ELECTRIC & MUSICAL INDUSTRIES LTD.

Records & International Division.

"STEREOSONIC"/4-TRACK MIXER TYPE REDD.37.

Contents List.

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Reference REDD.M37/2.

Corrected Aug. 1963
for P.M.N.1 & 2.

ELECTRIC & MUSICAL INDUSTRIES LTD.

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"STEREOSONIC"/4-TRACK MIXER ASSEMBLY TYPE REDD.37.

Summary.

For the prototype Mixer, Serial No. 58070A, reference should be made to the functional diagram Drawing REDD.C26/A1/2 and the simplified version Drg. REDD.C26/C2/2; also to REDD.C26/B4 and B5/2 for modification details. See Sheet 1 of Drawing List dated 18.12.62.

The next 2 Mixers, Serial Nos. 58121A & B, are covered by a new functional diagram, Drg. REDD.37/A3/2, and reference should also be made to Drgs. REDD.C26/C2/2 and B5/2.

This description explains how all methods of tape recording at present envisaged should be used with the new equipment. The various circuit functions are described in some detail, together with notes on the maintenance and operation of the equipment.

In any complex equipment of this nature there are a large number of alternative methods of solving the design problems. Some of these alternatives are mentioned, and reasons are given as to why they are not adopted.

General Description.

This write-up covers only the Mixer assembly, which consists of 5 transportable units which fit together to form a desk, and which contain all the necessary controls, low level amplifiers and level indicators to meet the full requirements of balance and control in modern tape recording technique.

For the purposes of this description, it is assumed that all other equipment is available. This other equipment consists of a selection of normal and stereo microphones, together with the necessary stands, booms, cables, individual microphone power units for condenser mics. or multiple mic. power units such as the German or REDD.46 types, tape recorder(s), and monitor and studio playback loudspeakers with built-in power amplifiers.

Recording - Possible Methods.

1. Multi-microphone single track technique, in conjunction with any normal tape machine.

2. Combinations of stereo and single microphones, in conjunction with any existing tape recorder, (normally using two tracks on $\frac{1}{4}$" tape).

Continued.....

3. As above but using up to 4-track recording, thus permitting post-recording balancing and giving more satisfactory transfer to stereo and single track master tapes.

4. Multi-microphone monaural technique, recording, for example, four sections of an orchestra simultaneously on four tracks, thus permitting post-recording balancing.

5. As above, but recording the tracks in sequence, one or more at a time, thus avoiding the multiple transfer processes and consequent deterioration of quality, which now occur on certain "pop" recordings.

(There are many other possible variations such as recording the orchestra backing on the first track and then recording three attempts at the vocal on the remaining three tracks, thus permitting the final tape to be made by selecting the best sections of the vocal from these three tracks).

Transfer.

When connected to a suitable existing tape machine, the equipment is capable of making the necessary transfer from 1" wide 4-track tape to $\frac{1}{4}$" wide master tape, both from monaural and stereo. Naturally, the equipment is unnecessarily complex for this purpose, but it is thought that this feature will be of considerable use for those centres where there is sufficient time between recording sessions for the equipment to be used for both tasks.

Physical Shape and Size.

The mixer desk is somewhat larger than that for the Stereo/Duo/Mono Equipment Type 17, and all 5 of its units contain amplifiers, etc. As before, an arm-rest is provided and the design is such that a studio standard of comfort is provided for the operator on location.

Instead of the slightly sloping desk used on the Type 17, the top of the desk is completely flat. This simplifies manufacturing problems, and also has the advantages of giving complete freedom from obstruction (an important point for stereo recording) and removing the tendency for musical scores to slide off.

The overall size of the desk assembly, excluding the arm rest, is 58$\frac{1}{2}$" wide by 24" front-to-back, by 31" high.
(1490 mm x 610 mm x 790 mm).

Weight approx. 750 lbs.

Continued.....

Design Considerations.

For 3 or 4-track work, special precautions have been taken against underloading any of the magnetic tracks, as this would be sure to result in an unsatisfactory signal-to-noise ratio due to the extra transfer process involved.

The main problem in the design of this type of equipment is to decide what facilities can be omitted without detracting from the usefulness of the gear. It is desirable to make the equipment as flexible as possible in its uses, but this means that many more switches, plugs and sockets would have to be provided than would otherwise be the case, with the result that maintenance and operational problems would become acute. Also, the more flexible the equipment is made, the greater is the danger that it will be mis-used unintentionally, such as by the mis-matching of circuits.

A large number of additional or alternative possibilites were considered and some of these are mentioned below. It is hoped that the design finally chosen will prove to be a reasonable compromise, and will adequately meet all requirements. The main decision affecting the simplification of the equipment was to adopt a convention allotting definite uses to each of the four tracks, instead of allowing them to be used indiscriminately. This is also desirable so as to prevent possible confusion in the transfer rooms during the process of making the $\frac{1}{4}$" master tape from the 1" 4-track tape.

For stereo purposes, the uses allotted to the four tracks are determined by the fact that one of the main design aims of the equipment is that it should produce a tape from which both the stereo and mono master tapes can be made. Consequently, anything which detracts from the likelihood of doing this must be rejected. With the main stereo tracks on the outside edges of a 1" tape, there would be a grave danger of the high frequency signals becoming out of phase due to "weaving " of the tape. It was therefore decided that the convention will be:-

Track I:- Main stereo left.

Track II:- Main stereo right.

Track III:- Auxiliary left.
Mono injection (towards left if applicable).

Track IV:- Auxiliary right.
Mono injection (towards right if applicable).

On a machine such as the BTR/2 or BTR/3, with the tape oxide facing away from the observer, Track I is the top track.

Continued.....

The use of the additional two tracks raises at least one entirely new concept. Consider the case when Tracks I and II are being used for the left and right hand stereo signals in the normal way, and a single microphone is being used to boost the woodwind, which is being recorded, let us say, on Track III. It is quite certain that the balance engineer and the producer will want to hear the woodwind in its correct angular position. It is therefore necessary to provide a pan-pot on the monitor circuit so that the signal from Track III can be correctly placed, and it is obviously necessary that a note should be made of the angular setting of this pan-pot, so that the correct position can be re-established during the making of the master tape.

LAP/AV. Sept., 1959.

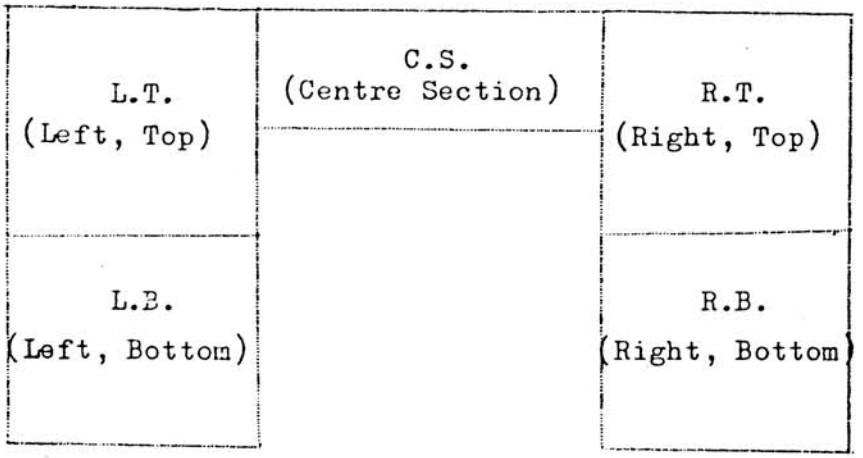
INTRODUCTION.

As a general introduction to the equipment, a description of the positions and functions of the various circuit elements and controls is now given. It is recommended that this should be read over again when inspecting the equipment for the first time.

The Mixer Assembly has been designed in a form which allows its elaborate circuit arrangements to be quickly set up to give a wide variety of uses, from simple cases using a small number of microphones and feeding one or more normal single track tape machines, to complex arrangements of multiple microphones feeding up to a maximum of four tracks on a suitable tape recorder. The system is designed so that the wide variety of operational features built into the equipment are under the immediate control of the recording operator by means of faders, switches and press buttons. Level indication of one, two, three or four tracks on individual meters is provided. A master level indicator shows the maximum signal in multi-track working, or is used as the normal level indicator in single track cases. via one of the others, ... Deleted by Page 2c.

It is inevitable that a design of this mature must lead to a very complex circuit schematic and it is essential that engineers and recording operators who use the equipment shall be very familiar with its basic arrangements. The following description has been written to elucidate its various functions and to simplify, as far as possible, the approach to the equipment in general use.

Continued.....



GENERAL ARRANGEMENT OF BOX UNITS - FRONT VIEW. See Dig. REDD. 37/D27 (deferred by Page 2c).

L.B. Contains: Mic. Amps. 1, 2, 3, 4.
Spare Amp. L.
P.L.I.'s I, II, III, IV and Highest Reading P.L.I.

L.T. Contains: "~~Mon.~~" Check" Amp. L. and "~~Mon.~~" Check" Amp. R.
"Test" Amp. L.
Echo Output Amp. 1 and Echo Output Amp. 2.
Talk-Back Mic. Amp.
Tone Generator Unit.

R.B. Contains: Mic. Amps. 5, 6, 7, 8.
Monitor Amp. L. and Monitor Amp. R.
Spare Amp. R.
"Test" Amp. R.

R.T. Contains: Inter Amps. I, II, III, IV and Line Amps. I, II, III, IV.

C.S. Contains: 4 ~~Peak~~ Level Indicator Meters.
~~Highest Reading Light Beam Level Indicator~~ Meter.
1 Talk-Back Microphone.

From the above details the general layout of the equipment units can be seen. Before continuing to the Input and Output Connections, "Patching" and Controls, the following points should be noted regarding the functions of these units.

The Mic. Amps. follow a logical sequenoe with their associated lines.

The "Test" and "Spare" amplifier positions are fully powered with input and output connections available on the "Patching" (Siemens socket) strips and are intended for auxiliary uses or test purposes, as their names suggest.

Continued.....

The four L.I.'s must be clearly understood to be associated with tape machine tracks, Thus, for example, with a 2-track machine, Tracks I and II would normally be used, L.I.'s I and II would indicate respectively these tracks.

The "Check" Amps. serve multiple purposes, i.e., Studio playback, Studio Talk-Back, Play-Back to Artiste's Headphones, and also are associated with checking facilities which are built into the equipment. L. and R. signify Left and Right, i.e., as they would normally be applied in stereo working.

The Monitor Amps. L. & R. are normally used to drive the power amps. in the recording room monitor loudspeakers.

The Inter Amps. and Line Amps. follow a logical sequence in the four Track Output circuits.

The Tone Generator output connection is available on the patching strip of Unit L.T. for auxiliary purposes, if required.

Connections, (on Tuchel Sockets).

1. Input Connections.

L.B. Nil.

L.T. M.1A and B. M.2A and B. M.3A and B. M.4 and M.4A.
(M.1 & 2 - A). (M.1 & 2 - B).
Echo Returns H.1 and H.2.

R.B. Nil.

R.T. M.5 and 5A. M.6A and B. M.7A and B. M.8A and B.
(M.7 & 8 - A). (M.7 & 8 - B).
Pickup Input L. Pickup Input R.
(Pickup Input L. and R.).
(Pickup input - designated O — switches to Studio P/B.
or "Check" circuits, e.g., for artiste's headphones).
External Talk-Back/Announce Mic. (8-Pole miniature Jones socket).
(Not yet fitted on Serial No. 58070A.

