

DESIGNS DEPARTMENT HANDBOOK

NO. 7.212(75)

Tester Magnetic Recorder Reproducer TE1/26

C O N T E N T S

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Tester Magnetic Recorder Reproducer TE1/26

1. INTRODUCTION

The TE1/26 enables routine frequency response measurements to be made on magnetic recording equipment.

The reproducing response is measured by using a special multitone test film instead of the normal frequency calibration tape. Five frequencies (125Hz, 1kHz, 5kHz, 10kHz, 14kHz) are recorded simultaneously on the multitone tape and each frequency can be selected in turn by operating the appropriate push button.

The overall response can also be measured. This is achieved by turning each selective amplifier into an oscillator to provide the frequencies to be recorded. It is possible to measure the output from the reproducing amplifier whilst recording because the meter is connected via a wide band amplifier to the input sockets.

2. OPERATION

2.1 Reproducing Response Measurement

- 2.1.1 Place the multitone tape on the machine and connect the reproducing amplifier output(s) to the input terminal(s) of the tester. If the machine is connected to a desk or console do not terminate the input.
- 2.1.2 Select 1kHz, check that REP/REC button is in the REP mode. Select appropriate channel button A or B then set the reproducing gain control on the machine so that the meter reads 0.
- 2.1.3 Select the remaining frequencies in turn and note frequency response.

2.2 Overall Response Measurement

- 2.2.1 Replace the multitone tape with a blank tape.
- 2.2.2 Release the REP/REC button so that the tester is in the recording mode.
- 2.2.3 Connect the output(s) of the tester to the recording machine input(s). If the machine is connected to a desk or a console do not terminate output(s).
- 2.2.4 Select 1kHz and the appropriate channel button (A or B), then set the recording gain control on the machine so that the meter reads 0.
- 2.2.5 Select the remaining frequencies in turn and note frequency response.

2.3 Measurement of Phase Difference Between Channels

Providing the machine has a balanced output the phase difference between channels of a stereophonic machine can be measured as follows.

2.3.1 With the recording machine and the tester in the condition noted in 2 above select 10kHz. Operate $\frac{1}{2}$ (A + B) push button and note reading then operate $\frac{1}{2}$ (A - B) push button and note reading. If reading is below -15dB phase error is less than 20 degrees.

3. CIRCUIT DESCRIPTION

The heart of the meter is an active selective filter (see Fig. 1) using a bridged-T feedback network whose design equations are:

$$a = \frac{D}{2A}$$

$$f = \frac{1}{2\pi} \sqrt{\frac{1}{C^2 D (A + B)}}$$

$$Q = \sqrt{\frac{D}{4 (A + B)}}$$

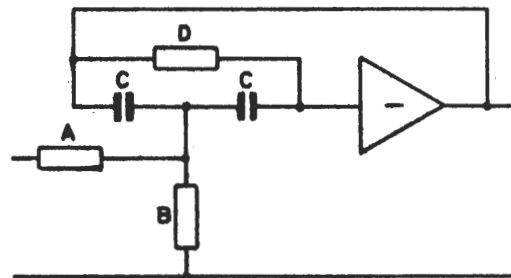


FIG. 1

The values chosen for the meter are gain (a) = 1, $f = 125\text{Hz}$, 1, 5, 10 and 14kHz and $Q = 10$. This value of Q is high enough to keep errors due to break through of adjacent frequencies less than 0.2dB. It is also low enough to keep errors due to a frequency (speed) error of $\pm 1\%$ due to the recording machine also below 0.2dB. The resistors A and B are made partly variable so as to permit trimming of gain and frequency. Because of the values chosen their mutual effect is very slight though the frequency trimmer (B) does also affect the Q of the circuit to some degree. This is unimportant because of the limited range of adjustment.

3.1 The Input Circuit

The fixed part of the filter input resistor is provided by two equal resistors which, in the A or B position are both connected to the live side of the relevant input, whose other side is 'earthed'. In the $\frac{1}{2}$ (A + B) position one resistor goes to the line side of each input; this connection is also used in the $\frac{1}{2}$ (A - B) position except that the B input is reversed. In the MONO position extra resistors are added to give an attenuation of 4dB whilst keeping the output impedance the same as in the other configuration.

3.2 The Meter Amplifier

In the 'record' position the input circuit is directly connected to this circuit which converts the input voltage input to a current in a 3K9 resistor across which is connected a VU meter. The feedback components are selected so that at all frequencies the meter reads '0' for an input of -17dB.

