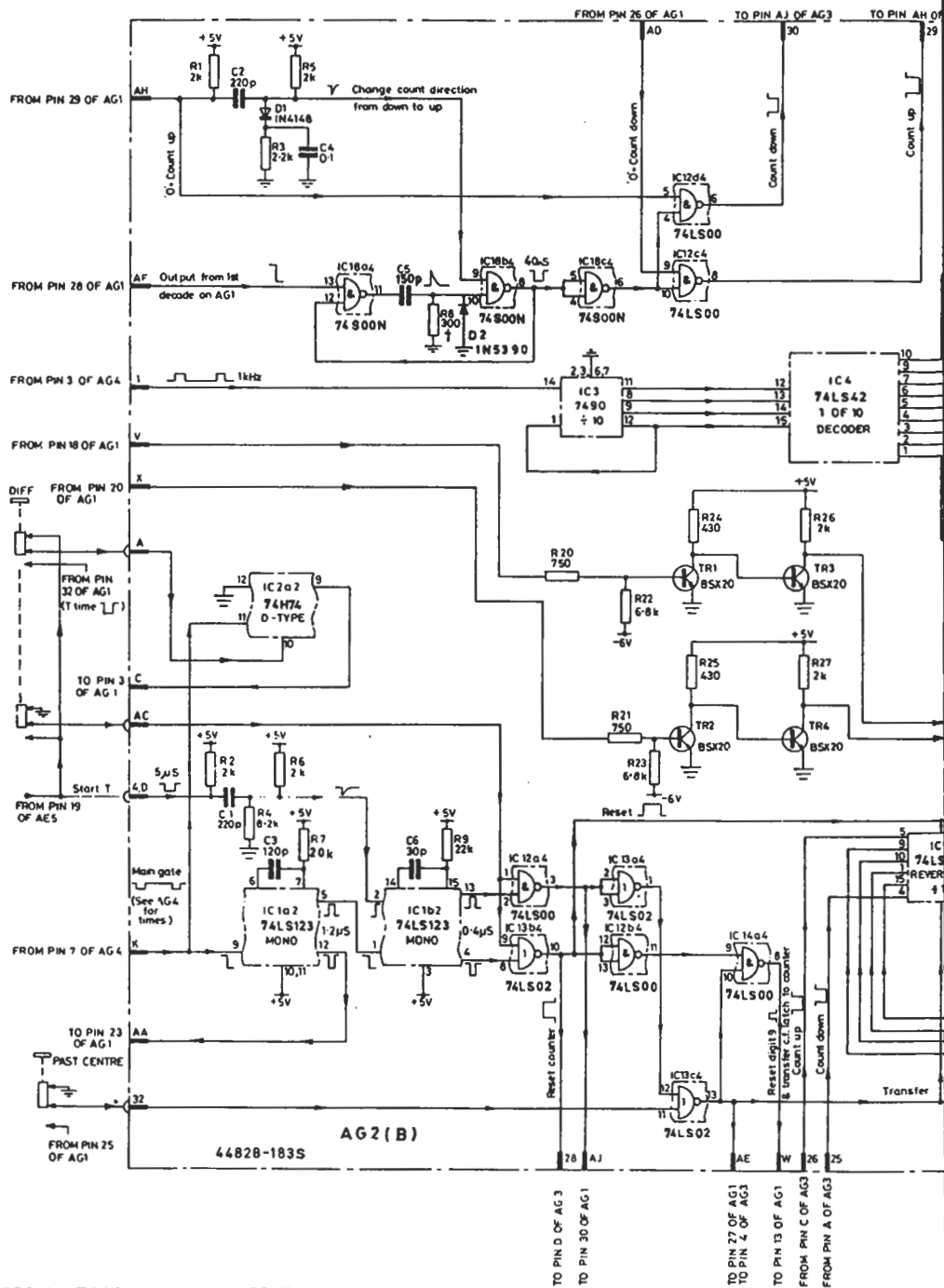
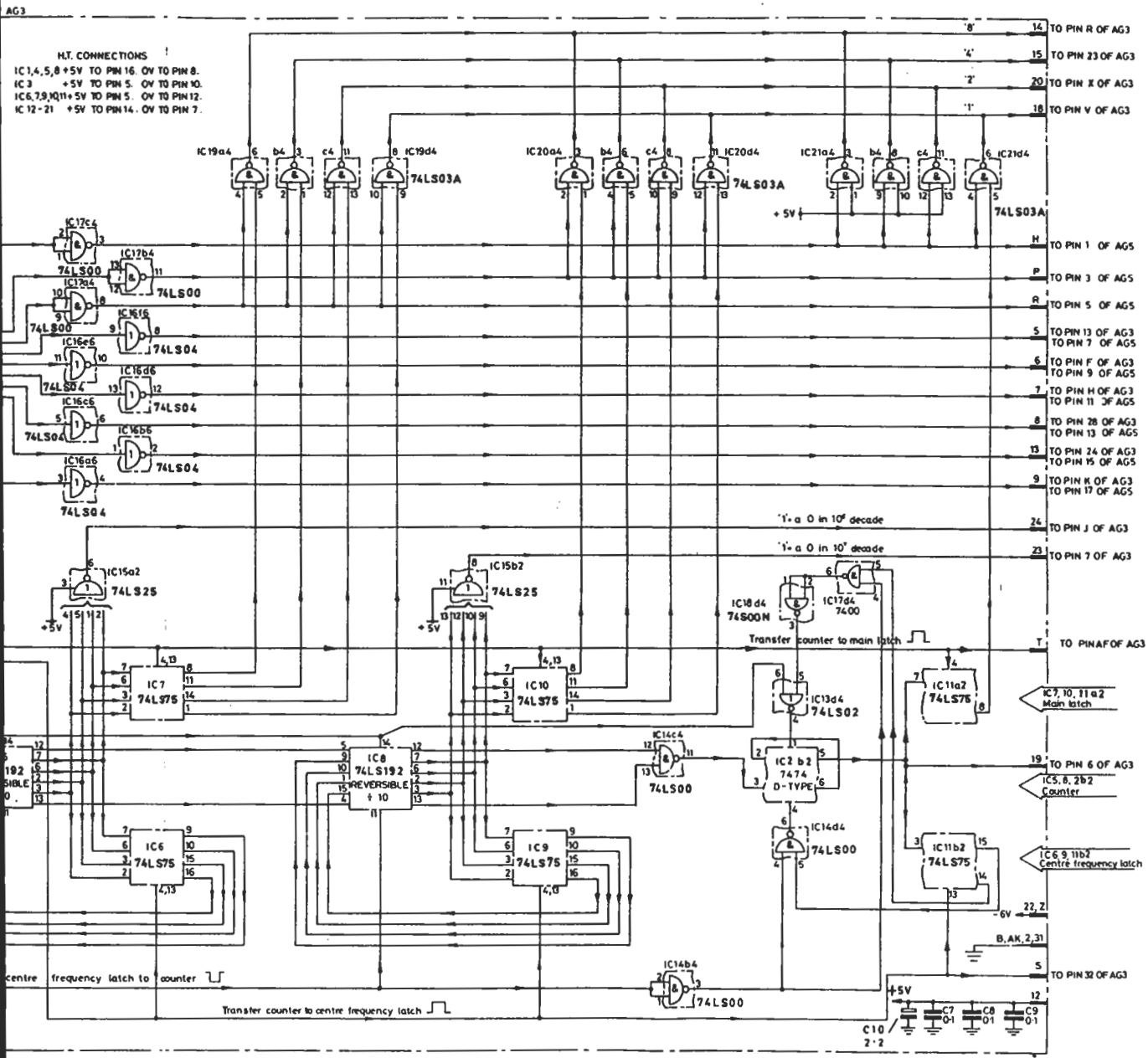


