O P T R O N I C S

GRAPHIC EQUALIZER

'OPTRO 203'

OPTRONICS PTY LIMITED
11 Milgate Street
Huntingdale 3167
Victoria. Australia

OPTRO 203

SPECIFICATIONS

Input	600 ohm	(terminated)
	40K	(bridging)
	level	+24 dBm maximum
Output	600 ohm	
	level	+24 dBm maximum
Equalizer	Frequencies	31 Hz, 62 Hz, 125 Hz, 250 Hz, 500 Hz, 1 KHz, 2 KHz, 4 KHz, 8 KHz, and 16 KHz.
	Amount	± 15 dB at each of the above frequencies
	In/Out	key, silent operation
Frequency Response	(Equalizer out)	± 0.5 dB 30 Hz to 15 KHz
Distortion	less than 0.25% T.H.D. 30 Hz to 15 KHz at +24 dBm output	
Noise	90 dB below +16 dBm output	
Size	3.5" high x 19" wide x 8" deep (standard rack mounting)	
Power	200 to 260 Volts 40 to 60 Hz at 20 V.A.	
Connectors	Front Panel	Tip, ring and sleeve jacks normalized to rear connectors
	Rear Panel	XL-3-13 Input
		XL-3-14 Output

Controls etc.

Front Panel	Input Jack, level control, equalizer In/Out key 10 Octave slider control switches, mains On/Off and mains indicator, output jack.
Rear Panel	Input connector, 600 ohm or bridging input slide switch, output connector and mains fuse.

G U A R A N T E E

The equipment carries a general guarantee against failure of the equipment supplied due to quality of components, workmanship, or factory assembly, for a period of twelve months from the date of delivery, provided faults or defects have not been caused by incorrect maintenance or operation of the equipment.

This guarantee is the only guarantee given with respect to the equipment and all other warrantees or conditions as to correspond with description suitability for any purpose or merchantability whether expressed or implied by law are expressly excluded.

GENERAL DESCRIPTION

The OPTRO 203 Graphic Equalizer is a ten octave system which covers the entire audio spectrum and allows complete control of spectral balance. Ten in line, quadrant type action, switches are used to control boost or cut of each octave. A filter IN/OUT key enables a pre set equalization to be switched in or out for particular program requirements. An input level control allows control of the overall gain. The equalizer is normally used with unity gain, input to output.

TECHNICAL DESCRIPTION

The audio programme enters the unit via a Cannon XL-3-13 rear panel mounted connector. This input is normalized through a tip, ring and sleeve jack which is mounted on the front panel. The signal then enters a balanced electrostatically shielded multi mu metal magnetically shielded input transformer; also a 600 ohm/bridging selector slide/switch. The output of this transformer feeds C3, an R.F. by pass capacitor.

The signal then feeds the input of EQD (graphic equalizer circuit block). The output of the EQD, when the Filter IN/OUT key is in the OUT position, is an inversion in phase of its input signal and at a level almost identical to its input level.

The output of the EQD, when the Filter IN/OUT key is in the IN position, is an inversion in phase of its input signal, and at a level, at any of the ten octave frequencies, depending on the positions (boost or cut) of the graphic in-line switches.

The boost facility is achieved by an additive process, whereby the output from the EQD is enhanced at one or more of the graphic frequencies, depending on the position of the switches.

The cut facility is achieved by a subtractive process, whereby the output from the EQD is depleted at one or more of the graphic frequencies depending on the positions of the switches.

Ten tuned, 'Q' corrected circuits provide the frequency selective function of the equalizer. A resistor R3 provides a charging path for the D.C. output from the EQD to the capacitors C4 to C13 in the filter Coil Board assembly, so keeping the D.C. potential difference across the Filter IN/OUT key to a minimum. This being essential for silent operation of the IN/OUT key. The signal output of the EQD feeds the input of the LDA (Line drive amplifier circuit block) via a level control (VR1).

The voltage gain of the LDA being set by resistor R14 to 15 dB. Capacitor C14 is used to D.C. isolate the feedback resistor R14. The output of the LDA drives the line output transformer via D.C. isolation capacitor C16.