C.S. Tape Replay Inputs I, II. III, IV. (From "Line-Out" of tape machine
(Ditto I, II, and III, IV.).
(Head Current Measuring Inputs I, II & III, IV). (Applicable only to
BTR.3 - switched directly to Level Indicator circuits).

Continued.....

Connections, (on Tuchel Sockets), continued.

2. Output Connections.

L.B. Buzzer/Light plug only. (4-pin miniature Jones).

L.T. Echo Outputs 1 and 2, i.e., to echo chamber(s).
Studio P/B or "CHECK" "L". Studio P/B or "CHECK" "R".
(Ditto L AND R.).
Tone Generator 1 and 2. (Low level points for microphone channel tests).

R.B. Nil.

R.T. Monitor Feed "L". Monitor Feed "R".
(Ditto L and R).

C.S. Outputs of Line Amps. I, II, II, IV. (To "Line In" of tape machine).
(Ditto I, II and III, IV).
~~External Level Indicator Meter Connections I and II, III and IV.~~
~~(G.P.O. double jacks on Ser. No. 58070 A.~~
~~Tuchel double jacks on Ser. Nos.58121 A & B).~~
~~(Not applicable to Highest Reading P.L.I.).~~

The above are the actual input and output connections of the equipment. Note that connections shown in brackets, e.g., (M.1 & 2 - A), are double connectors in parallel with the appropriate pair of single connectors so that "Quad" cables may be used if required. These would normally be for stereo applications. The letter M, of course, signifies microphone connections.

The "Pick-Up" input points are for special purposes; for instance, it would be possible to play a stereo disc from a suitable pick-up arrangement into these points and so give full playback of the disc out to the studio.

The Tone Generator points 1 and 2 are for applying low level test signals to the microphone input sockets.

Patching Arrangements.

The following summary of "Patching" arrangements is intended to be studied in conjunction with the functional diagram of the equipment. The patching connectors are Siemens sockets which are laid out in such a way that appropriate circuit points may be coupled (i.e. "patched") by means of Siemens "U"-links. In general, it will be seen that where the words "to" or "from" do not occur, the connecting points may be regarded as not in the normal signal path of the equipment. e.g., "Spare" amplifier input and output, across which a U-link should obviously not be placed.

Note that "S & D" means "Sum and Difference" - i.e., the special devices for stereo microphone channels. These, along with "Shufflers" are not used in plain microphone channels, so that alternative patching arrangements are given in these cases.

Continued.....

L.B. Mic. Amps. 1, 2, 3, 4 Outputs to associated Tone Control Inputs,
Level Indicators I, II, III, IV Inputs from Selector Switch system.
~~Hi,hoot Roading P.L.I. Input (Test Point).~~
"Spare" Amp. L. - Input and Output.

L.T. M.1 and M.2 Tone Control Outputs to Mic. Faders.
OR M.1 and M.2 Tone Control Outputs to 1st S & D Inputs and
1st S & D Outputs to Mic. Faders.
"Test" Amp. L. - Input and Output.
Echo Returns, M.1 and M.2 to Echo Faders.
Check Amp. L. Input from Input Pads and Switching.
Check Amp. R. Input from Input Pads and Switching.
Tone Generator Output to Pad and Switching, (i.e., application of test tones to various points).

R.B. Mic. Amps. 5, 6, 7, 8 Outputs to associated Tone Control Inputs.
Monitor Amp. L. Input from Input Pads and Switching.
Monitor Amp. R. Input from Input Pads and Switching.
"Spare" Amp. R.-Input and Output.
"Test" Amp. R. - Input and Output.

R.T. M.7 and M.8 Tone Control Outputs to Mic. Faders.
OR M.7 and M.8 Tone Control Outputs to 1st S & D Inputs and
1st S & D Outputs to Mic. Faders.
Line Amp. Outputs I, II, III, IV. (These are parallel connections normally occupied by 200 ohm loading plug).

On Ser. Nos. 58121A & B:-

Outputs of Inter Amps. I, II, III, IV to Inputs of Main Faders.
(Permitting possible introduction of S. & D. circuits, Spreader, Shuffler).

C.S. M1, 2, 3, 4, 5, 6, 7,8 Fader Outputs to Main Combiners
(Note that attenuator pads, assembled inside special U-links, are normally introduced at this point).
OR M.1, M.2, M.7, M8 Fader Outputs to Spreaders to Shufflers to 2nd S. & D. to Main Combiners.
(Note that "Main Combiners" include Splitters and Pan Pots on M.3, 4, 5, 6.).

Main Combiner I, II, III, IV Step-Up Transformers to Inter Amps. I, II, III, IV Inputs.
Main Fader Outputs I, II, III, IV to Inverse Attenuators Inputs I,II,III, IV on Ser. No.58070A or to Track Combiners on Ser. Nos.58121A & B.
(Note that attenuator pads in U-links may be introduced at this point).

Continued.....

OR. In the case of simultaneous mono and 2-track stereo recording only, then on Track III only, Auxiliary Mono Step-Down Transformer to Inter Amp. III Input.

Main Fader III Output to Auxiliary Mono Attenuator
to Fixed Pad, III Input on Ser. No.58070A.
or to Track Combiner III Input on Ser. No. 58121A & B.

CONTROLS.

The following description of controls should again be studied in conjunction with the functional diagram. The controls are detailed according to the box in which they are located. There are no controls on Box Unit R.B.

Left Bottom.

Left Top. M.1, M.2, M.3A to B Switches - for choice between two microphones in alternative positions in the studio.

M.4 to 4A Switch and Attenuator - for switching in and controlling an extra microphone in parallel with M.4. (Two controls, i.e., Coupling Switch and Fine Pre-Set Attenuator.
Do not operate this switch unless there is a 200 ohm source connected to Input Socket M.4A).

M.1, M.2, M.3, M.4 Pre-Set Attenuators for adjustment of individual microphone levels.
M.1, M.2, M.3, M.4 Bass Lift, Straight Through, or Attenuator Switches (Bass Lift is for figure-of-8 condenser microphones).
For fixed Bass Lift, Straight Through, or Attenuated (10 dB) conditions on each microphone channel according to choice.
M.1, M.2, M.3, M.4 Top Lift, Top Cut Controls.
M.1, M.2, M.3, M.4 Bass Lift, Bass Cut Controls.

For adjustment of frequency responses of individual mic. channels according to choice. (Serial No. 58070A has fixed Tone Controls of the "Classic" type. Serial Nos. 58121 A & B have alternative plug-in Tone Controls, thus permitting the use of the "Classic" or "Pop" type if preferred. The range of both types is ± 10 dB in 2 dB steps.

Talk-Back/Tone Generator Switch.- to Push Buttons I, II, III, IV. (Also to 3 Talk-Back Push Buttons on Serial No. 58070A). For tests and recording tones or announcements etc. on tape tracks.

Continued.....

Echo Coupling Switch.

For switching EITHER two echo lines in series to both Echo Outputs (either of which can go to Echo Chamber).

OR Echo 1 Output to 1st Echo Chamber and Echo 2 Output to 2nd Echo Chamber, (or, of course, to a pair of loudspeakers in one Echo Chamber, or for normal and "tremulant" echo, etc)

Check Circuit Selector Switches.

For switching:-

(a). Studio P/B, Mono or Stereo.

(b). Studio Headphones for Artistes.

(c). Check circuit uses which allow checking of all Microphone Channels, Echo Send lines and Echo Return lines and Replay Lines I, II, III, IV - i.e., Line Out points from Tape Machine - all without disturbing the working conditions.

Gain Control. (Check Circuit/Studio L.S., etc.).

This is the means of controlling Studio Playback level or is used as a calibrated attenuator in the application of these circuits under "Check" conditions. The Check circuit has a maximum gain of 12 dB into an external 200 ohm load.

Check Circuit Coupling Switch.

3-way type fitted on Ser. No. 58070A,
giving L and R to L - Normal Stereo - L. and R. to both studio loudspeakers (or check circuits), according to choice. For various applications.

5-way type on Ser. Nos.58121A & B, giving
Both channels to L output (for mono Studio Play-Back of stereo recording,etc).
"Off", with both outputs disconnected from studio, terminated with 200 ohms, and fed to Auxiliary Monitor Switch, (for Checking purposes. Overall gain of Check circuit is then 12 dB).
Normal stereo operation.
"Off" but with outputs still connected to Studio P/B L.S.'s (So that Talk-Back to studio still operates).
Both channels to R output (for quick comparison between two Studio L.S.'s, in conjunction with "L" position above).

Auxiliary Talk-Back Push Button. (Check Circuit).

Normally used for speaking to artiste's headphones. On Right channel only A moderate amount of attenuation is introduced on the Monitor L.S. circuits so as to prevent howl-back if a Studio L.S. is in use.

Continued.....

On Ser. Nos,58121A & B:-

Check Circuit Poling Push-Button.

Reverses polarity of L output for checking possible out-of-phase effects.

Right, Top.

Microphone A to B Switches, Attenuators, Tone Controls, in symmetrical arrangement. Compare with Box Unit L.T.

On Ser. No. 58070A:-

Monitor A/B Key. Subject to track selection, (see below).

L.I. A/B Key. Not subject to track selection.

Monitor Track Switches. Allow listening to any or all of the four possible tracks, in association with the Monitor A/B Key.

On Ser. Nos. 58121A & B:-.

Monitor A/B Key.

Selects output of Line Amps. (going to "Line In" of tape machine)
or Replay lines (coming from "Line Out" of tape machine).

L.L. A/B Key.

Switchable between Selected Replay (Coming from "Line Out" of tape machine or whatever has been selected by Monitor A/B Key.

Monitor Attenuators.

Not normally to be considered when working with 2-track machines. Allow listening to any or all of the four possible tracks. For 3- or 4-track working, the attenuators replace the Inverse Attenuators and permit poorly loaded magnetic tracks to be raised in level without upsetting the required musical balance. The attenuators also permit selective Play-Back, with one or more tracks reduced in level.

Continued.....

Monitor Pan Pots. Not normally to be considered in working with 2-track machines. With 3 or 4-track machines, to be used for establishing required positioning of a given instrument or section of an orchestra by recording on an unused track and determining and logging the angle, so that the same conditions can be met in transfer of the multi-track tape.

On Ser. No. 58070A:-

Monitor Off/On/Check Switch. (Aux. Monitor Switch).

Normal off/on switch, for Monitor, with a position for switching to the check circuits whedh give the various facilities for indicating and listening to Mic. Amp. Outputs, artistes Playback to studio, Tone Generator for testing, etc., etc., under full working conditions.

On Ser. Nos. 58121A & B:-

Auxiliary Monitor Switch:-

Gives normal monitoring of all four tracks in central position.
In anti-clockwise ("Check 0") position, picks up the outputs of the Check circuit, (which are then loaded by 200 ohms and may thus be used for calibration purposes).
In clockwise ("Check") position, picks up the outputs of the Check circuit whilst latter is working normally (for checking Play-Back level fed to studio, etc.).

Monitor Gain Control.

Normal Monitor Gain Control, (ganged form, for L and R simultaneous control).

On Ser. No.58070A:-

Monitor Coupling Switch.

