



INSTRUCTION MANUAL  
MINIATURE BATTERY OPERATED TAPE RECORDER  
TYPE CEB.

TABLE OF CONTENTS

	<u>PAGE</u>
<u>SECTION 1</u> <u>GENERAL</u>	4
1.1 Application	4
1.2 General Description	4
1.3 Performance Specifications	5
<u>SECTION 2</u> <u>DETAILED DESCRIPTION</u>	7
2.1 Tape drive mechanism	7
2.2 Battery supply switching	8
2.3 Recording channel	8
2.4 Playback Channel	8
2.5 Monitor and rewind alarm system	9
<u>SECTION 3</u> <u>OPERATING PROCEDURE</u>	10
3.1 Setting up the equipment	10
3.2 Recording	10
3.3 Playing back	11
3.4 Other facilities	11
3.5 Batteries	11
<u>SECTION 4</u> <u>MAINTENANCE</u>	13
4.1 Lubrication	14
4.2 Adjustments	15
4.2.1 Supply spool brake	15

	<u>PAGE</u>
4.2.4 Rewind alarm	15
4.2.5 Record and playback heads	15
4.2.6 Azimuth adjustments	15
4.2.7 D.C. Bias Adjustments	16
4.3 Amplifier Test Information	17
Table 1. Record amplifier	17
Table 2. Replay amplifier	18
4.4 Overall performance test figures	19
4.5 Fault Locating Table	20

APPENDIX 1. SCHEDULE OF COMPONENTS.

APPENDIX 2. GENERAL NOTES ON THE CAPSTAN AND FLYWHEEL.

DRAWINGS.

<u>Drawing No.</u>	<u>Title</u>
CD.1105	Circuit Schematic
A.3105	General arrangement, lid removed
A.4105	Top view with front panel removed
A.5105	Plan of chassis showing capstan assembly, etc.
A.6105	Bottom view
A.7105	General arrangement of Battery Compartment

---

SECTION 1. GENERAL

1.1 Application.

The Type CEB Tape Recorder is a lightweight battery operated unit, suitable for recording in locations where A.C. power is not available. It incorporates a spring-driven motor, a recording amplifier channel with sufficient gain to use a high quality 50 ohm moving coil microphone and a play-back channel with loudspeaker output. Monitoring and metering facilities are also included.

1.2 General Description.

The tape recorder is housed in a maroon plastic covered wooden case, overall dimensions being 14" x 8 $\frac{1}{2}$ " x 8 $\frac{1}{2}$ " high. Its weight is 23 $\frac{1}{2}$  lbs including batteries.

The unit is constructed around an aluminium casting, which comprises the tape deck and mounts the double-spring clockwork motor, the tape drive and speed regulating mechanisms and the tape head assembly. The amplifier chassis is fitted to the main casting, while the loudspeaker and the battery compartments are attached to the case.

Interconnecting leads are brought out via 4 pin plugs and sockets. The battery plug and sockets are coded to prevent incorrect mating.

In order to reduce the effects of microphony the amplifier tubes are mounted on shockmounted sub-chassis, and the wiring to the component panel is carried out in special multi-stranded wire woven around a nylon core. The movement of the shockmounted chassis is limited.

Operating controls, fitted to the side of the unit and available through an opening in the case, are as follows:-

START/STOP lever, which also operates the battery switch.

MICROPHONE socket, this being a standard 3 pin receptacle to suit standard studio microphones.

'PHONES jack, for monitoring purposes (high impedance 'phones).

GAIN control for adjusting the recording level.

Access to the motor drive belt and the majority of adjustment points is gained by removing the front panel which is held by 4 screws.

The following controls and meter are available from the front panel:-

Meter Switch - with positions for checking LT and HT batteries and recording level.

Play-Record Switch.

Capstan Speed Adjusting Screw.

Playback level - preset with screwdriver adjustment.

The unit is held in its carrying case by two screws fitted with grooved rings to attach the carrying strap. This allows the operator to carry and use the unit while supported from his shoulders.

The tape transport system has been designed to make the most efficient use of the limited power available from the spring motor. At the same time the performance achieved is of a high order, thus enabling recordings of professional standards to be made.

Fast forward and rewind facilities are available by carrying out a simple re-threading of the tape to be described later (Section 3.4.).

The recording amplifier channel has been designed to give ample gain for use with a high quality 50 ohm moving coil microphone. The record head incorporates a ferrite core with resultant economy of bias power.

No erase head is provided in this unit and pre-erased tapes are to be used.

A playback head is used to monitor the recording through a separate amplifier channel and high impedance earphones. The same head and amplifier are used to drive a 5" loudspeaker for re-play purposes. Winding may be carried out whilst recording.

Lines marked on the perspex panel, directly above the spool of tape on the supply side, permit the operator to ascertain when a motor rewind is necessary.

The battery complement is as follows:-

- 1 - type 742 "LT" battery ( $1\frac{1}{2}V$ )
- 2 - type 467 "HT" battery ( $67\frac{1}{2}V$ .ea.)

The life of the batteries depends on the operating cycle of the equipment. For example, if the equipment is operated say for 2 hours per day at cycles of 10 minutes on and 50 minutes off, then the approximate life of the batteries would be:-

"LT" - 50 hours' actual recording time  
"HT" - 20 " " " " "

### 1.3 Performance Specification.

Tape Speed       $7\frac{1}{2}$ " /Sec

<u>Recording</u>	Full track		
<u>Frequency response</u>	With $\pm 2$ db of the response at 1 Kc/s, from 100 c/s to 7 Kc/s when re-played on a recorder having C.C.I.R. characteristics.		
<u>Distortion</u>	At full recording level, less than 5% when re-played as above.		
<u>Signal/Noise Ratio</u>	Better than 40 db below full recording level, with the gain control set for an input of -80 dbm, when re-played as above.		
<u>Wow and Flutter</u>	Better than 0.35% R.M.S. total.		
<u>Bias Oscillator frequency</u>	40 Kc/s. $\pm 10\%$		
<u>Re-Play amplifier output</u>	Approx. 60 mW into loudspeaker at full recording level.		
<u>Re-Play amplifier distortion</u>	Less than 5%.		
<u>Playing time per wind</u>	4 minutes.		
<u>Battery consumption</u>	<u>Record</u>	<u>Re-play</u>	
1.5V	0.35 amp.	0.18 amp.	
135V	12.5mA	8.5 mA.	

