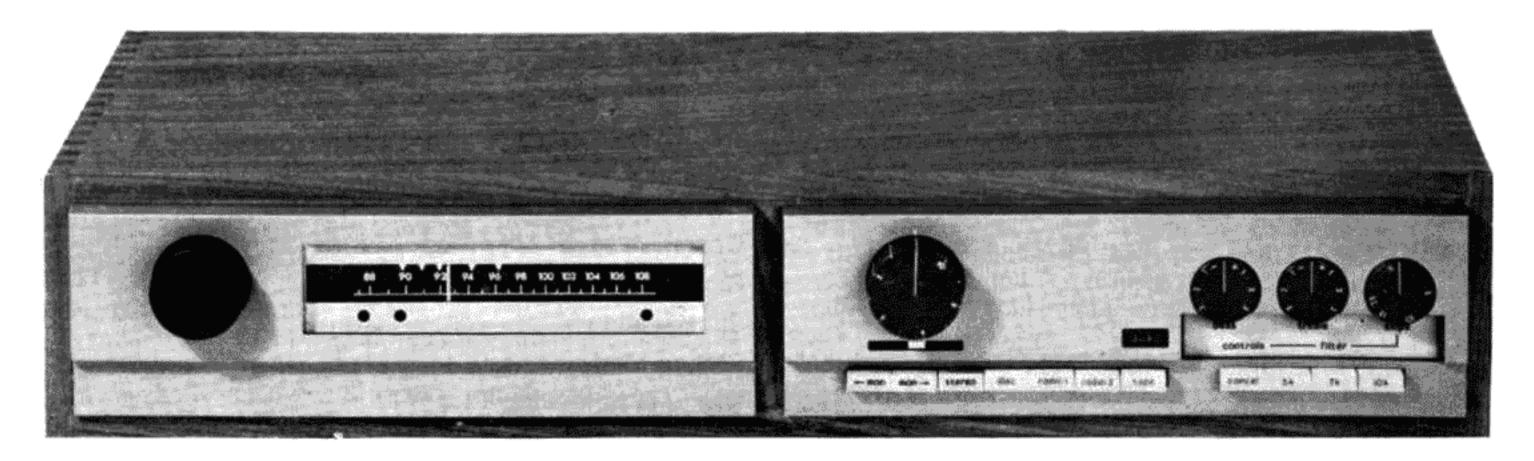


For more Hi-Fi manuals and set-up information please visit www.hifiengine.com

FM 3 Stereo Tuner Instruction Book

QUAD for the closest approach to the original sound



Free standing unit comprising QUAD FM3 tuner and QUAD 33 control unit housed in the QUAD afrormosia sleeve

QUAD FM 3 TUNER

instruction booklet

Contents

	page
Aerial	Ę
Aerial Plug	11
Audio Signal Output	٤
Circuit Description	7
Circuit Diagram	9
Components List	Ş
Connections	3
De-emphasis	6
Earth	Ę
Guarantee	12
ntroduction	3
nstallation	3
Mains Voltage Adjustment	3
Mute Threshold Control	7
Operation	6
Rear Panel View	4
Specification	8
Station Markers	5
Use with other amplifiers	ϵ

The Acoustical Manufacturing Co. Ltd
St Peters Road, Huntingdon, Cambs, PE18 7DB, England
Telephone: 52561/2 Telex: 32348 Quad G

Stock No. OIF38EH

INTRODUCTION

The Quad FM3 tuner is a self-powered tuner designed for use with the Quad 33/303 amplifier. It incorporates automatic mono-stereo switching but it also provides a mono output on a separate pin of the DIN plug which can be selected by the control unit, so as to override the automatic switching under difficult reception conditions.

The unique twin lamp tuning indicator gives a positive indication of correct tuning without the need to detune to check it. The indicator shows an error of 1 part in 10,000.

The third indicator lamp on the scale lights when a stereo transmission is received, and the scale positions of up to five stations can be marked by the easily re-set station markers.

Inter-station noise is suppressed to an extent determined by the pre-set control at the rear of the tuner.

