GRUNDIG

TK 14

TAPE RECORDER SERVICE MANUAL

LIST OF CONTENTS

APPENDIX

Issue 1

July 1961

SECTION I. INTRODUCTION

The Grundig Recorder type TK14 operates at a single speed of $3\frac{3}{4}$ inches per second. The maximum spool size which can be accommodated is $5\frac{3}{4}$ inches.

The Main Chassis Mounting Plate, which carries most of the components, is spot-welded onto a steel frame which forms the centre portion of the whole instrument. After removal of the Plastic Bottom of the machine and the Plastic Top Cover, all parts are readily accessible. The Amplifiers are contained on the single Printed Circuit which can be reached easily for servicing purposes. The Mains Power Pack is mounted onto a separate sub-chassis.

The two-pole Motor drives a very generous fly-wheel which is mounted into a self aligning bearing. The upper portion of the fly-wheel spindle is stabilised by being pressed against two protrusions on the Plastic Bearing Disc.

The right-hand Clutch is driven from the fly-wheel and use is made of the weight of the spool and tape on the right hand Clutch to obtain the correct amount of clutching action. In the "Fast Forward" position, the right hand clutch is moved to the left against an Idler Wheel which then engages with the upper portion of the Motor Pulley. For "Fast Rewind" operation, the left hand clutch is moved against the upper portion of the Motor Pulley.

A "Pressure Tape" is fitted to the Pressure Roller Arm of the machine which makes contact with the back of the tape and presses this, quite uniformly, against a large portion of the Head Face. This provides an intimate contact between the active coating on the tape and the head and minimises sudden loss due to "drop outs".

The machine is fully press-button operated, the Press Buttons being interlocked so as to prevent incorrect operation. Before depressing any other button, the "Stop" button must first be operated.

A Magic Eye Recording Level Indicator is fitted and the machine is equipped with two sockets for inputs from a Microphone, Telephone Adaptor, Radio Set or Gramophone pick-up. A High Impedance and an Extension Loudspeaker Output, together with a Loudspeaker Switch are also fitted. A digital type Position Indicator is fitted which is belt driven from the left hand clutch.

The TK14 was first introduced by GRUNDIG (GT. BRITAIN) LTD., in August 1961.

Please address all Technical Correspondence on Grundig Equipment to:—
THE CHIEF ENGINEER, GRUNDIG (GREAT BRITAIN) LTD.
Newlands Park, Sydenham, London, S.E.26
Telephone: SYDenham 2211

SECTION 2. CIRCUIT DESCRIPTION

The circuit diagram of the machine is enclosed with this manual separately and is contained in the pocket formed by the rear cover. The diagram is colour coded where the colour Red denotes all the components used when recording. Green denotes all components used when playing back. Blue shows the Motor circuit and Power Pack. All connections which are common to both, Recording and Playback Amplifiers, are shown in Black.

2.1 THE RECORDING AMPLIFIER

2.1.1 Microphone Recording

The signal is fed from pin 1 of the microphone socket (pin 2 being the earth connection), R1 forming the input impedance. Via the input selector, 2.1-2.2, the signal is fed to the recording/playback switch contacts 1.21-1.22. The signal then passes through blocking condenser C1 to the grid resistor R5 of the first half of the ECC83 pre-amplifier. The cathode of this is earthed and its anode load is R6, decoupled by C2. From the anode feed condenser, C3, the signal travels to the recording level control R7 and to the grid of the second half of the ECC83. The cathode bias of this is obtained through R10, the anode load is R9 and the anode blocking condenser C5, feeding the signal to the triode section of the ECL86. The grid resistor of this valve is R12 and cathode bias is obtained by R18, decoupled by C11.

From the anode load R17, decoupled by C8, the signal is fed via C10 into the frequency correction network for the recording amplifier, via switch contacts 1.14-1.13. In this, C4 and L3 largely determine the required rise of the frequency response towards high frequencies, with R8 being included to flatten the peak. To obtain a smooth rise from a frequency of about 1000 c/s onwards, R15, R21, R16, and C7 are fitted. At high frequencies, the amount of feed back from the triode section of the ECL86 into the cathode of the second half of the ECC83 is reduced, thereby increasing the gain at such frequencies. C12 is included to restrict the amount of feedback at very low frequencies (below 333 cycles) to provide a slight amount of bass lift and to improve the signal to noise ratio.

R19 and R13 feed the audio signal into the recording head and their purpose is to prevent changes in recording head current at different frequencies. The Head is fed from a high impedance source (through R19 and R13) and the effect of the varying head inductance at different frequencies is thereby negligible. C6 is included to prevent leakage of recording bias back into the amplifier where it might upset the operating point. Depressing the recording button opens switch contact A which removes the muting of the signal from C10.

2.1.2 Extension L.S./Gram. P.U. Recordings

The signal is fed from pin 1 of the "Radio L.S./Gram. P.U." socket of the TK14, where R4 and R3 form an input potential divider. From the junction of the two components the signal is fed via switch contacts 2.3-2.2, recording/playback switch contacts 1.21-1.22 to condenser C1 and to the grid of the first half of the ECC83.

The circuit then follows as for microphone recordings.

2.1.3 The Bias Oscillator

When recording, the pentode section of the ECL86 functions as the bias oscillator. The section is disconnected from the rest of the amplifier by switch contacts 1.11-1.10, the output transformer primary is short-circuited by contacts 1.4-1.5 and feedback is provided from L4, the bias oscillator coil, through C21, R37 (variable pre-set), switch contacts 1.10-1.11 and R29 into the grid of the pentode.

The Erase Head is fed from a tapping of the secondary on the bias oscillator coil, and the Recording Head is fed via C19, a trimmer condenser. Cathode bias for the pentode section of the ECL86 is provided by R32, decoupled by C17, and R33. R30 forming the grid resistor. The screen grid is fed via R36, decoupled by C18.

2.1.4 The Magic Eye

In the recording position the signal is fed from switch contact 1.13 through R26 into the rectifying diode, MR2. The output is smoothed by C16 and fed to the magic eye pre-set control R31. R34 is the anode load of the triode section of the EM84 and R35 is its target load. Variation of the value of R34 would alter the sensitivity of the EM84 and variation of R35 would alter the display brilliance, but both are interrelated.

2.2 THE PLAYBACK AMPLIFIER

When playing back, the signal is provided by the Playback Head and fed via switch contacts 1.23-1.22 through condenser C1 into the grid of the first half of the ECC83. The grid resistor is again R5 and the signal travels, as described for the recording amplifier, to the second half of the ECC83 and to the triode section of the ECL86. R7, previously the recording level control, now becomes the volume control. The signal, appearing at C10 on the anode of the triode section of the ECL86, is now passed into the frequency correction network for the playback amplifier. This consists of C9, R20, and R14. At very low frequencies the amount of feedback from the triode section of the ECL86 into the cathode of the second half of the ECC83 is limited due to the high reactance of C9. R20, in parallel with C9, is fitted to prevent low frequency instability and to provide some small amount of feedback at very low frequencies. The correction network produces the required bass lift for the playback amplifier but at high frequencies C4 and L3 again restrict the amount of feedback with R8 included to flatten the peak, so that the playback amplifier provides the required bass and treble lift to compensate for losses in the recording and playback processes.

From switch contact 1.15 the signal is taken to the potential divider R22/R23 and is fed to pin 3 of the Extension L.S./Gram. P.U. socket. This provides the high impedance output for feeding external amplifying equipment.

From switch contact 1.14 the signal is fed through C13, R25 and R29 (grid stopper) into the control grid of the pentode section of the ECL86. This stage now functions as a power amplifier for the built-in loudspeaker and for the extension loudspeaker socket. The DC resistance of the primary of the oscillator coil and its inductance at audio frequencies are too small to affect the audio signal and this is now fed to the primary of the output transformer. C22 prevents H.F. instability and because of the high peak voltages appearing across it, must be of at least 1000V DC rating. The loudspeaker is fed from the secondary of the output transformer. The loudspeaker switch 3.1-3.2-3.3 connects either one side of the loudspeaker to chassis or alternatively disconnects the loudspeaker and inserts the dummy load R38. At the same time the output signal is fed to pin 1 of the output socket.

The negative feedback loop from the secondary of the output transformer via C14, R28, R27 (tone control) and C15 provides tone control facilities.

When used as power output stage, the ECL86 is biased by R32, decoupled by C17. R33 is now short circuited by switch contacts 1.9-1.8. The erase head is disconnected and the oiscillator feedback line is open-circuited by switch contacts 1.10-1.11. The DC return path for the grid of the pentode section of the ECL86 is now provided by R29, R27 and R28. Depressing the start button opens switch contact B which removes the muting of the signal from C10.

2.3 THE POWER PACK

The TK14 is fitted with a three-core mains lead via a chassis mounted plug and a lead mounted socket. The mains input is fed via the mains switch (micro switch) and the mains fuse to the primary of the mains transformer. Mains input selection is by placing the fuse into its appropriate holder, the position of the fuse being visible through a window in the bottom of the machine. A full wave bridge metal rectifier, MR1, provides the HT supply which is fed from one part of the secondary winding of the mains transformer through the HT fuse (mounted adjacent to the mains fuse). C23 is the reservoir condenser and smoothing is by R24, C8, R11 and C2.

2.4 THE MOTOR

The motor is a two pole motor. Some are fitted with a fan and with a tapped winding. One winding, White-Blue, is for normal forward running, whilst the other one, White-Green, is used in either the fast forward or fast rewind positions. Other motors are equipped with an untapped winding and the two fastwind change-over switches are omitted.

The motor is fitted with a motor pulley which is located on the motor shaft by a torsion spring. The centre of the belt groove in the motor pulley must be exactly 14.5mm above the top of the chassis.

SECTION 3. DISMANTLING FOR SERVICING

3.1 ACCESS TO COMPONENTS

All major components for the TK14 are readily accessible by removing the bottom of the instrument (four screws in rubber feet) and by removing the top deck. To remove the top deck proceed as follows:—

Remove the four (on some models five) holding screws and gently lift off the back of the top cover. Next place three fingers of each hand onto each of the six operating keys and with the thumbs of each hand gently lift the front lip of the top deck. This will now come off easily.

When refitting the top deck, place this loosely in position and press the rear of the top deck well home on to its lip. With three fingers of the left hand depress the operating keys and push the left hand corner of the top deck downwards with the other hand. Next repeat with the right hand corner depressing three keys with one hand and locating the top deck with the other.

When replacing the deck mounting screws, observe that the shorter one of the four (or five) screws must be located in the front right hand position i.e. closest to the Start Key. To gain access to the printed circuit panel, remove the bottom screen first. Loosen the four mounting screws holding the printed circuit screen to the printed circuit panel and slide the metal screen downwards. The screen will now come off. Next unscrew the four screws completely, taking care not to lose any of the four spacers. The printed circuit panel can now be swung outwards; it is still retained by its connecting leads. In this position, however, the TK14 is fully operational. With the machine standing on its side, all electronic functions may be checked.

The recording/playback switch is operated by the recording button of the TK14. The swivel bracket of the recording button engages in a large eyelet on the end of the slider of the recording/playback switch and when re-assembling the printed circuit and replacing this on its mounting pillars, care must be taken that the recording button swivel bracket engages properly in the slider. An opening is provided in the printed circuit panel to observe the relative positions.

3.2 REPLACEMENT OF DRIVE BELTS

To replace the drive belts of the TK14 proceed as follows:—

1. Remove Mains Lead.
2. Remove Top Deck.
3. Unclip EM84 from its holding bracket together with Valve Base.
4. Remove Dust Cover from drive spindle.
5. Remove Indicator Drive Belt.
6. Remove three countersunk Fixing Screws of Sound Channel Plate.
7. Remove complete Sound Channel and Top Deck Fixing Bracket under right hand side of Sound Channel. Moving it forward on its leads.
8. The Clutch Drive Belt and the Fly-Wheel Drive Belt may now be replaced.
9. Re-assemble in reverse order, making sure that the right hand Top Deck Fixing Bracket is positioned properly with threaded hole uppermost and held by the longest of the three countersunk screws.

SECTION 4. CLUTCHES AND BRAKES

The clutches are of the friction type and will not normally need attention, other than an occasional cleaning of the felt clutch faces with methylated spirits to remove any accumulation of dirt or foreign matter. For this purpose the clutch may be taken apart as follows:—

Removal of the large clutch spring ring will release the upper clutch spindle, exposing the circlip of the upper clutch half. Remove this circlip, the small washer and the upper clutch half. The felt insert may now be cleaned.

Before re-assembling the clutch, make quite sure that the plastic washers which fit between the upper clutch half and the circlip are undamaged. They can easily effect the speed of the machine and cause wow or flutter.

There are three positions from which a braking action is applied to the peripheries of the clutches. These are the brake bracket with the plastic brake piece, operated by the brake plate and engaging against the left hand clutch, and the brake ring, fitted to and operated by the brake bracket, engaging against the right hand clutch. These two brakes are used when recording, playing back or fast winding. A leaf spring is fitted to the temporary stop lever to exert a breaking action onto the left hand clutch when depressing the "Temporary Stop" button. The temporary stop lever also disengages the pressure roller of the TK14 when this is in its normal forward running position.

When the brakes are engaged i.e. when the machine is in its neutral position, the right hand and left hand brake operating rods must have a play of at least 1mm. They must not prevent the brake bracket from moving sufficiently for the brakes to engage fully.

The brake for the left hand clutch is so arranged that it only exerts force when the left hand clutch is rotated in an anti-clockwise direction with the brakes engaged. At the same time it lifts off the braking ring from the periphery of the right hand clutch. The purpose of this is to ensure that after fast forward winding and when depressing the stop button the left hand clutch only is braked so as to prevent tape loops being formed. Likewise, when stopping after fast rewinding, a braking action is applied only to the right hand clutch for the same reason.

For the correct assembly of clutches and the correct designation of components please refer to the exploded clutch photograph in the Appendix of this manual.

SECTION 5. TESTING THE TK14

5.1 ELECTRONIC TESTS

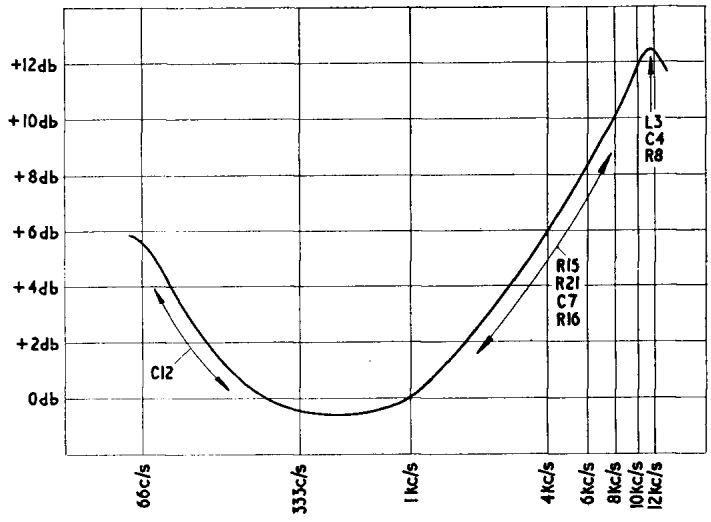
It must be emphasised that all electronic test specifications can only be met if the correct tape is used for the machine. Tapes which are recommended for the TK14 are "Grundig Tape", "Master Tape" or "BASF" type LGS.

Other tapes have different electrical characteristics, and sometimes also vary in their mechanical specifications, and if they are used, the TK14 will not give the performance of which it is capable.

5.1.1 Frequency Response of Playback Amplifier

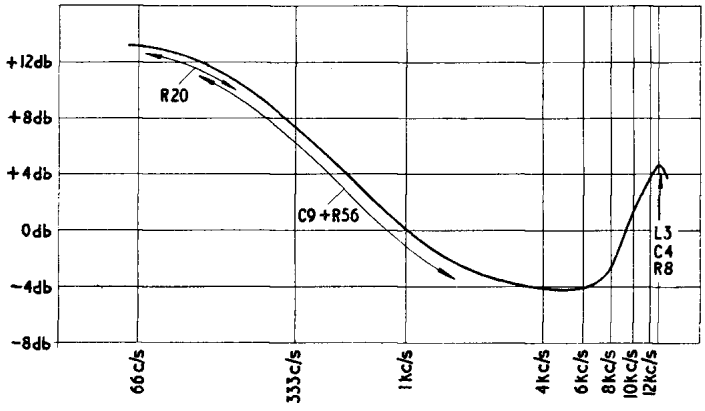
Using Test Network ①, a signal of 39 mV ± 2 dB at a frequency of 1000 c/s is fed into the head circuit.

