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INSTRUCTION MANUAL

CUEMASTER 77 MK VG

PROFESSIONAL TRANSPORTABLE RECORDER

ISSUE 3

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ISSUE	DATE	CHANGE	SERIAL	SECTION	AMENDMENT
1	29.9.80				ORIGINAL ISSUE
2	14.1.81				Sync. Logic: Remote Control Unit.

C O N T E N T S

1. INTRODUCTION

The CUEMASTER 77 Mk VG professional recorder has been designed to provide operational flexibility and reliable performance. It represents the fifth generation of professional reel to reel transportable recorders.

Packaged as a complete recorder, it offers more facilities and features in a transportable case than many sophisticated studio console recorders.

Technical performance meets or exceeds all broadcasting specifications.

Basic features are:

- Three motor - capstan direct drive two speed
- Three heads - micro azimuth adjustment
- Digital tape timer - hours, minutes, and seconds
- Automatic tape tension control - constant tape tension from beginning to end of a reel plus different size reel capability
- Deck controls and amplifier monitoring enable accurate dub editing
- Fully solid state electronics
- Built-in serviceability

The deck is available in full track, two track or stereo configuration with one amplifier unit required for each channel.

2. SPECIFICATION

2.1 Deck Specification

Size	Carry Case	527mm wide, 445mm high, 248mm deep
	Deck	433mm wide, 222mm high, 152mm deep
	Amplifier Unit	433mm wide, 89mm high, 152mm deep
Weight	Deck	16.4 kg
2 x	Amplifier Unit	7.3 kg
	Carry Case	9.5 kg
	Total	33.2 kg
Tape size		Nominal ¼ in.
Spool sizes		Cine type 7 ins. (BS 1568/1960) 5 or 3 ins.
Power supply		230 to 250V, 50 Hz, 150 VA, 117V 60 Hz optional
Fuses		AC 1 amp. M205 230V, 2 amp. M205 117V DC 2 amp. M205

Heads - Separate Erase, Record and Play heads. Laminated construction

Tape Timer - Driven directly from the tape. Indicates in hours, minutes, and seconds. Maximum time 9 hours. 59 mins. 59 secs.

2.2 TAPE DRIVE

Capstan

Capstan is direct-drive from a hysteresis synchronous motor. Speed change is via a toggle switch between the RECORD and PLAY push buttons. Power for the motor is derived from the 220 volt power transformer tap.

Spools

Each spool has an induction motor drive powered directly from the 240 (117) volt power line. Tape tension is automatically controlled by a tension sensing feedback system.

Brakes

The brakes are solenoid operated and dynamically assisted. Actuation noise is eliminated by an adjustable poling pin, which stops the solenoid armature from poling.

Pressure Roller

The pressure roller is solenoid operated. Actuation force is controlled by a poling adjustment, which also eliminates noise.

2.2 TAPE DRIVE CONTINUED

Head Mount

Each head is mounted in a precision-machined one-piece brass mount. The head mount has provision for precision azimuth adjustment and a positive lock of the azimuth setting.

Controls

Stop, Play, Edit, Spool, Record, and Power On. Indication of power on is via the stop lamp. A sliding potentiometer for spooling in either direction. A reset button for the Tape Timer Counter. Tape Speed, and Local/Remote selector switches.

2.3 PERFORMANCE DETAILED SPECIFICATION

2.3.1 Deck

Tape Speed	7.5/15 i.p.s. with 3.75/7.5 i.p.s. as an option
Tape Speed Accuracy	+ .1% - 0% short term
	+ .2% - 0% long term
Tape Timer Accuracy	10 secs for 1,200 feet of tape
Wow and Flutter	Better than 0.08% CCIR peak weighted at 15 i.p.s.
	Better than 0.1% CCIR peak weighted at 7.5 i.p.s.
	Better than 0.15% CCIR peak weighted at 3.75 i.p.s.
Winding Time	Less than 70 secs. for 1,200 ft of tape
Starting Time	1 second to meet wow and flutter specifications.
Equalization	I.E.C., N.A.B. optional

2.3.2 Input Signal

	Line (balanced)		mic (balanced)
	600 ohm.	10K	
Input impedence	600 ohm	10K	400 ohms
Return loss 30 Hz - 16 KHz	40 dB	-	-
Min. level	-12 dBM	-12dBM	250uV
Max. level	+20 dBM	+20dBM	15mV(clipping)

2.3.3 Output Signal

Line Output (via tip, ring and sleeve jack)	+21 dBm maximum level before clipping
Output matching impedance	
Line	600 ohm balanced
Monitor	15 ohm unbalanced
Output source impedance	100 ohm max. (30Hz to 16 KHz) Typical 50 ohm

2.3.4 Replay Characteristics

Frequency Response:

Using test tape BASF DIN 39S at 15 i.p.s.	30Hz to 18KHz ± 1dB
Using test tape BASF DIN 19S at 7.5 i.p.s.	30Hz to 16KHz ± 1dB
Using test tape BASF DIN 9 at 3.75 i.p.s.	30Hz to 8KHz ± 1dB

Signal to Noise Ratio: Broad band unweighted

w.r.t. 320 nw/m - MONO 3.75 i.p.s. 58dB 7.5 i.p.s. 62dB 15 i.p.s. 64dB
510 nw/m - STEREO 3.75 i.p.s. 58dB 7.5 i.p.s. 62dB 15 i.p.s. 64dB

NOTE: Due to head pole effect [+0.5dB / -1.5dB] at 31Hz and [+1.5dB / -0.5dB] at 63Hz:7.5 ips
and fringing effect [+0.5dB / -1.5dB] at 63Hz and [+1.5dB / -0.5dB] at 125HZ:15 ips
frequency response is

2.3.5 Sync. Characteristics

(Replay from Record head)

Frequency Response:	3.75 i.p.s. 30 Hz to 4KHz ± 3dB 7.5 i.p.s. 30 Hz to 8KHz ± 3dB 15 i.p.s. 30 Hz to 16KHz ± 3dB
Signal to Noise Ratio:	
w.r.t. 320 nw/m - MONO	50 dB Play only
510 nw/m - STEREO	50 dB Both channels play mode

2.3.6 Record Characteristics

Gain	20dB
Record/Replay Frequency Response	3.75 i.p.s. 30Hz to 8Hz ± 2dB 7.5 i.p.s. 30Hz to 16KHz ± 2dB 15 i.p.s. 30Hz to 20KHz ± 2dB

Erasure 7.5 i.p.s. 70dB @ 1KHz recorded at 320 nwb/m mono and 510 nw/m stereo

2.3.6 Record Characteristics continued

Bias and Erase Frequency 100KHz ± 1KHz
Maximum input level +20dBm

Unity gain overall noise using Ampex 406 tape with bias applied WRT 320 nwb/m mono and 510 nwb/m stereo.

Line Input

	3.75 i.p.s.	7.5 i.p.s.	15 i.p.s.
Broadband	54 dB	58 dB	59 dB
30 Hz - 20KHz	58 dB	60 dB	61 dB
ANSII weighted	63 dB	65 dB	66 dB

Mic Input

	3.75 i.p.s.	7.5 i.p.s.	15 i.p.s.
Broadband	54 dB	58 dB	59 dB
30 Hz - 20KHz	58 dB	60 dB	61 dB
ANSII weighted	63 dB	65 dB	66 dB

Overall T.H.D. unweighted

Using Ampex 406 tape
320 nw/m - MONO 1.5% max.
510 nw/m - STEREO 2% (34dB at 0.2 dB over bias @ 1KHz)
3% distortion occurs 6dB above quoted flux levels for mono and 2dB above for stereo

2.3.7 Monitor Characteristics The monitor may be switched to record, replay or bias signals.

Power 2 watt into 15 ohm

Frequency Response 30 Hz to 16KHz ± 3dB at 2W

Signal to Noise Ratio: Record selected 60dB below 2 watts

Distortion at 1KHz 1% T.H.D.

2.3.8 Line to Line

Frequency Response 30 Hz - 20KHz ± 1dB

Distortion at 1KHz @ +16dBm Less than 0.3 T.H.D.

2.3.9 Mic to Line

Frequency response - 50Hz - 15KHz ± 1dB
Distortion at 1KHz @ 2.5 mV - less than 0.5% T.H.D.

3. OPERATION

3.1 Deck Control

With the deck connected to a 250/230 volts and 50Hz supply (optional 117 volt. 60Hz), and the power switch at the lower left hand corner turned on, the STOP push button will illuminate.

Five push buttons and two selector switches on the lower right hand corner of the deck control the various modes of operation. There is provision for remote control of all but the EDIT function.

3.1.1 PLAY may be selected at any time and is cancelled by:

(1) Tape break
(2) SPOOL push button
(3) STOP push button

The PLAY push button will cancel RECORD and override the tape break while actually depressed. When selecting PLAY from SPOOL the tape will automatically come to a stop before the PLAY mode is activated.

3.1.2 EDIT is provided to enable manual handling of the tape for various editing purposes. When selected it will release the brakes.

EDIT sets up 4 conditions of operation:

(1) Can be cancelled ONLY by the STOP push button
(2) Cannot be selected if already in the SPOOL mode.
(3) If previously in the PLAY or RECORD mode, the EDIT push button will release the brakes and inhibit the tape-up motor to give bin-editing.
(4) A tape break will not cancel EDIT.

3.1.3 The SPOOL mode can be selected to enable fast spooling in either direction. The direction of spooling is controlled by a sliding potentiometer located next to the power switch.

SPOOL will be cancelled by any of 4 conditions:

(1) STOP push button
(2) Tape break
(3) RECORD push button (selects PLAY, not RECORD)
(4) PLAY push button

SPOOL cannot be selected if previously in the EDIT mode.

3.1.4 RECORD can be selected ONLY if previously in the STOP or PLAY mode RECORD will be cancelled by any of 4 conditions:

(1) Tape break
(2) PLAY push button
(3) SPOOL Push button
(4) STOP Push button.

For recording, the channel safe switch on the Amplifier Unit must also be switched into the record mode.

If the RECORD push button is pressed while in SPOOL mode, the tape will stop and PLAY will be activated.

3.1.5 The STOP push button cancels any other mode, and causes the capstan motor to run approximately 2 minutes. If a fast start is required the capstan motor will be running (from the last STOP action) or can be started before PLAY or RECORD is selected, by pressing the STOP push button. The STOP lamp is only lit when the capstan motor is running.

3.1.6 The speed switch selects low or high tape speed. These speeds are 7.5 and 15 ips or 3.75 and 7.5 ips respectively. The tape timer and record and replay equalization are also changed by this switch.

3.1.7 The CONTROL switch selects if control of the TAPE SPEED and spooling to be on the deck or on the remote control unit. When the remote controls are used all functions are in parallel except SPEED and spooling.

3.2 Amplifier Controls

The amplifier has controls for:

Record/Safe/Lockout
Record Levels
Output Selector
Output Level
Monitor Selector
Monitor Volume

One amplifier is used for one channel. Thus a stereo or two track deck requires two amplifiers.

3.2.1 Record/Safe/Lockout

This three position switch enables RECORD to be selected on the deck when in the RECORD position. When in the LOCKOUT position the RECORD push button on the deck is inoperative and the machine cannot be placed in the RECORD mode.

3.2.1 Record/Safe/Lockout (cont)

When in the SAFE position RECORD mode can be selected on the deck but bias is not applied to the RECORD and ERASE head for that channel, but recording can still take place on the other channel of a stereo machine. The LED indicator is only lit when RECORD is selected.

3.2.2 Record levels

The amplifier has two record inputs, input 1 and 2, which are mixed before recording on tape. The level control knobs control the recorded level for each input. Both inputs have a tip ring and sleeve input socket on the front panel in parallel with the Cannon XLR connector on the side.
The CAL position on each knob sets unity gain from input to output when the output level knob is also set in its CAL position and play is selected. When in the CAL position the recorded signal for an input of +16dBm will be 320nWb/m for mono and 510nWb/m for stereo. Input 1 can be supplied as a microphone input as an option. The CALIBRATION switch disables the front panel control and gets that input to the calibrate level.

3.2.3 Output Selector

The amplifier has two output connectors wired in parallel. A tip, ring and sleeve socket below the Output level control and a Cannon XLR socket on the side panel. A jack inserted into the front panel socket internally disconnects the side panel socket.

The signal that appears on these sockets is selected by the three push buttons beside the output level knob. The three signals are:

1. RECORD - the mixed signal from the record input sockets
2. PLAY - the signal from the replay head
3. SYNC - signal from the reocrd head used in playback instead of the normal record mode.

3.2.4 Output Level

The level control knob beside the output selector push buttons sets the output level when either PLAY or SYNC are selected. When RECORD is selected the output level is set only by the INPUT level controls. When in the CAL position the recorder is set for unity gain as described in Section 7.2.2. The CALIBRATION switch has the same effect as well as disabling the level control when in the calibration position.

3.2.5 Monitor Selector

This set of three push buttons selects what signal is displayed on the VU meter and amplified by the monitor speaker amplifier.

Three positions are:

1. INPUT - The signal on the two inputs are displayed to enable adjustment of the input level controls.
2. OUTPUT - The signal on the outut socket (as selected by the OUTPUT selector) is displayed to allow checking and adjustment of the output level.
3. BIAS - The bias on the record head is displayed to give a check of continuing correct operation and to enable adjustment of bias level for different types of tape. OVU indication is correct bias level for Ampex 406 tape.

3.2.6 Monitor Volume

The selected signal on the VU meter is also fed to the input

of a monitor amplifier which drives a speaker mounted in the case. The volume of this speaker is set by the Monitor Volume Control located above the monitor output socket. If a tip, ring and sleeve jack is placed in this socket, the internal speaker is disconnected and the external headphones on the jack are fed by the amplifier.

3.3 Connections

3.3.1 Remote Control 1 (Side Panel) J20

1. Spool lamp
2. Spool push button
3. Record lockout (ground to activate)
4. Timer Count Pulse
5. Record lamp
6. Ground
7. +24V
8. Record push button
9. +12V
10. Play push button
11. Play lamp
12. Stop push button
13. Stop lamp
14. Wind
15. Rewind

Return push buttons to ground - all buttons are momentary action. Return lamps to +24V, 40MA max each.

Mates with Cannon DA 15P connector, DA20961 backshell and two D20419-16 screw latches.

The WIND and REWIND push buttons are enabled only when SPOOL is selected, and active only while actuated.

3.3.2 Remote Control 2 (Head Connector panel) J22

This socket connects to Remote Control Unit part number 23-2073 See drawing 23-2072 for details.

1. Spool lamp
2. Spool push button
3. Record lockout
4. Timer count pulse
5. Record lamp
6. Ground
7. +24V
8. Record push button
9. N.C.
10. Monitor audio ground
11. Speed switch wiper
12. Low speed contact
13. N.C.
14. +12V
15. Play push button
16. Play lamp
17. Stop push button

3.3.2 Remote Control 2 (Head connector panel) Contd.

18. Stop lamp
19. Wind spool pot
20. Rewind spool pot
21. Timer up/down line
22. Monitor audio CH2
23. Monitor audio CH1
24. Spool pot wiper
25. High speed contact

Return all push buttons to ground
All push buttons are momentary action
Return lamps to +24V, 40 M.A. max. each.

Mates with Cannon DB 25P connector DB 24659 backshell and two D20419-16 screw latches.

3.3.3 Input

Front panel input 1	Tip) balanced input 10K ohms Ring) Sleeve ground
Side panel input 1 Mates with XLP-3-31	1 ground 2) 3) balanced input 600 ohms - 10Kohms
Side panel input 2 Mates with XLP-3-31	1 ground 2) 3) balanced input 600 ohms - 10Kohms

Both inputs are 600 ohm balanced or 10K ohm bridging selected by a slide switch on the side panel.

3.3.4 Output

Front panel	Tip) Ring balanced 600 ohm output Sleeve ground
Side panel Mates with XLP-3-32	1 ground 2) 3) balanced 600 ohm output

Power Inlet

L 240V 50Hz active
N 240V 50Hz neutral
E ground

Mates with XLR-LNE-11C

Note: 117V 60Hz optional

Fuses

Mains 240V - 1 amp M205
117V - 2 amp M205
DC 2 amp M205

4. REGULAR MAINTENANCE

4.1 Tape Path and Head Cleaning

Each day of regular use all parts of the deck contacting tape should be cleaned. A clean tape path ensures optimum wow and flutter, tape drop out, frequency response and noise.

Each head face and the capstan shaft and pressure roller are the critical items. Use a solvent impregnated soft lint free swab to thoroughly clean each surface so there is no visible evidence of accumulated oxide dust or dirt. Suitable solvents are methylated spirits, toluene petroleum ether (Shell X272) or iso-prophyl alcohol. Tape guides, stabilizer rollers and tension arm posts should be cleaned if they appear dirty.

CAUTION: do not use carbon tetrachloride for cleaning.

4.2 Head Demagnetization

Each week of regular use the heads should be demagnetized to minimise noise, program erasure and distortion.

CAUTION: Switch off the deck before demagnetizing the heads.

Switch on the demagnetizer at least half a metre from the deck. Slowly pass the poles of the demagnetizer over and around each head gap and capstan shaft with a circular motion. Slowly withdraw the demagnetizer from the head area and switch it off at least half a metre from the deck.

4.3 Spool Motor Check

4.3.1 To check a spooling motor, run the motor at full speed, without a tape reel in the SPOOL mode. Manually hold the brakes off and press the STOP and START buttons simultaneously, and then release both. The motors should run on for at least ten seconds, without binding in any one spot. If the motor fails this test, it requires new bearings.
The bearings are self-lubricated, and require no oiling.

5. MECHANICAL ALIGNMENT

5.1 Brakes

5.1.1 The 77 MkVG machine employs dynamic braking to allow differential sized reels to be used on the deck. This is acomplished by allowing the machine to stop under tension control, so that any loop formed during the braking period is sensed as a loss of tension and the appropriate motor has additional voltage applied to it to remove the offending loop. Note that dynamic braking is applied only while tape is in motion, after which time the spooling motors are switched off.

The brakes are of the differential type, i.e. the braking torque in the "take-up" direction is approximately one-half the torque in the other direction. This is normally sufficient to stop equal sized reels, but when using differential sized reels, the inertia difference between the reels can exceed a 10:1 ratio, so that without dynamic assistance, tape spillage could occur. For mechanical adjustment of brakes, refer to figure 1.

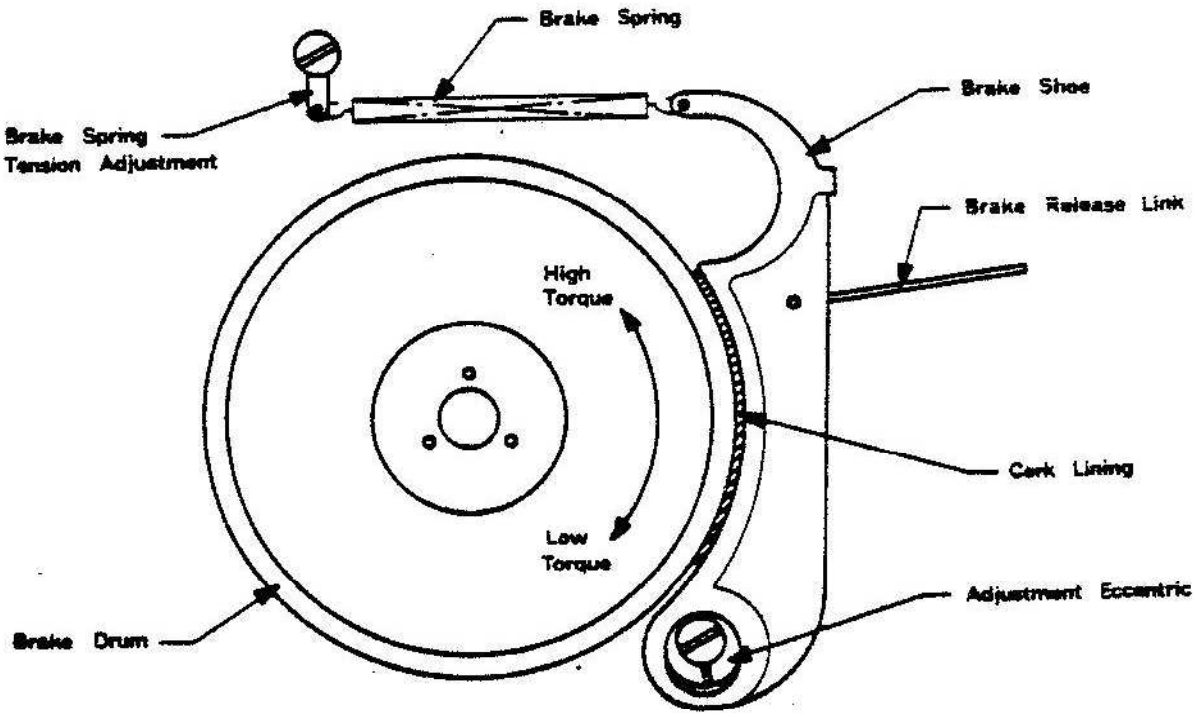


FIG. 1 BRAKE ADJUSTMENTS

5.1.2 Check differential torque on the brake drum. There should be at least a 2:1 ratio. If no significant difference is felt, adjustment of the eccentric is indicated. Slacken the lock screw and rotate the eccentric until the heel of th cork lining (nearest the eccentric) just touches the brake drum. Nip the lock screw and check the differential torque. A slight variation of the eccentric may be needed to optimise the differential torque. When satisfied, tighten the lock screw.

Note that the eccentric mating hole in the brake shoe is slightly oval in the vertical direction to allow the brake shoe to move in this plane, so that when supplying tape, the shoe is driven away from the eccentric, causing the heel (lower) of the shoe to contact the drum (high braking torque) and when accepting the tape the shoe is driven towards the eccentric causing the toe (upper) of the shoe to contact the drum (low braking torque)

5.1.3 With the deck in STOP mode adjust the brake spring to give a spring force of 200 to 300 grams.

A simple check on braking force is to press both PLAY and STOP together with no tape loaded. This turns on the spooling motors with the brakes still applied. The motor should just turn slowly. If they do not turn the brake force is excessive and the spring should be loosened. If they spin quickly the spring should be tightened.

5.1.4 After realigning the brakes, check that the release mechanism works satisfactorily. Select EDIT mode (releases brakes) and check that the brakes release completely, and hubs rotate freely. Select STOP mode and check that the brake release links are free in the mating hole in the shoes.

If the brakes fail to release either bend the release link to absorb excess slack, or check that the solenoid "poling" adjustment (eccentric "DELRIN" cam on the rear of the deck near the brake solenoid) is correctly set.

This adjustment prevents the solenoid from poling, and hence reduces the audible noise resulting from poling. It is adjusted by releasing the cam lock screw and manually pushing the solenoid "home", then rotating the cam until until the cam and brake solenoid lever touch. Rotate the cam slightly further so that the solenoid is just off poling (about 0.25mm or 0.010 inch). Lock the cam locking screw and readjust the brake linkages.

Total solenoid travel should be less than 2 mm (0.08 inch) to minimise acoustic noise.

5.2 Pressure Roller Solenoid

5.2.1 The pressure roller solenoid is also designed to be acoustically quiet and hence must be adjusted so that it does not pole. Refer to figure 2 for adjustment points.

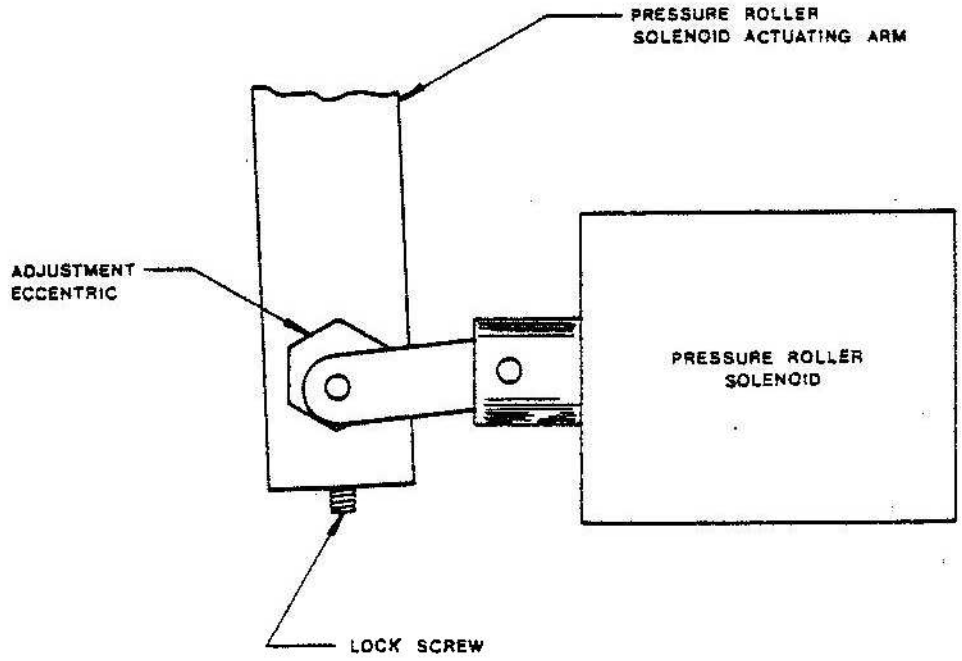


FIG. 2 - PRESSURE ROLLER SOLENOID ADJUSTMENT

5.2.2 Check that when starting the transport the solenoid noise is quiet and the pressure roller force is 2Kg $\pm$ 2Kg.
Force is checked by pulling the pressure roller off the capstan with a spring balance. When tape movement stops the balance indicates the pressure roller force. Note that this check is made with the supply spool empty and the take up spool full.

Pressure roller force is altered by releasing the locking screw on the solenoid actuating arm and rotating the solenoid adjustment eccentric until the required force is obtained.

Note that if the solenoid "poles", the adjustment has been taken too far.

5.2.3 The tape lift arm is set so that when spooling with the EDIT control disengaged the tape clears the play and record heads by approximately 2mm.

5.3. Tape Path Alignment

5.3.1 Remove the two tape guides between the Erase and Record heads and between the Replay head and Capstan motor. Thread a tape and operate manual EDIT knob so tape is against all three heads. Set SPOOL control in the centre and select SPOOL mode. Spool the tape slowly back and forth across the heads. The tape should track centrally across each head. If this is not the case adjust the stabilizer roller heights by changing the shims below the roller bearing. Note that if a shim is removed it should be added to the top of the roller bearing.

Select PLAY mode and check tape height again. If it rides up or down, adjust capstan parallelism adjusting nut (nut "B" in fig 4) using an 8mm AF "Spintite". This adjustment is locked by nut D.

5.3.2. Adjust the height of the brake drums to place the tape central on the spool.

5.3.3 Replace the two tape guides and check that the tape rides centrally without touching the edges of the guides.

5.4 Tape Tension Setting

5.4.1 With the sensor arms in normal play position (about 3mm deflection), measure the spring return force at the sensor. It should be 8 gm$\pm$ 2 gm and have a hysterysis of less than 2 gm. (Hysterysis is the change in force required to reverse the direction of motion of the sensor arm).

5.4.2 With the sensor covers in place and a full reel of tape on the machine measure tape tension between reel and sensor arm with equal tape on each reel. Ajust RV1 + RV2 on the spooling board to give 40 gm of tension. If a tentelometer is not available adjust for 3 mm deflection of the tape path over the sensor arm. In the operating position check that manually moving the tension arm gives a tension range of at least 20 gms to 100 gms.

5.4.3 Check tension at beginning and end of both reels. It must be between 30 and 60 gms, and is typically 30 to 45 gms.

5.4.4 Tension setting should be as close as possible to the minimum figure to ensure correct hold back tension in SPOOL mode. Check hold back tension and adjust the tension setting to give a maximum of 60 grams. On the take up side the check should be made with the pressure roller in the "non-edit position". Check the tension on each reel both full and empty and allow time for the start pulse to settle before making a measurement. Excessive hold back will slow spooling towards the end of a reel.

5.4.5 Place the deck in a vertical plane and re-check tension. A 15% variation is normal but should not result in the tape tension exceeding the limits of min 30 grams to a max. 60 grams.

5.5 Capstan Motor Replacement

5.5.1 Removal - Refer to figure 3.
To remove the capstan motor disconnect the electrical cable at the capstan supply circuit board and place the deck vertically on the bench. Unclip the +24V power supply circuit board and place to one side. Unscrew nuts A, B, and C and slide the motor out to the rear.

5.5.2 Assembly - Refer to figure 3 and 4.

Assembly is the reverse of removal. With the motor in place tighten nuts A and C just finger tight and bring up B until the capstan is approximately parallel to the pressure roller.

5.5.2 Assembly continued.

Tighten nuts A and C firmly. Play tape and adjust nut B so the tape between the capstan and tape timer roller is flat and free of buckles and twists. Lock this adjustment by tightening nut D.

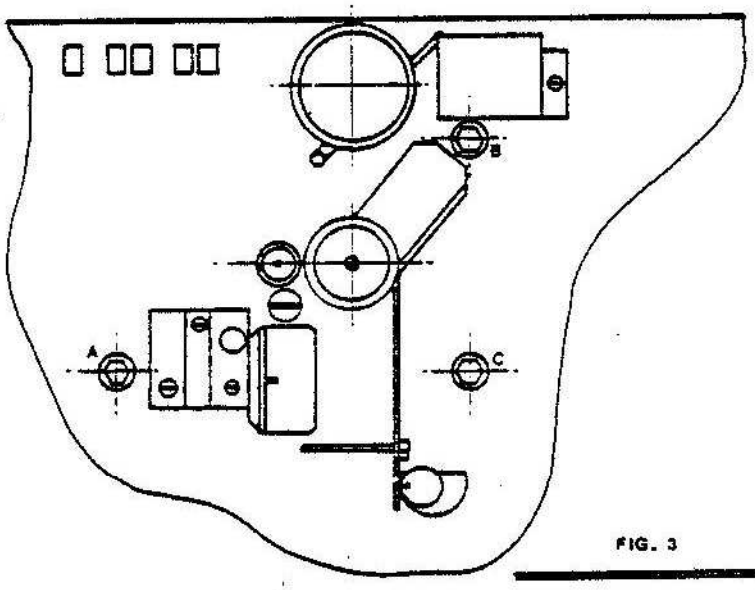
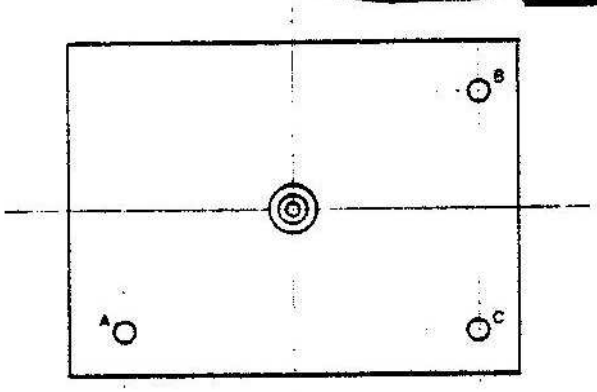


FIG. 3



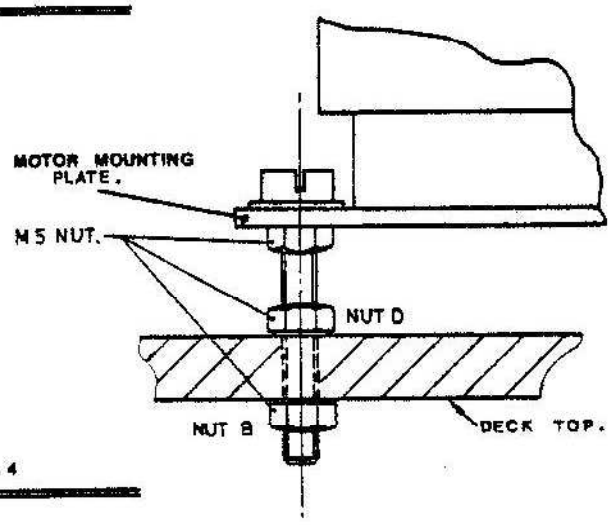
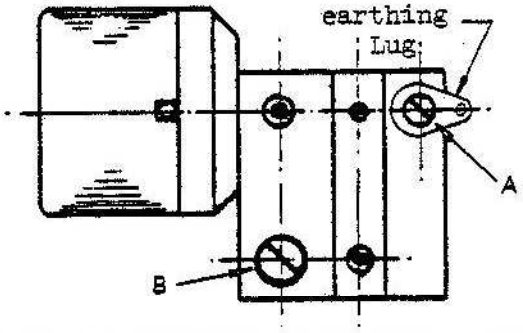


FIG. 4

5.6 HEAD REPLACEMENT

5.6.1 To remove any of the three head-mount assemblies, the pop-up hum shield should first be removed, by pulling it up off its post. The post is then removed by rotating it 90 degrees and lifting up.
The head leads are then unsoldered from the deck-connector bracket and earthing-lug and the two head-block locating screws (A) and (B) are removed. Remove the tape-guide pins, and lift the assembly off the deck.



5.6.2 Replacement is the reversal of removal. Place the head-mount assembly on the deck, with one 0,13 mm shim (part no. 01101001) and two 0,25 mm shims (part no. 01101002) under it. Replace the screw, shakeproof washer and earthing lug at A, and the screw at B. Adjust the head-mounts until the screws are in the centre of the holes in the head-block, then tighten the screws.

5.6.3 Thread a tape behind the tape-lift arm (on the head-side of the arm), and spool forward to settle the tape. Stop the tape by centralizing the spooling-pot lever. Look at the tape-position across the laminations. For a full-track mono machine, the edges of the laminations should show above and below the tape: for a two-track stereo machine the tape should completely cover the laminations.

5.6.4 Adjust the head-mount by adding or removing head-mount shims, so that all three heads are in line with each other and the centre of the tape, to within $\pm$ 0,05 mm ($\pm$.002") (After adding or removing shims, spool the tape as in 5.6.3 to re-settle it on the heads).

5.6.5 After the head-height is set, resolder the head-leads to the appropriate connections. Then set the horizontal position of the head-mount assembly. The Replay head position is set to give equal angle tape wrap on each side of the gap. A visual check gives satisfactory accuracy. The actual total wrap angle can best be optimised while playing the azimuth section of a BASF DIN 19S test tape. Adjust the azimuth for peak output. If the output level can be increased by increasing the tape tension by holding back the supply reel, then either the tape tension is too low, or the Replay wrap angle is insufficient. Check tape tension as per section 5.4 If holding back the supply reel to increase tape tension now produces an increase in output level by more than 0.5dB the wrap angle is insufficient. Move the Replay head mount forward. A point will be reached at which forward movement produces no further increase in output. At this position the level will also display an increased steadiness.