All internal circuits have been aligned at the factory and the tuner is supplied ready for use. External connectors are in the rear compartments of the moulded polystyrene pack.

INSTALLATION

Mounting

The tuner may either be used free standing or mounted in a cabinet panel of up to $\frac{3}{4}$ " thick.

In the latter case cut a rectangular aperture 10" x 3" approximately, in the panel using the template contained in the rear of this booklet.

Remove the two screws from the rear of the cover and slide the cover off.

Insert the tuner into the aperture from the front, ensuring that the lugs on the rear of the tuner front panel locate inside the aperture.

Replace the cover from the rear, insert the two screws and tighten until the tuner is just held in position and then give one additional half turn to each screw to lock securely.

The tuner requires no ventilation.

Mains Voltage

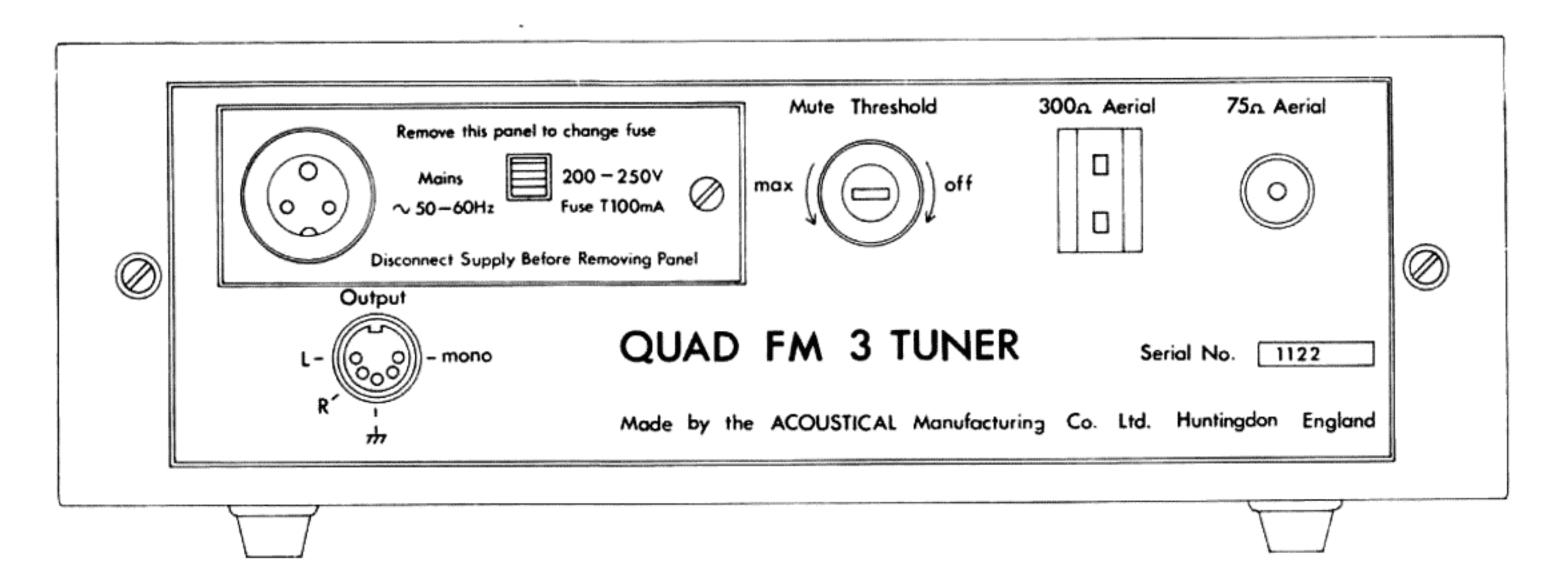
Ensure that the mains voltage adjustment at the rear of the tuner is correctly set for your supply voltage.

The reversible cover plate at the rear of the tuner determines the position of the slide switch used to effect the circuit change from one voltage range to another and automatically ensures that the switch is correctly set for the voltage marked on the exposed side of the cover plate.