With all controls set to maximum, an output level of 50 mV should be obtained from contacts 2 and 3 (high impedance output) on the "Radio L.S./Gram. P.U." socket. The response at other frequencies is indicated in the graph below. The allowable tolerance is ±2 dB for all frequencies, except 1kc/s and 12kc/s. To obtain the correct lift at the frequency of 12kc/s, the screw of the absorption coil L3 must be adjusted.



5.1.2 Frequency Response of Recording Amplifier

Using Test Network ②, a signal at a frequency of 1000 c/s is fed into the microphone input, until a head current of 0.5 mV/100 Ohms (using Test Network ⑤) is obtained. The frequency response at other frequencies is shown on the graph below where a tolerance of ±2 dB from the levels indicated is permissible.



5.1.3 Full Level Recording

Most electronic tests on the TK14 depend on a "Full Level Recording". This condition is obtained when enough signal is fed into the machine and with the controls set to such a position that a maximum permissible recording current is passed into the recording head before saturation of the Tape occurs.

When a full level recording is made, a number of interrelated conditions must be met which are as follows:—

1. The Magic Eye of the machine will close at a frequency of 1000 c/s. (Recording Level Adjustment).
2. The Input Signal required for this condition does not exceed a maximum figure (Input Sensitivity check).
3. The Audio Recording Current fed into the head is 5 mV/100 Ohms, using Test Network ⑤ (Head Current Setting).
4. On playing back a 1000 c/s recording meeting all above requirements, an Output Level of 500 mV is obtained from the high impedance output (Minimum Playback Level).
5. The Distortion Factor obtained on playback from the high impedance output under the above conditions does not exceed 6% (Maximum Total Harmonic Distortion).
6. The Hum and Noise level on playback (no signal) should not exceed 2.5 mV (Signal to Noise ratio 50 dB).

All the above conditions and requirements are a close indication of the efficiency of the machine.

5.1.4 Head Currents and Voltages

The HF bias current to the recording head is 0.6 mA and may be measured by using Test Network ③, where a valve voltmeter should show a potential drop of 60 mV ± 15% across the 100 Ohm resistor in the chassis return lead of the recording head. C19 is adjusted until this recording bias is obtained.

The erase current should be measured by using Test Network ④ where a valve voltmeter should show a potential drop of 420 mV ± 10% across the 10 Ohm resistor in the chassis return lead of the erase head. R37 is adjusted until this erase current is obtained.

It must be observed that the adjustment of R37 and C19 are interdependant and erase current and recording bias must be checked after an adjustment has been made to either of them.

The audio recording current should produce a potential drop of 5 mV across the 100 Ohm resistor in parallel with the head, (use Test Network ⑤) when a frequency of 1000 c/s is fed to the Microphone or Radio L.S. Gram. P.U. input of the machine. For this test the bias oscillator must be made inoperative by short circuiting the erase head. Under this condition the magic eye should close. Also see section 5.1.3 "Full Level Recording" above.

5.1.5 Alignment of Heads

The position of the recording/playback head assembly is very critical and is particularly important for the perfect reproduction of recordings made on other machines. The adjustment should be carried out with a tape on which a frequency of approximately 6000 c/s has been recorded on a standard machine. Connect a valve voltmeter to the high impedance output (pins 3-2 of Radio L.S./Gram. P.U. socket) and play back the tape. The two screws on either side of the head should be adjusted for maximum output. The tape guides should be so adjusted that the pole pieces protrude 0.1mm above the top edge of the tape.

5.1.6 The Hum and Noise Level

The hum level may be adjusted to a minimum by means of R39 (humdinger). To check the hum level, feed a signal of 80 mV ± 2 dB at a frequency of 1000 c/s into the "Radio L.S./Gram. P.U." socket and make a full level recording. On playback the level should be noted and with the tape removed the residual hum and noise should not exceed −50 dB of the previously noted level.

5.1.7 Modulation Level Adjustments, Sensitivity and Distortion Factor

To set the modulation level, feed a 1000 c/s signal to the Radio L.S./Gram. P.U. input of the machine (using Test Network ⑤). Cause the magic eye to close and check the head current (using Test Network ⑤). This should be 5 mV across the 100 Ohm resistor in parallel with the recording head. The bias oscillator must be made inoperative for this purpose by short circuiting the erase head. If necessary, alter pre-set R31 (in magic eye circuit) until this condition is obtained. Next check the input level into the machine which should not exceed 87 mV ± 2 dB for the correct input sensitivity of the TK14. If the signal is fed into the "Microphone" input, a signal of 2.2 mV ± 2 dB should cause the magic eye to close.

If the recording is made, a playback voltage of at least 500 mV should be obtained, and the distortion factor should not exceed 6%.

5.1.8 Frequency Response Via Tape

To check the frequency response, feed a signal of approximately 20 mV at 1000 c/s into the "Microphone" input and adjust the recording level control until the two illuminated sectors of the magic eye just close. Next reduce the input signal by 20 dB to (1/10th) and record frequencies of 60 c/s, 333 c/s, 1 kc/s, 4 kc/s, 8 kc/s, 10 kc/s and 12 kc/s.

Rewind the tape and play back, observing the playback level on a valve voltmeter connected to pins 3 and 2 of the Radio L.S./Gram. P.U. socket. The output levels should not deviate by more than +3−5 dB.

5.1.9 The Output Stage

When feeding a signal of 333 c/s into Test Network ①, check the output level of the output stage by connecting a 5 Ohm (±2%) resistor across pins 1 and 2 of the "Output" socket. The output voltage (internal loudspeaker switched off) should not be less than 2.75V at a maximum total harmonic distortion factor of 6%.

Operation of the tone control reduces the output at 12 kc/s by approximately 14 dB when rotated from its maximum treble to minimum treble position. Other frequencies are attenuated correspondingly less.

The hum level from the output stage, measured across the 5 Ohm resistor in substitution of the loudspeaker, must not exceed 14 mV when all controls are set to maximum.

5.2 MECHANICAL TESTS AND SERVICE NOTES

5.2.1 The Sound Channel

The sound channel comprises all mechanical aprts for guiding and moving the tape in addition to the recording or playback head and the erase head.

It is most important that the tape is guided in a straight line along its full length of travel and the correct adjustment of the tape guides is therefore very critical. After carrying out any adjustment to the sound channel, all screws must be resealed with insulating varnish or sealing lacquer.

5.2.2 The Pressure Roller

The pressure roller conveys the tape past the head assemblies at an even speed. The pressure of the pressure roller against the capstan spindle should produce a pull on the tape, when running, of approximately 3½ ounces. The pressure roller is self-aligning so that it will always run quite parallel to the fly-wheel (capstan) spindle. It is important for the pressure roller to be kept clean and for cleaning purposes methylated spirits is recommended.

5.2.3 The Pressure Tape

The pressure tape ensures that the tape makes an intimate contact of uniform pressure against a large surface of the head to minimise the effect of "drop outs" and to ensure good high frequency response. The pressure tape is tensioned and will not normally require adjustment. Cleaning is recommended, using a soft brush, but any pressure tape which, for any reason, has become damaged, must be replaced. The pressure tape should not foul the mu-metal case of the head or the mu-metal screening plate in front of the head.

5.2.4 Wow and Flutter

If a wow meter is available, the reading should not exceed ±0.2%.

Alternatively a signal of approximately 5000 c/s should be played back when no appreciable variation in pitch should be audible.

5.2.5 Clutch Facings

Uneven pull from either spool spindle or an amount of jerkiness may be due to the accumulation of dirt on the felt insert under the corresponding upper clutch half. The felt may be cleaned with the aid of methylated spirits, using a small brush. It is also permissible to roughen the felt with a piece of fine sand paper. Where tapes other than those specified are used, it is not impossible for these to jam in the accurately machined tape guides, especially under "Fast Wind" Conditions. This may give an impression of incorrect mechanical operation of the clutches.

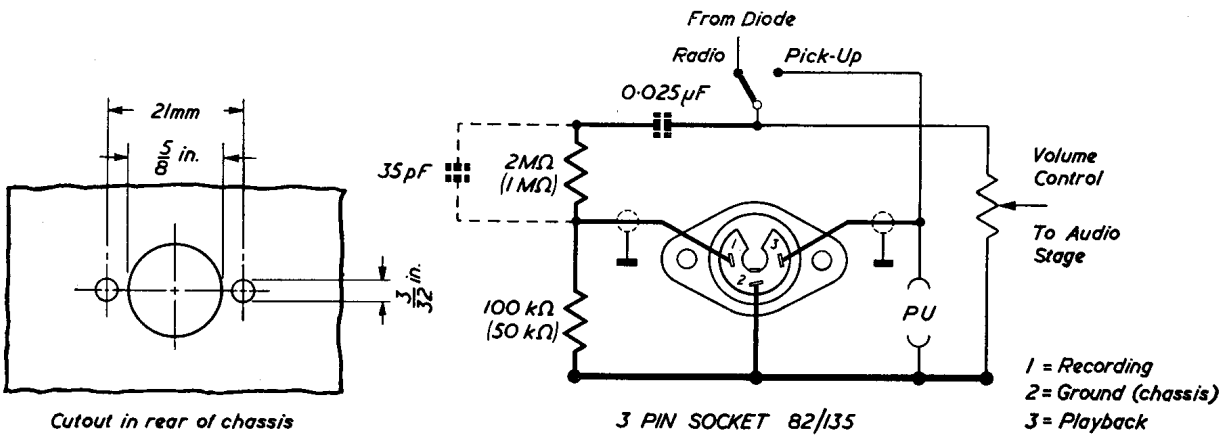
5.2.6 Lubrication

All bearings consist of self-lubricating sintered bearings and regular lubrication should not be necessary. It is recommended, however, to check the lubrication after the instrument has had approximately 1000 hours of use. Shell Vitrea Oil No. 21 is recommended for this purpose but should be used sparingly and with care. Metal sliders, push rod linkages and the two press button assemblies should be greased. A high viscosity Vaseline grease is recommended for such applications.

SECTION 6. ADDITIONAL INFORMATION

6.1 THE DIODE CONNECTION

For high quality recording from a radio receiver, a worthwhile improvement may be obtained by feeding the TK14 directly from the detector diode. This makes the level of the recording independant of the setting of the radio receiver volume control and by-passes the distortion of the output stage. The diode connection consists basically of a potential divider which should be mounted as close as possible to the volume control of the radio receiver. If DC is present on the volume control the blocking condenser should be added in series, as shown in the diagram below. The value of 1 to 2 Mohms is based on the radio set delivering approximately 100 mV to the diode load. Where the voltage varies considerably from this figure a suitable value of resistor should be chosen so that a signal of approximately 20 mV on mean programme level is fed into the recorder.



By using a twin screened cable (SL233) and arranging the connections as shown on the diagram, the TK14 can be made to record from the radio receiver or play back through it, using the same lead. This lead should be connected to the "Microphone" input when recording and to the "Radio L.S./Gram. P.U." socket (high impedence output) when playing back.

6.2 AC/DC OPERATION

The TK14 must only be connected to "AC only" apparatus. Where connection to AC/DC sets (Radio, Television Receiver etc.) is essential, an isolating transformer should be connected between the AC/DC equipment and the TK14. Alternatively it is possible to modify the auxiliary equipment so that this is converted to an AC only instrument. This could be done by feeding its mains input through an isolating transformer so as to separate the chassis of such equipment from the mains supply. The ratio of an isolating transformer for the signal lead is not critical; it is often possible to use a surplus mains transformer of sufficient power rating as a mains isolating transformer.

6.3 OPERATION FROM CAR BATTERIES AND OPERATION FROM MAINS SUPPLIES OTHER THAN 50 c/s

The TK14, like any other mains operated piece of equipment, may be operated from a car battery or a similar accumulator provided a suitable rotary or vibrator convertor is used.

The TK14 is only intended for operation from a 50 cycle mains supply and conversion to some other mains frequency, although technically possible, is not recommended mainly because of the expense involved. Conversion would entail the replacement of the motor and the mains transformer, both expensive items, and it is often considered to be more advantageous if a Frequency Changer is interposed between the mains supply and the machine. This firstly rectifies the unsuitable AC supply to DC then reconverts it to a 50 cycle AC supply, suitable for the TK14.

Suitable vibrator converters for battery operation and suitable frequency changers for operation from mains supplies of other than 50 cycles are manufactured by Messrs. Valradio, 57, Fortess Road, London, N.W.5., to whom enquiries should be directed.

SECTION 7. SUMMARISED SPECIFICATION OF THE TK14

MAINS VOLTAGE	50 cycle AC only, 200-220, 220-240 V
POWER CONSUMPTION	49 Watts = Playback 34 Watts = Record 54 Watts = Fast Wind
FUSES	0.8 Amp = Mains Fuse
	0.1 Amp = HT Fuse (surge resisting)
VALVE LINE-UP	ECC83, ECL86, EM84 plus metal rectifiers B250 C75 and E25 C5
MAXIMUM SPOOL SIZE	$5\frac{3}{4}$ inches
TAPE SPEED	$3\frac{3}{4}$ inches per second, $\pm 2\%$
RUNNING TIME PER FULL TAPE	1 hours each track, 2 hours total
REWIND TIME PER FULL TAPE	180 seconds (approx)
RECORDING SENSE	According to International Standards
WOW AND FLUTTER	Not exceeding $\pm 0.2\%$
FREQUENCY RESPONSE	60 − 12000 c/s + 3 − 5 dB
FULL LEVEL RECORDING	
Output Level Via Tape	500 mV, minimum
Distortion Factor	6%, maximum
Recording Head Current	5 mV across 100 Ohm resistor (at 1000 c/s)
INPUT SENSITIVITY	
Microphone	2 mV
Radio/Pick-Up	80 mV
OUTPUT POWER	2.5 Watts
IMPEDANCES	
Microphone Input	0.5 Megohm
Radio/Pick-Up Input	1 Megohm
High Impedance Output	15 Kohm
Ext. L.S. Output	5 Ohm
LOUDSPEAKER	$5\frac{3}{4} \times 4\frac{3}{4}$ elliptical with ceramic magnet

HUM AND NOISE LEVEL	
From High Imp. Output	2.5 mV, maximum
From Ext. L.S. Output	14 mV, maximum (across a 5 Ohm resistor)
DIMENSIONS OF TK14	$14\frac{3}{4} \times 11\frac{1}{2} \times 6\frac{3}{4}$ inches
WEIGHT OF TK14	20 lbs
MICROPHONE SUPPLIED WITH TK14	GDM 18, High Performance Moving Coil
PRESSURES AND TENSIONS	
Pressure Roller against Capstan	500 grammes (18 ounces)
Pressure Tape	80 grammes ($2\frac{3}{4}$ ounces)
Clutches against Motor or Idler	475 grammes (17 ounces)
Tape Pull when moving	100 grammes ($3\frac{1}{2}$ ounces)
L.H. Brake Pressure	400 grammes (14 ounces)
R.H. Brake Pressure	200 grammes (7 ounces)