5.6.6 The Record head is set the same as the Replay head, except that SYNC should be selected to check wrap.

5.6.7 The Erase head is not critical, however it should be set to maximise erasure of 50 Hz prerecorded tone.

5.6.8 Replace the tape guide-pins as follows:

Assemble a lock-nut (03200102) to each guide-pin, and then screw the cheese-head supply guide-pin (01600734) into the hole between the Erase and Record heads. Spool a tape back and forth across the heads and adjust the guide-pin up or down until the tape rides centrally without touching either edge of the guide.
Repeat with the tapered take-up guide-pin, (01600876) which is screwed into the hole adjustment to the spooling motor.
Tighten the lock-nuts on the guide-pins.

5.7 Tension Arm Replacement

If the tension arm is replaced special care must be taken in setting its operating point. The spring force is adjusted to 8 gm $\pm$ 2 gm with less than 2 gm hysterysis. Hysterysis is the change in force required to reverse the direction of motion of the sensor arm.

Having set the tensions as per section 5.4 the check on control range must be made and the 20 gm to 100 gm range must be achieved to ensure full proportional range from beginning to end of the reel. The arm must be close to the sensor coil and parallel to it. Arm to coil clearance should be between 0.1mm (.004") to 0.2mm (.008"). If the lower end of the control range (20 grm) cannot be achieved by manually moving the sensor arm over the coil while tape is running, the arm angle must be adjusted so the arm covers less sensor coil area in the normal running position.

Note: Bending the arm will change the set tension and a pot adjustment will need to be made before rechecking the control range. Check holdback tension as per section 5.4.4

5.8 Stabilizer Roller Replacement

The stabilizer roller height must be carefully set to ensure correct tape handling. The .005" shims enable the height to be adjusted. To set the roller height remove both tape guides and pressure roller. Position the shims to give central tape positioning over the heads with the deck in PLAY mode. Between two and five shims will be needed to take up the clearance between roller height and available post height. When the roller height has been set fill the excess space between roller and top cap with shims to give minimum clearance. Do not compress the shims between the roller and top cover as this will tighten the bearing and produce tape timer errors and wow and flutter problems. When the height is set replace the tape guides and pressure roller. Ensure that the roller rotates freely. Check wow and flutter and tape timer accuracy.

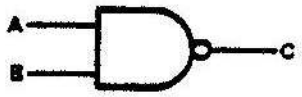
6. CIRCUIT DESCRIPTION

6.1 Deck Control Logic - Refer Drg. 23-2098

The deck control logic circuits control the correct operating sequences of the deck, and ensure that undesirable operating states cannot occur. It consists of five bistable memories to store commands from push buttons, solenoid drivers, capstan motor timer, and interlocking logic.

The two basic logic elements used in the circuit are CMOS NAND and NOR gates operating on a +12V supply.

NAND GATE



$$C = \overline{A \cdot B}$$

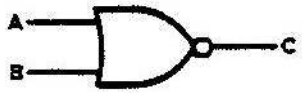
Truth Table

A Input	B Input	C Output
0	0	1
0	1	1
1	0	1
1	1	0

By De Morgan's Law:

If all inputs are 1, the output will be 0
of if any input is 0, the output will be 1.

NOR GATE



$$C = \overline{A + B}$$

Truth Table

A Input	B. Input	C Output
0	0	1
0	1	0
1	0	0
1	1	0

By De Morgan's Law

If all inputs are 0, the output will be 1
or if any input is 1, the output will be 0.

NOTE: Either type of gate, with all inputs connected together acts as an Inverter.

6.1 Cont.

Each of the bistables consists of a two input NOR gate and a transistor. The EDIT bistable is described in detail. U1/8 is normally high via R19 and R21. U1/9 is normally low. Thus U1/10 is low and transistor Q7 is off, and its collector is high, maintaining the high drive to U1/8.

Pushing the EDIT push button takes U1/8 low and since both inputs to the NOR gate are now low, its output U1/10 goes high which immediately turns on Q7 into saturation. Q7 collector going low takes U1/8 low through R19. This positive feedback through R 19 holds U1/8 low even after the push button is released. Thus the bistable is in a stable condition as long as neither input to the NOR gate is forced high. Q7 being low is used to control deck functions in line with EDIT requirements.

To reset the bistable the condition of both inputs low on the NOR gate must be changed. Either input going high will force the output U1/10 low, Q7 will turn off and allow U1/8 to go high and so maintain the reset condition. This resetting action comes from U3/10 which is normally low and goes high when deck conditions necessitate the resetting of the EDIT bistable.

Note that the NOR gate is powered from a +12V supply and R19 will place +24V through R21 on input pin 8. This does not exceed the absolute maximum rating of the device since all gate input pins have internal diode clamps to ground and +12V. Thus the actual voltage appearing on the input will be +12.6V and the diode will conduct approximately $\frac{11.4V}{100K}$ = 114 micro amps to the +12V supply.

6.1.1 Play Mode

PLAY mode is selected by setting two consecutive bistable memories. The output of each bistable controls different elements on the deck to implement tape playing.

The first bistable called the Play Request bistable, is formed by U1/a and Q2. Pressing the PLAY push button sets the bistable if the reset input (U1/2) is low.

Resetting action occurs when U3/3 is forced high by either the STOP push button or the TAPE BREAK switch making, or when the SPOOL push button is pressed when not in the EDIT mode, and causing U3/2 or U3/1 to go low.

Once this bistable is set, U1/3 turns on the capstan motor through Q2.

The brake and pressure roller solenoids, the play lamp, and the pulse start to the spooling motor control board will not be energised until the second bistable, formed by U1/b and Q3 is set.

This bistable is set by the motion input, from the tape timer board going low, and reset by the output of the first PLAY bistable going high. Once the first bistable is set, the second will be set when tape motion ceases and the MOTION line goes low.

6.1.1 Play Mode Contd.

When this occurs, 3 events take place simultaneously:

(i) U1/4 provides a pulse start to the spooling board through Q5.

(ii) U1/4 energises the brake solenoid through R33, Q9 and Q10.

(iii) Q3 collector energises the pressure roller solenoid through Q8 and also turns on the PLAY push button lamp.

The PLAY push button resets the SPOOL bistable through U6/3 and the RECORD bistable through U5/4.

The spooling motors will run when Q13 is turned on by U4c and Q11..U4/10 goes high to turn on Q13 only if STOP is not active and the MOTION line is active. The spooling motor will run whenever there is tape motion. The MOTION line is generated by the Tape Timer circuit and will be inactive if there is a TAPE BREAK. This logic ensures that when the tape break switch is made the spooling motor will not run on due to the over-spin of the stabilizer roller that generates the MOTION signal.

6.1.2 Stop Mode

The STOP push button resets the PLAY, RECORD and SPOOL bistables through U3/1, U5/5 and U6/2 respectively (wired OR through D11 with U5/13 which is the $\overline{\text{STOP BUS}}$).

The $\overline{\text{STOP BUS}}$ is active when the STOP push button is pressed or when a TAPE BREAK occurs, only if the PLAY, RECORD or SPOOL push buttons are not pressed. This condition is sensed by U5b.

It also resets EDIT directly through U3/9 and sets the capstan motor timer formed by U3/b and U2/d. This timer keeps the capstan motor running for approximately two minutes through Q12. If, during the two minute period, the STOP button is pushed again, D12 discharges the timing capacitor C9 so the timing period commences from zero again.

The STOP lamp is illuminated through Q1 via U3/4 whenever Capstan motor turns.

6.1.3 Record Mode

The record bistable is formed by U2/b and Q4.

The RECORD push button takes U2/5 low to set the RECORD bistable and U1/1 low through D4 to set the PLAY REQUEST bistable. When the MOTION line goes low indicating no tape motion, the PLAY bistable is set. U1/4 which is normally low holds the RECORD bistable reset through U5/2 and enables the bistable to be set only when it goes high.

6.1.3 Record Mode Contd.

The SPOOL bistable is reset through U6/4 when the RECORD push button is pushed. Q4 going low illuminates the RECORD lamp and starts the bias oscillator in the amplifier chassis.

The RECORD LOCK-OUT switch in the amplifier chassis holds the RECORD bistable reset through U5/13.

The PLAY push button also resets the RECORD bistable through U5/4.

6.1.4 Spool Mode

The SPOOL bistable is formed by U2/a and Q6.

The SPOOL push button sets the bistable through U2/2. The bistable is reset by the following:

(i) PLAY push button through U6/3.

(ii) RECORD push button through U6/4

(iii) STOP BUS through U6/2.

(iv) It is held reset by the EDIT bistable output Q5 through U6/5. This resetting action ensures that SPOOL cannot be selected once EDIT is active.

The collector of Q6 is low when SPOOL is selected and earths the wiper of the SPOOL control potentiometer enabling control of tape motion left and right. It also provides a pulse start to the spooling motors through Q5 to take up any tape slackness when SPOOL is selected.

Q6 collector also holds the EDIT bistable reset through U3/8 so that once in SPOOL, EDIT cannot be selected. U2/2 energises the brake solenoid through U4/8 when SPOOL is active.

6.1.5 Edit Mode

The EDIT push button sets the EDIT bistable through U1/8 which in turn energises the brake solenoid through U4/1 and 2.

U1/10 inhibits the take-up motor only when PLAY is active through U3d and D13 so that when PLAY is also selected a "BIN EDIT" control is achieved. When EDIT only is selected the take up motor is not inhibited and manually moving the spools will give tensioned tape because MOTION will go true and provide constant tension drive to the spooling motors.

The bistable is held reset by SPOOL through U3/8 and the STOP push button through U3/9.

The tape break switch does not reset EDIT unless D8 is in the circuit. If the machine is in the "BIN EDIT" mode the tape break switch will reset the PLAY bistable and set the machine back to the EDIT mode.

6.2 Monitor - Ref. drg. 23-2092

The signal selected by S5 to be displayed on the VU meter is amplified by Q1 and Q2, which form a wideband (flat to 300 KHz) class A amplifier with a closed loop gain of 10. The collector of Q2 drives the VU meter through R11 and drives the monitor volume potentiometer direct. The wiper of the monitor volume pot drives the monitor speaker amplifier formed by Q3 to Q9. Q3 and Q4 are a high gain darlington input buffer driving the power drivers Q6, Q8 and Q7, Q9. Q5 provides D.C. bias to eliminate cross-over distortion in the output stage. Gain is set at approximately 20 by R12 and R14.

6.3 Spooling Motor Control - Ref. drg 23-2094

Control of the two spooling motors to provide correct operating and braking tension, and wind and rewind speed, is achieved by two tension control systems sensing tape tension, and controlling the spooling motors through a transistor in a bridge rectifier in series with the motor.

The take up and supply motor circuits are almost identical so only the take up circuit is described.

Transistor Q1 and transformer T5 form a tuned collector oscillator with a fixed frequency of approximately 170 KHz.

The transformer T5 is mounted on the deck below the tape arm. As tape tension changes, the tape arm swings across T5 to change its "Q". The changing "Q" adjusts the output level on the secondary S2. Thus tape tension is directly proportional to S2 output voltage. The oscillator oscillates only when Q1 emitter is earthed through diodes CR1, CR2 and CR4.

Secondary S2 is rectified and filtered by CR9 and C3, and this level drives the base of Q3 which is in series with the motor via a bridge rectifier formed by CR11 - CR14. Thus Q3 controls the motor current and therefore, the tape tension to hold the tape arm at the preset position over the sensing transformer T5. R13, C5, and R8 provide feedback on Q3 to provide a clean sinusoidal current waveform to the motor. C7, 8 and 9 are the phase lead capacitors for the motor start winding. C17 protects Q3 from mains transients.

When PLAY is selected, pin 12 on the spooling motor control board is grounded and forward biases CR4 and CR7. Thus the oscillators begin oscillating and turn on the motors. For about 100 millisecs after PLAY or SPOOL has been selected, pin 8 is held to ground, forward biasing CR1 and CR5. This causes the oscillators to provide the maximum base drive to Q3 for the 100 milliseconds regardless of the position of the tape arms, and thus give a full 240V drive to the take up motor. R17 in series with CR5 reduces the level of this pulse drive to the supply motor. This high torque pulse gets the tape up to speed quickly and reduces initial tape bounce and flutter. RV1 and RV2 control the preset tension on the spooling motors.

After the STOP button is pressed, pin 12 is held at ground until tape motion ceases, and forward biases CR4 and CR7. This provides dynamic braking drive to the motors while the brakes are applied, but removes the drive after the tape is stopped.

When SPOOL is selected the wiper of the spooling potentiometer is grounded. Shifting the pot left (right) places less (more) resistance in series with CR6 (CR2) through pin 13 (17) and the supply (take up) oscillator increases (decreases) in output to move the tape left (right) onto the supply (take up) reel. To provide a large neutral area in its mid position, the pot is large in resistance so neither oscillator has extra drive in the pot's centre area. To provide a controlled minimum tension when passing through this mid position pin 8 is also grounded to maintain both

6.3 Spooling Motor Control Contd.

oscillators running in the normal constant tension mode, through CR1 and CR5 R19 and 20 reverse bias diodes CR2 and CR6 to maintain preset tension in SPOOL mode when the spool pot wiper is at each extreme of the pot.

Selecting EDIT disables the take up motor by grounding pin 4 and hence the base of Q1. The motor is disabled so that when EDIT and PLAY are selected together a BIN EDIT mode results.

6.4 Capstan Motor Control - Ref. drg. 23-1326

The capstan motor runs when Q12 on the deck logic PCB earths the LED in PC 1 and causes approximately 22mA to flow through it, illuminating the LDR (light dependent resistor) in the optical isolator, which drops from many meg-ohms to below 50K ohms. C3 and diac DC 1 then go into a relaxation oscillation mode and turn on triac TC 1. The triac is turned on during the zero crossing of the load current due to the leading voltage on the diac caused by C2. This action causes a clean spike-free switching for the motor current. R3 and C4 remove the possibility of false firing of the triac by suppressing transient voltages caused by the back E.M.F. of the motor. C5 - C8 are the phase lead capacitors for the start winding of the motor.

When current is not flowing in the LED the LDR in the optical isolator is many meg-ohms in resistance and does not allow any voltage to appear on the diac. Thus the triac does not conduct, and the motor does not run.

Two speeds can be selected via the tape speed select switch.

(1) High speed - earthing the switch (i.e. energising both relay A and B)

(2) Low speed - opening the switch

The relay contacts switch the motor windings to give a 6 or 12 pole configuration. The high speed requires more torque and therefore, more phase lead capacitance (by switching in another 0.47 uF capacitor C1) for the start winding of the motor.

6.5 Power Supply - Ref. drg. 23-2096

The 35 volt secondary of the power supply transformer is rectified by BR1 and filtered by C1 to produce 40 volts. This is fused by F1 and then used to drive the two solenoids and the 24 volt regulator.

The 24 volt regulator uses three transistors to acomplish regulation.

Zener diode CR1 forms a stable 12 volt reference connected to the emitter of Q3. The output voltage is sampled by a resistive divider R5 and 6, and compared with the reference. The difference is amplified by Q3 and used to drive Q1 and Q2 which turn on or

6.5 Power Supply Cont.

off to reduce the difference to zero. If the output were to fall, the divider R5 and R6 would sense the fall and remove base drive from Q3. This reduces the collector current of Q3 and, hence more of the current being supplied by R1 and R3 goes into the base of Q2, which, in turn, increases the drive to Q1. Q1 turns on further to restore the original output voltage and reduce the difference between reference voltage and sampled voltage.

R2 in series with Q2 collector limits the base drive to Q3 so if the output is shorted, the short circuit current is limited to a safe level before the fuse blows.

Unregulated voltages	40 to 50 V
Regulated voltage	22 to 25 V
Maximum output current	2 amps
Short circuit current	4 to 8 amps
Regulation at 1 amp	200 millivolts
Ripple at 0.2 amp	15 millivolts peak to peak
DC fuse	2 amp M205
AC fuse	1 amp M205 - 240 V 2 amp M205 - 117 V

6.6 Replay Amplifier - Ref. drg. 23-2090

Transistors Q1, Q2 and Q3 form a low noise DC coupled equalized preamplifier with a mid band gain of approximately 40dB. Speed equalization networks are selected by earthing the gates of field effect transistors Q4 and Q5. RV2 (RV4) provide independent level adjustments for the low (high) speed and RV1 (RV3) provide independent high frequency compensation adjustment for the low (high) speed. Resistor R15 (R16) sets the low frequency for the low (high) speed.

The output of the preamplifier is wired to the front panel OUTPUT potentiometer. The input to the program amplifier is switch selectable to be the output of the preamp (in PLAY and SYNC modes) or the RECORD input. This input has a OVU nominal level of -15dBm for PLAY AND RECORD switch settings and -35dBm for SYNC switch selection. The input is driven through a filter L1 to remove bias.
The program amplifier has a nominal gain of 18dB. The output of the program amplifier is connected to the output balancing transformer which has a 6dB voltage gain. The balanced output impedence is typically 50 ohms. The capacitor across the balanced output of the transformer rolls off the frequency response beyond 20 KHz and at 100 KHz the output is in excess of 40dB down.

In SYNC mode Relay RL1/1 is energised. This disconnects the

6.6 Replay Amplifier Contd.

play head from the input to the preamplifier and substitutes the record head. Since the record head has been optimised for "record" performance its output level is approximately 20dB lower than the play head, hence an additional 20dB gain is required in the program amplifier to bring the SYNC level up to the PLAY level. This network is "switched in" by earthing the gate of FET Q7 (automatic in SYNC REPLAY mode). RV7 controls the SYNC gain. Note that there is additional logic behind selecting SYNC mode.

If SYNC mode is selected when the deck is recording, SYNC operation is inhibited, thus returning the replay channel to replaying from the replay head. Additionally in two track machines, if the front panel SAFE switch is in SAFE mode, SYNC operation is permitted in this channel, while recording takes place in the other channel.

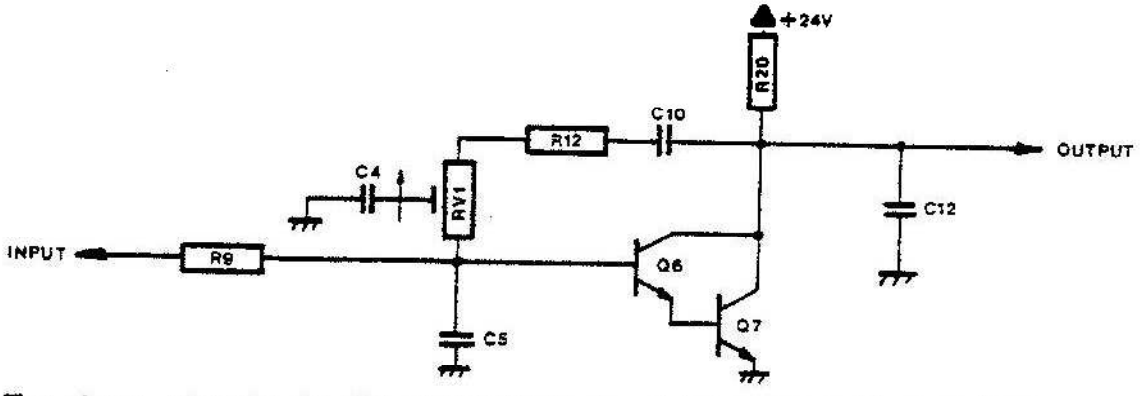
WARNING: In the SAFE mode, this channel can be replaying from the record head while the other channel is recording ONTO the other channel of the same record head. The channel to channel crosstalk of the record head is about - 60dB. However the record track can have up to 2 volts RMS of high frequency audio onit, which means that there will be a high crosstalk between channels in this mode especially above 10KHz.

This mode should only be used for FOLDBACK and not used to remix into the recording channel, otherwise a danger exists of the recording channel oscillating at 15 KHz to 20KHz.

6.7 Record Amplifier - Ref. drg. 23-2091

Transistors Q1 and Q2 form a low noise low distortion mixing preamplifier with a gain of 20dB. The preamplifier mixes two line inputs which are attenuated by the respective front panel RECORD LEVEL controls.

The preamplifier output is passed on to the low (high) speed level preset potentiometer RV2(RV4). The equalizing amplifier, Q6 and Q7 is self-biased via resistors R17, 18 and 19 and capacitor C13. The speed equalizing netowrks are selected by earthing the gates of Q3 (low speed) or Q4 (high speed).



The above circuit is the equivalent equalizing circuit when low speed is energised (biasing components removed).

6.7 Record Amplifier Contd.

It forms a 3 "pole" adjustable active filter. Phase delay network R9/C5, R20/C12 and RV1/C4 delay the phase of the feedback signal with respect to the input to such an extent that the network can self oscillate (180 degrees phase shift) under maximum phase delay. R12 is used to reduce the phase delay to less than 180 degrees to prevent oscillation but still permit the required high frequency boost to be given to the record head driver.

The phase delay is controlled by RV1 and C4. Figure 5 shows the maximum, minimum and typical frequency responses of this

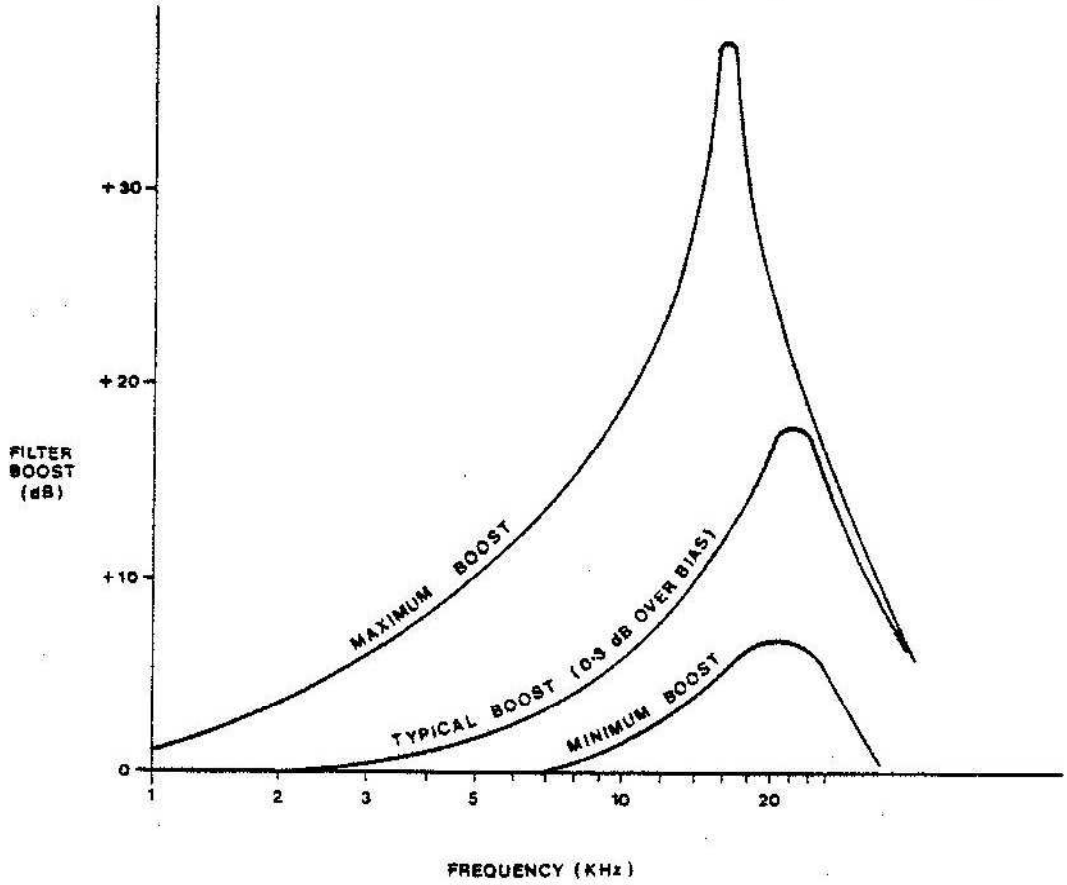


FIG. 5
RECORD EQUALIZER BOOST CHARACTERISTICS

Capacitor C10 is used to provide the 3180 microsecond NAB break point if reduced to 0.047 UF, i.e.3dB boost at 50Hz.

Since the recording process is basically a constant flux characteristic, a constant head current is required when frequencies are below 3KHz. Above 3KHz the head current requires to be boosted a certain amount to compensate for head losses and tape losses. To implement this current drive to the heads the collector load of Q8 is a 10 mA current source formed by Q9 and associated components.

Transistor Q8 works as an emitter follower so that the collector

6.7 Record Amplifier Contd.

current in Q8 is directly proportional to the emitter voltage which in turn is equal to output of the equalizer stage.

Since the load on Q8 is a constant current any change in current through Q8 must be compensated for by an equal and opposite change in the current through capacitor C16, i.e. the head current.

Thus the record head driver is a voltage to current converter with a transconductance of 5mA/volt with a maximum current drive of 10mA P-P and a limiting voltage of 15V P-P. The source impedence of the current drive is equal to R24 (47K).

The record head current is passed through bias trap L1/C18 to isolate bias frequencies from the record head driver. Capacitor C16 absorbs any stray bias which happens to leak through the bias trap.

Bias, derived from the bias oscillator, is adjusted by RV7 and passed through capacitor C19 to the record head. C19 has a high impedence at audio frequencies and prevents any of the audio current being bypassed by the bias level control.

SYNC relays RL1/1 and RL2/1 are energised in PLAY mode to direct the record head output to the replay amplifier SYNC relay so that in SYNC REPLAY mode the record head is accessible to the replay amplifier.

In RECORD mode relays RL 1 and RL2 de-energise and connect the record head to the record amplifier.

Both leads of the record head are switched to prevent earth loops forming in SYNC mode since the same head is shared between two circuits.

Control of relays RL1 and RL2 is designed for a fast de-energise and a slow energise to ensure that the record head is never switched when there is bias on it.

This timing function is performed by Q1 on the mother board to de-energise relays in less than 10mSec and energise in about 100mSec.

6.8 Mic Pre-Amp - Ref. drg. 23-2089

The microphone input is coupled to the pre-amplifier via a 200 ohm to 50K transformer with a gain of 20dB. The pre-amp is a 3 stage DC coupled amplifier with a fixed gain of 28dB. The output of the pre-amp drives the front panel INPUT 1 level pot, the wiper of which is mixed with the INPUT 2 level pot output to drive the record head amplifier.

Transistor Q1 operates with a collector current of 10uA. Its bias voltage is derived from the emitter of Q3 and maintained by the DC feedback path. Two negative feedback paths to Q1, one via R5 and the other via R11 and C6 in parallel, increase the input impedence of the amplifier. Q3 is an emitter follower which gives a low source impedence for the feedback and output.

6.9 Tape Timer - Ref. drg. 23-1354

The tape timer counts revolutions of the top stabilizer roll and converts this to an equivalent tape playing time, at the selected speed.

6.9.1 Counting, and the direction of the count (either up or down) are sensed by blocking the infra-red light (from LED1 and LED2) to the photo transistors Q1 and Q2. When the light is blocked Q1 (Q2) turns off, Q3 (Q4) turns off and U 2/5,6 (U2/8,9) goes high which in turn produces a low at U2/4 (U2/10). R4, C17 and R3 (R8, C8 and R7) provide positive feedback around the sensor to give a clean transition on the output of U2. When both Q1 and Q2 are covered U3/1 and U3/4 are both low. This gives a low at U1/12 which indicates a "coincidence". This coincidence pulse is used to clock the counter U6 to produce the timing indication.

6.9.2 The stabilizer roll has a circumference of 3.75 inches, and one revolution produces two coincidence pulses for 3.75 inches of tape. U4 is set as a binery counter and produces four outputs; divide by 2,4,8 and 16 on pins 6,11,14 and 2 respectively. It is clocked by the coincidence pulse so each output produces one pulse per second if the tape speed is 3.75, 7.5, 15 and 30 i.p.s. respectively.

The appropriate output of U4 is gated to the input, U6/36 of the counter, by grounding the appropriate input line on U5.

6.9.3 Since tape can be wound in both directions the timer must decrease its reading when tape id being spooled back on to the supply reel. Direction of rotation is sensed by U3. U1/5,6 and U1/9,8 and R11, R12 and C5 form a 250 KHz oscillator that clocks the first flip-flop of U3. U3/3 will be high at the leading edge of coincidence when counting up and so U3/5 will be clocked high by U1/12. This line is used to control the count direction (either up or down) of the counter U6. If the direction of rotation is reversed U3/5 will go low causing the counter to go down. An error condition can exist if the direction of rotation is reversed during coincidence and the particular coincidence pulse is about to clock the counter chain. In this situation the timer will count one second in the wrong direction. At 7.5 i.p.s. this can occur only on every fourth pulse.

6.9.4 The selected count pulse on U6/36 clocks U6 to provide the timing indication. U6 is a 6 digit up down counter-display driver. The clock pulses on pin 36 clock the counter either up or down depending on the state of the up-down line U6/40. U6 provides a multiplexed display drive for common cathode 7 segment displays. Each segment is driven directly from the chip through 1K resistors R16 to R22. Each digit is sequentially selected by Q5 to Q9.

6.9.5 The MOTION signal is generated on U2/11 by rectifying and filtering the output of one sensor on U2/4. When tape is in motion U2/4 will be alternately high and low. C3 A.C. - couples this signal to D2 which will hold C4 discharged. When motion ceases C4 will charge through R9 and U2/11 will change from high to low when the charge on C4 reaches half supply. This short delay in signalling no motion to the deck logic board is to ensure that tape has definately stopped before PLAY mode begins.

TAPE BREAK high will force U2/11 low regardless of the state of U2/13.

6.10 Bias Oscillator - Ref.drg. 23-1329

When the deck is in the RECORD mode, pin 11 on the bias oscillator PCB is grounded and will turn on Q4 if the SAFE switch is in the RECORD position. Q4 turning on will turn on Q1 over a period of approximately 60 milliseconds. Q2, Q3 and L1 form a class C push-pull oscillator which runs when supplied with 24V D.C. from the collector of Q1. Thus when a bias is turned on, it increases to its maximum level over a period of 60 milliseconds, and when turned off decreases to zero level over the same period. This controlled rise and fall of bias eliminates recorded "clicks" on tape. In a two track configuration the oscillators in each amplifier must run at the same frequency to stop beat notes being generated. C6 couples the emitter of Q3 in each oscillator to synchronize their frequencies.

7. AMPLIFIER ALIGNMENT

7.1 Preliminary

Before the audio performance of the machine is checked, or a primary alignment made, the deck must be fully functional and the tape path must be clean and demagnetized.

CAUTION: 1. Switch off power before demagnetizing the heads.

2. Do not make D.C. resistance measurements on the heads.

3. Use an inert solvent such as methylated spirits to clean the heads and tape path.

7.2 Replay

7.2.1 Select a tape speed of 7.5 i.p.s. : LO on a 7.5/15 i.p.s. machine and MED on a 3.75 /7.5 i.p.s. machine. Thread a BASF DIN 19S test tape, select PLAY on the output selector push buttons, and place the output level switch at the CAL position. Place an A.C. voltmeter across the balanced output and load the output with 600 ohms.

7.2.2 Play the test tape. The first section of tone enables the correct CAL level to be set. Adjust LO LEVEL RV2 on the replay board to give a reading of +16dBm on the output for a mono head and +12dBm for a stereo head. With the first 1kHz section still playing adjust the azimuth to peak the output level. RV2 may now need to be readjusted to the specified levels above. To set the azimuth slacken the locking screw and rotate the adjusting screw until the output level peaks. Do not overtighten the locking screw. A light lock is sufficient. Fig. 6 shows the adjustment points.

CAUTION: Beware of secondary peaks on either side of the true azimuth setting.

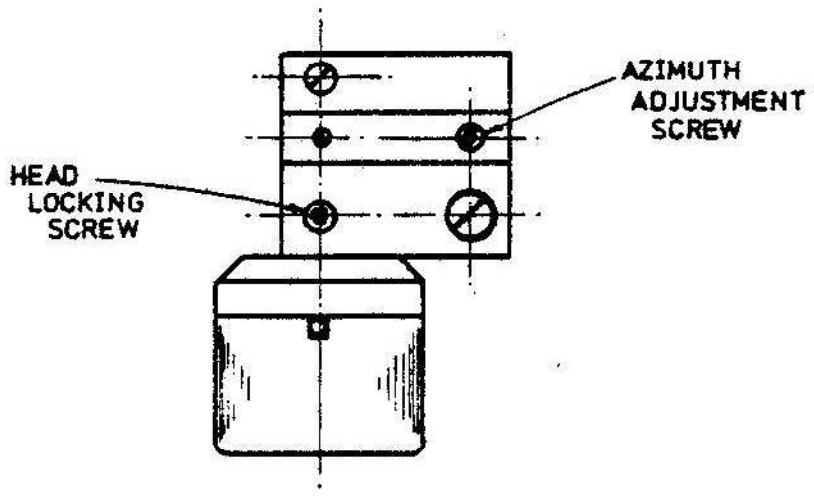


FIG. 6
AZIMUTH ADJUSTMENTS.

7.2.3 The next section of the test tape enables azimuth to be set at 10KHz. The azimuth should be adjusted to a peak steady output level for a full track machine. On a two track deck adjust the azimuth for an in phase signal between the two tracks.

The rest of the tape enables frequency response to be checked. The output should not vary by greater than ± 1dB over the range 30Hz to 16KHz. High frequency levels can be adjusted by RV1- H.F. COMP LO. on the replay board. Note that the H.F. COMP control affects the 1KHz level slightly, so this must be checked after adjusting the high frequency response. Low frequency response below 60Hz can be adjusted by changing R15. Decreasing R15 decreases the level.

Remove the test tape and select PLAY mode. Check that the noise on the output is less than -46dBm. This corresponds to a signal to noise ratio of -62 WRT + 16dBm.

7.2.4 Select MED speed (15 i.p.s. on a 7.5/15 i.p.s. machine) and thread a BASF DIN 38S test tape. Set the HI LEVEL RV4 on the replay board for +16dBm for mono and +12dBm for stereo. Azimuth should not be adjusted since it is set with the 7.5 i.p.s. tape. Check frequency response - ± 1dB 30Hz to 18KHz. High frequency response is adjusted by RV3, HF COMP MED. Low frequency can be increased by increasing R16. Noise with PLAY selected, but no tape against the head, should be below -48dBm. This corresponds to a signal to noise ratio of -64dB WRT + 16dBm.