Gives L and R to Left - Normal Stereo - L and R to Both Loudspeakers, according to choice.

On Ser. Nos.58121A & B:-

Monitor Coupling Switch:

L position puts both channels on to Left Monitor L.S.
O position puts both channels off.
Central position gives normal stereo operation.
2 position puts both channels on to both Monitor L.S.'s.
R position puts both channels on to Right Monitor L.S.

Poling Push Button.

Reverses polarity of R Monitor L.S. for checking polarity effects. Will work only if Monitor L.S. power amp. has an isolating input transformer.

Continued.....

Centre Section.

Mic. Faders 1 -2, 3,4, 5,6, 7 -8. 1 and 2, 7 and 8 can each be mechanically coupled as pairs for stereo cases.
Echo Return Faders. H.1 and H.2.
Main Faders. I - II -III - IV. May be mechanically coupled in pairs for sterec purposes, or three together for simultaneous mono and stereo.
Track Push Buttons. I - II - III - IV. (See Main Faders).
These allow Tape Announcements or Tone from Generator to be applied to each or all tracks. They may be locked in position. A large amount of attenuation. is introduced on the Monitor L.S. circuits to prevent local howl-back.

"STUDIO" Press Buttons. Two in parallel under Faders 1 and 2, 7 and 8.
For Studio Talk-Back. Moderate attenuation is introduced on the Monitor L.S. circuits to prevent howl-back via the studio.

Buzzer. Press Button Under Faders 3 and 4.

Red Light. Press Button Under Faders 5 and 6. Locking type.

Echo Selectors. (8 above respective Mic. Faders). Allow tapping off of echo signals either before or after micropnone faders (including special case of S. & D. circuits) and applying via echo pots to Echo Send Line 1 or 2 according to choice. (But see below).

Echo Pots. (8 above Echo Selectors).
For controlling the amount of echo fed through to the echo chamber(s).

Spreaders.
Two controls - one above Faders 1 and 2, the other above Faders 7 and 8. For stereo use, when using S. & D. circuits.

Pan Pots. Four controls - i.e. Mic. 3 Pan Pot, Mic. 4 Pan Pot, Mic. 5 Pan Pot and Mic. 6 Pan Pot. Each situated above appropriate fader.
(See Mic. Chan. Selectors below).

Echo Return Pan Pots.
If an Echo Send Line (1 or 2) has been selected by Echo Selectors, these Echo Return Pan Pots allow the return signal to be panned (according to the setting of Echo Return Selectors below) between Track I and II or between Track III or IV.

Echo Return Channel Selectors. (Action similar to Mic. Channel Selectors below)
Allow selection of Echo Pan Pots (above) to Main Faders I and II or to III and IV.

Mic. Channel Selectors.
Allow selection of Microphone Channels to Main Fader circuits as follows:-
Mic. 1 to Faders I, II, III, or IV.
Mic. 2 to Faders I, II, III, or IV.
Mic. 3 to Faders I and II, or to III and IV, in association with Pan Pots.
Mic. 4 to Faders I and II, or to III and IV, in association with Pan Pots.
Reversed Case for Mics. 5, 6, 7, 8 - i.e., symmetrical arrangement.

Continued.....

On Ser. No.58070A:-

Monitor "Pots.". (In front of the 4 L.I. Meters). Regard these as not to be used pending full 3- or 4-track applications. To be left in fully clockwise positions.

On Ser. Nos.58121A & B:-

on all Units

Track Selector Switches. (Immediately above Main Faders. I, II, III, IV). Permit any Main Fader to be routed through any track.

L.I. Switch. (In front of Level Indicators). 3 positions, i.e., Normal for working condition (reading Line In or Line Out), Tone Generator for setting up all L.I.'s, and Head Current (I) position - only applicable to BTR.3, but may be used for other purposes.

Delta Pots. (Below Arm Rest).
There are 14 Delta Pot. Controls, each picking up at the outputs of their respective Faders - including the 4 Echo Return Faders. The range of these controls (down from Max.) is 6 dB. The central control is the Auxiliary Mono Attenuator having a range of 8 dB, in 2 dB steps. Circuit conditions are intended to be set up so that these controls together give an adequate range of adjustment and will feed the mixed output from these controls at zero level to a separate mono tape machine. Note that this feed is via Main Fader III which normally should be coupled mechanically to Main Fader I and II which are used for the main stereo output.

Two changeover switches are fitted, associated with Mic. channels M.1. and 2, 7 and 8. Their purpose is to switch the Delta Pots. of these channels to a point earlier in the circuit when S. & D. units are not applied to the particular mic. channels and when, therefore, a pad (normally 12 dB) is applied to the mic. channels. This is to ensure that adequate level is fed from the particular mic. channels to the Auxiliary Mono circuit. When S.&D units are in use, the switch must be thrown to the right, (to the position marked "L R"), otherwise the difference signal will be included in the Auxiliary Mono output. The other position of the switches is marked "Sum/ Left, Difference/Right" ("Σ L/ Δ R"), and this should be regarded as a warning and not as an operating instruction.

Talk-Back /Announce Pre-Set Control. (Behind door in Box Unit L.T.). For adjustment of gain.

Continued.....

General Notes on Mic. Channel Track Selection, Echo, Check Circuit, etc.

1. Microphone Routes.

Mic. 1. to Mic. Channel Selector Switch and via this switch to Main Faders I, II, III or IV - through Inter Amp., Main Fader, Pad, for Ser. No.58070A, or Track Selector for Ser. Nos. 58121A & B, Line Amp. and to Track output. Note:- This signal is heard Left on I and III or Right om II and IV with monitor switch in "Stereo" position, (assuming that Monitor Pan Pots. III and IV are set fully L and R respectively). Note also that the level indicators show the actual track signal - i.e., at the output to the tape machine.

Mic.2. Ditto.

Mic.3. to Mic. Channel Selector Switch via its Pan. Pot. With the Mic. Channel Selector Switch set to "I, II", the signal appears on Main Fader I (Left) with Pan Pot. fully anti-clockwise and on Main Fader II (Right) with Pan Pot. fully clockwise. It appears on Main Fader III (Left) or on Main Fader IV (Right) with Selector Switch at "III, IV".

Mic.4. (Ditto).

A.1, A.2. Auxiliary Mic. Channels - See Page 17, Part B.

Mic.5. Ditto.

Mic. 7. As Mic. 1 and 2.

Mic.8. As Mic. 1 and 2.

H.3 and H.4. If microphones are used on Echo Return Lines, Main Fader conditions are as for M.3, 4, 5, 6 above. This would be a special case, not normally used.

2. Echo Conditions.

Mic. 1. Echo Pot. and Echo Switch to Echo Send Line 1 only. (Echo Switch gives choice of before or after Fader, and Left or Sum when S. & D. circuits are in).

Mic. 2. Echo Pot. and Echo Switch (which selects before or after Fader) to either Echo Send Line 1 or 2.

Mics. 3, 4, 5, 6. Ditto.

Continued.....

Mic.7. as Mic. 1.

Mic. 8. As Mic. 2.

Thus, the case is that Echo can be sent only to Echo Send Line 1 by Mics. 1 and 7, but all others can send to Lines 1 or 2. The outputs of Echo Lines 1 and 2 can,however, be coupled by the Echo Coupling Switch.

Check Circuit on Echo Send.

Checks conditions as described above - Echo Line 1 indicates on Left, i.e., Meter I, and Echo Line 2 on Right i.e., Meter II. Meters III and IV are not used in circuit checks. Naturally it follows that Mics. and 7 show Echo "Sends" on Meter I only, unless the Echo Coupling Switch is operated.

Echo Returns, H.I and H.II Tied to Main Faders I & II. See Page 17, Part D

Echo Returns, H.3 and H.4.

(Remember that respective Echo Return Faders must be up!). Sending a signal into Echo Return Line H.3, the signal can be selected by the Echo Channel Selector Switch in the Return Line to Main Faders I, II or III, IV, via its associated Pan Pot. For checking purposes, with the Check Circuit Coupling Switch set to its centre ("Stereo") position, (or to "L"), the signal will appear only on one Meter. If the Check Circuit Coupling Switch is accidentally set to "2", this signal will, of course, appear on Meters I and II, and similarly for any other si ilar cases. (Remember that Main Faders and Echo Return Faders do not affect the CHECK indications).

Sending a signal into Echo Return Line H.4, the signal can be routed to the required Main Fader exactly as for Echo Return Line H.3.
In the CHECK position, with the Check Circuit Coupling Switch in its centre position, it appears on whichever Track has been selected, exactly as for Echo Return Line H.3 above.

FT/(A.Rd)/AV. (Prototype, Serial No. 580704). 19th August, 1959.

LAP/AV (Notes added re differences on Serial Nos 58121A & B), 10th Sept., 1959.

"STEREOSONIC"/4-TRACK MIXER TYPE REDD.37, CONTINUED.

Errata.

Page 1:- Delete first two paragraphs. See sheet 1 of REDD.37 Drawing List. To avoid cross-reference, it is hoped to produce complete functional diagrams of the Mixers as they now are.

Modifications.

In order to increase the facilities, a considerable number of modifications were introduced late in 1962. Full details are given on Production Modification Note No.1 dated 1.6.62. The most important changes were as follows:-

Part "B" - Convert Echo Returns HI & H2 to auxiliary mic. channels A.1 and A.2, without mic. amps. or tone controls.

Part "C".- Add new rotary Echo Return Faders H3 & H4, with Delta Pots., Splitters, Pan Pots. and Channel Selectors.

Part "D".- Add new rotary Echo Return Faders HI and HII, with Delta Pots.

Part "G".- Move "L and R" Delta Pot. tapping points on "Stereosonic" channels to before pads.

Part "K".- Replace five P.L.I.'s by four V.U. Meters.

Part "L".- Fit two stereo pan pots.

Part "M".- Add wiring for stereo correlator.

Operating Levels.

As stated on the Block Schematics, the levels shown are voltages relative to .447 V. RMS, under the conditions shown, a 200 ohm gain set with its attenuator set to "-39" is connected to any one of the inputs to the Mixer, the levels shown should be obtained.

An unterminated gain set at "-39" would produce a voltage equivalent to a level of -33. The 600 ohm input impedance of the 10 dB pad will produce a loading loss of 3.1 dB and will reduce this level from -33 to -36.1. The pad itself will produce a further loss of 6.9 dB, thus making the total loss 10 dB when the pad is switched in.

The conditions on the output of the mic. amp. are fully explained on the special drawing showing the working conditions. (REDD.17/D49).

The reason why the level is shown dropping from -25.7 to -26 at the output of the fader is that the echo pot. and delta pot. and limiter have a loading effect of .3 dB.

It must be emphasised that all levels shown are for the single signal case. In actual operation, using more than one microphone input, additive effects will occur - for example, the level at the input of the echo send amplifiers will not be as dangerously low as shown on the diagram if more than one echo send pot. is at maximum.

The levels shown should therefore be regarded as test figures for engineers' use. In any case, the actual input level may be very different to the +33 into open circuit shown, which is based on the output of a KM.56 Microphone some 20 feet away from a 40-piece orchestra playing Mezzo forte and inclined at an angle of 45° to it. The actual maximum open circuit level may be anything between -50 for a modern ribbon microphone on quiet chamber music up to the equivalent of 0 dBm for a U.47 Microphone close to powerful instruments such as trombones.