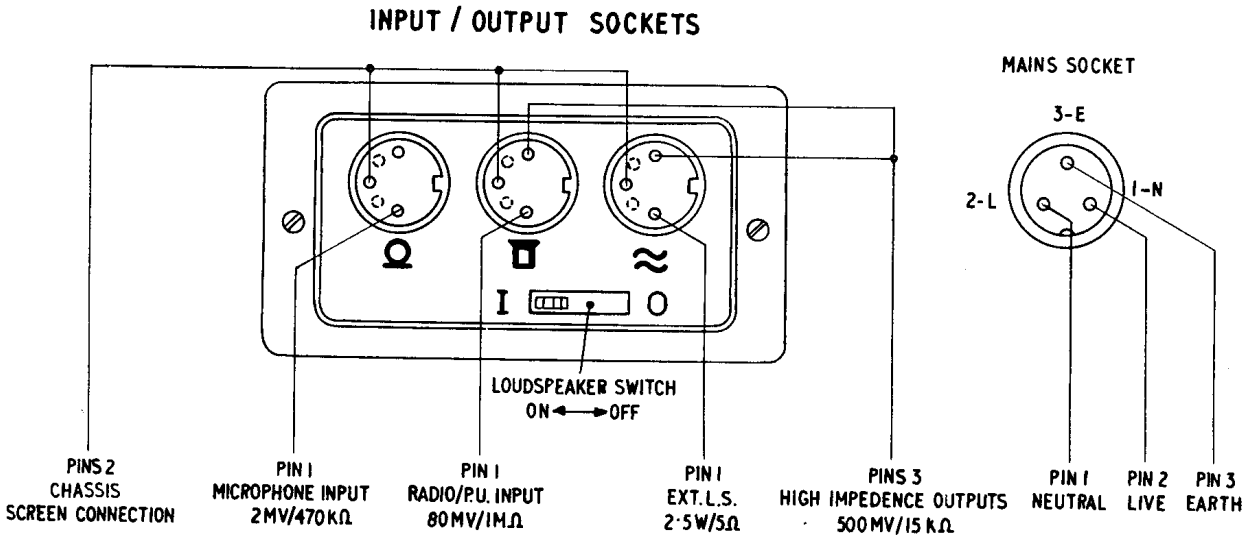
SECTION 8. MECHANICAL FAULTS

SYMPTOMS AND FAULTS	CURE
TAPE DOES NOT MOVE AFTER DEPRESSING START KEY	
Tape not threaded correctly	Correct
Insufficient pressure between Pressure Roller and Capstan Spindle	Adjust
Pressure Roller not free on Spindle	Clean and lubricate
TAPE DOES NOT RUN AT ITS CORRECT SPEED WHEN RECORDING OR REPRODUCING	
Incorrect tape pull	Adjust
Tape jamming in Tape Guides	Adjust
Left hand clutch jamming	Clear
Spool scraping against Top Deck	Adjust or replace spool
Incorrect mains voltage setting	Adjust
Drive Belt twisted	Correct
TAPE RUNS SLOW IN EITHER FAST WIND POSITION	
See above	
Oil on left hand Clutch Tyre	Clean
Oil on Idler Pulley	Clean
Motor running on incorrect winding	Check contacts D and E
Use of incorrect Tape	Use recommended Tape only
FAST WIND BUTTONS JAMMING	
Locking bracket out of adjustment	Adjust
HEAD WEARS TOO QUICKLY	
Incorrect Tape pressure	Adjust
TAPE JUMPS OUT OF TAPE GUIDES	
Pressure roller out of adjustment	Adjust
Dirt or iron oxide on pressure roller or Capstan Spindle	Clean
Sound Channel out of adjustment	Adjust
Use of incorrect Tape	Use recommended Tape
TAPE MOVES WITH NO KEYS DEPRESSED	
Brakes not operating	Clean and adjust
TAPE SCRAPES AGAINST EDGE OF SPOOL	
Spool Warped	Replace
Tape Guides out of adjustment	Adjust
FLYWHEEL DRIVE BELT JUMPS OUT OF GROOVES	
Motor Pulley incorrectly set	Adjust motor pulley so that centre of belt runs 14.5 mm above chassis

SECTION 9. ELECTRICAL FAULTS

SYMPTOMS AND FAULTS	CURE
DISTORTED RECORDING- LOW VOLUME- NO ERASE	
Bias Oscillator not working	
Faulty ECL86	Replace
Faulty Oscillator coil	Replace
Short circuit across erase head	Clear
Slider switch not operating	Check that the recording button is correctly located on the slider switch
Faulty Record Head	Replace
Condenser C20 faulty	Replace
CROSS TALK FROM ONE CHANNEL TO THE OTHER	
Tape Guides incorrectly set	Re-adjust
Pressure Tape incorrectly fitted	Re-adjust
WOW AND FLUTTER	
Clutches Jerk	Check clutch adjustment
Pressure tape incorrectly set	Re-adjust
Motor Pulley out of adjustment	Adjust
Insufficient pressure of pressure roller	Adjust
Dirt or Iron Oxide on pressure roller or Capstan Spindle	Clean
Belt twisted	Correct
Position indicator jamming	Clear or replace
Brakes not working	Adjust
Flywheel bearing dry	Lubricate
HUM LEVEL TOO HIGH	
Faulty ECC83	Replace
Faulty ECL86	Replace
Faulty Smoothing	Check and replace
Humdinger R39 out of adjustment	Adjust
NO RECORDING LEVEL INDICATION	
Faulty EM84	Replace
Faulty Pre-set R31	Replace
Faulty MR2 rectifier	Replace
RECORDING LEVEL TOO LOW	
Low HT Supply	Check
Faulty ECC83	Replace
Faulty Slider switch	Check
LOW PLAYBACK GAIN	
Incorrect bias during recording	Adjust C19
Faulty or dirty Head	Clean or replace
Faulty output transformer	Replace
Low HT supply	Check
Insufficient tape pressure	Adjust
Use of incorrect tape	Use recommended tape only
NO PLAYBACK	
Signal muted due to faulty contact B	Adjust
Loudspeaker muted by contact C	Adjust
Loudspeaker switched off	Switch on for playback

SECTION 10. CONNECTIONS TO THE TK 14.



Connecting Leads:	SL3 (as supplied with TK14) for all Input and Ext. L.S. connections	3-pin plug one end, 2 bared leads other end
	SL233 for all Input and Output connections	3-pin plugs both ends
Microphone Extension Cables:	MEC5 = 5 yds. long MEC10 = 10 yds. long MEC15 = 15 yds. long	consisting of special low capacity cable with 3-pin plug one end and 3-pin socket other end
Headphones:	SE3 single earpiece with earclip and STET stethoscope attachment	
External Amplifier:	GRUNDIG Channel Reproducer type CR1 in column type enclosure. Containing 3 Watt amplifier and 10 × 5½ loudspeaker. Supplied with connecting cable for high impedance output from TK14	
Mixer Unit:	Type GMU3. 4-Channel Electronic Mixer Unit with Magic Eye Level Indicator	
Telephone Adaptor:	Type TA3. Inductive Type with rubber suction fixing to telephone. Connected into Microphone input of TK14	

