FERGUSON TRANSPORTABLE TABLE RADIOGRAM MODEL 399

SERVICE MANUAL

MECHANICAL DETAILS

Removing Record Changer

Unscrew 2 screws securing ventilation panel and 5 screws round perimeter of changer board. By lifting the rear of the changer board the ventilation panel can be easily removed. To complete removal of record changer, disconnect motor leads at connector box, unplug pick-up leads from chassis and lift changer clear of case.

Removing Chassis

Unscrew woodscrew securing connector box and disconnect leads to output transformer (note order for re-assembly). Pull off front control knobs. Unscrew nuts securing wood clamp at rear of printed board, remove screw securing front of chassis and withdraw chassis.

SPECIFICATION

Power Supply

200-250 volts, 50 c/s. AC

Waveranges

Medium: 182—557 Metres
Long: 1090—1940 Metres

Record Changer

BSR UA14 4-speed, with TC8M turnover crystal cartridge.

Aerial

Internal ferrite-rod.

Valves

V1 **UCH81**—Frequency changer
V2 **UBF89**—IF amplifier and detector
V3 **UCL83**—AF amplifier and output
V4 **UCL83**—Phase splitter and output
V5 **UY85**—Half-wave rectifier

Pilot Lamps

12V, 0·1A MES

Loudspeaker

8 inches × 5 inches elliptical, 3 ohms speech coil.

Power Output

5½ watts approximately.

Cabinet Dimensions

16¾ inches wide (including fittings) × 8¾ inches high × 19¾ inches deep.

THORN ELECTRICAL INDUSTRIES LIMITED

FERGUSON RADIO CORPORATION LTD., Great Cambridge Road, Enfield, Middlesex

Service Depots

LONDON: Eley's Estate, Angel Road, Edmonton, N.18. *Telephone: EDMonton 3060*
BIRMINGHAM: 24 Sheepcote Street, 15. *Telephone: Midland 5291*
MANCHESTER: Thorn House, Derby Street, Cheetham, 8. *Telephone: Deansgate 8484*
GLASGOW: 160/162 Battlefield Road, S.2. *Telephone Langside 9251/2/3/4*

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CIRCUIT DESCRIPTION

Tuner

With the receiver switched to MW, S1A short-circuits, the long-wave winding L1 on the ferrite-rod aerial and the medium-wave winding L2 is tuned by C3 with trimmer C4. To tune the LW band, both aerial windings are series connected and C2 is connected across the circuit by S1A. C5 couples the signal to the grid circuit of V1 (UCH81) the frequency changer. C1 which is shunted by R1, limits the grid circuit impedance of V1 at low frequencies. The oscillator is grid tuned, with L4 the grid coil and L3 the feedback coupling from the oscillator anode circuit. On MW, L4 is tuned by C12 with trimmers C13 and C14, on LW C11 is connected across L4 by S1B.

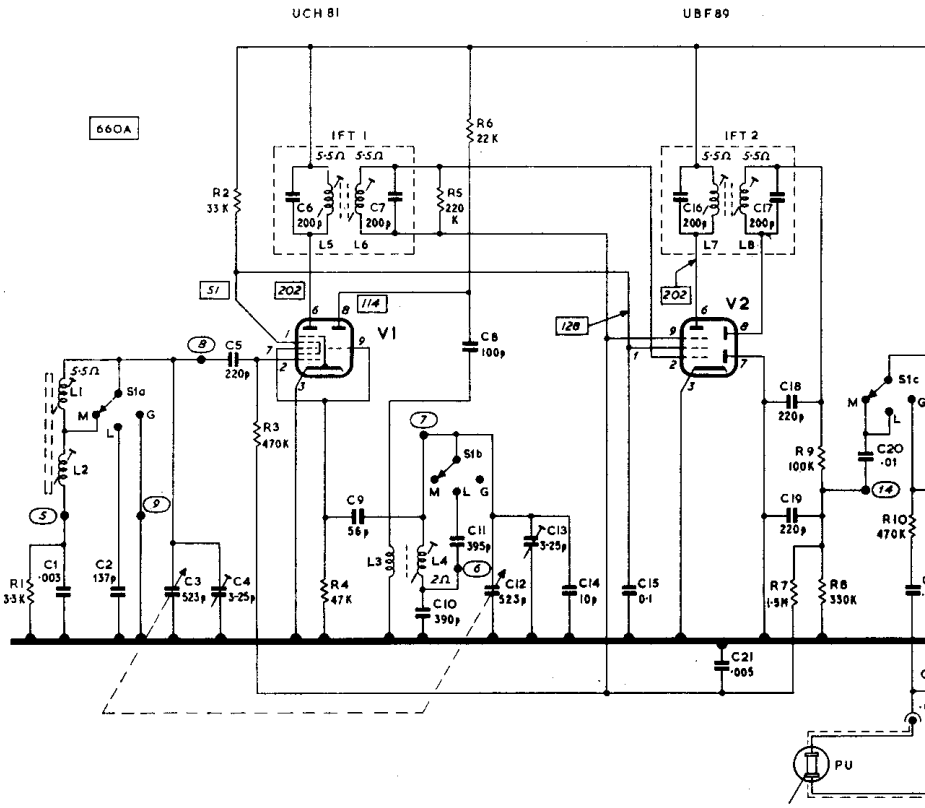
V2 (UBF89) functions as the IF amplifier and sound detector. The DC voltage across R8 produced by the rectified signal is decoupled by R7 and C21 and fed as AGC bias to the grid circuits of V1 and V2.