Fig. 7.29 Counter front end AG1

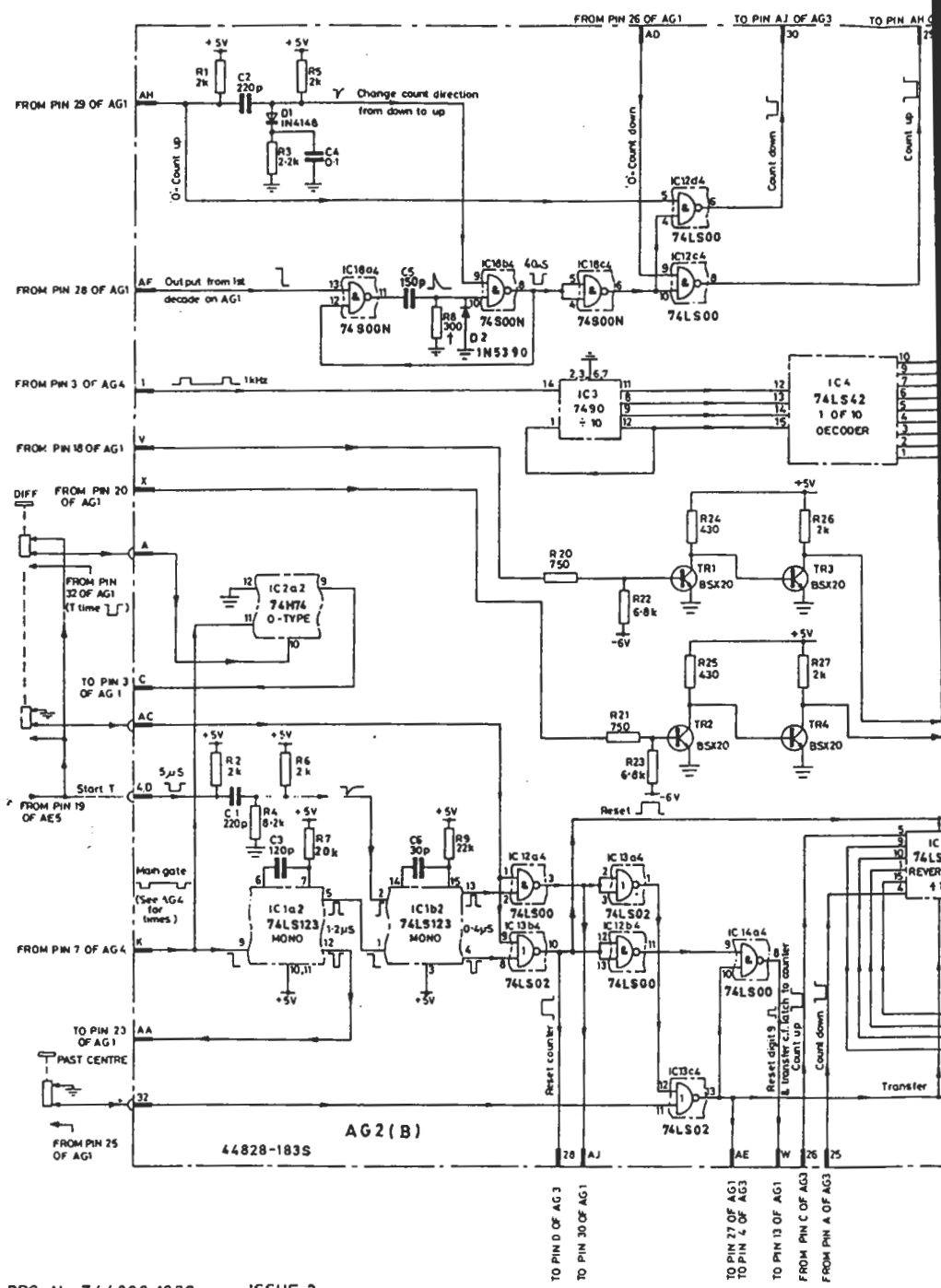


DRG No Z44828-183S ISSUE 3



Decade $\times 10^6$ Decade $\times 10^7$ Decade $\times 10^8$ (0 or 1 only)

