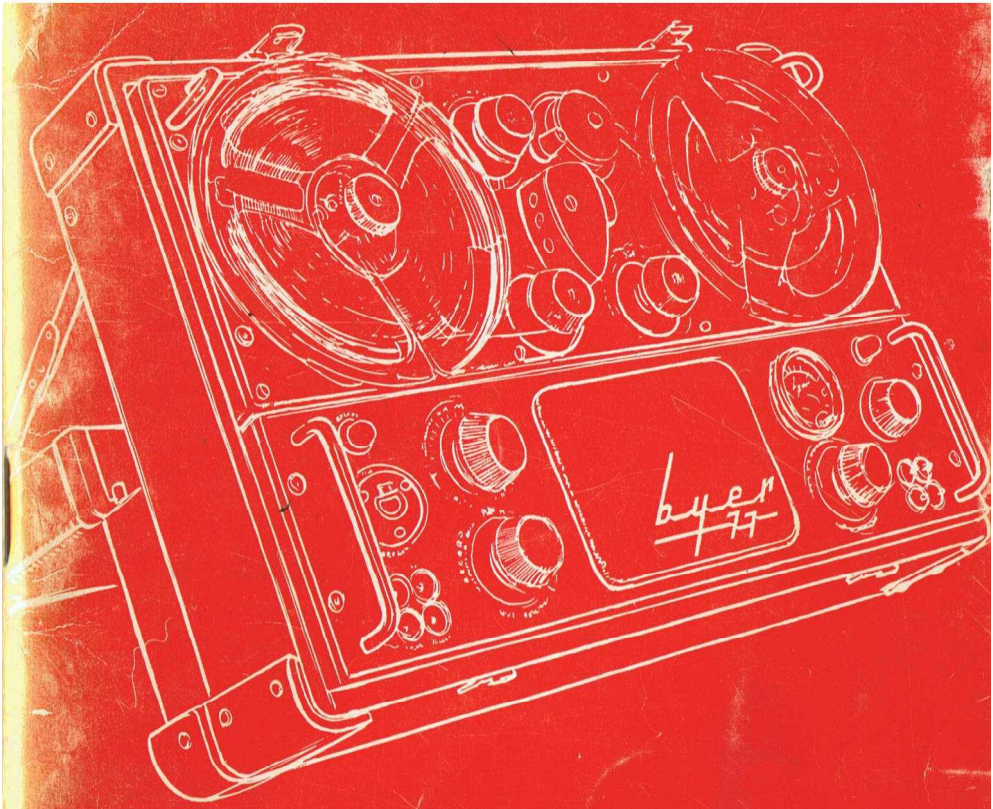


OPERATING INSTRUCTIONS for

byer

MODEL 77

MAGNETIC TAPE RECORDER

Foreword

The professional application of sound recording extends over a very wide field ranging from its use by individual specialists in science and the arts to the large organisations engaged in the radio, television and film industries. Musicians use sound recordings to improve instrument tone, zoologists to study bird and animal life and scientists to control unwanted noise.

Research laboratories use sound recording not only for transcription and archive purposes, but also as a convenient means of investigating all kinds of periodic and transient phenomena occurring in and beyond the audio spectrum.

Modern rocketry is made possible only with the aid of telemetry, industrial automation relies upon the transmission of pre-stored information to actuate the complex machines which function without human aid.

All this is being done with the aid of magnetic tape, which engineers have been quick to realise provides the ultimate medium for the recording of sound and other information.

In fact, magnetic tape provides an electronic memory which in many respects completely out-performs its human prototype. The more important and exacting the job, the more the user entrusts his reputation and, in some cases, his livelihood, even his life, to magnetic tape recording and reproducing equipment. He must use apparatus of outstanding performance and unquestioned reliability.

From its commencement Byer has consistently led the tape recorder industry in this country. Byer machines are the best available — they offer the greatest value and operate at the lowest cost per hour. As a result, Byer tape recorders are preferred over all others. All Australia's major broadcasting networks and leading gramophone record makers are Byer users. Professional preference has established Byer as Australia's standard of excellence in sound recording.

Magnetic Tape Recorder Division

ROLA COMPANY (AUST.) PTY. LTD.