OPERATION.

The equipment is now well known and understood and no attempt will be made to describe in detail the various circuits or their operation. Neverthe less, there are some points which need emphasising.

General Working Levels.

The correct operation of any equipment depends upon neither underloading nor overloading the amplifiers, and thus avoiding an unnecessarily poor signal-to-noise ratio or distortion. The maximum permissible output level of the amplifiers is about +17 dBm. It follows that, at the check points following the mic. amps., the level should not be allowed to exceed +12 dBm, or putting this another way, if a V.U. Meter is used to check this level and the usual 10 dB is allowed for the sluggishness of the meter, the indicated level at this point should not be allowed to exceed +2 dBm. The output level of the Line Amp. may, of course, be read directly, and the output level of the inter-amps. may be obtained quite easily by reference to the Block Schematic from which it can be seen that the output levels of the inter- and line-amps. will be the same when 20 dB pads are in use and the main fader is set at "-9". Again allowing for the fact that a V.U. Meter may read 10 dB less than the actual peak, it is clear that main fader settings of below "-15" should be carefully avoided when 20 dB pads are in use.

Delta Mono Balance.

In order to obtain the correct Delta Mono Balance, it is essential that the correct pads are used in the correct places, as shown on the issue of the Block Schematic dated 1.6.62. Unless there is a specific request to the contrary from the Balance and Control Engineer, the ratio of these pads must be maintained. For example, if the 6 dB pads are removed from channels M.3 to M.6 and A.1 and A.2, the 12 dB pads in M.1, 2, 7, 8 must be reduced to 6 dB, and the 20 dB pads in the Echo Return Channels H.1 to H.4 must be reduced from 10 dB to 6 dB. Pads should only be used if experience shows that without them there is a danger of over-loading the inter-amps.

* when using Stereo Pan Pots, see middle of Page 25

The preceeding paragraph now strictly applies only to the REDD.51. The REDD.37 are being fitted with Mono Pan Pots on M1, 2, 7, 8, and the correct pads for these channels will then be 6dB. (See Functional Diagram dated 14.3.64). The same principle of maintaining the ratio of the pads still applies, of course.

Engineers should set up their equipment with all Delta Pots. at maximum and B.C. operators should ensure that Delta Pots. are used at their maximum possible setting consistent with obtaining the desired Mono balance. At least one Delta Pot. should always be at maximum. If the Delta Mono output is then too high, it should be reduced by reducing the setting of the Delta Mono Attenuator or by increasing the value of the plug-in pad which follows it.

Echo Send Levels.

Similarly, at least one Echo Send Pot. should be at maximum in order to ensure that an adequate level is fed to the Echo Send Amps in the Mixer. If the amount of echo is too great, it should be reduced elsewhere.

Inter. Amp. III. - Special Warning.

Inter-Amp. III is frequently used as the Delta Mono Inter-Amp. and in this position receives the lowest input level of any amplifier in the equipment. An amplifier with the lowest possible hum and noise should therefore be reserved for this position.

Delta Pot. Selector Switches.

The inscription "Sigma L" and "Delta R" on the two toggle switches on the Delta Pot. panel should be regarded as a warning. If the "Stereosonic" circuits are in use, and either switch is left in this position, Sum & Difference signals will be fed to the Delta Mono balance, which, of course, would be most undesirable. When using the "Stereosonic" circuits, the switches should therefore be set to the "L" and "R" position.

On the other hand the "Sigma L"/"Delta R" position should always be used when the "Stereosonic" circuits are not in use, in order to obtain the correct Delta Mono balance. (When modification Part "C" (See Page 17) has been carried out, it will be impossible to obtain any programme on the Delta Pots. from the "L/R" position unless the "Stereosonic" circuits are in use, and this matter will then need particularly careful attention).

Mic. Channel Sensitivities.

On the REDD.51 the loss of the Combiners is 6 dB less on Channels M.1, 2 & M.7, 8 than it is on M.3-6. (See Drawing REDD.37/B145/1, now re-numbered REDD.51/B62). This accounts for the use of 6 dB more padding on M.1, 2, 7, 8 in order to maintain the correct Delta Mono balance. These conditions will not apply on the REDD.37 when Mono Pan Pots have been fitted to M1, 2, 7, 8. (See top of page). The Combiner loss on M.1-8 & A.1-2 will then be similar. (See Drg. REDD.37/B145/2). When the "Stereosonic" circuits are brought into use, the sensitivity of Mic. Channels M1, 2, 7, 8 is reduced by 3.4dB (see REDD.37/D44/1), or by 4dB if the Shuffler is still used. The only way of correcting for this would be to introduce 4dB pads immediately after Mic. Amps. M3-6, but in practice these small divergencies cause no difficulty.

LAP/MAP Mar., 1964.

ABBEY ROAD MASTER COPY

MODIFIED "STEREOSONIC"/4-TRACK MIXER TYPE REDD.37, continued.

Further Modifications - P.M.N.2.

Further changes, notably the addition of echo to the Monitor circuits, are detailed on Production Modification Note No.2 dated 18.12.62 and are covered by these extra pages of this Write-up, which also includes further notes on the operation of the equipment.

Errata.

The recent changes make a number of alterations to the Write-up necessary:-

Page 4, Para.3. Delete last sentence beginning "A master level..." and ending "...single track cases".
Page 5, C.S. Delete "Highest Reading L.B.L.I. Meter".
Add general note:- "See Drg.REDD.37/D27".
Pages 5 & 6. For "Monitor Check" read "Check".
Pages 6,7 & 8. Delete references to Highest Reading P.L.I. and to External L.I. Meter Jacks.
Page 9, CONTROLS. Delete "4 switches.....P.L.I".
Penultimate para., Line 2:- Alter "Pop" to "Classic".
Line 4:- Alter to read "Classic" or "Pop".
Page 11, P.L.I. A/B Key. Delete "except.....Unit L.B".
Alter to read:- "Switchable between Selected Replay (Coming from "Line Out" of tape machines) or whatever .....Key".
Page 14, Para.1. Alter "Inverse Attenuators" to read "Monitor Pots".
Alter "anti-clockwise" to read "clockwise".
Delta Pots. Alter "ten" to read "14 Delta Pot....."
Alter "two" to read "4 Echo Return Faders".
Alter "...a pad (normally 6dB)..." to read "12dB".
Page 15, Para.1. Alter "Inverse Attenuator" to read "Pad".
Alter "H.1 and H.2" to read "H.3 and H.4".
Add note re A.1. & A.2. See Page 17, Part "B".
Page 16. Add note re Echo Returns H.I. & H.II. See page 17 Part "D".
Alter H.1 & H.2 to read H.3 & H.4, respectively.
Page 19. Delete third paragraph beginning "If Pads....." and ending ".... M.2 & M.8 closed".
General. For "Peak Level Indicator(s)" read "Level Indicator(s)" or "VU Meter(s)".

Continued.....

Plug-in Pads.

The use of the correct pads (as shown on the Functional Diagrams) has the further big advantage of facilitating testing by equalising channel gains.

When Delta Mono is not in use, the pads may be changed to other reasonable values if desired, but it must be realised that the Echo Send levels will then be affected. (See also "Mic. Channel Separation" below).

Mono Recording.

For simple Mono recording, all inputs should be routed through to, say, Track I. The Delta system should be reserved for simultaneous Stereo and Mono recording.

VU Meters.

Slower reading VU Meters are due to be fitted on the REDD.37 in place of the Peak Level Indicators. The latter had a scale range of 55dB, whereas that of the VU Meter proper is only 23dB.

Four push-buttons marked "+20dB" are fitted to the Mixer. When they are depressed, the sensitivity of the VU Meters will be increased by 20dB, provided that the switch on the RS.128 VU Meter Amplifiers is set to "0".

The attenuators on the VU Meter Amplifiers are also normally set to "0", and the VU Meters will therefore read "0 VU" for a steady tone level of 0 dBm (1 mW in 200 ohms). In general, due to the sluggishness of the VU Meter movements, the reading should not be allowed to "go into the red" during tape recording, but please see separate instructions on the use of VU Meters.

Tone Generator.

The Tone Generator has a low output impedance. If it were to be used directly to measure the frequency response of, say, an amplifier designed to work from a 200 ohm source, the bass response might appear to be much better than it actually was.

The Tone Generator is designed to give its indicated output level into a 200 ohm load. If an amplifier with an bridging input is being tested, the input to the Tone Generator Pads (on the adjacent Siemens socket) may be used as a convenient 200 load. A "Test" type U-link (with sockets on top) should be used and a jumper which is plugged in to this U-link may be used as the input lead to the amplifier under test. If must be remembered that the source impedance (Tone Generator in parallel with 200 ohms) is then even lower, and that this method is therefore unreliable for frequency response measurements. However, the method is quick and simple for routine checks.

Continued.....

Tone Generator Pads.

For the reasons given above, and also to provide two independent sources for stereo testing, a twin Tone Generator Pad is built into the Mixer. The Pad provides two in-phase 200 ohm sources, and the design is such that one output may be loaded or left unloaded without appreciably affecting the other output. The disadvantages of simple paralleling are thus avoided.

If the Tone Generator is set for an output of 0 dBm and the output(s) of the Pad connected to the input(s) of the Mixer with the Pre-Set Attenuator at "0" and the 10dB Pad in circuit, 0 dBm should be obtained at the Check point following the Mic. Amp.

A third output from the Pad supplies tone (via the Announec/Tone Selector switch and four Track Push-Buttons) to the inputs of the Line Amps., for setting up tape machines. A level of 0dBm from the Tone Gen. will produce 0dBm at the output of the Mixer. The extremely low source impedance of the Pad will greatly attenuate any programme coming through from the Studio, and the necessity of shutting down the faders may thus be avoided without introducing possible unreliability due to change-over switching.

Mic. Channel Separation —— Echo.

To avoid having to use expensive and weighty high-gain double-cassette mic. amps., the loss of the Main Combiners has been deliberately kept to a minimum. For similar reasons, resistive mixing was used rather than 16 hybrid transformers.

The separation between Mic. Fader outputs, although not high, should prove adequate. The worst possible case would occur, for example, if M.1. & M.2 were used without pads, were both switched to the same Main Fader, and if M.1 was being used "dry" (i.e., with no echo) and full echo was being used on M.2. The "dry" output from Fader M.1 would then appear, at a level 17dB lower, across the open Echo Pot of M.2. (See Drg.RLDD.37/B145). Even this comparatively poor separation would probably not be significant, the acoustic separation in the studio being comparable. With 12dB Pads in each channel, the figure would become 41dB and would be completely negligible. This, then, is yet another reason for using the correct pads in the correct places.

Echo Sends & Returns.

Two new switches will be found near the VU Meter Box. The L.H. switch controls Echo Send 1 and Echo Returns H.I. & H.II. The R.H. switch controls Echo Send 2 and Echo Returns H.3. & H.4.

To avoid confusion with the Mic. Channel Echo (Send) Selector switches, these new switches are designated Echo Return Selectors, this being their main function. However, it should be remembered that they also determine the position in the circuit from which the Echo Sends are picked up.

Continued.....

Normal Echo.