Connections

The tuner is supplied with leads and plugs for direct connection to the Quad 33 control unit. For use with other amplifiers see the separate section under this heading. (Page 6).

When used with the Quad 44 control unit it will be necessary to remove the two-pin American type mains connector and replace it with one of the main output connectors supplied with the Quad 44, and since the PM3 is earthed via the signal lead the centre pin of the mains plug can be left unconnected.



Rear panel view

Mains

The 3-pin connector fits the corresponding mains input at the rear of the tuner and the plug with the two flat pins at the opposite end of this lead should be inserted into one of the two corresponding sockets at the rear of the control unit, whose on/off switch will then also control the supply of the tuner.

Signal

The signal lead is terminated at each end in a 5-pin DIN plug used as:

- pin 1 Mono
 - 4 Blank
 - 2 Common screen
 - 5 Right-hand stereo
 - 3 Left-hand stereo

One plug should be inserted into the Radio 1 socket at the rear of the control unit and the other into the DIN socket at the rear of the tuner. The lead is reversible.

Aerial

The tuner provides for either a 75 ohms coaxial feeder or a 300 ohm balanced feeder. Both sockets are at the rear of the tuner and both types of plug are provided. VHF aerials usually consist of dipoles either alone or with reflectors and directors. In general the weaker the signal the more complex the aerial required but as the signal will be affected by such local factors as screening by high ground or nearby buildings and possibly by reflections from them

too, as well as by the distance from the transmitter and the power it radiates, the advice of a local specialist dealer should be sought regarding the most suitable type for each location.

Since stereo reception involves an inherently lower signal to noise ratio it is often necessary to use a more efficient aerial for stereo than would be necessary for mono broadcasts.

With a suitable aerial the tuner is ideal for fringe area reception but even in areas of higher signal strength the aerial should be better than the minimum necessary to produce a signal if full advantage is to be taken of the interference suppressing capability of FM.

Earth

The tuner does not require a separate external earth since it is bonded to the Quad 33 control unit via the existing interconnecting cables.

ADJUSTABLE STATION MARKERS

The approximate position on the tuning scale of any five stations may be indicated for future reference by adjusting the station markers. This is done by turning the tuning knob until the scale pointer is aligned with one of the markers, pressing the knob inwards against its spring so as to engage the pointer with the marker, and, still keeping the knob pressed, tuning to the station to be marked. Releasing the knob disengages the pointer from the marker leaving the latter in that position.

Since one marker cannot pass another they should be adjusted in sequence according to the position of the stations on the scale.

These markers are then used as a quick guide to the scale position of the station required and the final tuning is carried out with the aid of the twin lamp tuning indicator. (See Operation).

USE WITH OTHER AMPLIFIERS

Check the mains voltage adjustment and connect to a suitably switched supply.

The audio output of the tuner is 100mV at 22.5 kHz deviation and the amplifier used should give full output from this signal level. The input resistance of each channel must be greater than 50,000 ohms and any associated capacity not greater than 1000pF.

Check that the pins used in the DIN plug (see page 5) agree with the input socket of the amplifier or make the appropriate alterations. If the amplifier switching does not provide for selecting pin 1 on mono this output could be taken to another Radio or Auxiliary input so as to preserve the facility of over-riding stereo under weak signal conditions (see Operation). Such an input should comply with the above requirements.

DE-EMPHASIS

FM broadcasts are pre-emphasised (accentuation of the higher frequencies) prior to transmission and must be deemphasised at the receiver to restore the correct tonal balance. (This is similar to the record equalisation pro-

cedure with discs.) The correct de-emphasis for Britain and Europe is $50\mu \text{sec}$ and for North America $75\mu \text{sec}$. Normally this will have been correctly set prior to purchase but the $50\mu \text{sec}$ equalisation can be easily converted to $75\mu \text{sec}$ by adding a capacitor of $.0056\mu \text{F}$ in parallel with each of the existing correction capacitors C108, C110 & C111. These additional capacitors may most conveniently be located on the underside of the printed circuit board.

