

SPECIFICATION

Motor Input

240/250V 50 Hz AC nominal*

(taken from 230V (or, in some models, 245V) tap on the Recorder mains transformer)

*See back page for modification to 60 Hz operation

Current Consumption

135 mA

Maximum Spool Diameter

5½ in.

Tape Speeds

DB42—3½ in. per second and 1⅞ in. per second

DB21—3½ in. per second

Number of Tracks

DB42—Four (standard quarter-track)

DB21—Two (standard half-track)

Fast Wind

Either direction—2½ minutes for 850ft. of tape

Magnetic Heads

DB42—Two Record/Play (stacked) and two Erase (stacked)

DB21—One Record/Play and one Erase

Tape Position Indicator

Digital type fitted with reset button and belt-driven from the take-up spool carrier

SERVICE NOTES

Cleaning

The use of cleaning fluids (such as petrol or carbon-tetrachloride) which might damage plastic surfaces or rubber drives should be avoided.

A soft cloth dampened with methylated spirits should be used to clean the working surfaces of the spool carriers, capstan, pinch wheel, motor pulley and intermediate wheels.

Oxide deposits on the magnetic heads and tape guides may be removed in the same manner, but objects such as screwdrivers should be kept away from the heads to avoid magnetization. Pressure pad and clutch pad surfaces should be kept clean and fluffy.

Lubrication

The sliding surfaces of all operating plates and links should be left dry; the use of grease is unnecessary and may subsequently lead to hardening and binding.

The following points may require occasional lubrication:

- The spool carrier bearings.
- The intermediate drive wheel bearing.
- The top flywheel bearing.
- The intermediate spooling wheel bearing.

Continued on page 7

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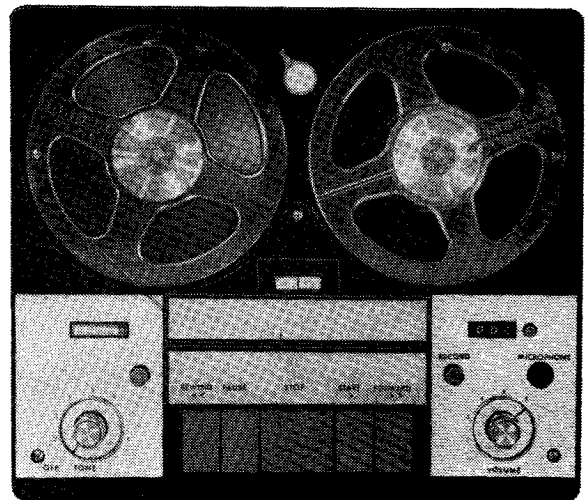
SERVICE MANUAL

Price: Two Shillings and Sixpence

THORN 5-INCH TAPE DECKS

TWIN-TRACK, SINGLE-SPEED MODEL DB21

FOUR-TRACK, TWO-SPEED MODEL DB42



Model DB42

Tape Deck DB21 is similar in appearance except that amp/sup button, track switch and speed change controls are not fitted.

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

BRITISH RADIO CORPORATION LIMITED

SERVICE DEPOTS

LONDON

PO Box No. 121, Eley's Estate, Angel Rd., Edmonton, N.18
Tel. 01-807 3060 Ansafone Spares Tel. 01-807 6332

BIRMINGHAM

24 Sheepcote St., 15 Tel. 021-643 9988

GLASGOW

160/162 Battlefield Rd., S.2
Tel. Langside 9251/2/3/4

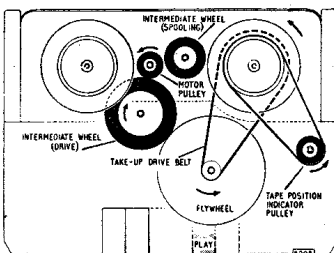


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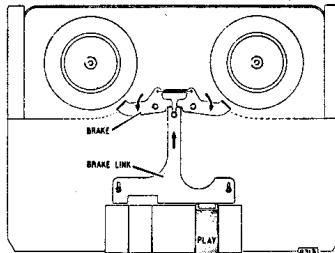
FAULT FINDING CHART