7.2.5 For a 3 3/4 / 7 1/2 i.p.s machine the replay levels at 3 3/4 i.p.s using a DIN 9 test tape are set to +14dBm for a full track machine and +10dBm for a two track machine. This is because the level section on the test tape is 250 nwb/m and not 320 nwb/m as in the 7 1/2 and 15 i.p.s. test tapes.

7.3 Line to Line

7.3.1 Connect an audio oscillator set for +8dBm to INPUT 2 and set the RECORD 2 LEVEL switch at CAL. Select RECORD on the output selector and measure the signal on the output loaded with 600 ohms. Adjust the TRANSFER GAIN RV4 on the mother board to give +8dBm on the output.

7.3.2 With RECORD still selected on the OUTPUT switch increase the input level to +16dBm. Measure total harmonic distortion on the output. It should be less than 0.5% at 1KHz.

7.3.3 Reduce the input level back to +8dBm and check the frequency response from input to output. It should be ± 1dB 30Hz to 20KHz.

7.3.4 Deselect CALIBRATION switch and increase the RECORD 2 LEVEL control to maximum, select RECORD on the OUTPUT selector switch and decrease the oscillator output until the output is 0dBm. Measure the oscillator output. It should be -20dBm, or less which gives a maximum record gain of 20dB or more.

7.3.5 Select RECORD on the OUTPUT selector and set the oscillator for 100KHz at +20dBm. Rotate the slug of the replay bias trap L4 on the mother board to give a null on the output.

7.4 Mic to Line

7.4.1 On machines equipped with a microphone input, set INPUT 1 level switch to CAL and select RECORD on the output selector. Measure the output level loaded with 600 ohm and apply a 1KHz signal on the RECORD input at a level of 2mV R.M.S. The output level should be + 8dBm for an input level in the range of 2 to 3mV.
Note: TRANSFER GAIN must have been previously set as in 7.3.1 before this check is made.

A level of 2mV may be difficult to obtain. A satisfactory method is to use a 1000 to 1 divider formed by a 47K and 47ohm resistor, but measuring at the output of the oscillator. With this divider 2mV on the input to the pre-amp would be measured at the oscillator output as a level of 2V.

With the input 1 level switch set to CAL a + 8dBm output should be obtained with an input between 2 and 3mV.

7.4.2 With RECORD still selected on the OUTPUT switch, increase the input level to 15mV and reduce the INPUT level 1 control until the output is +16dBm. Measure the total harmonic distortion. It should be less than 0.5% at 1KHz.

7.4.3 Decrease the oscillator level until the output is +8dBm and check the frequency response. It should be ± 1dB 50Hz to 15KHz.

7.4.4 Set the INPUT 1 level control to CAL. and set the INPUT 2 level control to zero. Dissconnect the oscillator. If the divider described in 7.4.1 is not used, bridge the input with a 47 ohm resistor. Measure the output noise. It should be -40dBm or less to give a signal to noise ratio of 56dB.

7.5 Record

Select RECORD on the RECORD/LOCKOUT switch and select RECORD mode on the deck.

7.5.1 On a full track deck monitor the bias oscillator at TP2 with a high impedance meter or oscilloscope. The level should be 55V RMS (170V P.P.) Connect a frequency meter at the TP1 on the monitor board (drg. 23-2092) and adjust the bias oscillator coil slug to give a 100KHz ± 500Hz output. Check that safe stops the oscillator.

On a two track deck put CH1 in RECORD and CH2 in SAFE and set CH1 bias oscillator to 100KHz as above. Place both channels in RECORD and adjust the CH2 bias oscillator to the centre point between the audible out-of-sync points. The sync note can be heard by selecting BIAS on the monitor switch.

7.5.2 Connect an oscilloscope at TP3 on the Record PCB and rotate L1 for a null in the 100KHz level. The level should be less than 2V P.P.

Connect a low distortion audio oscillator set for +8dBm to INPUT 2 and set the RECORD 2 LEVEL control to CAL. Select PLAY on the OUTPUT selector, and set the OUTPUT LEVEL control to CAL. Connect an AC voltmeter to the output and load it with 600 ohms. Thread a reel of Ampex 406 bulk erased tape on the deck. Set the BIAS LEVEL RV7 on the Record Board to approximately 1/2 clockwise rotation and set the input audio oscillator to 1KHz. Push the RECORD button on the deck. Adjust the LEVEL LO RV2 control on the record board for +8dBm on the output at 7.5 I.P.S. Adjust the LEVEL MED RV4 for +8dBm on the output at 15 I.P.S.

7.5.3 At 7.5 I.P.S. set the Record head azimuth for peak output at 1KHz. Adjust RV7 BIAS LEVEL for peak output at 1KHz. Increase the bias level until the 1KHz level drops by 0.2dB. Change the oscillator frequency to 15KHz and readjust the azimuth for a peak steady output level. On a two track deck set the azimuth for an in phase signal between the two channels at 15KHz.

7.5.4 Re-adjust the LEVEL LO controls RV2 and RV4 for 8dBm output at 1KHz. Check the overall frequency response of the machine at -4dBm both speeds. The high frequency response is adjusted by HF COMP LO RV1 at 7.5 i.p.s and HF COMP MED RV3 at 15 i.p.s. The output should be within ± 2dB from 30Hz to 16KHz at 7.5 i.p.s 30Hz to 20KHz for 15 i.p.s. and 30Hz to 8KHz at 3.75 i.p.s.

7.5.5 Set the oscillator to 1KHz and increase its level until the output is +16dBm. Connect a distortion meter across the output and load it with 600 ohm. Measure the distortion. It should be less than 1.5% THD for a mono deck and less than 2% THD for a stereo deck.

7.5.6 Change the oscillator frequency to 50Hz and check that distortion is within the specified limits.

7.5.7 Record a length of tape with 50Hz at +16dBm. Re-record over the section with no input signal present then replay again in PLAY mode only. The output while replaying is a measure of the erasing ability. The output should be less than -40dBm to give an erasure of 56dB at 50Hz.

7.5.8 Record a section of tape with no input signal. Replay that section of tape in PLAY mode only. The output noise should be less than -42dBm at 7.5 i.p.s. to give an overall signal to noise ratio of 58dB. The output noise should be less than -43dBm at 15 i.p.s. to give an overall signal to noise ratio of 59dB.

7.6 Monitor

7.6.1 Connect an audio oscillator set for +8dBm at 1KHz to INPUT 2 and set the RECORD 2 LEVEL switch to CAL. Load the output with 600 ohm and connect an AC voltmeter across it.

7.6.2 Select RECORD on the output selector and PLAY on the monitor selector. Adjust the MONITOR OUTPUT LEVEL RV2 on the mother board for 0 VU indication on the VU meter.

7.6.3 Select RECORD on the monitor selector. Adjust the MONITOR INPUT LEVEL RV1 on the mother board for 0 VU indication.

7.6.4 Select RECORD mode on the deck and BIAS on the monitor selector. Adjust MONITOR BIAS LEVEL RV3 on the mother board for 0 VU indication.

Select RECORD on the monitor selector and set the oscillator for 0 VU indication. Place a 15 ohm load across the tip and ring of the monitor jack and connect a noise and distortion meter across it. Set the MONITOR LEVEL to 5.5 V RMS to give an output power of 2 watts. Measure the distortion. It should be less than 1% THD.

7.6.5 With the MONITOR LEVEL still set at 2 watts, check the frequency response. It should be within ± 3dB, 30Hz to 16KHz.

7.6.6 With the MONITOR LEVEL still set at the 2W point remove the input signal and measure the noise across the 15 ohm load. It should be less than 5.5 millivolts RMS to give a signal to noise ratio of 60dB.

7.7 Sync

7.7.1 Select LOCKOUT on the SAFE switch and thread a BASF DIN 19S test tape on the deck. Select SYNC on the output selector and set the output level with SYNC LEVEL RV7. Check frequency response at 7.5 i.p.s. It should be witnin ±3dB 30Hz to 8KHz. With a BASF DIN 38S test tape the frequency resp repsonse at 15 i.p.s. should be within ± 3dB 30Hz to 16 KHz. At 3.75 i.p.s. with a DIN 9 test tape it should be ± 3dB 30Hz to 4KHz.

7.7.2 Remove the tape. Select PLAY mode and with SYNC still selected on the output selector measure the noise on the output. The level should be less than -34dBm to give a signal to noise ratio of 50dB, w.r.t. 16 dBm.

7.8 Wow and Flutter Check

7.8.1 Thread a reel of bulk erased Ampex 406 tape on the deck. Connect an oscillator to RECORD INPUT 2 and set it to 3KHz. Set RECORD 2 LEVEL to CAL and record a tape with 3KHz, at the required speed.

Set output level to CAL. Then select PLAY on the output selector and connect a Wow and Flutter meter across the output connector. Place the deck in PLAY mode and at each tape speed, measure the Peak weighted CCIR Wow and Flutter . It should be less than;

0.08%	@	15 i.p.s.
0.1%	@	7.5 i.p.s.
0.15%	@	3.75 i.p.s.

8. SPARE PARTS LISTING

8.1 Amplifier

Description	Manufacturer	Manufacturers Part No.	CEI Part No.
Extender P.C.B. assy.			04000871
Bias Oscillator P.C.B.			04000884
Record Amplifier PCB assy. I.E.C. 3 3/4- 7 1/2 I.P.S			04000928
Record Amplifier PCB assy I.E.C. 7 1/2 - 15 I.P.S.			04000934
Replay Amplifier PCB assy.			
I.E.C 3 3/4-7 1/2 I.P.S			04000927
Replay Amplifier PCB assy I.E.C. 7 1/2-15 I.P.S.			04000933
Monitor PCB assy.			04000922
Mother PCB assy			04000923
Input Transformer	L.M. Ericsson	454 2006/1	00400322
Output Transform			00400323
Bias Transformer			02200041
Replay bias trap			02200042
Record bias trap			02200045
V.U. Meter	Master Instruments	FB30A Illuminated .24V	00700016
Input bridging switch	Swann	1299-02-01	00803026
Monitor & output switch Assy	Schadow	3XF22UGR15FSB	00803177
Pot, Input, Output & Monitor	A. &. R. Soanar	VCU10KC	00200661
Record lockout switch	C & K	7103 KY ZGE SPDT	00803157
Card relay	National	RS24V	02000034
Mic pre-amplfier			02302085
Mic input transformer			90304007
Calibrate Switch	C & K	7201	00803043
Peak Indicator PCB Assembly			02302188

8.2 Below Deck

Description	Manufacturer	Manufacturers Part no.	CEI Part No.
7 1/2 - 15 IPS Capstan motor	Papst	HSKZ 32-80-6/12-440D	04001229
3 3/4 - 7 1/2 IPS Capstan motor	Papst	HSKZ 32-80-6/12-440D	04001370
240V Spooling motor			04001074
117V spooling motor			04001318
Pressure roller solenoid	I.R.H.	428-36V	02301054
Brake solenoid	I.R.H.	427-36V	02301053
Power transformer			00400039
Fuse holder	Belling Lee	L2006A	00802910
Power Supply PCB assy			04000909
240V 50Hz Capstan motor PCB assy			04000926
240V 50Hz spool motor PCB assy			04000921
117v 60Hz Capstan motor PCB assy			04000900
117V 60Hz Spool motor PCB assy			04000901
Motor connector pin - male	Utilux	H9002	00802098
Motor connector pin - female	Utilux	H9001	00802087
Nylon PCB support pin	Richlok	CBS - 3N	00000150
Capstan PCB relay	Relay Pty Ltd	SRE D24	02000045
Capstan PCB optical isolator			02301040

8.3 Above Deck

Description	Manufacturer	Manufacturer's Part No.	CEI Part No.
Record and replay head humshield			*01602012*
Pop Up humshield			02301207
Spool retaining knob			02301049
Top stabilizer roller assy.			02301316
Bottom stabilizer roller assy.			02301339
Stabilizer roller cover			01600785
Pressure roller cover			01600786
Tape lifter arm			01600719
Tension arm and boss assy take-up.			02301363
Tension arm and boss assy supply.			02301364
Brake drum assy			02301063
Brake shoe assy			02301062
Tape break micro switch	Micro Switch	311SM703-T	00803170
Tape lifter and brake spring			00900525
Tape arm spring - take-up			00900539
Tape arm spring - supply			00900540
Tension Sensor PCB assy			04000867
Tape timer PCB assy			04000899
Spool potentiometer	A & R Soanar	VSU45-5K LIN	01101010
Spool pot knob	A & R Soanar	BH-25MM	00900047
Transistor IR425	International Rectifier	IR 425	01000164
Mains Switch	C & K	7201-J51-Z-Q-RED	00803171
Deck Logic PCB assy			04000908
Stop push button	Mulon	MUM-1S3W-KB	00803180
Play push button	Mulon	MUM-1S3Y-KB	00803181
Edit push button	Mulon	MUM-1S3G-KB	00803182
Spool push button	Mulon	MUM-1S3B-KB	00803183
Record push button	Mulon	MUM-1S3R-KB	00803184
Push button lamp	Chicago Miniature	CM 388	00803112
Tape timer reset push button	C & K	8125-V3	00803168
Tape timer push button cap	C & K	BLACK 7089	00803169
Speed and local remote switch	C & K	7201-J52-Z-Q	00803167
Pressure roller 7½ - 15 i.p.s.			02301064
Pressure roller 3 3/4 - 7½ i.p.s.			02301159
Tape-guide pin (supply)			01600734
Tape-guide pin (take-up)			01600876
Head mount shim: 0,25 mm (.010")			01101001
Head mount shim: 0,13 mm (.005")			01101002

8.4 HEADS

The Nortronics part number is the type of head used, but this is mounted in a block and the CEI part number is matched head and head mount assembly .

Head	Nortronics Part No.	CEI Part No.
Replay - Full track mono	9102	02302080
- Two track stereo	9213	02301220
Record - Full track mono	9103	02302081
- Two track stereo	9209	02301221
Erase - Full track mono	9125	02302082
- Two track stereo	9222	02301222

DRAWING NO: 02600342
DECK ASSEMBLY 77MK V

THIS PARTS LIST INCLUDES

HANDLES
SCREWS
STAND-OFFS
BUSHES

1	01600855	DECK
2	01600792	DECK COVER STAND-OFF
3	03200520	CSK HEAD SCREW M6 X 20 PROTECTION FRAME
4	03200500	CHEESE HEAD SCREW M6 X 10
5	01600838	HANDLE BAR
6	01600840	HANDLE SUPPORT LOCKING
7	01600839	HANDLE SUPPORT
8	00608022	PIN 3/16" DIA X 5/8" LONG
9	01600772	PIVOT BLOCK
10	01600780	LOCKING BLOCK
11	03200907	CHEESE HEAD SCREW M3 X 30
12	00900511	SPRING
13	01300166	PLASTIC WASHER M3
14	03200017	SHAKEPROOF WASHER M3
15	03200104	NUT M3
16	02301293	PIVOT BLOCK ASSEMBLY
17	01600609	PIN - EDIT SWITCH STOP
18	03200501	CHEESE HEAD SCREW M6 X 12
19	03200022	SPRING WASHER M6
20	03200305	CHEESE HEAD SCREW M4 X 20
21	01600613	BRAKE SHOE POST
22	03200304	CHEESE HEAD SCREW M4 X 16
23	00600199	SOLDER LUG
24	03200009	SHAKEPROOF WASHER M4
25	01600595	SPRING ANCHOR STAND-OFF
26	01600876	TAPE GUIDE PIN, TAPER
27	01600734	TAPE GUIDE PIN
28	03200102	NUT M4
29	03200324	CSK HEAD SCREW M4 X 16
30	01600697	TENSION ARM STOP
31	03200203	CHEESE HEAD SCREW M2 X 12
32	01600496	TAPE BREAK SWITCH STOP
33	01600856	PCB STAND-OFF
34	00900925	NILSEN BUSH

ITEM	PART NO:	DESCRIPTION

DRAWING NO: 02600342
DECK ASSEMBLY 77MK V

THIS PARTS LIST INCLUDES

SWITCHES
BRAKE DRUMS
TAPE TIMER DISPLAY
TAPE TENSION PCB'S
TAPE BREAK MICROSWITCH

1	00803146	MAINS SWITCH
2	01100945	BRACKET
3	03200301	CHEESE HEAD SCREW M4 X 8
4	03200009	SHAKEPROOF WASHER M4
5	01101010	SPOOLING POT
6	00900053	BLACK KNOB - FSB SCHADOW
7	01100893	BRACKET
8	03200900	CHEESE HEAD SCREW M3 X 6
9	03200017	SHAKEPROOF WASHER M3
10	00804044	RED LENS
11	00804043	BULB MU 0893 28V
12	01100980	BRACKET
13	03200300	CHEESE HEAD SCREW M4 X 6
14	03200009	SHAKEPROOF WASHER M4
15	00803167	SWITCH
16	01000185	LED, RED
17	01000186	LED, GREEN
18	01101004	BRACKET
19	00804045	BLUE, LENS)
20	00804046	GREEN, LENS) LOGIC PCB SWITCHES
21	00804047	YELLOW, LENS)
22	00804048	WHITE, LENS)
23	01101003	SUPPORT BAR
24	04000899	TAPE TIMER DISPLAY PCB
25	03200250	CHEESE HEAD SCREW M2.5 X 6
26	01300191	TAPE TIMER DISPLAY INSULATION
27	01300160	MICROSWITCH INSULATION
28	00803170	TAPE BREAK MICROSWITCH
29	03200203	CHEESE HEAD SCREW M2 X 12
30	03200000	WASHER M2
31	00802307	SOLDER LUG
32	01101000	TENSION SENSOR SHIELD, TAKE UP
33	01100999	TENSION SENSOR SHIELD, SUPPLY
34	02300867	TAPE TENSION PCB
35	01300136	TAPE TENSION INSULATION
36	00900511	SPRING
37	03200253	CHEESE HEAD SCREW M2.5 X 12
38	02301063	BRAKE DRUM ASSEMBLY
39	02301049	SPOOL RETAINING KNOB ASSEMBLY

ITEM PART NO: DESCRIPTION

DRAWING NO: 02600342
DECK ASSEMBLY 77MK V

THIS PARTS LIST INCLUDES

HEADS
BRAKES
TRANSISTORS

ITEM	PART NO:	DESCRIPTION
1	02301226	PLAY HEAD ASSEMBLY, STEREO
	02301223	PLAY HEAD ASSEMBLY, MONO
2	02301227	RECORD HEAD ASSEMBLY, STEREO
	02301224	RECORD HEAD ASSEMBLY, MONO
3	02301228	ERASE HEAD ASSEMLBY, STEREO
	02301225	ERASE HEAD ASSEMBLY, MONO
4	01602012	HEAD SHIELD
5	01600857	HEAD MOUNT BODY
6	01600598	AZIMUTH ADJUSTING ARM
7	00900511	SPRING
8	03200947	SOCKET HEAD CAP SCREW M3 X 20
9	03200930	GRUB SCREW M3 X 6 CUP POINT
10	03200945	SOCKET HEAD CAP SCREW M3 X 10
11	01101002	HEAD MOUNT SHIM 0.127 THICK FOR HEIGHT ADJUST
12	01101001	HEAD MOUNT SHIME 0.254 THICK FOR HEIGHT ADJUST
13	03200009	SHAKEPROOF WASHER M4
14	00600199	SOLDER LUG
15	03200348	SOCKET HEAD SCREW M4 X 25
16	02301062	BRAKE SHOE ASSEMBLY
17	00900525	COTTON DAMPED SPRING
18	01600727	BRAKE TIE ROD, LONG
19	01600728	BRAKE TIE ROD, SHORT
20	02301058	BRAKE LEVER SHAFT
21	01600570	BRAKE LEVER ARM
22	01300234	MICA INSULATION SEE KIT 01000064
23	01000164	TRANSISTOR
24	01000064	TRANSISTOR
25	00802314	SOLDER LUG
26	01300234	STEP WASHER SEE KIT 01000064
27	03200005	SHAKEPROOF WASHER M2.5
28	03200252	CHEESE HEAD SCREW M2.5 X 10
29	01300099	TRANSISTOR COVER
30	02302268	INSULATED SCREW ASSEMBLY M2.5
31	03200004	WASHER M2.5
32	03200101	NUT M2.5

THIS PARTS LIST INCLUDES

STABILIZING ROLLERS
TENSION ARMS
POP-UP SHIELD

1	01600785	STABILIZING ROLLER COVER
2	01101013	SHIM WASHER
3	02301316	STABILIZING ROLLER ASSEMBLY, TAKE UP
4	02301339	STABILIZING ROLLER ASSEMBLY, SUPPLY
5	02302150	TENSION ARM BOSS ASSEMBLY, TAKE UP
6	02302149	TENSION ARM BOSS ASSEMBLY, SUPPLY
7	03200268	GRUB SCREW M2.5 X 8 CUP POINT
8	01600894	TENSION SENSOR ARM, TAKE UP
9	01600893	TENSION SENSOR ARM, SUPPLY
10	00900539	TENSION ARM SPRING, TAKE UP
11	00900540	TENSION ARM SPRING, SUPPLY
12	01600821	TENSION CONTROL MOUNTING POST
13	00900319	CIRCLIP
14	01101005	POST SHIM - FOR HEIGHT ADJUSTMENT
15	01600611	BEARING HOUSING NUT
16	01600892	TENSION ARM BOSS, TAKE UP
17	01600891	TENSION ARM BOSS, SUPPLY
18	00900945	SHORLUBE BUSH - DRY
19	01600787	STABILIZING ROLLER, TAKE UP
20	01600788	STABILIZING ROLLER, SUPPLY
21	00900940	BEARING, SUPPLY
22	00900949	BEARING, TAKE UP
23	01300060	'O' RING
24	01101040	SHIM WASHER
25	00900339	CIRCLIP
26	01600817	WEIGHT
27	00900527	POP-UP SHIELD LATCH SPRING
28	03200301	CHEESE HEAD SCREW M4 X 8
29	03200009	SHAKEPROOF WASHER M4
30	03200008	FLAT WASHER M4
31	01600751	SPRING RETAINING BUSH
32	01100903	POP-UP MU-METAL SHIELD
33	01600741	POP-UP SHIELD BLOCK
34	03200250	CHESSE HEAD SCREW M2.5 X 6
35	00900528	RETAINING SPRING
36	02301205	POP-UP SHIELD SHAFT ASSEMBLY
37	02301204	BEARING HOUSING ASSEMBLY
38	01600739	POP-UP SHIELD NUT
39	01600738	POP-UP SHIELD BEARING HOUSING
40	00900923	NILSEN BUSH

ITEM	PART NO:	DESCRIPTION

THIS PARTS LIST INCLUDES

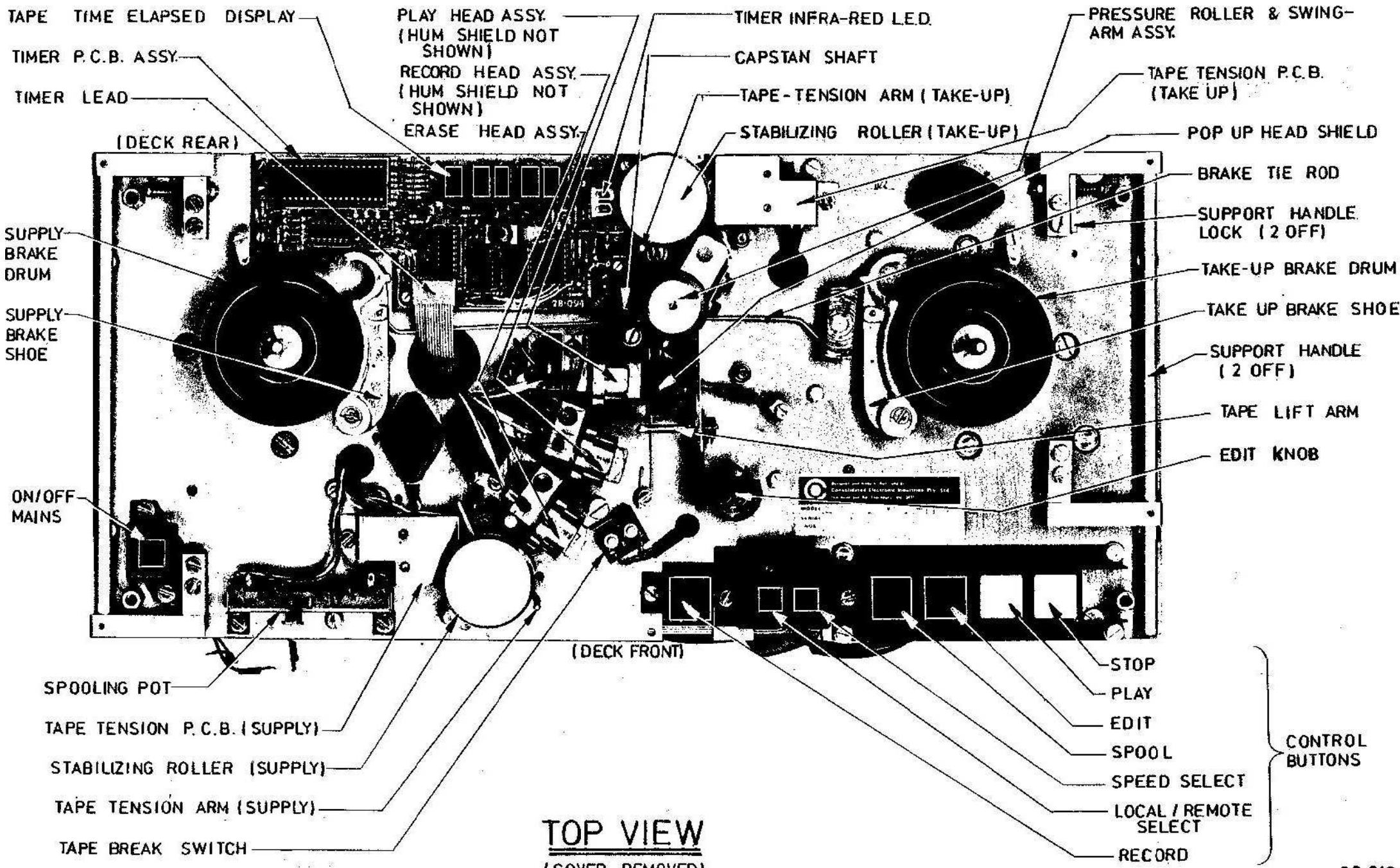
EDIT SWITCH
PRESSURE ROLLER
TAPE LIFT ARM

1	02301195	EDIT SWITCH ASSEMBLY
2	00900051	BLACK KNOB
3	00000011	FLAT WASHER
4	00000183	WAVE WASHER
5	00900328	GRIP RING
6	02301197	PRESSURE ROLLER PIVOT BEARING ASSEMBLY
7	01600611	BEARING HOUSING NUT
8	02302183	PRESSURE ROLLER SHAFT & ARM ASSEMBLY
9	02301064	PRESSURE ROLLER ASSEMBLY 19/38 CM.P.S.
OR	02301159	PRESSURE ROLLER ASSEMBLY 9.5/19 CM.P.S.
10	01600696	COVER
11	03200260	CSK HEAD SCREW M2.5 X 6
12	02302076	TAPE LIFT ARM SUPPORT BAR SUB-ASSEMBLY
13	03200340	GRUB SCREW M4 X 8 CUP POINT
14	00801052	HEAT SHRINK 12MM DIA
15	01600719	TAPE LIFT ARM
16	03200343	SOCKET HEAD SCREW M4 X 8
17	03200009	SHAKEPROOF WASHER M4
18	03200008	FLAT WASHER M4
19	01600129	EDIT SWITCH CAM
20	01600610	EDIT SWITCH SHAFT
21	00602024	SELLOCK PIN 1/8" DIA X 1/2" LONG
22	01600725	PRESSURE ROLLER PIVOT BEARING HOUSING
23	00900913	NILSEN BUSH
24	01600862	PRESSURE ROLLER SWING ARM
25	01600724	PRESSURE ROLLER PIVOT SHAFT
26	01600577	PRESSURE ROLLER SHAFT

ITEM	PARTNO:	DESCRIPTION

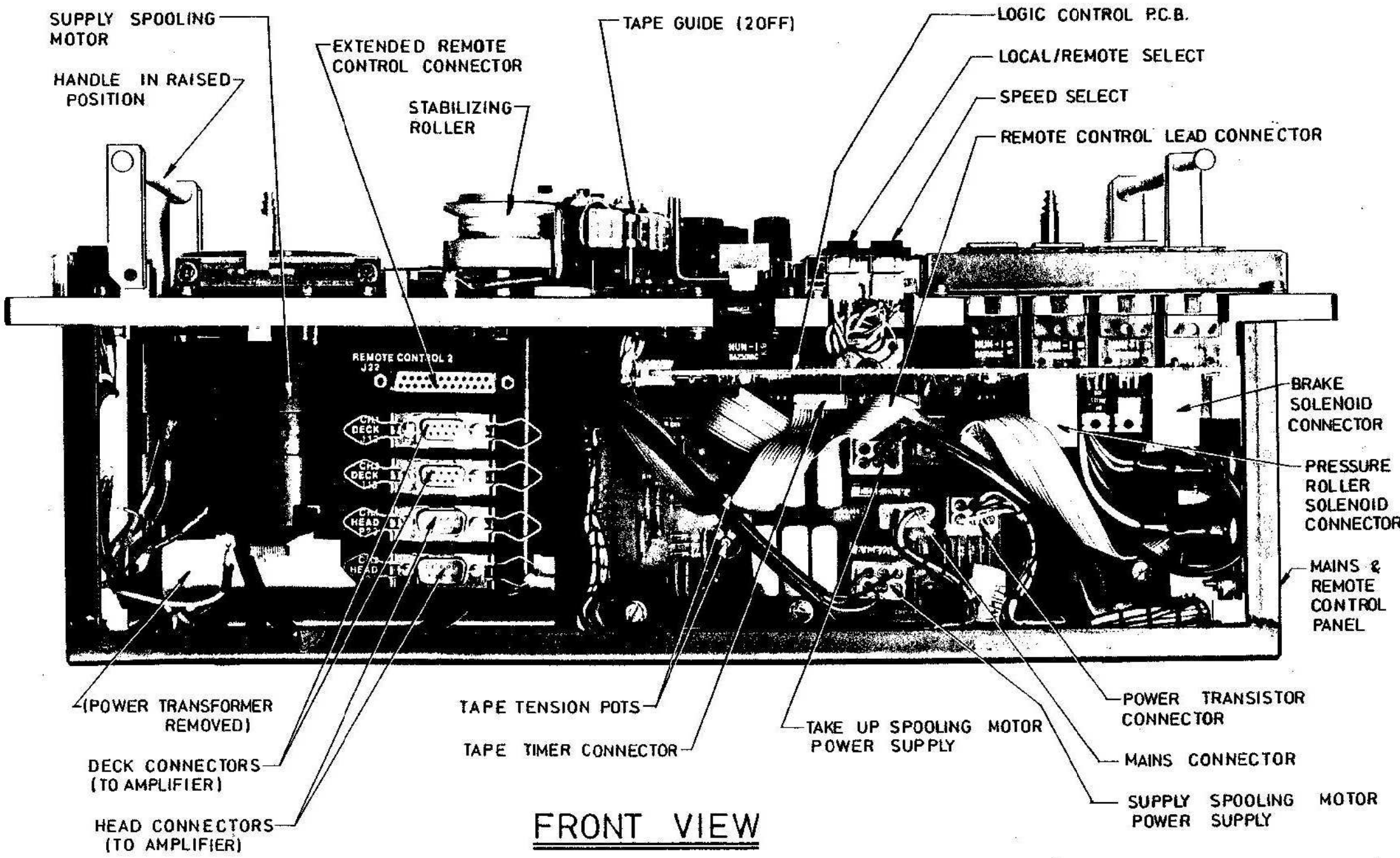
DRAWING LIST

PART NO:	TITLE	ISSUE	SIZE
02600319	Deck - Top View	A	4
02600320	Deck - Front View	A	4
02600321	Deck - Bottom View	A	4
02600322	Deck - Bottom View (Frame Removed)	A	4
02600323	Amplifier- Top View	A	4
02600309	Head Connection Circuit	A	3
02302090	Replay Amplifier Circuit	F	3
02300927	Replay Amp. PCB Assembly	)	
	IEC 3 3/4 - 7 1/2 IPS	)C	3
02300933	Replay Amp PCB Assembly	)	
	IEC 7 1/2 - 15 IPS	)	
02302091	Record Amplifier Circuit	F	3
02300928	Record Amp PCB Assembly	)	
	IEC 3 3/4 - 7 1/2 IPS	)E	3
02300934	Record Amp PCB Assembly	)	
	IEC 7 1/2 - 15 IPS	)	
02302092	Monitor Amplifier Circuit	B	3
02300922	Monitor Amp PCB Assembly	B	4
02301329	Bias Oscillator Circuit	D	4
02300884	Bias Oscillator PCB Assembly	B	4
02302093	Amplifier Interconnection	E	3
02300923	Mother PCB Assembly	F	3
02302096	Power Supply Circuit	A	4
02300909	Power Supply PCB Assembly	B	4
02302094	Spooling Motor PCB Circuit	F	3
02300921	Spooling Motor PCB Assembly	H	3
02301326	Capstan Motor PCB Circuit	B	4
02300926	Capstan Motor PCB Assembly	B	4
02301354	Tape Timer Circuit	D	3
02300889	Tape Timer PCB Assembly	D	3
02302098	Deck Logic Circuit	E	3
02300908	Deck Logic PCB Assy	E	3
02302097	Deck Block Diagram	C	3
02302095	Amplifier Block Diagram	E	3
02302089	Mic. Pre-Amp Circuit	D	3
02300929	Mic Pre-Amp PCB Assembly	B	3
02300930	Remote Control PCB Layout	A	3
02302072	REmote Control Unit Circuit	A	3
02300942	Logic PCB Circuit Sheet 1	B	4
02300942	Logic PCB Assembly Sheet 2	B	4
02600342	Deck Assembly Sheets 1 to 10	A	4/3/2