SECTION 2. DETAILED DESCRIPTION.

2.1 Tape-drive Mechanism.

Reference should be made to Drawing No. A.4105 showing details of the tape deck.

The drive of the motor is applied to the take-up spool hub (C) by means of the drive pulley (A) and a rubber belt (B).

The brake-lever (E) applies friction to the supply spool hub (D) when the start/stop lever (F) is in the "stop" position. In the "start" position a cam (G) partially releases the brake, leaving sufficient friction to provide some tape back-tension. This is controlled by means of a spring (SP1).

The linear speed of the tape is controlled by the capstan and governor assembly (H) in conjunction with the pinch wheel (J) and the servo arm (K). Details of the governor assembly are shown on Drawing No. A.5105.

A 50 cycle/sec. stroboscope is attached to the top of the fly-wheel (L) allowing for accurate pre-setting of the speed by means of a spindle (M) which in conjunction with a spring (SP2), (Drawing No. A.5105), controls the setting of the governor. The movement of one segment of the stroboscope past a given point per second is equal to a speed change of 1%.

When the equipment is switched on, the cam (G) also actuates a lever (N), which operates the filament supply switch (SWA) by means of an adjustable screw (O). In the "stop" position, a lever (P) applies braking to the motor pulley and the pinch wheel (J) is lifted clear of the capstan by means of a screw (Q) acting on the servo arm (K).

The action of the servo arm can be explained as follows:-

When the tape is threaded for normal operation as shown in Drawing No. A.3105, the upward tension on pulley "R" is governed by the amount of tape on the take-up spool. As the latter fills up the angle of contact between the tape and the pulley decreases with a resultant reduction in the upward pull. The result is a decrease in pressure between the pinch wheel and the capstan, thus equalising the tape tension. A limit to this is set by a spring (SP3).

The record and playback heads are mounted on a plate (S). Azimuth adjustment is by means of screws (AZR) and (AZP). A small terminal (T) is connected to the record head and extends through the front panel. It may be used for adjusting the record head Azimuth by feeding its output to an external amplifier.

A microswitch (SWE) is fitted to the rear of the motor. Details are shown in Drawing No. A.5105. The alarm lever (U) is under the influence of two tensions, i.e., the tension inserted by the motor spring countered by a spring (V), whose tension is adjustable by means of a screw



If required this switch can be used as a means of operating a rewind alarm system (not supplied with the equipment). The lever (U) has been locked by means of a screw.

## 2.2 Battery Supply Switching.

Reference to the circuit Schematic (Drawing No. CD.1105) shows that the filament circuit is closed by a microswitch operated from the start/stop lever (see previous section). The negative side of the L.T. battery is returned to ground, whilst the negative side of the H.T. supply is returned to ground via the bias resistors (R12 and R28).

Filament power is applied to the first two stages (V5 and V6) of the playback channel as soon as SWA is operated. When the "Play/Record" switch (WRA) is in the "Record" position the filaments of the record amplifier stages (V1, V2, V3 and V4) are energised. When the switch is in the "play" position, the loudspeaker amplifier is operated.

## 2.3 Bias Supply.

Reference to the Circuit Schematic, Drawing No. CD.1105, Issue (C) shows that the back bias resistance comprises two resistors, viz.,

- (a) Fixed resistor, R.12, 470 ohms,
- in series with
- (b) a potentiometer, R.28, 1000 ohms, linear.

As a result, the D.C. bias can be adjusted for minimum distortion. At any time, when the distortion is found to be excessive or after replacing V3 (Type 3V4), the D.C. bias should be adjusted as described in Section 4.2.7.

## 2.4 Recording Channel.

There are three stages of amplification (V1, V2 and V3) employing two type 1U5 tubes and one type 3V4. A type 3V4 tube (V4) is used in the bias oscillator stage.

Resistance/capacity coupling is used throughout the amplifier. High frequency pre-emphasis is provided by means of a feedback network (R9, R10 and C8).

In order to obtain a small amount of treble boost, a network consisting of R.29, R.30 and C.19 is added as a feedback circuit, between the anode and grid of V.1. Details are shown on the Circuit Schematic (Drawing No. CD.1105, Issue C).

If the condenser (C.19) is not connected, approximately 3db constant feedback over the frequency range is available.

A condenser having a value of 400 pF will give approximately 2 db boost at 7 Kc/s.

record head (RH1) via a blocking condenser (C6), load resistor (R10), and the secondary of the bias oscillator coil (L1). C7 forms a resonant circuit with the secondary of L1 and the record head.

A relative indication of the recording level is obtained on the built-in meter (M1). The value of the multiplier resistor (R2<sup>A</sup>) is such as to give a meter reading at the lower limit of the hatched portion of its scale, when full recording level is used.

#### 2.5 Playback Channel.

A three-stage, resistance/capacity coupled amplifier is used (V5, V6 and V7). Approximately 60 milliwatts output is available to feed the loudspeaker. Loudspeaker level control is obtained by means of a preset potentiometer R19.

A network consisting of R20 and C16 across the primary of the output transformer (T3) provides de-emphasis.

The anode voltage of the second stage (V6) is applied to the output stage (V7) when the play/record switch (WRA) is in the "PLAY" position. In the "RECORD" position, the filament of V7 is switched off, and V6 becomes part of the monitor circuit (see following section).

#### 2.6 Monitor System.

Under recording conditions, the signal is reproduced from the tape by the re-play head (PUL) and amplified in the first two stages (V5 and V6) of the play-back channel. The output of V6 is applied to the monitoring headphones through J1.

SECTION 3. OPERATING PROCEDURE.

3.1 Setting Up the Equipment.

When placing the recorder in operation, the following procedure should be followed:-

- (a) Loosen the captive thumb screw at rear of recorder case, open the flap and check that the batteries are fitted. See Section 3.5 for details of fitting or changing batteries, and refer to Drawing A.7105.
- (b) Plug a pair of high impedance headphones into the jack on the control panel at the left hand end of the case. Place the Start/Stop lever on "Start", and check battery voltages as shown on the built-in meter with the selector switch (WRE) in the "L.T." and "H.T." positions. The meter should read within the red hatch area of the scale. If the reading is low, the appropriate battery should be replaced.

