FERROGRAPH
MODELS 632, 634 & 632H

SUPPLEMENTARY NOTES

with

Revised Circuit Details

Serial No. 6/50,000 onwards

FERROGRAPH MODELS 632, 634 & 632H

1. BIAS SWITCH

The Bias switch on the rear panel is normally set to the "Low" position, when the bias is suitable for the standard tape, Ferrotape type A, and tapes of similar quality and characteristics. When in the "High" position the bias is suitable for the special "low noise" tapes such as Ferrotape type B, Scotch Dynarange tape, etc., and with this tape a peak recording level of "9" should be used.

2. ERASE LINK

The erase link has been split into two to enable "spot erasure" and superimposition to be used, and Section 7 in the Manual should read as follows.

7. RECORD LINKS

It must be born in mind that whenever the main selector switch is turned to Record, the oscillator supplying the erase head is energised, and under normal circumstances, if the tape is run in this position any previous signal on it will be wiped off. However, it is possible to prevent any erasure by removing the two plugs on the rear panel marked "Disconnect"—"Erase Only" and "Bias Only". If both of these are removed, no erasure can take place and it is sometimes useful to do so if the recorder is to be used by the relatively unskilled for the purpose of playback only.

Nevertheless, as a special Record Lock device is fitted to prevent accidental turning to Record, this precaution is not normally necessary, and the main purpose of these two links is to provide the various facilities described below.

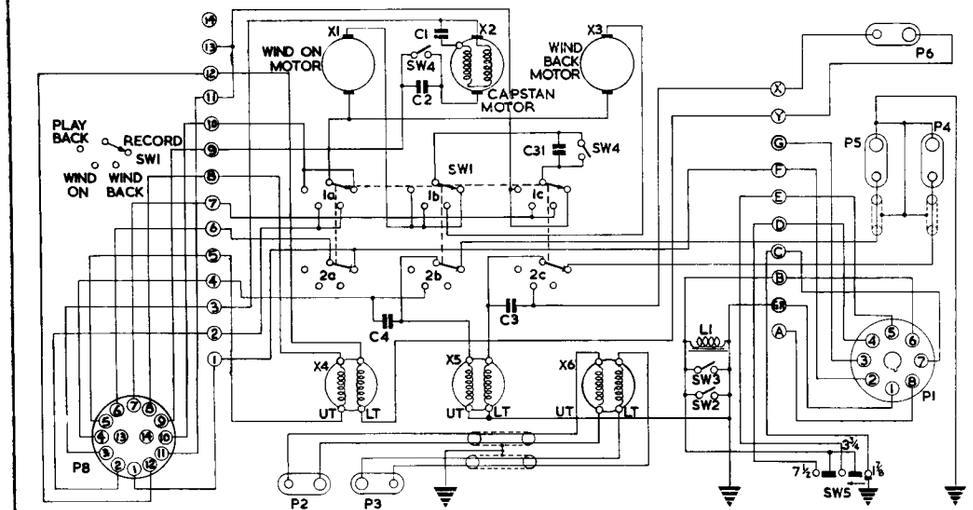
NOTE:—On no account should the "Erase Only" and "Bias Only" plugs be removed while the instrument is on Record as this may polarise the heads.