OPERATION

Switch on the control unit and press the appropriate pushbuttons. Tune in a station in the normal way guided either by the frequency scale or one of the previously set station markers. Then make the final tuning adjustment using the twin lamp tuning indicator. The correct point is where both lamps are alight and off-setting the tuning to either side causes one to brighten and the other to dim. If the left-hand lamp is dim adjust the tuning so that the pointer moves slightly to the left and vice versa.

With the Stereo and Radio 1 pushbuttons pressed on the Quad 33 control unit the tuner will respond automatically to the incoming signal reproducing either as stereo or two channel mono as appropriate.

With either or both of the Mono buttons pressed, with the Radio 1 button, all signals will be reproduced in mono and this facility is useful for over-riding the automatic switching when, under difficult reception conditions, a weak signal results in too much background noise on stereo. The stereo override facility is not available on the Quad 44 unless the output from pin 1 of the tuner is fed to the Auxiliary input.

When the station to which the FM3 is tuned broadcasts stereo the Stereo indicator lamp on the scale will light regardless of the push-buttons pressed.

MUTE THRESHOLD CONTROL

This control is on the rear panel and is intended to be set when the tuner is first installed.

The muting circuit suppresses all incoming signals below a level (threshold) determined by the setting of the Mute Threshold control. With this in the Max position only strong signals will be heard, all weak signals and inter-station noise being suppressed (muted). In the off position there will be virtually no muting and every signal present and all the inter-station noise will be reproduced. Between these two extremes there will be found a position which will permit reception of all usable stations without unnecessary inter-station noise and this setting will depend on both local reception conditions and the user's preference. It is therefore recommended that the control be set initially to the fully off position and advanced as required until the preferred position is found empirically.

Note that both tuning lamps are extinguished when the muting circuit is operated by the noise level rising above the threshold.

CIRCUIT DESCRIPTION

The FM3 is built on two printed circuit boards. One carries the power supplies and stereo decoder, while the other

carries RF, IF and discriminator together with tuning indicator and noise sensing circuits.

RF Board (M12327)

The aerial signal is fed via the tuned circuit L1 C2 to one gate of the RF amplifier TR1 (a dual gate MOS FET device with integral protection) and thence via L2 C11 to the mixer TR2. The local oscillator signal provided by TR3 operating in the earthed collector mode, is injected into the second gate of the mixer via L3a which is inductively coupled to L3b.

The IF output from the mixer TR2 is applied via a tuned matching transformer IFT1 to the multi element ceramic filter F1 the output of which feeds IC1.

IC1 contains the IF amplifier and limiter, and provides with L6 a quadrature discriminator. At pin 6 of IC1 there appears both the recovered audio and a d.c. voltage from the discriminator. After passing through an emitter-follower TR6 the audio passes through the low pass filter L7 C31 C32 to the decoder, and the d.c. voltage is used to drive the tuning indicator circuit TRs 7, 9, 10, 11, 12, 13, which also provides an output via R34 and R35 to operate the muting circuit in the stereo decoder. The pre-set control RV2 is used, as part of the alignment procedure, to set the tuning indicators to equal brilliance when correctly tuned to an incoming signal.

High frequency noise components of the audio signal are selected by L4, amplified by TR4 and TR5, and detected by D1. The resultant d.c. activates the muting circuit via TR8, and so mutes the audio output in the presence of weak, noisy signals. The gain of the noise

amplifier may be varied by RV1 thus pre-setting the noise level (threshhold) at which the muting operates.

Stereo Decoder (M12307)

The audio signal is passed via the muting circuit TR100 to IC100 and TR101. IC100 is a phase locked loop stereo decoder which produces left and right outputs on pins 4 and 5 and a beacon output at pin 6, in the presence of a 19 kHz pilot tone.

The left and right signals pass through active filters (TR106 and 107) to the output DIN socket. An undecoded, i.e. mono, signal is supplied by TR101.

De-emphasis is performed by C108, C110 and C111.

Power Supply

The RF board draws 80 mA from the +14 volt supply and 50 mA from the -14 volt supply.