Return Start/Stop lever into "Stop" position:

- (c) Place a 5" spool of pre-erased tape on the left hand hub, and thread the tape as shown on Drawing A.3105. It is essential that the tape be wound coated side inward. Place an empty 5" spool on the right hand hub. See that the tape is correctly placed in the guides and over the heads, otherwise it may run off the capstan when the recorder is started. IMPORTANT: Use only PVC thin base tapes with large hub spools; old type, small hub spools, will cause excessive changes in tape tension.
- (d) Pull out the retractable winding handle and wind up the motor. Do not overwind. Stop winding when resistance is felt.
- (e) Plug a 50 ohm moving coil microphone into the socket on the control panel. Place the Play/Record switch to "Record" position. Switch the lever to the "Start" position and meter selector switch to the "VU" position. Advance the "Gain" control until the meter peaks into the red hatch area whilst speaking into the microphone.
- (f) Set the speed of the flywheel by viewing the stroboscope under a 50 c/s fluorescent or neon light. The speed should be set by means of the screw driver adjustment adjacent to the fly wheel, so that one bar appears to pass a given point each second in <sup>an</sup> clockwise direction. This test should be made with the take-up spool (right hand) nearly empty, and the motor fully wound. Under these conditions, the tape speed will be approximately 1% fast, which will allow for a drop in speed as the motor unwinds. The recorder is now ready for use.

3.2 Recording.

- (a) Place the Start/Stop lever into "Start" position.

- (c) Check that the Play/Record switch is in the "Record" position.
- (d) Speak into the microphone.
- (e) Check.
  - (i) "I.T." and "H.T." meter readings.
  - (ii) ".U." meter reading - should peak within red-hatched area. If necessary adjust gain control.
  - (iii) Recording in monitor headphones.
- (f) Winding is necessary when the outside of the tape on the supply spool lines up with the markings printed on the perspex window. When winding, while a recording is in progress, wind at an even rate and do not overwind.
- (g) Switch off when the recording is completed by placing the Start/Stop switch into the "Stop" position.

NOTE: Having switched off, wait for approximately 1 minute before switching on again. This allows the flywheel to stop, and avoids spilling the tape. Alternatively the flywheel may be stopped quickly by gentle pressure of the finger on the rim.

### 3.3 Playing Back.

- (a) Thread tape to be replayed as in Section 3.1.
- (b) Start recorder as in 3.2 (a) and (b).
- (c) Check that Play/Record switch is in "Play".
- (d) Set level control (screw-driver slot adjustment through front panel), for convenient loudspeaker level.

### 3.4 Other Facilities.

To wind the tape fast forward, remove the tape from the pinch wheel so that it passes straight to the take-up spool (not via the capstan).

To rewind, remove the spools and change them over, threading as for fast forward.

No complex brakes or clutches are used to aid rewinding; the left hand or supply spool should be braked lightly with the finger tips when running fast, to ensure even winding of the tape.

### 3.5 Batteries.

Drawing No. A.7105 illustrates the battery compartment. Access is obtained by loosening the knurled captive screw at the rear of the

The battery complement comprises a type 742 battery (1.5 volts) for the L.T. Supply, and two type 467 batteries (67.5 volts) for the H.T. Supply.

The battery compartment socket (SKB) and the plug (PLA) attached to the interconnecting leads, are coded with red paint to prevent plugging in incorrectly.

SECTION 4. MAINTENANCE.

To Remove the Unit from the Case.

- (a) Open the flap of the battery compartment, and disconnect the battery cable.
- (b) Disconnect the loudspeaker cable, being careful not to damage the shock-mounted sub-chassis.
- (c) Unscrew the 2 screws which fasten the casting to the case.
- (d) Remove the winding handle.
- (e) Lift out the unit, holding it by the meter casting. DO NOT LIFT OUT THE RECORDER BY THE TAPE PULLEY OR CAPSTAN ASSEMBLY. THIS WILL RESULT IN SERIOUS DAMAGE TO THESE MECHANISMS.

Part	Shown On Drawing No:	Symbol:	Lubricant	Procedure	Period
Capstan ball bearings	A.5105	H1, H2	Solution of 10% Shell G.960 in Shellite.	Introduce 3 drops into each ball bearing, via the holes from which the shaft emerges	2 months
Governor disc.	A.5105	H3		Clean with 2-3 drops of kerosene	When requ
Spool hub. ) Pinch Wheel ) Trolley ) Motor )	A.4105 A.4105 A.4105 A.5105	C & D J R d	Grease : Shell Retinax A.	Should stiffness occur in any of these bearings, wash out with kerosene, and re-grease	When requ
<u>Motor.</u> Fan brake shaft pivots	A.5105	a & b	Shell G.960	Add 2-3 drops	2 months
Fan brake shaft worn	A.5105	c	"Acheson's Oildag"	Light smear	2 months
Other pivot bearings			Shell G.960	2-3 drops	2 months
Gears			Grease : Shell Retinax A.	Light smear	When requ
Belt Guide Pulley	A.4105	I	Shell G.	2-3 drops. NOTE: Keep oil off pulley.	When requ

## 4.2 ADJUSTMENTS.

### 4.2.1 Supply Spool Brake

The tension on the tape leaving the supply spool is important and may be measured by applying a gram gauge to the spool, at the junction of the spool arms and the rim, the correct tension being 15-17 grams. Adjustment may be made by bending the spring lug "SP11" (Drawing No. A4105) towards the spool for greater tension or away for less tension. The adjustments must be made with the start lever in the "Start" position.

### 4.2.2 Servo Arm Release Screw (Q).

This screw should be adjusted to lift the pinch wheel clear of the capstan when the machine is stopped. To adjust, place lever in "start" position and turn screw to give approximately .010" clearance between the end of the screw and the servo arm. Lock in position with locknut.