SYMPTOM	CAUSE	REMEDY
1. Flutter	(a) Dirty capstan (b) Bent capstan or motor shaft	Clean Replace faulty part
2. Wow or slow running	(a) Oil on flywheel, motor pulley, pinch wheel or intermediate wheel (b) Weak intermediate wheel tension spring (c) Weak pinch wheel pressure spring (d) Oxide on pinch wheel (e) Motor pulley slipping on "Play" (f) Pause brake arm sticking causing partial "Pause"	Clean all driving surfaces Shorten spring Remove and stretch Clean Replace spring in this assembly Free mechanism
3. Motor fails to run	(a) Wiring fouling fan (b) Intermediate wheel jammed on motor pulley	Redress wiring Operate speed change two or three times
4. Counter inaccurate	(a) Oil on drive belt or pulley (b) Oil gumming pulley bearing (c) Fluff in counter gears	Clean belt and pulley Remove pulley from counter and clean out bearing and shaft. Do not oil Remove with tweezers or replace counter
5. Counter not registering	(a) Counter drive belt out of position (b) Counter jamming	Replace or refit belt Fit new counter
6. Not spooling in one direction	(a) Spooling link spring disconnected (b) Wiring fouling spool carrier spindle	Reconnect spring Redress wiring
7. RH spool failing to take up on "Play"	(a) Drive belt off take-up pulley (b) Counter belt entangled with spool carrier	Refit belts
8. No tape motion on "Play" or "Record"	(a) Pause solenoid energized (b) Pause brake jammed or return spring unhooked	Check for wiring fault Free movement of arm and refit spring if necessary
9. Pinch wheel assembly not returning	(a) Return spring disconnected or weak (b) Muting switch jamming	Refit or shorten (recheck operation of auto-stop) Release or replace
10. Control keys not latching	(a) Latch plate spring disconnected or weak (b) Auto-stop solenoid wrongly adjusted	Refit or replace Readjust
11. Some control keys will not depress	(a) Brake link spring disconnected or weak spring (b) Broken interlock plate	Refit or replace Replace
12. Control key not returning	Key control spring missing or weak	Replace or bend spring
13. Tape spillage	Brake slip	Rub Uno pounce or blackboard chalk (<i>not french chalk</i>) into brake pads
14. Capstan fails to rotate at 1 1/2 in./sec. speed	Lift-off lever not clearing primary arm	Readjust and obtain .030 in. clearance

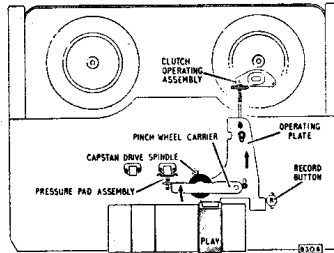
MECHANICAL OPERATION



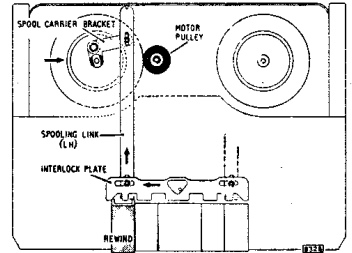
1. The drive transmission on Record/Play



2. Brake linkage movements



3. Pressure pad, and pinch wheel carrier movement when the Record/Play Key is operated



4. Spooling link action on rewind

MODEL DB21

Model DB21 is the twin-track single-speed version of the Model DB42 tape deck and employs a record and play-back speed of 3½ in./sec. only. The model is similarly constructed but Pause and Stop solenoids are not fitted and a twin-track head plate assembly is employed in place of the four-track assembly used in DB42.

Components which effect the speed change to 1½ in./sec. in Model DB42 are also not incorporated.

Components not fitted and item changes (excepting fixing screws, etc.) are listed below.