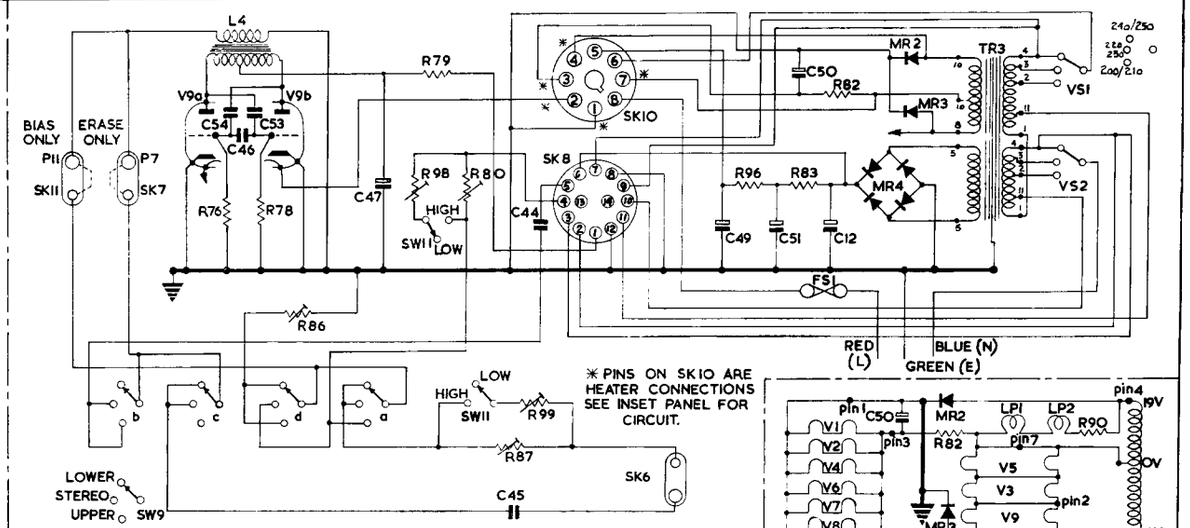
7.1. Spot Erase

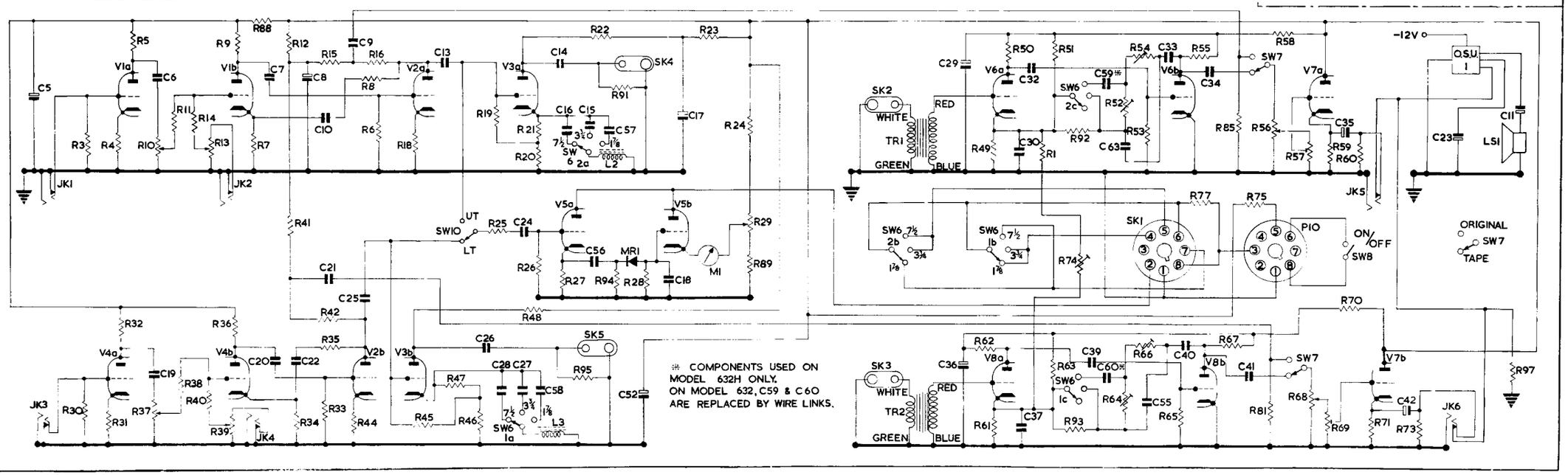
By removing the plug marked "Disconnect Bias Only", the bias supply to the record head is removed and only the erase head is energised. Normally, the bias on the record head also acts as a weak erase head and erases signals on the tape prior to the erase head, so that it is impossible to erase a click, for example, without affecting other parts of the tape. However, with this link removed and only the erase head energised, it can be used to erase small sections of the tape and by utilising the monitor head this can be done very accurately. As it is possible to impose a noise on the tape (even when no bias is present on the record head) if the input signal is large and the gain is turned well up, it is essential that both record gain controls be at zero when this is being done.