Fig. 7.30 Counter control and dividers AG2



DRG No Z44 828-183S ISSUE 3

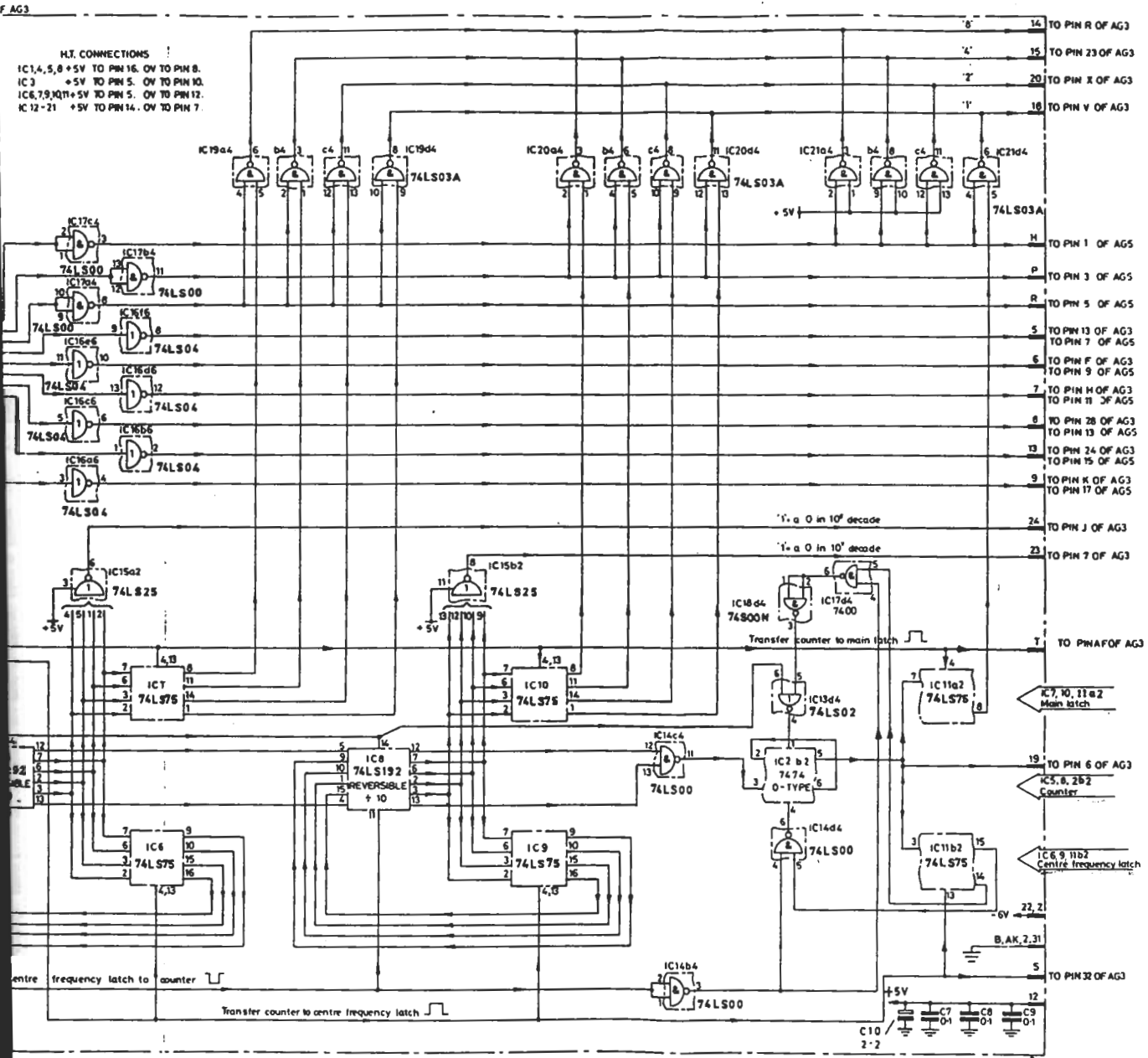
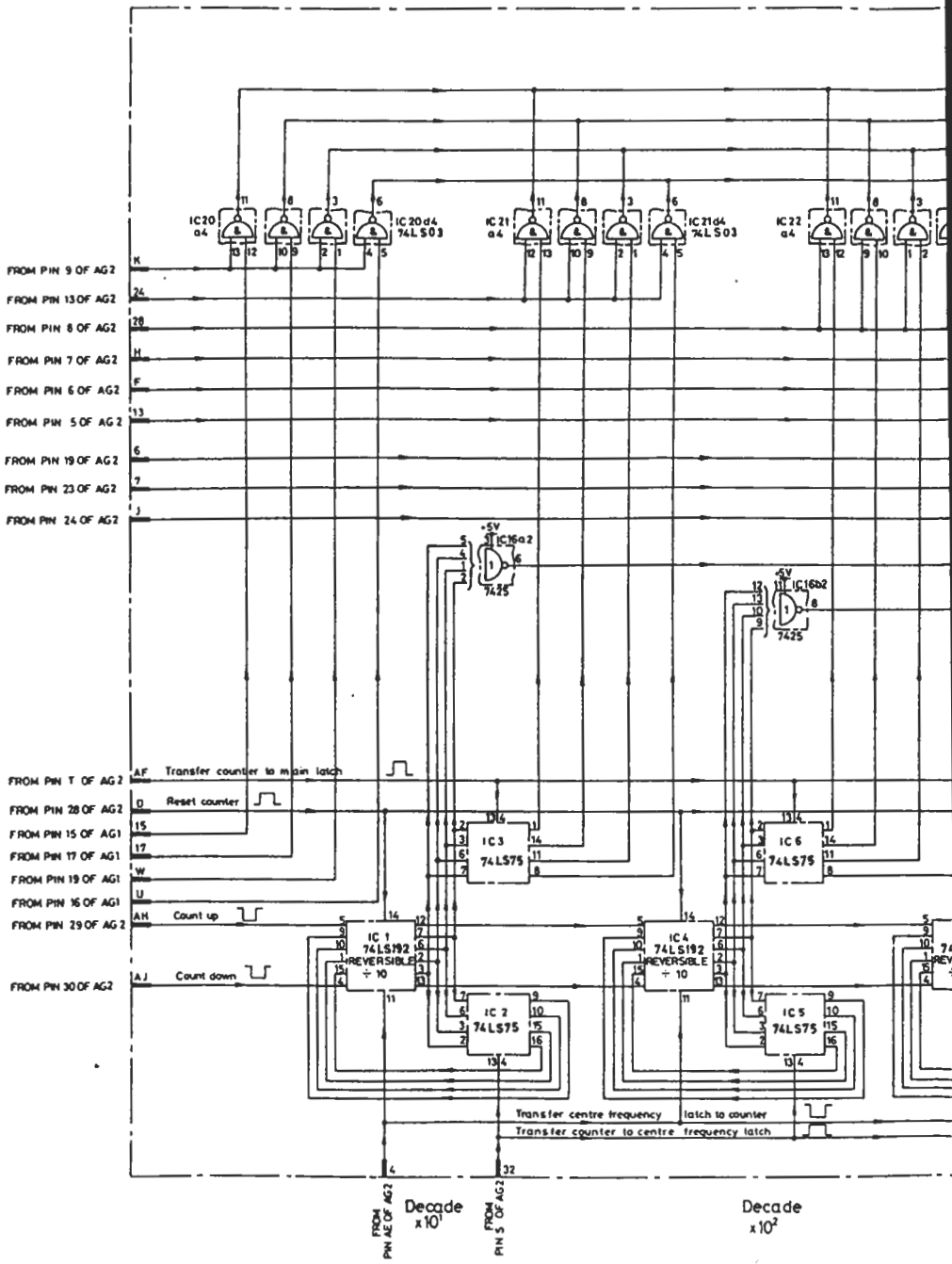
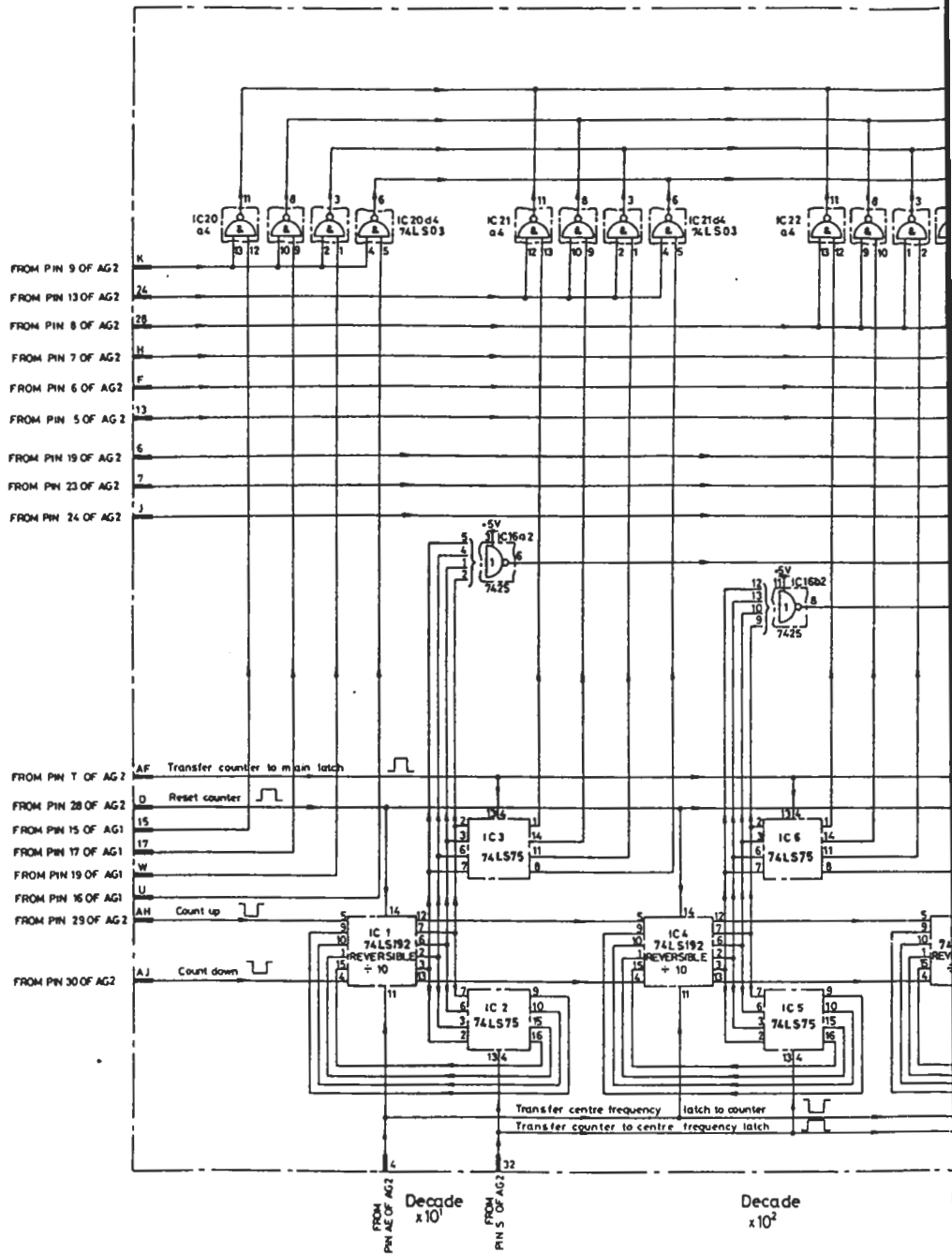