### 4.2.3 Fanbrake Shaft. (See Drawing No. A.5105).

Note that the pivot bearings are bored eccentrically and rotation of these controls the meshing of the worm and wheel (C). The meshing should be as deep as possible, consistent with complete freedom from binding. The pivots should also be adjusted to allow free rotation without excessive end play as this will cause noisy operation.

### 4.2.4 Re-Wind Alarm Switch. (See Drawing No. A.5105)

To place the switch SWB into operation, remove the screw which locks the lever (U).

To adjust the operation of the switch thread the tape to an empty take-up spool. Wind motor fully and allow machine to run for approximately 4 minutes. Adjust spring tension screw (X) on back of spring motor so that the switch just operates when the motor is running.

The alarm lever (U) should move approximately 1/32" when pressure is applied with the fingers and the microswitch (SWB) should operate. If not, loosen the screw "Z" and move lug "Y" slightly until switch operates correctly, then tighten screw.

### 4.2.5 To Replace Record and Playback Heads. (See Drawing No. A.4105).

After prolonged use it may be necessary to replace the heads. A complete assembly consisting of the base plate and heads is supplied as a replacement unit. It is only necessary to remove the two 6BA screws (S1 and S2), unsolder the leads and remove the old assembly. When replacing, be careful to retain the shims underneath the plate.

### 4.2.6 To Adjust Azimuth. (See Drawing No. A.4105)

Remove battery plug.

Demagnetise heads. This may be obtained from the manufacturer.



off the eraser.

Thread azimuth test tape on recorder.

Connect test lug "T" to the input of a high gain amplifier (use recorder chassis as earth). Start machine and adjust azimuth screw "AZR" at the side of the record head for maximum output from the amplifier. Remove amplifier connection and replace battery plug. Switch recorder to "Play" position and align replay head ("AZP") in a similar fashion by listening to the loudspeaker output.

#### 4.2.7 D.C. Bias Adjustment.

Connect a screened lead between the replay head (PUI) and a suitable amplifier, the output of which is fed to a distortion meter.

Prepare a recording at 800 or 1000 c/s. in the usual manner and adjust R.28 for minimum distortion reading.

NOTE. If the distortion and noise meter used is fitted with inbuilt weighting networks, it is advisable to carry out the above test with the "telephone weighting" switched in; this will eliminate the noise contents in the recording and will allow a more accurate setting of R.28.

4.3 Amplifier Test Information.TABLE 1. RECORD AMPLIFIER.

Tests taken on amplifier with 20,000 ohm/voltmeter and with the following battery voltages:-

L.T.	=	1.4 V to chassis
H.T.	=	120 V " "
Back-bias	=	10 V.

Stage	V. Anode	V. Screen
V1	33V	33V
V2	20V	36V
V3	26V	90V
V4	68V	68V

R.M.S. Bias oscillator voltage across Record head = 50V  $\pm$  5 V.

Output required for standard recording level = 1.5V RMS at 1000 c/s.

Maximum sensitivity (gain control turned to maximum).

Reference = 1.5V RMS at 800 c/s, measured across R10 with record head shorted out.

Input required = -76 dbm.

Frequency response

Output measured across R10 (record head in circuit).

50c/s	-3.5db
100c/s	-1.5db
1000c/s	0 db
3000c/s	+1.5db
5000c/s	+3.5db
7000c/s	+5 db
10000c/s	+2 db

Signal/Noise ratio Measured with gain control set to maximum.

Reference = 1.5V RMS across R10.

TABLE 2     PLAYBACK AMPLIFIER.

20,000 ohm/volt meter.

Battery voltages † L.T. = 1.45 V to chassis.

H.T. = 125 V to chassis.

Back bias - 6.8 V.

<u>Stage</u>	<u>V.Anode</u>	<u>V.Screen</u>
V5	17 V.	30 V.
V6	57 V.	57 V.
V7	88 V.	90 V.

Maximum sensitivity (level control turned up to max.)Reference output ‡ 25V RMS at 800 c/s. across primary of  
output transformer (= 60 mW approx.)

Amplifier Input required = - 70 dbm.

Frequency response.

200 c/s	+ 3 db
800 c/s	0 db
2000 c/s	- 0.5 db
7000. c/s	- 1.5 db

Distortion

at 60 mW output = 5%

Signal/noise ratio

50 db approx. (reference 60 mW).

4.4 Overall performance test figures.

Replayed on machine having CCIR characteristics.

Recorder Serial No .....212.....

Date Tested .....27-9-57.....

Wow and Flutter (R.M.S.) Wow: 2.2.% Flutter 1.8.% Total 3.0.%

Distortion (Reference: 800 c/s. -60 dmb input, gain control set to reference on V.U. meter).

R.M.S. distortion ...3.2.%

Signal to Noise ratio (Reference as above).

= .....-50.....db unweighted.

Frequency response (Reference 1 Kc/s, - 66dbm input, gain control set as above).

100 c/s. - .....0.....db

1000 c/s. - .....0.....db

7000 c/s - .....+1.....db

Tested by .....



Fault Condition	Possible Causes and Remedies.
5. Excessive distortion (contd.)	Batteries low - check and, if necessary, replace.  No or low bias oscillator output - check circuit and V4.  Faulty Valve (V3) - replace.  Incorrect valve of bias- re adjust R128 for minimum distortion.
6. Excessive microphony	Check adjustment of shockmounted sub-chassis - see that they clear chassis and limit studs.  Faulty valve (V1 or V2).

APPENDIX 1.SCHEDULE OF COMPONENTS.Key to Suppliers' Code No.