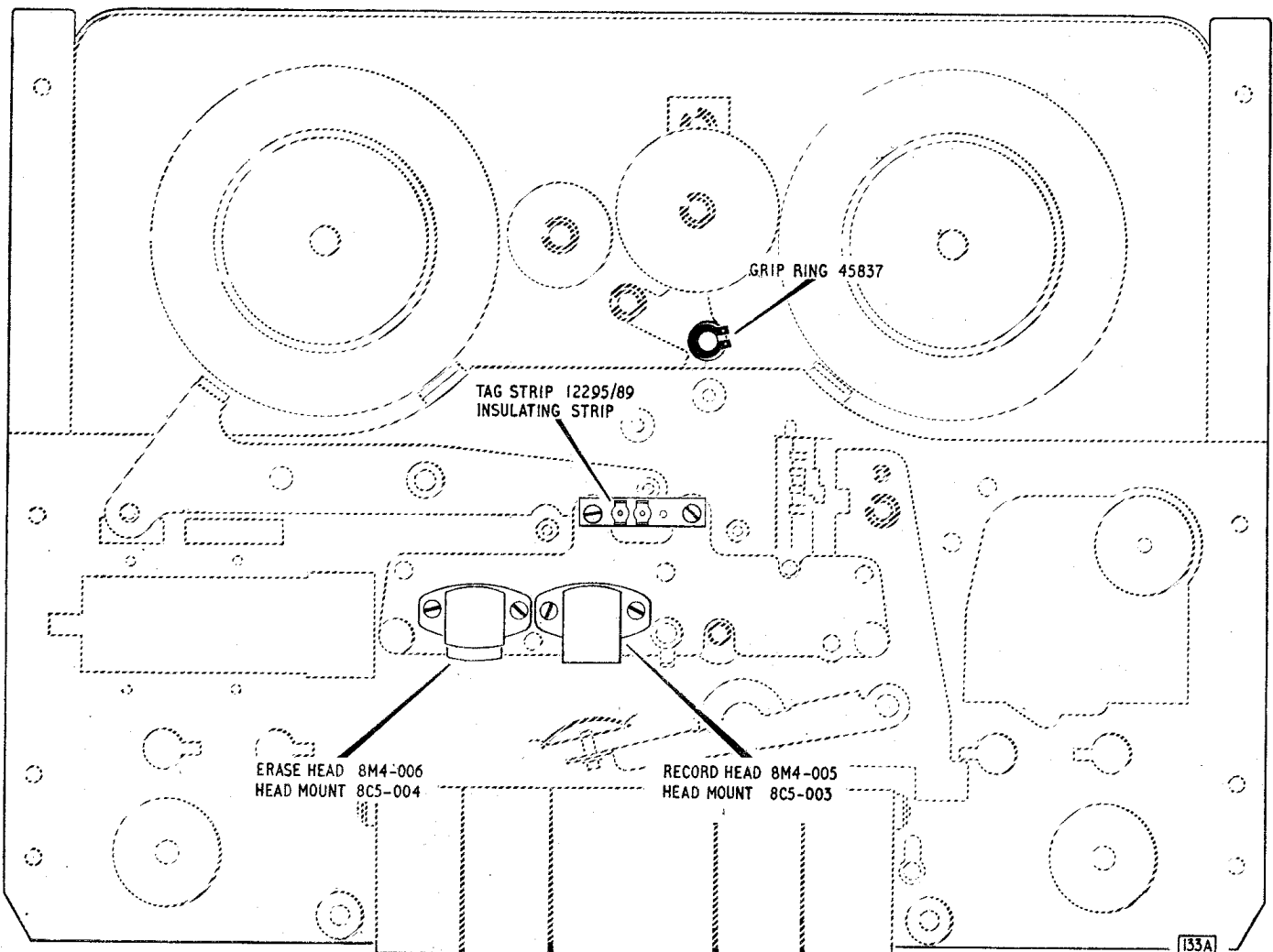
DB42 parts not incorporated

Description	Part No.
"Stop" solenoid	8M4-030
"Pause" solenoid	8M4-031
Speed change bracket	8B1-164
Speed change ramp	8B1-165

Description	Part No.
Speed change cam	8C5-053
Drive release lever	8B1-166
Index spring	8B5-094
Primary arm return spring	8B5-054
Drive release lever return spring	8B5-094
End-of-tape switch contact	8B3-141
Track switch	8E2-025/002

Parts changed or added in Model DB21

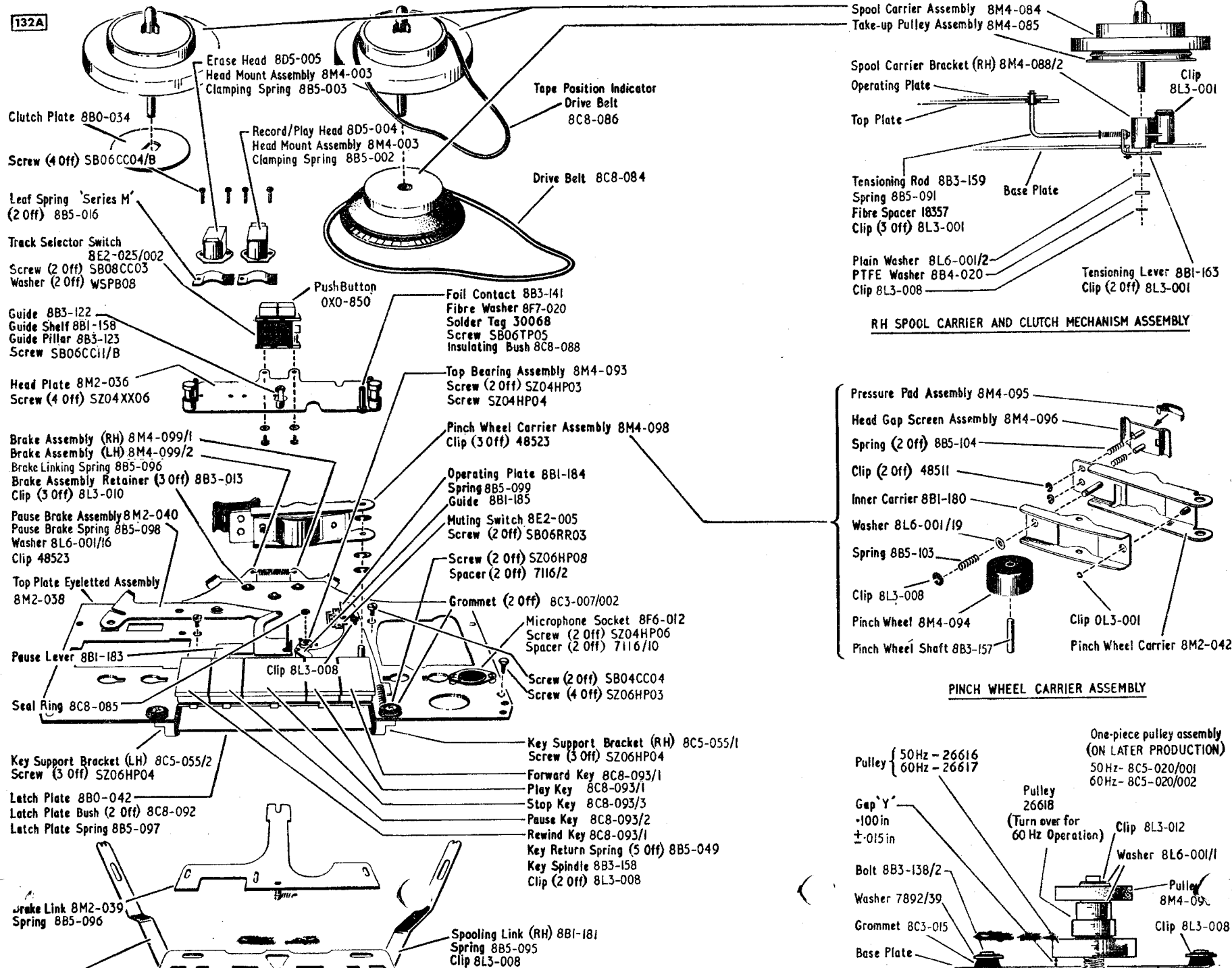
Description	Part No.
Record/Play head	8M4-005
Erase head	8M4-006
Tag strip	12295/89
Insulating strip	11098/3
Head mount—"Record"	8C5-003
Head mount—"Erase"	8C5-004
Head azimuth spring	8B5-047