Fig. 7.30 Counter control and dividers AG2



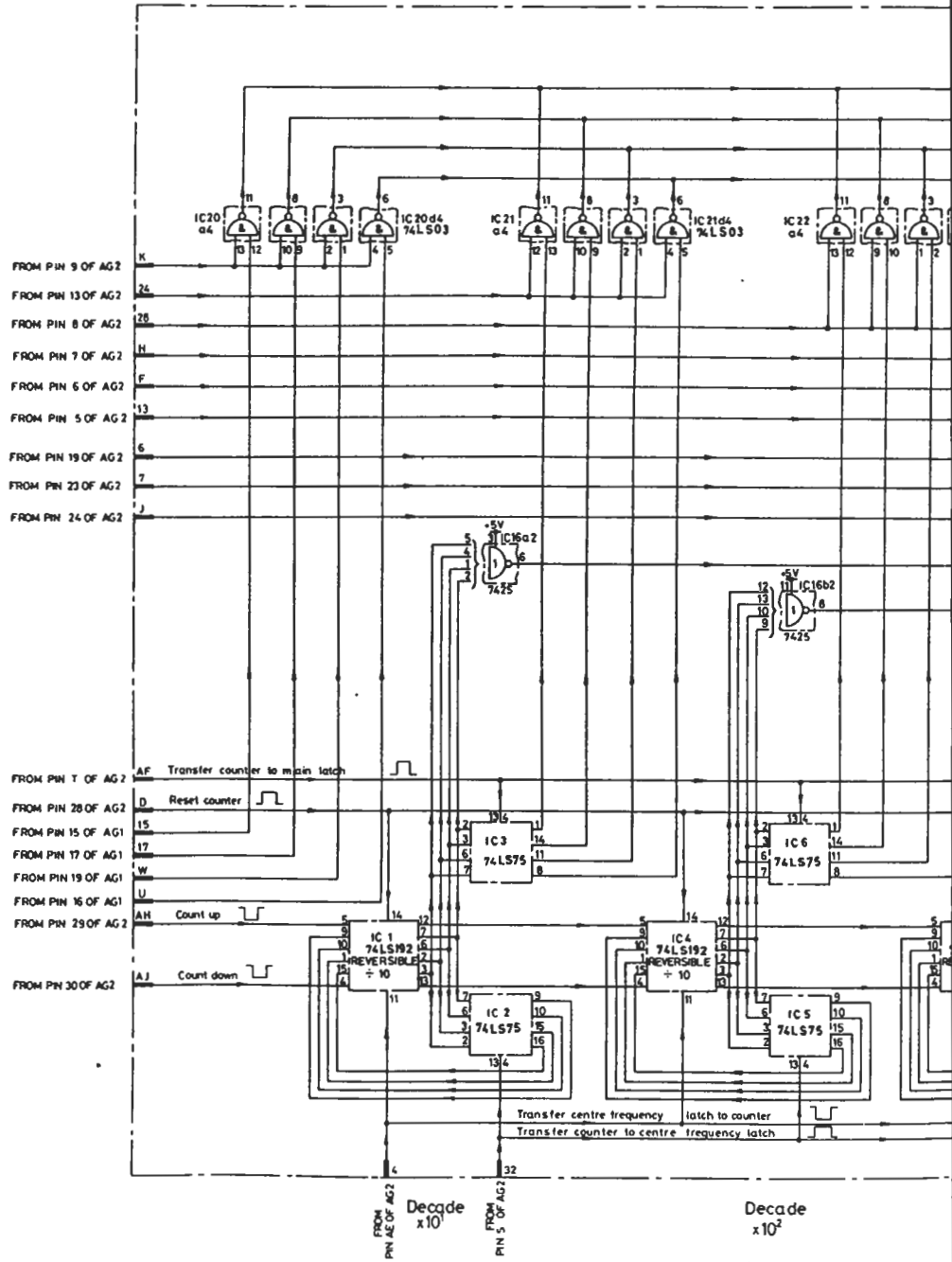
DRG No. Z44828-118D

ISSUE 2



DRG No. Z44828-118D

ISSUE 2



DRG No. Z 44828-118D

ISSUE 2

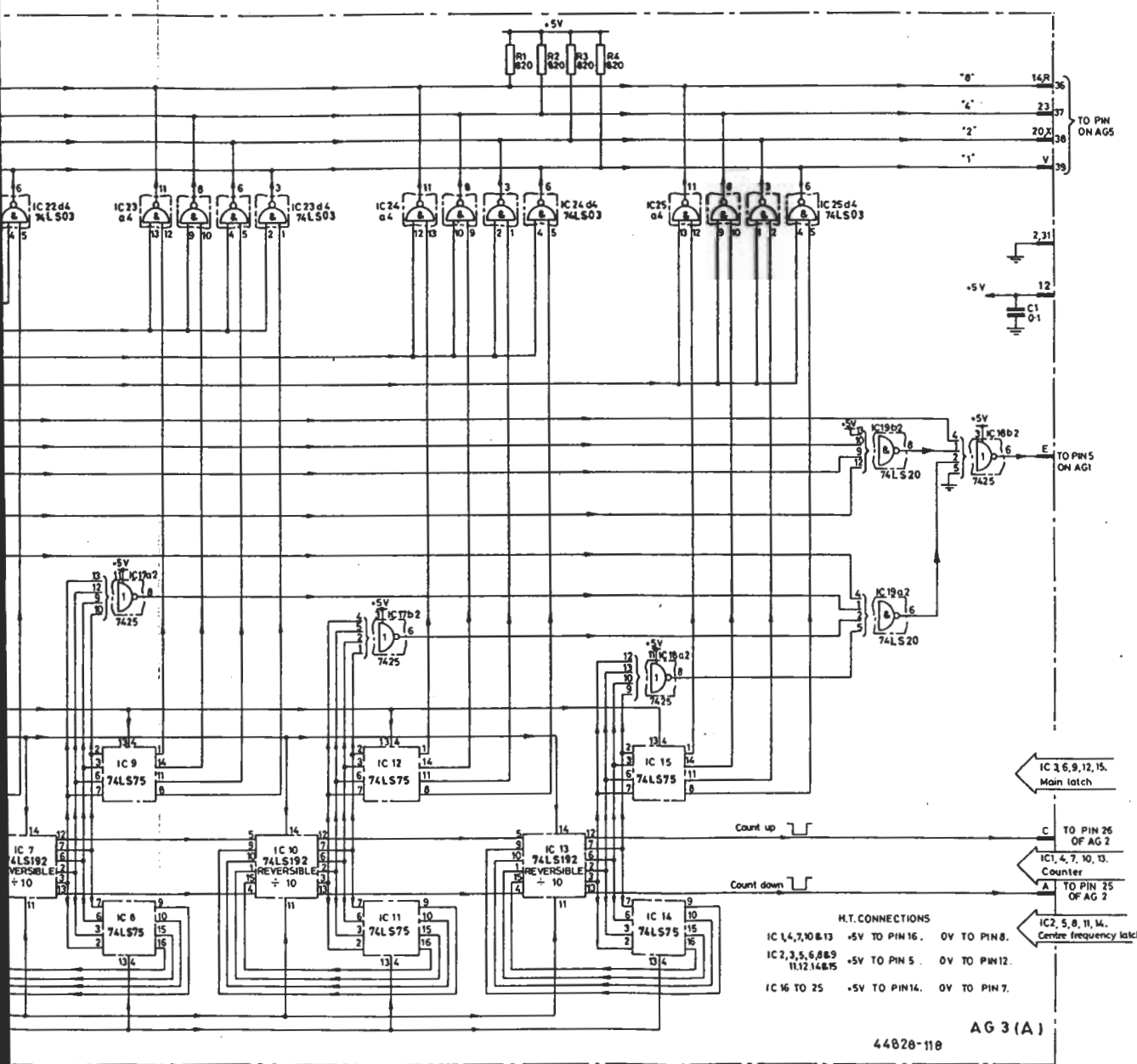


Fig. 7.31 Main divider chain AG3

Waveforms for AK1

TF 2370 controls - COUNTER ON/OFF : ON

Feed the a.c. supply through a variable transformer and adjust the voltage to exactly that for which the voltage selection panel is set.

Horizontal scale

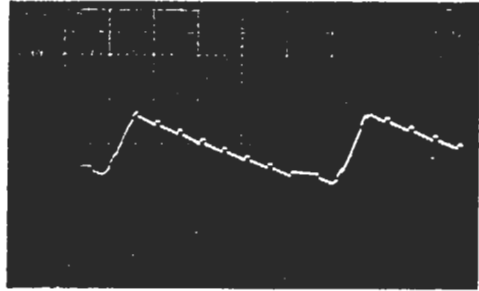
Vertical scale

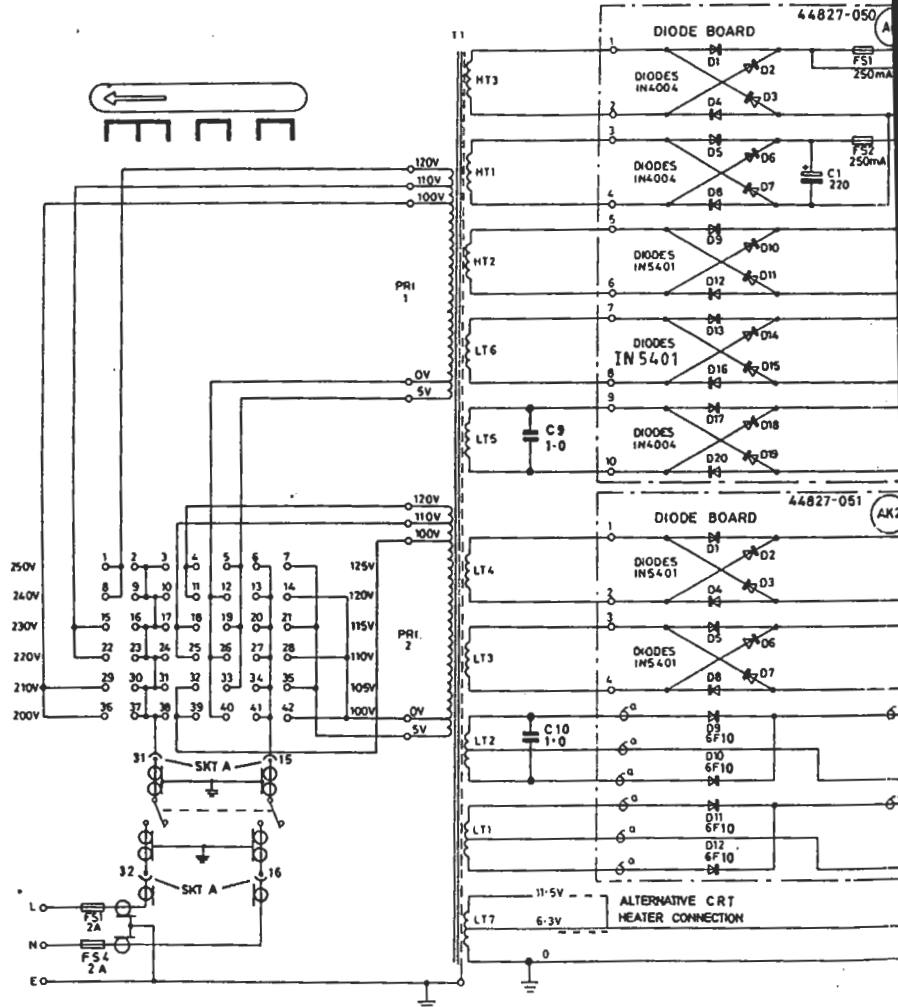
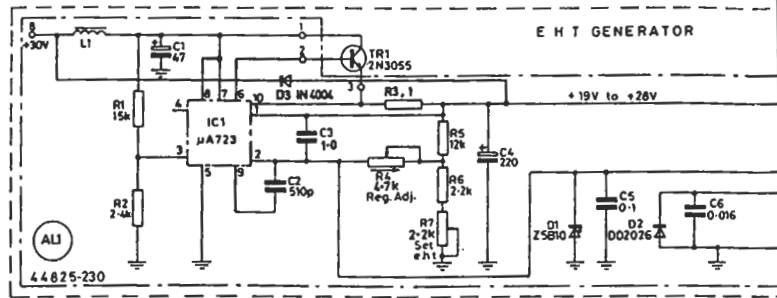
Datum level