8 Dorcas Street, South Melbourne, Victoria, Australia. MX 5171

APRIL, 1958

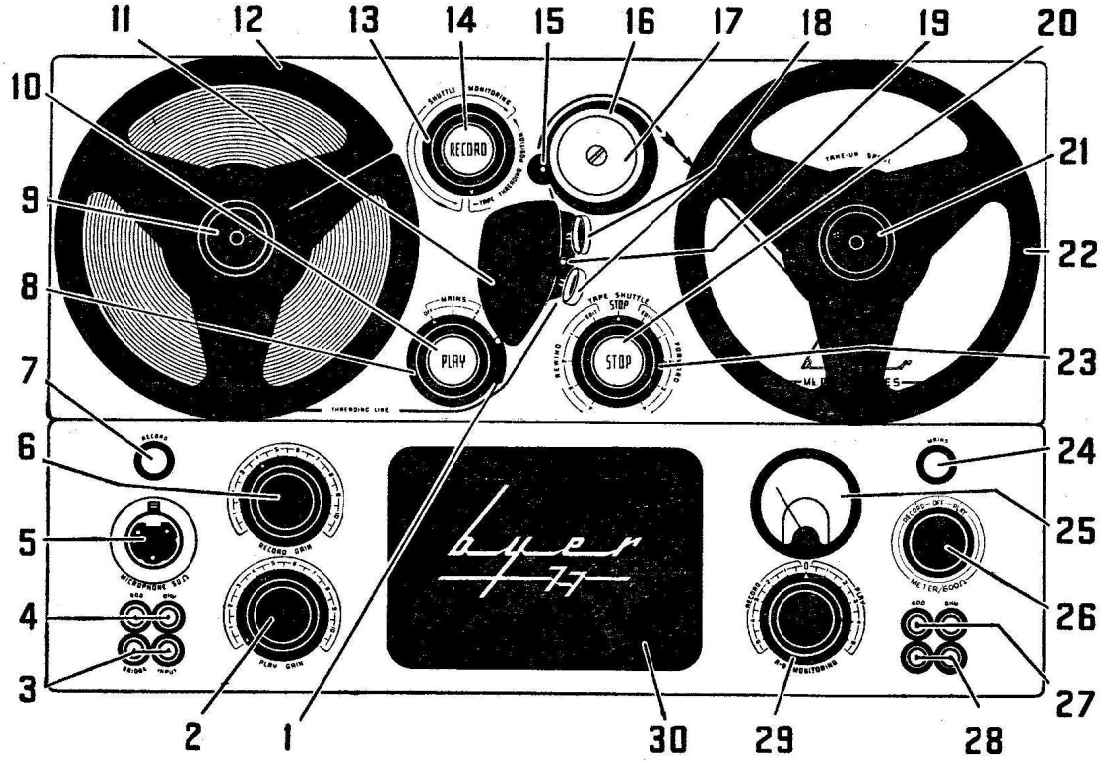
BYER MK. II SERIES

MODEL "77"