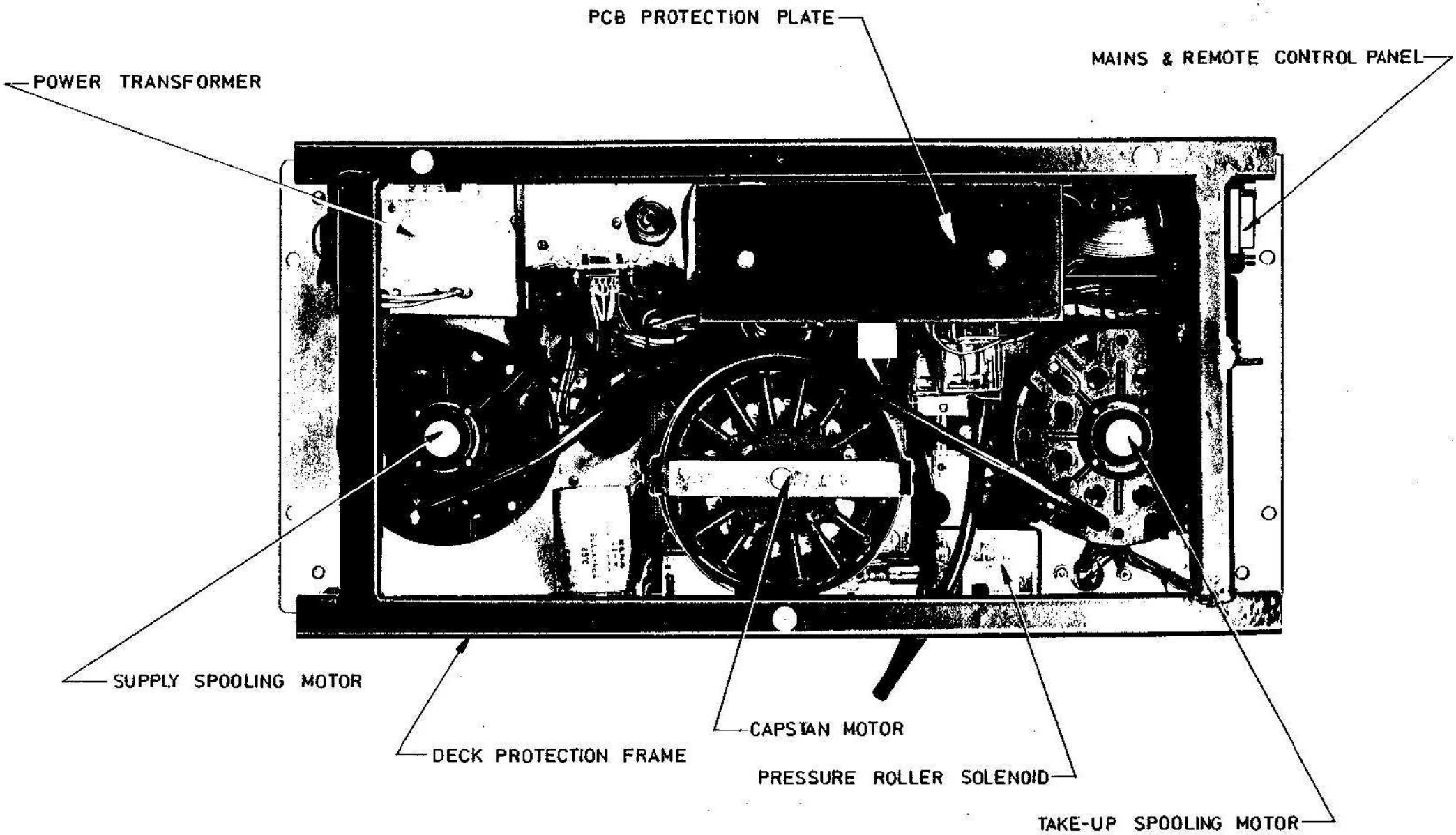


TOP VIEW

(COVER REMOVED)

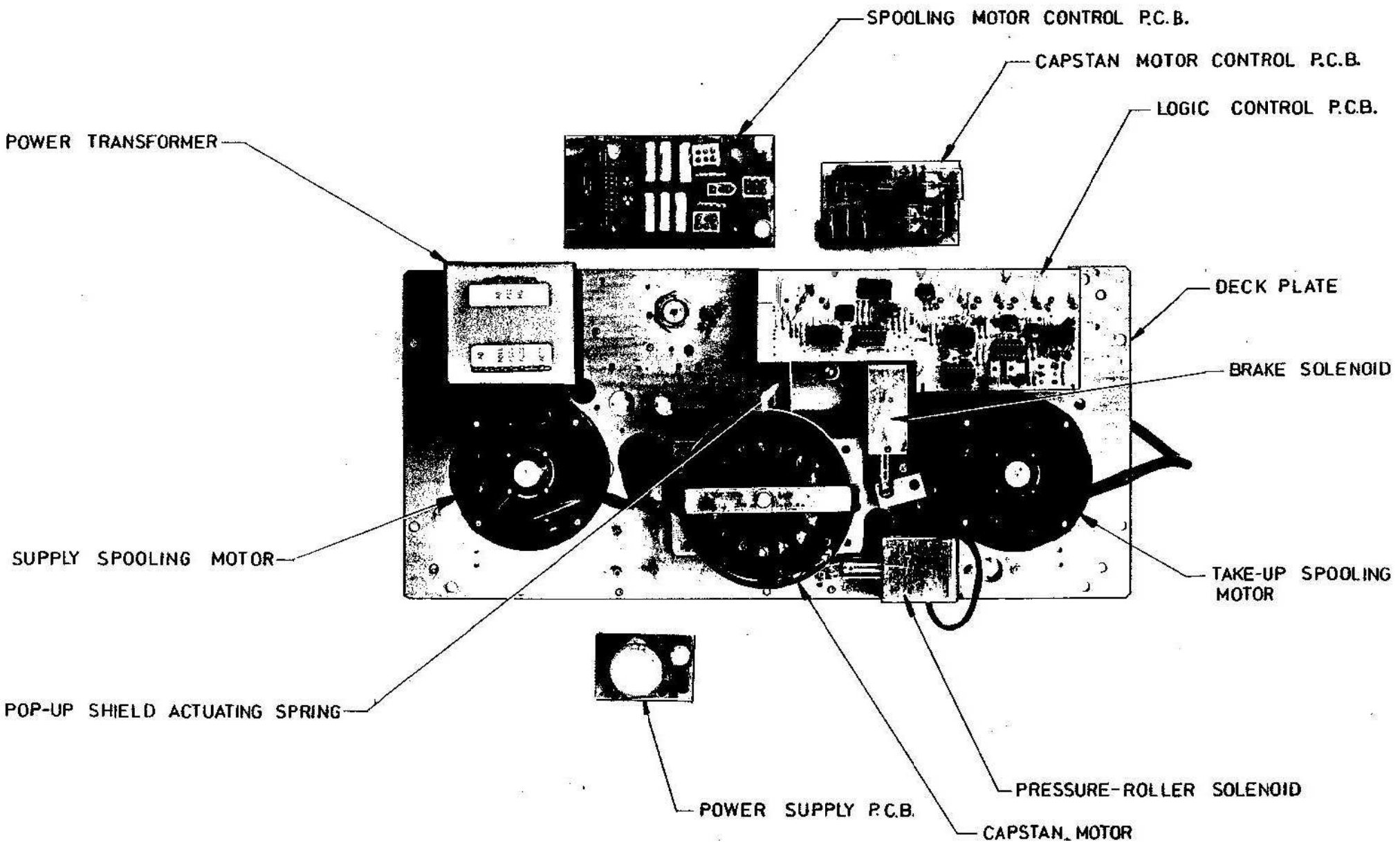

SUPPLY SPOOLING MOTOR
HANDLE IN RAISED POSITION
EXTENDED REMOTE CONTROL CONNECTOR
STABILIZING ROLLER
TAPE GUIDE (2OFF)
LOGIC CONTROL P.C.B.
LOCAL/REMOTE SELECT
SPEED SELECT
REMOTE CONTROL LEAD CONNECTOR
REMOTE CONTROL 2 J32
BRAKE SOLENOID CONNECTOR
PRESSURE ROLLER SOLENOID CONNECTOR
MAINS & REMOTE CONTROL PANEL
(POWER TRANSFORMER REMOVED)
DECK CONNECTORS (TO AMPLIFIER)
HEAD CONNECTORS (TO AMPLIFIER)
TAPE TENSION POTS
TAPE TIMER CONNECTOR
TAKE UP SPOOLING MOTOR POWER SUPPLY
POWER TRANSISTOR CONNECTOR
MAINS CONNECTOR
SUPPLY SPOOLING MOTOR POWER SUPPLY

FRONT VIEW



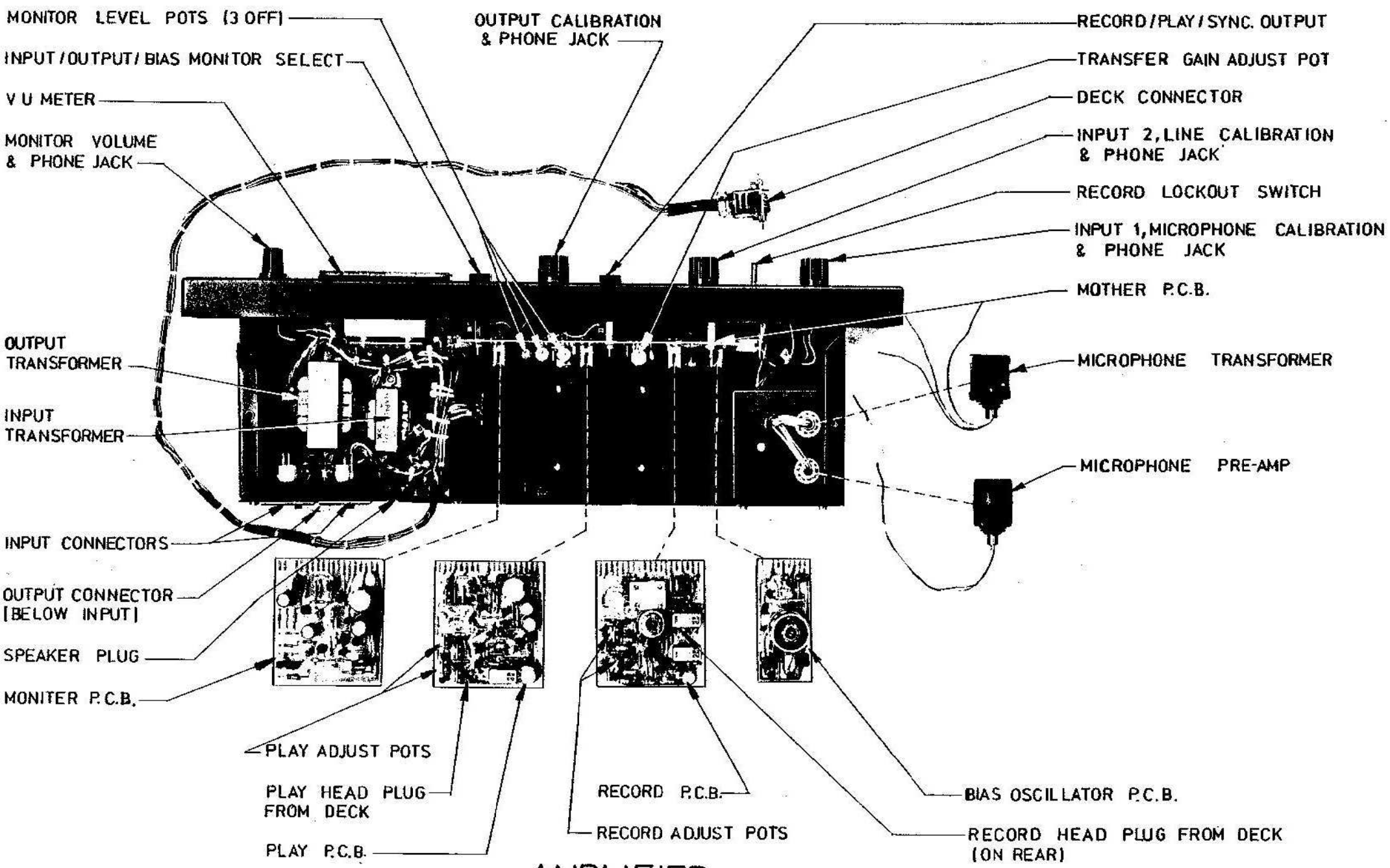
DECK

BOTTOM VIEW

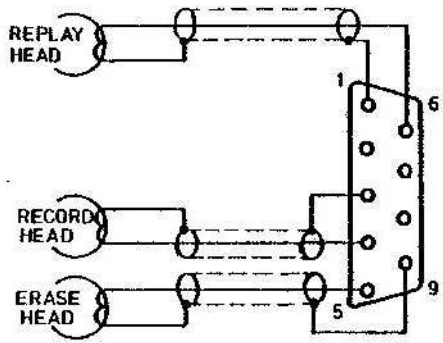


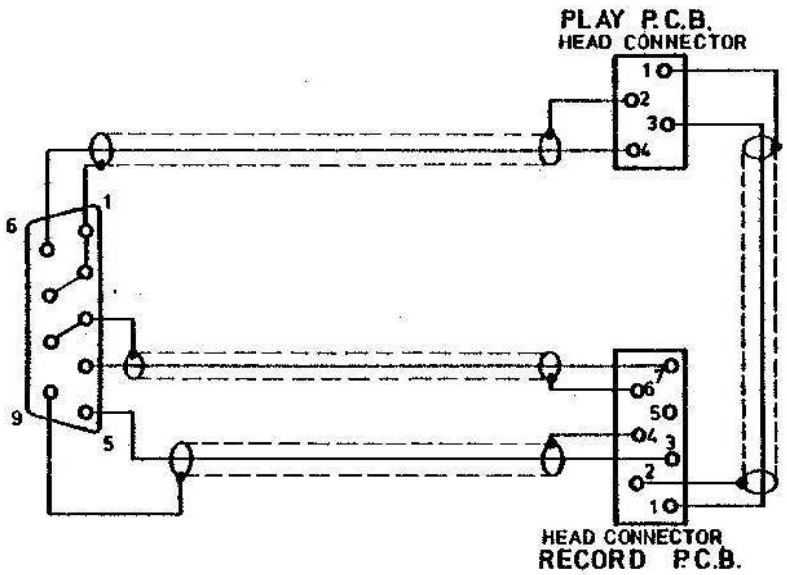
BOTTOM VIEW (DECK PROTECTION FRAME REMOVED)

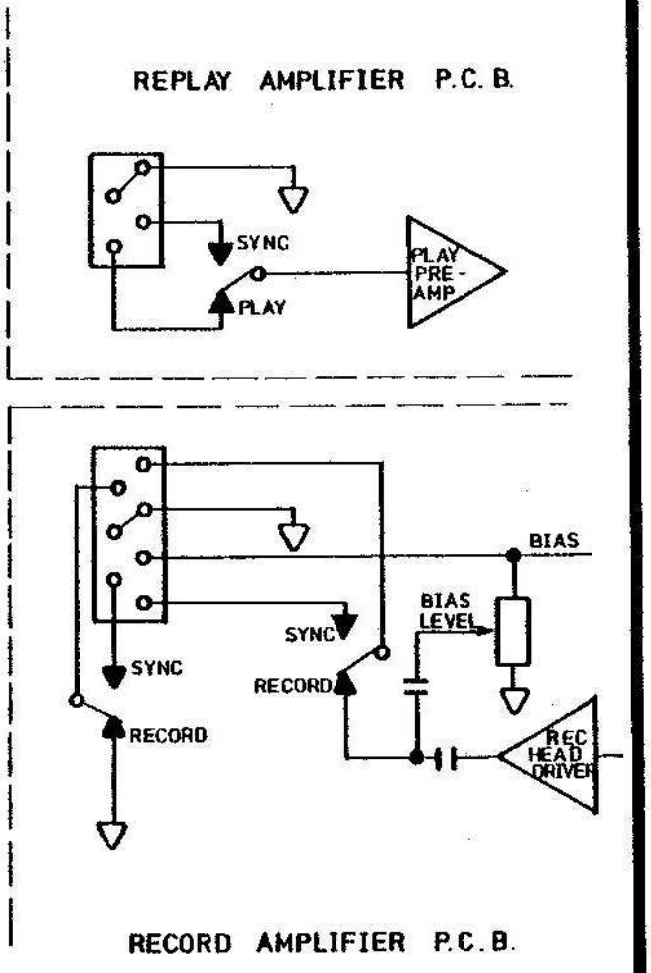
(BASIC DECK)



AMPLIFIER (TOP VIEW)

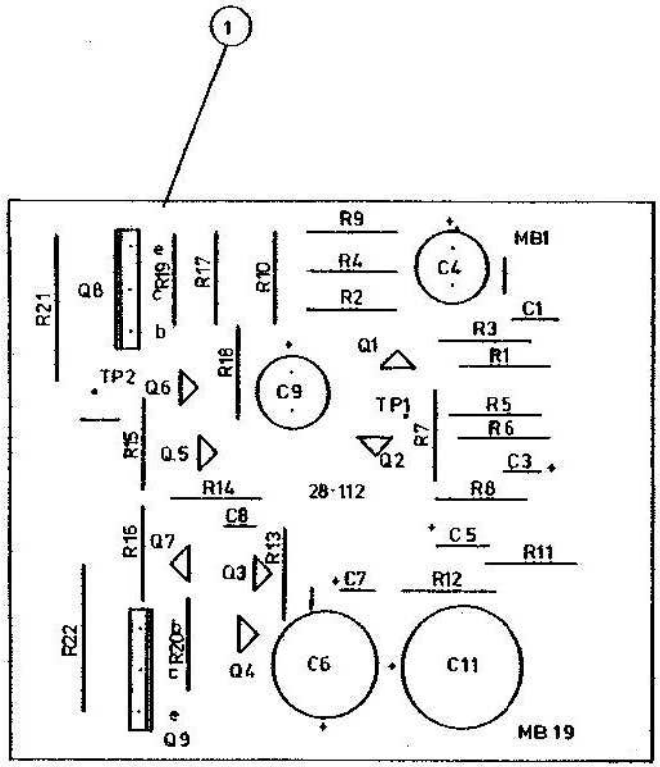






REVISIONS	UNLESS OTHERWISE STATED DIMENSIONS IN MILLIMETERS TOLERANCES LINEAR 0. ± 0.5 0.0 ± 0.1 HOLE DIA'S. + 0.25 −0 ANGULAR ± 0.5°	FINISH MAT'L.	USED ON MAT'L. No.
	SCALE N.T.S.	HEAD CONNECTION CIRCUIT 77 MK V G	3rd ANGLE PROJ.
	DRAWN S.D. 31-7-79	R. MEDDING & ASSOCIATES PTY. LTD. MELBOURNE AUSTRALIA ©	DRAWING No. 26-309
ISS	CHECKED		A 4 ISSUE A

0230 0922



①	28-112	BLANK P.C.B.
R22	02-075	RESISTOR 10HM ½W 5%
R21	02-075	" 1 OHM ½W 5%
R20	02-102	" 22 OHM ¼W 5%
R19	02-102	" 22 " " "
R18	02-125	" 1K5 " "
R17	02-125	" 1K5 " "
R16	02-123	" 1K " "
R15	02-127	" 2K2 " "
R14	02-149	" 150K " "
R13	02-137	" 15K " "
R12	02-139	" 22K " "
R11	02-130	" 3K9 " "
R10	02-110	" 100 OHM " "
R9	02-110	" 100 OHM " "
R8	02-131	" 4K7 " "
R7	02-135	" 10K " "
R6	02-124	" 1K2 " "
R5	02-123	" 1K " "
R4	02-141	" 33K " "
R3	02-155	" 470K " "
R2	02-169	" 2M7 " "
R1	02-155	" 470K " "
N°	PART N°	DESCRIPTION

TP2	08-2430	CN PIN
TP1	08-2430	" "
Q9	10-163	TRANSISTOR TIP 2955
Q8	10-162	" TIP 3055
Q7	10-128	" PN 4355
Q6	10-127	" PN 3643
Q5	10-059	" BC 318B
Q4	10-059	" BC 318B
Q3	10-059	" BC 318B
Q2	10-134	" PN 4250
Q1	10-059	" BC 318B
C11	03-053	CAPACITOR 470uF 25VRBELECTRO
C9	03-060	CAPACITOR 100uF 25V RB ELECTRO
C8	03-210	" 15pF CERAMIC
C7	03-152	" 1·5uF 35V TAG TANTALUM
C6	03-055	" 330uF 25VRB ELECTRO
C5	03-153	" 10uF 25V TAG TANTALUM
C4	03-060	" 100uF 25V RB ELECTRO
C3	03-154	100uF 4V TAG TANTALUM
C1	03-006	" ·1uF 100V POLYESTER FILM
N°	PART N°	DESCRIPTION

ITEM ① ADDED C/N 0118 6-9-80 PK

REVISIONS

8

UNLESS OTHERWISE STATED DIMENSIONS IN MILLIMETERS

TOLERANCES

LINEAR 0. ± 0.5
0.0 ± 0.1

HOLE DIA'S. + 0.25
− 0

ANGULAR ± 0.5°

SCALE 1 : 1

DRAWN S.D. 6·5·79

CHECKED PKay

FINISH

MAT'L.

USED ON

MAT'L. N°.

MONITOR P.C.B. ASSY.

77 MK V G

3rd ANGLE PROJ.

DRAWING N°.

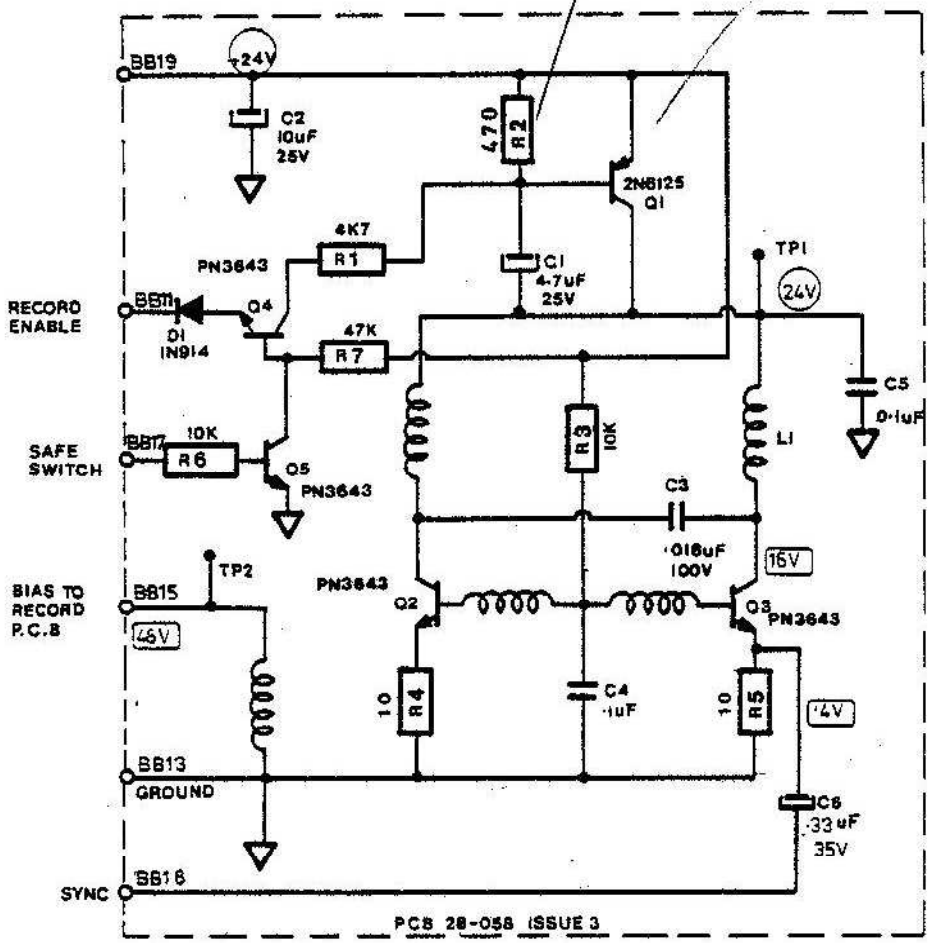
23-922

R. THEODORE & ASSOCIATES PTY. LTD.
MELBOURNE AUSTRALIA ©

A 4 ISSUE B

CHECK VALUE

USE HIGH GAIN IF SLOW TO TURN ON



NOTES

1. UNLESS OTHERWISE STATED ALL RESISTORS 1/4W 5%
2. C3 PHILLIPS POLYESTER 160V
- ◯ DC VOLTAGES
- ▭ RMS AC VOLTAGES
5. ALL VOLTAGES MEASURED WHILE RECORDING 1KHZ AT OVU IN CAL MODE.
6. ALL VOLTAGES MEASURED WITH HIGH IMPEDANCE METER (> 10MΩ)

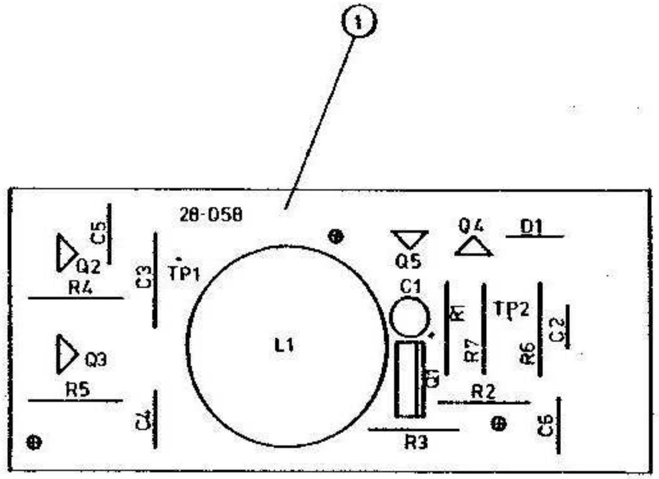
LAST USED Q5
R7
C6
D1
L1

77 Mk V Bias Oscillator -Synchronized

OSC COIL SLUG TYPE EFFECTS OSC, SYNC LOCK.

D	C/N 491. C6 ALTERED (WAS .1uF) NOTES ADDED. S.D. 10-7-78. T.K. PK			UNLESS OTHERWISE STATED DIMENSIONS IN MILLIMETERS TOLERANCES LINEAR 0. ± 0.5; 0.0 ± 0.1; HOLE DIA'S. + 0.25 −0; ANGULAR ± 0.5°	FINISH	USED ON
C	R4 & R5 WERE 33Ω			SCALE	MAT'L.	MAT'L. No.
B	R2 WAS 270Ω & C6 WAS .033uF			DRAWN J. BANOS 20-11-77	BIAS OSCILLATOR SYNCHRONIZED PCB CIRCUIT 77MkV	3rd ANGLE PROJ.
A				CHECKED T. HANSEN 26-7-78 PK	R. MEDDING & ASSOCIATES PTY. LTD. MELBOURNE AUSTRALIA	DRAWING No. 23-1329
						A 4 ISSUE D

02300884



COM Nº	PART Nº	DESCRIPTION
(1)	28-058	BLANK P. C. B.
TP1	08-2430	CN PIN
TP2	08-2430	" "

COM Nº	PART Nº	DESCRIPTION
D1	10-037	DIODE 1N914
Q1	10-146	TRANSISTOR 2N6125
Q2	10-127	" PN3643
Q3	10-127	" PN3643
Q4	10-127	" PN3643
Q5	10-127	" PN3643
L1	22 041	POTCORE ASS'Y
R1	02-131	RESISTOR ¼W 5% 4K7
R2	02-118	" " " 470Ω
R3	02-135	" " " 10 K
R4	02-101	" " " 10 Ω
R5	02-101	" " " 10 Ω
R6	02-135	" " " 10 K
R7	02-143	" " " 47K
C1	03-170	CAPACITOR 4·7µF 25V TAG TANTALUM
C2	03-153	" 10µF " " "
C3	03-035	" ·018µF 100V POLY. FILM.
C4	03-006	" ·1µF " " "
C5	03-006	" ·1µF " " "
C6	03-176	" ·33µF 35V TAG TANTALUM

REVISIONS: B — R2 WAS 270Ω. C/N 0094. 22-11-79. PKy

UNLESS OTHERWISE STATED DIMENSIONS IN MILLIMETERS
TOLERANCES
LINEAR 0. ± 0.5
0.0 ± 0.1
HOLE DIA'S. + 0.25 − 0
ANGULAR ± 0.5°

SCALE 1 : 1
DRAWN S.D. 13·6·79
CHECKED PKy

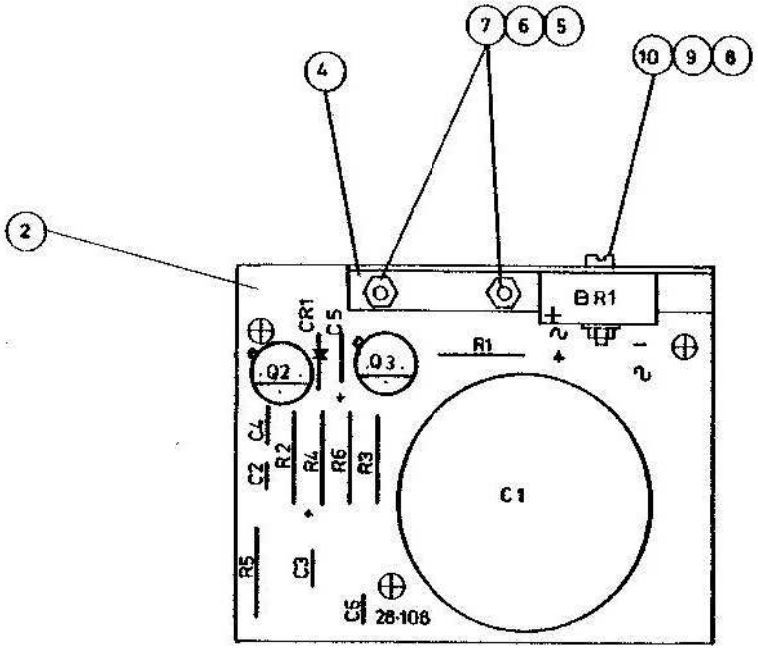
FINISH
MAT'L.

BIAS OSCILLATOR ASS'Y 77 MK V G.

R. MEDDING & ASSOCIATES PTY. LTD.
MELBOURNE AUSTRALIA

USED ON
MAT'L. Nº.
3rd ANGLE PROJ.
DRAWING Nº. 23-884
A 4 ISSUE B

0230 0909



COM Nº	PART Nº	DESCRIPTION
10	32-903	M3×12 CH. HD. SCREW
9	32-017	M3 SHK. PRF. WASHER
8	32-104	M3 NUT
2 OFF 7	32-250	M2,5×6 CH HD SCREW
2 OFF 6	32-005	M2,5 SHK. PRF WASHER
2 OFF 5	32-101	M2,5 NUT
4	11-957	RECTIFIER HEAT SINK
3		
2	28-108	POWER SUPPLY P.C.B.
1		

COM Nº	PART Nº	DESCRIPTION
BR1	10-204	BRIDGE RECTIFIER VJ148
Q3	10-127	TRANSISTOR PN3643
Q2	10-127	" PN3643
CR1	10-082	DIODE ZENER BZX79 C12
C6	03-153	CAPACITOR 10uF 25V 20% TAG TANT.LM
C5	03-153	" 10uF 25V " " "
C4	03-013	" ·056uF 100V 10% POLY.FLM.
C3	03-057	" 220uF 35VRB ELECTRO.
C2	03-007	" ·01 uF 100V 10% POLY.FLM.
C1	03-110	" 2500uF 63VRG ELECTRO.
R6	02-128	RESISTOR 2·7KΩ ¼W 5% CARBN.FLM.
R5	02-127	" 2·2 KΩ " " " "
R4	02-123	" 1KΩ " " " "
R3	02-123	" 1KΩ " " " "
R2	02-110	" 100Ω " " " "
R1	02-123	" 1KΩ " " " "

ISS. B — REVISIONS — ITEMS 6 TO 10 (INCL. ADDED C/W DIA 4-5-80.)

UNLESS OTHERWISE STATED DIMENSIONS IN MILLIMETERS

TOLERANCES
LINEAR 0. ± 0.5
0.0 ± 0.1
HOLE DIA'S. + 0.25 −0
ANGULAR ± 0.5°

SCALE 1 : 1

DRAWN S.D. 19·6·79

CHECKED P.Kay

FINISH

MAT'L.

USED ON

MAT'L. Nº.

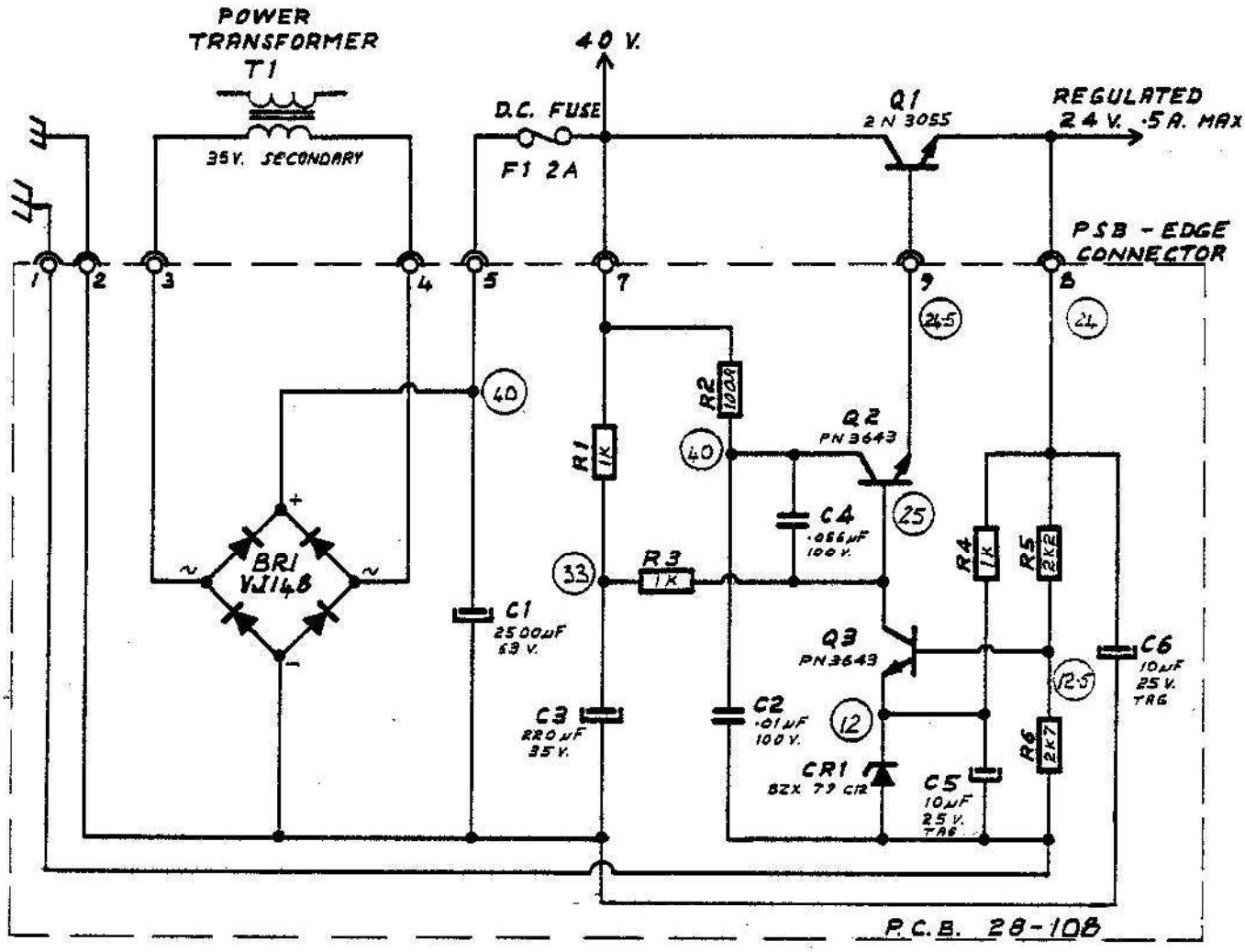
POWER SUPPLY ASSY. 77 MK V G

R. MEDDING & ASSOCIATES PTY. LTD. MELBOURNE AUSTRALIA ©

3rd ANGLE PROJ.