2 ms/div

0.5 V/div

197 V →





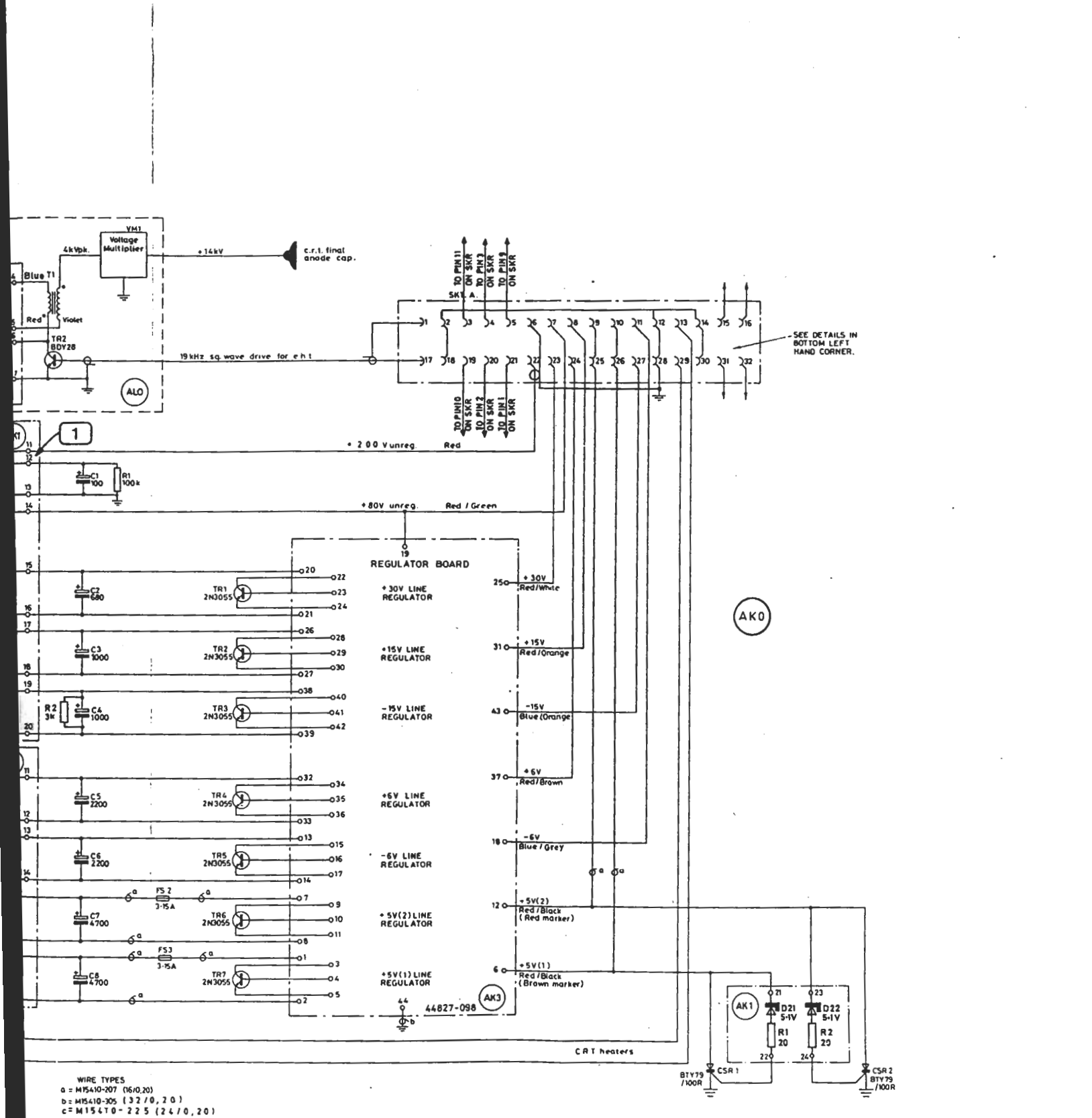
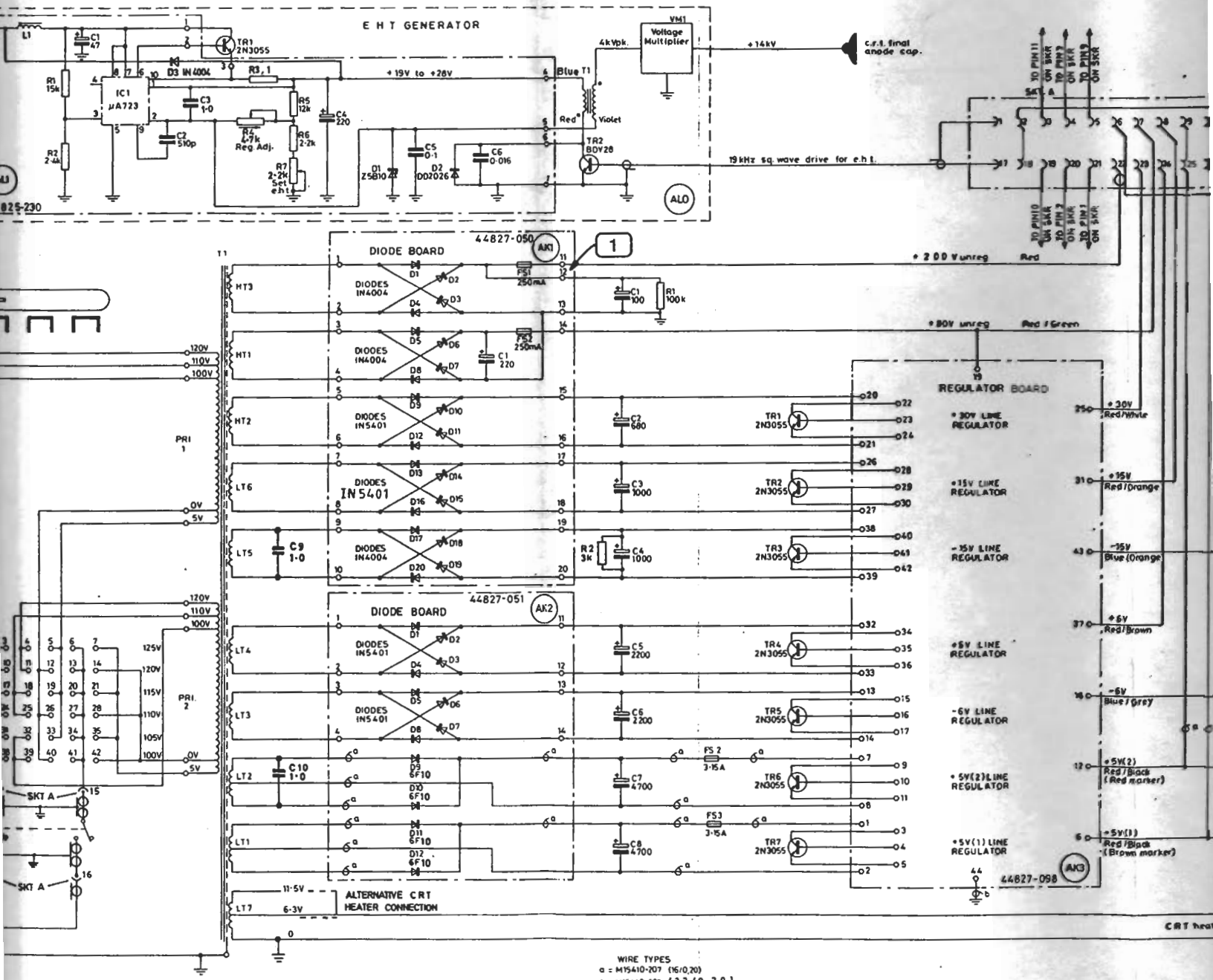


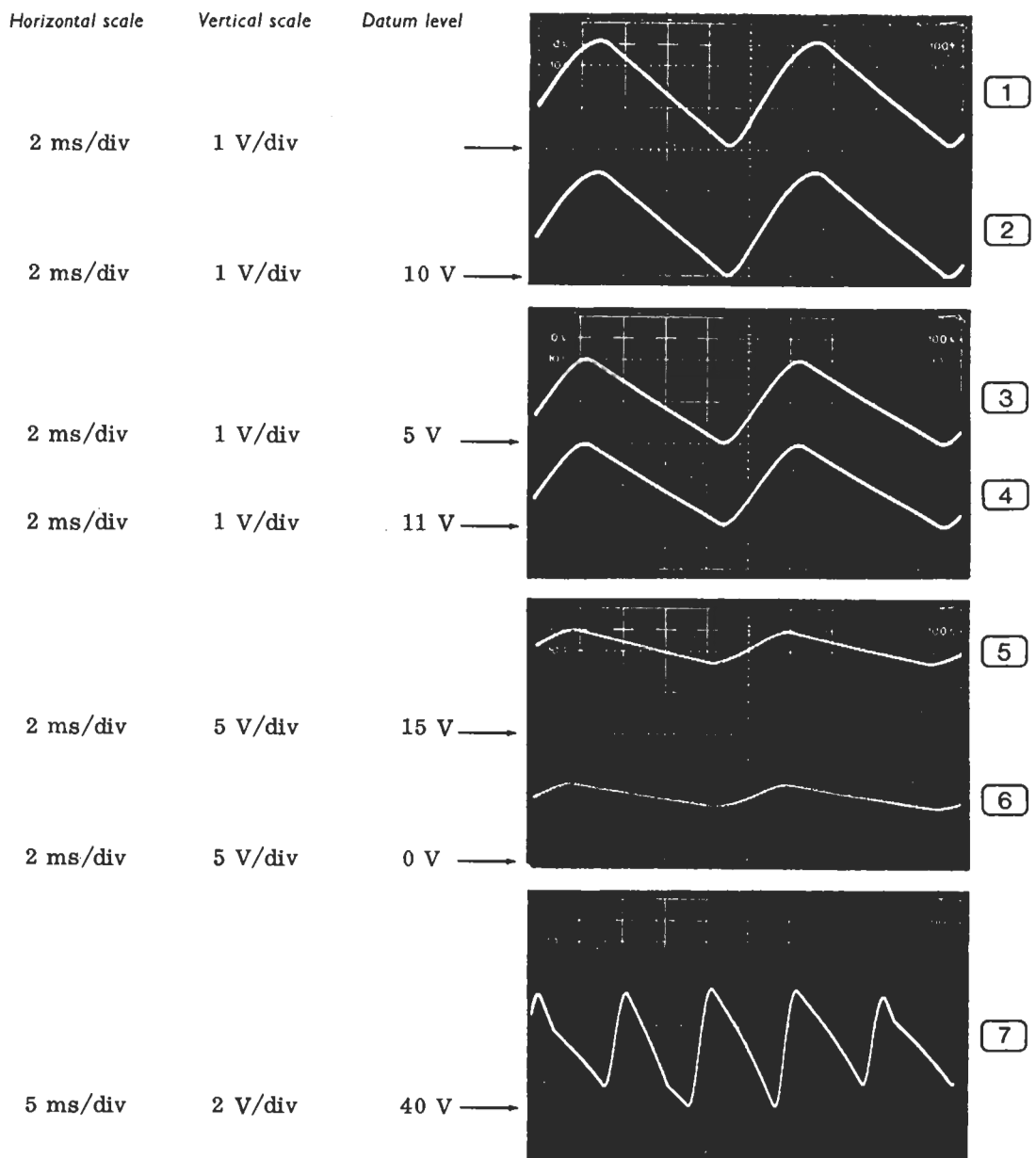
Fig. 7.32 Circuits: AK1, AK2, AK0, AL0 and AL1



WIRE TYPES
 a = M15410-207 (16/0,20)
 b = M15410-305 (32/0,20)
 c = M15410-225 (24/0,20)

Waveforms for AK3

Feed the a.c. supply through a variable transformer and adjust the voltage to exactly that for which the voltage selection panel is set.