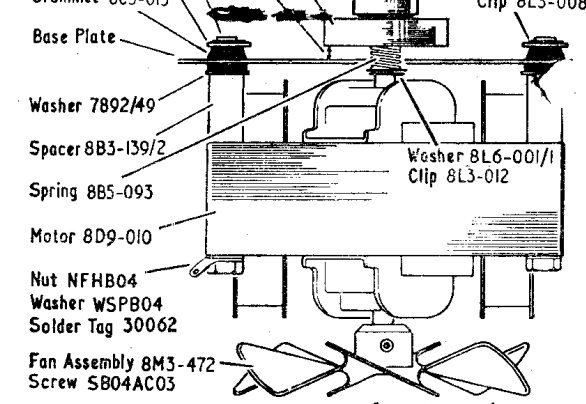
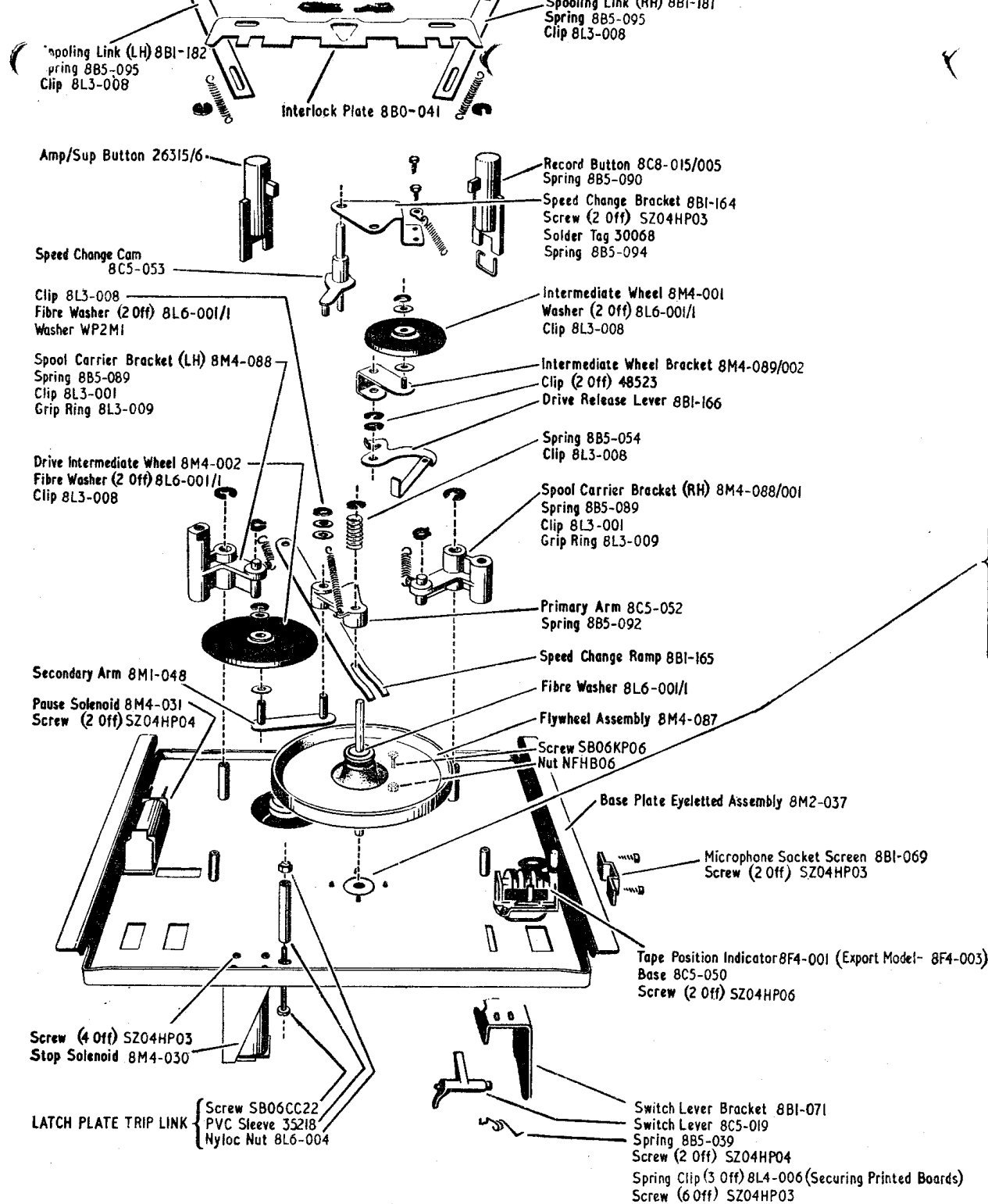