Audio Amplifier

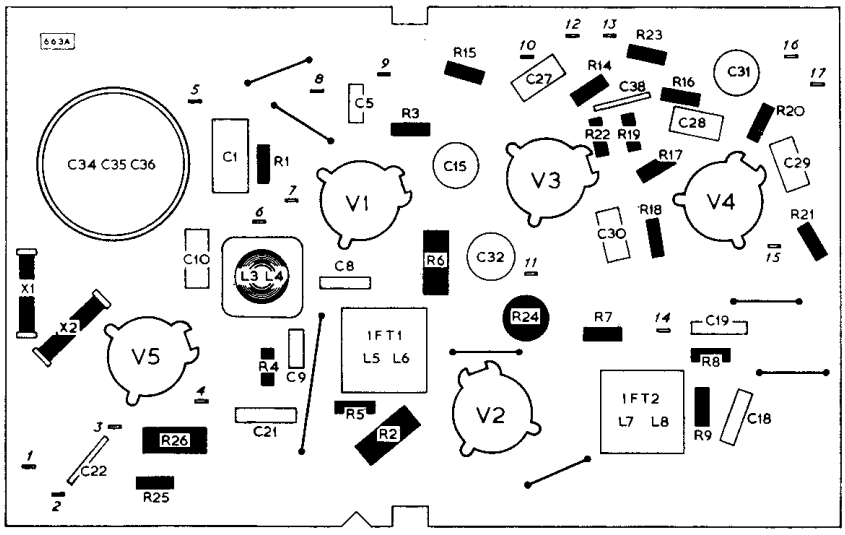
The push-pull amplifier circuit utilises two triode-pentode valves type UCL83, the pentode sections forming the output stage. One triode section V4A functions as the phase inverter and the other, V3A, as the input voltage amplifier. The tone and volume controls operate in the grid circuit of V3A and a negative feedback voltage from the secondary of the output transformer is injected across R14 in its cathode. The effect of C31 is to reduce the feedback at low frequencies to provide a degree of bass lift. The voltages developed across the anode and cathode loads of V4A are applied to the control grids of V4B and V3B through C29 and C30. C33 across the primary of the output transformer provides phase correction.

The tuner unit or gramophone pickup is switched into the amplifier circuit by S1C.