The output transformer is electrostatically shielded, and its secondary feeds a tip, ring and sleeve jack which is front panel mounted. This jack is also normalized to a Cannon XL-3-14 rear panel mounted connector. The output impedance being less than 80 ohms in the band 30 Hz to 15 KHz, is designed to be terminated by 600 ohms.

The unit is designed to be powered from 200 to 260 Volts, 40 to 60 Hz mains supply. The supply feeds the unit's power transformer PT-13 (which is electrostatically shielded and potted in a mu-metal case so as to reduce radiated magnetic fields), via the front panel mains rocker switch and rear panel mounted fuse.

The secondary of the power transformer is centre tapped and its outer legs feed diodes D1 and D2 so providing a full wave rectifier. The output of the rectifier is filtered by capacitor C19. The D.C. output of capacitor C19 is fed to the NRM (negative regulator module circuit block).

The NRM is a voltage/current regulator, its output being constant voltage up to its maximum current output. At this point the regulator becomes a constant current unit. The transition from voltage to current mode is very sharp, so leading to minimum dissipation during its current mode of operation. An external power transistor SD 445 is utilized to increase the current capacity of the NRM. The output impedance of the NRM rises with frequency and to control this a capacitor C15 is provided across the output of the regulator.

SERVICE INFORMATION

D.C. Voltages :- using a 20,000 ohms/Volt meter.

Point	Voltage	Mains Supply Voltage
negative terminal C19	36 to 42 Volts	240 V 50 Hz
negative terminal C15	23 to 26 Volts	200 to 260 V 50 Hz
negative terminal C16	11 to 13 Volts	200 to 260 V 50 Hz
negative terminal C14	11 to 13 Volts	200 to 260 V 50 Hz

NOTE: All Voltages negative with respect to earth.

OPTRO 203 PARTS LIST

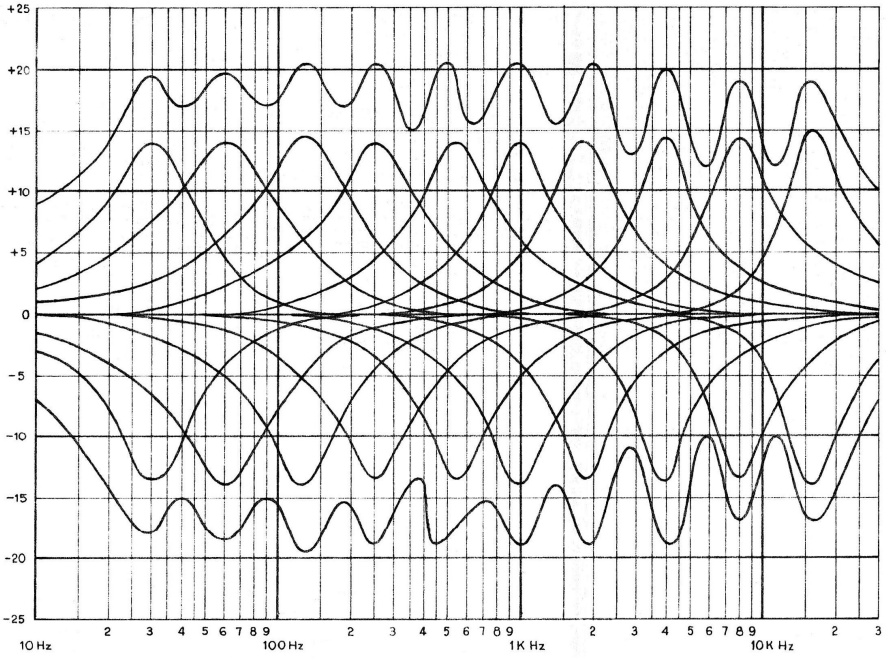
Main Board Assembly	Qty.	Supplier
PCB 203-1	1	Optronics Pty Ltd
EQD Module	1	Optronics Pty Ltd
LDA Module	1	Optronics Pty Ltd
NRM Module	1	Optronics Pty Ltd
Input Transformer IPT-24 40K.5K	1	Optronics Pty Ltd
1000 mF 70V electrolytic capacitor	1	Siemens Industries Limited
1000 mF 15V " "	1	Wima - Ferguson Agencies
100 mF 25V " "	1	" "
100 mF 35V " "	1	Siemens Industries Ltd
470 pF ceramic capacitor	3	Philips Industries Ltd
600 ohm $\frac{1}{2}$W resistor	1	" "
5.1K ohm " "	1	" "
1M " " "	1	" "
1.5K " " "	1	" "
AD 4003 diode	2	Anodeon Sales
47 mF 20V Kemet J tantalum	2	Union Carbide
Main Assembly		
.01 mF 2KV disc ceramic capacitor	2	Plessey Ducon Pty Ltd
TMC lever key S.527656 (blue lever - ivory insert)	1	Anodeon Sales
Graphic Switch Assembly Optro type 202 MK II	1	Optronics Pty Ltd
10K ohm log pot. type 'E'	1	Plessey Ducon Pty Ltd