FIG. 1 GENERAL VIEW

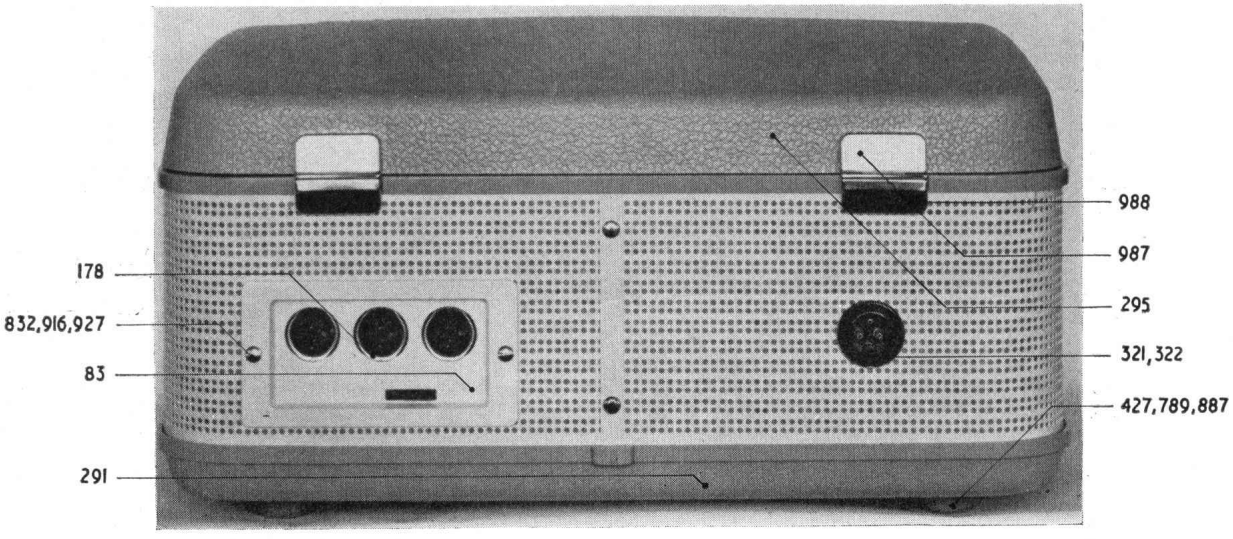


FIG. 2 BACK VIEW

To order parts, refer to pages 22 & 23

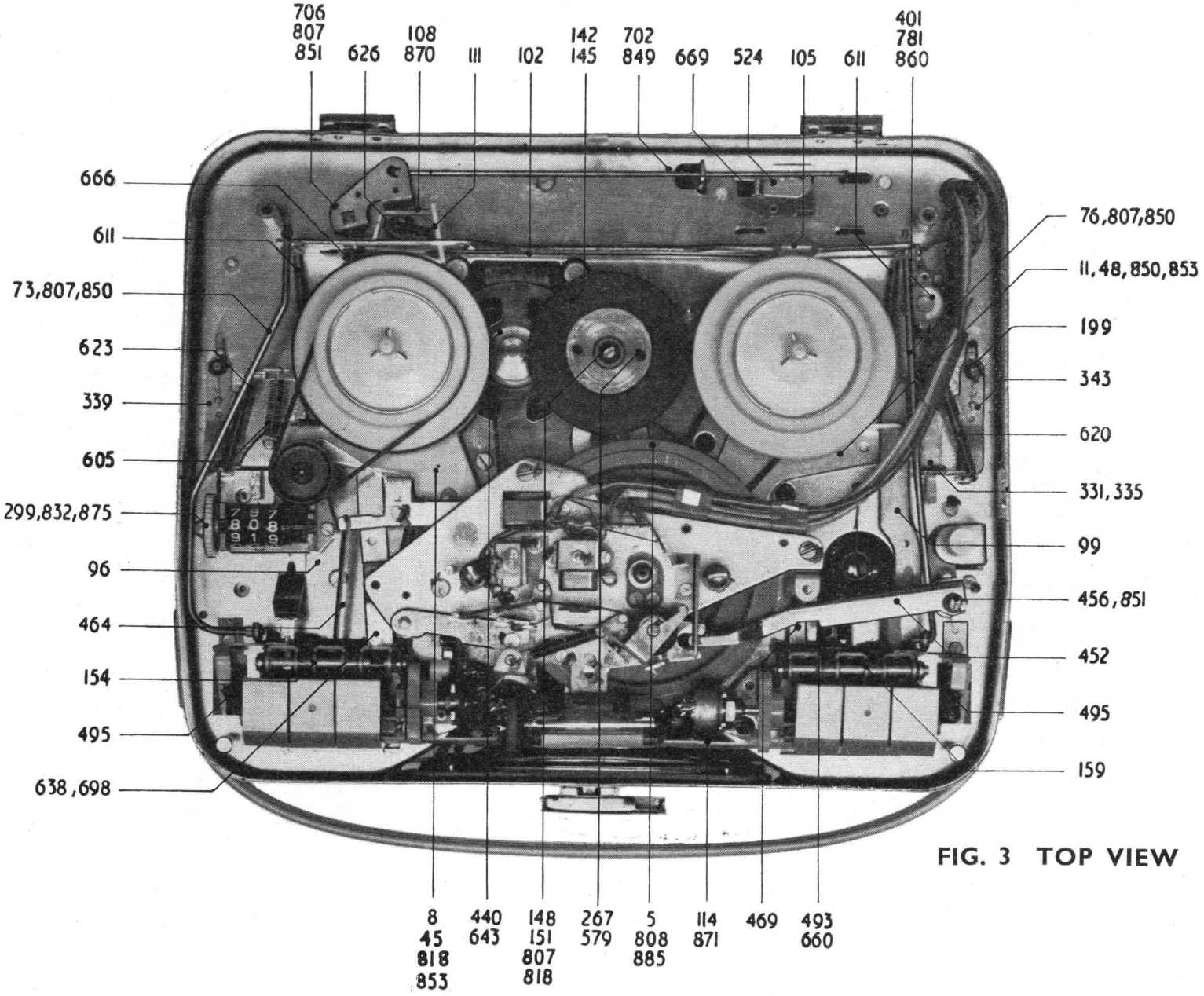


FIG. 3 TOP VIEW

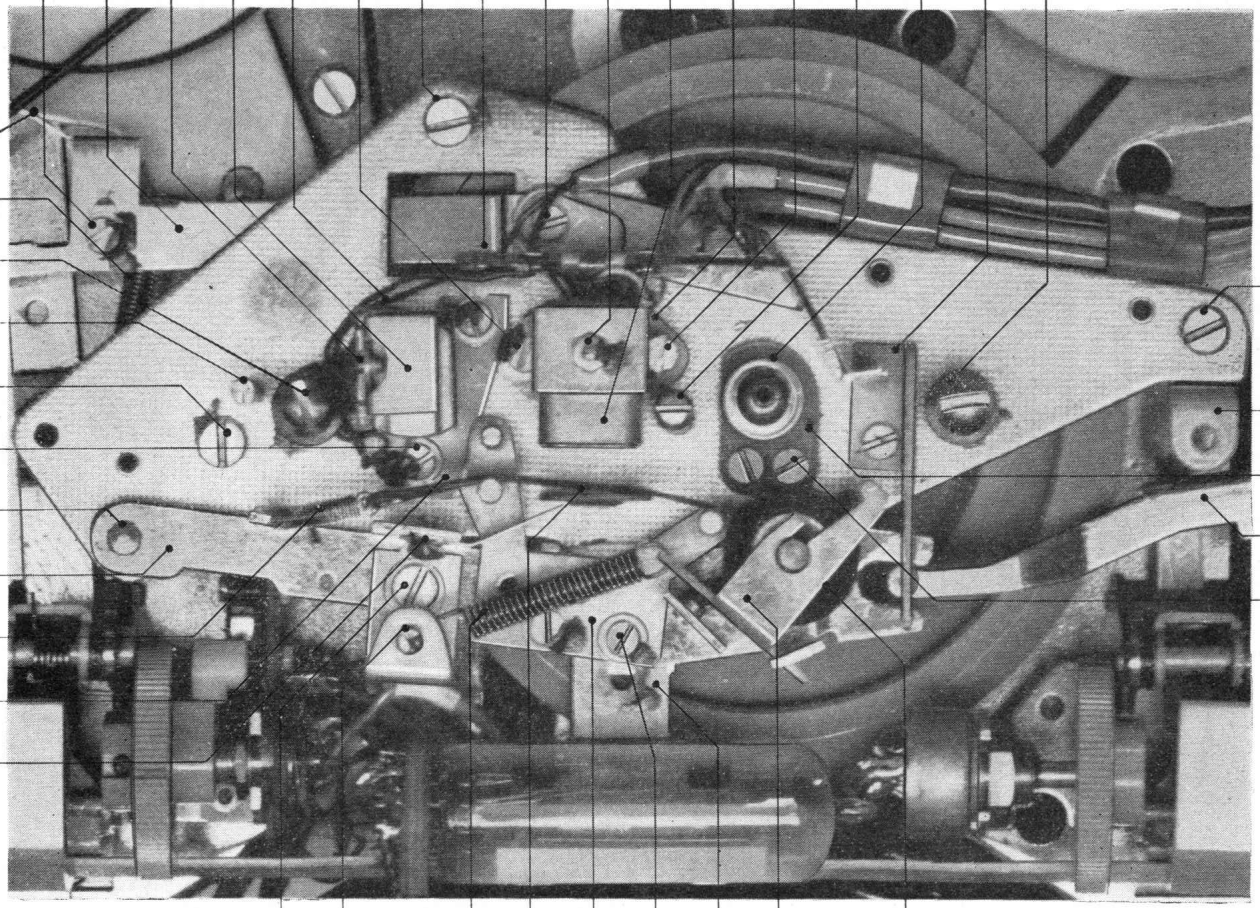


FIG. 4 SOUND CHANNEL

To order parts, refer to pages 22 & 23

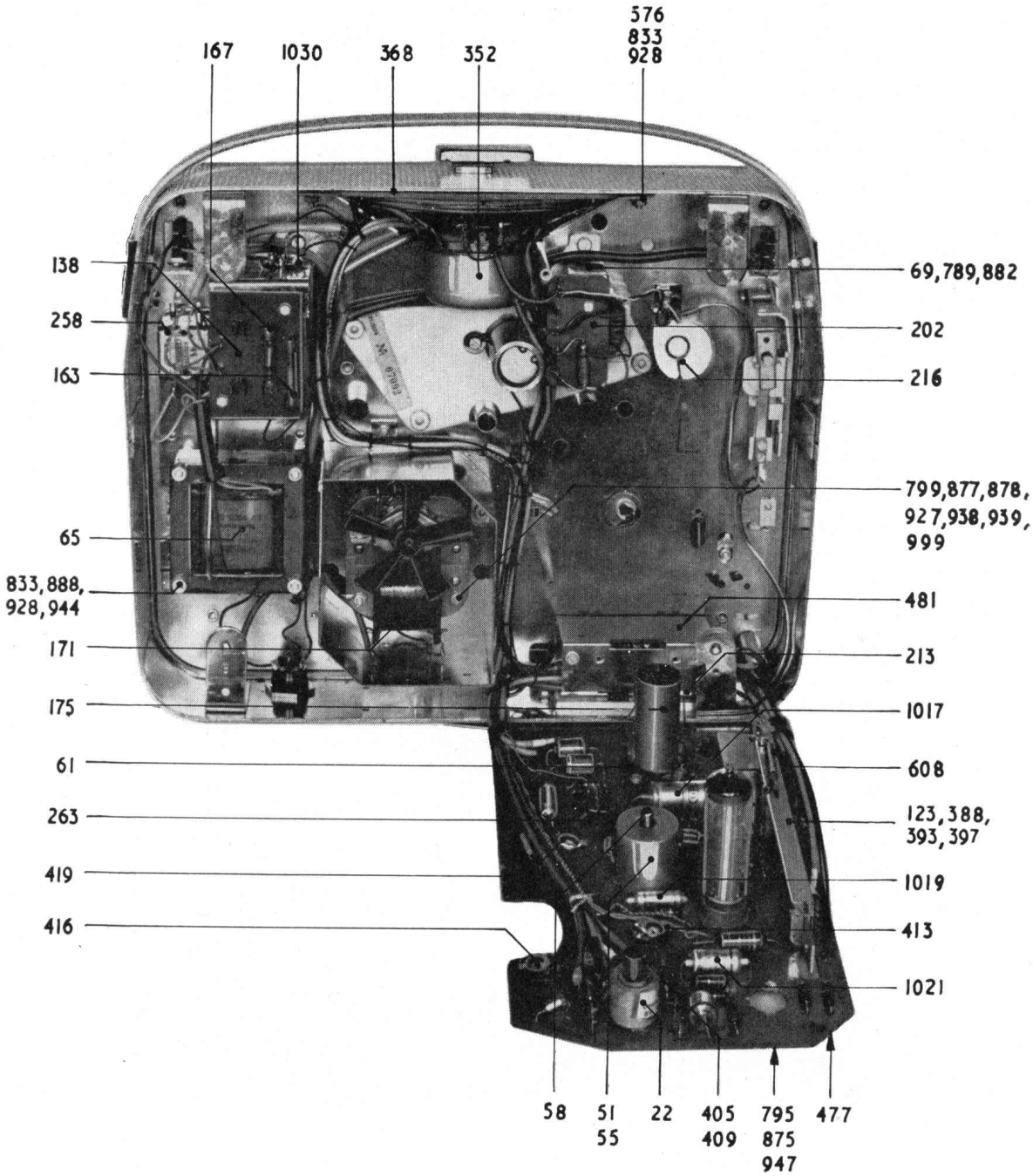
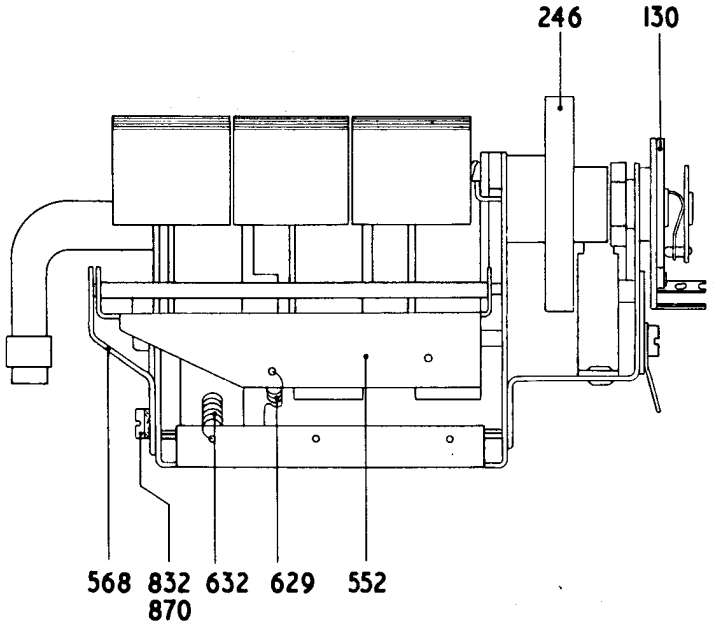
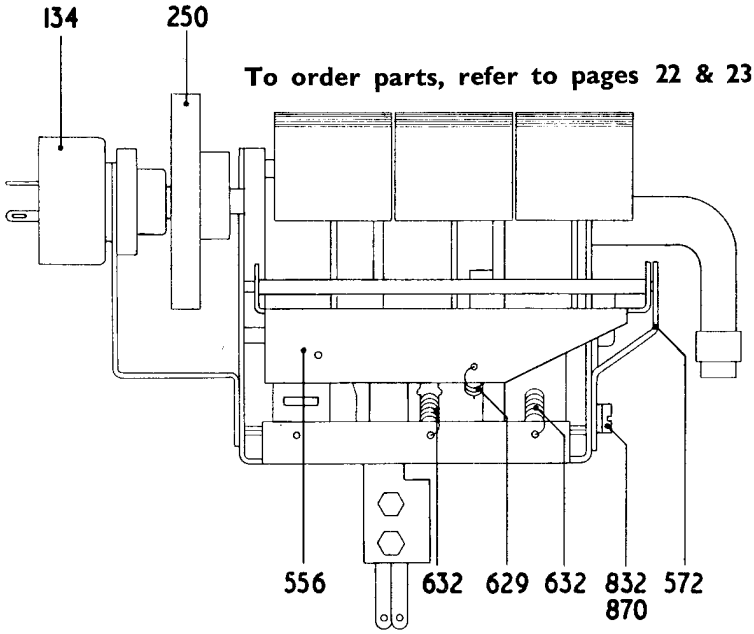
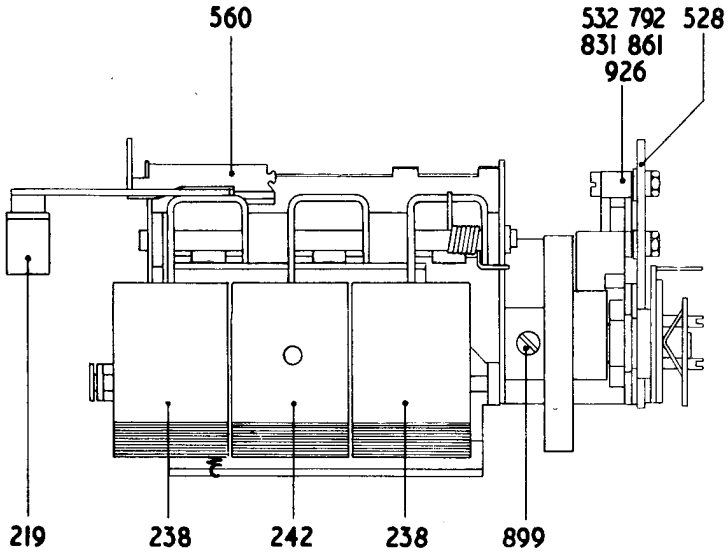


FIG. 5 REAR VIEW

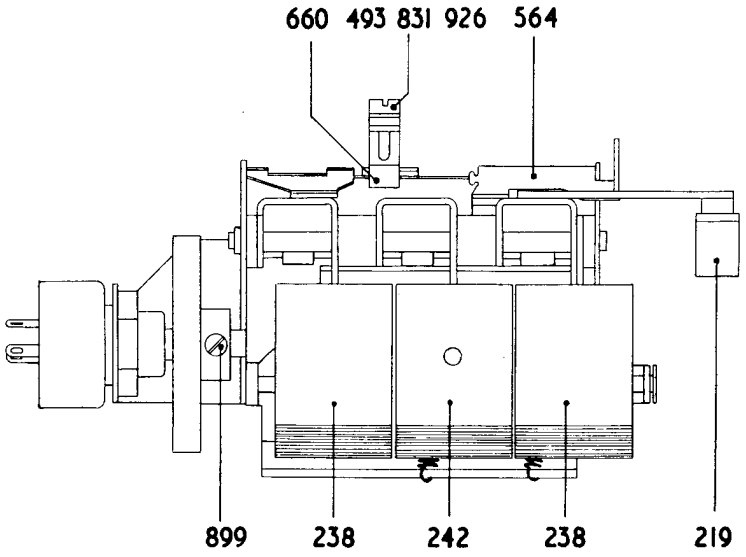
To order parts, refer to pages 22 & 23







L.H.



R.H.