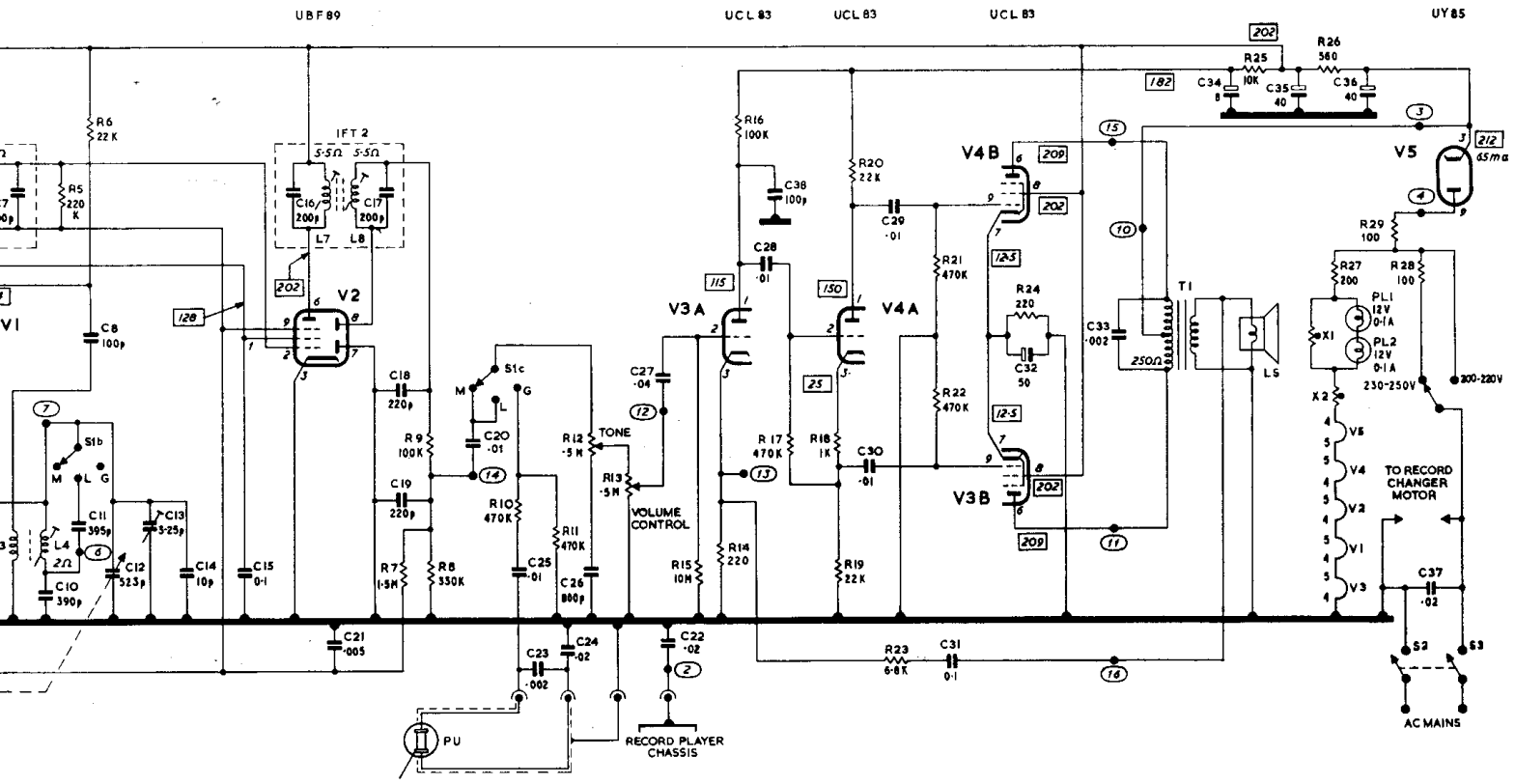
C24, C25 isolate the pickup, whilst C22 provides earthing for record player chassis. R10, R11 form a pickup signal attenuator and C23 gives phase correction.



Circuit Diagram. Figures in rectangles indicate voltages measured with a 20,000 Ω/V meter. DC resistance readings are shown against inductances where these are 1 Ω or greater.



Location of printed board components. C6 and C7 are located in IFT1, and C16, C17 in IFT2.



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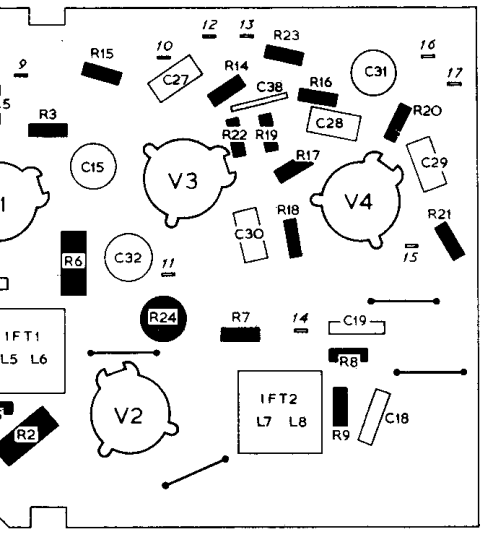