In the 'Replay' mode the amplifier input comes from the Selective Amplifier whose gain (nominally unity) is set so that the meter reads '0' when an input is applied at the selected frequency at a level of -17dB. It should be noted that, in either condition, if 'Mono' is selected the corresponding input is -13dB.

3.3 The Oscillator

In order to convert the device into a switchable, single frequency oscillator, the output of the selective amplifier is applied to a Zener controlled clipper amplifier. The constant amplitude square wave from the clipper amplifier is applied, after suitable attenuation and impedance padding, to the input of the selective amplifier, thereby completing the feedback loop. The selective amplifier rejects all but the fundamental so that its output is constant at all selected frequencies and its harmonic ratio is better than -30dB. This is quite adequate for all but distortion measurements.

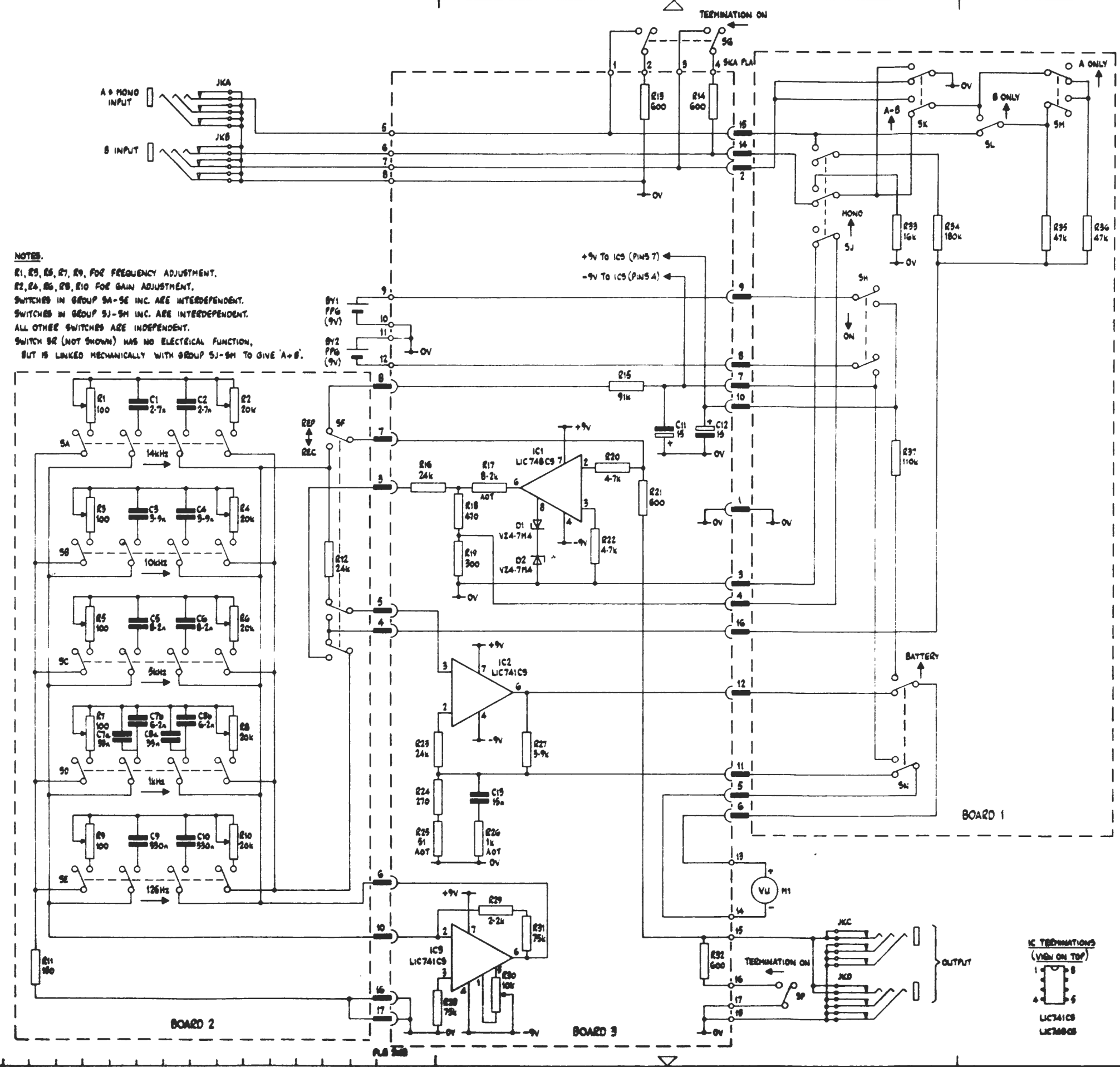
4. PERFORMANCE SPECIFICATION

Input Level	-17dB (each tone)
Input Impedance	30K Ω unbalanced
Test Frequencies	125Hz, 1kHz, 5kHz, 10kHz and 14kHz
Output Level	-17dB (single tone)
Output Impedance	600 Ω unbalanced