With the Echo Return Selectors fully anti-clockwise, Echo Send is picked up from the microphone channels in the normal way, and Echo Return is brought back into the microphone mix in the normal way, i.e. basic operation is exactly the same as it used to be. (See REDD.37/C278).

Monitor Echo.

If the switches are turned fully clockwise, the echo circuits are transferred from the Microphone mix to the Monitor circuits. The top row of 4 Monitor Echo Send Pots (under the arm-rest) now feeds Echo Send 1; the bottom row now feeds Echo Send 2. Echo Returns H.I & H.II are brought back into Monitor Tracks I & II; Echo Returns H.3 & H.4 into Monitor Tracks III & IV.

Echo is then being applied to whatever signals are on the Monitor circuits, but the echo will not be recorded, neither will its effect show on the Level Indicators.

The purpose is to enable up to 4 tracks to be recorded "dry", whilst permitting a clear idea to be obtained as to how they will sound when echo is added during the subsequent re-mix.

"Half-and-Half" Operation.

If desired, one of the Echo Return Selectors may be used to apply echo to the microphone circuits in the usual way, whilst the other is used to apply additional echo to the Monitor circuits.

Cross-connections.

Further, any required cross-connections may be made externally. For example, Echo Send 1 may be used to feed the echo chamber, and Echo Returns H.3 & H.4 used for the returns; in fact, this will be the normal method when only one Echo Send is being used.

Send from Mics., Return on Monitor.

There may be occasions when the procedure of sending from and returning to Monitor does not give the required results. For example, if the rythm section is being recorded on Track III, it may prove unsatisfactory to apply echo to the entire Track III mix.

By turning one of the Echo Return Selectors to the position one place removed from the anti-clockwise (Send from Mics., Return to Monitor), it becomes possible to assess the effect of, say, applying echo only to the guitar, again without actually recording the echo. For this purpose the Monitor L.S. Key switch must be set to "Line In" ("A"), otherwise the Echo Return will be heard before the direct sound (as the latter would be delayed in the tape recorder if the Key were set to "Line Out").

Continued.....

It is hardly necessary to point out that this condition must be used with discretion; if the recording is made "dry" under these conditions, it will not be possible to duplicate the effect during the re-mix. This condition, therefore, should be used only for a quick check, and the switch returned thereafter to one of the more normal positions.

Integral Tape Echo.

The tape machine which is being used for recording may be employed as an additional echo device, either on its own or in conjunction with an echo chamber. To achieve this, the Monitor L.S. Key switch is set to the "Line Out" of the tape recorder, and one or both of the Echo Return Selectors are set to their third positions (Send from Mon., Return to Mic.).

Warning:-

It must be strongly emphasised that, as with all such devices, only a limited amount of echo may be applied in this way. Any attempt to increase the echo will result in howl-round. If an entirely separate tape recorder is used for this purpose, this danger does not exist, as the circuit gain is restricted so that howl-round cannot occur. No such limitation is possible here, as the extra gain is often required for more normal echo purposes.

If this method is used, therefore, the danger point must be clearly established and the controls always set well below this point.

Special Warning:-

If, under these conditions, the Monitor L.S. Key switch is accidentally moved to the "Line In" position, howl-round will almost certainly occur, as there is then a direct loop path from the output of the Line Amp via the Monitor Echo Send, Echo Chamber (if used), Echo Return, Inter Amp, and Main Fader, back to the output of the Line Amp.

If space had permitted, it would have been easier from an operational point of view to fit, in place of the 2 Echo Return Selectors, 6 switches each controlling one function. As it is, all functions have had to be compressed on to 2 switches. The main purpose of the two middle positions of the switches is to provide for the external cross-connections referred to earlier. If these middle positions are used for the additional purposes outlined above, due care must be exercised.

Monitor L.S. & L.I. Key Switches.

The Monitor L.S. Key selects "Line In" to, or "Line Out" from, the tape recorder(s). (No confusion should arise if it is
the box symbol engraved on the Mixer panels rep
Indicator Key previously selected either "Line
it could be left in the latter position and it
the L.S. Key in order to change both L.S. and L
"Line Out" (A/B).

This was found to be unsatisfactory in control rooms with poor acoustic insulation from the studio, where the L.S. Key must be left on "Line In" (key down). The L.I. Key has therefore been rewired to select "Line Out" or "Follow Monitor" (key down).

Pan Pots M.3 & M.6.

The 11-stud type have been replaced by 21-stud type. The total coverage remains unaltered, but there is now an additional angular position mid-way between each of the original positions.

Stereo Pan Pots.

The two new Stereo Pan Pots are integral with the Spreaders, i.e., they are automatically brought into circuit when the Spreaders are connected. They must be used only in Sum & Difference.

On turning the control anti-clockwise, the stereo "picture" will close gradually to the left, becoming a point source on the left at the 90° position marked "L". Further anti-clockwise rotation will gradually open up the image again, but reversed, so that by the time the 180° position is reached the original full left signals will have become full right and vice versa.

Clockwise rotation from the normal (click) position will have a similar effect but towards the right.

The Check switches must be used from time to time on the outputs of the relevant Mic. Amps in order to ensure that the Diff. Booster Amps are being neither under- nor over-loaded. As may be seen from the Functional Diagram, the output level of the Difference Booster Amp is about 14dB higher than the level at the Mic. Amp. Check-point when the Mic. Fader is at maximum, and correspondingly less for lower Fader settings. It follows that the level shown on the VU Meter at the Check point should not be allowed to exceed "-12" when the Mic. Fader is at maximum. (See "General Working Levels" on Page 18. and add a cross-reference to this page).

On the REDD.51 Mixer the pre-set gain control of the REDD.47 Difference Booster Amplifiers should be carefully set (within narrow limits) so as to cancel any residual 1,000c/s cross-talk in the Mixer, with the Spreader and the Stereo Pan Pot at their normal (top) positions, of course. The switch on the Difference Booster Amp. must be left at "40".

Spreaders.

The original "-6....0....+6 dB" Types REDD.C14 have been replaced by "-12....0....+4 dB" Types REDD.C37 which enable stereo microphone pairs to be used closer to the source of sound (when the control must be turned anti-clockwise). Also, by the omission of the "+6dB" setting of the old type in its maximum spread position, the danger of adding too much out-of-phase cross-talk is avoided.

Continued.....

The green figures give the maximum total permissible included angle of the source, seen from a pair of crossed cosine (figure-of-8) microphones, for no out-of-phase (bogus) component.

The red figures give this angle for a cardioid-cosine (MS) microphone pair.

As before, the wide and narrow black "V" symbols indicate what is heard when the control is operated.

"Stereosonic" Circuits, General.

If the "Stereosonic" circuits (i.e., S. & D., Spreader and Shuffler) which are normally associated with particular stereo microphone pairs are not being used for that purpose, they may, of course, be used on the main stereo outputs. For example, they may be connected around the main faders by using suitable jumpers connected to the Siemens sockets which are provided; the plug-in Pads (normally 20dB) may then be placed, say, between the output of the Shuffler and the input to the Spreader.

The new Stereo Pan Pots are equally suitable for use on the main stereo outputs in the same way, i.e., within S. & D.

For a general description of the E.M.I. "Stereosonic" circuits, please see Write-up RSL.51.

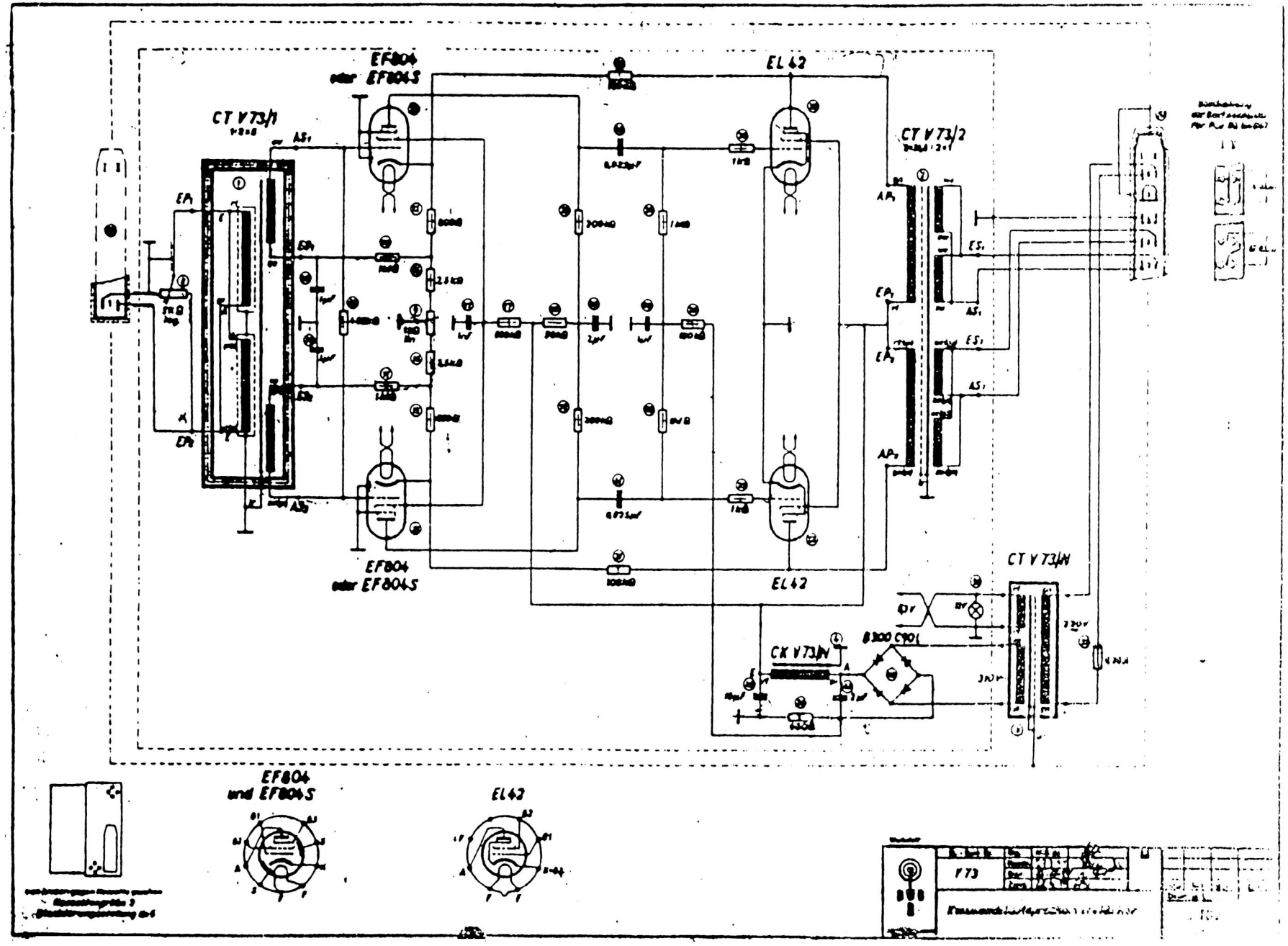
Stereo Correlator.