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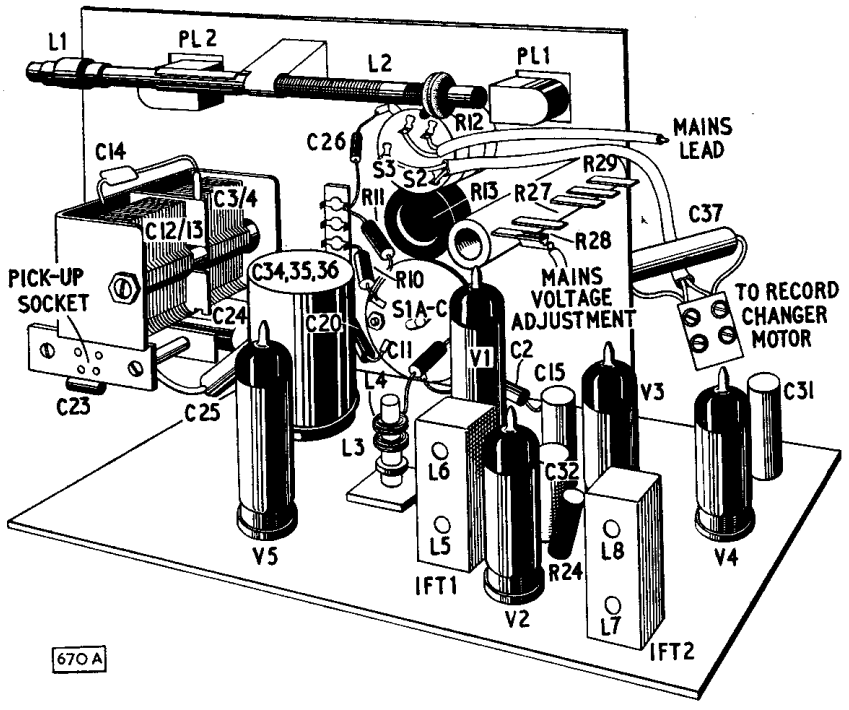


Rear view of chassis showing the location of trimming adjustments and including components not mounted on the printed board. T1 and C33 (not shown) are mounted on the speaker chassis.

CIRCUIT ALIGNMENT

Alignment markers are provided on the scale reflector in the form of notches cut along the top edge.

When viewed from front of chassis the extreme right-hand notch is the set cursor position, then reading from right to left the 580 Kc/s marker, 210 Kc/s marker and 1400 Kc/s marker.

IF

Switch to MW and rotate tuning control fully anticlockwise. Set the volume control to maximum and inject a 470 Kc/s modulated signal, via a 0·1μF capacitor, into V1 grid (pin 2). Adjust L8, L7, L6 and L5 for maximum output; reducing input as necessary to keep receiver output as low as possible.

RF

Note: Signals should be injected via a loop loosely coupled to the ferrite-rod aerial.

1. With gang fully closed, adjust cursor assembly to coincide with marker at righthand end of scale backing plate. Switch to MW.
2. Rotate tuning control anticlockwise until cursor coincides with 580 Kc/s marker.
3. Inject 580 Kc/s modulated signal and adjust L4 and the rod aerial adjusting ring for maximum output.
4. Rotate tuning control anticlockwise until cursor coincides with 1400 Kc/s marker.
5. Inject 1400 Kc/s modulated signal and adjust C13 and C4 for maximum output.
6. Repeat items 2 3 4 and 5 until no further improvement can be obtained.
7. Switch to LW and inject 210 Kc/s modulated signal.
8. Rotate tuning control until maximum signal output is obtained, 210 Kc/s check, then adjust the position of L1 on ferrite-rod for maximum output.

Stylus Replacement

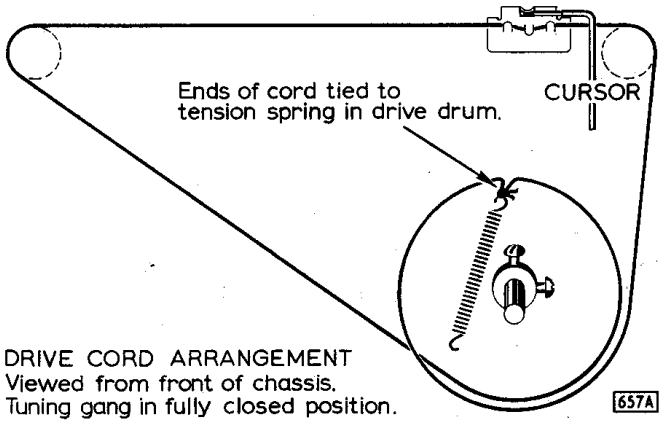
When replacing worn stylii, use the following types:—

LP-TC8R (coloured red)
78-TC8G (coloured green)

Do not remove the screw securing each stylus, one turn is sufficient to slacken and so enable the stylus to be withdrawn. When fitting the new stylus, ensure that it is correctly seated under the screw at one end and fitting over the stylus coupling at the other.

Drive Cord Replacement

Use approximately 30 inches of nylon braided cord.



DRIVE CORD ARRANGEMENT
Viewed from front of chassis.
Tuning gang in fully closed position.

657A

RESISTORS

All ¼ Watt carbon 20% tolerance unless otherwise stated.