PROFESSIONAL PORTABLE MAGNETIC TAPE RECORDER

INSTRUCTION MANUAL

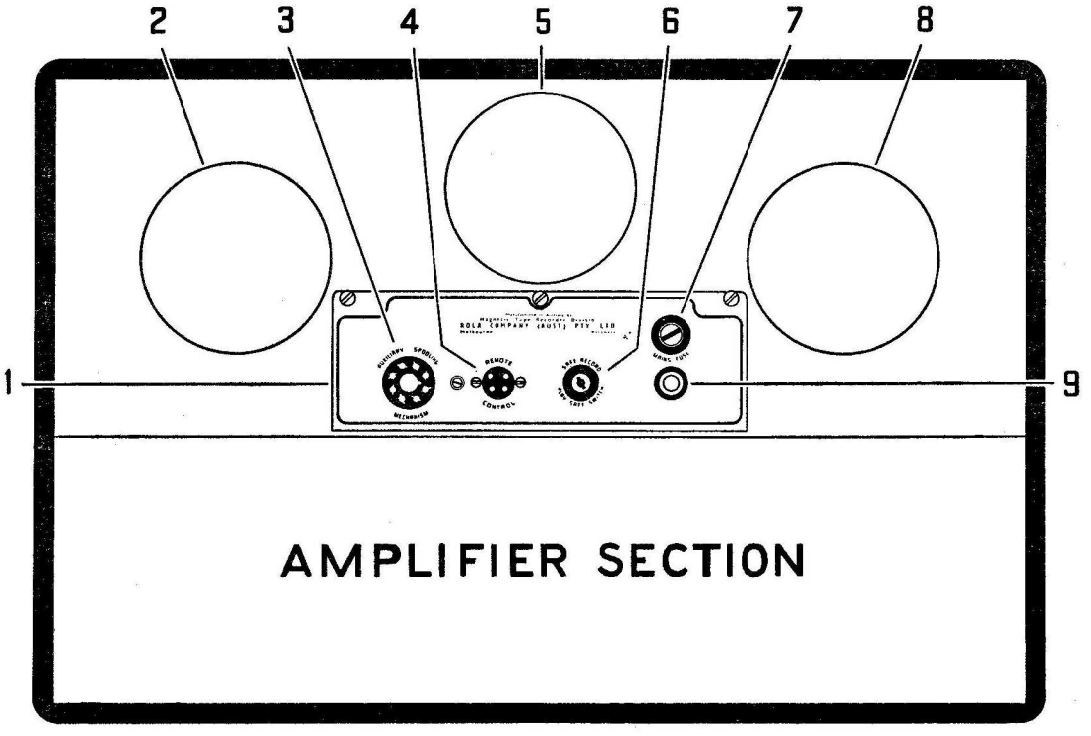
INDEX



1. TAPE OVER-RUN SWITCH
2. PLAY GAIN
3. BALANCED BRIDGE INPUT
4. 600 OHMS ZERO LEVEL INPUT
5. MICROPHONE INPUT
6. RECORD GAIN
7. "RECORD" INDICATOR
8. MAINS SWITCH AND SPEED EQUALISER CHANGE
9. SPOOL CAP
10. "PLAY" PRESS BUTTON
11. TRIPLE HEAD ASSEMBLY
12. SUPPLY REEL
13. SHUTTLE MONITOR
14. "RECORD" PRESS BUTTON
15. CAPSTAN
16. PRESSURE ROLLER
17. COVER PLATE
18. HEAD SHIELDS
19. TAPE LIFT PIN
20. "STOP" PRESS BUTTON
21. SPOOL CAP

22. TAKE-UP SPOOL
23. TAPE SHUTTLE CONTROL
24. "MAINS" INDICATOR
25. VU METER
26. METER/600 OHMS LINE SWITCH
27. 600 OHMS ZERO LEVEL OUTPUT
28. EXTERNAL SPEAKER OUTPUT
29. A.B. MONITOR CONTROL
30. MONITOR SPEAKER

1. CONTROL BOX
2. TAKE-UP MOTOR
3. AUXILIARY SPOOLING MECHANISM SOCKET
4. REMOTE CONTROL SOCKET
5. CAPSTAN MOTOR
6. PLAY-SAFE SWITCH
7. MAINS FUSE
8. SUPPLY MOTOR
9. RECORD BIAS ADJUSTMENT SCREW



BYER MK. II SERIES

MODEL "77"

PROFESSIONAL PORTABLE MAGNETIC TAPE RECORDER

●

INTRODUCTION AND GENERAL DESCRIPTION

The purpose of this booklet is to give the necessary information required for the successful operation of the Byer "77" Magnetic Tape Recorder.

To the professional recordist or to those experienced in the use of recording equipment, some of the instructions will appear superfluous, but others may find the contents helpful until such time as they become conversant with the instrument.

The Model "77" is normally composed of two units contained in a single carrying case — the tape transport mechanism and the amplifier. The two units are interconnected by flexible leads for operation as a complete tape recording and reproducing system.

HEAD ASSEMBLY

The Byer "77" is fitted with three separate heads mounted in a single head block assembly, i.e., Erase, Record and Play.

For optimum results, correct **Azimuth Setting** or **Head Gap Alignment** is essential in both the RECORD and the PLAY heads, but as this adjustment has been carefully made to international standards during manufacture, the **SETTING SHOULD NOT BE ALTERED,** unless absolutely necessary.