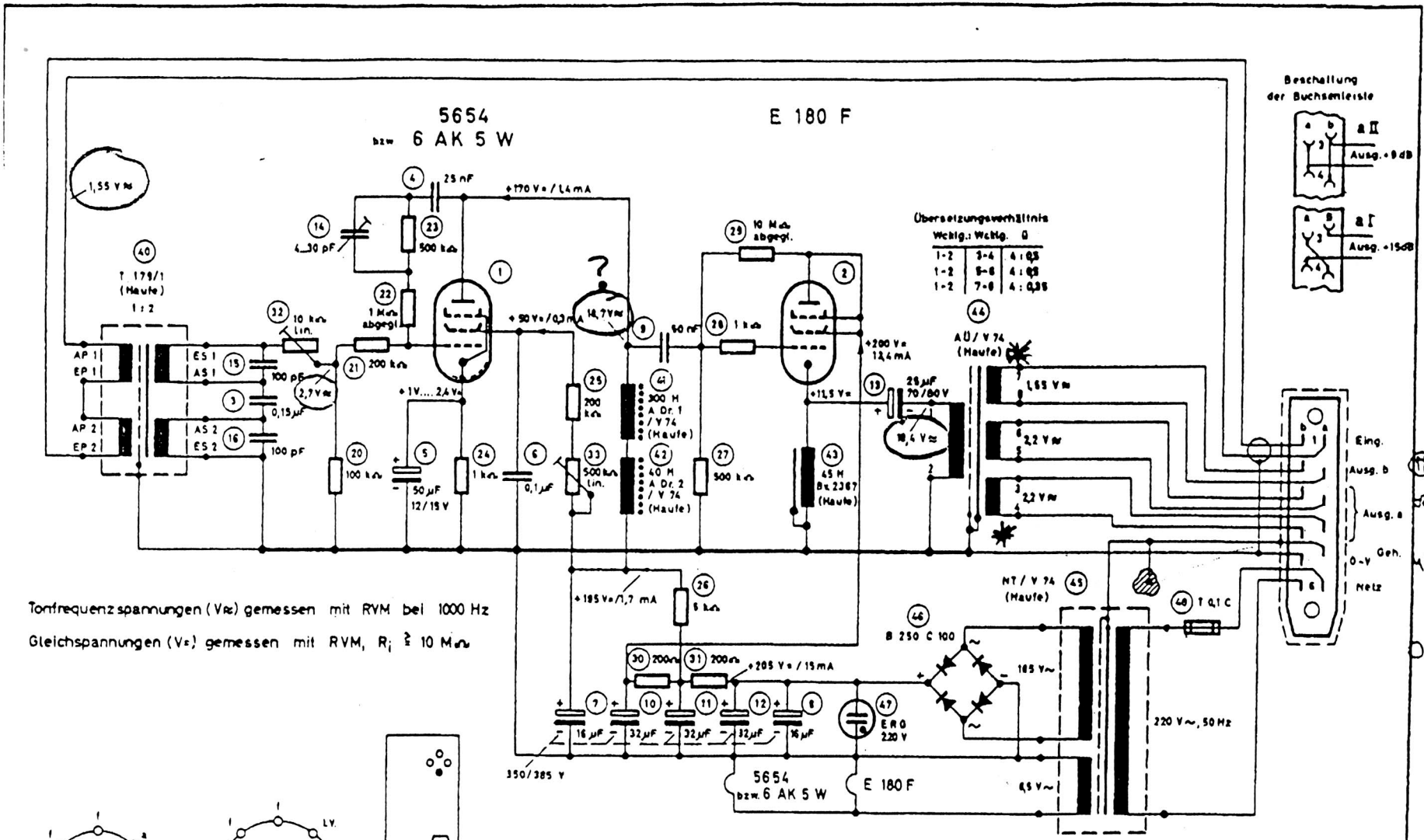
Please see separate instructions regarding the use of the Correlator.

Note that the Correlator works from Tracks I & II or the output of the Monitor Amps., and that it operates on whatever is being fed to the Monitor circuit inputs.

The Correlator Selector Switch is on the front face of the Top R.H. Unit, under the arm-rest. Whenever the Monitor circuits are operating on Stereo, the switch should be turned to the "L,R" position. The "I,II" position is intended for use only in the rather unusual conditions which sometimes occur during "Pop" work when simultaneous Stereo and Mono recording is being done but the Monitor L.S. is being driven from the Delta Mono balance, i.e., the Monitor Pots on Tracks I & II are turned off.

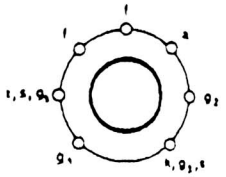
V73 Kommandolautsprecherverstärker



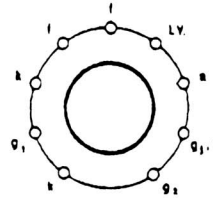


Tonfrequenzspannungen (V≈) gemessen mit RVM bei 1000 Hz

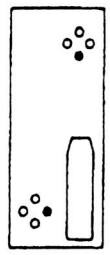
Gleichspannungen (V=) gemessen mit RVM, $R_i \geq 10$ MΩ



5654
6 AK 5 W



E 180 F



Kassettengrösse 1
Blockierungsstellung 15
(von hinten gegen die Kassette gesehen)

Werkstoff:

IRT	Br.-Buch Nr.	Ges.	29.10.59	Wo.	M
	V 74	Kontr.			1:1
		Gepr.	29.10.59		
		Genehm.			