Ref.	Value		Rating	Function and Part No.
R1	3·3K Ω			Part aerial circuit
R2	33K Ω		½W	V1/V2 SG HT feed
R3	470K Ω			V1 (heptode) grid leak
R4	47K Ω			V1 (triode) grid leak
R5	220K Ω	10%		IFT damping
R6	22K Ω		½W	Oscillator HT feed
R7	1·5M Ω			AGC decoupling
R8	330K Ω			Detector load
R9	100K Ω			IF filter
R10	470K Ω			Pick up output attenuator
R11	470K Ω			
R12	0·5M Ω	Lin. pot.		Tone control 30383/4
R13	0·5M Ω	Log. pot.		Volume control 30383/3
R14	220 Ω	10%		V3A NFB injection and cathode bias
R15	10M Ω			V3A grid leak
R16	100K Ω			V3A anode load
R17	470K Ω			V4A grid leak
R18	1K Ω			V4A cathode bias
R19	22K Ω	10%		V4A cathode load
R20	22K Ω	10%		V4A anode load
R21	470K Ω			V4B grid leak
R22	470K Ω			V3B grid leak
R23	6·8K Ω	10%		NFB limiter
R24	220 Ω	10%	1W	Output cathode bias
R25	10K Ω			HT smoothing
R26	560 Ω			
R27	200 Ω	5%		Mains dropper 13415
R28	100 Ω	5%		
R29	100 Ω	5%		

INDUCTORS AND TRANSFORMERS

Ref.	Description	Part No.
L1	LW } Ferrite-rod aerial	10782
L2	MW }	
L3	Oscillator feedback }	18342
L4	Oscillator tuning }	
L5 } L6	IFT 1	10900
L7 } L8	IFT 2	10899
T1	Push-pull output transformer	17611

MISCELLANEOUS

Ref.	Description	Part No.
LS	Loudspeaker	16012/19
PL1 } PL2	Pilot lamps 12V, 0·1A MES	33774
S1a } S1b } S1c	Waverange/gram switch	30384/1
S2 } S3	Mains on/off switch	30383/4
X1 } X2	Brimistor CZ2	4558/2

Part No. N20433.

CAPACITORS

All 350 Volt DC working, 20% tolerance unless otherwise stated.

Ref.	Value	Rating		Function and Part No.
C1	·003μF	2%		Part aerial circuit
C2	137pF	2%		LW fixed aerial trimmer
C3	523pF	Variable		Aerial tuning 30379
C4	3—25pF	Pre-set		Aerial trimmer
C5	220pF			V1 grid coupling
C6	200pF	2½%		L5 tuning
C7	200pF	2½%		L6 tuning
C8	100pF			V1 oscillator anode coupling
C9	56pF			V1 oscillator grid coupling
C10	390pF	2%		Oscillator padder
C11	395pF	2%		LW fixed oscillator trimmer
C12	523pF	Variable		Oscillator tuning 30379
C13	3—25pF	Pre-set		Oscillator trimmer
C14	10pF	5%		Fixed oscillator trimmer
C15	0·1μF			V1/V2 SG decoupling
C16	200pF	2½%		L7 tuning
C17	200pF	2½%		L8 tuning
C18	220pF			Detector reservoir
C19	220pF			IF filter
C20	·01μF			Coupling to tone control
C21	·005μF			AGC decoupling
C22	·02μF	300V AC		Motor plate isolating
C23	·002μF			Pickup phase correction
C24	·02μF	350V AC		Pickup isolating
C25	·01μF	300V AC		
C26	800pF			Part tone control
C27	·04μF	150V		V3A grid coupling
C28	·01μF			V4A grid coupling
C29	·01μF			V4B grid coupling
C30	·01μF			V3B grid coupling
C31	0·1μF			Bass boost NFB
C32	50μF	ELEC	25V	V3B/V4B cathode bypass 13210
C33	·002μF			Phase correction
C34	8μF	ELEC	275V	HT smoothing } 13237/5
C35	40μF	ELEC	275V	
C36	40μF	ELEC	275V	HT reservoir
C37	·02μF		300V AC	Mains RF bypass
C38	100pF	10%		RF bypass

SPARE PARTS LISTS

Description	Part No.
Cabinet	30448
Drive cord spring	3194
Knobs:	
Tuning	33390
(clip)	47409
Volume, Tone on/off	32671
(clip)	37346
Wavechange	32671/1
(clip)	37346
Lampholder	13305/2
Mains lead	9645/2
Record changer	16152
Scale	30432
Scale backing plate	30437
Scale pointer	30438
Ventilation partition	30431

The manufacturers reserve the right to vary specifications or use alternative materials as may be deemed necessary or desirable at any time.