0.2 ms/div 2 V/div

8

0.2 ms/div 2 V/div

9

0.5 ms/div 2 V/div

10

0.5 ms/div 2 V/div

11

5 ms/div

50 ms/div

0.5 s/div

50 μ s/div

0.5 ms/div

2 V/div

12

13

14

15

16

5 ms/div

50 ms/div

0.5 s/div

50 μ s/div

0.5 ms/div

2 V/div

17

18

19

20

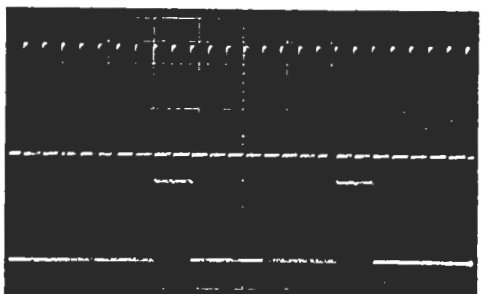
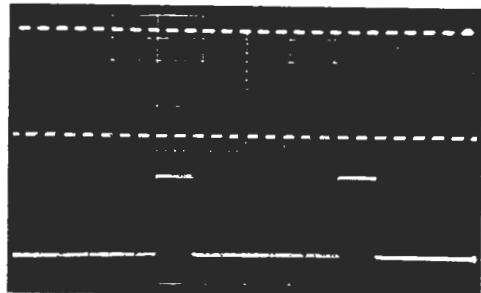
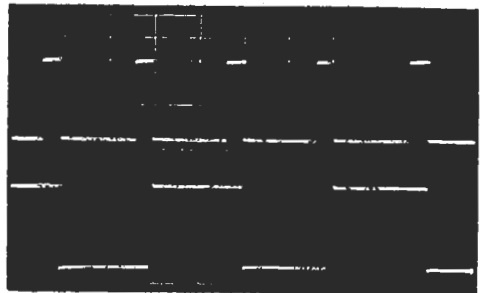
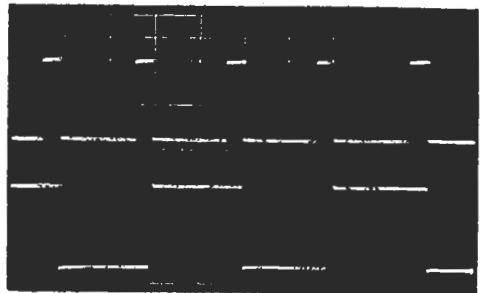
21

5 μ s/div 2 V/div

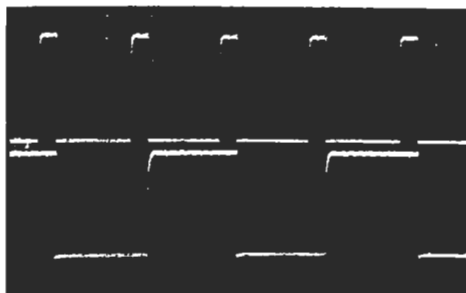
22

10 μ s/div 2 V/div

23



10 $\mu\text{s}/\text{div}$ 2 V/div

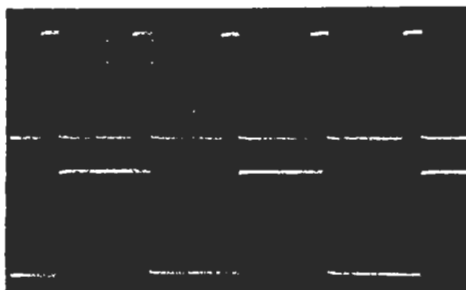


24

10 $\mu\text{s}/\text{div}$ 2 V/div

25

1 ms/div 2 V/div



26

1 ms/div 2 V/div

27

5 ms/div 2 V/div



28

5 ms/div 2 V/div

29

50 ms/div 2 V/div



30

50 ms/div 2 V/div

31

0.5 s/div 2 V/div

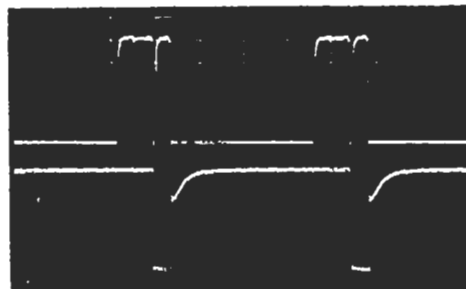


32

0.5 s/div 2 V/div

33

5 $\mu\text{s}/\text{div}$ 2 V/div



34

5 $\mu\text{s}/\text{div}$ 2 V/div

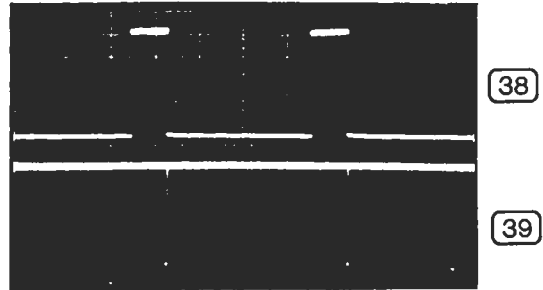
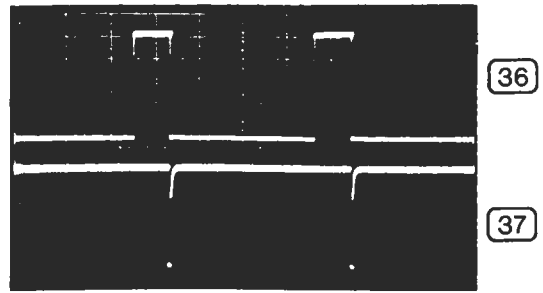
35