Should it become necessary to alter the Azimuth Setting of the PLAY Head to compensate for tapes recorded on machines with an incorrect Azimuth Setting, this adjustment can be carried out with the "Azimuth Adjusting Tool," which is available as an accessory.

CONTROL PANEL

The Control Panel at the rear of the Tape Transport Mechanism mounts the following facilities:—

A.C. Mains Fuse: This fuse can be removed for renewal or inspection by unscrewing the solid bakelite cap in an anti-clockwise direction and withdrawing the glass fuse container.

Play/Safe Switch: This switch is fitted as a safety device for protection against accidental erasure of tape. When the key is switched to the SAFE position and, if necessary, removed, the machine will operate only as a PLAY unit and **WILL NOT RECORD OR ERASE.**

Remote Control Socket: The machine may be operated remotely by means of the "START/STOP REMOTE CONTROL MECHANISM" available as an accessory.

A further control — "RE-WIND CONTROL MECHANISM" — is also available, but to permit its use, minor modifications to the machine become necessary. This unit incorporates two press buttons, one of which is depressed, to operate the machine, the other, when depressed, causing the machine to re-wind, or, in other words, to "step-back."

Bias Adjustment: All Byer recorders are adjusted for use with B.A.S.F. Type L.G.S. recording tape, and for optimum results it is recommended that this brand of tape be used. However, to compen-

sate for the varying bias requirements of other tapes an adjustment is provided. Turning the screw clockwise increases and anti-clockwise decreases the bias. Bias adjustment should be undertaken only by a competent recording engineer.

Auxiliary Spooling Mechanism Socket: To enable the Model "77" to be used with 10½ in. NAB Spools, a separate accessory — AUXILIARY SPOOLING MECHANISM — is available. This is a fully motorised unit which mounts above the Tape Transport Panel and plugs directly into the appropriate socket on the Control Box, transferring the power from the normal spooling motors to the heavy duty motors fitted to this deck.

Head Demagnetiser: After a period of time the Play Head may, under certain conditions, become magnetised. This condition is indicated by a surface noise similar to needle scratch in disc playing equipment, and to remedy the effect an inexpensive "Head Demagnetiser" is available as an accessory. There are two models. One is intended to plug into a socket on the rear of the control box unit on recorders carrying serial numbers 1 to 470.

The other is fitted with a three-pin plug for operation direct from the A.C. mains and may be used with any unit.

SPOOL SIZES

The use of 7 in. NARTB Type Spools with 2¾ in. Hub Diameter is strongly recommended. This spool, made in Australia exclusively by "Byer," has been developed by professional users as the most satisfactory for all purposes, and minimises the effects of varying tension ratios between a full and an empty spool. Its design follows very closely the external and hub diameters of the NAB professional spool.

BYER MK. II SERIES

MODEL "77"

PROFESSIONAL PORTABLE MAGNETIC TAPE RECORDER

OPERATING INSTRUCTIONS

Before attempting to operate, read these instructions carefully and check the mains supply voltage against the specification plate on rear panel of Tape Transport

PREPARING FOR OPERATION

1. With the recorder in an upright position, release the fasteners and open REAR cover to full extent, ensuring that the stays are in the locked position.
2. Tilt back the recorder until the rear cover supports the machine.
3. Remove the front cover.
4. Plug the mains lead into the A.C. mains supply and switch on at power point. Switch the MAINS switch to position 1 (Low Speed Operation) or position 2 (High Speed Operation). When the MAINS switch is set at positions 1 or 2 the bezel lamp marked MAINS on the amplifier panel should glow.
5. Load reel of tape on to the SUPPLY REEL spindle (left), and thread tape as indicated by THREADING LINE, ensuring that the tape is wound on to both spools with the oxide coating (dull surface) to the inside.
6. Power to the Tape Transport is controlled by the MAINS and SPEED CHANGE switch on the front panel, with 7½ in. per second being selected in Position No. 1, and 15 in. per second in Position No. 2.
   Equalisation is automatically switched with capstan motor speed.

SAFETY INTERLOCK SYSTEM

The following are points to be watched when operating the machine:—

YOU CANNOT —

(a) Record with PLAY-SAFE Key in SAFE.

(b) Record or Play unless TAPE SHUTTLE is set to STOP.

(c) Maintain operation unless the tape is threaded.

