

DESIGNS DEPT. MANUFACTURING INFORMATION

No. 6.334(78)

Dispersion Equaliser

EQ3/35

J.W.H. O'Clarey
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GP

D.D.M.I. No. 6.334(78)
Title Sheet

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BBC

DS/SPA4

DESIGNS DEPT. MANUFACTURING INFORMATION

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Dispersion Equaliser

EQ3/35

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Dispersion Equaliser EQ3/35

1. Introduction

This unit, which forms part of audio delay equipment EP1M/23, may be preset to compensate for the dispersion introduced by up to 25 repeater amplifiers. The unit consists of five second-order all pass networks and one first-order all pass network. These separate networks may be adjusted and cascaded as required.

Pins 6 and 7 are joined so the presence of the unit may be detected. By using this facility the EP1M/23 switches to bypass if the EQ3/35 is removed.

2. Specification

Performance Data

Input:

Audio Input	Unbalanced
Audio input impedance	Greater than $5K\Omega$
Audio input level	zero programme volume
Power consumption	+25 <u>±</u> 0.5volts at 22 <u>±</u> 5mA

Outputs:

Audio output	Unbalanced
Audio output impedance	Less than 50Ω
Audio output level	zero programme volume
Dispersion range	see Handbook 6.163(78)
Frequency response	+0.2dB from 100Hz to 6.5kHz
Total Harmonic Separation	better than 70dB for an input signal of 1kHz at +8dBm into 600Ω .
Signal to Noise ratio	better than 70dB4w

3. Mechanical Data

Chassis	CH1/65A
Indexing positions	1,12,15 .
Plug indexing position	A1
Weight	0.5kg

4. Installation Data

For dispersion setting refer to D.D. Handbook No. 6.163(78).

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Mount in PN3/55 and wire to pins as follows:

<u>Pin No.</u>	<u>Function</u>
1	Chassis earth
2	audio input (unbalanced line)
3	audio input (earth)
4	Not used
5	Not used
6) These pins are joined in the unit and) they may be used to detect that the unit is in position.
7	
8	Not used
9	Power supply earth (0 volts)
10	Not used
11	Not used
12	Audio output (unbalance live)
13	Audio output (earth)
14	Not used
15	Not used
16	Not used
17	Power supply positive (25 volts)

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Dispersion Equaliser EQ3/35

PRODUCTION TEST SCHEDULE

1. Description

This unit may be preset to compensate for the dispersion introduced by up to 25 repeater amplifiers. It consists of 5 second-order and 1 first-order all pass network. These networks may be adjusted and cascaded as required. The phase shift introduced by the first order network is given by the following equation:

$$\text{phase shift} = \tan^{-1} \frac{2\omega CR}{(\omega CR)^2 - 1} \text{ degrees}$$

This phase shift of the second order networks is twice that of the first order network.

2. Information

- | | |
|--------------------------|---|
| a) Design Section | Transmission Section |
| b) Designer | M.T. Ellen |
| c) Engineer responsible | D.C. Savage |
| d) Handbook | Part of Handbook 6.163(78) for audio
Delay Equipment EP1M/23. |
| e) Technical Instruction | Not available on 1.7.78 |
| f) Other information | |
| g) Pre-Production Batch | This PIS has been tested on a pre-
production batch in Designs Dept. |

3. Manufacturing Performance Specification

a) Input Requirements:

Low distortion sine-wave 20Hz to 15kHz at +10dBm maximum.

b) Outputs:

Similar to input but shifted in phase

c) Power Supply:

+25 ± 0.5 volts at 22 ± 5mA

d) Performance:

Gain 0 ± 0.1dB at 1kHz

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Frequency Response	+0.2dB from 100Hz to 6.5kHz
Total Harmonic Separation	Better than 70dB for an input signal of 1kHz at +8dBm into 600Ω
Signal to Noise Ratio	Better than 70dB4w

4. Warning

- a) No voltages above 50 volts d.c. or 30 volts a.c. are connected to this unit.
- b) This unit does not contain MOS devices.