DRAWING Nº. 23-909

A 4 ISSUE B

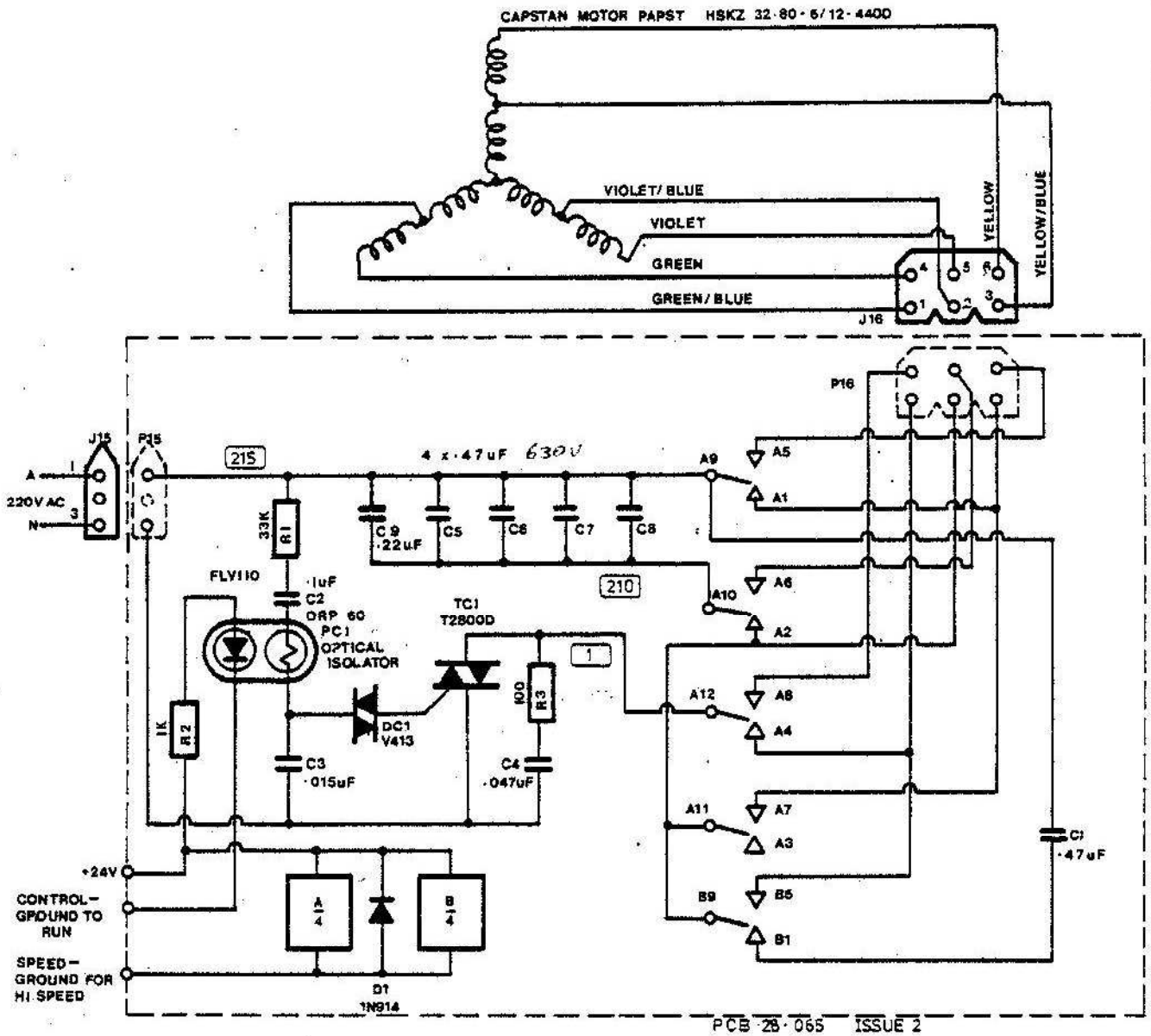


NOTES

1. ALL RESISTORS ¼ W. 5 %

(40) D.C. VOLTAGES

CHANGES	TOLERANCE UNLESS OTHERWISE SPECIFIED: FRACTION ± 1/64" DECIMAL ± .005" ANGLE ± 1/2°	ROUTING.	
		NEXT ASSY.	MAT'L.
		FINISH	
	DESIGNED	R. HENNING & ASSOCIATES PTY. LTD. 505 [illegible] ST., E. BRUNSWICK. ©	DRAWING NUMBER
	DRAWN S. DEUTSCHER 17·5·77	POWER SUPPLY P.C.B. CIRCUIT 77 MK I G.	A 4
	CHECKED PK		23-2096.
	SCALE		ISSUE- A



PCB 28-065 ISSUE 2

NOTES

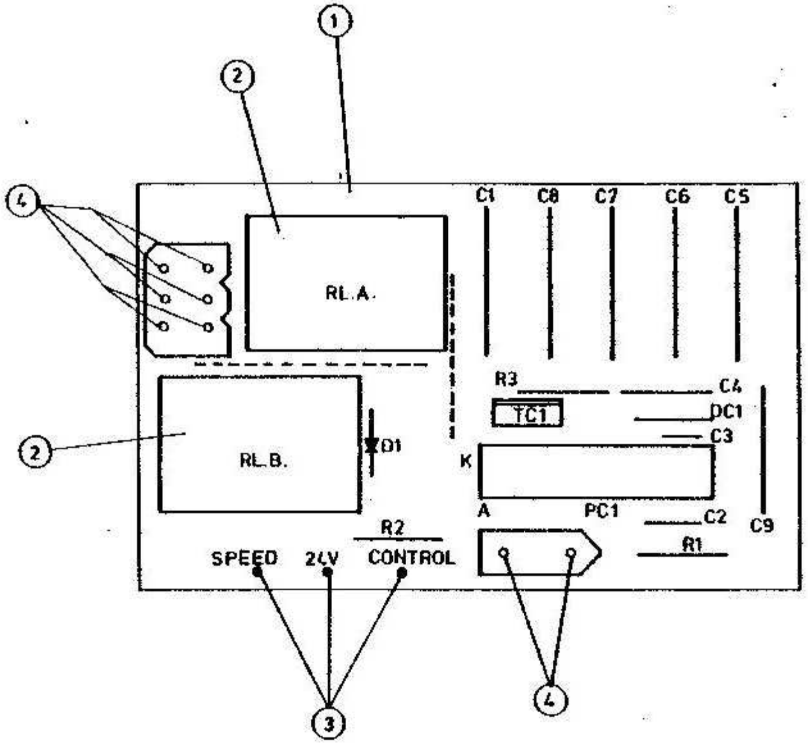
ALL RESISTORS ¼W 5%

RMS AC VOLTAGE

VOLTAGES MEASURED WITH 240 VAC APPLIED TO 250 TAP ON TRANSFORMER

	C9 ADDED. 10.9.77	REVISIONS	UNLESS OTHERWISE STATED DIMENSIONS IN MILLIMETERS TOLERANCES LINEAR 0. ± 0.5 0.0 ± 0.1 HOLE DIA'S. + 0.25 −0 ANGULAR ± 0.5°	FINISH	USED ON
				MAT'L.	MAT'L. No.
			SCALE	CAPSTAN MOTOR CONTROL PCB CIRCUIT CM2000/77MkV	3 ANGLE PROJ.
			DRAWN J. BANOS 21-9-77	R. MEDDING & ASSOCIATES PTY. LTD. MELBOURNE AUSTRALIA. ©	DRAWING No. 23-1326
	B	ISS	CHECKED T. HANSEN 31-8-78		A 4 ISSUE B

02300926



Qty	COM N°	PART N°	DESCRIPTION
	①	28-065	CAPSTAN MOTOR CONTROL P.C.B.
2 OFF	②	20-046	RELAY SOCKET
3 OFF	③	08-2430	C N PIN
8 OFF	④	08-2434	H2774 PIN
	PC1	23-1040	LED-LDR PHOTO ISOLATOR ASSY.

COM N°	PART N°	DESCRIPTION
D1	10-037	DIODE
RLB	20-045	RELAY SRE-D24
RLA	20-045	RELAY SRE-D24
TC1	10-144	TRIAC T2800D
DC1	10-147	DIAC V413
C9	03-026	CAPACITOR ·22 uF 400V 10% POLY.FM
C8	03-027	" ·47uF 400V " " "
C7	03-027	" ·47uF 400V " " "
C6	03-027	" ·47uF 400V " " "
C5	03-027	" ·47uF 400V " " "
C4	03-029	" ·047uF 400V " " "
C3	03-008	" ·015uF 100V " " "
C2	03-006	" ·1uF 100V " " "
C1	03-027	" ·47uF 400V " " "
R3	02-110	RESISTOR 100Ω ¼W 5% CARBON FLM
R2	02-123	" 1KΩ " " " "
R1	02-141	" 33KΩ " " " "

REVISIONS: B — ITEMS ② ③ ④ C/N ADDED 6-3-80

UNLESS OTHERWISE STATED DIMENSIONS IN MILLIMETERS

TOLERANCES
LINEAR 0. ± 0.5
0.0 ± 0.1
HOLE DIA'S. + 0.25 − 0
ANGULAR ± 0.5°

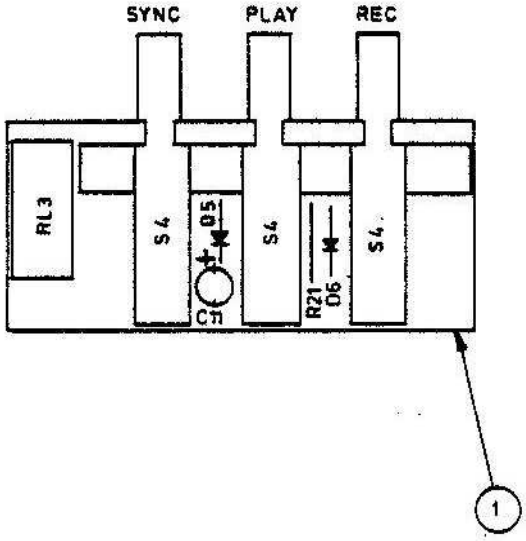
SCALE 1 : 1
DRAWN S.D. 19·6·79
CHECKED

FINISH
MAT'L.

CAPSTAN MOTOR CONTROL P.C.B. ASSY 77 MK V. G.

R. MEDDING & ASSOCIATES PTY. LTD.
MELBOURNE AUSTRALIA

USED ON
MAT'L. Nº.
3rd ANGLE PROJ.
DRAWING Nº. 23-926
A4 ISSUE B



NO	PART NO	DESCRIPTION
1	28-135	BLANK PCB
S4	08-3177	ISOSTAT SWITCH 3 GANG (BLACK)
RL3	20-034	RELAY NATIONAL RS 24V
C11	03-153	CAPACITOR 10µF 25V TANTALUM
R21	02-131	RESISTOR 4K7 1/4 WATT
D6	10-037	DIODE IN914
D5	10-037	DIODE IN914

REVISIONS

UNLESS OTHERWISE STATED DIMENSIONS IN MILLIMETERS

TOLERANCES
LINEAR ± 0.5
ANGULAR ± 0.5°

SCALE 1:1

DRAWN A.H.P 24-10-80

CHECKED

FINISH

MAT'L.

USED ON

MAT'L. No.

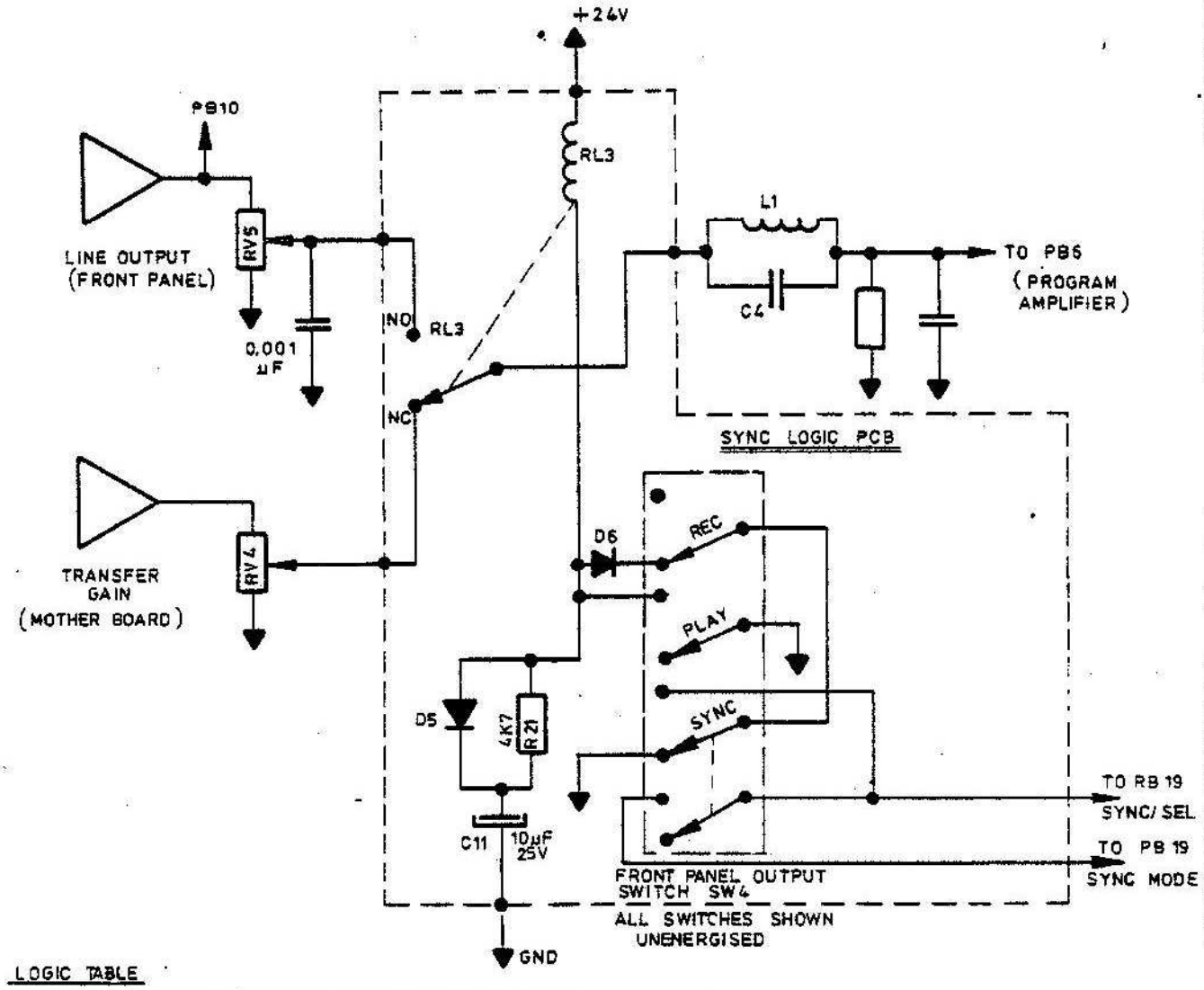
COMPONENT LAYOUT
SYNC LOGIC PCB
77 MK V G

3rd ANGLE PROJ.

DRAWING No.
23-942
SHEET 1 OF 2

R. MEDDING & ASSOCIATES PTY. LTD.
MELBOURNE AUSTRALIA ©

A4 ISSUE B



LOGIC TABLE

SWITCH SELECTED			LINE OUTPUT	
REC	PLAY	SYNC	REPLAY MODE	RECORD MODE
1	0	0	LINE I/P	LINE I/P
X	1	0	REPLAY HEAD	REPLAY HEAD
0	0	1	RECORD HEAD	LINE I/P
X	1	1	RECORD HEAD	REPLAY HEAD
0	0	0	REPLAY HEAD	REPLAY HEAD

SINGLE BUTTON OPERATION

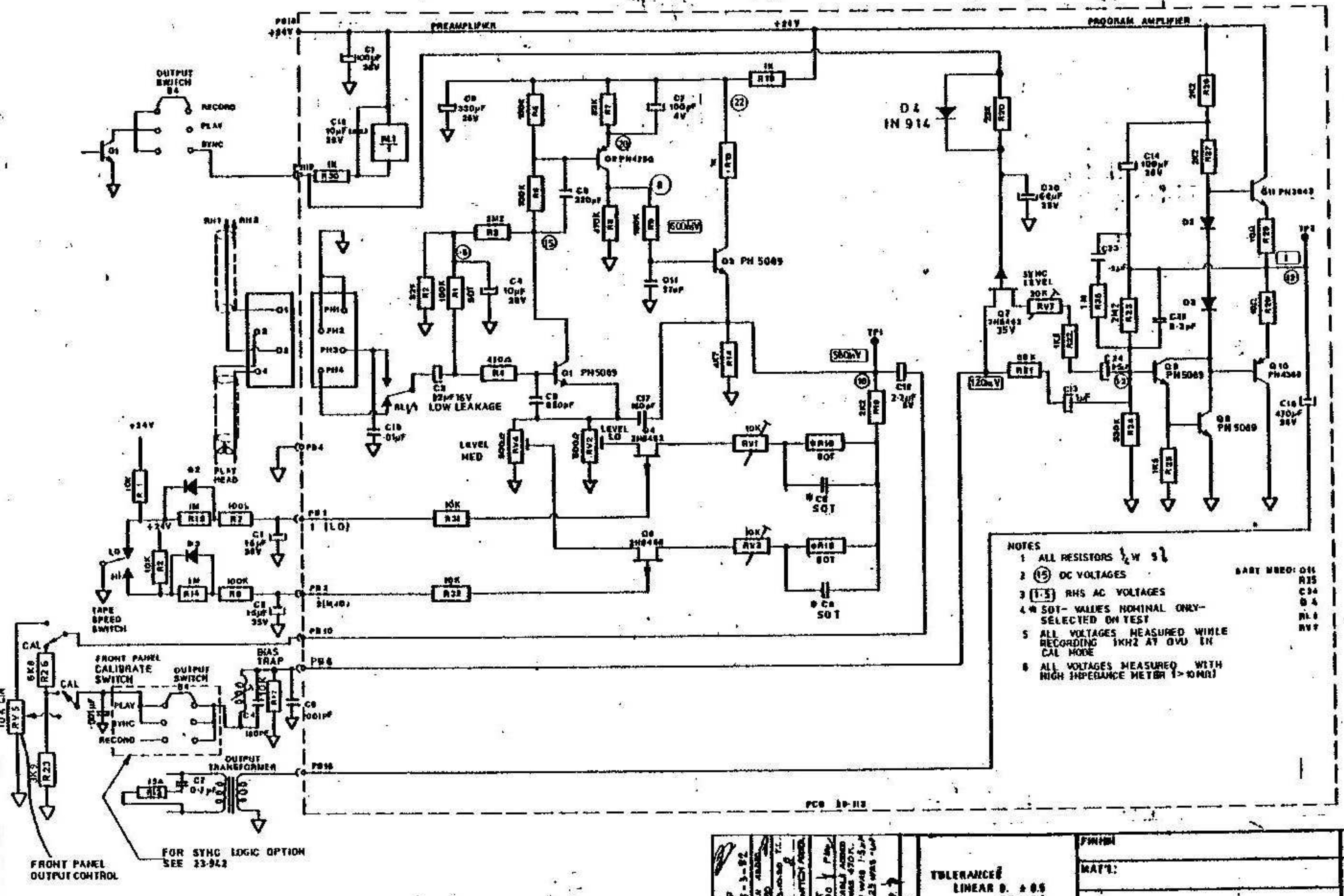
0 – UNENERGISED
1 – ENERGISED
X – DON'T CARE

CONNECTION
NOT CONNECTED

REFERENCE DRAWINGS

SYNC LOGIC PCB 28-135

REDRAWN C/N 0877 AHP 17-3-81	UNLESS OTHERWISE STATED DIMENSIONS ARE IN MILLIMETERS	FINISH —	USED ON 23-923
	TOLERANCES LINEAR ± 0.5	MAT'L	MAT'L No.
	ANGULAR ± 0.5°	CIRCUIT DIAGRAM SYNC LOGIC PCB 77 MK V G	AMPEX
	SCALE NTS		DRAWING No. 23-942 SHEET 2 OF 2
B	AHP 29-10-80 28-10-80	© AMPEX AUSTRALIA PTY. LTD. MELBOURNE AUSTRALIA	A4 ISSUE E



NOTES

1. ALL RESISTORS ¼W 5%
2. (15) DC VOLTAGES
3. [1·5] RMS AC VOLTAGES
4. * SOT- VALUES NOMINAL ONLY- SELECTED ON TEST
5. ALL VOLTAGES MEASURED WHILE RECORDING 1KHZ AT 0VU IN CAL MODE
6. ALL VOLTAGES MEASURED WITH HIGH IMPEDANCE METER (>10MΩ)

PART UNUSED: Q11, R35, C34, D4, RL1, RV7

* COMP	3·75/7·5 I.P.S. DECK IEC	3·75/7·5 I.P.S. DECK NAB	7·5/15 I.P.S. DECK IEC	7·5/15 I.P.S. DECK NAB
C8	·022 µF	·022 µF	·015 µF	·012 µF
C9	·015 µF	·012 µF	·01 µF	·012 µF
R15	150 K	150 K	3M3	270 K
R16	3M3	270 K	1M	270 K

REVISIONS

TOLERANCES LINEAR 0. ± 0.5, 0.0 ± 0.1; HOLE DIA'S. + 0.25 − 0; ANGULAR ± 0.5°

SCALE

DRAWN J. Banks 21-11-77

CHECKED

FINISH

MAT'L:

RELAY AMP PCB CIRCUIT

R. MEDDING & ASSOCIATES PTY. LTD. MELBOURNE AUSTRALIA

USED ON

MAT'L Nº.

3rd ANGLE PROJ.

DRAWING Nº. 23-2090

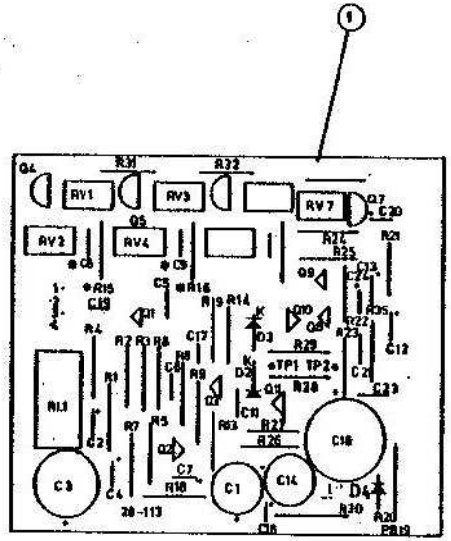
* COMPENSATION COMPONENTS

TYPE	COMP'N	PART N°	VALUE
3.75 / 7.8	C8	03-009	0.022 µF 100V
LEC	C9	03-008	0.015 µF 100V
23-927	R15	02-149	150 K
	R16	02-164	3M3
7.5/15	C8	03-008	0.015 µF 100V
LEC	C9	03-007	0.01 µF 100V
23-933	R15	02-164	3M3
	R16	02-159	1 M

NOTE

ALL COMPONENTS IN PARTS LISTS AT RIGHT MAKE UP BASIC P.C.B. 23-935.

FOR COMPLETED P.C.B'S. COMPENSATION COMPONENTS FROM TABLE AT LEFT ARE ADDED.



COM N°	PART N°	DESCRIPTION
RL1	20-034	NATIONAL RELAY RS-24V
D4	0100 0087	DIODE 1N914
D3	0100 0087	" 1N914
D2	0100 0087	" 1N 914
Q11	10-127	TRANSISTOR PN3643
Q10	10-128	" PN4355
Q9	10-093	" PN5089
Q8	10-093	" PN5089
Q7	10-094	FET 2N5462
Q5	10-094	" 2N5462
Q4	10-094	" 2N5462
Q3	10-093	TRANSISTOR PN5089
Q2	10-134	" PN4250
Q1	10-093	" PN5089
1	28-113	P.C.B. BLANK
8 OFF 8	08-2430	CN PIN
C24	03-152	CAPACITOR 4.5uF 35V TAG TANTALU
C23	03-006	" .1uF 100V POLYESTER FLM
C21	03-234	" 3.3pF CERAMIC
C20	03-174	" 6.8uF 35V TAG TANTALUM
C19	03-007	" .01uF 100V POLYESTER FLM
C18	03-153	" 10uF 25V TAG TANTALUM
C17	03-207	" 150pF CERAMIC
C16	03-053	" 470uF 25V RB ELECTRO
C14	03-060	" 100uF 25V "
C13	03-151	" 1uF 35V TAG TANTALUM
C12	03-172	" 2.2uF 35V "
C11	03-209	" 27pF CERAMIC
C9	SEE TABLE	" SEE TABLE POLYESTER FLM
C8	" "	" SEE TABLE "
C7	03-154	" 100uF 4V TAG TANTALUM
C6	03-205	" 220pF CERAMIC
C5	03-203	" 680pF "
C4	03-153	" 10uF 25V TAG TANTALUM
C3	03-055	" 330uF 25V RB ELECTRO
C2	03-158	" 22uF 16V SELECT. TANT
C1	03-060	" 100uF 25V RB ELECTRO

COM N°	PART N°	DESCRIPTION
RV7	02-616	POT 20K SOANAR MTP
RV6	02-614	POT 500Ω SOANAR MTP
RV3	02-615	" 10K " "
RV2	02-614	" 500Ω " "
RV1	02-615	" 10K " "
R35	03-159	RESISTOR 1M ¼W 5%
R33	02-135	" 10K " "
R31	02-135	" 10K " "
R30	02-123	" 1K " "
R29	02-101	" 10Ω " "
R28	02-101	" 10Ω " "
R27	02-127	" 2K2 " "
R26	02-127	" 2K2 " "
R25	02-125	" 1K5 " "
R24	02-153	" 330K " "
R23	02-163	" 2M2 " "
R22	02-125	" 1K5 " "
R21	02-145	" 68K " "
R20	02-139	" 22K " "
R19	02-127	" 2K2 " "
R18	02-123	" 1K " "
R16	SEE TABLE	" SEE TABLE " "
R15	" "	" " " " "
R14	02-131	" 4K7 " "
R13	02-123	" 1K " "
R9	02-147	" 100K " "
R8	02-155	" 470K " "
R7	02-148	" 82K " "
R6	02-147	" 100K " "
R5	02-147	" 100K " "
R4	02-118	" 4700 " "
R3	02-163	" 2M2 " "
R2	02-146	" 82K " "
R1	02-147	" 100K " "

REVISIONS

LINK DELETED
D4 ADDED
C20 WAS 1.5 µF
C/N 0660 W.L. 5-3-82

ISSUE 'C' C/N 0168 11-8-80
C23 WAS 0.015 µF
PIN 23-933 ADDED
COMPENSATION TABLE ADDED
ISSUE 'B' C/N 0084 22-7-80
R18 WAS 1M
C12 WAS 4.3 µF
C23 WAS 0.47 µF
R34 DELETED

UNLESS OTHERWISE STATED DIMENSIONS IN MILLIMETERS
TOLERANCES
LINEAR 0 - 6 ± 0.5
6.0 ± 0.1
HOLE DIA'S + 0.25 −0
ANGULAR ± 0.5°

SCALE 1 : 1
DRAWN S.O 19-6-79
CHECKED P.K.

FINISH
MAT'L

REPLAY PCB ASSY
77 MK V G

R. MEDDING & ASSOCIATES PTY. LTD.
MELBOURNE AUSTRALIA

USED ON
MAT'L No.
DRAWING No.
23-927
23-933
A 3 ISSUE D

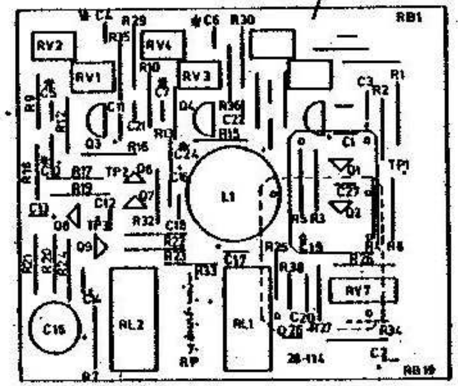
✱ COMPENSATION COMPONENTS			
TYPE	COMPN	PART Nº	VALUE
3.75 / 7.5 I.P.S. DECK	C4	03-007	0.01 μF 100 V
	C5	03-019	0.0033 μF 100 V
I.E.C.	C6	03-023	0.0056 μF 100 V
	C7	03-016	0.001 μF 100 V
23-928	C10	03-012	0.047 μF 100 V
	C24	03-152	1.5 μF 35 V
7.5 / 15 I.P.S. DECK	C4	03-023	0.0056 μF 100 V
	C5	03-016	0.001 μF 100 V
	C6	03-018	0.0022 μF 100 V
I.E.C.	C7	03-205	220 pF CERAMIC
	C10	03-152	1.5 μF 35 V
23-934	C24	03-152	1.5 μF 35 V

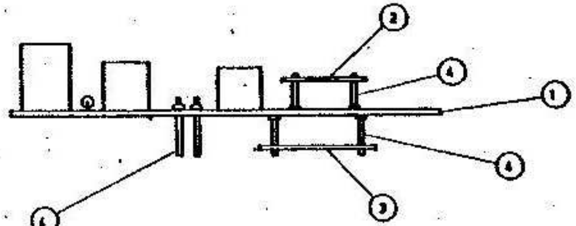
NOTE

ALL COMPONENTS IN PARTS LISTS AT RIGHT MAKE UP P.C.B. 23-936.

FOR COMPLETED P.C.B.S COMPENSATION COMPONENTS FROM TABLE AT LEFT ARE ADDED.

①	28-114	P C B BLANK	
②	11-907	TOP BIAS SHIELD	
③	11-908	BOTTOM BIAS SHIELD	
④	08-2430	C/N PIN	10 OFF





PINS INSERTED FROM TOP

Nº	PART Nº	DESCRIPTION
RV7	02-624	POTENTIOMETER 20K PT-15H
RV4	02-617	" 50K SOANAR HTP
RV3	02-615	" 10K "
RV2	02-617	" 50K "
RV1	02-615	" 10K "
R38	02-118	RESISTOR ¼ W 5% 470 Ω
R36	02-1K	RESISTOR ¼ W 5% 220 Ω
R35	02-1K	" " " 220 Ω
R34	02-134	" " " 8K2
R33	02-124	" " " 1K2
R32	02-139	" " " 22K
R30	02-135	" " " 10K
R29	02-135	" " " 10K
R27	02-147	" " " 100K
R26	02-131	" " " 4K7
R25	02-147	" " " 100K
R24	02-143	" " " 47K
R23	02-114	" " " 220 Ω
R22	02-142	" " " 39K
R21	02-114	" " " 220 Ω
R20	02-135	" " " 10K
R19	02-147	" " " 100K
R18	02-143	" " " 47K
R17	02-153	" " " 330K
R16	02-125	" " " 1K5
R15	02-141	" " " 33K
R13	02-145	" " " 68K
R12	02-145	" " " 68K
R10	02-145	" " " 68K
R9	02-145	" " " 68K
R7	02-101	" " " 10 Ω
R6	02-127	" " " 2K2
R5	02-135	" " " 10K
R4	02-151	" " " 220K
R3	02-143	" " " 47K
R2	02-139	" " " 22K
R1	02-139	" " " 22K

Nº	PART Nº	DESCRIPTION
L1	22-045	POTCORE ASSY.
RL1	20-034	RELAY NATIONAL RS24V
RL2	20-034	" " RS-24V
Q9	10-134	TRANSISTOR PN4250
Q8	10-093	" PN5089
Q7	10-093	" PN5089
Q6	10-093	" PN5089
Q4	10-094	FET 2N5462
Q3	10-094	" 2N5462
Q2	10-093	TRANSISTOR PN5089
Q1	10-093	" PN5089
C27	03-211	CAPACITOR 10pF CERAMIC
C26	03-017	" ·0015μF 100V POLY. FILM.
C24	SEE TABLE	CAPACITOR SEE TABLE TAG TANTALUM
C22	03-007	" ·01μF 100V POLYESTER FILM
C21	03-007	" ·01μF " "
C20	03-006	" ·1μF " "
C19	03-007	" ·01μF " "
C18	03-037	" ·0018μF " "
C17	03-153	" 10μF 25V TAG TANTALUM
C16	03-019	" ·0033μF 100V POLYESTER FILM
C15	03-060	" 100μF 25V RB ELECTRO
C14	03-153	" 10μF 25V TAG TANTALUM
C13	03-176	" 33μF 35V " "
C12	03-018	" ·0022μF 100V POLYESTER FILM
C11	03-152	" 1·5μF 35V TAG TANTALUM
C10	SEE TABLE	" SEE TABLE POLYESTER FILM
C7	SEE TABLE	" SEE TABLE POLYESTER FILM
C6	" "	" " " "
C5	" "	" " " "
C4	" "	" " " "
C3	03-153	" 10μF 25V TAG TANTALUM
C2	03-152	" 1·5μF 35V " "
C1	03-152	" 1·5μF " "

REVISIONS		
E	STRAP ① TO ④ INC. ADDED; C27 WAS 10 pF; C18 WAS ·0082μF; E/PN 23-934 ADDED; COMPENSATION TABLE ADDED; C/N 0025 & 0118 11-12-80	
D	R38 ADDED C/N 0041 17-2-80	
C	R36 WAS 100 Ω; R34 WAS 100 Ω; C4 WAS ·0047μF; C5 WAS ·0033μF; C6 WAS ·001μF; C/N 0094 22-11-79	

UNLESS OTHERWISE STATED DIMENSIONS IN MILLIMETERS

TOLERANCES
LINEAR 0. ± 0.6
0.0 ± 0.1
HOLE DIA'S. + 0.25 / −0
ANGULAR ± 0.5°

SCALE 1:1

DRAWN S D 7-6-79

CHECKED

FINISH

MAT'L.