In addition, the movement of the TAPE SHUTTLE control whilst the machine is running will automatically stop the operation.

FAST FORWARD AND REWIND

Fast Forward and Rewind operations are accomplished by means of the TAPE SHUTTLE.

Turned to the right for FAST FORWARD and to the left for FAST REWIND, the speed of these operations is progressively variable in Positions 1, 2, 3 or 4, in either direction. However, to overcome spool inertia, it is desirable to turn the SHUTTLE CONTROL to the full forward or rewind position before selecting the desired shuttling speed.

In Position 4 full-speed shuttling in either direction is selected without any slowing down of the tape motion, and at this speed 1200 ft. of tape can be transferred from one spool to the other in 45 seconds.

The Edit position is explained in Paragraph headed — "SHUTTLE MONITORING" below.

Because of the safety interlocking system, the TAPE SHUTTLE control must be set to STOP before the record or play functions can be operated. It must be remembered also that the movement of this control during record or play will automatically stop the machine.

TAPE OVER-RUN SWITCH:

Situated immediately beneath the head block assembly is a safety device which, unless held open by the pressure of tape passing over it, will not allow the machine to maintain operation. Therefore, should no tape be threaded on the machine, or, in shuttling, should the tape over-run and all be wound in error from either spool, or should the tape between the capstan and the supply reel be interfered with in any way, the tape over-run switch will operate and automatically stop the machine.

SHUTTLE MONITORING

This control is used in conjunction with the TAPE SHUTTLE; turning the control anti-clockwise brings the tape closer to the PLAY head, and if used in this position during FAST FORWARD and REWIND it is possible to search aurally for any given spot on the tape.

Having arrived at the approximate position on the tape, set the TAPE SHUTTLE to EDIT and then position the tape manually by rotating either spool in either direction.

NOTE

After locating the position required, return the SHUTTLE MONITOR control to the TAPE THREADING POSITION, as constant shuttling with the tape in contact with the PLAY and RECORD heads will cause them to wear at an excessive rate.

TAPE THREADING

When threading (loading) a tape on to the machine, rotate the SHUTTLE MONITOR control to the TAPE THREADING position to move the pressure roller away from the capstan and the head shield away from the PLAY head, as well as to bring the tape lift pin from its recess in the head block. Although this is not absolutely essential for the threading of the tape, it is recommended in order to simplify this operation.

As mentioned earlier it is necessary for the tape, when threaded, to hold the over-run switch OPEN. It is therefore important that when threading, the tape passes over the TOP of the switch actuating arm, and to facilitate threading at this point a small solenoid is incorporated which will hold the arm in its "down" position whilst threading is effected. It will remain down until such time as the machine is operated, after which the switch is held open by tape tension on the actuating arm.

Thus with Shuttle Monitor control at "Tape Threading Position" and the Over-Run switch fully open, it will be observed that there is a clear tape path round the guide roller, over the TOP of the over-run switch, round the Triple head assembly between the Tape Lift Pin and the Head Shields, between Capstan and Pressure Roller, around the last named and across on to the Take-up spool.

This method of loading has been termed "Wrap-Round Tape Threading," and is noted for its simplicity.

V.U. METER

Visual indication for level control is by means of a V.U. Meter. Correct audio level is obtained by operating the appropriate GAIN CONTROL until the pointer deflects to the zero marking on the scale on "peaks" or loud passages only. An **occasional** movement into the red section of the scale is not harmful, but consistent deflection in this manner should be avoided.

RECORDING

1. Move speed change equaliser control to required tape speed. This control is a three-position switch, the extreme left position being,

as marked, OFF, Position 1 permitting 7½ in. per second operation and Position 2 15 in. per second operation.

2. Apply a suitable signal to the amplifier by connecting:—

(a) A low impedance microphone (50 ohms) equipped with the appropriate input connector to the microphone input socket.

(b) A zero level unterminated 600 ohm line into the upper twin jacks of the inputs section.

(c) A zero level terminated 600 ohms source into the lower twin jacks of the inputs section.