The tape should be run on playback to locate the part of the tape which it is required to erase, and the start located at the face of the playback head. This precise spot is marked on the tape in some way, a "chinagraph" pencil or crayon being very useful for this. The tape is then played back to the end of the passage and this also marked on the tape. The tape is then wound back to the first mark and this is located manually against the erase head face, the "Bias Only" link removed and the deck switch turned to Record,

R	3 4 40 9 41 33 35 8 25 20 26 89 62 49 50 1 74 87 93 64 54 66 68 77 67 75 81 58 57 68 69 70 30 31 32 5 37 10 11 38 14 13 39 36 7 88 12 34 42 15 44 16 6 18 45 47 46 19 21 48 27 95 22 94 91 28 23 24 29 76 78 86 61 98 79 80 51 63 92 99 52 53 65 55 85 96 56 83 82 59 60 71 73 90 97
C	2 22 21 25 24 16 5 19 6 4 7 20 1 8 10 3 9 31 13 26 28 27 58 14 15 56 57 52 18 17 54 46 53 29 36 47 37 30 32 39 60 45 44 59 63 55 33 40 34 49 41 51 50 12 35 42 23 11
MISC	XI V4b P3 SW4 X2 X3 SW2 SW6 V5a SK5 P5 SK4 MR1 PII SW9 P7 SK2 TRI V6a SKIO V6b MR4 MR2 V7b LPI VS1 LP2 JK3 JK1 P8 V4a V1a P2 JK2 X4 V1b JK4 SW1 X5 V2b V3b X6 V2a SW10 SW3 L1 V3a L3 SW5 L2 P1 P6 V4b MI SK11 SK7 V9a SK3 L4 V9b TR2 V8a SW11 SW6 SK8 SK1 SK6 V8b SW7 P10 FS1 V7a SW8 MR3 JK5 TR3 JK6 VS2 OSU1 LS1







simultaneously pressing the Record Lock button. For short passages the reels should be rotated manually until the second mark is against the erase head face and then the deck switch turned from record. This manual rotation avoids any possibility of a switching click due to switching on the motors, although for longer passages it is quite in order to use the motors until the second mark appears at the left hand reel. The drive should be stopped and the final part wound manually for greater accuracy and to avoid overrunning the mark.

This method is invaluable for deleting any unwanted parts of a recording or for removing any clicks which are inadvertently made on the tape.

7.2. Superimposition

Superimposition is made possible by removing the plug labelled "Disconnect Erase Only", which removes the supply to the erase head but leaves the bias on the record head. This means that by following the normal record procedure a signal can be recorded onto a previous recording *e.g.* commentary onto background music. However, as explained previously, the record head bias will also act as a weak erase head, slightly reducing the level of the original recording and also selectively erasing the higher frequencies. The result will be a reduced first recording with a diminished high frequency response and a superimposed second recording, the recording level of which will need to be judged by experience and can be checked audibly by using the monitor head. If it is required to diminish the erasing effect of the bias, a variable resistance (approximately 3,000 ohm) could be connected in place of the "Bias Only" plug and the bias reduced to obtain the required balance in quality of the two recordings.

If it is attempted to superimpose over only part of a recording by turning to record midway through the recording, a "jump" in the level of the original signal will be observed due to the change from no erasure to the slight erasure of the bias. In this case it is desirable to fade in the bias gradually to provide a smooth transition. It has been found most convenient to connect a 100 K ohm logarithmic potentiometer (carbon) in place of the "Bias Only" plug and to rotate this from maximum resistance to the zero position. Of course, recording should only take place when the bias is at its maximum value (or very nearly) otherwise distortion will occur.

It is also possible to reduce the level of the original signal by connecting a variable resistance in place of the "Erase Only" plug as explained in the next section.

The actual synchronisation of the two recordings is done using the monitor head with either headphones or loudspeaker as required. However, due to the physical spacing of the record and playback head, there will be a $\frac{1}{4}$ second delay (at $7\frac{1}{2}$ in/sec) between the monitor signal and the record signal and this may make very exact synchronisation a little awkward.

7.3. Interjection

This consists of fading out the original recording, interjecting the new signal and then fading back the original signal again. This is achieved by removing both the plugs and inserting two plugs wired to a wirewound, 4 watt, variable resistance of approximately 2,000 ohm maximum value. A suitable potentiometer is available in the list of

accessories, having a graded characteristic with 1,700 ohm maximum value and having an open circuit position after this. The potentiometer should be wired to one of the thick pins and to both the thin pins (linked together), when it is thus controlling both bias and erase supplies to the heads.