DB21 Tape Deck showing differences from Model DB42

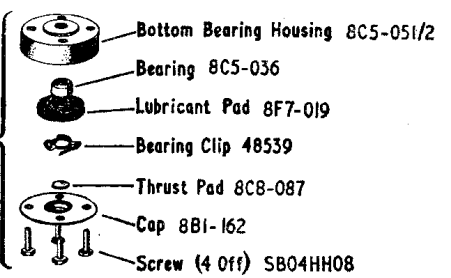
EXPLODED VIEW OF TAPE DECK—MODEL DB42 (DB21 is similar. Differences are outlined on Page 3)

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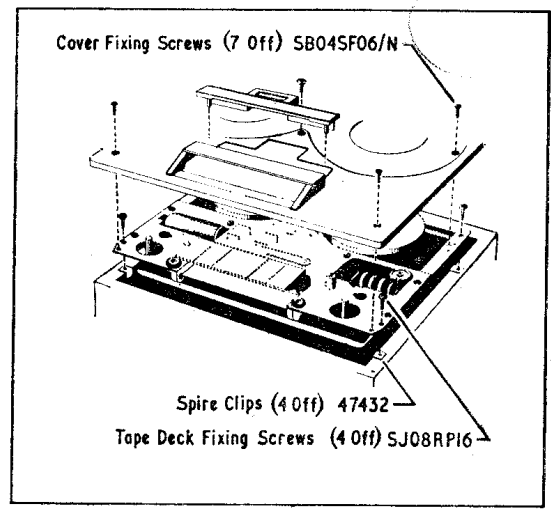




MOTOR & PULLEY ASSEMBLY { 112V 60c/s 8D9-003
230V 50c/s 8D9-010
115V 50c/s 8D9-001



BOTTOM BEARING ASSEMBLY



ELECTRICAL AND MECHANICAL ADJUSTMENTS

Mechanical tolerances and clearances shown below are intended for assembly procedure only and need not be strictly adhered to if the machine is functioning satisfactorily.

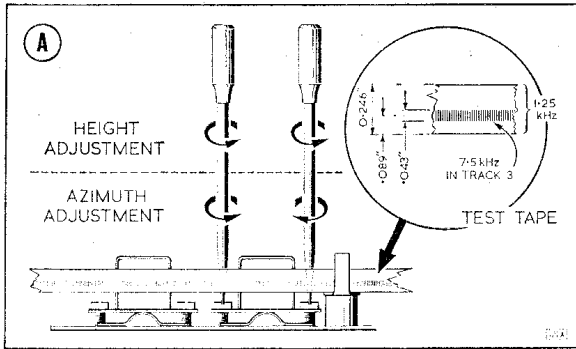


Diagram A shows method of adjusting azimuth and height setting of the signal head using special test tape.*

The method of adjustment requires a simultaneous indication of both and it can be seen how this is achieved by reading from track 3. The azimuth is correct when the 7.5 kHz tone is at maximum and the height when the 1.25 kHz tone is at minimum. Height is adjusted by turning both screws in the same direction and azimuth by turning in opposite directions.

As it is easy to determine minima aurally, the loudspeaker may be used to find the minima aurally of the 1.25 kHz tone. On the other hand, because maxima are difficult to recognize aurally, a meter should be used to determine the peaks of 7.5 kHz tone.

*The special Thorn Height and Azimuth Test Tape Type 6 may be purchased from the manufacturers, Messrs. Tutchings Electronics Ltd., 14 Rookhill Road, Friars Cliff, Christchurch, Hants.

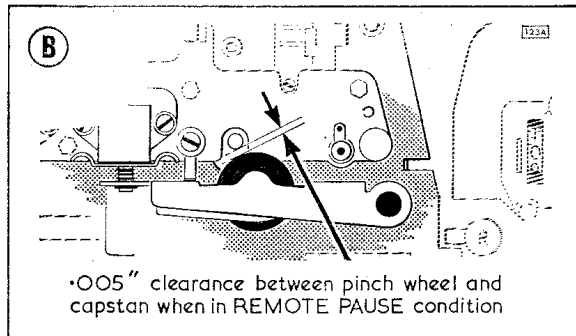


Diagram B illustrates the functions of the pause linkage during remote pause. When the remote solenoid is energized the clearance between the pinch wheel and capstan should be $\cdot 005$ in. At the same time the pause brake pad is lightly applied to the feed spool carrier to ensure an instant stop/start action of the pause.

Diagram C. When the solenoid is de-energized there should be a clearance of $\cdot 040$ in. ($\cdot 065$ in. in later production) as indicated. Adjustment of the pause brake is carried out during assembly by bending the heel section to obtain the correct clearances.