3. Press "Record" button; the record indicator will glow and the tape transport mechanism will operate.

4. Adjust recording level with the RECORD GAIN control. The V.U. Meter, switched to the record channel by means of the Meter/600 ohm switch, will indicate the programme material in proportion to the magnitude of applied signal modulation. With the meter/600 ohms switch in this position the 600 ohm line output is bridged across the Record channel. Recording level should be adjusted so that average peaks will indicate Zero V.U. on the meter scale.

5. Adjust A-B monitoring control to required monitor listening level, selecting either the input signal or, alternatively, that from the replay channel. This latter signal is taken from the replay head and reproduces material recorded on the tape. Direct comparison between input signal and recorded signal can be achieved by oscillating the monitor control to either side of the central position.

Headphones (with single jack) inserted in one of the monitor sockets will automatically mute the monitor speaker. Alternatively a standard P.M.G. type twin jack may be used.

PLAYING

Assuming the machine to be made ready for operation and the speed change control set to the required tape speed, press the "PLAY" button and the transport mechanism will operate. The meter/600 ohms switch should be positioned on the play channel and the PLAY GAIN control adjusted for required play level. The "A-B MONITORING" control may be adjusted for required monitoring level of replay signal. This latter function is quite independent of the play gain control setting.

Headphones or an external Monitor Speaker can be inserted in the external speaker socket/s for monitoring purposes.

In the Model "77" it is possible to switch from PLAY to RECORD and vice versa merely by pressing either button and without any pause in tape motion. As there are no clicks or electrical noises recorded on to the tape, unlimited scope is available for editing and word or sentence "drop in."

EDITING

On the Byer "77" editing is rendered extremely simple by the controls provided for this purpose. The TAPE SHUTTLE and SHUTTLE MONITOR controls permit rapid location of any desired position on the tape which, once selected, can be marked on the tape (over the PLAY head) by means of a "Chinagraph" or similar pencil, after gently pulling down the head shield.

Similarly, unwanted sounds and passages may be cut with scissors and the tape rejoined as outlined in the following paragraph headed "SPLICING."

SPLICING

To re-join tape cut in editing, lay one end of the tape on top of the other to give an overlap of approximately ½ in., ensuring that the oxide coating on both ends is facing in the same direction. Cut through the tape ends with scissors at an angle of 45 degrees. Remove loose pieces and butt join the ends with special Splicing Tape applied to the shiny (uncoated) side of the recording tape, trimming off the surplus splicing tape with scissors.

To simplify the splicing of tape, we recommend the use of Byer "Mitremite" Tape Splicer, which is a small and inexpensive semi-automatic splicing device.

ERASING

Erasure is effected automatically whilst recording. A recorded tape or any portion of it may be erased without a new signal being recorded, by running it through the machine in the RECORD function with the RECORD GAIN CONTROL set to its minimum.

Rapid erasure of tape may be carried out with the Byer Model BE2 Bulk Eraser which, in a matter of seconds, will remove all traces of signal from a full reel of tape. Price on application.

BIAS ADJUSTMENT

The Bias control is initially set at the factory to suit the majority of generally available high-quality tapes. However, it may be re-adjusted to obtain peak performance from any particular type of tape it is desired to use.

The adjustment procedure is as follows—

Set the panel meter switch to "RECORD" and feed a 400 c.p.s. signal from an oscillator to the input of the "Record" amplifier. Adjust the "Record Gain" control to give a reading of -7 VU on the panel meter.

Start the machine recording at a speed of 7½ i.p.s. on the selected tape. Switch the VU meter to "PLAY" and turn the bias control to its maximum anti-clockwise position. Next, slowly turn the bias control clockwise until peak output is indicated on the VU meter. The setting which gives peak output is the correct one for the particular tape being used.

BYER MK. II SERIES

MODEL "77"

PROFESSIONAL PORTABLE MAGNETIC TAPE RECORDER

GENERAL CARE OF MACHINE

The Model "77" has been designed and built with meticulous care, and should give long and trouble-free service.

No attempt is made here to give details of major maintenance, as this aspect is covered in a separate Service Manual, but the suggestions offered will ensure that repairs and replacements are kept to a minimum.

When such repairs or replacements do become necessary, it is important that only genuine "Byer" components be used, and that the work be performed by a competent person. Expert workmanship is just as important in the maintenance of your recorder as in its manufacture.