Index	Dat.	Name	Änderung

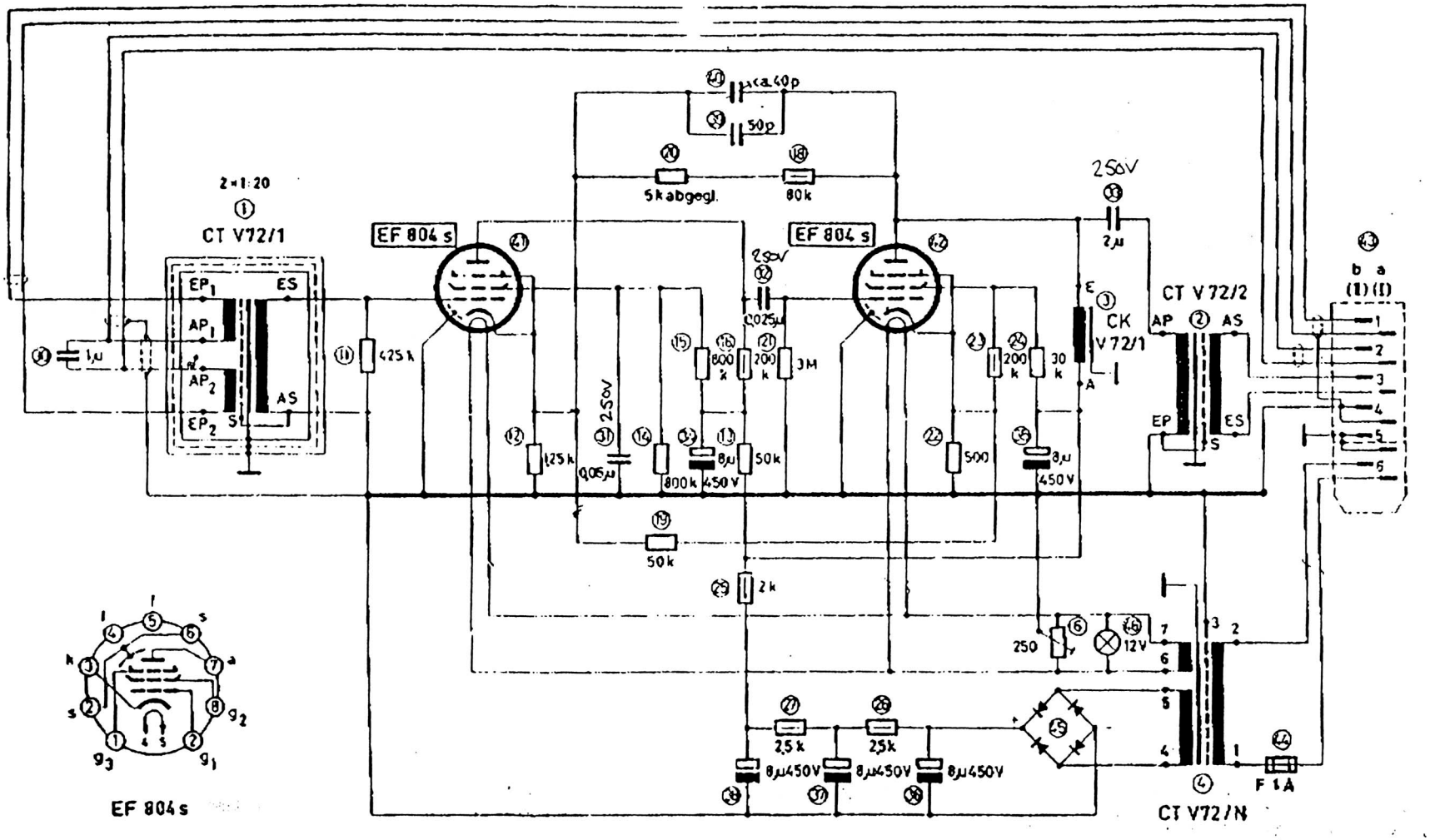
Trennverstärker

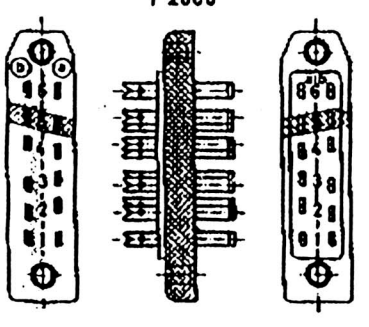
Zeichnung Nr. S 1174

Anz. d. Bl. 1 Blatt

V 74
Ausgabe 1
Blatt 8

Kassettenverstärker V 72 mit Netzteil

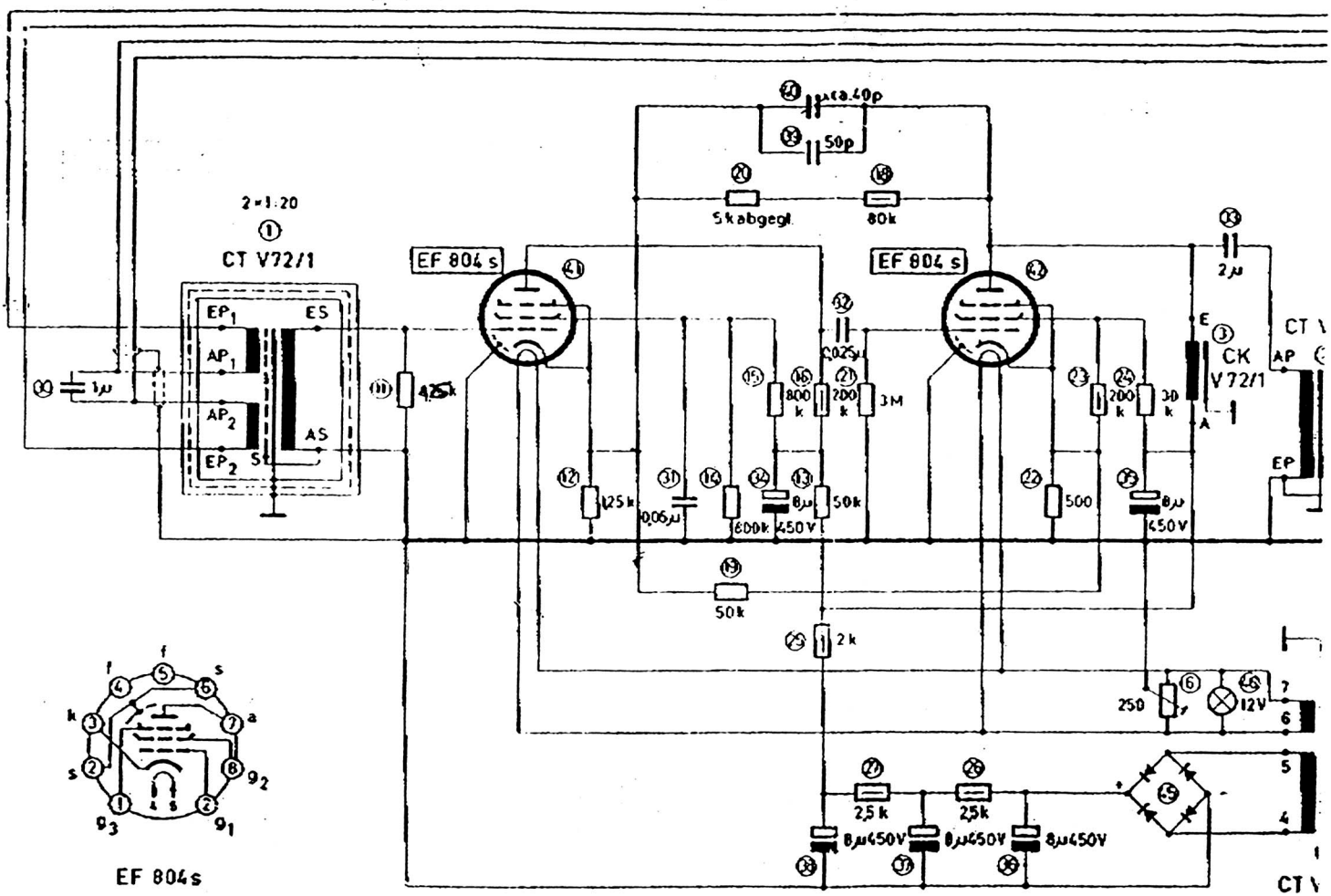




① Eingangsübertrager CT V72/1 - Bv. 191 Ausg. 2
② Ausgangsübertrager CT V72/2 - Bv. 192
③ Anodendrossel CK V72/1 - Bv. 193
④ Netztrafo CT V72/N - Bv. 198
⑤ Drahtdrehwiderstand 250 A1 DIN 41469
⑥ Trimmer in abgeglichenem Zustand ca. 40pF
⑭ Feinsicherung F 0,08/500 DIN E 41574
⑯ kurze Stecklampe 12V ML 26 Rafi-L-Nr. 822
⑮ Selen-Gleichrichter 330 B 60 AEG Sockel M

0,25 Watt
0,5 Watt

V-72 Unmodified

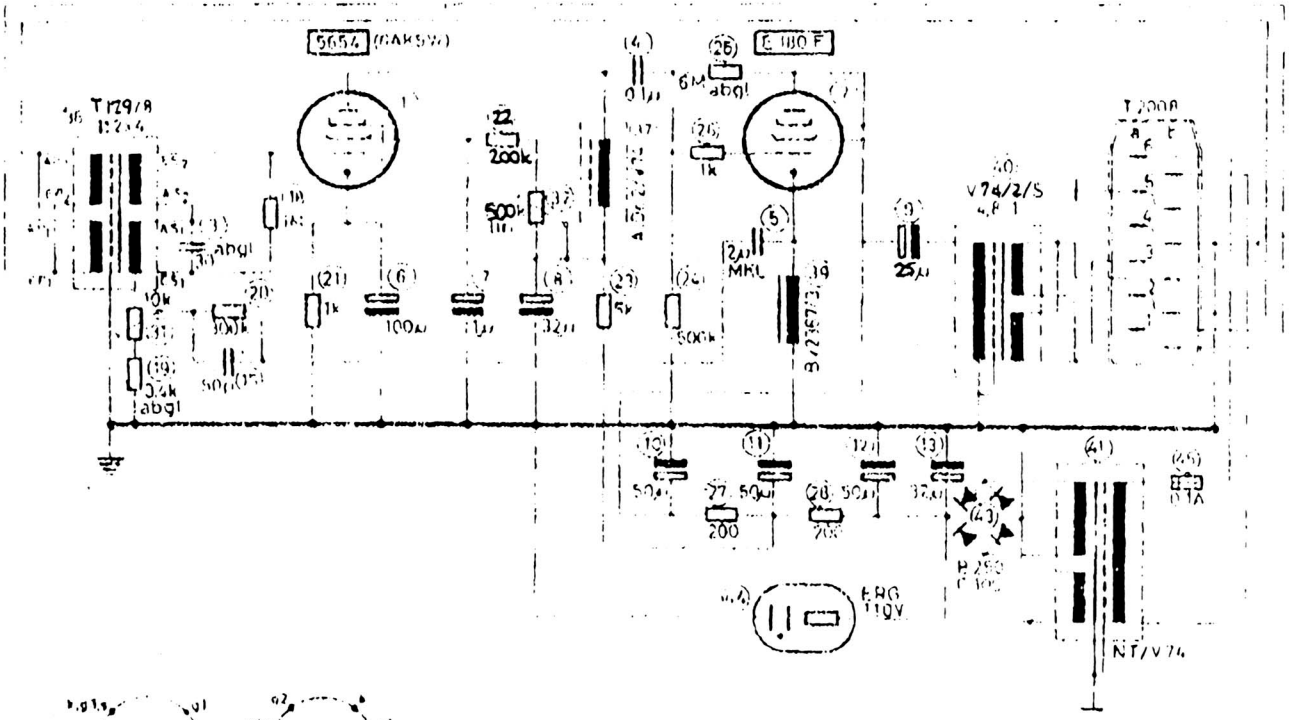


① Eingangsübertrager CT V72/1 - Bv 191 Ausg. 2
② Ausgangsübertrager CT V72/2 - Bv. 192
③ Anodendrossel CK V72/1 - Bv. 193
④ Netztrafo CT V72/N - Bv. 198
⑥ Drahtdrehwiderstand 250 A1 DIN 41469
⑭ Trimmer in abgeglichenem Zustand ca. 40pF
㉔ Feinsicherung F 0,08/500 DIN E 41574
㊻ kurze Stecklampe 12V ML 26 Rali - L - Nr. 822
㊺ Selen-Gleichrichter 330 B 60 AEG Sockel M

0,25 Watt

0,5 Watt

März 1962	Studio Verstärker V 72 a	A IV, 60-1

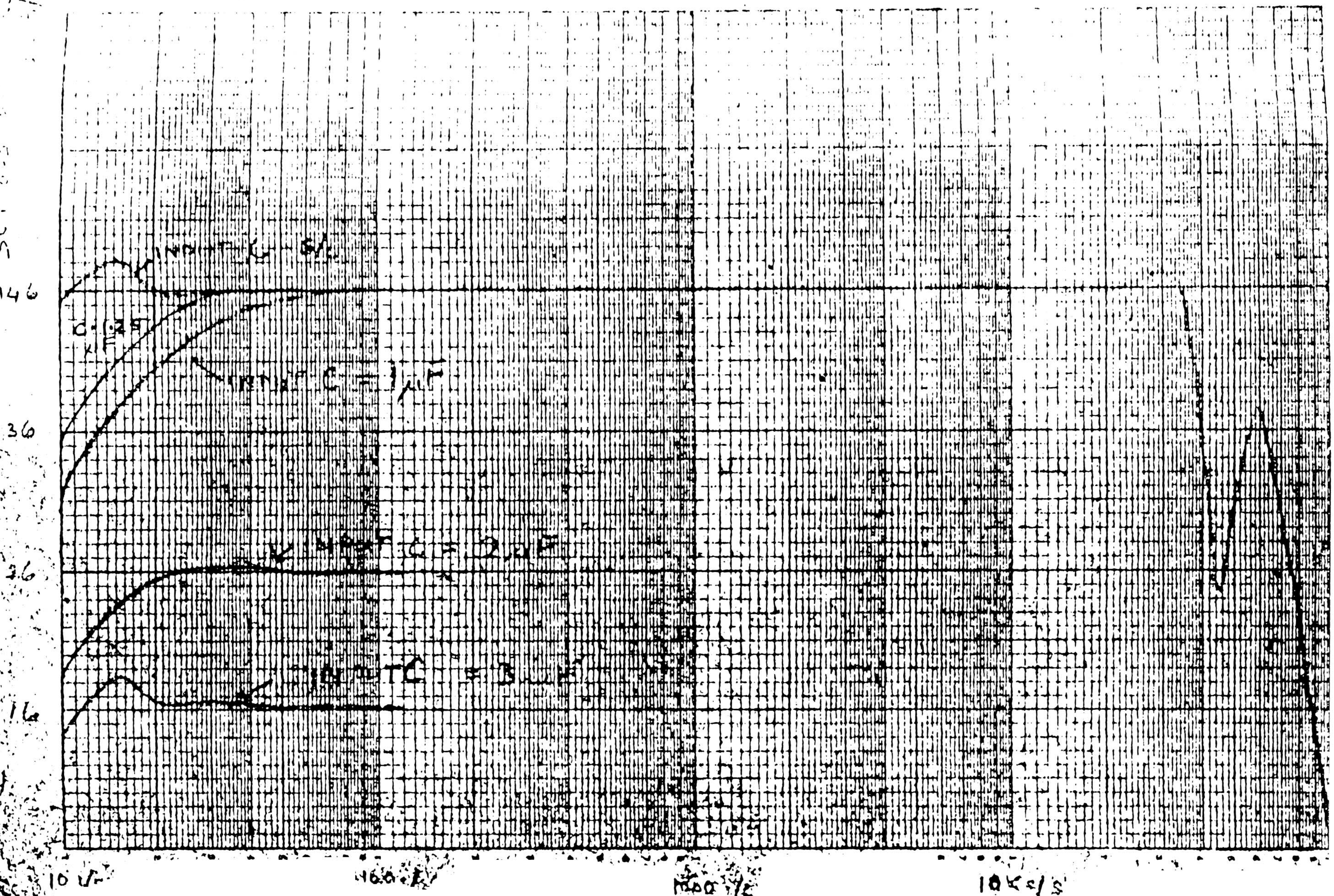


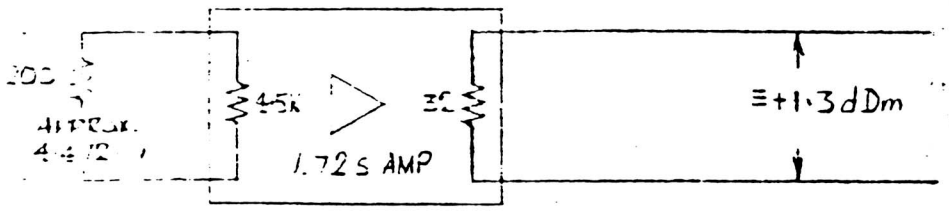
Blockierungsstellung 1 (wie V 72)

GAIN / FREQUENCY RES[illegible] OF MODIFIED V[illegible] AMPLIFIER No.