<u>Code No.</u>	<u>Supplier's Name.</u>	<u>Address.</u>	<u>Telephone No.</u>
1	Commonwealth Electronics Pty.Ltd.	3-5 James Street, Baulkham Hills, N.S.W. Derwent Park Annexe.Hobart Tas.	YA 4211 Hob. W. 9444.
2	Mullard-Australia Pty. Ltd.	35 Clarence Street, Sydney	BX. 2006.
3	Manufacturers Special Products Pty.Ltd.	47 York Street, Sydney	B. 0233.
4	United Capacitor Co. Pty.Ltd.	433 Punchbowl Road,Enfield N.S.W.	UW. 3511.
5	Ducon Condenser Ltd.	Christina Road, Leighton Field N.S.W.	UB. 1321
6	W.J.McLellan & Co.Ltd.	126 Sussex Street, Sydney	BX. 1131
7	Master Instruments Pty. Ltd.	13 Blackfriars Street, Chippendale. N.S.W.	MA. 8001
8	Transmission Products Pty.Ltd.	Denison Street, North Sydney	XB. 4018
9	Trimax Transformers	Charles Street, North Coburg. VIC.	Melbourne FL.1203
10	Bellco Pty.Ltd.	30 Carrington Street,Sydney	BX, 2811
11	Morgan Crucible Co. (Aust.) Pty.Ltd.	Bourke Road, Alexandria N.S.W.	MU. 1371

Circuit No.	Description	Value	Tolerance	Supplier Code.	Suppliers Type No.
V1,V2,V5 V6	Valve type 1U5			2	1U5
V3,V4,V7	" " 3V4			2	3V4
T1	Record Input Transformer	50:50,000 ohms		9	TA1393
T2	Replay " "	50:25,000 ohms		9	TA1133
M1	Meter, 0-50uA movement red case, red hatched area, 70-90% scale. Case S.21.			7	S.21
L1	Bias oscillator coil 40 Kc/s.			1	S128
RH1	Record head assembly			1	S129
PU1	Playback head assembly			1	S130
J1	Twin circuit jack			8	
T3	Transformer, 10,000 ohms/V.C.			3	XA20
LS1	Loudspeaker 5"			3	20861/ 525/PT.
SWA,SWB	Microswitchette			10	Burgess V3.
WRA	Play/record switch	3 pole, 3 position N/S		3	Oak type E
WRB	Meter switch	2 pole, 3 position, 1 wafer		3	Oak series 20 type 2E.
R23	Record gain control potentiometer	0.5 meg.		5	500 K/C
R19	Loudspeaker volume control, potentiometer	1 meg.		5	1 meg/C
R28	Variable bias resistor	1000 ohms		5	1000 ohms/A
R12	Bias resistor.	470 ohms	10%	11	Type T



Circuit No.	Description.	Value	Tolerance	Supplier Code	Suppliers Type No.
R20 R27 R10	H.T. Dropping Resistor ) De-emphasis Resistor ) Anode Load )	4,700 ohms	10%	11	Type T
R6	Feedback resistor	10,000 ohms	2%	6	DCC
R7 R9 R13	Screen dropping resistor ) Decoupling " ) " " )	10,000 ohms	10%	11	Type T
R8	Anode load "	22,000 ohms	10%	11	Type T
R11 R16 R18 R22	Oscillator gridleak " ) Anode decoupler " ) " load " ) " decoupler " )	47,000 ohms	10%	11	Type T
R14	Screen dropping "	1.5 meg ohms	10%	11	Type T
R5, R17	Gridleak resistor	2.2 " "	10%	11	Type T
R25	L.T. Metering "	30,000 ohms	2%	6	DCC
R24	V.U. " "	36,000 ohms	2%	6	DCC
R2, R4	Anode Load "	0.1 meg. ohms	2%	6	DCC
R15 R3 R29	Anode load " ) Screen dropping " ) Feedback " )	0.47 meg. ohms	2%	6	DCC
R30	Feedback resistor	1 meg. ohm	1%	11	Type T
R26	H.T. Metering resistor	3 meg. ohms	2%	6	DCF
C9	Oscillator Grid Capacitor	2,200 pF	20%		JTH.310
C12	" Tuning "	0.002mF, 350V	10%	4	PCM
C7	" Bypass "	0.005 mF, 350V	10%	4	PCM
C8 C16	Feedback " ) De-emphasis " )	0.01 mF, 350V	10%	4	PCM
C2, C4, C15	Coupling	0.02mF, 350V	10%	4	PCM
C11 C13	Bypass " ) Coupling " )	0.05 mF, 350V	10%	4	PCM

Circuit No.	Description	Value	Tolerance.	Supplier Code	Suppliers Type No.
C3	Screen bypass Capacitor)	0.1 mF, 350V	10%	4	PMI
C14	Coupling " )	0.1 mF, 150V	10%	6	1B50C
C6	" "	1.0 mF	10%	4	CF91N
C5,C10, C17,C18	Bypass Capacitor ) )	8 mF, 525V	20%	5	ET2D
C19	Feedback "	400 pF	10%	5	S/S

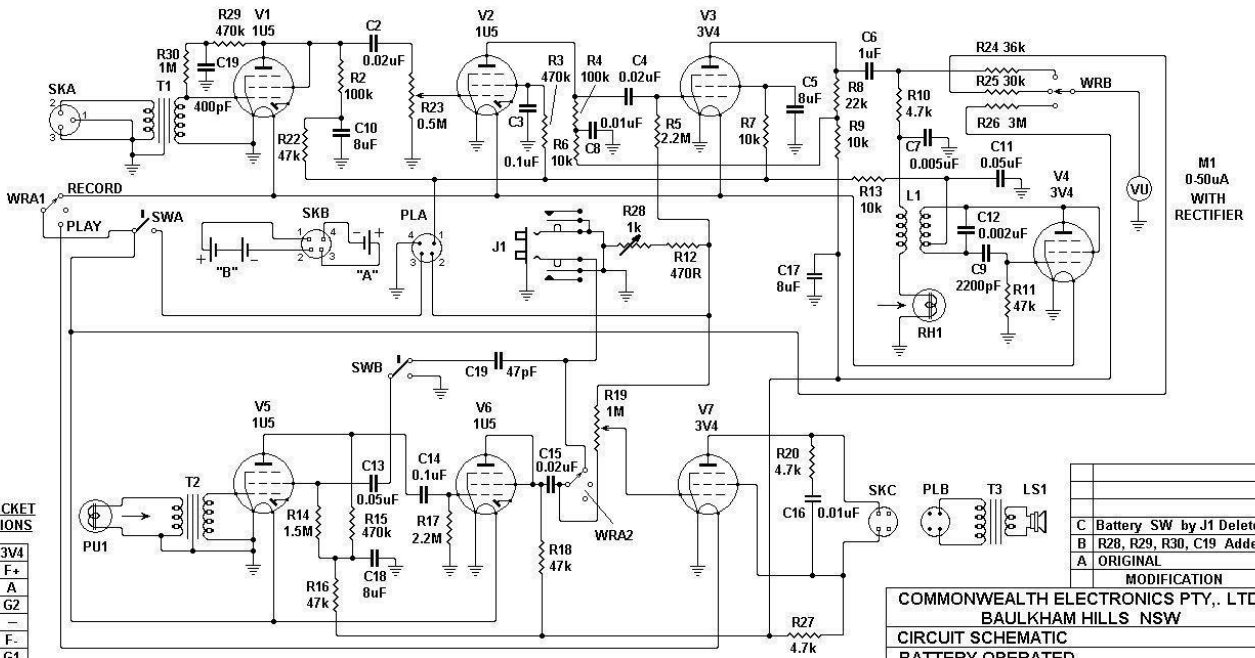
APPENDIX 2.