50 μ s/div 2 V/div

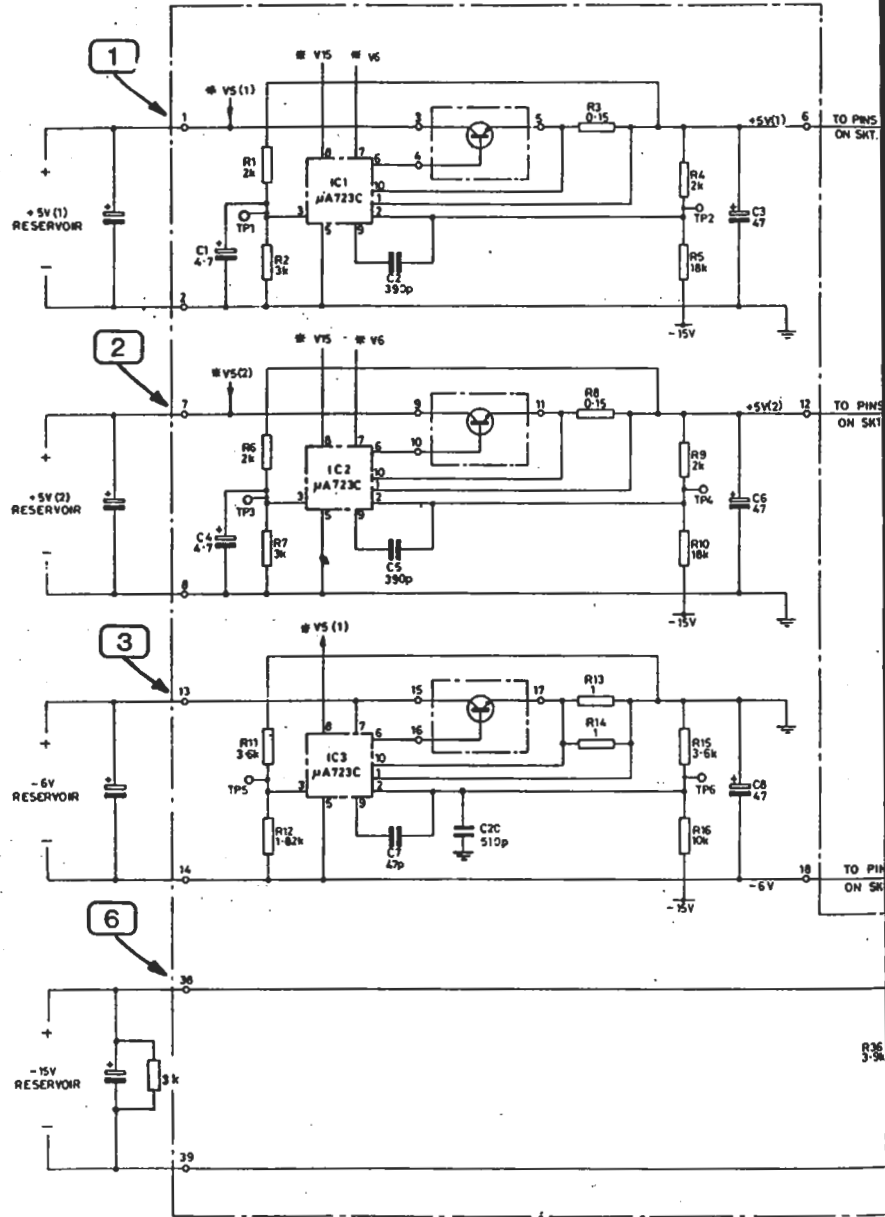
50 μ s/div 2 V/div

0.5 ms/div 2 V/div

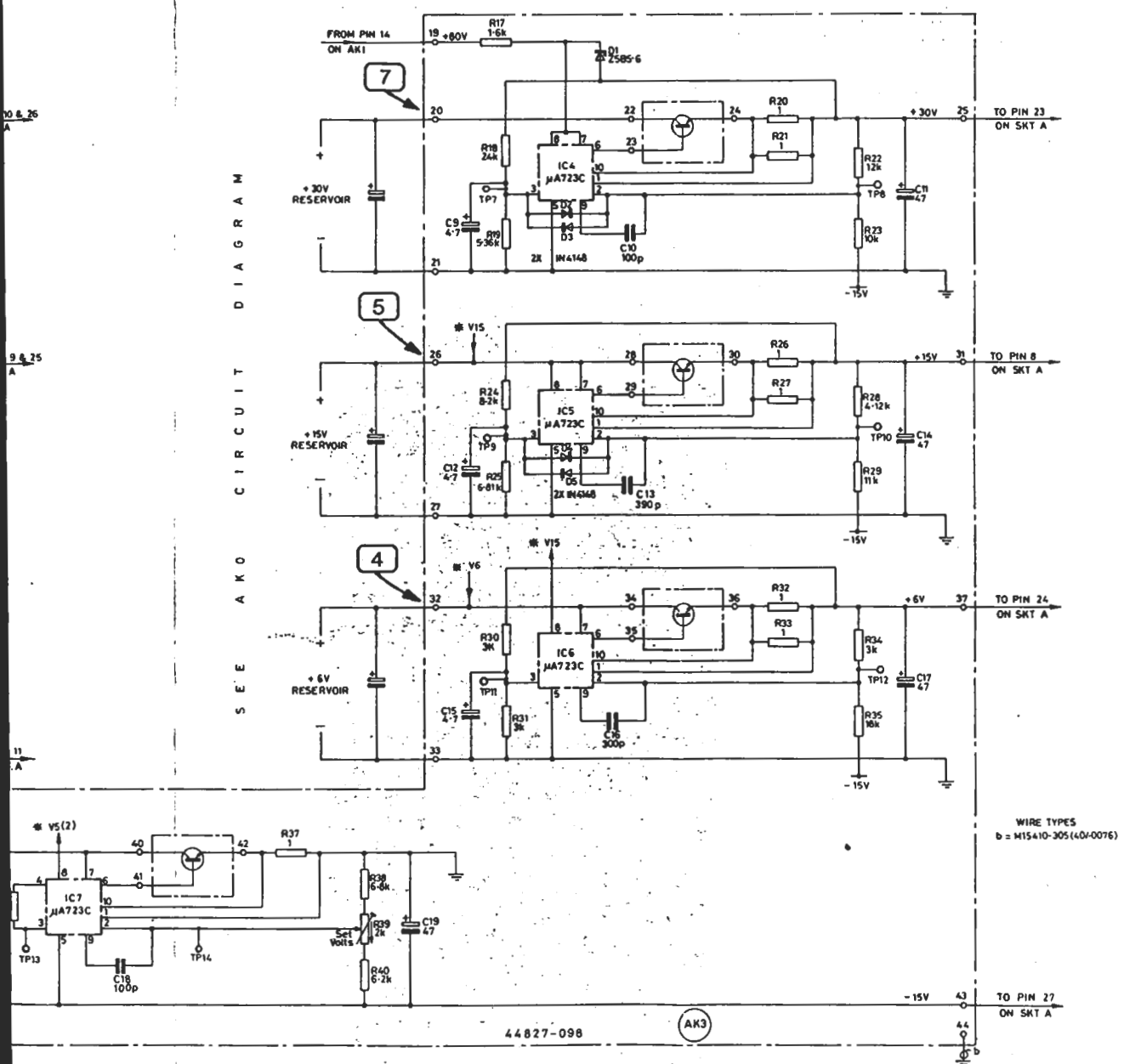
0.5 ms/div 2 V/div



SEE ALSO CIRCUIT DIAGRAM



SEE AKO CIRCUIT DIAGRAM

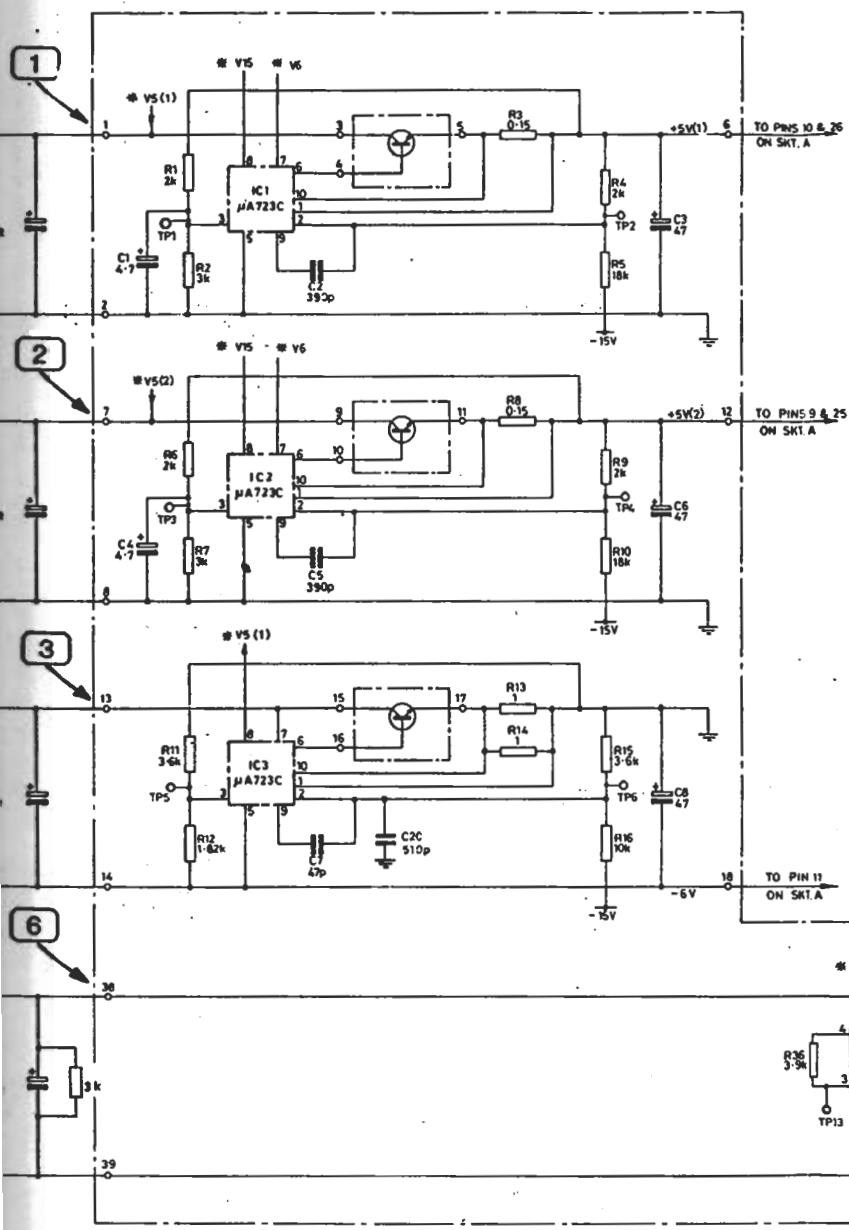


WIRE TYPES
b = M15410-305(404-0076)