5. MAINTENANCE

From time to time it may be necessary to check the frequency of the output tones and their level. After this has been done plug the output of the device to the input A to A, B to B and check that meter reads 0 ± 0.2 dB for each frequency.

NOTES.
 R1, R3, R5, R7, R9, FOR FREQUENCY ADJUSTMENT.
 R2, R4, R6, R8, R10 FOR GAIN ADJUSTMENT.
 SWITCHES IN GROUP SA-SF INC. ARE INTERDEPENDENT.
 SWITCHES IN GROUP SJ-SM INC. ARE INTERDEPENDENT.
 ALL OTHER SWITCHES ARE INDEPENDENT.
 SWITCH SR (NOT SHOWN) HAS NO ELECTRICAL FUNCTION,
 BUT IS LINKED MECHANICALLY WITH GROUP SJ-SM TO GIVE 'A+B'.



D39651 A2

THIRD ANGLE PROJECTION
 All dimensions in millimetres unless otherwise stated.
 Normal tolerances
 no decimal place : 1 mm
 one decimal place : 0.3mm
 two decimal places : 0.1mm
 unless otherwise stated.
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TE1/26
(TESTER, MAGNETIC RECORDER/REPRODUCER) CIRCUIT

DRN	TCD	CKD	APPD
D.J.A.			C.I.

ISSUED 08/12/75
D39651

NETS LIST: 009602 A4

D39657 A4

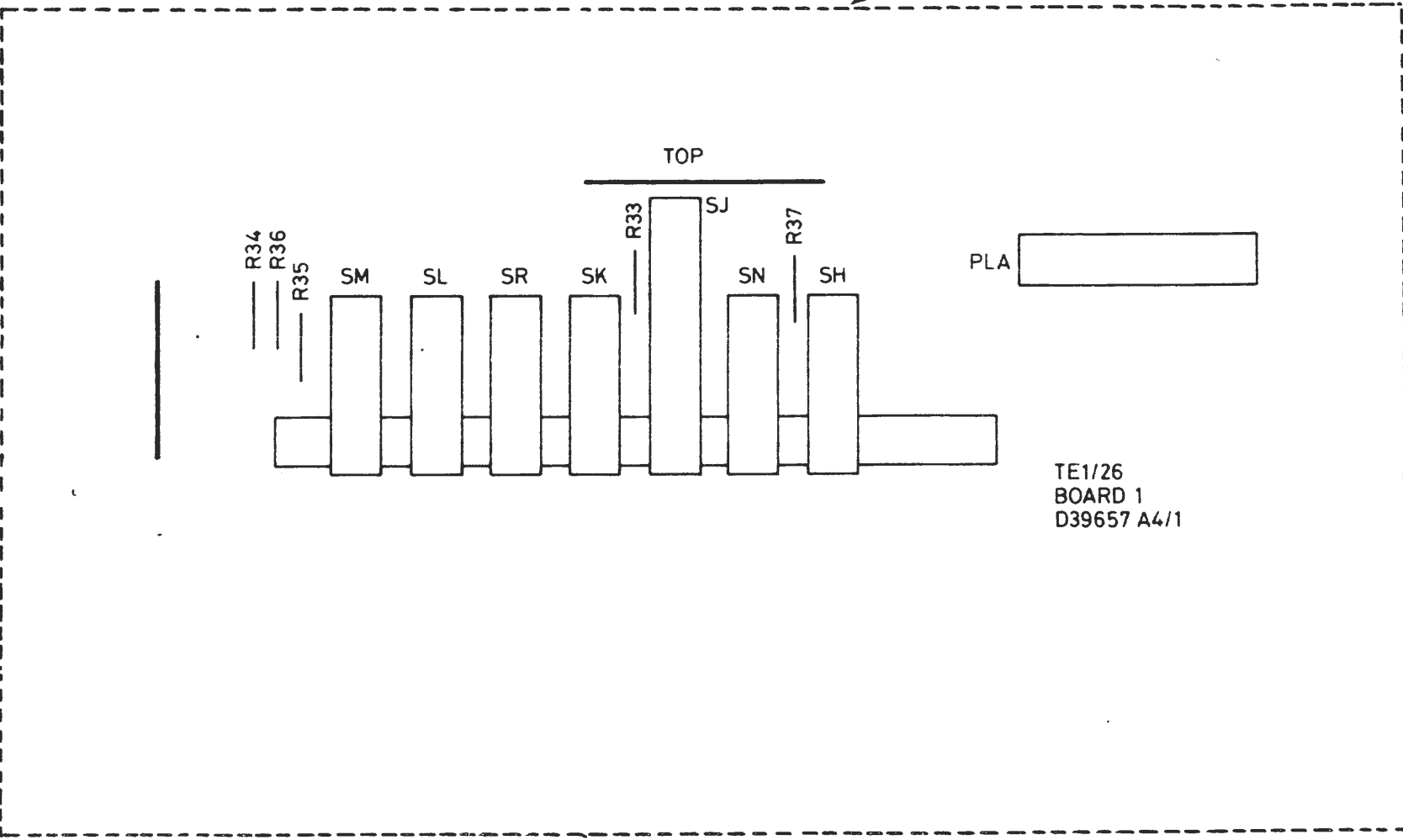
TE1/26 PRINTED BOARD COMPONENT LOCATION 1