FIG. 6 PRESS BUTTON UNIT

To order parts, refer to pages 22 & 23

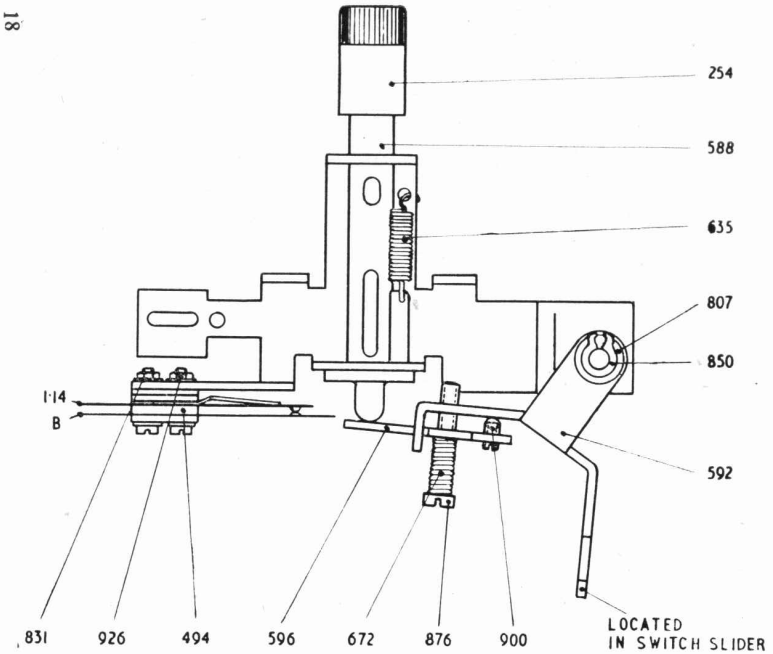


FIG. 7 RECORDING BUTTON ASSY

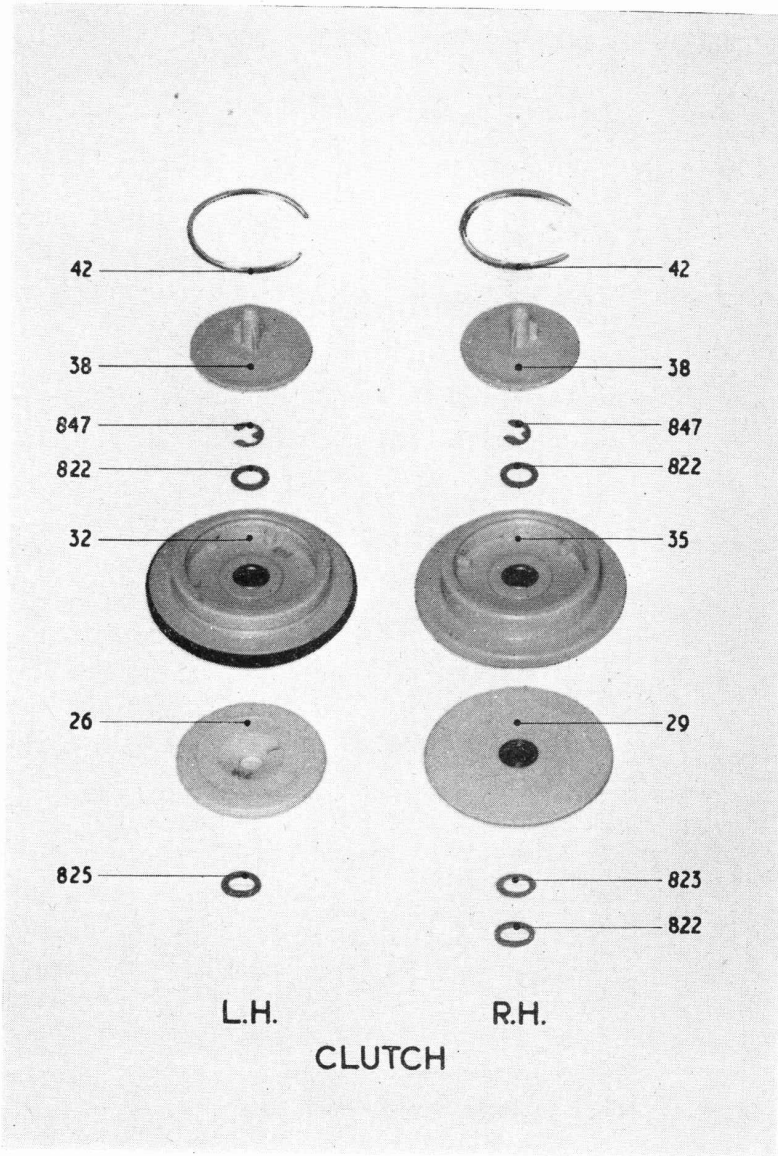


FIG. 8

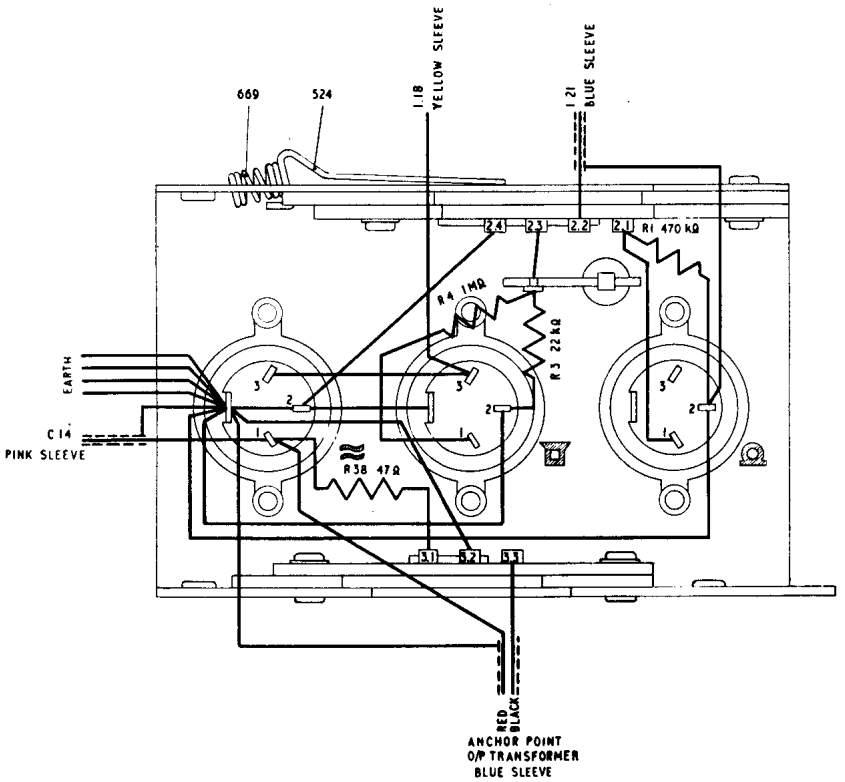


FIG. 9 WIRING DIAGRAM—BACK SOCKETS

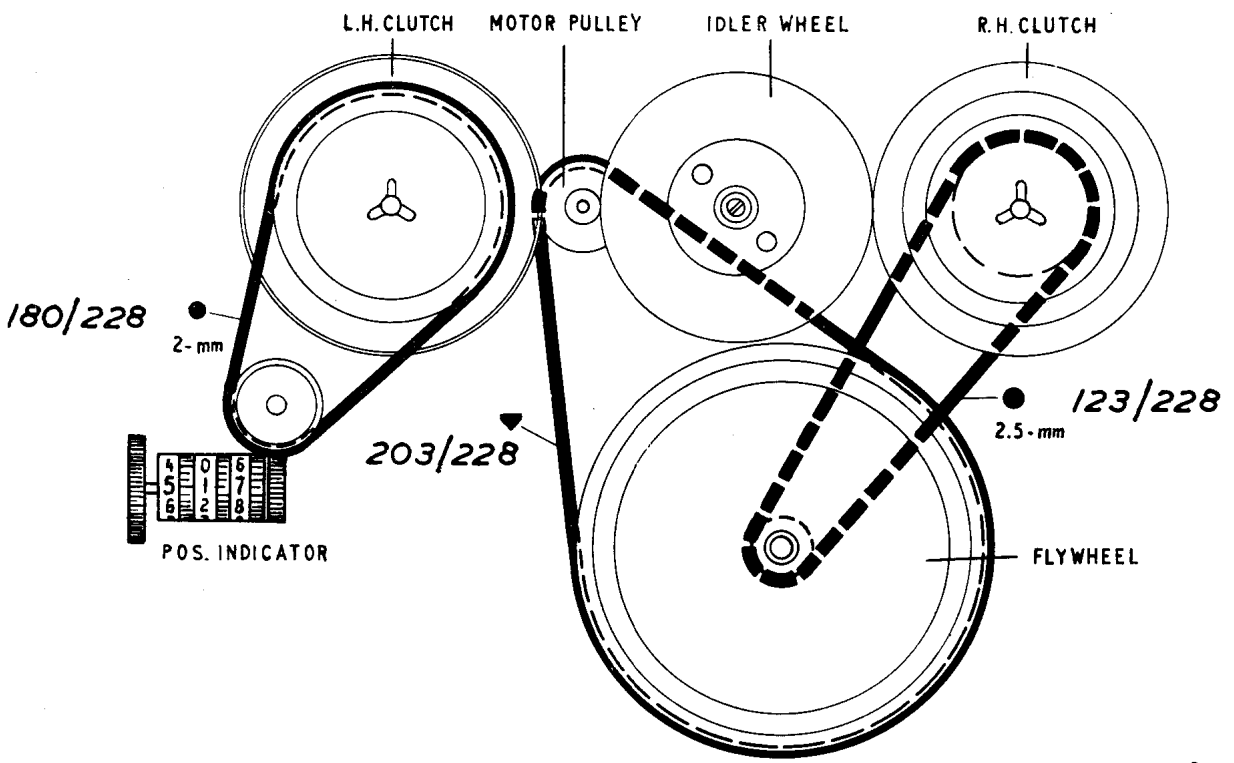
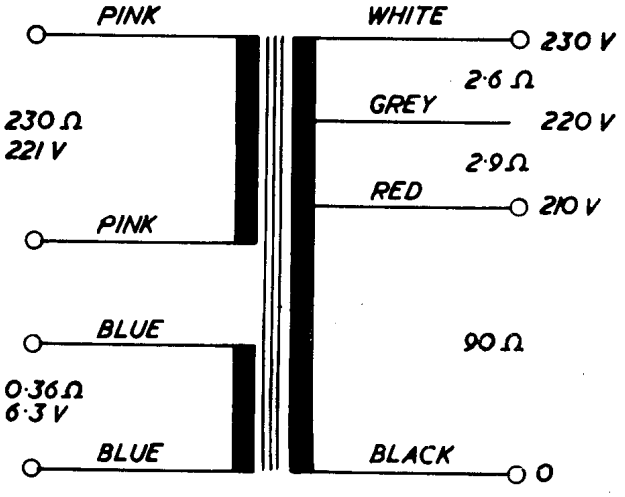


FIG. 10 DRIVE BELTS

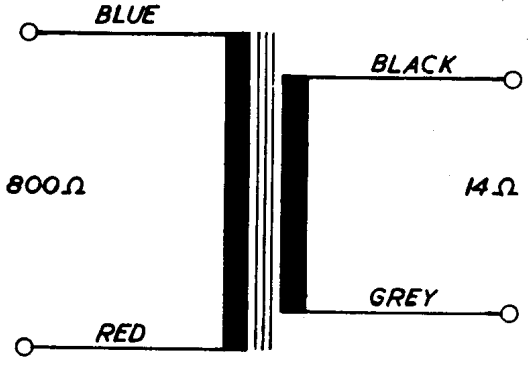
MAINS TRANSFORMER 203/85
BV 9005-526

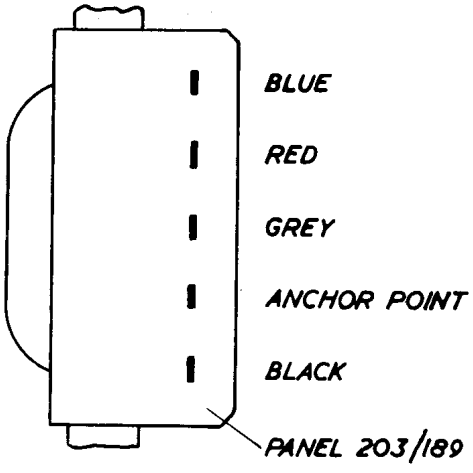


ABSORPTION COIL 177/50
BV 9230-001

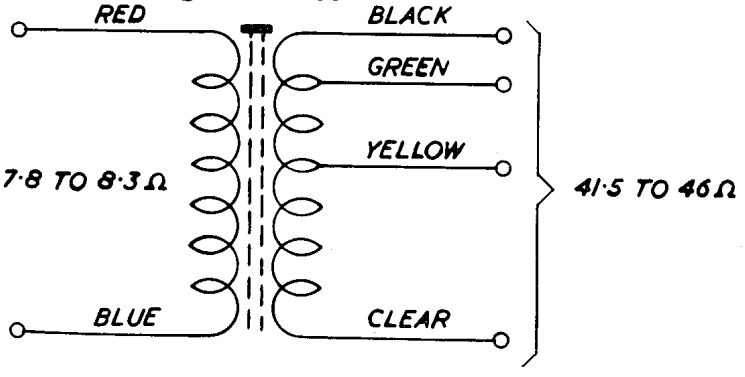
SCREENING CAN 177/52
CORE 115/53

OUTPUT TRANSFORMER 203/95
BV 9054-509





OSCILLATOR COIL 203/28
BV 9281-086



CORE 203/318
LOCKING SPRING 82/318/1

FIG. 11 TRANSFORMER & COIL DETAILS

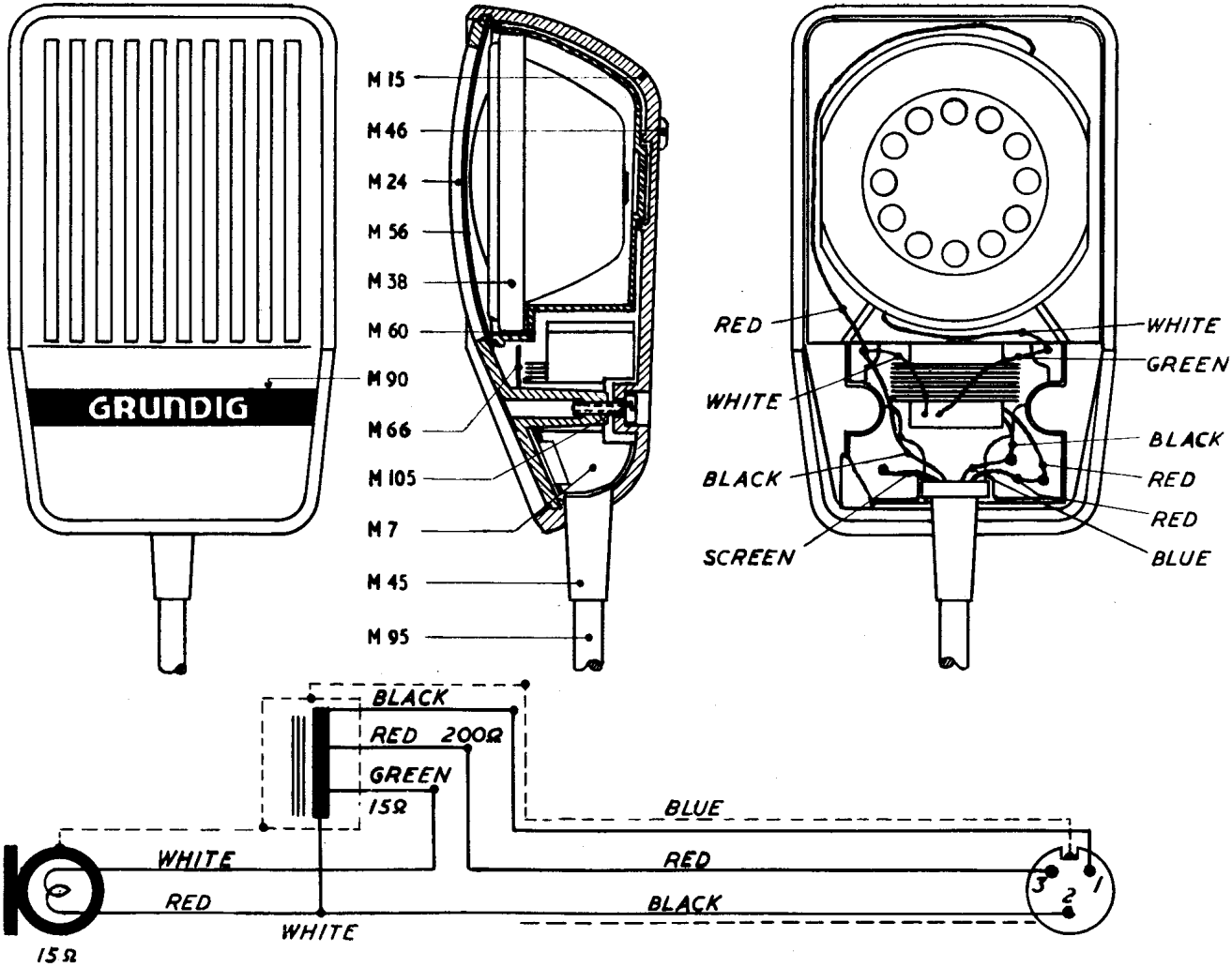


FIG. 12 MICROPHONE—GDM 18

Ref.	Description	Part No.
M7	Mic. Transformer Assy. ..	207/98
M15	Back Case	207/162
M24	Grill	207/167
M38	Mic. Insert	207/171
M45	Grommet	207/173
M46	Feet (PVC)	207/174
M56	Mesh	207/188
M60	Mic. Insert Support	207/189
M66	Screen	207/191
M90	GRUNDIG Name Plate ..	207/330
M95	Screen Cable	3049/8
M105	Filister Hd. Screw M2.6×8 ..	1134/SNP
	J3 Plug Assy.	119/1

When ordering, quote description and Part No. only.

SPARES LIST

When ordering, quote description and Part No. only

Ref.	Description	Part No.
5	Capstan & Bearing Assy.	203/25
8	Clutch Arm L.H.	203/26L
11	Clutch Arm R.H.	203/26R
14	Erase Head	127/32
18	Rec./Playback Head	203/33
22	Oscillator Coil	203/38
26	Lower Clutch Half L.H.	203/40L
29	Lower Clutch Half R.H.	203/40R
32	Upper Clutch Half L.H.	203/41L
35	Upper Clutch Half R.H.	203/41R
38	Upper Clutch Spindle	203/42
42	Clutch Spring Ring	82/43
45	Clutch Shaft L.H.	123/45L
48	Clutch Shaft R.H.	123/45R
51	Absorption Coil	177/50
55	Screening Can	177/52
58	Core	115/53
61	Rubber Mounted Valve Base	203/75
65	Mains Transformer	203/85
69	Output Transformer	203/95
73	Operating Rod	203/103L
76	Operating Rod	203/103R
83	Back Panel (moulded)	203/127
96	Push Bar Lever	203/130L
99	Push Bar Lever	203/130R
102	Brake Plate	203/131
105	Brake Ring	203/132
108	Brake Bracket	203/132/1
111	Plastic Brake Piece	203/132/2
114	Connecting Bar	203/133
118	Pressure Roller Arm	203/134
121	Pressure Roller & Bracket Assy.	203/134/1
123	Switch Slider (Printed Circuit)	203/139
127	Spring Mounting Screw	203/143
130	Volume Control	203/144
134	Tone Control	203/145
138	Mains Selector Panel	203/147
142	Idler Wheel Assy.	203/151
145	Idler Wheel	203/151/1
148	Idler Wheel Shaft	203/151/2
151	Idler Wheel Spacing Ring	203/151/3
154	Press Button Unit L.H.	203/153L
159	Press Button Unit R.H.	203/153R
163	Fuse 0.1A	203/157/0.1
167	Fuse 0.8A	203/157/0.8
171	Motor Assy.	203/158
175	Valve Screen	203/161
178	Back Socket Panel Assy.	203/166
186	Top Deck 4 hole fixing	203/174/1A
187	Top Deck 5 hole fixing	203/174/1B
190	Pressure Roller	203/177
199	Threaded Counter Plate	203/184
202	Tag Panel	203/189
205	Indicator Strip L.H.	203/190L
209	Indicator Strip R.H.	203/190R
213	Valve Retaining Spring Clip	203/193
216	Valve Retaining Spring Clip	203/193/1
219	Spring Set Actuator	203/199
238	Press Button	203/202
242	Press Button w. Dot	203/202/1
246	Control Disc. L.H.	203/203L
250	Control Disc R.H.	203/203R
254	Recording Button	203/205
258	Full Wave Bridge Rectifier 250V	123/207
263	Half Wave Rectifier 25V	115/209
267	Exp. Spring	123/214
271	Mu-Metal Pressure Spring Plate	203/215
275	Magic Eye Holder	203/216
279	Tape Pressure Band	203/217
291	Cabinet Bottom Assy.	203/220/2
295	Cabinet Lid Assy.	203/220/3
299	Position Indicator	203/221
303	Mu-Metal Head Screen	203/224
307	Erase Head Screen	203/225
311	Clutch Drive Belt	123/228
315	Pos. Indicator Drive Belt	203/222
319	Flywheel Drive Belt	203/228
321	Plug Chassis Mounting	203/236
322	Socket Cable Fitting	203/237
323	Head Mounting Bracket	127/238
327	Compression Spring	111/239
331	Washer	203/242
335	Buffer	203/243
339	Locking Bracket L.H.	203/244L
343	Locking Bracket R.H.	203/244R
347	Guide Bracket	203/247
352	Speaker	203/250
356	Tape Guide, Large	123/251
360	Tape Guide	188/251
364	Plain Tape Guide	203/252
368	Speaker Baffle	203/254
372	Head Cover	203/293
376	Front Escutcheon	203/294
380	Position Indicator Window	203/295
388	Slider Switch Assy.	203/301
393	Screen	203/306
397	Screen (short)	203/306/1
401	Variable Capacitor 10..60 pF	123/315
405	Core	203/318
409	Locking Spring	82/318/1
413	Miniature Pre-Set 1 kΩ	147/321/1k
416	Miniature Pre-Set 100 kΩ	147/321/100k
419	Miniature Pre-Set 5 MΩ	147/321/5M
427	Rubber Foot	203/334
432	Handle Assy.	203/335
436	Handle Cover	203/336
440	Motor Pulley 50 c/s	203/355
444	Bush	203/356
448	Temp. Stop Lever	203/357
452	Operating Arm	203/358
456	Shouldered Screw	203/359
460	Deck Fixing Bracket	203/361
464	Link	203/362
469	Push Rod	203/363
477	Amplifier Screen	203/365
481	Screen	203/366
485	Erase Head Mounting Bracket	203/386
489	Plastic Bearing	123/391
493	Spring Set Assy.	127/399/42
494	Spring Set Assy.	127/399/43
495	Spring Set Assy.	127/399/44
508	Head Fulcrum	203/401
524	Consecutive Switch Bracket	203/444
528	Micro Switch Mounting Plate	203/453
532	Micro Switch	203/454
536	Ch./Hd. Screw	127/468/1
540	Dustshield	203/484
544	Plastic Head Cover	127/490
552	Locking Flap L.H.	203/493L
556	Locking Flap R.H.	203/493R
560	Brake Flap L.H.	203/494L
564	Brake Flap R.H.	203/494R
568	Side Bearing Plate	203/495L
572	Side Bearing Plate	203/495R
576	Speaker Fixing Clamp	203/499
579	Stop Bracket	203/503
588	Shaft	203/531
592	Swivel Bracket	203/533