General Notes on the Capstan and Flywheel.

The capstan and flywheel assembly is mounted on self aligning ball bearings in a cast aluminium housing. It is absolutely essential that the capstan and flywheel revolve with complete freedom. As a check on correct operation, the flywheel should take at least 25-30 seconds to come to rest after switching off the recorder.

In the event of trouble with this assembly, it is strongly recommended that a replacement unit be obtained and the faulty one returned for repair. Due to the extreme accuracy required, each capstan is precision ground in its own bearings and it is therefore not recommended to change the bearings. A new shaft assembly must be fitted complete with bearings. Occasionally the capstan should be carefully wiped clean with a rag damped in petrol and a smear of oil applied with the finger tip to prevent rust forming on the surface. On no account use coarse abrasives such as emery paper.

The governor disc (H3 - Drawing No. A.5105) should be left unlubricated but a few drops of kerosene may be applied occasionally if erratic operation of the governor is noticed. The governor pad ring (H4) is fitted with leather pads spaced at 180° to give a balanced action. It is unlikely that the pads will need attention but the ring should be quite free to move on its pivot screws. Do not tighten these up.



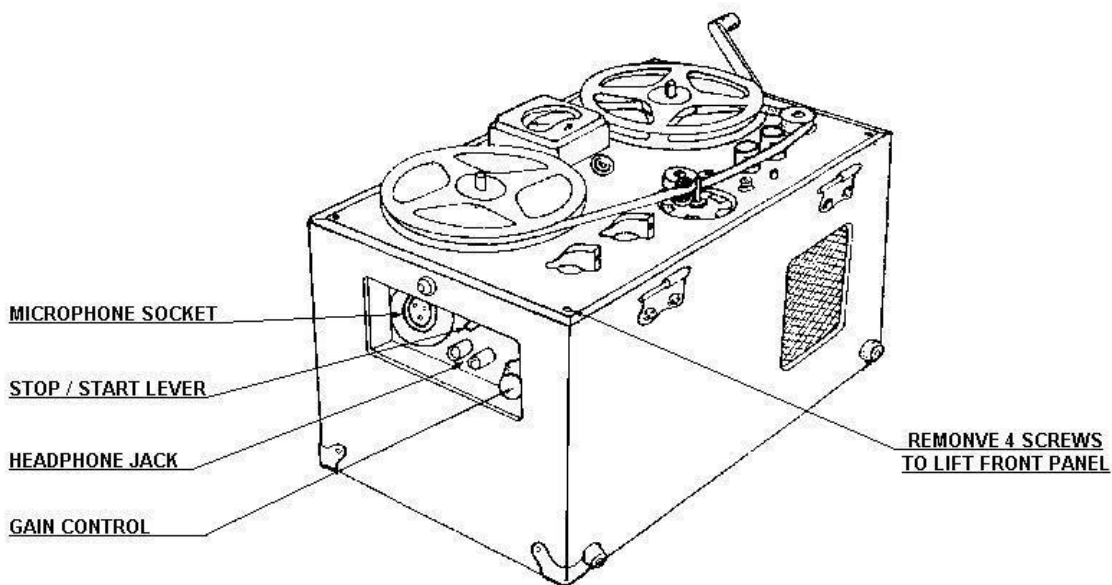
**VALVE SOCKET CONNECTIONS**

PIN	1U5	3V4
1	F-	F+
2	A	A
3	G2	G2
4	D	-
5	-	F-
6	G1	G1
7	F+	F+

Note, currently unresolved are the two C19s

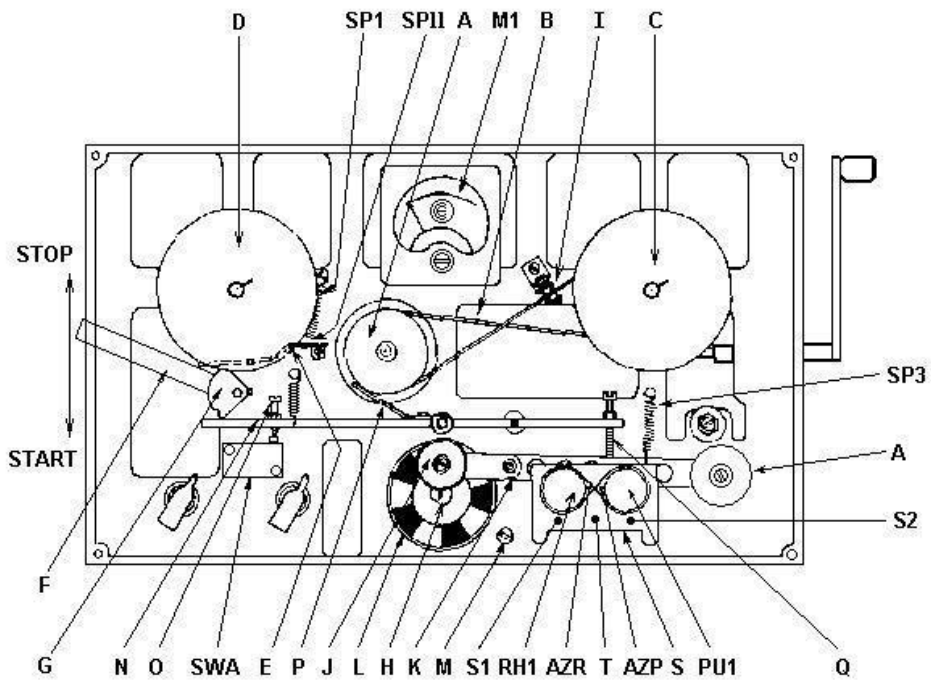
MODIFICATION	
C	Battery SW by J1 Deleted
B	R28, R29, R30, C19 Added
A	ORIGINAL