The Tape Transport Mechanism, being almost entirely electrically operated, will require very little attention. However, after prolonged use, it will be desirable to clean carefully the head assembly and the capstan and pressure roller to remove oxide adhesion, by carefully wiping them with a small quantity of cleaning fluid applied to a soft cloth. Similarly, the specially treated panels and the carry case itself may also be cleaned.

The Model "77" is equipped with self-lubricating bearings throughout, which have been fully lubricated during assembly, and **no lubricating procedure is therefore necessary.**

For maintenance purposes, the amplifier section can be likened to a radio receiver in so far as it incorporates similar component parts such as valves, resistors, condensors, etc., and should not require any maintenance whatsoever other than possible replacement of fuses, of which two are fitted to the Model "77".

The MAINS or A.C. Fuse is situated on the control panel at the rear of the transport mechanism. The other Fuse is wired into the amplifier beneath the Power Transformer, and forms an additional protection against power supply breakdown.

BYER MK. II SERIES

MODEL "77"

PROFESSIONAL PORTABLE MAGNETIC TAPE RECORDER

ACCESSORIES

The following is a list of accessories designed for use with the Model "77", and to enable the user to perform with a single unit almost any function of which magnetic recording is capable.

Some of the items listed are not currently in production, but should you have an interest in any, please write to us and we will give you details of availability and price.

Microphone and Stand
Waterproof Cover
Stop/Start Remote Control Mechanism
Re-wind Remote Control Mechanism
Head Demagnetiser
Azimuth Adjusting Tool
Multi-Channel Mixer
Speaker Enclosure
Auxiliary Spooling Mechanism
Bulk Eraser
Stereophonic Operation
Sound-to-Film Synchroniser
Co-Incidental Track Operation

OTHER UNITS IN THE MARK II SERIES RANGE

Model "33" — Tape Reproducer
Model "66" — General Purpose Portable
Model "22" — Lightweight Portable Recorder
Model "100" — Studio Console Machine

BYER MK. II SERIES

MODEL "77"

PROFESSIONAL PORTABLE MAGNETIC TAPE RECORDER

SPECIFICATIONS

OPERATING METHOD

Press-button — electro-mechanical interlock.

TAPE SPEEDS

7½ in. and 15 in. per second.

SPOOL SIZE

NARTB 7 in. O.D. by 2¾ in. Hub (10½ in. NAB with auxiliary spooling mechanism fitted).

TAPE DRIVE

Three Motors: Capstan being directly driven by synchronous single or dual speed drive motor with integral flywheel, whilst take-up and rewind are by separate high torque induction motors.

STARTING AND STOPPING TIME

Instantaneous.

TIMING ACCURACY

Plus or minus 0.1% (plus/minus 1.8 seconds in 30 minutes).

REWIND AND FAST FORWARD TIME

45 seconds for 1,200-ft. reel.

FLUTTER AND WOW

Better than 0.2% at 7½ in. per second.
0.15% at 15 in. per second.

BIAS FREQUENCY

55 Kc.

HEADS

Separate "ERASE," "RECORD" and "PLAY" Heads.

DISTORTION

Record: Less than 1% (from 600 ohms input).
Play: Less than 1% (for zero level out — i.e., plus 8 dbm).
ALL MEASUREMENTS AT 1,000 CPS.

FREQUENCY RESPONSE

At 7½ in. per second:

40 to 10,000 cps. ± 2 db.

30 to 14,000 cps. ± 4 db.

At 15 in. per second:

40 to 15,000 cps. ± 2 db.

30 to 18,000 cps. ± 4 db.

SIGNAL TO NOISE RATIO

Not less than 52 dB below 2% T.H.D. level.

INPUTS

Balanced 600 ohms.

Balanced Bridge In.

50 ohm Microphone.

OUTPUTS

Balanced 600 ohms.

Unbalanced 3.5 ohms (for monitor purposes only).

METERING

V.U. Meter.

POWER OUTPUT

To 600 Ohms line — greater than plus 18 dbm at less than 1% distortion.

To Monitor Speaker — 2 Watts at 2.5% distortion.

POWER CONSUMPTION

150 Watts.

POWER REQUIREMENTS

210 to 250 Volts A.C., 50 Cycle.

WEIGHT

Approx. 47 lbs.