Main Assembly contd.	Qty.	Supplier
Mains rocker switch T-127	1	I R H Components Pty Ltd
Tip, ring, sleeve jack socket TP 1104	2	A E Supplies Pty Ltd
Rubin panel lamp type 181	1	E S Rubin Pty Ltd
60V 20 mA lilliput lamp	1	E S Rubin Pty Ltd
Output transformer OPT-04	1	Optronics Pty Ltd
Power transformer PT-13	1	Optronics Pty Ltd
Slide switch MSP-78	1	A.W.A.
Cannon connector type XL-3-13	1	Total Electronics
Cannon connector type XL-3-14	1	Total Electronics
Fuse Holder type E 6011	1	Belling & Lee
Cable clamp	1	G.R.A.
Transistor Type 2N 4199 or SD 445	1	Total Electronics/Fairchild
Knob type K5486	1	R B Churchley
Graphic switch knob	10	Optronics Pty Ltd

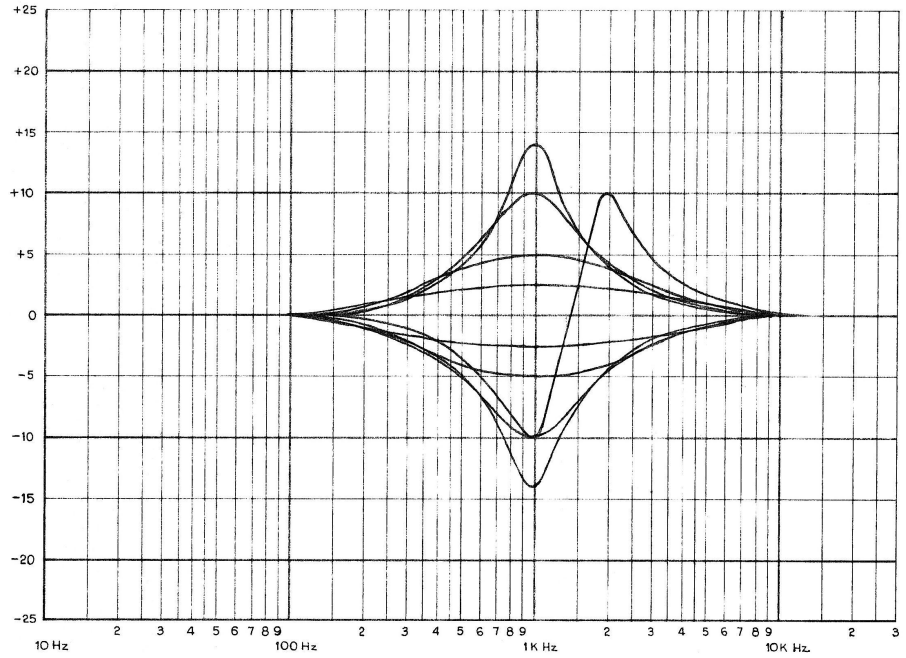
Coil Board

Coil assembly Type L4	1	Optronics Pty Ltd
Coil assembly Type L5	1	Optronics Pty Ltd
Coil assembly Type L6	1	Optronics Pty Ltd
Coil assembly Type L7	1	Optronics Pty Ltd
Coil assembly Type L8	1	Optronics Pty Ltd
Coil assembly Type L9	1	Optronics Pty Ltd
Coil assembly Type L10	1	Optronics Pty Ltd
Coil assembly Type L11	1	Optronics Pty Ltd
Coil assembly Type L12	1	Optronics Pty Ltd
Coil assembly Type L13	1	Optronics Pty Ltd