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CHANGE

1-12-75

MINIMUM SIZE TO CUT NEGATIVE



TE1/26
BOARD 1
D39657 A4/1

CHARACTERS AND LINES TO BE PRINTED IN WHITE
PRINTED WIRING ON REVERSE SIDE OF BOARD IS D39656 A3

SCALE 1:1

BBC
VM161A4

TE1/26
PRINTED BOARD 1
COMPONENT LOCATION

DRN	D. J. A.
TCD	
CKD	
APPD	C. H.

DESIGNS DEPT
D39657
A4

TE1/26 PRINTED BOARD COMPONENT LOCATION 2

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BBC

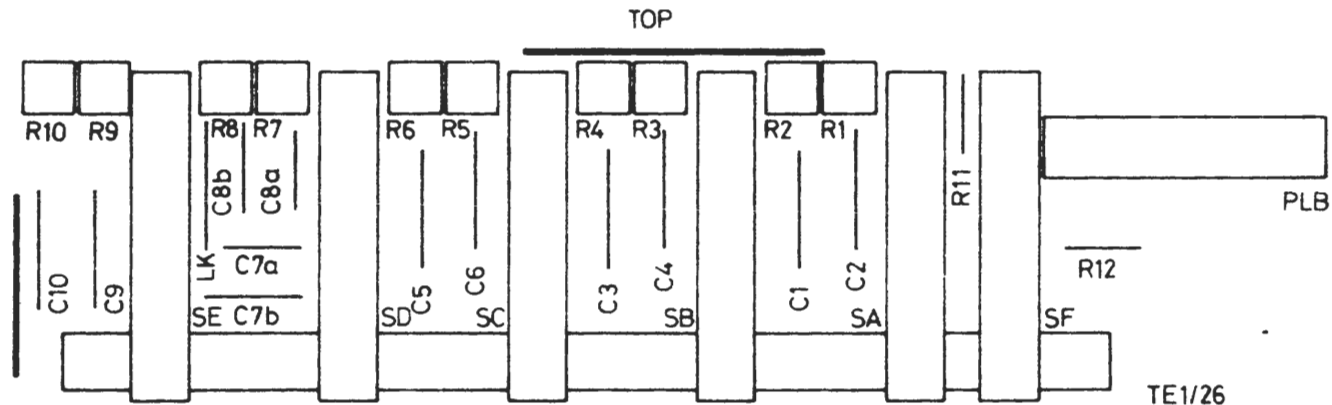
VM161A4

CHANGE

1-12-75

MINIMUM SIZE TO CUT NEGATIVE

TE1/26
PRINTED BOARD 2
COMPONENT LOCATION



TE1/26
BOARD 2
D39660 A4/1

CHARACTERS AND LINES TO BE PRINTED IN WHITE
PRINTED WIRING ON REVERSE SIDE OF BOARD IS D39659 A3

SCALE 1:1

DRN	D.J.A.
TCD	
CKD	
APPD	C.H.