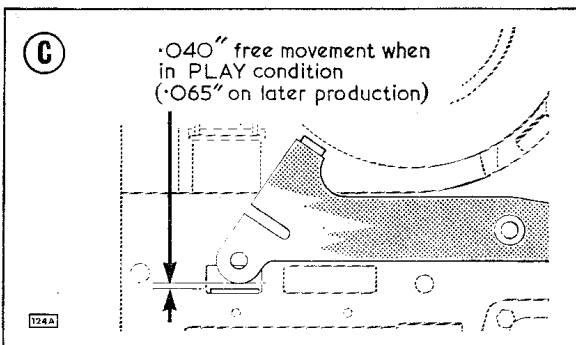


Diagram D. The geometry of the brakes (i.e. leading and trailing shoes) is so arranged that servo assistance is given to whichever spool is feeding tape when the brakes are applied. The diagram indicates the correct tension on the tape that should be obtained when unwinding the last few turns from the hub of a reel in the direction in which the servo action of the brakes is occurring.

Diagram E indicates the correct tension on the tape due to the torque applied to the take-up reel in the 'Play' condition. This measurement is also taken with just a few turns of tape on the hub of the reel. The action of the clutch tensioner can be assessed by alternately depressing the 'Rewind' key and 'Play' key when carrying out this measurement. In both D and E above, insufficient tape tension will probably be due to a weak brake spring or worn brake pads.

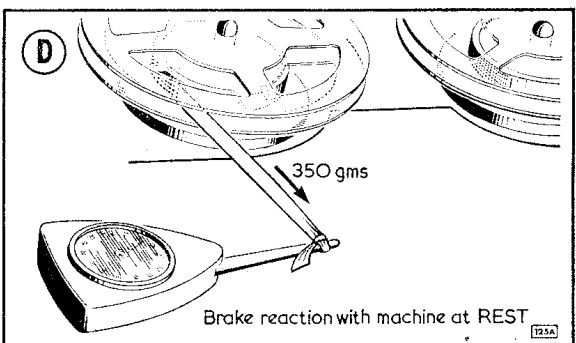


Diagram F. Setting of the auto-stop solenoid (DB42) and latch plate screw (DB21). The solenoid is energized by joining the appropriate tags on the solenoid power board. In earlier models the effective length of the latch plate trip link between the armature of the solenoid and the latch plate is adjusted so that the latch plate just rolls over the heel of the keys without latching. This adjustment has been carried out during assembly at the equivalent to 180V mains, thus ensuring that it functions correctly under all conditions of mains voltage. In later production, a more powerful stop solenoid obviates the need for this adjustment. In model DE21, which does not incorporate stop and pause relays, adjustment of the latch plate is made by turning the setscrew shown dotted in Fig. F until the heel of the Play key (when depressed) protrudes not less than $\cdot 015$ in. below the latch plate.

Diagram G indicates the pull-through tension which the capstan and pinch wheel are capable of exerting on the tape when the Play key is depressed.

The tension of approximately 600 grammes indicates that the pressure of the pinch wheel compression spring is correct and also that excessive oxidization of the pinch wheel has not occurred.

Diagram H indicates the load imposed on the tape by the pressure pad assembly. If this pressure is too high excessive wow and flutter will result. On the other hand, if the load is considerably less than that quoted, it is probable that the pressure pad spring is weak and that with poor quality tape, 'drop-outs' during recording would occur.