COMMONWEALTH ELECTRONICS PTY., LTD.		SCALE
BAULKHAM HILLS NSW		DRN.
CIRCUIT SCHEMATIC		CHKD.
BATTERY OPERATED		CHGS. ENG.
TAPE RECORDER, TYPE CEB		PART No.
		<b>CD 1105</b>

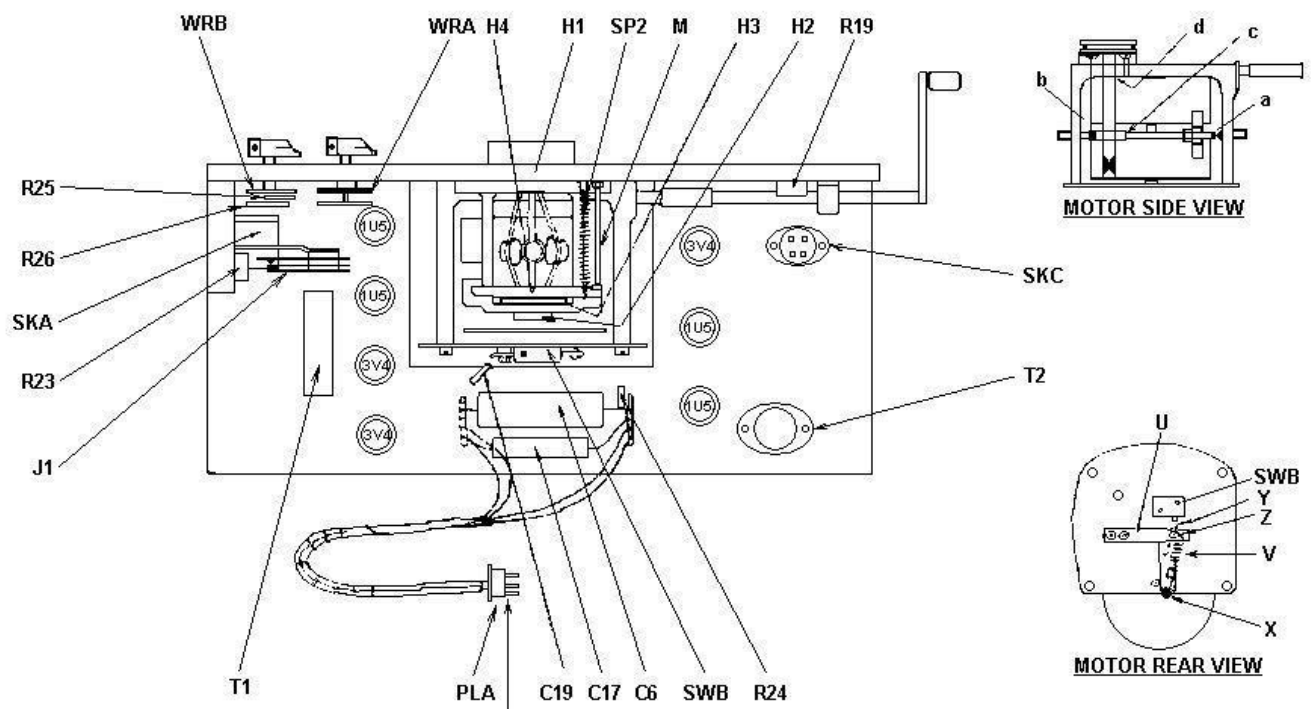


2	FAST SPOOLING
ISSUE	MODIFICATION

Used On	No. Per	MATERIAL TYPE	<b>Commonwealth Electronics Pty., Ltd.</b>		SCALE DRN. CKD. APPD. APPD MFG. CHGS ENG.
			SYDNEY	HOBART	
TOLERANCE UNLESS OTHERWISE STATED		SIZE	<b>MINATURE TAPE RECORDER TYPE CEB GENERAL ARRANGEMENT (LID REMOVED)</b>		PART No. <b>A 3105</b>
			FINISH	SEE ASSEMBLY No:	