SPECIFICATION

Frequency range: 88-108 MHz

Sensitivity: 30dB sig: noise for $1\mu V$

Aerial input: 75Ω coaxial

300 Ω balanced

Full limiting: from less than $2\mu V$

Image rejection: 56dB

IF rejection: 80dB

400 kHz selectivity: 46dB

Capture ratio: 3dB

IF bandwidth: Less than —3dB at ± 120 kHz

Greater than —60dB at ±400 kHz

Output at 38 kHz and above: —50dB

Frequency response: ± 1dB 20 Hz—15 kHz

Channel separation: 40dB at 1 kHz

Distortion: at 1 kHz and \pm 40 kHz deviation: typically 0.3%

Output: 100mV per channel for 30% modulation Source impedance: $5k\Omega$ Recommended load impedance: Greater than $50k\Omega$

Recommended load capacity: Less than 1000pF

De-emphasis: 50μ Sec or 75μ Sec as required

Power input: 100-125/200-250V; 50-60 Hz; 6VA

Dimensions: Width $10\frac{1}{4}$ " (260 mm) Height $3\frac{5}{8}$ " (92 mm) free standing

3¼" (83 mm) panel only

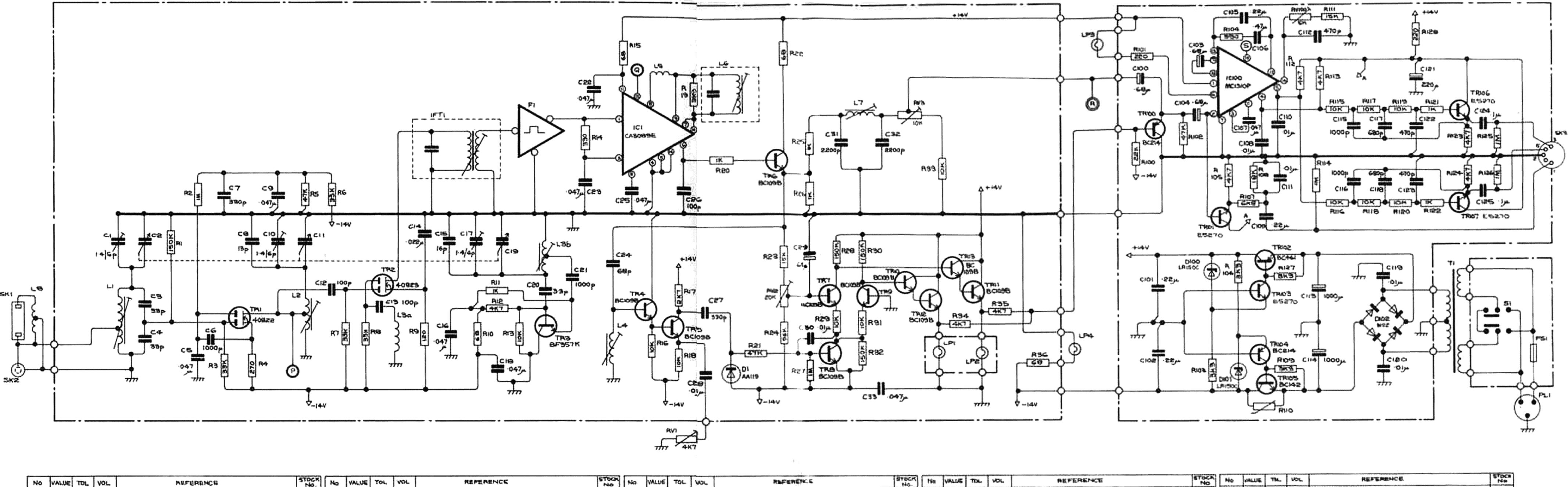
6½" (165 mm) free standing Depth

 $5\frac{1}{2}$ " (140 mm) behind cabinet panel when mounted

> (allow 2½" (64 mm) beyond rear panel for

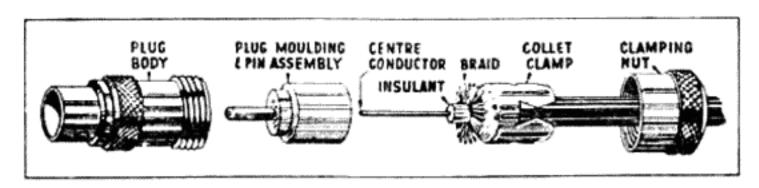
connectors)