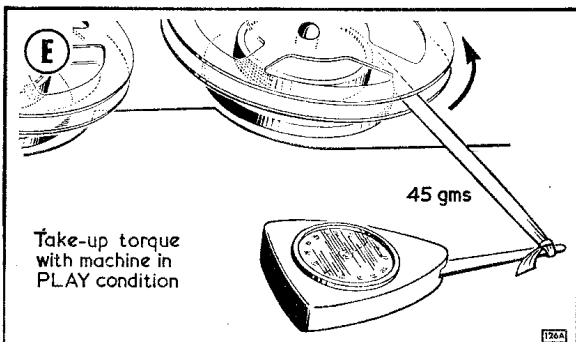
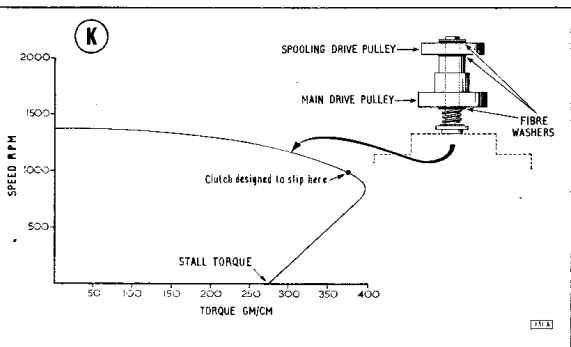
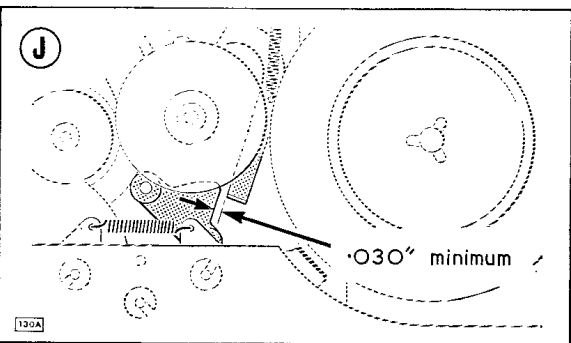
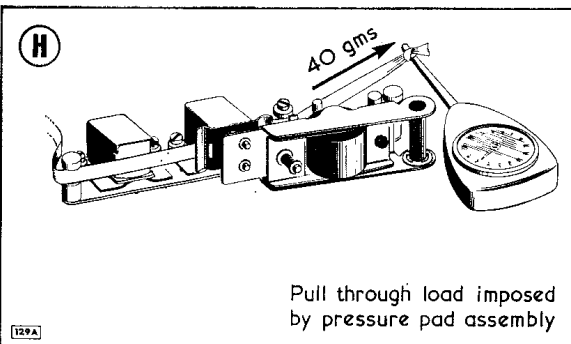
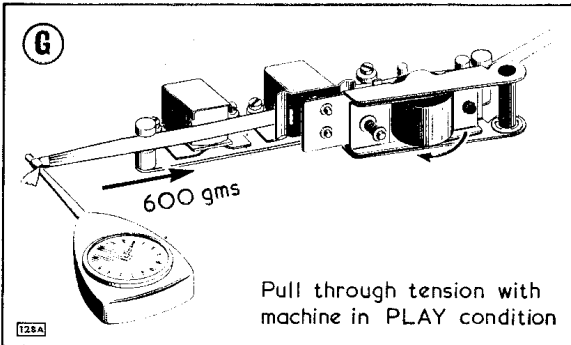
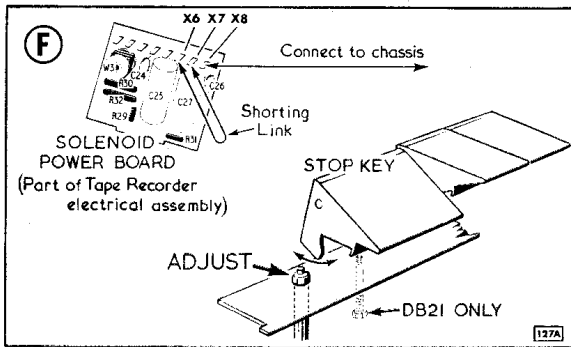


Diagram J shows speed change mechanism clearance. The clearance indicated is that which should exist between the lift-off lever and the primary arm when the speed change control is in the 1 $\frac{1}{2}$ in. per second position. It is essential that this clearance exists, otherwise the drive to the capstan will fail as the intermediate wheel wears.

Diagram K illustrates the action of the slipping motor pulley assembly.

It can be seen that rotational slip between the motor pulley and the motor shaft can occur and the reasons for allowing controlled slip are twofold.

Reference to the speed versus torque characteristic of the motor will clearly indicate that the stalled torque is lower than the maximum running torque. Thus it will be appreciated that unless the motor can be prevented from stalling, its maximum output cannot be utilised. Therefore, the slip between the motor pulley and the shaft has been arranged to occur when the load exceeds the safe-running limit. At the commencement of spooling, however, the motor is able to deliver its maximum torque when, of course, it is most necessary. In practice the slip only happens when the spooling drive is first engaged; once the reels have picked up speed and the load on the motor is reduced, the slip ceases. Additionally, this controlled slip has the advantage of reducing the skidding between the driving surfaces of the spooling wheels and greatly reduces wear on them. It also results in a much smoother acceleration of the reels when the drive is first engaged, thereby reducing wear on the tape.



Service Notes—Lubrication—continued

A light machine-oil should be used.

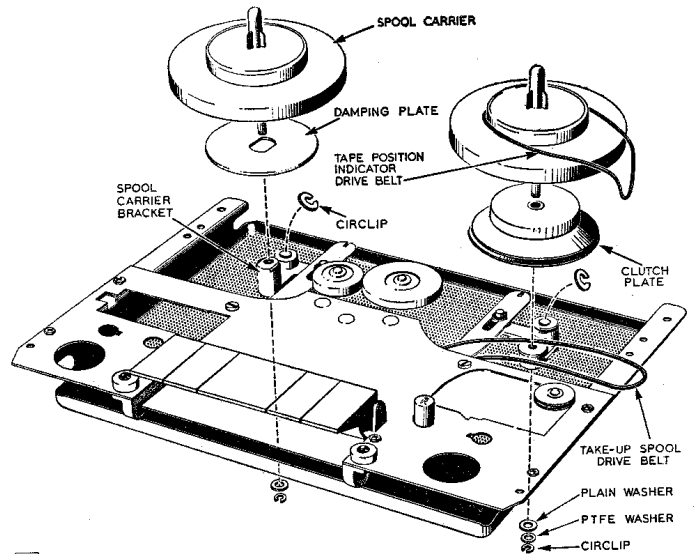
A small drop on the end of a matchstick is sufficient in each case.

It is important that oil should be used sparingly to ensure that it is not spread to the drive surfaces of the wheels by centrifugal action. If this happens the excess oil should be removed, again using a cloth dampened with methylated spirits.