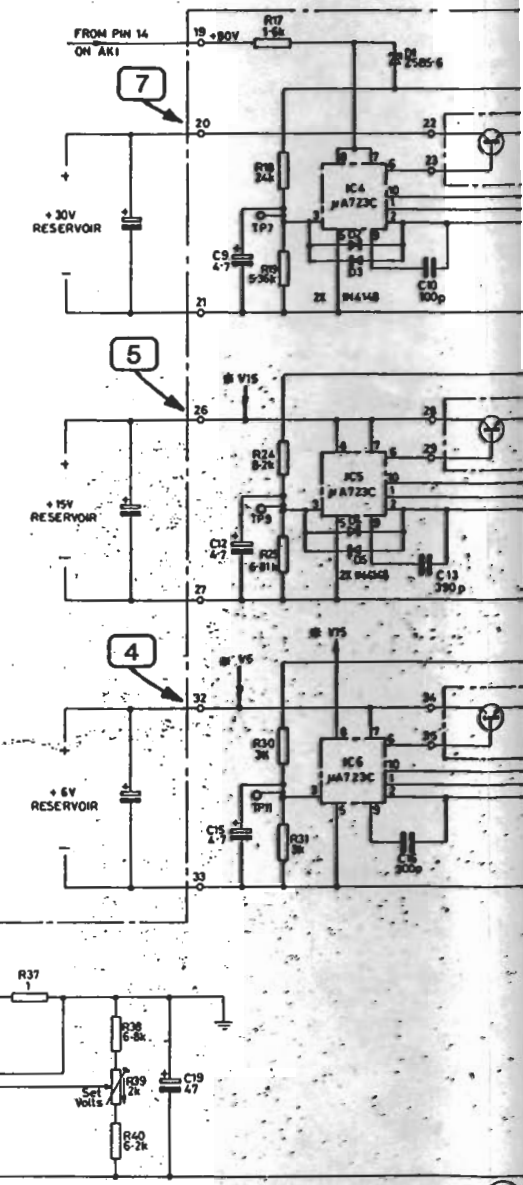
44 827-098

AK3

Fig. 7.33 Regulator AK3



SEE ALSO CIRCUIT DIAGRAM

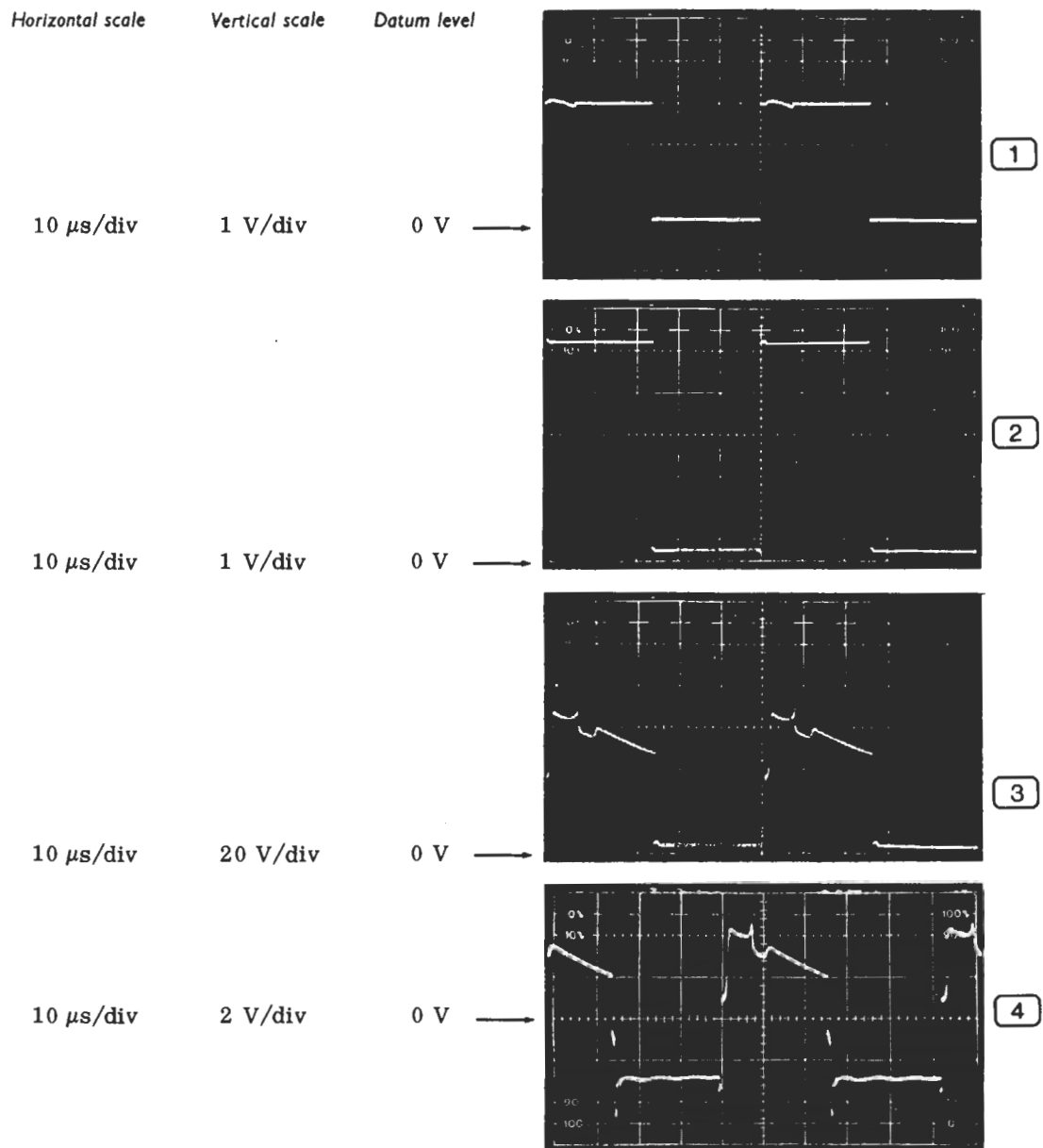


44827-098

AK3

Waveforms for AM1, AM2 and AM3

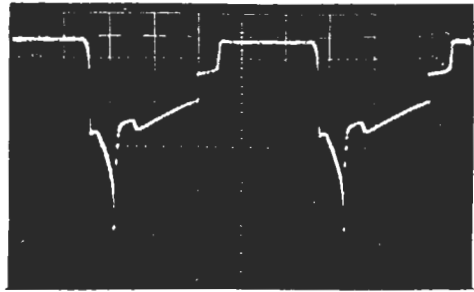
TF 2370 controls - SWEEP MODE : SINGLE
 HORIZONTAL SCALE and RANGE : 10 MHz/DIV
 FILTER BANDWIDTH : NARROW
 REFERENCE FREQUENCY 0-110 MHz : Fully counter-clockwise
 BRIGHT LINE POSITION : (9) and (11) So that the bright line is
 obscured behind the centre dashed frequency graticule line.
 VERTICAL SCALE RANGE : 10 dB/DIV
 STORE and DISPLAY : HIGH DEFN
 GRATICULE INTENSITY : (8) to (12) Normal contrast so that the
 waveform amplitude is as shown.



10 μ s/div

2 V/div

0 V

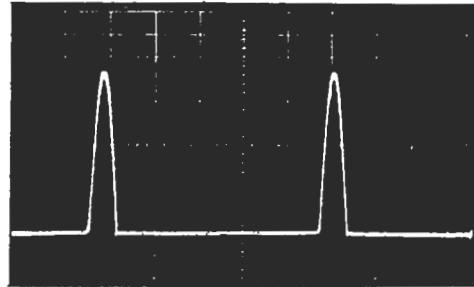


5

10 μ s/div

100 V/div

0 V

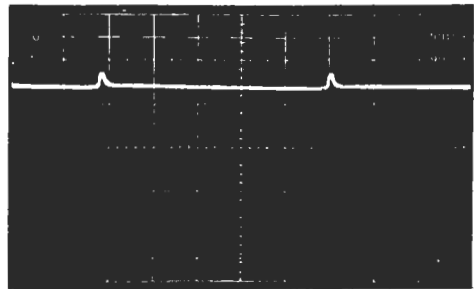


6

10 μ s/div

100 V/div

0 V

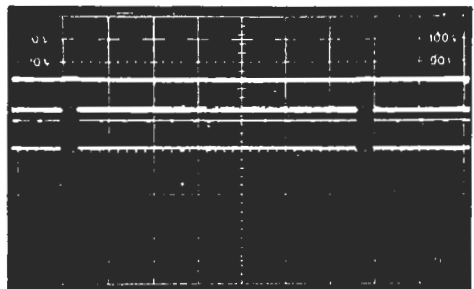


7

2 ms/div

0.5 V/div

14 V

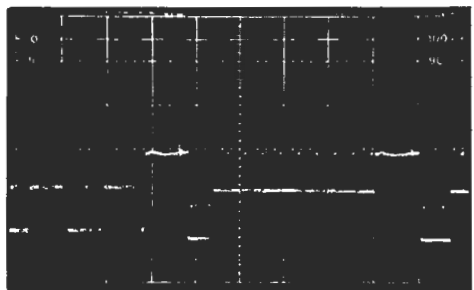


8

10 μ s/div

0.5 V/div

14 V

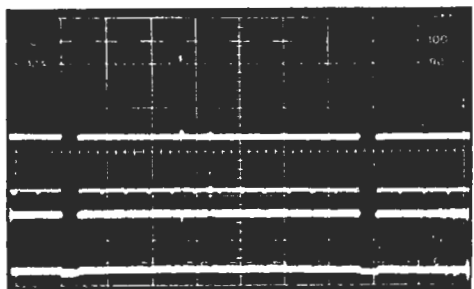


9

2 ms/div

1 V/div

3 V



10

FIL HARPER
FIL ALPO