5. Test Apparatus Required

- 1 off 0 - 30 volt variable power supply up to 100mA, fitted with an ammeter and current limit control.
- 1 off frequency counter
- 1 off audio phase meter
- 1 off AC test equipment type EP14/1
- 1 off AVO

6. Inspection

- a) Check that the slot positions of the coding comb are correct.
- b) No mains voltages are connected to this unit. Check that all the link positions and the AOT positions have been fitted with the specified solder pins.
- c) Check that the following components are correctly inserted:
 - i) Capacitors 1C1 - 1C4 - 5C1 - 5C4. C21 - C25
 - ii) Resistors 1R1 - 1R6 - 5R1 - 5R6. R21 - R30
 - iii) Integrated Circuits IC1 - IC4
 - iv) Plug

7. Test Procedure

7.1 To check the current consumption

- a) Connect the PSU (set to 0 volts) to PLA 9 (negative) and PLA17 (positive). Gradually increase the voltage to 30 volts while monitoring the current.
- b) The current should be within the range 22 ± 5 mA
- c) If the current is incorrect carefully re-examine the printed board for solder bridges.

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7.2 To check the Frequency Response

- a) Ensure that all the AOT resistors are in circuit and link all the sections in cascade. Connect the AC test set oscillator (75Ω source, internal 600Ω termination and 0dBm) to pins 2 and 3. Connect the AC test set detector (high impedance, mean indication) to pins 12 and 13. Measure the frequency response.
- b) The gain should be constant to within $\pm 0.2\text{dB}$ from 100Hz to 6.5KHz.
- c) If the frequency response is incorrect re-wire the links to bypass each delay section in turn until the fault has been found. Also check that the component values are correct.

7.3 To Check the Gain

- a) Leave the equipment set up as in Section 7.2 and measure the gain of the EQ3/35 at 1kHz.
- b) The gain should be within $0 \pm 0.1\text{dB}$.
- c) If the gain is not within these limits check all the component values.

7.4 To Check the Distortion

- a) Leave the equipment set up as in section 7.3 but increase the output from the oscillator to +8dBm and set it to 1kHz. Press the "mean-flat" button and adjust the attenuator setting to obtain a centre reading. Now press the "mean - 1000Hz" button and re-adjust the attenuator setting to obtain a centre reading. Note the difference between the two attenuator settings.
- b) The difference should be greater than 70dB.
- c) If this test does not meet the specification check that the DC bias on the operational amplifiers is half the supply voltage. Also check that the distortion is not being introduced by the test equipment.

7.5 To Check the Signal to Noise Ratio

- a) Leave the equipment set up as in Section 7.4 but change the oscillator output level to 0dBm and press the TPM button. Check that the TPM indicates 4 when the attenuator is at 0dB. Replace the oscillator with a 600Ω resistor, press the "weighted" button and readjust the attenuator to make the TPM peak to 4. Note the new attenuator setting.
- b) The reading should be better than 70dB (i.e. 70dB4w)
- c) If this figure cannot be obtained the integrated circuits may be at fault.

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7.6 To Measure the Phase Shift

N.B. This measurement should only be carried out if the ordering information specifies the delay and delay settings required.

- a) Set up the equipment as in section 7.2 (to measure frequency response). Connect the inputs to the phase shift meter to the input and output of the EQ3/35. Connect a frequency counter to the monitor output of the EP14/1 oscillator. Measure the phase shift at the frequencies specified on the ordering information.
- b) Ensure that the phase shift meets the tolerance specified in the ordering information.
- c) If the unit does not meet the specification check that the components values have been calculated correctly.

ISS. 2
CHANGE 14-3-79

ITEM No.	No. OFF	DESCRIPTION	C'T REF.	BBC REF. OR DRG. No.
DRAWING NUMBERS				
		CIRCUIT	Δ45400 A2	
		PARTS LIST	Δ45401 A4	
		ASSEMBLY	Δ45402 A2	
		DETAILS	Δ45403 A2	
		P.B WIRING	Δ45404 A2	
		" " (COMP SIDE)	Δ45405 A2	
		" COMP LOC	Δ45406 A3	
		" DRILLING	Δ45407 A3	
FURTHER INFORMATION REQUIRED FOR MANUFACTURE :-				
		ASSY INFORMATION	E.A 10484	
		WIRING INFORMATION	E.A 10140	
1.	1.	CHASSIS, CH1/6SA, TO BE MODIFIED BY CONTRACTOR AS FOLLOWS:-		
		FRONT PANEL		Δ45403 A2 DET 1
		COOING PLATE		" DET 3
		HANDLE		" DET 4
2.	1	PRINTED BOARD.		Δ45404 A2, Δ45405 A2 Δ45406 A3, Δ45407 A3
3.				
4.	6	M2.5 x 6L9 PAN HD MS Zn P. (SCREW)		
5.	6	M2.5 PLAIN WASHER, MS Zn P.		
6.				
7.				
8.	AR.	SLEEVING, 1mm BORE, COLOUR RED.		
9.				
10.				

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