[illegible] 200 LOAD

V72S INSERTION GAIN AT 1000~ = 46dB

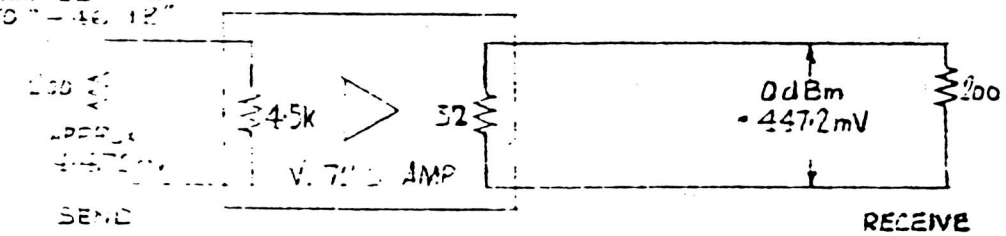




OUTPUT NOT LOADED.
WORKING GAIN ≡ 41·3dB

$\frac{200}{232} = 1.29dB$

GAIN SET TO "-46.12"

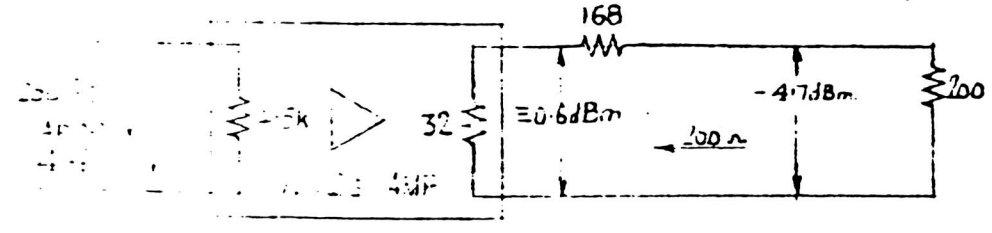


NORMAL TEST CONDITIONS

INSERTION GAIN = 46 dB
WORKING GAIN = 40 dB

$\frac{366}{400} = 0.72dB$

$\frac{200}{400} = 6.02dB$

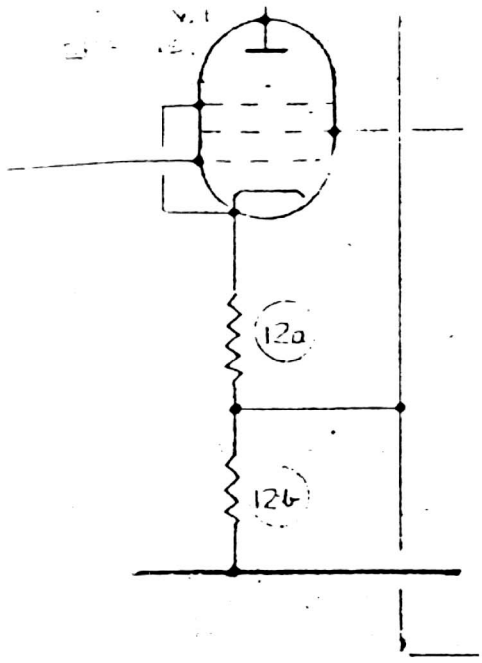


BUILT OUT TO 200Ω

INSERTION GAIN = 41·3 dB
WORKING GAIN = 35·3 dB

COMPARE WITH DRAWING REDD.17/D18

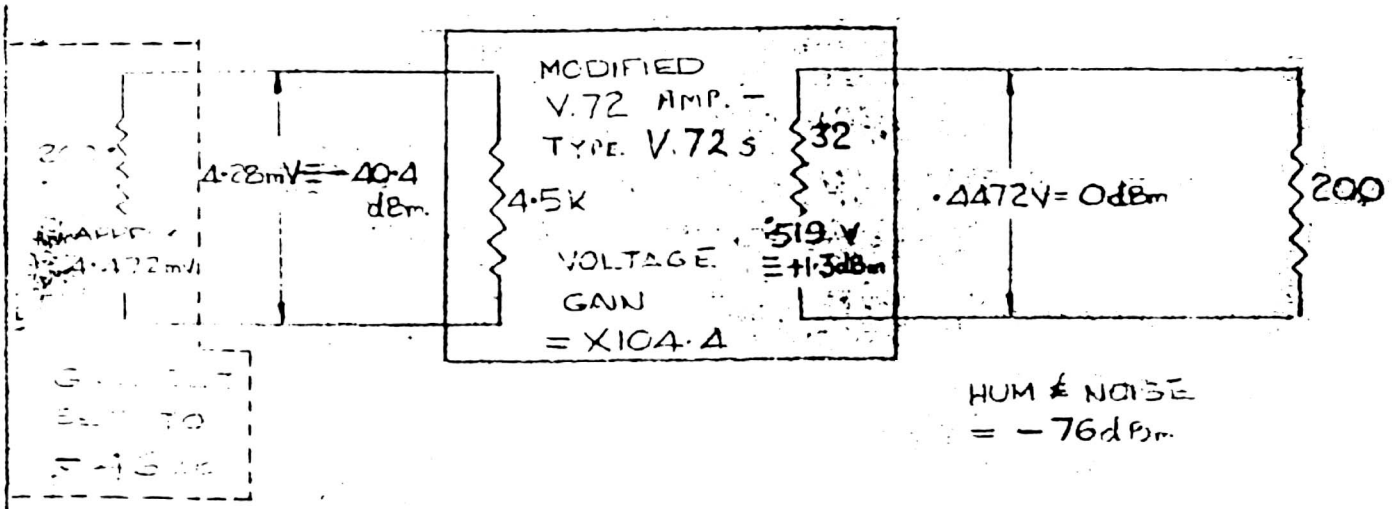
FINISH	TITLE V. 72s AMPLIFIER, 40dB - WORKING CONDITIONS	E.M.I. INTERNATIONAL LTD HAYES, MIDDLESEX RECORD ENGINEERING DEVELOPMENT DEPT.	
MATERIAL			DRAWING No. REDD.17/D49
DR'N [illegible]	DATE 20-8-59	C'K'D [illegible]	SCALE —



REMOVE EXISTING 1·25K RESISTOR (12)
AND WIRE AS SHOWN NEW RESISTORS

(12a) = 680Ω.
(12b) = 560Ω. (ADJUST ON TEST)

LATER V72s, MODIFIED BY SIEMENS & HALSKE HAVE CATHODE CIRCUIT OF EF.804S (41) UNALTERED (IE. SAME AS V72) BUT WITH 50pF (39) REMOVED & RESISTOR 80K (18). CHANGED TO 160K



HUM & NOISE
= −76dBm.

INSERTION GAIN = 46 dB

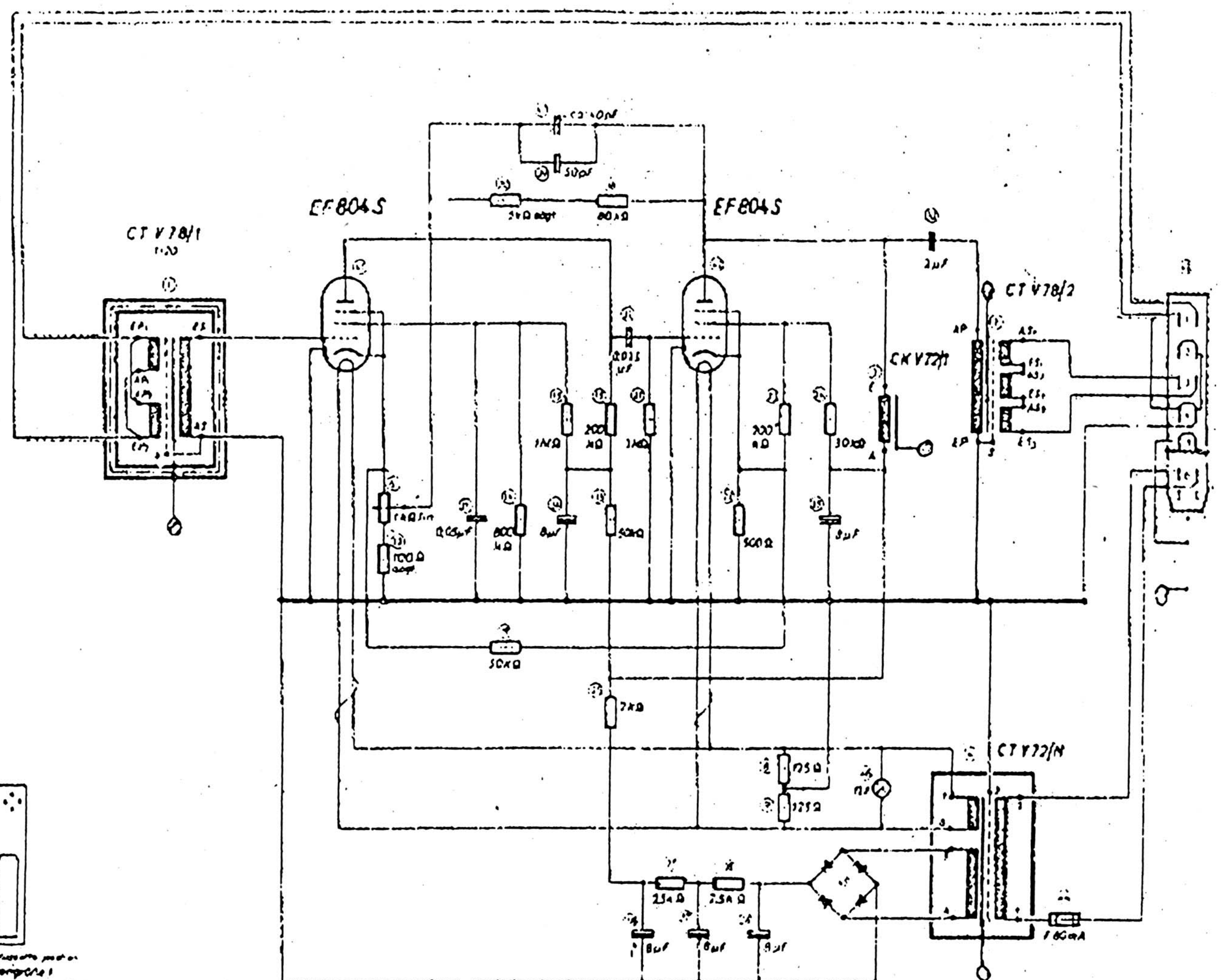
VOLTAGE GAIN = X104·4

(LOG 104·4 = 40·4)

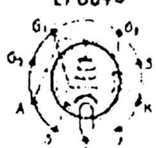
WORKING GAIN FROM 200Ω SOURCE = 40dB

E.M.I. LTD., HAYES MIDDX. RECORD ENGINEERING DEVELOPMENT DEPT.		
TITLE: V.72 AMP. MODIFIED TO V.72S. FOR EXTRA 6·4 dB GAIN.		
DRN	DATE 15-12-56	DRG Nº

V-78



EF804S



Nennspannungen der				
Keramik-Kondensatoren	Papier-Kondensatoren		MP-Kondensatoren	Elkos
500 V	3 V~	250 V	250 V	+50 V
Pos. 39		Pos. 31, 32	Pos. 33	Pos. 14, 19, 28, 27, 30

Pos 12 auf 70 µA abgeglichen
" 70 " 50 µA "
bei Anz. Inst. Wid. 1 kΩ

V 70		
Kommandoverstärker		S 1005