Weight: 6 lb (2.7 Kg)



NO VALUE TOL VOL	MUFERENCE	No.	No YA	LUE TOL	AOF	REPERENCE			LDE 7	or I m	-	Mar enem.	190-	1900	WELDS 113	-	Lett's truers of th	No		-	1300		1410
RI 150K ±10% 15KI	RA UPM 050		A DESCRIPTION OF THE PARTY OF T	90 410%		ISKRA UPM 050	275/R	C/P3			1	DAU 236 30 5	248	C632	470p # #	7%	EPE PPD HAME	Mo.	Di	1/		MULLARD AAIIO	
The second secon		A THE PARTY OF THE		47 ±5%		MIKAR UPM OSO	240 H	C80 3	3p 4	Ap.		ERIE APO NPO	AB H	CIP4	Ja 88	250V	SEMENS MINI BEZOH	495/I		\perp			
R3 39K #10% 19K				C3 ±10%		MEKRA UPM 050	240 H	CEI 10	3p +	00%	-17	EPIE GGI	16/8	CES	Se 188	- PSOV	GIRMENS MEM B2254	495.1					
			Last a section of a section of the s	₹8 ±5%		ISKRA UPM 050	255/0	C88 -0	170	the state of the s			1 200						DHOO	1		ANI LINING	
	The second secon			X 15%		ISKRT UPM 050	350 C		170				00 2			_			Die			ARI LRISOC	
RG 35K #10% ISKI	**************************************		The real Parties and the last of the last	K3 ±10%			244/8	C24 6	Sp ±1	3/2		URA BD S	dies						200			GENERAL INSTRUMBUTS WOR	
		203/0		-	1	MULLARD SERVED DERO	340ID	CES 10			_	LELMCO LEMPLAC IRP	3 (00)										
the state of the same of the s		THE PERSON NAMED IN	District and design as a series	SK 410%	and the second second second	ISKRR UPM 050	3400 2240	CEE 10	0p ±	700		EME AP	26/85										
			the second second second second second	K7 ±5%		ISKNA UPM OGO	240 11	C87 53				man time to	288	RYL	AKT MIN	0%	PLEASEY MPC404/8/02888/004 LPIVEN	374 B	ICI			8CA CA3089 G	
The state of the s		A COLUMN TO A COLU	the secretary was a second	K7 45%		ISKRA UPM OSO	PAO/H	CE8 -0	la la			EROFOL SONT 1807-310/1	FDW/H	SVR	Pon		PHER PTIOV	375/A					
				n ±0%		IZMRR UPM 050		C89 ·6			-		-	RVB			PHER PTIOV	BTC D	C100			MOTOROLA MCISIOP OR TI SHITGHT	
THE CANONICAL PROPERTY OF THE				H 410%		ISKAR UPM OSO	230 6	Committee of the commit	4 STATEMENT STREET	CONTRACTOR OF THE PARTY OF THE			06/N	1,1				-		1			
***************************************		CONTRACTOR OF THE PARTY OF THE		K 4.10%		ISHRA UPM OSO	market and a second	And the supple and the supple	*	the second second	NAME AND ADDRESS OF THE OWNER, WHEN		24/M	-		-i- -		1	FI			MIRATA SPGIOTMA	
		-	·	K & 10%	-1	ISKRA UPM OSO	230 E			-		SUPLEX HISIS 160	14 M	RVIDO	**		MHER STYON	375/8		1			
		of the Confederation of the Co	Mark Service Service	K ± 10%	·	PSKRA UPM 050	non-amondariamen				THE RESERVE AND ADDRESS OF THE PERSON NAMED IN COLUMN 2 IN COLUMN		00/1	1		-		1		1	$\overline{}$		
		Annual Property and Property an	Annual Control of the control	N ± 10%	4	ISHRA UPM 050	230 E	230	-	20/4		LEWICO CENTERCIET	20,-							1			
		A COUNTY OF THE PARTY OF THE PA	Commence of the second second second	× 40%		MEMPIA UPM 050		 	-+				_			_			1 41	1		ACOUSTICAL 586. A 12202 155-1 GB 6629	750/H
		CONTRACTOR OF SPECIAL	-	£10%	_	ISKAR UPM 050	250 K	-			-			7781			BCR 40888	1	18	1		ACOUSTICAL DRG A 18808 1851. GB 6683	750 H
		Annual Science Science of	The second service and the second	K #10%		ISKAA UPM 050		 			-			TRB			RCA 408E8	1	L9	1		ACQUISTICAL DRG. A IERO'S 1958. GB 6604	
				K7 ±5%		ISHRR UPM OSO	840H	 		_	-			TRE			BF 557 K	1	LA	1		TOKO CAN 1980-BX	750/4