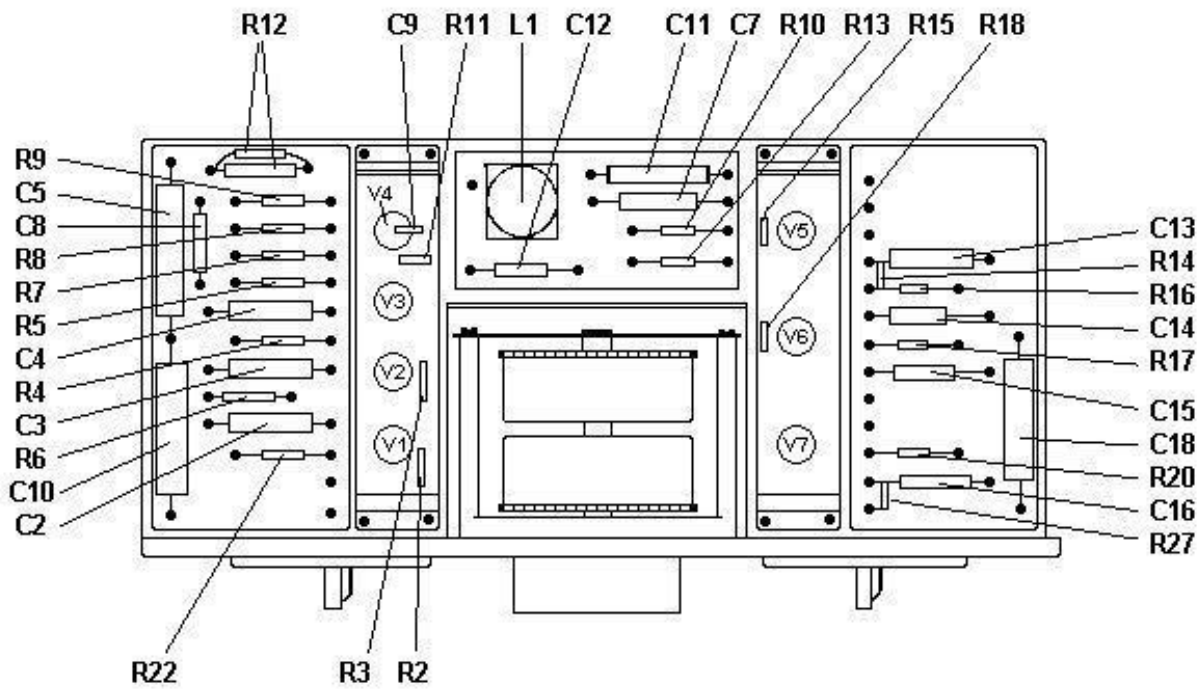



Used On	No. Per	MATERIAL	<b>Commonwealth Electronics Pty., Ltd.</b> SYDNEY HOBART <b>MINIATURE TAPE RECORDER</b> <b>TYPE CEB</b> <b>TOP VIEW WITH</b> <b>FRONT PANEL REMOVED</b>	SCALE DRN.  CKD. APPD. APPD MFG. CHGS. ENG.
		TYPE		
		SIZE		
TOLERANCE UNLESS OTHERWISE STATED		FINISH	SEE ASSEMBLY No:	PART No. <b>A 4105</b>
			ITEM	



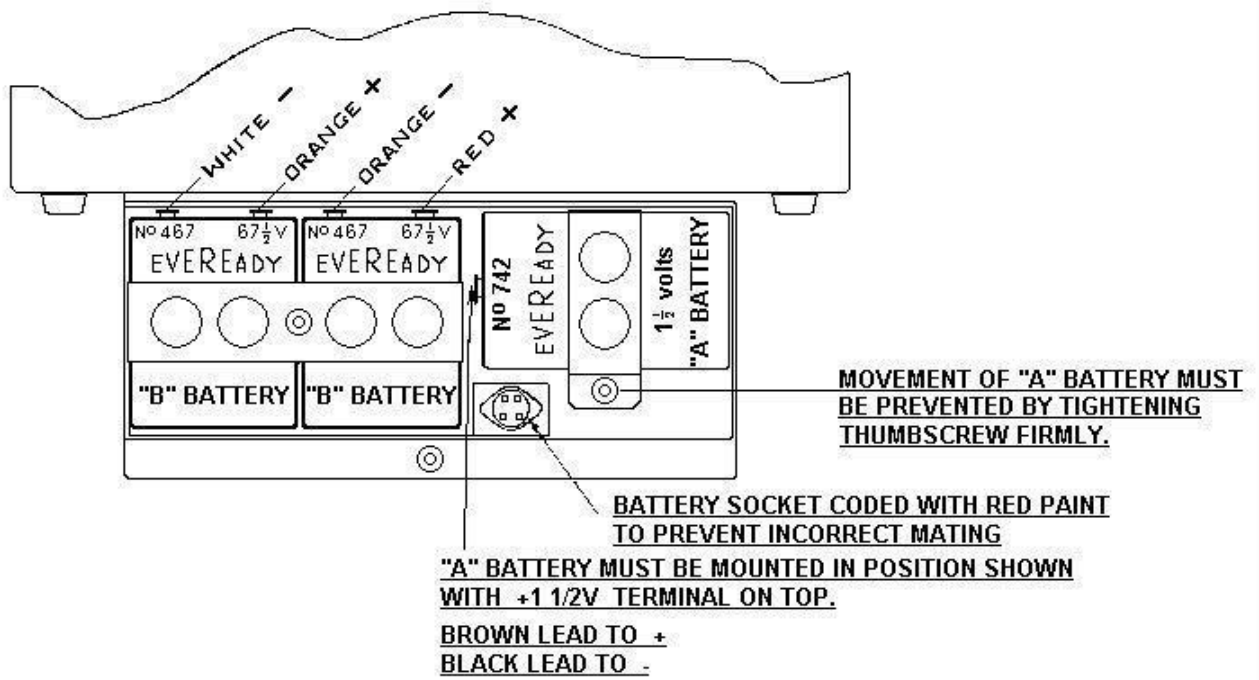
**BATTERY PLUG CODED WITH RED PAINT  
TO PREVENT INCORRECT MATING**

Used On	No. Per	MATERIAL	Commonwealth Electronics Pty., Ltd. SYDNEY HOBART	SCALE DRN. CKD. APPD. APPD MFG. CHGS ENG.
		TYPE		
		SIZE	MINATURE TAPE RECORDER TYPE CEB PLAN OF CHASSIS SHOWING CAPSTAN ASSEMBLY ETC	PART No. <b>A 5105</b>
		FINISH		
TOLERANCE UNLESS OTHERWISE STATED			SEE ASSEMBLY No: ITEM	



Used On	No. Per	MATERIAL TYPE	<b>Commonwealth Electronics Pty., Ltd.</b>		SCALE DRN.  CKD. APPD. APPD MFG. CHGS ENG.
			SYDNEY HOBART		
TOLERANCE UNLESS OTHERWISE STATED		SIZE	<b>MINATURE TAPE RECORDER TYPE CEB</b>		PART No. <b>A 6105</b>
			FINISH	<b>BOTTOM VIEW</b>	
SEE ASSEMBLY No:				ITEM	





Used On	No. Per	MATERIAL TYPE	<b>Commonwealth Electronics Pty., Ltd.</b>		SCALE DRN. <i>[Signature]</i> CKD. APPD. APPD MFG. CHGS ENG.
			SYDNEY	HOBART	
		SIZE	<b>MINATURE TAPE RECORDER TYPE CEB GENERAL ARRANGEMENT OF BATTERY COMPARTMENT</b>		
		FINISH			
TOLERANCE UNLESS OTHERWISE STATED			SEE ASSEMBLY No:	ITEM	PART No. <b>A 7105</b>