When ordering, quote description and Part No. only

Ref.	Description	Part No.
596	Adjusting Plate	203/534
601	Tag Strip Bracket	203/588
603	Exp. Spring	203/609
605	Exp. Spring	203/610
608	Exp. Spring	203/611
611	Exp. Spring	203/612
614	Exp. Spring	203/613
617	Exp. Spring	203/614
620	Exp. Spring	203/615
623	Exp. Spring	203/616
626	Exp. Spring	203/617
629	Exp. Spring	203/618
632	Exp. Spring	203/619
635	Exp. Spring	203/620
638	Exp. Spring	203/621
643	Torsion Spring	203/622
655	Torsion Spring	203/626
660	Leaf Spring	203/629
663	Leaf Spring	203/630
665	Bow Spring	141/631
666	Compr. Spring	203/631
669	Compr. Spring	203/632
672	Compr. Spring	203/633
675	Compr. Spring	203/634
698	Push Bar	203/641
702	Push Rod	203/642
706	Swivel Bracket	203/643
710	Guide Bracket	203/644
	WASHERS	
781	2.2×5.5×0.5 Steel	9096
782	3.2×7×0.5 Steel	9031
783	4.3×9×0.8 Steel	9015
784	5.3×11×1 Steel	9012
787	2.2×4.5×0.5 Presspan ..	9162
788	3.2×6×0.5 Steel	9157
789	4.3×8×0.5 Steel	9160
792	2.2×5.5×0.5 Presspan ..	9164
795	2.8×6.5×0.5 SRBP	9167
798	3.2×7.5×1 Steel	9017
799	3.2×9×0.75 Steel	9065
801	3.2×11×1 Steel	9002
804	3.7×6×1 SRBP	9168
807	4.2×9×0.5 Simrit	9030
808	4.2×12×1.25 Steel	9014
812	5.2×10×0.1 SRBP	1165
815	6.1×12×0.5 SRBP	9020
818	6.2×10×0.5 Simrit	9016
821	8.2×13×0.2 Simrit	9019
822	8.2×13×0.5 Simrit	1184
823	8.2×13×1 Simrit	9011
824	8.2×14×0.5 SRBP	1166
825	8.2×15×0.2 SRBP	9022

Ref.	Description	Part No.
	S/P WASHERS	
831	2.2 mm	9045
832	3.2 mm	9095
833	4.3 mm	9027
838	Spring Washer Curved A3 ..	9140
846	Circlip 4	1256
847	Circlip 5	1258
849	Gripring 2	1261
850	Gripring 3	1260
851	Gripring 4	1264
852	Gripring 5	1265
853	Gripring 6	1263
	CH./HD. SCREWS	
860	M2×8 Steel	1415/S
861	M2×10 Steel	1310/S
865	M2.6×4 Steel	1378/S
869	M3×3 Steel	1420/S
870	M3×4 Steel	1051/S
871	M3×5 Steel	1008/S
872	M3×6 Steel	1035/S
873	M3×8 Steel	1377/S
874	M3×10 Steel	1053/S
875	M3×15 Steel	1055/S
876	M3×20 Steel	1313/S
877	M3×45 Steel	1033/S
878	M3×50 Steel	1315/S
882	M4×5 Steel	1353/S
883	M4×5 Brass N/P	1353/BNP
884	M4×6 Steel	1056/S
885	M4×10 Steel	1384/S
886	M4×10 Brass N/P	1384/BNP
887	M4×35 Steel	1361/S
888	M4×50 Steel	1049/S
893	Hex/Hd. Screw M3×4 Steel ..	1043/S
897	Fil/Hd. Screw M3×7 Brass N/P	1036/BNP
	GRUB SCREWS	
898	Flat ended M2.6×6 Brass ..	1316/B
899	Cupped M3×6..	1407
900	Pointed M3×6..	1409
	CH./HD. SELF TAPPING SCREWS	
904	Z2.9×6.5 Steel	1428/S
905	S2.9×9.5 Steel	1430/S
	CK./HD. SCREWS	
909	M3×5 Steel	1393/S
910	M4×8 Steel	1411/S
911	M4×10 Steel	1331/S
916	Instr.Hd. Screw M3×8 Brass N/P	1371/BNP
920	Half Nut M2.6 Steel	1229/S

Ref.	Description	Part No.
921	Half Nut M3 Steel	1225/S
922	Half Nut M4 Steel	1217/S
926	Full Nut M2 Steel	1244/S
927	Full Nut M3 Steel	1227/S
928	Full Nut M4 Steel	1240/S
929	Full Nut M5 Steel	1228/S
	SPACERS	
939	3.2×12×12.3 Steel	7553
940	3.2×12×8.8 Steel	7554
941	5.1×8×4.7 Alu.	7557
942	4.1×8×6 Alu.	7558
944	4.1×5.6×16 Steel	7556
947	3.3×5.3×7 Steel	7513
978	Valve Base (ECL 86)	2093
979	Valve Base (ECC 83)	2094
980	Valve Base (EM84)	2095
987	Cabinet Hinge, Upper Half ..	7014/1
988	Cabinet Hinge, Lower Half ..	7014/2
989	Cabinet Lock, Upper Half ..	7047/1
990	Cabinet Lock, Lower Half ..	7047/2
999	Grommet	5025
	ELECTROLYTIC CAPACITORS WIRE ENDED	
1017	8 µF 350/385V	KEL-8/350
1019	10 µF 12/15V	KEL-10/12
1021	50 µF 12/15V	KEL-50/12
	ELECTROLYTIC CAPACITORS LUG FIXING	
1030	8+50+50 µF 350/385V ..	KET-8+50+50/350
	POLYESTER FOIL CAPACITORS	
1037	4700 pF 125V	KPF-4700/125
1038	0.047 µF 125V	KPF-0.047/125
1039	0.1 µF 125V	KPF-0.1/125
1047	0.022 µF 400V	KPF-0.022/400
1048	0.1 µF 400V	KPF-0.1/400
1055	1000 pF 1000V	KPF-1000/1000
	POLYSTYRENE CAPACITORS	
1063	100 pF ±10% 125V ..	KPP-100/125/10
1064	680 pF ±10% 125V ..	KPP-680/125/10
1065	820 pF ± 5% 125V ..	KPP-820/125/5
1066	1000 pF ±10% 125V ..	KPP-1000/125/10
1067	1800 pF ± 5% 125V ..	KPP-1800/125/5
1068	2700 pF ± 5% 125V ..	KPP-2700/125/5
1069	3300 pF ± 5% 125V ..	KPP-3300/125/5
1074	3300 pF ±10% 500V ..	KPP-3300/500/10

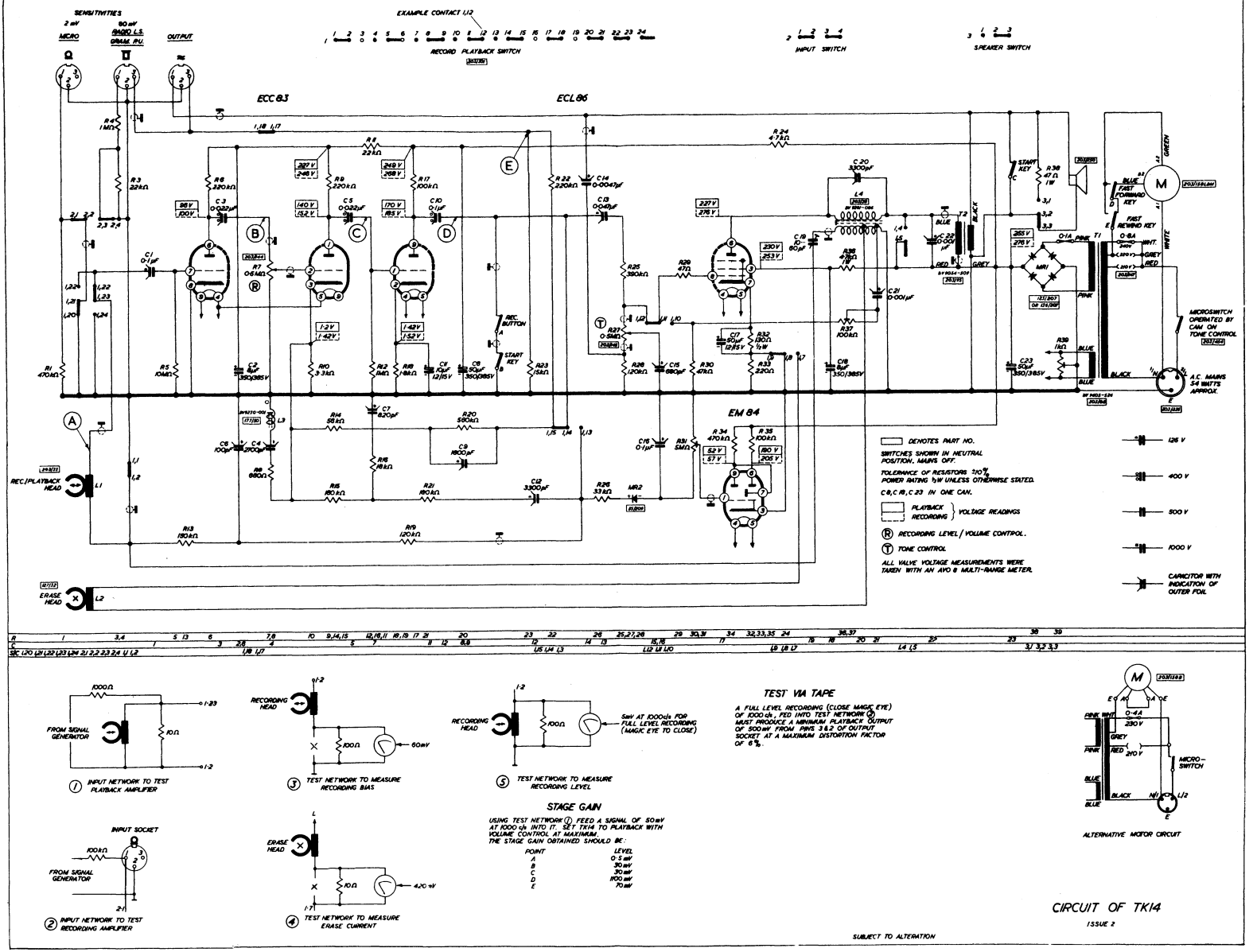
Tolerance of Resistors: ±10%
Power rating $\frac{1}{3}$W, except R32 ($\frac{1}{2}$W) and R36 and R38 (1W).

NOTES

ERRATA

It is regretted, that this Service Manual for TK14 recorders contains the following errors:

Page 5	The two graphs of the response of the Playback and Recording Amplifiers are shown reversed. The top graph refers to the Recording Amplifier, the bottom graph to the Playback Amplifier.
Page 6	Section 5.1.7. The end of the first and beginning of the second line should read: " . . . .to the Radio L.S./Gram. P.U. input (using Test Network 2).
Page 12	The arrows to pins 1 and 2 of the Mains Socket are shown reversed.
Page 18	The L.H. clutch of some models is now fitted with a spring (Part Number 203/46) and a washer (Part Number 9048) between the upper and the lower clutch half.
Page 19	The Part Number of the Position Indicator Drive Belt has now been changed to 203/222.
Page 20	The D.C. Resistance of the Output Transformer Secondary is 1.4 Ohms, not 14 Ohms as shown. The Part number of the Oscillator Coil is 203/38, not 203/28 as shown.
Circuit Diagram	The TK14 is fitted with Mains Voltage Tappings of 210V and 230V (nominal), not 210V and 240V as shown.



1 INPUT NETWORK TO TEST PLAYBACK AMPLIFIER

3 TEST NETWORK TO MEASURE RECORDING BIAS

5 TEST NETWORK TO MEASURE RECORDING LEVEL

TEST VIA TAPE

A FULL LEVEL RECORDING (CLOSE MAGIC EYE) OF 1000 c/s, FED INTO TEST NETWORK ⑤ MUST PRODUCE A MINIMUM PLAYBACK OUTPUT OF 500 mV FROM PINS 3 & 2 OF OUTPUT SOCKET AT A MAXIMUM DISTORTION FACTOR OF 6%.

2 INPUT NETWORK TO TEST RECORDING AMPLIFIER

4 TEST NETWORK TO MEASURE ERASE CURRENT

STAGE GAIN

USING TEST NETWORK ① FEED A SIGNAL OF 50mV AT 1000 c/s INTO IT. SET TK14 TO PLAYBACK WITH VOLUME CONTROL AT MAXIMUM. THE STAGE GAIN OBTAINED SHOULD BE:

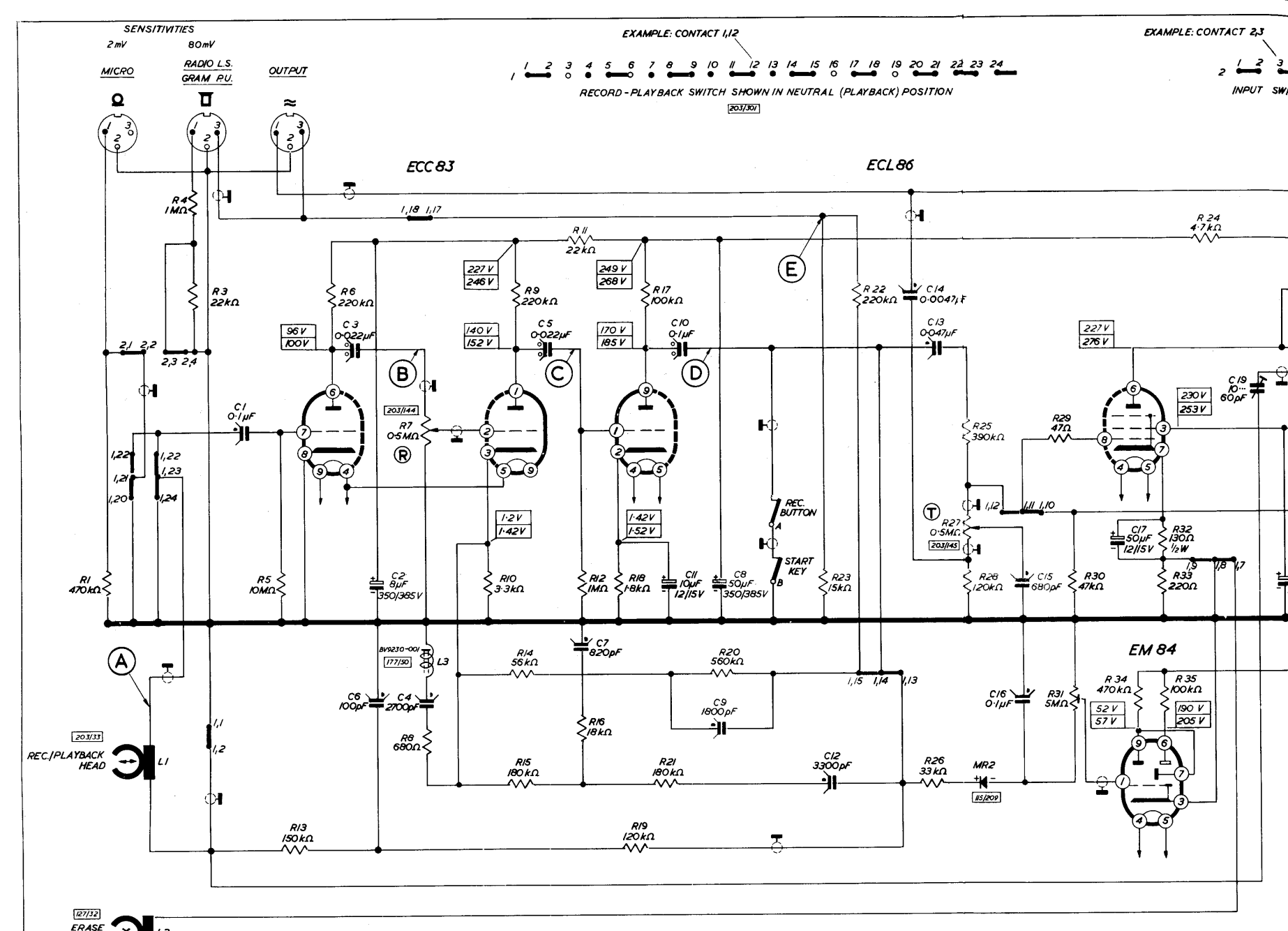
POINT	LEVEL
A	0·5 mV
B	30 mV
C	30 mV
D	1100 mV
E	70 mV