USED ON

MAT'L. Nº.

RECORD P.C.B. ASSY.

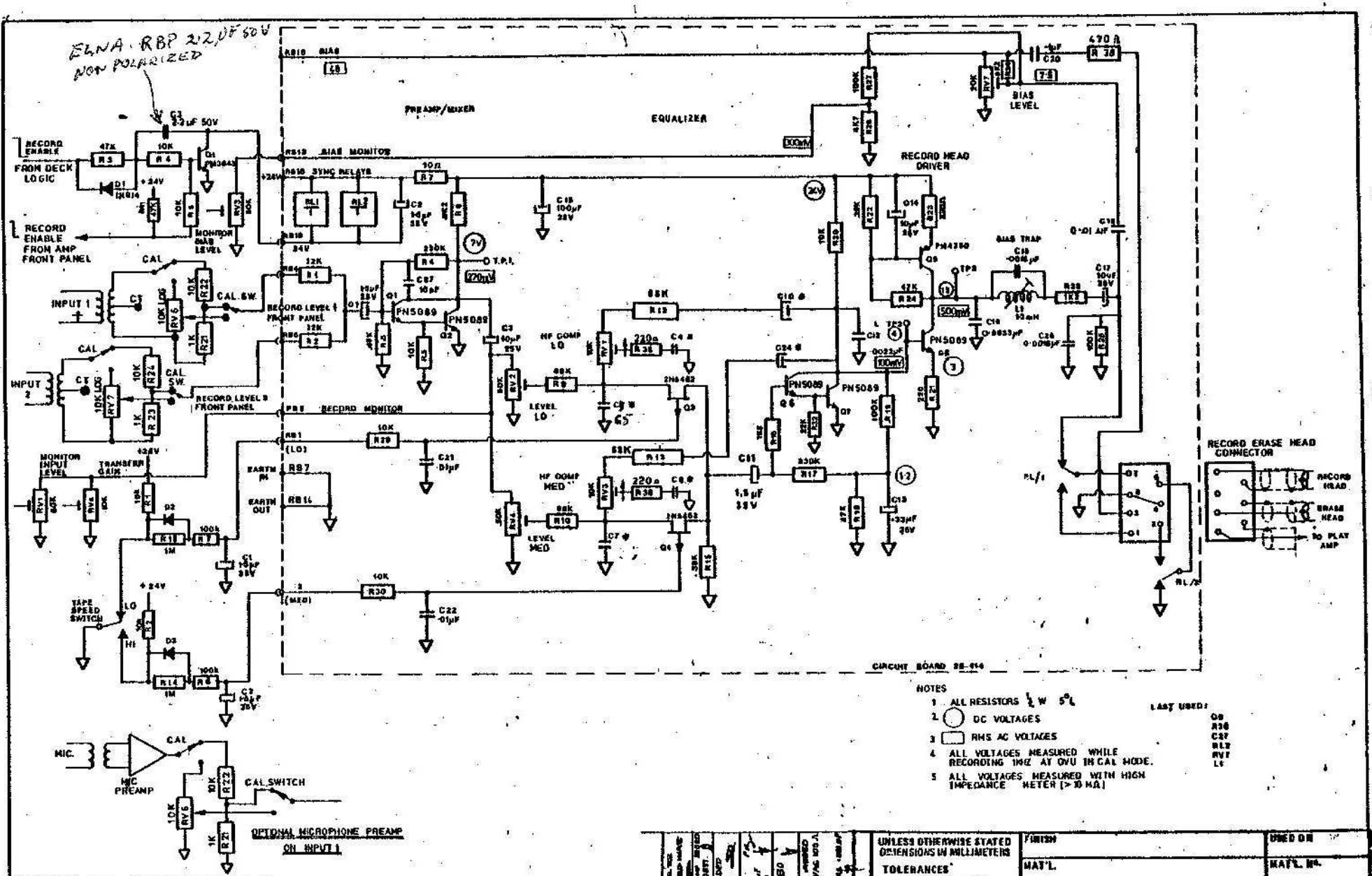
77 MK Ⅴ G

R. MEDRINC & ASSOCIATES PTY. LTD. MELBOURNE AUSTRALIA

3rd ANGLE PROJ.

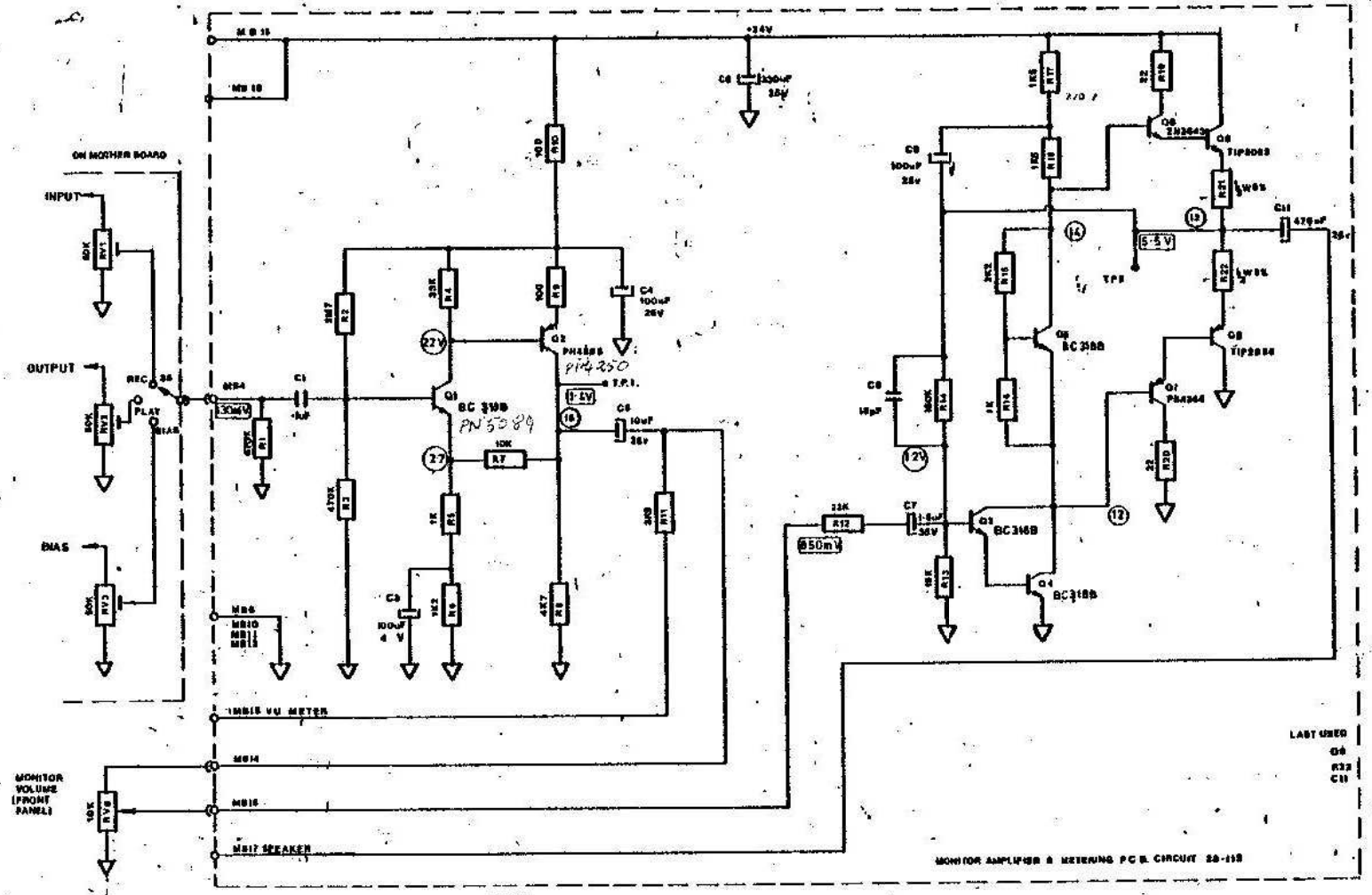
DRAWING Nº. 23-928 23-934

A 3 ISSUE E



# COMP	3·75/7·5 I.P.S. DECK IEC	NAB	7·5/15 I.P.S. DECK IEC	NAB
C4	·01 µF	·01 µF	·0068 µF	·0068 µF
C5	·0033 µF	·0033 µF	·001 µF	·001 µF
C6	·0068 µF	·0068 µF	·0022 µF	·0022 µF
C7	·001 µF	·001 µF	220 pF	220 pF
C10	·047 µF	·047 µF	15µF 35V	·047 µF
C24	15µF 35V	·047 µF	15µF 35V	·047 µF

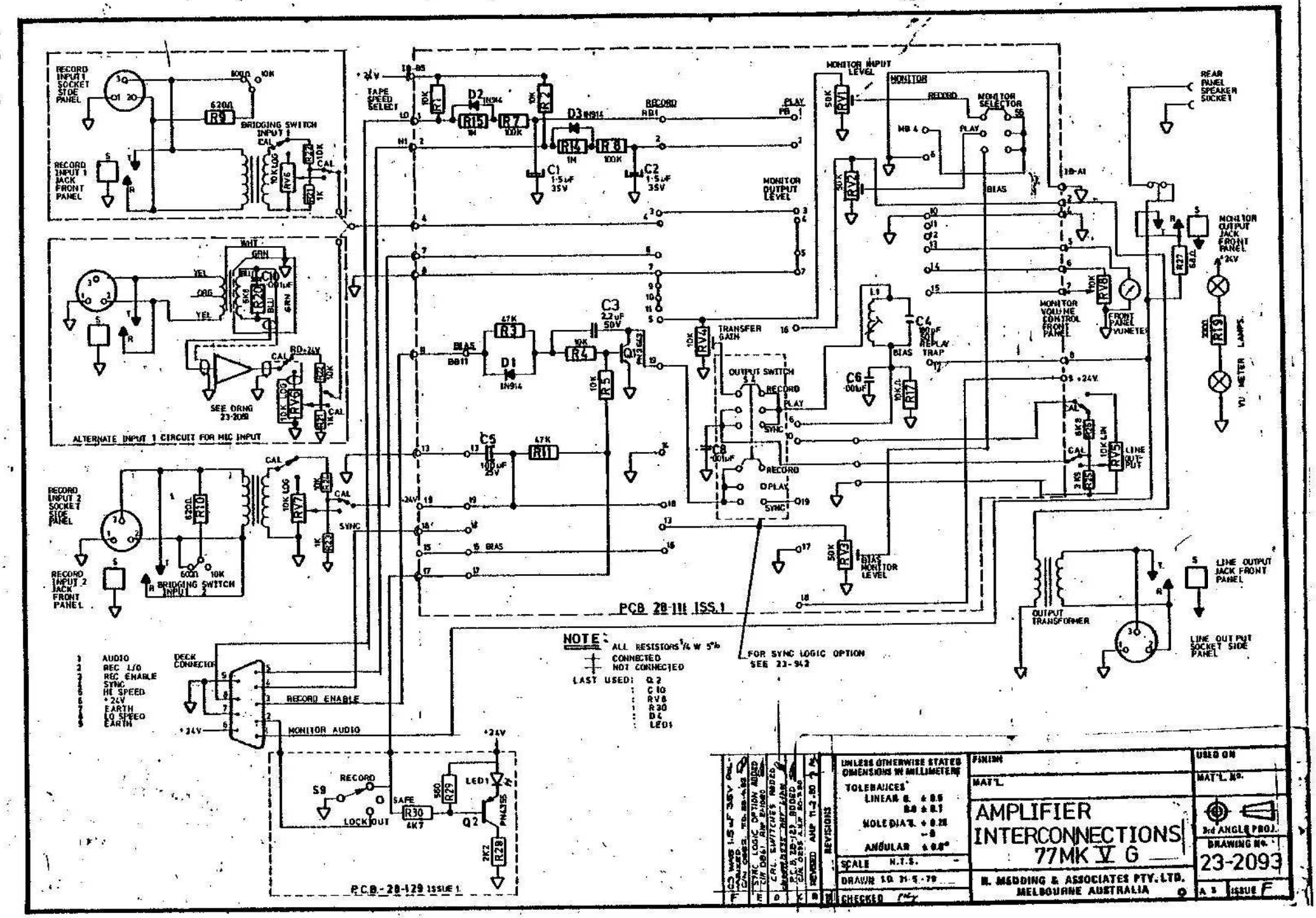
UNLESS OTHERWISE STATED DIMENSIONS IN MILLIMETERS	FINISH
TOLERANCES LINEAR 0. ± 0.5, 0.0 ± 0.1, HOLE DIA'S ± 0.25, ANGULAR ± 0.5°	MAT'L.
SCALE N.T.S.	RECORD PCB CIRCUIT 77mkV G 1
DRAWN	
CHECKED	R. HEDDING & ASSOCIATES PTY. LTD. MELBOURNE AUSTRALIA
	USED ON
	MAT'L. No.
	3rd ANGLE PROJ.
	DRAWING No. 23-2091
	A 3 ISSUE 6

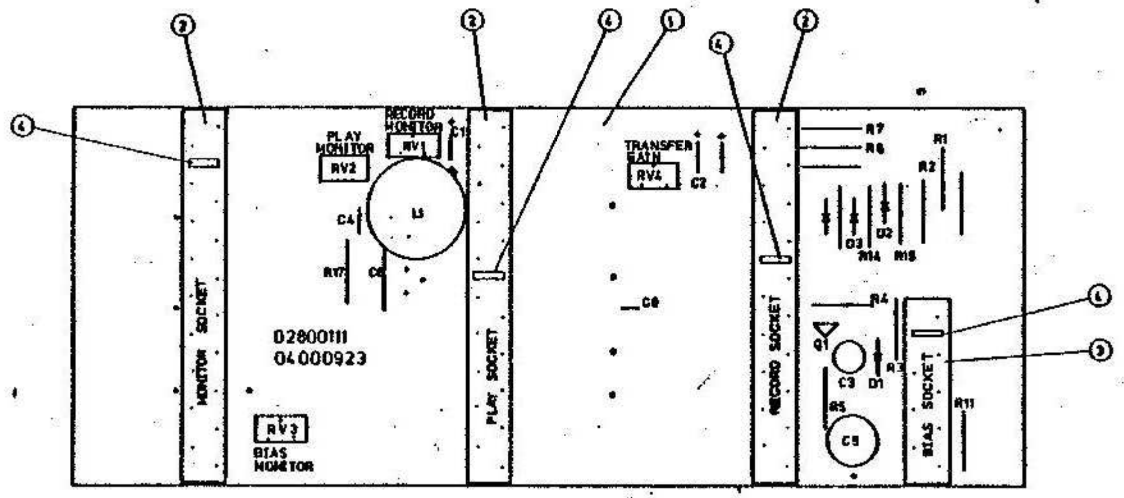


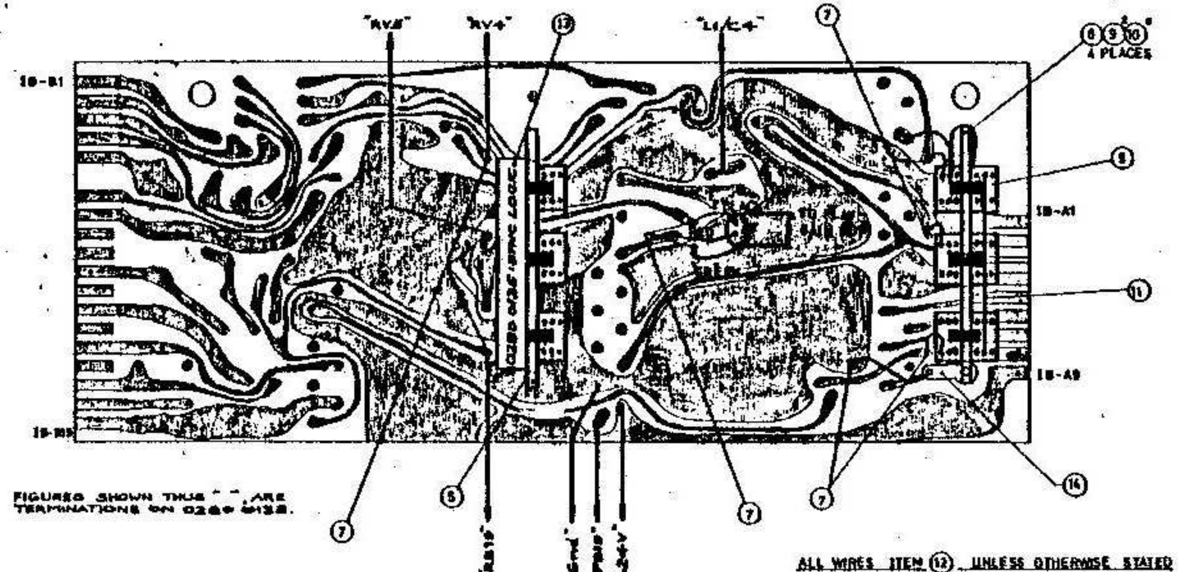
NOTES

1. ALL RESISTORS ¼W 5% UNLESS OTHERWISE STATED
2. (12) DC VOLTAGES
3. [12] RMS AC VOLTAGES
4. ALL VOLTAGES MEASURED WHILE RECORDING 1KHZ AT 0VU IN CAL MODE AND MONITOR POT SET FOR 2WATTS OUTPUT INTO A 15Ω LOAD.
5. ALL VOLTAGES MEASURED WITH HIGH IMPEDANCE METER (> 10 MΩ)

REVISED AMP. 11-2-80	UNLESS OTHERWISE STATED DIMENSIONS IN MILLIMETERS	FINISH	USED ON
REVISIONS	TOLERANCES LINEAR 0. ± 0.5, 0.0 ± 0.1, HOLE DIA'S + 0.25 −0, ANGULAR ± 0.5°	MAT'L	MAT'L No.
	SCALE NTS	MONITOR AMP P.C.B. CIRCUIT 77MkV G	3rd ANGLE PROJ.
	DRAWN DEUTSCHER 6-5-75	R. HEDDING & ASSOCIATES PTY. LTD. MELBOURNE AUSTRALIA	DRAWING No. 23-2092
			A3 SHEET 1


RECORD INPUT 1 SOCKET SIDE PANEL
RECORD INPUT 1 JACK FRONT PANEL
BRIDGING SWITCH INPUT 1
ALTERNATE INPUT 1 CIRCUIT FOR MIC INPUT
SEE DRNG 23-3088
RECORD INPUT 2 SOCKET SIDE PANEL
RECORD INPUT 2 JACK FRONT PANEL
BRIDGING SWITCH INPUT 2
TAPE SPEED SELECT
RECORD
PLAY
MONITOR OUTPUT LEVEL
MONITOR INPUT LEVEL
MONITOR
MONITOR SELECTOR
BIAS
TRANSFER GAIN
OUTPUT SWITCH
BIAS MONITOR LEVEL
REAR PANEL SPEAKER SOCKET
MONITOR OUTPUT JACK FRONT PANEL
MONITOR VOLUME CONTROL FRONT PANEL
FRONT PANEL VU METER
VU METER LAMPS
LINE OUTPUT
OUTPUT TRANSFORMER
LINE OUTPUT JACK FRONT PANEL
LINE OUTPUT SOCKET SIDE PANEL
PCB 28-111 ISS.1
DECK CONNECTOR
1 AUDIO
2 REC I/O
3 REC ENABLE
4 SYNC
5 HI SPEED
6 +24V
7 EARTH
8 LO SPEED
9 EARTH
RECORD ENABLE
MONITOR AUDIO
RECORD
SAFE
LOCKOUT
LED1
P.C.B. 28-129 ISSUE 1
NOTE: ALL RESISTORS 1/4 W 5%
CONNECTED
NOT CONNECTED
LAST USED: Q 2
C 10
RV 8
R 30
D 6
LED 1
FOR SYNC LOGIC OPTION SEE 23-942
UNLESS OTHERWISE STATED DIMENSIONS IN MILLIMETERS
TOLERANCES
SCALE N.T.S.
DRAWN
CHECKED
FINISH
MAT'L
AMPLIFIER INTERCONNECTIONS 77MK V G
B. MEDDING & ASSOCIATES PTY. LTD. MELBOURNE AUSTRALIA
USED ON
MAT'L No.
3rd ANGLE PROJ.
DRAWING No. 23-2093
A 3
ISSUE F





FIGURES SHOWN THUS " " ARE TERMINATIONS ON 0280 0132.

ALL WIRES ITEM (12) UNLESS OTHERWISE STATED

QTY	COM Nº	PART Nº	DESCRIPTION
	1	26-111	P.C.B. BLANK
3 OFF	2	08-2084	19 PIN EDGE CONNECTOR
	3	08-2000	9 PIN EDGE CONNECTOR
4 OFF	4	08-2086	POLARISING KEY
2 OFF	5	08-3177	2 BANK SWITCH 'SCHADOW'
11 OFF	7	08-2430	C N PIN
4 OFF	8	18-037	SWITCH STAND-OFF
8 OFF	9	32-200	M2×6 CH. HD. SCREW
8 OFF	10	32-001	M2 SHK. PRF. WASHER
70MM	11	08-0081	22 SWG TINNED COPPER WIRE
400MM	12	08-0005	7/·010" HOOK-UP WIRE -YELLOW-
	13	23-0942	SYNC LOGIC P.C.B. ASSY
	14	00802314	SOLDER LUG SINGLE SMALL
	RV4	02-615	POTENTIOMETER 10K SOANAR H.I.P
	RV3	02-617	" 50K " "
	RV2	02-617	" 50K " "
	RV1	02-617	" 50K " "

COM Nº	PART Nº	DESCRIPTION
L1	22-042	BIAS TRAP POTCORE
Q1	10-060	TRANSISTOR PN 3566
D3	10-037	DIODE 1N914
D2	10-037	" 1N914
D1	10-037	" 1N914
C8	03-016	CAPACITOR ·001µF 100V POLY. FILM
C6	03-016	" ·001µF " " "
C5	03-060	" 100µF 25V ELECTROLYTIC
C4	03-206	" 180pF CERAMIC
C3	00300083	" 2.2µF 50V RBP
C2	03-152	" 1·5µF " " "
C1	03-152	" 1·5µF " " "
R17	02-135	RESISTOR 10K ¼W 5%
R15	02-159	" 1M " "
R14	02-159	" 1M " "
R11	02-143	" 47K " "
R8	02-147	" 100K " "
R7	02-147	" 100K " "
R5	02-135	" 10K " "
R4	02-135	" 10K " "
R3	02-143	" 47K " "
R2	02-135	" 10K " "
R1	02-135	" 10K " "

REVISIONS: H G F E D C B A

UNLESS OTHERWISE STATED DIMENSIONS IN MILLIMETERS
TOLERANCES
LINEAR 0. ± 0.6
0.0 ± 0.1
HOLE DIA'S. + 0.26 − 0
ANGULAR ± 0.5°

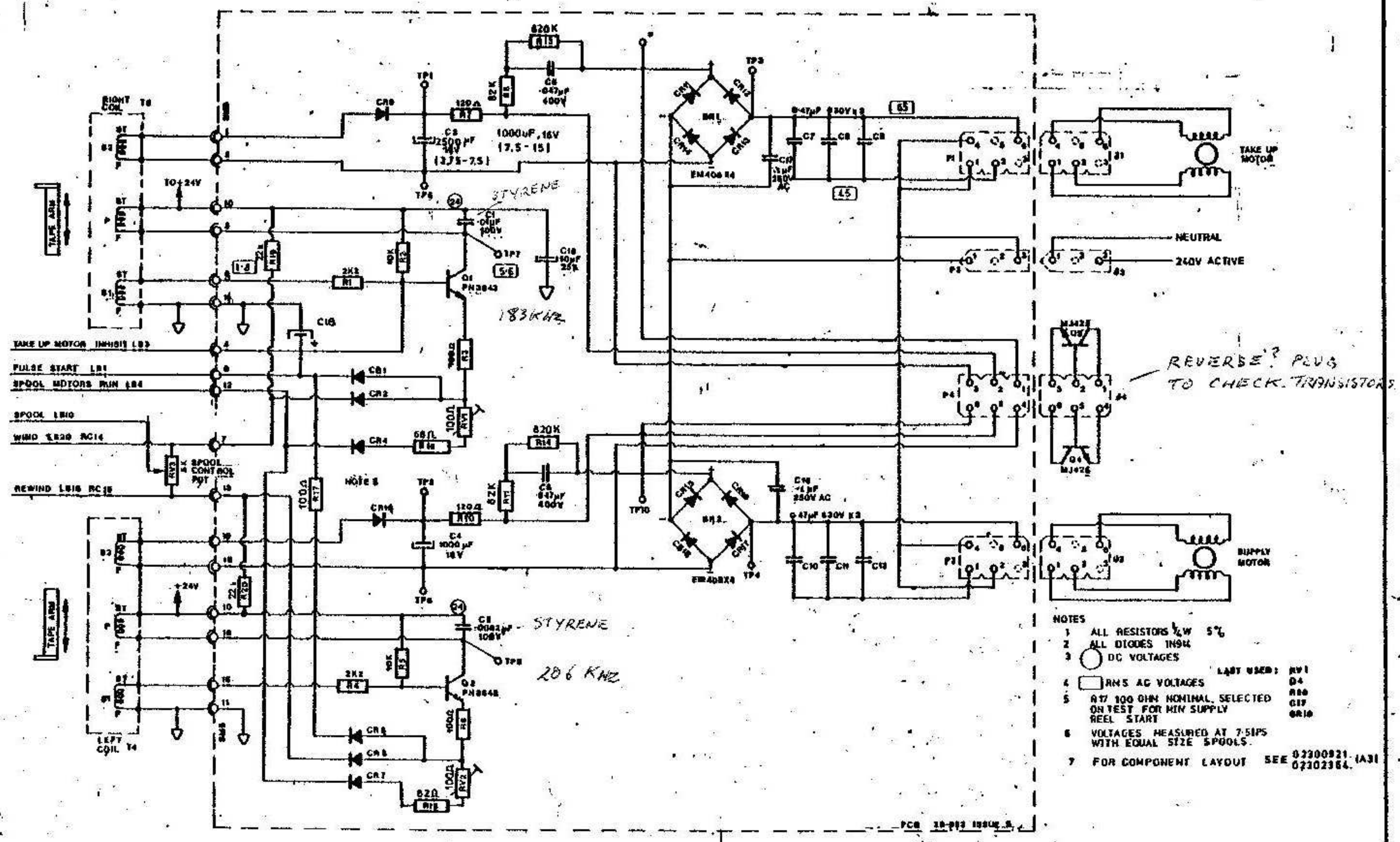
SCALE 1:1
DRAWN S.D. 14·6·79
CHECKED

FINISH
MAT'L.

MOTHER P.C.B. ASSY
77 MK V G

R. MEDDING & ASSOCIATES PTY. LTD.
MELBOURNE AUSTRALIA

USED ON
MAT'L. Nº.
DRAWING Nº.
23-923
A 3 ISSUE H



REVISIONS	
F	C/N 0872 30-11-81
E	R16 WAS 100Ω. RV1 AND RV2 WERE 50Ω. C/R 0141 ALKX + 80
D	C/N 0096 2.0118. 12-2-80. R16 WAS 120Ω. R8 & R11 WERE 220K. R15 & R14 WERE 470K
C	R17 WAS 22Ω. C/N 0456 12-2-80
B	R19, R20 WERE 56K. C3 WAS 1000μF. C/N 0094 22-11-79

UNLESS OTHERWISE STATED DIMENSIONS IN MILLIMETERS
TOLERANCES
LINEAR 0. ± 0.5
0.0 ± 0.1
HOLE DIA. + 0.25 − 0
ANGULAR ± 0.5°
SCALE N.T.S.
DRAWN J. Banos 28-11-77
CHECKED

FINISH
MAT'L

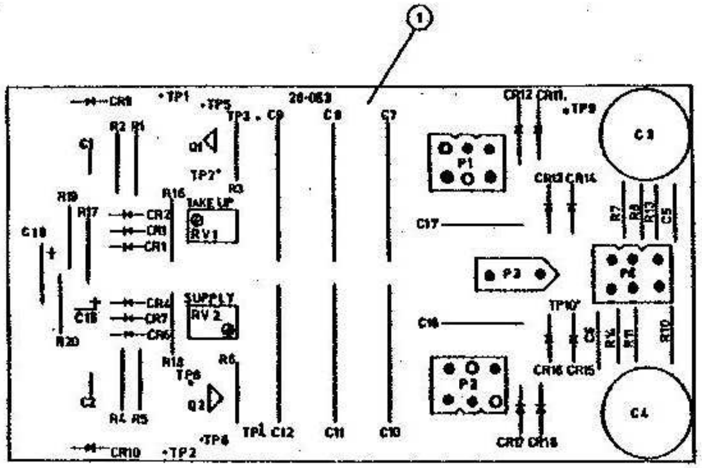
SPOOLING MOTOR CONTROL
P.C.B. CIRCUIT
77 REV. 6

R. MEDDING & ASSOCIATES PTY. LTD.
MELBOURNE AUSTRALIA

USED ON
MAT'L. No.
3rd ANGLE PROJ.
DRAWING No. 23-2094
A4 ISSUE F

CON. NO.	PART NO.	SPEED IPS	DESCRIPTION
C3	02300921	7 1/2 - 15	03-078 1000μF 16V RB ELECTROLYTIC
C3	02302364	3 3/4 - 7 1/2	03-077 2500μF 16V RB ELECTROLYTIC

COMPONENT LIST



FOR CIRCUIT. SEE 02302094 (A3)

COM Nº	PART Nº	DESCRIPTION
P4	08-2014	MOLEX 6WAY PLUG H9328
P3	08-2006	" 3WAY " H9323
P2	08-2014	" 6WAY " H9326
P1	08-2014	" 6 WAY " H9326
TP10	08-2430	CN PIN
TP9	08-2430	" "
TP8	08-2430	" "
TP7	08-2430	" "
TP6	08-2430	" "
TP5	08-2430	" "
TP4	08-2430	" "
TP3	08-2430	" "
TP2	08-2430	" "
TP1	08-2430	" "
● (16 OFF)	08-2445	MOLEX PIN MALE M1376
O (4 OFF)	08-2444	" " FEMALE M1377
RV2	02-677	POTENTIOMETER 3299W 100Ω
RV1	02-677	" 3299W 100Ω
Q2	10-127	TRANSISTOR PN 3643
Q1	10-127	" PN 3643.
CR18	10-042	DIODE EM408
CR17	10-042	" EM408
CR16	10-042	" EM408
CR15	10-042	" EM408
CR14	10-042	" EM408
CR13	10-042	" EM408
CR12	10-042	" EM408
CR11	10-042	" EM408
CR10	10-037	" 1N914
CR9	10-037	" 1N914
CR7	10-037	" 1N914
CR6	10-037	" 1N914
CR5	10-037	" 1N914
CR4	10-037	" 1N914
CR2	10-037	" 1N914
CR1	10-037	" 1N914

COM Nº	PART Nº	DESCRIPTION
(1)	20-053	SPOOLING MOTOR CONTROL P.C.B.
C18	03-170	CAPACITOR 4.7 uF 25 V
C17	03-360	CAPACITOR 4uF 250VAC PME 271M
C16	03-360	" ·1uF " " "
C15	03-153	" 10uF 25V TAG TANTALUM
C12	03-028	" ·47uF 630V PHILLIPS
C11	03-028	" ·47uF " "
C10	03-028	" ·47uF " "
C9	03-028	" ·47uF " "
C8	03-028	" ·47uF " "
C7	03-028	" ·47uF " "
C6	03-029	" ·047uF 400V
C5	03-029	" ·047uF "
C3	——	" SEE COMPONENT LIST "
C4	03-077	" 1000uF " " "
C2	03-024	" ·0082uF 100V
C1	03-007	" ·01uF 100V
R20	02-139	RESISTOR 22KΩ ¼W
R19	02-139	" 22KΩ "
R18	02-109	" 82 Ω "
R17	02-110	" 100 Ω "
R16	02-106	" 68 Ω "
R14	02-156	" 820K "
R13	02-156	" 820K "
R11	02-146	" 82 KΩ "
R10	02-111	" 120 Ω "
R8	02-146	" 82 KΩ "
R7	02-111	" 120 Ω "
R6	02-110	" 100 Ω "
R5	02-135	" 10K Ω "
R4	02-127	" 2K2 Ω "
R3	02-110	" 100 Ω "
R2	02-135	" 10K Ω "
R1	02-127	" 2K2 Ω "

REVISIONS

ISS	REVISION
H	C3 WAS 1000μF C4 WAS 1000 or 2500 C/N 0292
G	02302364 - LOW SPEED PART Nº ADDED C/N 0268
F	C18 ADDED. TC. 13.6.80
E	RV1, RV2 WERE 02-410 R19 WAS 02-141, R16 WAS ... C/N D141 17-6-80
D	R11, R8 WERE 220K, R13, R14 WERE 470K, R18 WAS 120Ω C/N 0085, 0116 12-2-80
C	R17 WAS 22Ω. 08-2444 ADDED C/N 0352, 0458 12-2-80
B	ISSUE B C3 WAS 3000μF R19, R20 WERE 56K C/N 0094 22-11-79

UNLESS OTHERWISE STATED DIMENSIONS IN MILLIMETERS

TOLERANCES: LINEAR 0. ± 0.8 / 0.0 ± 0.1; HOLE DIA. + 0.36 / − 0; ANGULAR ± 0.5°

SCALE 1:1

DRAWN S.D. 21-6-79

CHECKED

FINISH

MAT'L.