DESIGNS DEPT

D39660 A4

VM161A4

BBC

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TE1/26 PRINTED BOARD COMPONENT LOCATION 3

D39663 A4

CHANGE

1-12-75

C12 POLARITY REVERSED
CF12156
JER 20 5 76

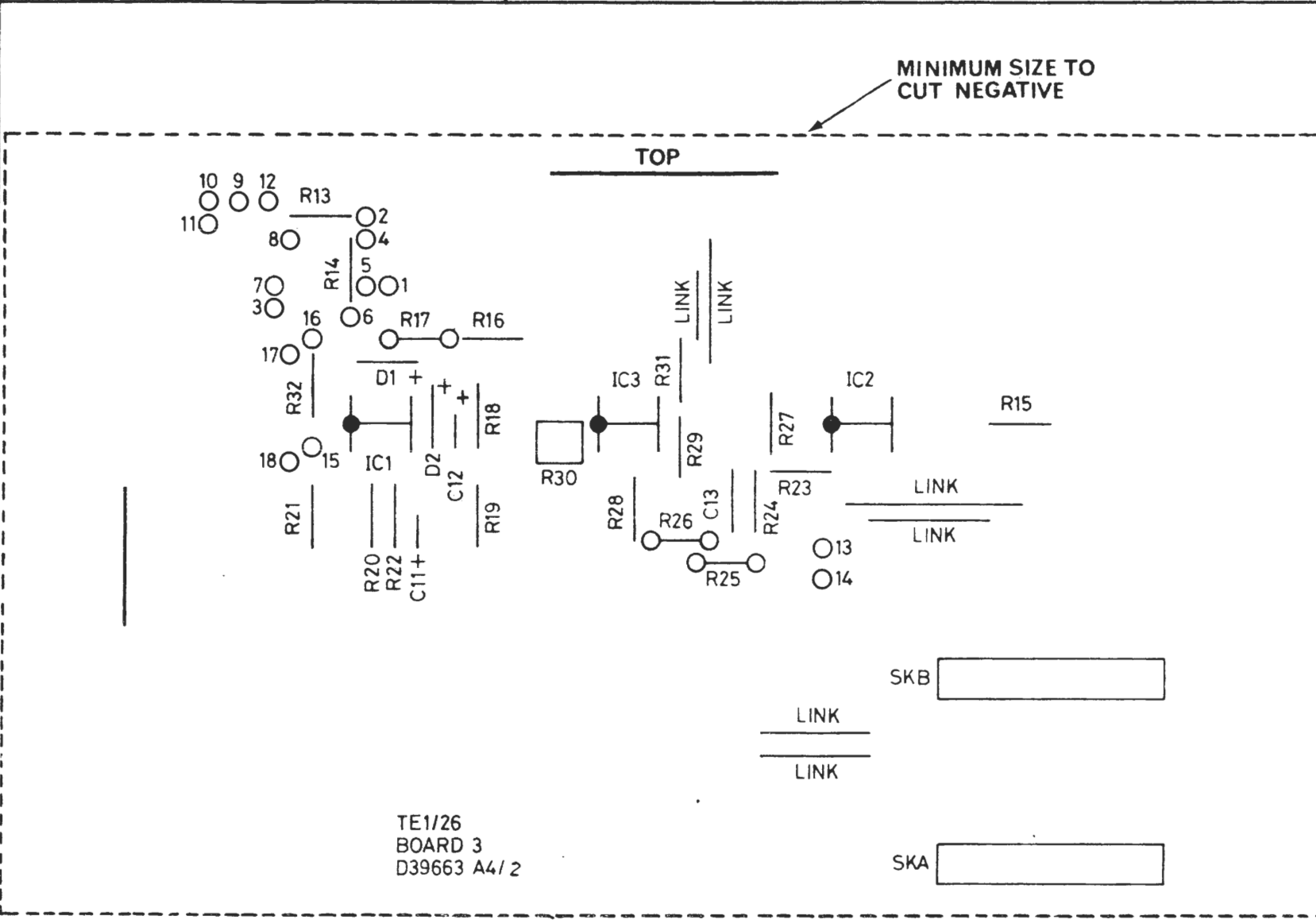
TE1/26
PRINTED BOARD 3
COMPONENT LOCATION

DRN	D. J. A.
TCD	
CKD	
APPD	C. H.

D39663

DESIGNS DEPT

A4



CHARACTERS AND LINES TO BE PRINTED IN WHITE
PRINTED WIRING ON REVERSE SIDE OF BOARD IS D39662 A2.

SCALE 1:1