Coil Board contd.	Qty.	Supplier
Capacitor C4	1	Optronics Pty Ltd
Capacitor C5	1	Optronics Pty Ltd
Capacitor C6	1	Optronics Pty Ltd
Capacitor C7	1	Optronics Pty Ltd
Capacitor C8	1	Optronics Pty Ltd
Capacitor C9	1	Optronics Pty Ltd
Capacitor C10	1	Optronics Pty Ltd
Capacitor C11	1	Optronics Pty Ltd
Capacitor C12	1	Optronics Pty Ltd
Capacitor C13	1	Optronics Pty Ltd
Resistor R4	1	Optronics Pty Ltd
Resistor R5	1	Optronics Pty Ltd
Resistor R6	1	Optronics Pty Ltd
Resistor R7	1	Optronics Pty Ltd
Resistor R8	1	Optronics Pty Ltd
Resistor R9	1	Optronics Pty Ltd
Resistor R10	1	Optronics Pty Ltd
Resistor R11	1	Optronics Pty Ltd
Resistor R12	1	Optronics Pty Ltd
Resistor R13	1	Optronics Pty Ltd
PCB type 203-2	1	Optronics Pty Ltd



DRN	L. Loftus.	FINISH	TOLERANCES
CHD		ATTEN. & CUT GRAPHIC EQUALISER	
APPD			
DATE	22-1-70	OPTRONICS	DRG No / ISSUE
SCALE			



DRN	L. Loftus	FINISH	TOLERANCES
CHD		ATTEN. & CUT PLUS CUT & BOOST ADJ. OCTAVES	
APPD			
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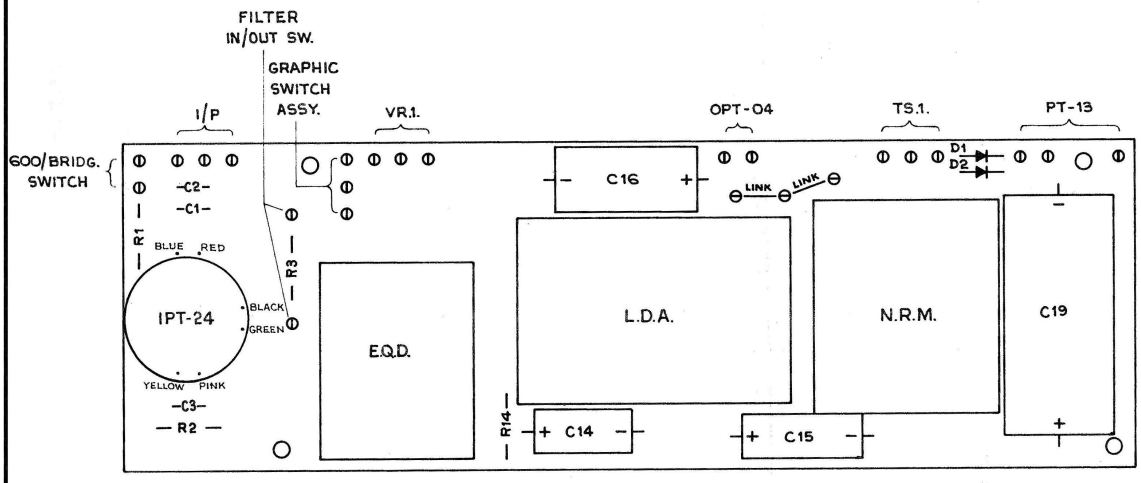
SCALE			