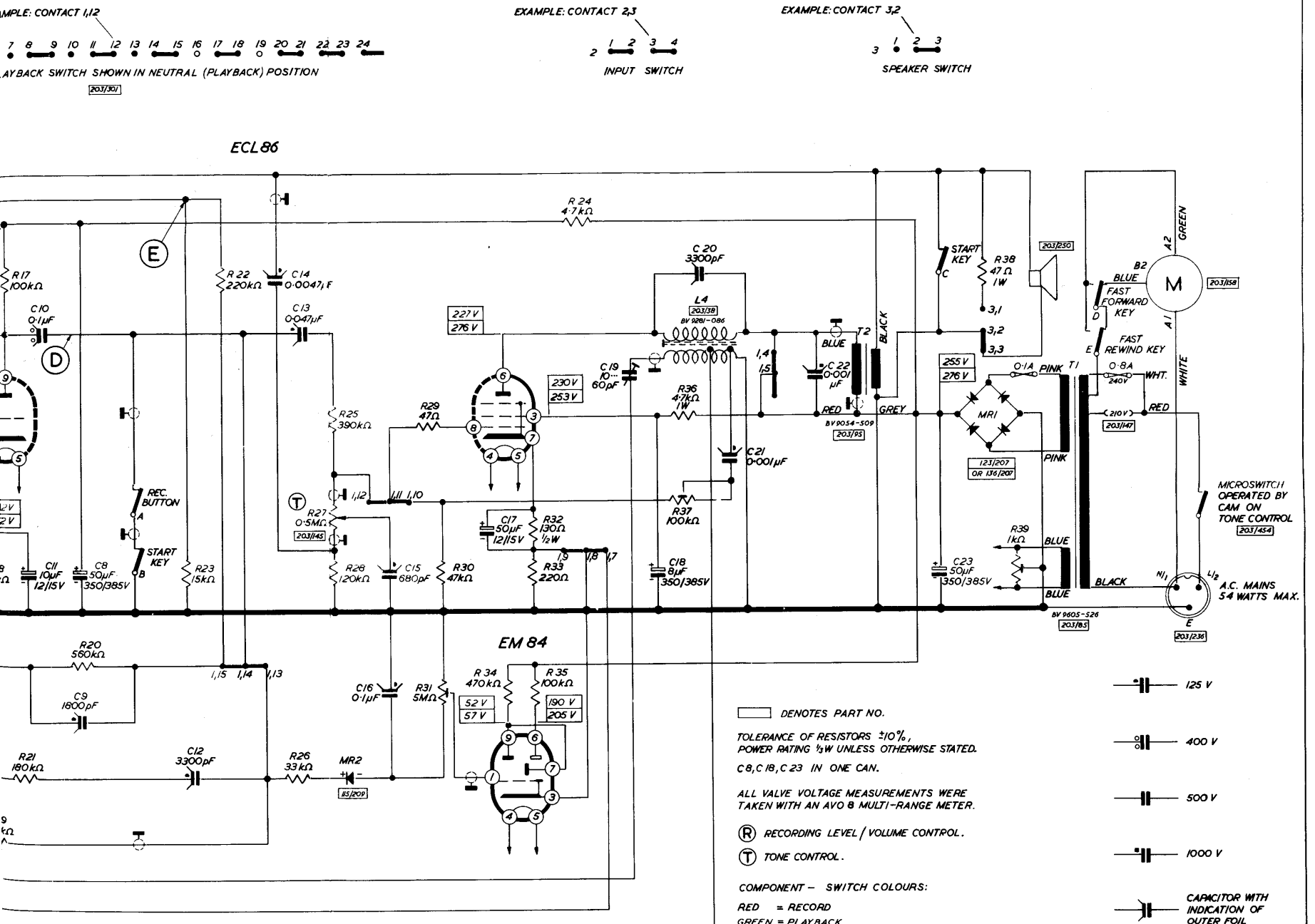
ALTERNATIVE MOTOR CIRCUIT

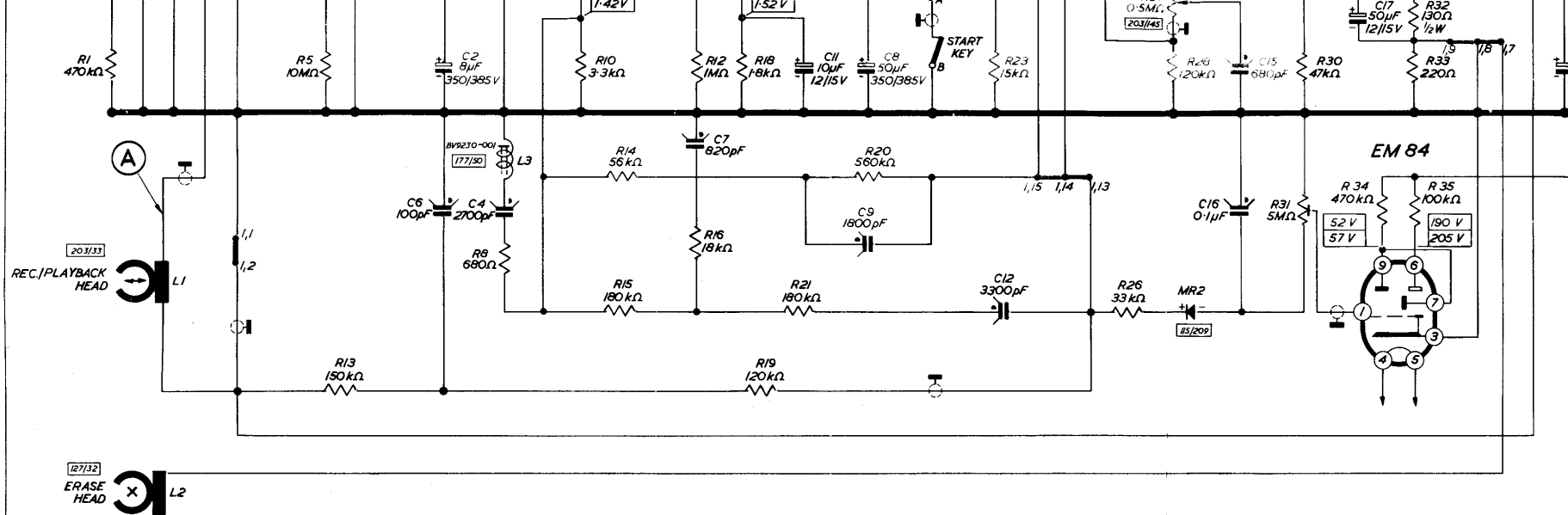
CIRCUIT OF TK14

ISSUE 2

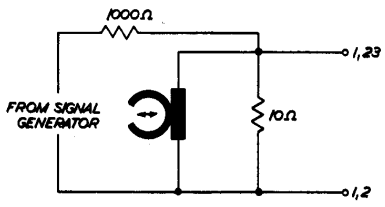
SUBJECT TO ALTERATION


SENSITIVITIES
2 mV
80 mV
MICRO
RADIO L.S.
GRAM P.U.
OUTPUT
EXAMPLE: CONTACT 1,12
RECORD - PLAYBACK SWITCH SHOWN IN NEUTRAL (PLAYBACK) POSITION
203/301
EXAMPLE: CONTACT 2,3
INPUT SWI
ECC 83
ECL 86
EM 84
R4 1MΩ
R3 22kΩ
R11 22kΩ
R6 220kΩ
R9 220kΩ
R17 100kΩ
R24 4·7kΩ
R22 220kΩ
C14 0·0047µF
C13 0·047µF
C3 0·022µF
C5 0·022µF
C10 0·1µF
C1 0·1µF
R7 0·5MΩ
R25 390kΩ
R29 47Ω
R27 0·5MΩ
C17 50µF 12/15V
R32 130Ω ½W
R33 220Ω
C19 10…60pF
R1 470kΩ
R5 10MΩ
C2 8µF 350/385V
R10 3·3kΩ
R12 1MΩ
R18 18kΩ
C11 10µF 12/15V
C8 50µF 350/385V
R23 15kΩ
REC. BUTTON
START KEY
R28 120kΩ
C15 680pF
R30 47kΩ
C7 820pF
R14 56kΩ
R20 560kΩ
C9 1800pF
R16 18kΩ
C6 100pF
C4 2700pF
R8 680Ω
L3
BV9230-001
177/50
L1
REC./PLAYBACK HEAD
203/33
R15 180kΩ
R21 180kΩ
C12 3300pF
R26 33kΩ
MR2
115/209
C16 0·1µF
R31 5MΩ
R34 470kΩ
R35 100kΩ
R13 150kΩ
R19 120kΩ
127/32
ERASE

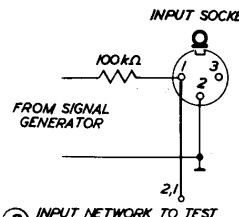

EXAMPLE: CONTACT 1,12
7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
PLAYBACK SWITCH SHOWN IN NEUTRAL (PLAYBACK) POSITION
203/301
EXAMPLE: CONTACT 2,3
1 2 3 4
2
INPUT SWITCH
EXAMPLE: CONTACT 3,2
1 2 3
3
SPEAKER SWITCH
ECL86
EM 84
R17 100kΩ
C10 0·1μF
R22 220kΩ
C14 0·0047μF
C13 0·047μF
R24 4·7kΩ
C20 3300pF
L4 203/118 BV 9281-086
227 V
276 V
230 V
253 V
R29 47Ω
R25 390kΩ
C19 10-60pF
R36 4·7kΩ 1W
C21 0·001μF
C22 0·001μF
T2
BLUE
BLACK
RED
GREY
BV 9054-509
203/95
START KEY
R38 47Ω 1W
3,1
3,2
3,3
203/250
255 V
276 V
MR1
123/207 OR 136/207
0·1A
PINK
T1
0·8A
240V
WHT.
210V
203/147
RED
A2 GREEN
B2 BLUE
FAST FORWARD KEY
FAST REWIND KEY
A1 WHITE
M
203/158
MICROSWITCH OPERATED BY CAM ON TONE CONTROL
203/454
REC. BUTTON
START KEY
R23 15kΩ
C11 10μF 12/15V
C8 50μF 350/385V
R27 0·5MΩ
203/145
R28 120kΩ
C15 680pF
R30 47kΩ
C17 50μF 12/15V
R32 130Ω ½W
R33 220Ω
R37 100kΩ
C18 8μF 350/385V
R39 1kΩ
C23 50μF 350/385V
BLUE
BLACK
BV 9605-526
203/185
N1 L2
E
203/236
A.C. MAINS 54 WATTS MAX.
R20 560kΩ
C9 1600pF
R21 180kΩ
C12 3300pF
R26 33kΩ
MR2
115/209
C16 0·1μF
R31 5MΩ
R34 470kΩ
R35 100kΩ
52 V
57 V
190 V
205 V
DENOTES PART NO.
TOLERANCE OF RESISTORS ±10%, POWER RATING ⅓W UNLESS OTHERWISE STATED.
C8, C18, C23 IN ONE CAN.
ALL VALVE VOLTAGE MEASUREMENTS WERE TAKEN WITH AN AVO 8 MULTI-RANGE METER.
(R) RECORDING LEVEL / VOLUME CONTROL.
(T) TONE CONTROL.
COMPONENT – SWITCH COLOURS:
RED = RECORD
GREEN = PLAYBACK
125 V
400 V
500 V
1000 V
CAPACITOR WITH INDICATION OF OUTER FOIL



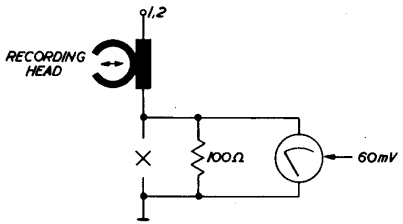
R	1	3,4	5 13	6	7,8	10	9,14,15	12,16,11 18 19 17 21	20	23	22	26	25,27,28	29 30 31	34	32,33,35 24
C	1	3	6 2 4	5	7	11	10	8 9	12	14	13	15 16	17	19	18	
S/C	1,20 1,21 1,22 1,23 1,24 2,1 2,2 2,3 2,4 1,1 1,2	1,18 1,17							1,15 1,14 1,13			1,12 1,11 1,10		1,9 1,8 1,7		



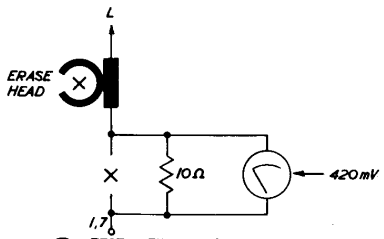
① INPUT NETWORK TO TEST PLAYBACK AMPLIFIER



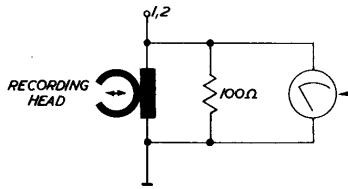
② INPUT NETWORK TO TEST RECORDING AMPLIFIER



③ TEST NETWORK TO MEASURE RECORDING BIAS



④ TEST NETWORK TO MEASURE ERASE CURRENT



⑤ TEST NETWORK TO MEASURE RECORDING LEVEL

STAGE GAIN

USING TEST NETWORK ① FEED A SIGNAL OF 50mV AT 1000 c/s INTO IT. SET TK14 TO PLAYBACK WITH VOLUME CONTROL AT MAXIMUM.
THE STAGE GAIN OBTAINED SHOULD BE:

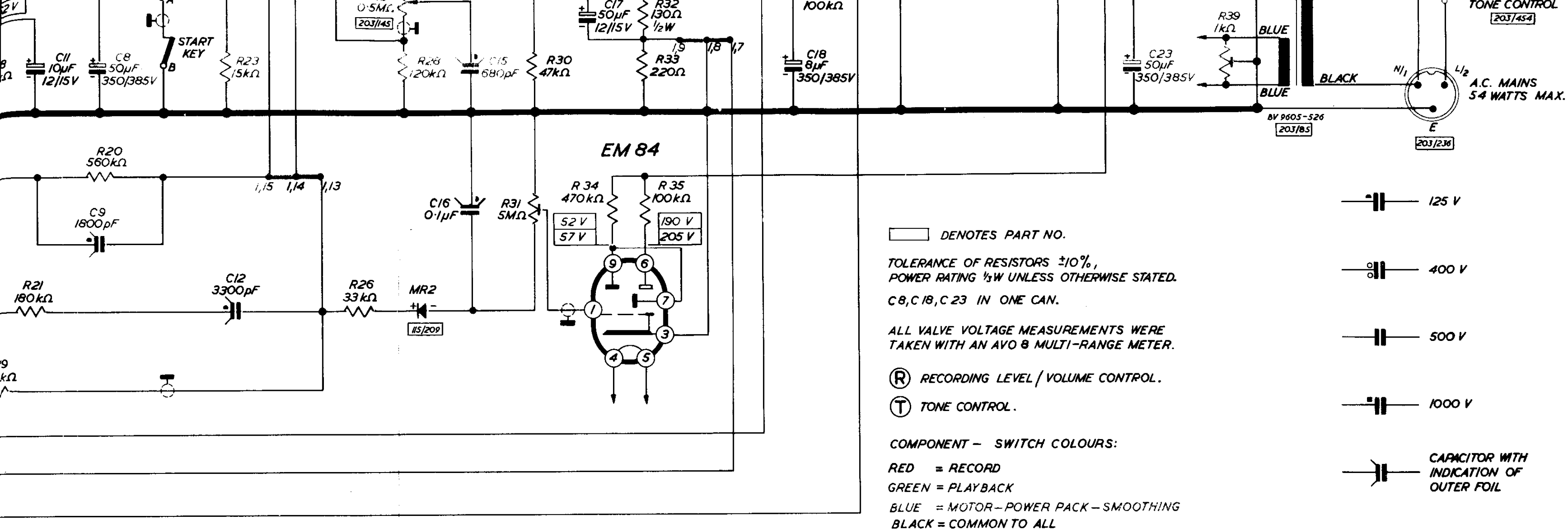
POINT	LEVEL
A	0·5 mV
B	30 mV
C	30 mV
D	1100 mV
E	70 mV

TEST VIA TAPE

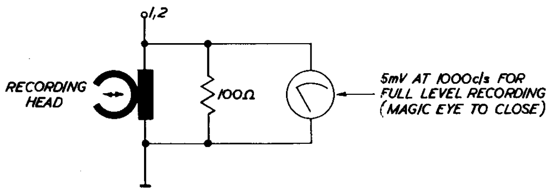
A FULL LEVEL RECORDING (O
OF 1000 c/s, FED INTO TEST
MUST PRODUCE A MINIMUM P
OF 500 mV FROM PINS 3 & 2
SOCKET AT A MAXIMUM DIST
OF 6%.

ORANGE = TEST NETWORK FOR RECO

VIOLET = TEST NETWORK FOR PLAY
AND STAGE GAIN.