			A STATE OF THE PARTY OF THE PAR	K7 #5%		ISKAR UPM 050	240/4	-	-+-					784		_	BCIOBB	1	LS	37,		SIGMA SCIO OR PAINTSN TYPE CII BE INDOIS IN	
			-	1 ±10%	-	(SKRA) UPM OBO	240 H 165 C	I 	-				$\overline{}$	TRE			BC109B	1	1 46	1		TORO KAC 3-KSBGHM	
						ISKRA UPM 050	lice le	I 						THE			BC109B	1	1 17	1		TOKO CAN 1980-BX	750/9
094 547 4100 1976	RR UPM 050	604 0	P107 7	4 ±10% 43 ±10% 90 ±10%		IERRA UPM 050	244/0	C100	_	-	-	UNION CARBIDE KROSESS				_	BCtOBB	1	Les	1		ACQUSTICAL DAG A IRES	1
The state of the s	SHA LIPM 050	2620	G-40 0	90 400	┼─┼	ISKRA UPM OBO	THE IN	C/00 -3		236 100	-	UNION CARBIDE HROSESS 4	+9+/3 +9+/3 +9+/3 +90/8	700			001098	+		1			
		reale.	NED 21	EQ 1810/8	 -	TORAN DAN 080	EG UP	CIO2 2	- I	5% 160	- T	SIEMENS MKM BESSTI	454/0	TRO		_	BCIOSB	1		1			
		165C			++		+	C108 4	-			UNION CARBINE KRESUSS		TRIO		_	всюзв	+		1			
		198/A	 				-	C104 -4				UNION CAMBIDE KROBESS	499/0	THII		_	8C7088	1	IPTI	1		TOKO KAL -1806A	
		250/1	CI 14	16p		STEATITE R-TRIKO HE-06-30	5840			MARKET WITH SALES				TRIZ		_	BCIOSB	1	1	+			
		183/8	C2			DAU 338/30	554/B	C106 14	7 2	180	- Ju		923				BC098	1	1	1			
				p ±5%	++	ERIE APD Namo	837 8	C197 0	7.	- P	-	SIEMENS MKM BBES41	900/K			_		1	TI	1		DAGNAL TW760	
	RA UPM 050			D 25%		ERIE APD N350	557/8	CION		1 P	- L			-				1-1	1	1			
		BOCE	CS O	474 -25	/	LEMCO LEMPLAC IEP	500/5	C109 -8	0.0	1X 1	-	SHEMMUNS MINI BEICSAL	104/D					1		1			
		240 F	C6 10	47μ 250 Ορ 740% Ορ 20%	1-1	ERIE WOI	5548	CHO S	144	5X 200	~			THIOO		_	BC214-	1	LPI	1		VITALITY 690 14V -04A	690M
		240F	(-) 88	- +BO/8	-	ERIR APD	BRAIC	CIII	14 6	5 B	20-			THIO		_	8/8/3/10		LPE	.1		VITALITY 680 14V OAA	620M
<u> </u>		307 8	C9 13	p 45%	 	ENIE APD NESO	545 D	CUB	10 m 1 m	770	20			SOIRT			BC4G1	+	LPH	1		VITALITY 600 144 04A	6/50 M
135 55 1377		30.70	C9 10	47/1 110%		LEMCO LEMPLAC IZP	Fro/I	C113 10				ERIE BIDS -104-06/6-0A-0850	440/8	TROOTS		_	E5270	1	LPA	1		VITALITY 680 144 04A	600/M
			CIO	160	-	STEATITE A-TRIKO 112-06-30	500/I	CITA				ENIE 21105-104-0108-0A-0850	450 8	TRIOS		_	Bcar4	1	1	+			
		-	CID 14	1-5		DAU 336/30		C114 100				ERIE APD NI-K	7 30 / G	77000			BCIAC	-	1	+			
		-	C19 10	op 420%			33713					AND HOD WAY	61613	THIOS.					Fil	+		DOMA ANTIQUEDE (BOAS AM) BESINGE TOCKES	675/5
			The state of the state of the state of	CONTRACTOR OF THE PARTY OF THE	_	ERIE (65)	+	C116 10					BROIA				を発見する を物化する	+1	1	1-			
				OP #20%		LENCO LEMPLAC IOP	504/A	C119 66				320	EZIO/A	140)					1	1	1-1-		1
8100 ZEM ±10% IBK	TAM UPM 050	20%	C 15	2 F5%		ERE APD Nato	SAAIN	CUO	7	-	- 1	EPIE APD HI-K	No.	-				-	1	+	1		1
	THE UPM 050	2000	CIG	47. 20. 9	 	LENCO LEMPLAC IZP	600/T	C119 4	1 2				See N	-		_		-	1	+			
Landard Committee Committe	CRR UPM 050	200/6	C17 14	р #5% 47µ ⁻¹⁰ 40% 6р	1	STEATITE R-TRING HE-06-ED	ESAIO	C191 90	0_		and the second second	EMO EX PEO IG	566/H 454/B	-				1	1	1			
FUOD 18K% ±10% 15K	IRA UPM 050	2001	CB	مراجعة المراجعة	1		500/2	CIER 4	000					1		_		1	1	1	1		1
1002 IN 9 [210]	nn will voy		100	1 4 60%	1 1	MANAGE MANAGEMENT IN PROPERTY OF THE PARTY O		Per interest		La Line	- 1	ERE APD HI-K	SEC/A	1 1	1	- 1		1	<u> </u>		<u> </u>		and the same of