DRN	L. LOFTUS.	FINISH	TOLERANCES
CHD		ELECTRONICS P.C.B. OPTRO 203 GRAPHIC EQUALISER	
APPD			
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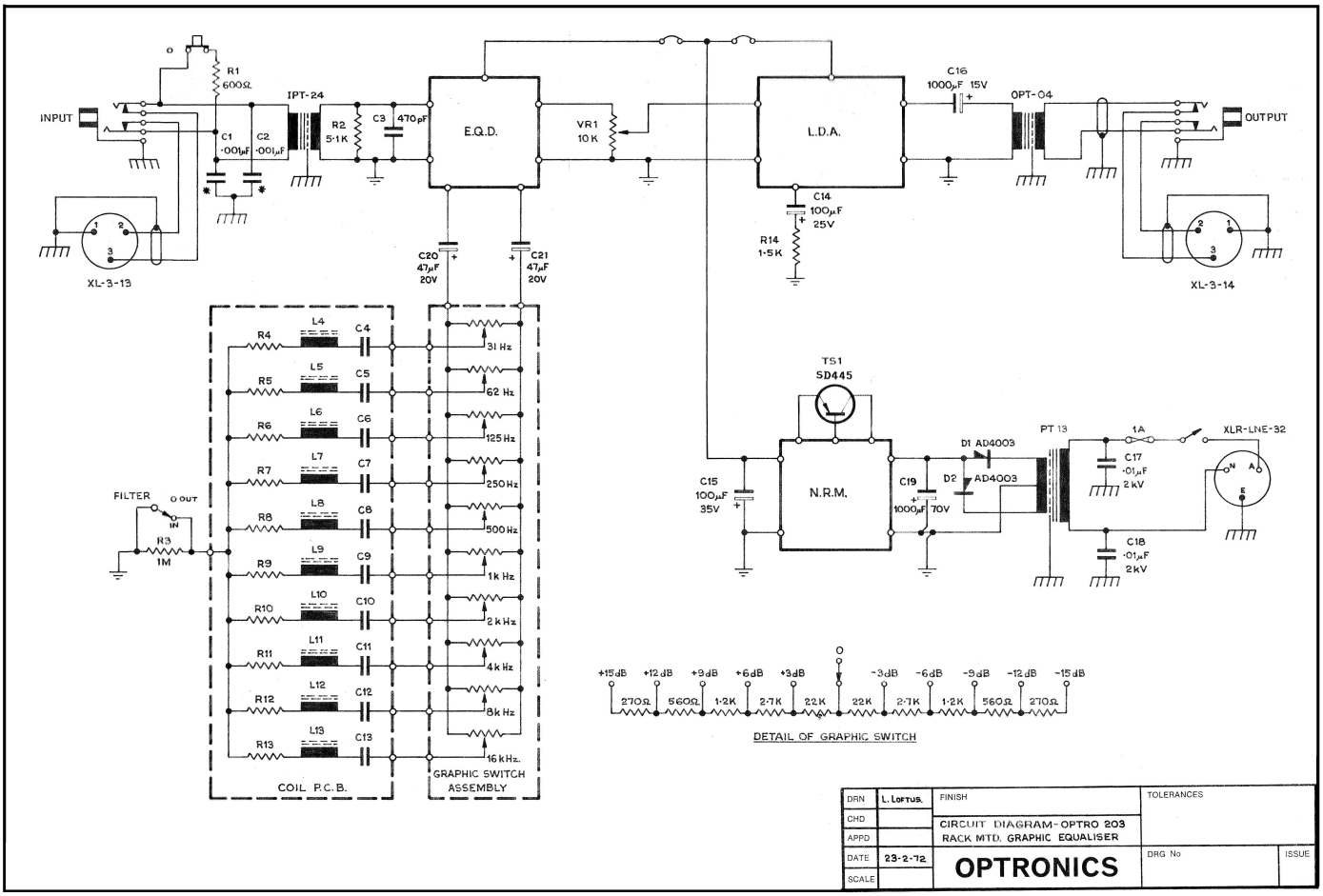
SCALE			



DRN	L. LOFTUS.	FINISH	TOLERANCES
CHD		CIRCUIT DIAGRAM - OPTRO 203 RACK MTD. GRAPHIC EQUALISER	
APPD			
DATE	23-2-72.	**OPTRONICS**	DRG No / ISSUE
SCALE			