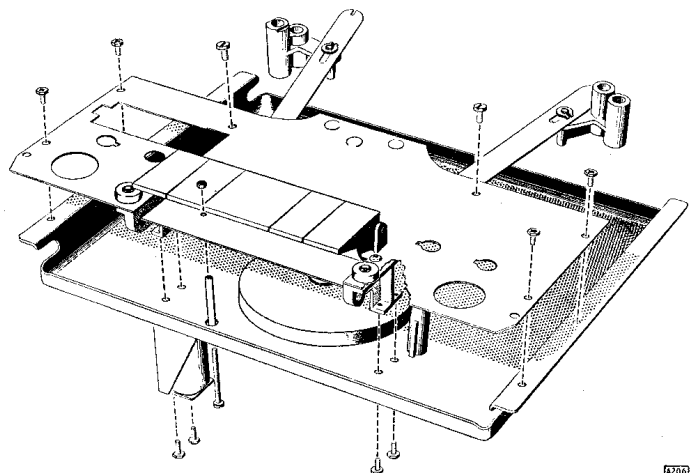
Do not lubricate the tape position indicator.

DISMANTLING FOR SERVICE

The diagrams below illustrate the two-stage process for dismantling the top plate assembly.



Top Plate Removal, first stage



Top Plate Removal, final stage

continued overleaf

MECHANICAL NOTES**Top Plate Assembly**

Detach tape indicator drive belt. Remove circlip and washer from underside of base plate to release feed (left-hand) spool carrier. The take-up spool has also a PTFE (polytetrafluorethylene) washer located between circlip and steel washer. The PTFE washer is part of the clutch mechanism and must not be substituted by any other type. When withdrawing take-up pulley, note that belt-driven clutch plate will also be released from the spindle.

Remove damping plate from feed spool carrier bracket, and circlip from spindle below the washer, leaving spool carrier bracket attached to spooling link. Remove similar circlip from take-up spool carrier bracket. Unscrew nut from screw linking control keys latch plate to stop relay. Remove circlip which secures clutch operating rod to top plate.

From underside of base plate, take out four screws securing control keys assembly. Finally, remove two self-tapping screws from each side of top plate and also two cheese-headed screws adjacent to ends of head plate assembly. Taking care not to impose any strain on the capstan spindle nor to bend spooling links, carefully lift off the top plate and spool carrier brackets within limit of leads.

Head Plate Assembly

This assembly (not shown) is secured by four hexagon-headed PK screws and may be detached after unsoldering Erase and Record/Play head connections. In Model DB42 it is also necessary to disconnect the stop foil connection and to remove from the underside of the head plate two screws securing the track switch to the head plate.

The Pinch Wheel Carrier Assembly

The pinch wheel carrier assembly may be lifted from its spindle following removal of one circlip located on the inside of the lower arm of the pinch wheel carrier.

The Motor

The motor is secured on a 'floating' suspension by three circlips and washers which may be reached upon removal of the spool carriers and intermediate wheel.

Note and disconnect soldered motor connections if motor is to be completely detached.

60 Hz CONVERSION

To modify the tape deck for 60 Hz operation, reverse the $1\frac{1}{2}$ in. per sec. pulley (Part No. 26618) so that the smaller diameter face contacts the intermediate drive wheel; also replace the $3\frac{3}{4}$ in. per sec. pulley (Part No. 26616) with Part No. 26617. See Fig. 6. In later production models, separate $1\frac{1}{8}$ and $3\frac{3}{4}$ in. per sec. pulleys are replaced by single composite pulleys (Part No. 8C5-020/001—50 Hz; Part No. 8C5-020/002—60 Hz).

Pinch Wheel Assembly. The pinch wheel "floats" upon a separate spring-loaded sub-carrier attached to the main pinch wheel carrier. This system allows the pinch wheel to be virtually self-aligning in both vertical and horizontal planes when in contact with the capstan.

The main pinch wheel carrier also supports the pressure pad assembly.

Spool Carriers. The spooling system has been designed to provide a means of increasing friction to the take-up spool for the Play/Record function and reducing it for the fast-wind and rewind functions. The increased friction provides a tight wind onto the take-up reel and reduces tape bounce when the Pause control is released. Furthermore, the take-up drum will not stall in the event of the counter becoming jammed.

The change of clutch tension is achieved by the tensioning lever pulling the RH spool carrier onto the take-up pulley.

When the Stop key, or either Wind key, is operated, the operating plate is tripped thereby reducing clutch friction and allowing the spool to run more freely.

Head Position In Head Clamp. Erase head should protrude .035in. from front edge of clamp. Record/Play head should be recessed .095in. \pm .010in. from front edge of clamp.

Readjust only if factory settings have been disturbed or if relevant parts have been replaced.

DC RESISTANCE OF MAGNETIC HEADS AND SOLENOIDS

Model	Record/Play	Erase
DB42	450 Ω	4 Ω
DB21	335 Ω	1.75 Ω
Solenoids	27.5 Ω each	

It will be necessary to demagnetize the heads if an ohmmeter is used for the above measurements.

When ordering replacement parts, please quote Model number and include the description or function given with the part number.