SPOOLING MOTOR CONTROL P.C.B. ASS'Y. 77 MK V C.

R. MEDDING & ASSOCIATES PTY. LTD. MELBOURNE AUSTRALIA

USED ON

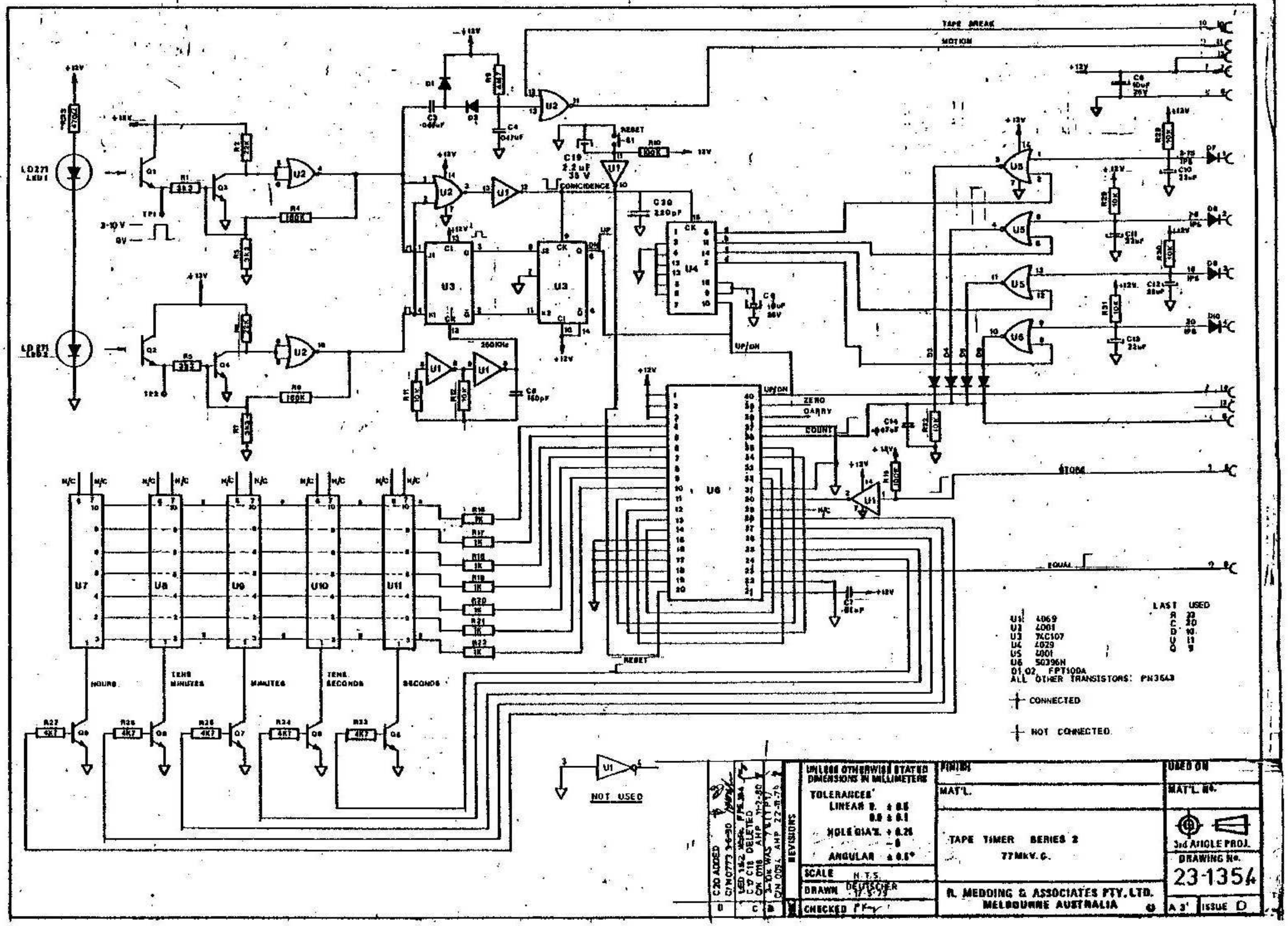
MAT'L. Nº

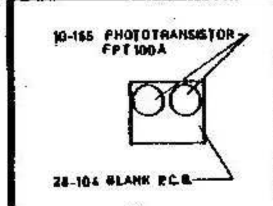
3rd ANGLE PROJ.

DRAWING Nº. 02300921 02302364

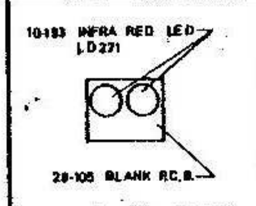
A3 ISSUE H

FILE UNDER 02300921

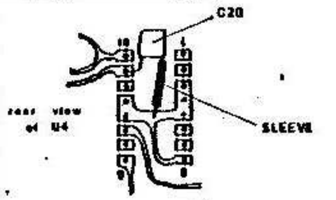

TAPE BREAK
MOTION
RESET
COINCIDENCE
UP/DN
ZERO
CARRY
COUNT
STORE
EQUAL
RESET
HOURS
TENS MINUTES
MINUTES
TENS SECONDS
SECONDS
NOT USED
U1 4069
U2 4001
U3 74C107
U4 4029
U5 4001
U6 50396N
D1, D2 FPT100A
ALL OTHER TRANSISTORS: PN3643
LAST USED
R 33
C 20
D 10
U 11
Q 9
CONNECTED
NOT CONNECTED
C20 ADDED
UNLESS OTHERWISE STATED DIMENSIONS IN MILLIMETERS
TOLERANCES
LINEAR
HOLE DIA'S.
ANGULAR
SCALE N.T.S.
DRAWN DEUTSCHER
CHECKED
REVISIONS
FINISH
MAT'L.
TAPE TIMER SERIES 2
77MkV.C.
R. MEDDING & ASSOCIATES PTY. LTD.
MELBOURNE AUSTRALIA
USED ON
MAT'L. No.
3rd ANGLE PROJ.
DRAWING No.
23-1354
A3
ISSUE D



DETAIL 'A' 23-924

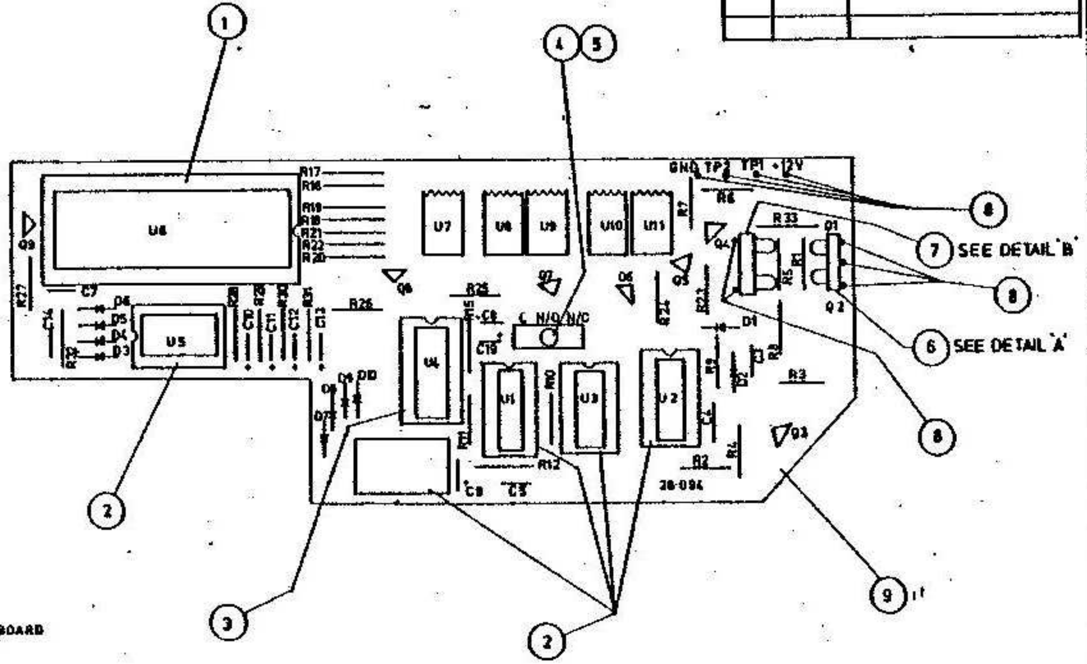


DETAIL 'B' 23-925



DETAIL 'C'

①	08-2216	IC SOCKET 40 PIN
②	08-2180	IC SOCKET 14 PIN (5 OFF)
③	08-2181	IC SOCKET 16 PIN
④	08-3166	C&K PUSH BUTTON 8126 V3
⑤	08-3169	PUSH BUTTON CAP BLACK 7089
⑥	23-924	LIGHT DETECTOR ASSY.
⑦	23-925	LIGHT SOURCE ASSY.
⑧	08-2430	CN PIN (9 OFF)
⑨	28-094	77 MK V TAPE TIMER P.C.B.



COM Nº	PART Nº	DESCRIPTION.
U11	10-197	FND 367 7 SEGMENT DISPLAYS
U10	10-197	FND 367 " "
U9	10-197	FND 367 " "
U8	10-197	FND 367 " "
U7	10-197	FND 367 " "
U6	10-190	MOSTEK MK50396N 6 DEC.TIMER
U5	10-171	IC CD 4001 CN
U4	10-166	" CD 4029 CN
U3	10-151	" MM 74 C107N
U2	10-171	" CD 4001 CN
U1	10-167	" CD 4069 CN
	28-094	TAPE TIMER P.C.B.
Q9	10-127	TRANSISTOR PN 3643
Q8	10-127	" PN 3643
Q7	10-127	" PN 3643
Q6	10-127	" PN 3643
Q5	10-127	" PN 3643
Q4	10-127	" PN 3643
Q3	10-127	" PN 3643
C20	03 205	CAPACITOR 220pF CERAMIC
C19	03-172	CAPACITOR 2.2uF 35V TAG TANTALUM
C14	03-012	" ·047uF 100V GREEN CAP
C13	03-156	" 22uF 16V TAG TANTALUM
C12	03 156	" 22uF 16V " "
C11	03 156	" 22uF 16V " "
C10	03-156	" 22uF 16V " "
C9	03-153	" 10uF 25V " "
C8	03-153	" 10uF 25V " "
C7	03-007	" ·01uF 100V GREEN CAP
C5	03-207	" 150pF CERAMIC
C4	03-012	" ·047uF 100V GREEN CAP
C3	03-012	" ·047uF " "

COM Nº	PART Nº	DESCRIPTION
D10	10-037	DIODE 1N914
D8	10-037	" 1N914
D6	10-037	" 1N914
D7	10-037	" 1N914
D6	10-037	" 1N914
D5	10-037	" 1N914
D4	10-037	" 1N914
D3	10-037	" 1N914
D2	10-037	" 1N914
D1	10-037	" 1N914
R33	02-116	RESISTOR 470Ω ¼W 5%
R32	02-135	RESISTOR 10K ¼W 5%
R31	02-135	" 10K " "
R30	02-135	" 10K " "
R29	02-135	" 10K " "
R28	02-135	" 10K " "
R27	02-131	" 4K7 " "
R26	02-131	" 4K7 " "
R25	02-131	" 4K7 " "
R24	02-131	" 4K7 " "
R23	02-131	" 4K7 " "
R22	02-123	" 1K " "
R21	02-123	" 1K " "
R20	02-123	" 1K " "
R19	02-123	" 1K " "
R18	02-123	" 1K " "
R17	02-123	" 1K " "
R16	02-123	" 1K " "
R15	02-147	" 100K " "
R12	02-135	" 10K " "
R11	02-135	" 10K " "
R10	02-147	" 100K " "
R9	02-165	" 4M7 " "
R8	02-149	" 150K " "
R7	02-129	" 3K3 " "
R6	02-139	" 22K " "
R5	02-129	" 3K3 " "
R4	02-149	" 150K " "
R3	02-129	" 3K3 " "
R2	02-139	" 22K " "
R1	02-129	" 3K3 " "

NOTES

1. C20 ON BACK OF BOARD OPPOSITE U4 SEE DETAIL 'C'
2. FND 367 7 Segment Displays must be from common batch.

REVISIONS

ISSUE	
D	DETAIL 'C' ADDED C/N 0773
C	C20 ADDED C/N 0773 2-6-80
B	ITEMS 1)-(9) INCL. ADDED DETAILS 'A','B' ADDED C/N 0718 A.H.F. 11-2-80 C17 & C18 DELETED

UNLESS OTHERWISE STATED DIMENSIONS IN MILLIMETERS

TOLERANCES LINEAR 0. ± 0.5, 0.0 ± 0.1; HOLE DIA'S. + 0.25 − 0; ANGULAR ± 0.5°

SCALE 1:1

DRAWN SD 20-6-79

CHECKED

FINISH

MAT'L.

TAPE TIMER P.C.B. ASS'Y 77 MK V G

R. MEDDING & ASSOCIATES PTY. LTD. MELBOURNE AUSTRALIA

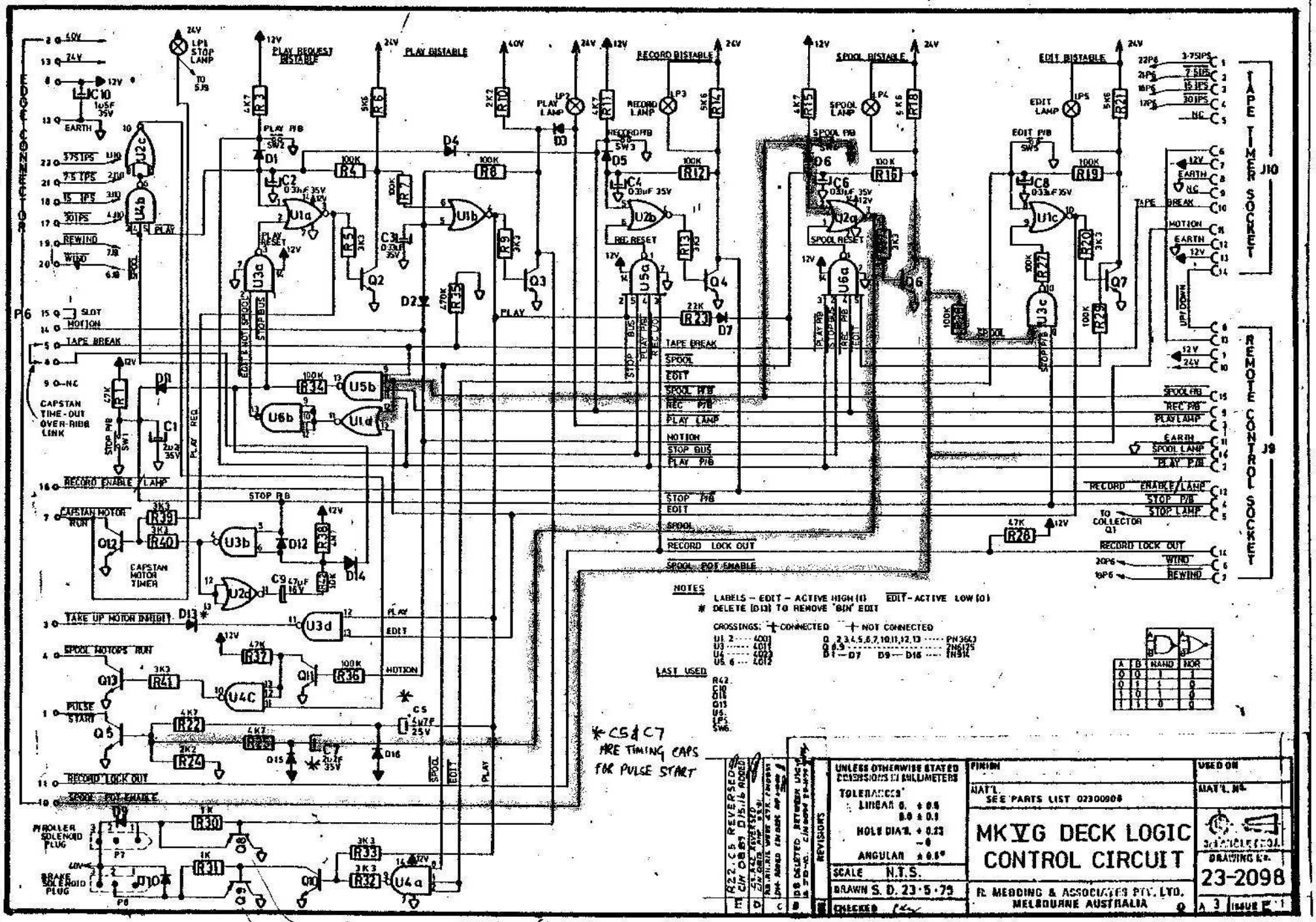
USED ON

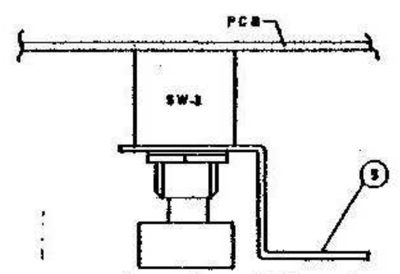
MAT'L. Nº.

3rd ANGLE PROJ.

DRAWING No. 23-899

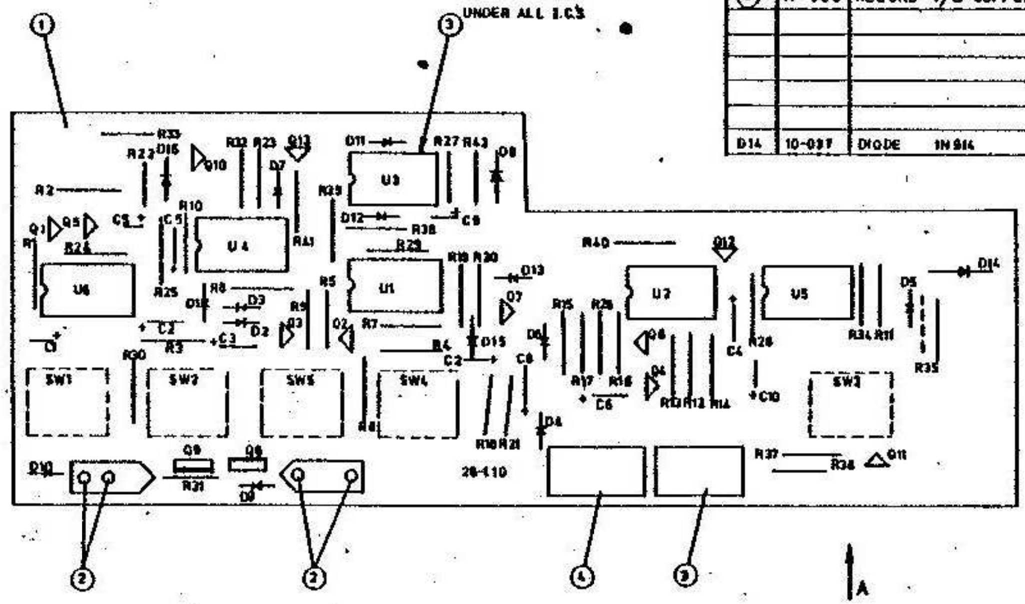
A3 ISSUE D


MKVG DECK LOGIC CONTROL CIRCUIT
DRAWING No. 23-2098
R. MEDDING & ASSOCIATES PTY. LTD. MELBOURNE AUSTRALIA
SCALE N.T.S.
DRAWN S.D. 23·5·79
CHECKED
ISSUE 1
TAPE TIMER SOCKET J10
REMOTE CONTROL SOCKET J9
PLAY BISTABLE
RECORD BISTABLE
SPOOL BISTABLE
EDIT BISTABLE
PLAY REQUEST BISTABLE
CAPSTAN MOTOR TIMER
PULSE START
TAKE UP MOTOR INHIBIT
SPOOL MOTORS RUN
RECORD LOCK OUT
SPOOL BOT ENABLE
RECORD ENABLE LAMP
CAPSTAN TIME-OUT OVER-RIDE LINK
TAPE BREAK
SPOOL
EDIT
SPOOL P/B
REC P/B
PLAY LAMP
MOTION
STOP BUS
PLAY P/B
STOP P/B
REWIND
WIND
NOTES
LABELS – EDIT – ACTIVE HIGH (1) EDIT – ACTIVE LOW (0)
DELETE (D13) TO REMOVE 'BIN' EDIT
LAST USED
*C5 & C7 ARE TIMING CAPS FOR PULSE START
GAIN SENSITIVE (MOUNTED ON OTHER SIDE OF BOARD



NOTE REMOVE SWITCH MTG BEZEL AND FIT SUPPORT BRACKET AS SHOWN
PART VIEW 'A' (RECORD P/B.)

COM N°	PART N°	DESCRIPTION
SW1	08-3185	SWITCH HUN 153W WHITE.
SW2	08-3186	" " 153Y YELLOW.
SW3	08-3184	" " 153R RED.
SW4	08-3188	" " 153B BLUE.
SW5	08-3187	" " 153G GREEN.
(1)	28-110	BLANK P.C.B.
4 OFF (2)	08-2434	MOLEX PIN
2 OFF (3)	08-2180	14 PIN I.C. SOCKET
(4)	08-2181	16 PIN I.C. SOCKET
(5)	11-980	RECORD P/B SUPPORT
D14	10-037	DIODE 1N914



COM N°	PART N°	DESRIPTION
D13	10-037	DIODE 1N914
D12	10-037	" 1N914
D11	10-037	" 1N914
D10	10-037	" 1N914
D9	10-037	" 1N914
D7	10-037	" 1N914
D6	10-037	" 1N914
D5	10-037	" 1N914
D4	10-037	" 1N914
D3	10-037	" 1N914
D2	10-037	" 1N914
D1	10-037	" 1N914
Q13	10-127	TRANSISTOR PN3643
Q12	10-127	" PN3643
Q11	10-127	" PN3643
Q10	10-127	" PN3643
Q9	10-146	" 2N6125
Q8	10-146	" 2N6125
Q7	10-127	" PN3643
Q6	10-127	" PN3643
Q5	10-127	" PN3643
Q4	10-127	" PN3643
Q3	10-127	" PN3643
Q2	10-127	" PN3643
Q1	10-127	" PN3643
U6	10-192	INTEGRATED CIRCUIT CD4012CN
U5	10-192	" " CD4012CN
U4	10-191	" " CD4023CN
U3	10-175	" " CD4011CN
U2	10-171	" " CD4001CN
U1	10-171	" " CD4001CN
C10	03-152	CAPACITOR 1·5uF 35V TAG TANTALUM
C9	03-157	" 47uF 16V " "
C8	03-176	" ·33uF 35V " "
C7	03-172	" 2·2uF 35V " "
C6	03-176	" ·33uF 35V " "
C5	03-170	" 4·7uF 25V " "
C4	03-176	" ·33uF 35V " "
C3	03-176	" ·33uF 35V " "
C2	03-176	" ·33uF 35V " "
C1	03-172	" 2·2uF 35V " "

COM N°	PART N°	DESCRIPTION
R43	02-135	RESISTOR 10K ¼W 5%
R41	02-129	RESISTOR 3K3 ¼W 5%
R40	02-129	" 3K3 " "
R39	02-129	" 3K3 " "
R38	02-165	" 4M7 " "
R37	02-143	" 47K " "
R36	02-147	" 100K " "
R35	02-155	" 470K " "
R34	02-147	" 100K " "
R33	02-129	" 3K3 " "
R32	02-129	" 3K3 " "
R31	02-123	" 1KΩ " "
R30	02-123	" 1KΩ " "
R29	02-147	" 100K " "
R28	02-143	" 47K " "
R27	02-147	" 100K " "
R26	02-147	" 100K " "
R25	02-131	" 4K7 " "
R24	02-127	" 2K2 " "
R23	02-139	" 22K " "
R22	02-131	" 4K7 " "
R21	02-132	" 5K6 " "
R20	02-129	" 3K3 " "
R19	02-147	" 100K " "
R18	02-132	" 5K6 " "
R17	02-129	" 3K3 " "
R16	02-147	" 100K " "
R15	02-131	" 4K7 " "
R14	02-132	" 5K6 " "
R13	02-129	" 3K3 " "
R12	02-147	" 100K " "
R11	02-131	" 4K7 " "
R10	02-127	" 2K2 " "
R9	02-129	" 3K3 " "
R8	02-147	" 100K " "
R7	02-147	" 100K " "
R6	02-132	" 5K6 " "
R5	02-129	" 3K3 " "
R4	02-147	" 100K " "
R3	02-131	" 4K7 " "
R2	02-129	" 3K3 " "
R1	02-143	" 47K " "

REVISIONS	
E	D15, D16 ADDED. R22, C5, REVERSED
D	C/N 0883
C	R42 ADDED D14 ADDED C/N 0853
B	ITEMS 2 TO 5 INCL. VIEW A ADDED D6 DELETED C/N 0094 22-11-79

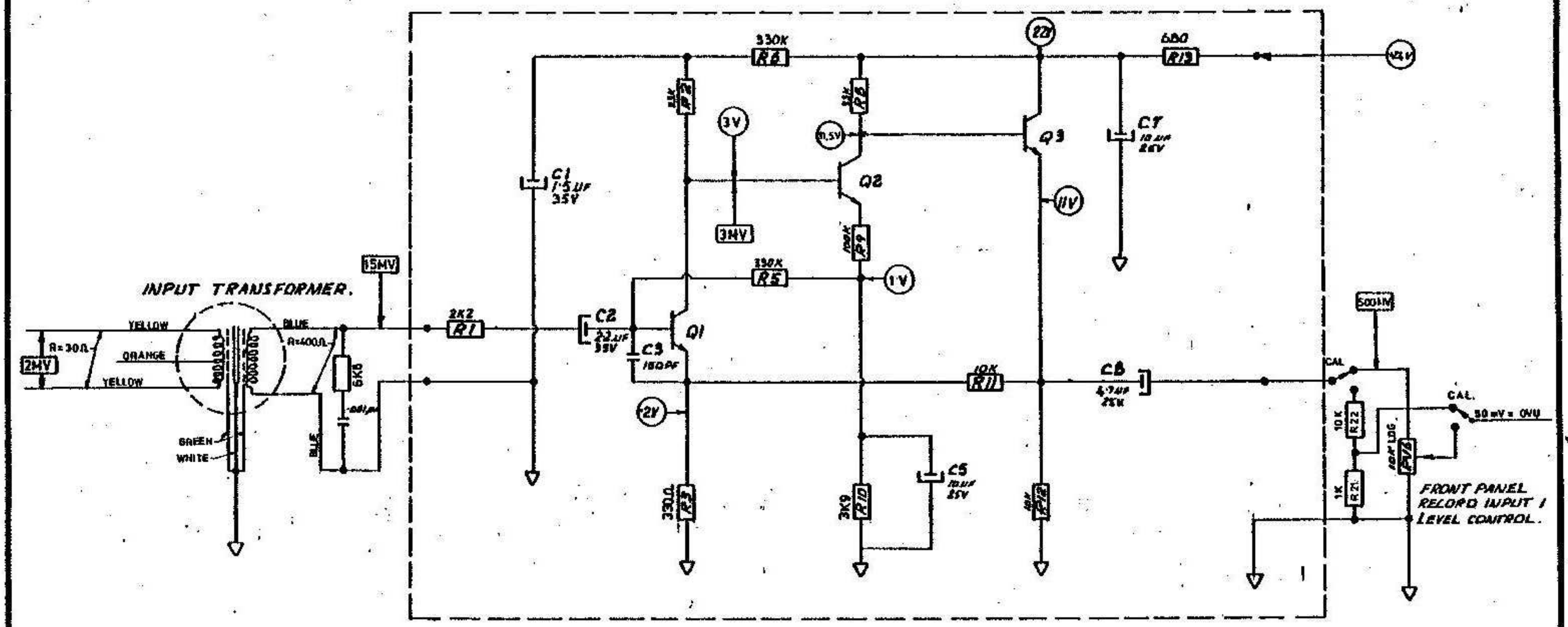
UNLESS OTHERWISE STATED DIMENSIONS IN MILLIMETERS
TOLERANCES: LINEAR 0. ± 0.5, 0.0 ± 0.1
HOLE DIA'S. + 0.25 − 0
ANGULAR ± 0.5°
SCALE 1:1
DRAWN S.D. 21-6-79
CHECKED

FINISH
MAT'L.

LOGIC P.C.B. ASSY.
77 MK V C.

R. MEDDING & ASSOCIATES PTY. LTD. MELBOURNE AUSTRALIA

USED ON
MAT'L Nº.
3rd ANGLE PROJ.
DRAWING Nº. 23-908.
A3 ISSUE E



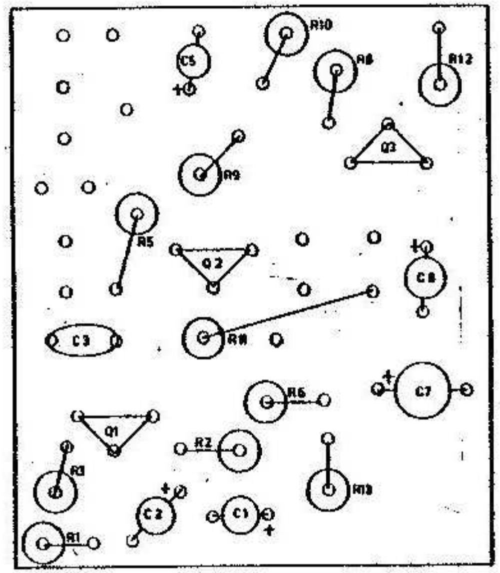
ALL TRANSISTORS PN5089
• RESISTORS ¼W 5% c.c.
◯ DC VOLTAGES.
▭ AC VOLTAGES MEASURED RECORDING 1K AT 0VU CAL.MODE.

LAST USED: Q3
, R13
, C9

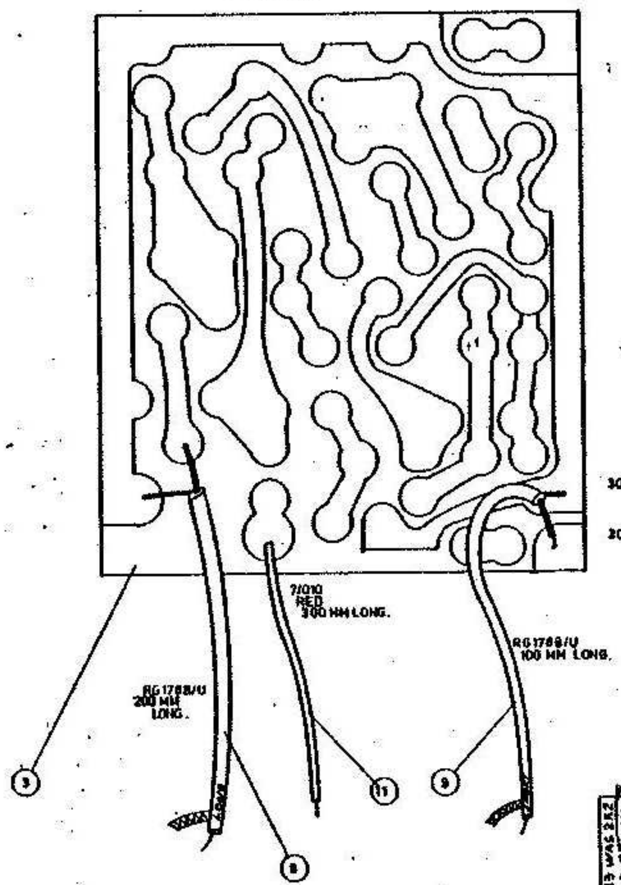
REVISIONS	
D	CAL. SWITCHES ADDED CN 0083; R21 & R22 ADDED MK V.G; C/N 0228 AHF 2-8-80
C	R10 WAS 8K2, R9 WAS 2K2; C4, C6, R4, R7, & C7 ALL DELETED; C/N 0075, 01/8 15-2-80
B	C5 ADDED C/N 0064 22-1-79

UNLESS OTHERWISE STATED DIMENSIONS IN MILLIMETERS TOLERANCES LINEAR 0. ± 0.3 0.0 ± 0.1 HOLE DIA'S. + 0.25 − 0 ANGULAR ± 0.5°	FINISH MAT'L.	USED ON MAT'L Nº.
SCALE NTS.	MIC. PRE AMP. CIRCUIT: 77 MK V G	3rd ANGLE PROJ. DRAWING No. 23·2089.
DRAWN S.DEUTSCHER 10-6-73.	R. MEDDING & ASSOCIATES PTY. LTD. MELBOURNE AUSTRALIA	A3 ISSUE D
CHECKED P.K.		

TOP



BOTTOM



NOTE:
ALL RESISTORS STAND ON END
CIRCUIT REFERENCE 23-2089

300MM	11	08-0003	HOOKUP WIRE 7/010 RED
	10		
200MM	9	08-0185	CO-AX TEFLON RG178 B/U
	8		
	7		
	6		
	5		
	4		
	3	03-4451	MIC PRE AMP PCB.
	2		
	1		
	COMP N°	PART N°	DESCRIPTION

COMP N°	PART N°	DESCRIPTION
Q3	10-093	TRANSISTOR PN5089
Q2	10-093	" PN5089
Q1	10-093	" PN5089
C8	03-170	CAPASITOR 4.7uF 25V TAG TANTALUM
C7	03-153	" 10uF 25V " "
C5	03-153	" 10uF 25V TAG TANTALUM
C3	03-207	" 150pF CERAMIC PHILIPS'
C2	03-172	" 2·2uF 35V TAG TANTALUM
C1	03-152	" 1·5uF 35V " "
R13	02-121	RESISTOR 680Ω 1/4W 5%
R12	02-135	" 10K " "
R11	02-135	" 10K " "
R10	02-130	" 3K9 " "
R9	02-110	" 100Ω " "
R8	02-141	" 33K " "
R6	02-153	" 330K " "
R5	02-153	" 330K " "
R3	02-116	" 330Ω " "
R2	02-141	" 33K " "
R1	02-127	" 2K2 " "

REVISIONS
B — R10 WAS 6K2, R3 WAS 2K2. C4 C6 R4 & R7 ALL DELETED. C/N OOTS. DUE 13-2-80

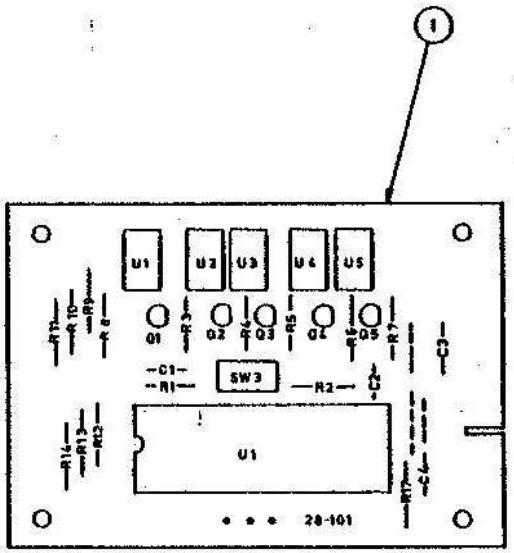
UNLESS OTHERWISE STATED DIMENSIONS IN MILLIMETERS
TOLERANCES
LINEAR 0. ± 0.5
0.0 ± 0.1
HOLE DIA'S. + 0.25 − 0
ANGULAR ± 0.5°
SCALE 4 : 1
DRAWN E.D. 1-8-79
CHECKED

FINISH
MAT'L.