R: 17 21 20 23 22 26 25,27,28 29 30 31 34 32,33,35 24 36 37 38 39
C: 11 10 8 9 12 14 13 15 16 17 19 18 20 21 22 23
S/C: 1,15 1,14 1,13 1,12 1,11 1,10 1,9 1,8 1,7 1,4 1,5 3,1 3,2 3,3



⑤ TEST NETWORK TO MEASURE RECORDING LEVEL

STAGE GAIN

USING TEST NETWORK ① FEED A SIGNAL OF 50mV AT 1000 c/s INTO IT. SET TK14 TO PLAYBACK WITH VOLUME CONTROL AT MAXIMUM.
THE STAGE GAIN OBTAINED SHOULD BE:

POINT	LEVEL
Ⓐ	0·5mV
Ⓑ	30mV
Ⓒ	30mV
Ⓓ	1100mV
Ⓔ	70mV

TEST VIA TAPE

A FULL LEVEL RECORDING (CLOSE MAGIC EYE) OF 1000 c/s, FED INTO TEST NETWORK ② MUST PRODUCE A MINIMUM PLAYBACK OUTPUT OF 500mV FROM PINS 3 & 2 OF OUTPUT SOCKET AT A MAXIMUM DISTORTION FACTOR OF 6%.

ORANGE = TEST NETWORK FOR RECORDING AMPLIFIER.

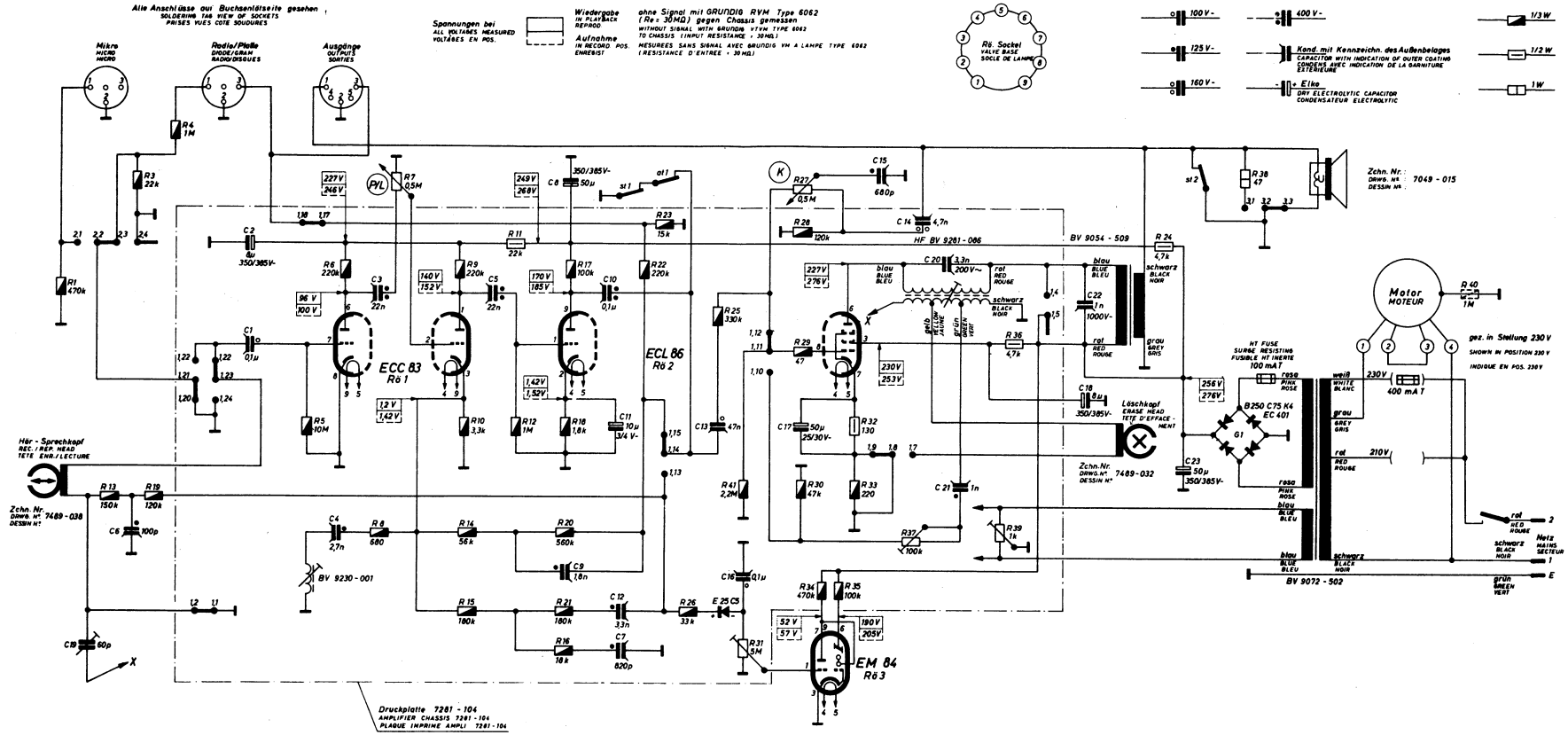
VIOLET = TEST NETWORK FOR PLAYBACK AMPLIFIER AND STAGE GAIN.

ENTER MODIFICATION AND SERVICE DETAILS HERE

CIRCUIT OF TK14

ISSUE I

SUBJECT TO ALTERATION



Motor MOTEUR	TK 14 LG	TK 14 L H	
	7882-099	7882-132	7882-193
1	weiß WHITE BLANC	weiß WHITE BLANC	
2	violett VIOLET VIOLET	grün GREEN VERT	
3	blau BLUE BLEU	blau BLUE BLEU	
4	rosa PINK ROSE	rot RED ROUGE	
Widerstand R 40 RESISTOR R 40 RESISTANCE R 40	1 MΩ	——	

5874

1465 He

Kontakte	2(1..4)	1(20..24)	1(1,2)	1(17,18)	st1 at1 1(13,14,15)	1(10,11,12)	1(7,8,9)	1(4,5)	3(1,2,3)	CONTACTS
R	1 13 3,19	2 4	5 6 8 7	9,10,14,15 11,12	20,21,16,18,17 22 23 26 25	41 31	27,26,29,30,34 35 32 33	37 39 36	24 38 40	TR
C	19 6	2,1	4 3	5 9,8	10,11,12,7 13 16	17 15	14 20 21	22,18 23		C

2 Eingangsumschalter
INPUT SELECTOR
SELECTEUR D'ENTREES
1 2 3 4

3 Lautsprecherschalter
SPEAKER SWITCH
INTERRUPTEUR HAUT PARLEUR
1 2 3

Beispiel: Kontakt 1,8
EXAMPLE: CONTACT 1,8
EXEMPLE: CONTACT 1,8

1 Aufn./Wdg. Schalter
REC./PLAYBACK SWITCH
COMMUTATEUR ENR./LECTURE
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Kontaktfedersätze CONTACT SETS JEUX DE CONTACT	1	2	3
Aufnahmetaste at RECORDING BUTTON TOUCHE D'ENREGISTR.	r		
Starttaste st START BUTTON TOUCHE START	r	r	a

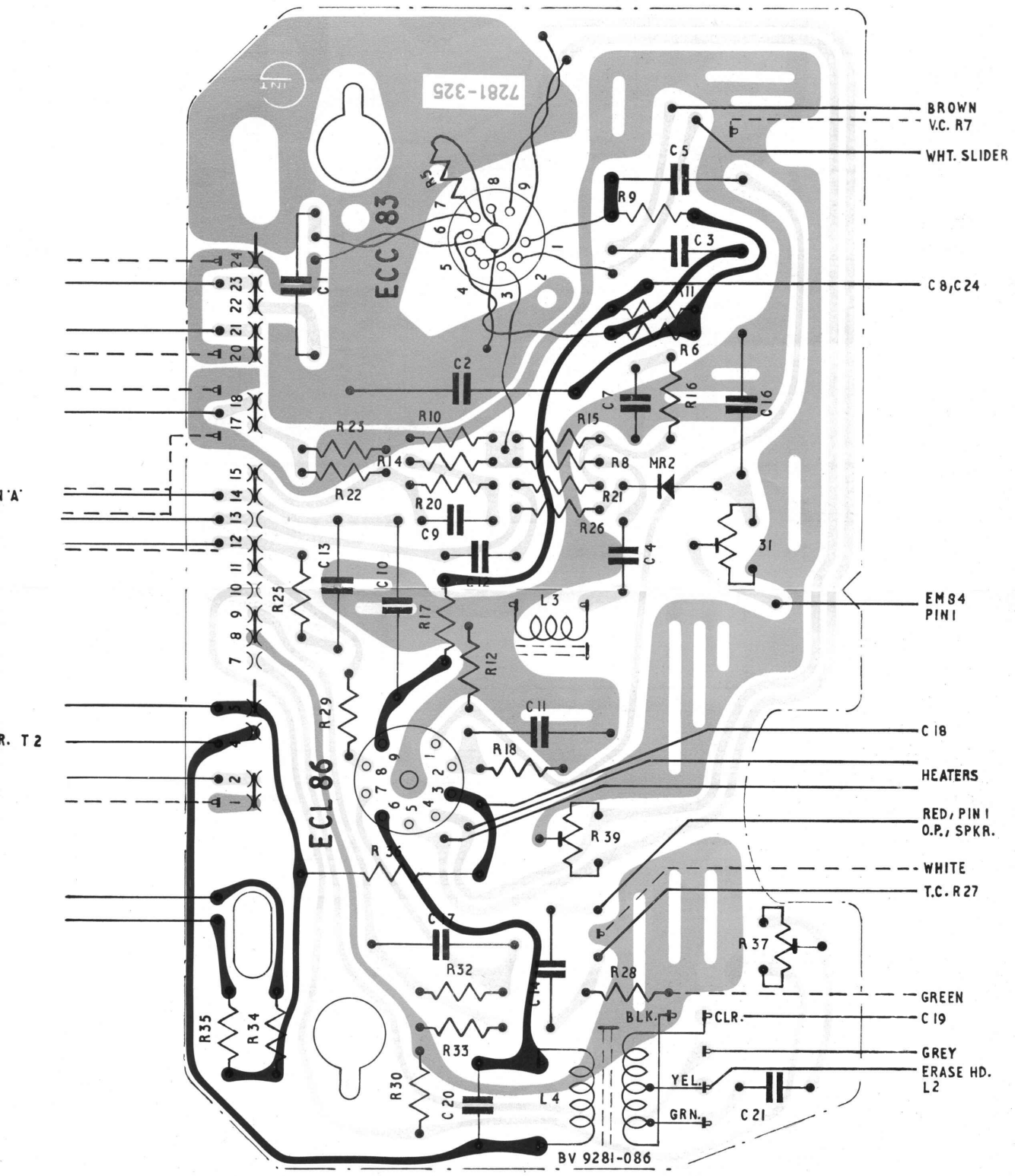
r = Ruhekontakt
r = BREAK CONTACT
r = CONTACT DE REPOS

a = Arbeitskontakt
a = MAKE CONTACT
a = CONTACT DE TRAVAIL

GRUNDIG WERKE GMBH FÜRTH (BAY.)

TK 14 L E

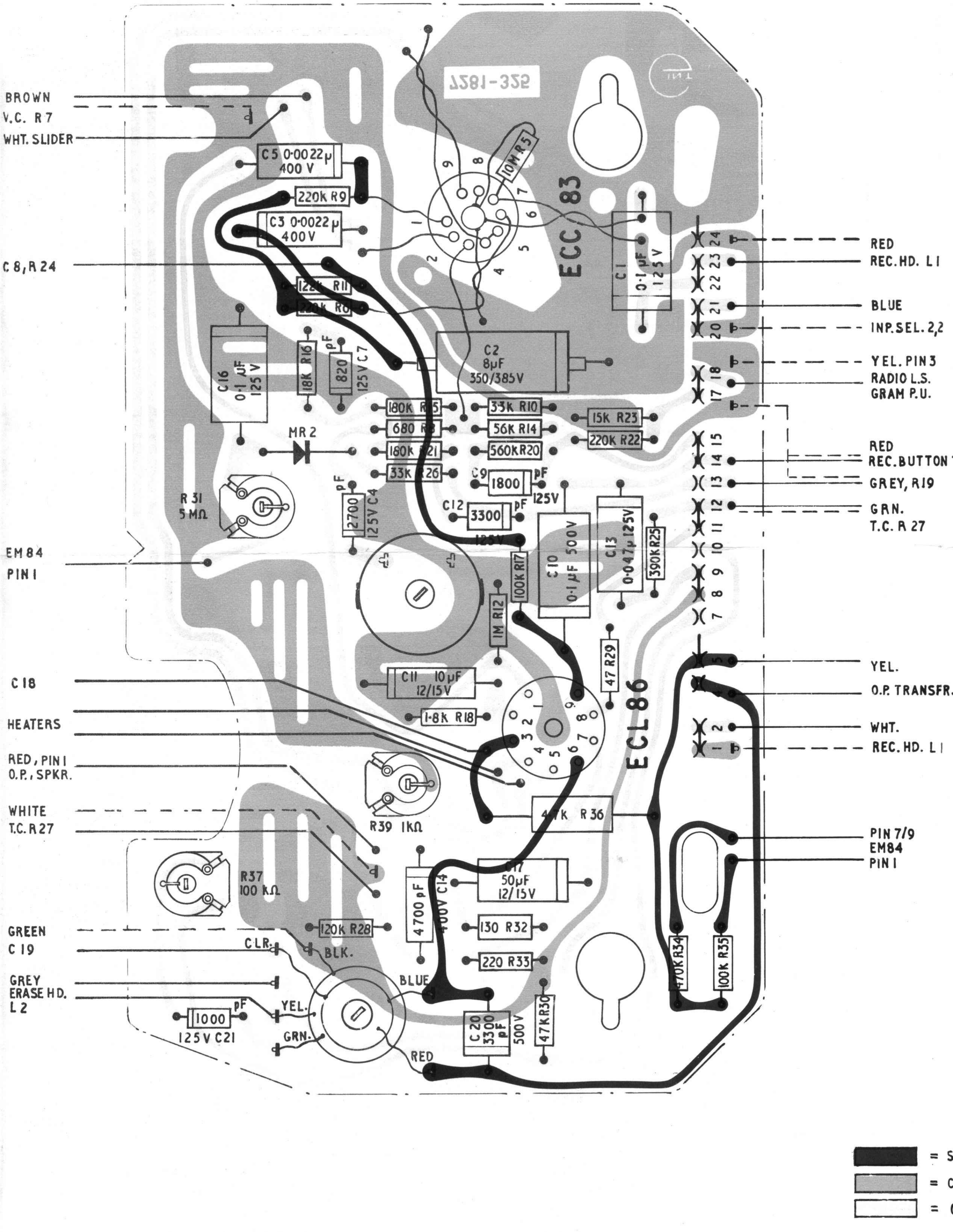
(39-5114-2000.02)



SUPPLY VOLTAGE

COMMON (CHASSIS)

OTHER CONNECTIONS



BROWN
V.C. R7
WHT. SLIDER
C 8, R 24
EM84
PIN 1
C18
HEATERS
RED, PIN 1
O.P. SPKR.
WHITE
T.C. R27
GREEN
C 19
GREY
ERASE HD.
L 2
RED
REC. HD. L1
BLUE
INP. SEL. 2,2
YEL. PIN 3
RADIO L.S.
GRAM P.U.
RED
REC. BUTTON
GREY, R19
GRN.
T.C. R 27
YEL.
O.P. TRANSFR.
WHT.
REC. HD. L1
PIN 7/9
EM84
PIN 1
C5 0·0022μ 400 V
220K R9
C3 0·0022μ 400V
122K R11
220K R6
C16 0·1 μF 125 V
18K R16
820 pF 125 V C7
C2 8μF 350/385V
ECC 83
10M R5
C1 0·1 μF 125 V
180K R15
680 R3
160K R21
33K R26
33K R10
56K R14
560K R20
15K R23
220K R22
MR 2
C9 1800 pF 125V
C12 3300 pF 125V
2700 pF 125V C4
R 31 5 MΩ
C10 0·1 μF 500V
C13 0·047μ 125V
390K R25
100K R17
1M R12
47 R29
C11 10μF 12/15V
1·8K R18
ECL 86
47K R36
R39 1kΩ
R37 100 kΩ
C17 50μF 12/15V
4700 pF 400V C14
120K R28
130 R32
220 R33
47K R30
470K R34
100K R35
C20 3300 pF 500V
1000 pF 125V C21
CLR.
BLK.
BLUE
YEL.
GRN.
RED
= S
= C
= (