With the potentiometer in the open circuit position no erasure takes place and the original signal is unaffected. If the potentiometer is rotated slowly the resistance gradually falls and the erase voltage increases correspondingly. The erasure also increases and with the tape running, the original signal is gradually faded out. When the resistance is zero, the erase and bias are at their normal values and recording can commence. Afterwards the procedure can be reversed and the original signal faded back in. This method can also be used to fade in and out at the ends of a recording.

It will be found that even the above graded potentiometer does not produce the same effect as a fade made during the recording because the erase field will first selectively erase the higher frequencies (similar to the bias). This produces the phenomenon that the signal tends to grow muffled before an audible change in volume can be detected, and it is advisable to produce the fade during the recording process if this is practicable. This effect also tends to produce an apparent jump in the signal on first starting to turn from the "off" position to the maximum resistance position. The instantaneous change from infinite resistance to 1,700 ohms produces a very slight jump in the erasure of normal frequencies but a much larger one at the higher frequencies.

This can be avoided by using two potentiometers, the 1,700 ohm special potentiometer connected between the pins of the "Erase Only" plug and the 100K ohm carbon potentiometer across the "Bias Only" plug as suggested in Section 7.1. (In this case no link is required between the two plugs as the bias and erase are controlled separately). With both controls fully "off", the "Bias" potentiometer should be turned slowly till the bias is fully "on" and the high frequencies have been faded gradually out. The "Erase" potentiometer can then be turned till the desired level of erasure occurs.

This last arrangement can be very versatile and allows superimposition to occur over fully erased or partially erased signals, and as the resultant recording on the tape can be monitored almost immediately, the signal levels can be controlled to exactly the effect required.

It must again be emphasised that the "Bias only" and "Erase Only" plugs must not be removed when on "Record" and this applies equally to the potentiometers when plugged into these same sockets.

3. VOLTAGE SELECTOR (240V Models only)

The voltage selector illustrated in Fig. 1. has been superseded by twin voltage selectors, both knobs having three positions for mains supplies of 200-210, 220-230, and 240-250 volts. To select the correct setting, both knobs should be pulled outwards (they will not come entirely free), rotated till the correct range is opposite the indicator stud, then pushed firmly home.

The voltage selector knobs must always be set to the same voltage range, otherwise excessive hum will result.

4. REEL MOTORS

On playback and record, the back tension normally applied by the supply reel motor has been replaced by a special constant friction brake applied to the left hand spool carrier. The take-up reel motor is fed its usual 150V (or 75V) from the mains transformer and the deck motor switch has two poles in order to switch the reel and capstan motors separately. Resistor R2 is no longer fitted.

On fast wind, the brake is automatically removed and the appropriate reel motor is fed with 240V (or 110V) as usual. The deck switching has been modified to suit the new arrangement, three poles being used, and to accommodate the extra leads, P8 and SK8 are 14 way and use 12 core connecting cable. The two tagstrips have been replaced by a single combined tagboard mounted on the cross strap at the centre of the deck.

Parts List Changes

CIRCUIT REF.	DESCRIPTION	PART NO.
R2	No longer fitted	
R84	No longer fitted	
R97	3·3 K Ω ½w 20% Carbon	BP/2917/R
R98	25K Ω Pre-set Carbon Pot.	BP/2402/P
R99	25K Ω Pre-set Carbon Pot.	BP/2402/P
C30	4,700pf 500V +100-0% Ceramic	BP/530/C
C31	0·1μF 300V Paper (AC Working)	BP/707/C
C37	4,700pf 500V +100-0% Ceramic	BP/530/C
C55	25pf 350V 5% Polystyrene	BP/539/C
C59	2,700pf 10% Polystyrene	BP/577/C
C60	2,700pf 10% Polystyrene	BP/577/C
C63	25pf 350V 5% Polystyrene	BP/539/C
SW4	Manual Start Switch	MC/2959
SW11	Bias Switch (Slide)	BP/4071/S
P8	Plug 14 Way	BP/2349/P
SK8	Socket 14 Way	BP/3963/C
TR1	Input Transformer	MC/973B
TR2	Input Transformer	MC/973B
L2	Treble Boost Inductor	MC/727
L3	Treble Boost Inductor	MC/727
VS1	Voltage Selector	BP/7030/V
VS2	Voltage Selector	BP/7030/V