MIC PRE-AMP P.C.B. ASSY 77 MK. V. G.

R. MEDDING & ASSOCIATES PTY. LTD.
MELBOURNE AUSTRALIA

USED ON
MAT'L. N°.
3rd ANGLE PROJ.
DRAWING N°.
23-929
A 3 ISSUE B



COMP N°	PART N°	DESCRIPTION
R17	02-147	RESISTOR 100K ¼W CARBON FILM
R14	02-123	RESISTOR 1K ¼W CARBON FILM
R13	"	" " " " "
R12	"	" " " " "
R11	"	" " " " "
R10	"	" " " " "
R9	"	" " " " "
R8	"	" " " " "
R7	02-131	" 4K7 " " "
R6	"	" " " " "
R5	"	" " " " "
R4	"	" " " " "
R3	"	" " " " "
R2	02-135	" 10K " " "
R1	"	" " " " "
SW3	08-3168	SWITCH P.B. C&K8125V3
U6	10-197	7 SEG. NUMERICAL DISPLAY FND367
U5	"	" " " " "
U4	"	" " " " "
U3	"	" " " " "
U2	"	" " " " "
U1	10-190	6 DEC. CLOCK COUNTER MM5039GN
-	08-2216	I.C. SOCKET 40-PIN
Q5	10-127	TRANSISTOR PN3643
Q4	"	" "
Q3	"	" "
Q2	"	" "
Q1	"	" "
C4	03-172	CAPACITOR 2,2µF 35V TANTALUM
C3	03-157	" 47µF 16V "
C2	03-007	" 0.01µF POLYESTER FILM
C1	03-012	" 0.047µF " "
①	28-101	BLANK PCB

UNLESS OTHERWISE STATED DIMENSIONS IN MILLIMETERS
TOLERANCES
LINEAR ± 0.5
ANGULAR ± 0.5°
SCALE 1:1
DRAWN RHP 19-12-80
CHECKED
REVISIONS

REFER 23-2072
DAT'L.
USED ON
MAT'L. No.

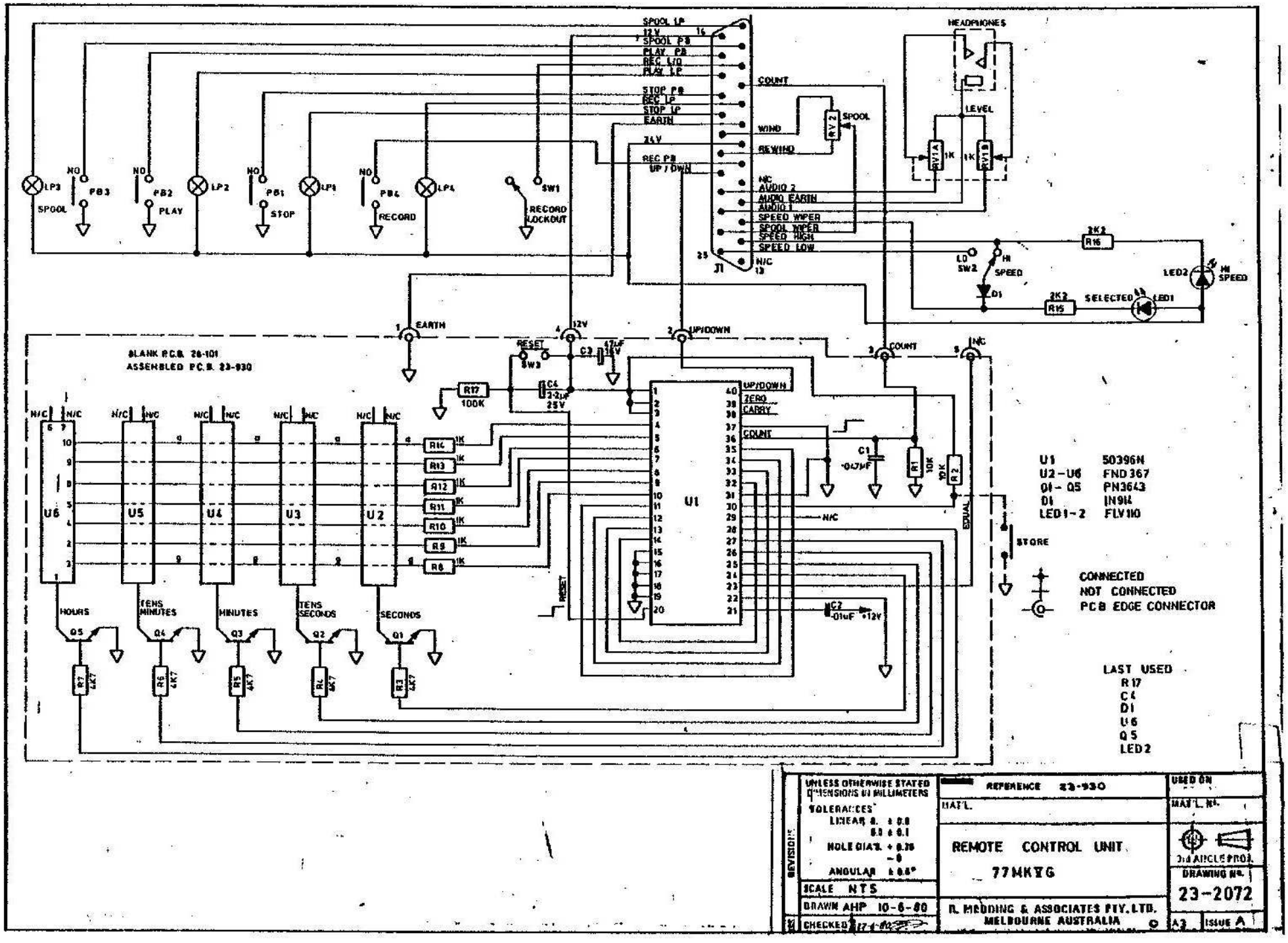
COMPONENT LAYOUT
REMOTE CONTROL UNIT
77 MK V G

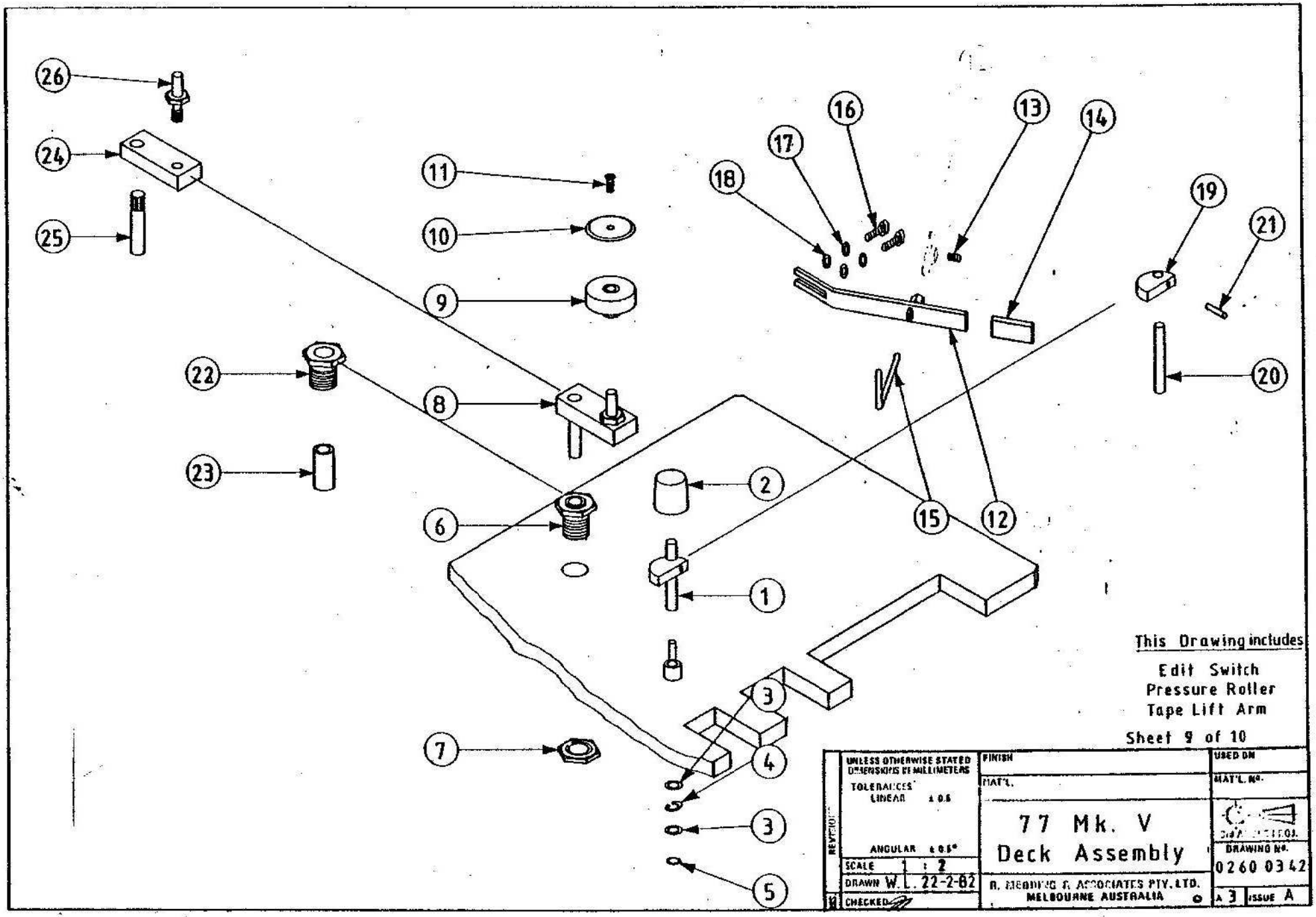
3rd ANGLE PROJ.

R. MEDDING & ASSOCIATES PTY. LTD.
MELBOURNE AUSTRALIA

DRAWING No.
23-930

A3 ISSUE 1


SPOOL LP
12V
SPOOL PB
PLAY PB
REC L/O
PLAY LP
STOP PB
REC LP
STOP LP
EARTH
24V
REC PB UP/DWN
COUNT
WIND
REWIND
NC
AUDIO 2
AUDIO EARTH
AUDIO 1
SPEED WIPER
SPOOL WIPER
SPEED HIGH
SPEED LOW
N/C
J1
HEADPHONES
LEVEL
RV1A 1K
RV1B 1K
RV 2 SPOOL
LP3 SPOOL
PB3
PB2 PLAY
LP2
PB1 STOP
LP1
PB4 RECORD
LP4
SW1 RECORD LOCKOUT
LD SW2 HI SPEED
D1
2K2 R16
LED2 HI SPEED
2K2 R15
SELECTED
LED1
EARTH
12V
UP/DOWN
COUNT
N/C
BLANK P.C.B. 26-101
ASSEMBLED P.C.B. 23-930
RESET SW3
C3 47uF 16V
R17 100K
C4 2·2uF 25V
U1
U2
U3
U4
U5
U6
UP/DOWN
ZERO
CARRY
COUNT
N/C
EQUAL
C1 ·047uF
R1 10K
R2 10K
R14 1K
R13 1K
R12 1K
R11 1K
R10 1K
R9 1K
R8 1K
HOURS
TENS MINUTES
MINUTES
TENS SECONDS
SECONDS
Q5
Q4
Q3
Q2
Q1
R7 4K7
R6 4K7
R5 4K7
R4 4K7
R3 4K7
RESET
C2 ·01uF +12V
STORE
U1 50396N
U2-U6 FND 367
Q1-Q5 PN3643
D1 IN914
LED1-2 FLV110
CONNECTED
NOT CONNECTED
PCB EDGE CONNECTOR
LAST USED
R17
C4
D1
U6
Q5
LED2
UNLESS OTHERWISE STATED DIMENSIONS IN MILLIMETERS
TOLERANCES
LINEAR 0. ± 0.8
0.0 ± 0.1
HOLE DIA'S. + 0.25 −0
ANGULAR ± 0.5°
SCALE NTS
DRAWN AHP 10-6-80
CHECKED
REVISIONS
REFERENCE 23-930
MAT'L.
REMOTE CONTROL UNIT
77MKIIG
R. HEDDING & ASSOCIATES PTY. LTD.
MELBOURNE AUSTRALIA
USED ON
MAT'L No.
3rd ANGLE PROJ.
DRAWING No.
23-2072
A3
ISSUE A

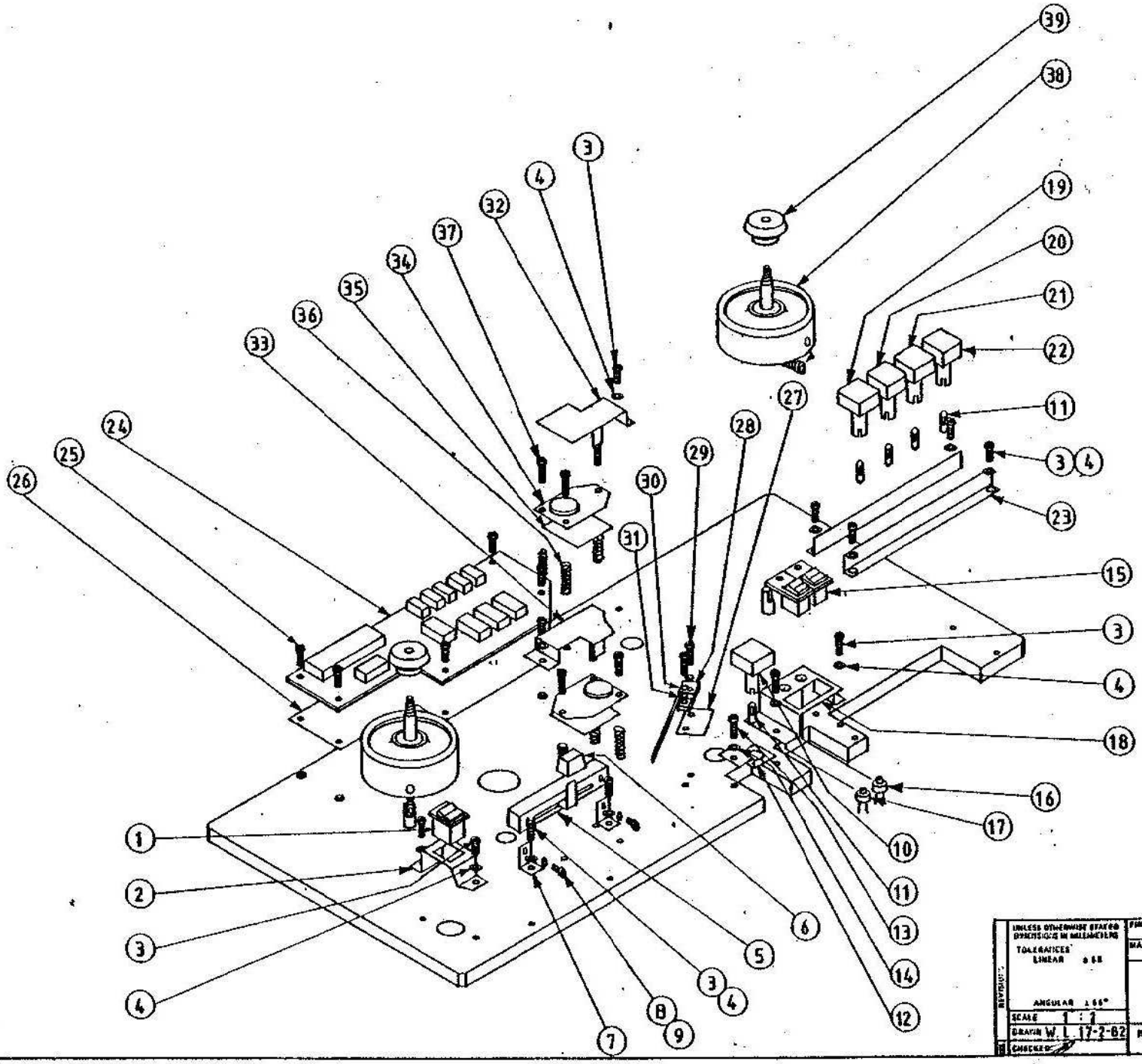


This Drawing includes

Edit Switch
Pressure Roller
Tape Lift Arm

Sheet 9 of 10

UNLESS OTHERWISE STATED DIMENSIONS IN MILLIMETERS TOLERANCES LINEAR ± 0.5 ANGULAR ± 0.5°	FINISH MAT'L.	USED ON MAT'L. No.
SCALE 1 : 2 DRAWN W.L. 22-2-82 CHECKED	77 Mk. V Deck Assembly	DRAWING No. 0260 0342
REVISIONS	R. HEDDING & ASSOCIATES PTY. LTD. MELBOURNE AUSTRALIA	A 3 ISSUE A



This Drawing Includes

Switches
Brake Drums
Tape Timer Display
Tape Tension P.C.B's
Tape Break Microswitch

Sheet 3 of 10

UNLESS OTHERWISE STATED DIMENSIONS IN MILLIMETERS
TOLERANCES
LINEAR ± 0.5
ANGULAR ± 0.5°

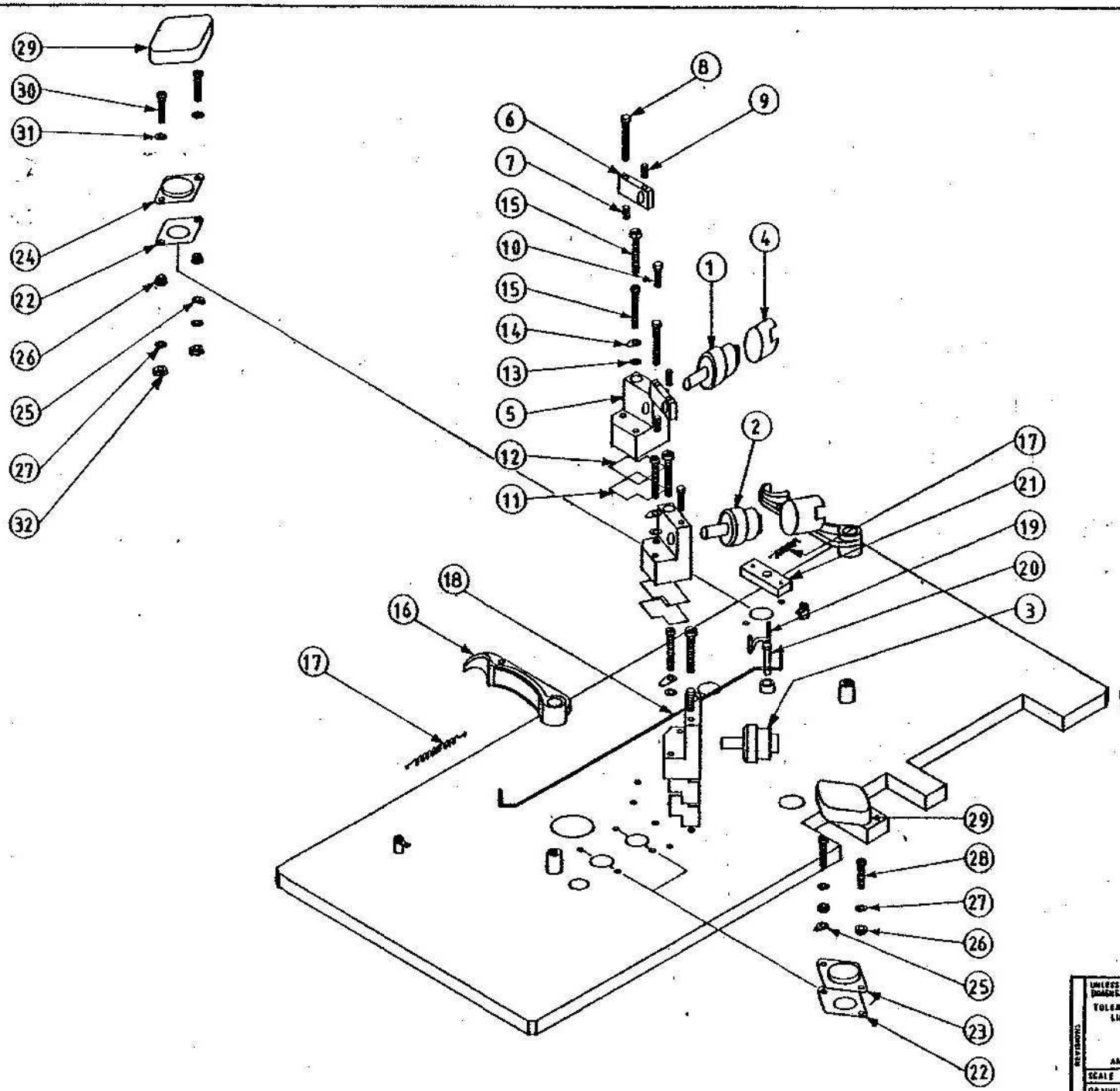
FINISH
MAT'L.
UNLESS

77 Mk. V
Deck Assembly

SCALE 1 : 1
DRAWN W. L. 17-2-82
CHECKED

R. MEDWAY & ASSOCIATES PTY. LTD.
MELBOURNE AUSTRALIA

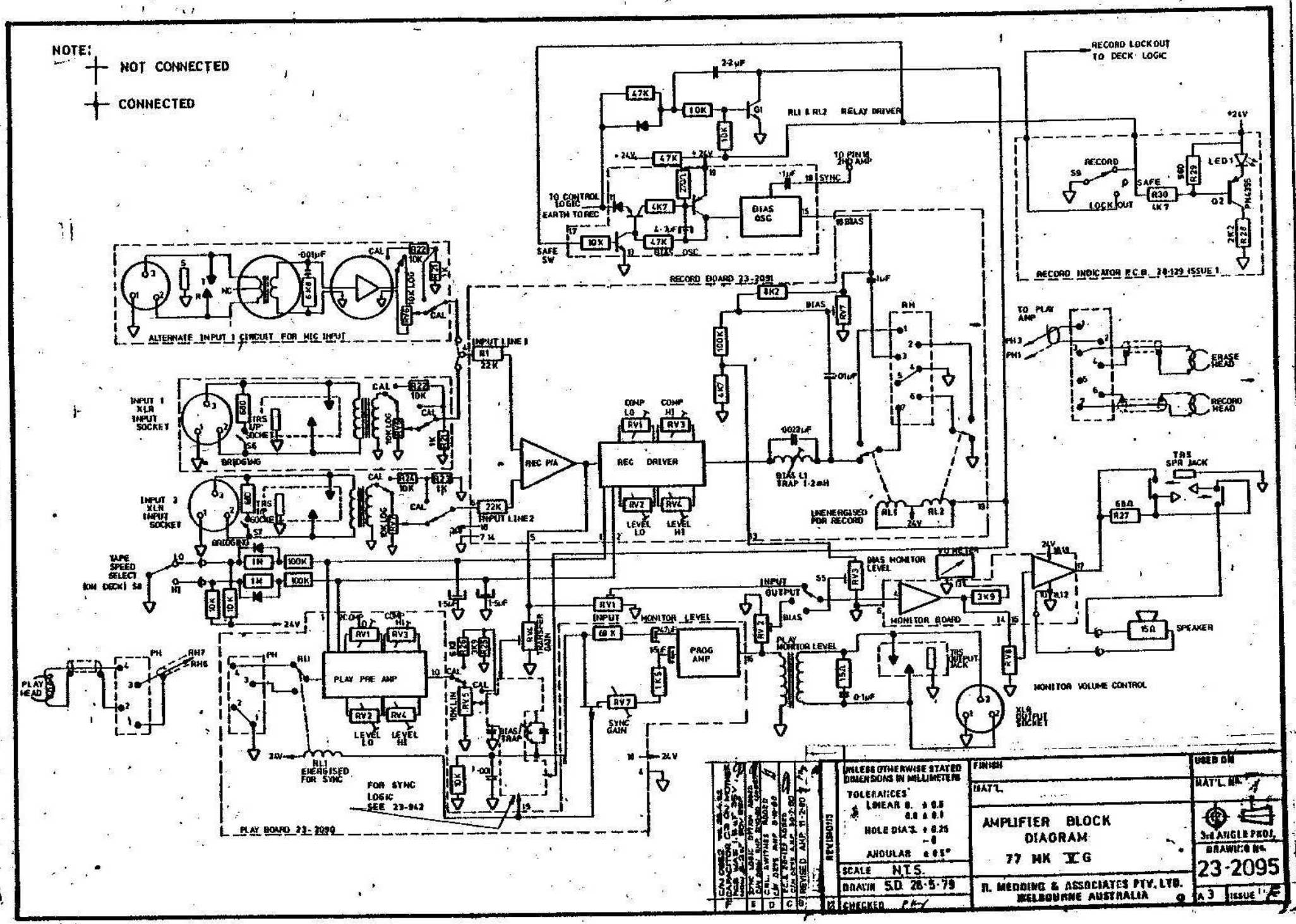
MAT'L. No.
DRAWING No.
0260 0342
A 2 ISSUE A

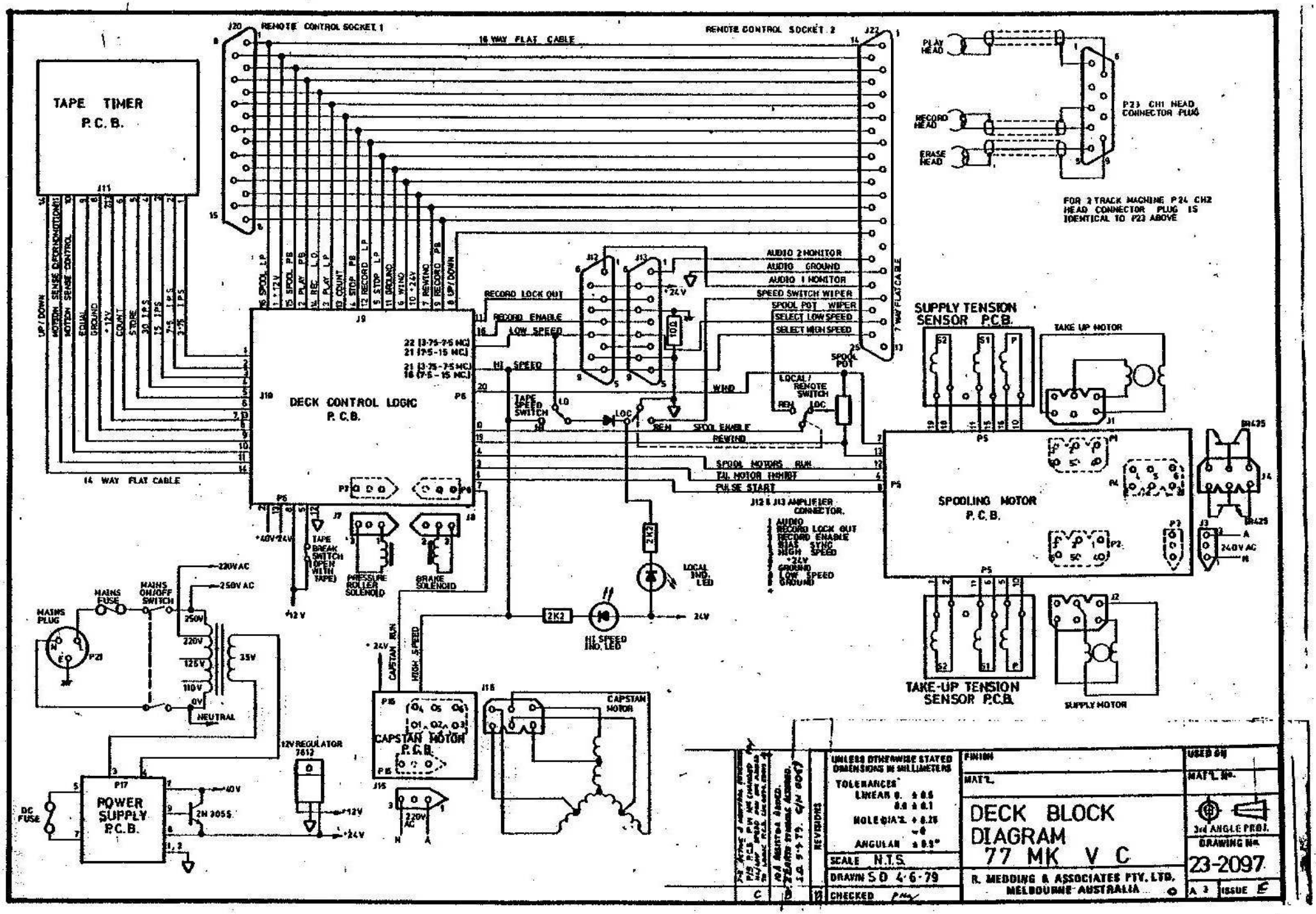


This Drawing Includes
Heads
/ Brakes
Transistors

Sheet 5 of 10

UNLESS OTHERWISE STATED DIMENSIONS IN MILLIMETRES TOLERANCES LINEAR ±.05 ANGULAR ±.05°	FINISH	USED ON
	MAT'L	MAT'L SPEC.
SCALE 1 : 2	77 Mk. V Deck Assembly	DRAWING No. 0260 0342
DRAWN W. L. 18-2-82	R. McGINNIS & ASSOCIATES PTY. LTD. MELBOURNE AUSTRALIA	A 2 Issue A
CHECKED		


NOTE:
NOT CONNECTED
CONNECTED
RECORD LOCKOUT TO DECK LOGIC
RECORD BOARD 23-2091
RECORD INDICATOR P.C.B. 28-129 ISSUE 1
ALTERNATE INPUT 1 CIRCUIT FOR MIC INPUT
INPUT 1 XLR INPUT SOCKET
INPUT 2 XLR INPUT SOCKET
INPUT LINE 1
INPUT LINE 2
REC P/A
REC DRIVER
BIAS OSC
RL1 & RL2 RELAY DRIVER
TO CONTROL LOGIC EARTH TO REC
SAFE SW
BIAS TRAP 1·2mH
UNENERGISED FOR RECORD
TO PLAY AMP
ERASE HEAD
RECORD HEAD
TAPE SPEED SELECT (ON DECK) S8
PLAY HEAD
PLAY PRE AMP
PLAY BOARD 23-2090
RL1 ENERGISED FOR SYNC
FOR SYNC LOGIC SEE 23-942
PROG AMP
MONITOR BOARD
MONITOR VOLUME CONTROL
SPEAKER
XLR OUTPUT SOCKET
TRS SPR JACK
TRS OUTPUT JACK
BIAS MONITOR LEVEL
PLAY MONITOR LEVEL
MONITOR LEVEL
INPUT OUTPUT
LEVEL LO
LEVEL HI
SYNC GAIN
BIAS TRAP
UNLESS OTHERWISE STATED DIMENSIONS IN MILLIMETERS
TOLERANCES
LINEAR 0 - 6 ± 0.5
6 - 30 ± 0.1
HOLE DIA'S ± 0.25 -0
ANGULAR ± 0.5°
SCALE N.T.S.
DRAWN S.D. 28-5-79
CHECKED
FINISH
MAT'L.
AMPLIFIER BLOCK DIAGRAM
77 MK IIG
R. MEDDING & ASSOCIATES PTY. LTD. MELBOURNE AUSTRALIA
USED ON
MAT'L. No.
3rd ANGLE PROJ.
DRAWING No.
23-2095
A 3
ISSUE


TAPE TIMER P.C.B.
REMOTE CONTROL SOCKET 1
16 WAY FLAT CABLE
REMOTE CONTROL SOCKET 2
7 WAY FLAT CABLE
DECK CONTROL LOGIC P.C.B.
14 WAY FLAT CABLE
RECORD LOCK OUT
RECORD ENABLE
LOW SPEED
HI SPEED
TAPE SPEED SWITCH
WIND
REWIND
SPOOL ENABLE
SPOOL MOTORS RUN
TAL MOTOR INHIBIT
PULSE START
AUDIO 2 MONITOR
AUDIO GROUND
AUDIO 1 MONITOR
SPEED SWITCH WIPER
SPOOL POT WIPER
SELECT LOW SPEED
SELECT HIGH SPEED
SPOOL POT
LOCAL / REMOTE SWITCH
J12 & J13 AMPLIFIER CONNECTOR.
PLAY HEAD
RECORD HEAD
ERASE HEAD
P23 CH1 HEAD CONNECTOR PLUG
FOR 2 TRACK MACHINE P24 CH2 HEAD CONNECTOR PLUG IS IDENTICAL TO P23 ABOVE
SUPPLY TENSION SENSOR P.C.B.
TAKE UP MOTOR
SPOOLING MOTOR P.C.B.
TAKE-UP TENSION SENSOR P.C.B.
SUPPLY MOTOR
TAPE BREAK SWITCH (OPEN WITH TAPE)
PRESSURE ROLLER SOLENOID
BRAKE SOLENOID
LOCAL IND. LED
HI SPEED IND. LED
MAINS PLUG
MAINS FUSE
MAINS ON/OFF SWITCH
240V AC
250V AC
NEUTRAL
12V REGULATOR 7812
POWER SUPPLY P.C.B.
DC FUSE
2N 3055
CAPSTAN MOTOR P.C.B.
CAPSTAN MOTOR
24.0V AC
UNLESS OTHERWISE STATED DIMENSIONS IN MILLIMETERS
TOLERANCES
SCALE N.T.S.
DRAWN SD 4-6-79
CHECKED
DECK BLOCK DIAGRAM 77 MK V C
R. MEDDING & ASSOCIATES PTY. LTD. MELBOURNE AUSTRALIA
3rd ANGLE PROJ.
DRAWING No. 23-2097
A 3
ISSUE E