How to load the 'Belling-Lee' Coaxial Aerial Plug L.734/P



- 1 Trim feeder by removing 1" outer cover, \(\frac{3}{4}\)" of braid and \(\frac{7}{6}\)" of insulant.
- 2 Slide clamping nut and collet on to feeder and splay the braid.
- 3 Push centre conductor through plug pin as far as possible and bend sharply for soldering. Solder and trim.
- 4 Slide collet up to splayed ends of braid and trim braid flush with plug moulding, using knife against collet.
- 5 Push assembly home into plug so that collet enters it. Screw nut on firmly to grip feeder. The plug pin must be firm.
- 6 In the case of feeder larger than 0.261" dia. over cover, the hole in the collet clamp encircles braid only.

ALWAYS

- (a) Avoid scoring centre conductor and braid when removing insulant.
- (b) Solder the conductor with a quick iron, to avoid melting the cable and plug insulant.
- (c) Trim loose ends to avoid short circuiting.
- (d) Ensure that the claws of the collet are the correct way round so as to grip the outer sheath.
- (e) Avoid twisting cable when reassembling plug, as this tends to break the conductor.

By courtesy of Belling & Lee, Ltd, Gt. Cambridge Road, Enfield, Middlesex

GUARANTEE

This tuner is guaranteed against any defect in material and workmanship for a period of twelve months from the date of purchase.

Within this period we undertake to supply replacement parts free of charge provided that failure was not occasioned by misuse, accident or negligence. Labour and carriage costs are not covered unless by local agreement.

Within the U.K. the guarantee offered with this equipment does not limit the consumer's existing statutory rights.