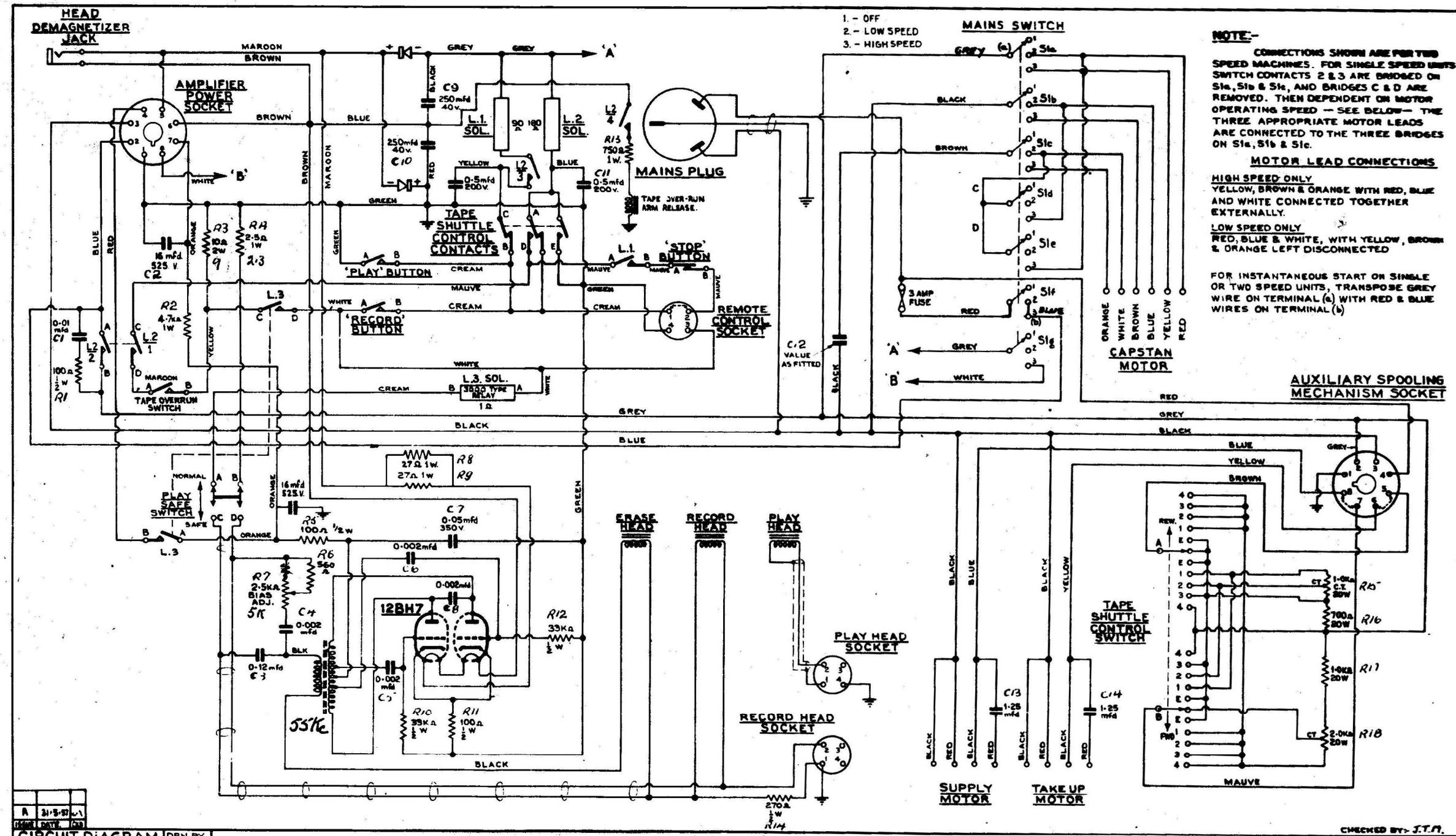
DIMENSIONS

Panel Size: Tape Transport, 19 in. x 7 in.

Amplifier, 19 in. x 5¼ in.

Case (Overall): 20¼ in. x 14 in. x 7½ in.

CIRCUIT DIAGRAMS



ISSUE	DATE	CHG
A	21-3-57	1

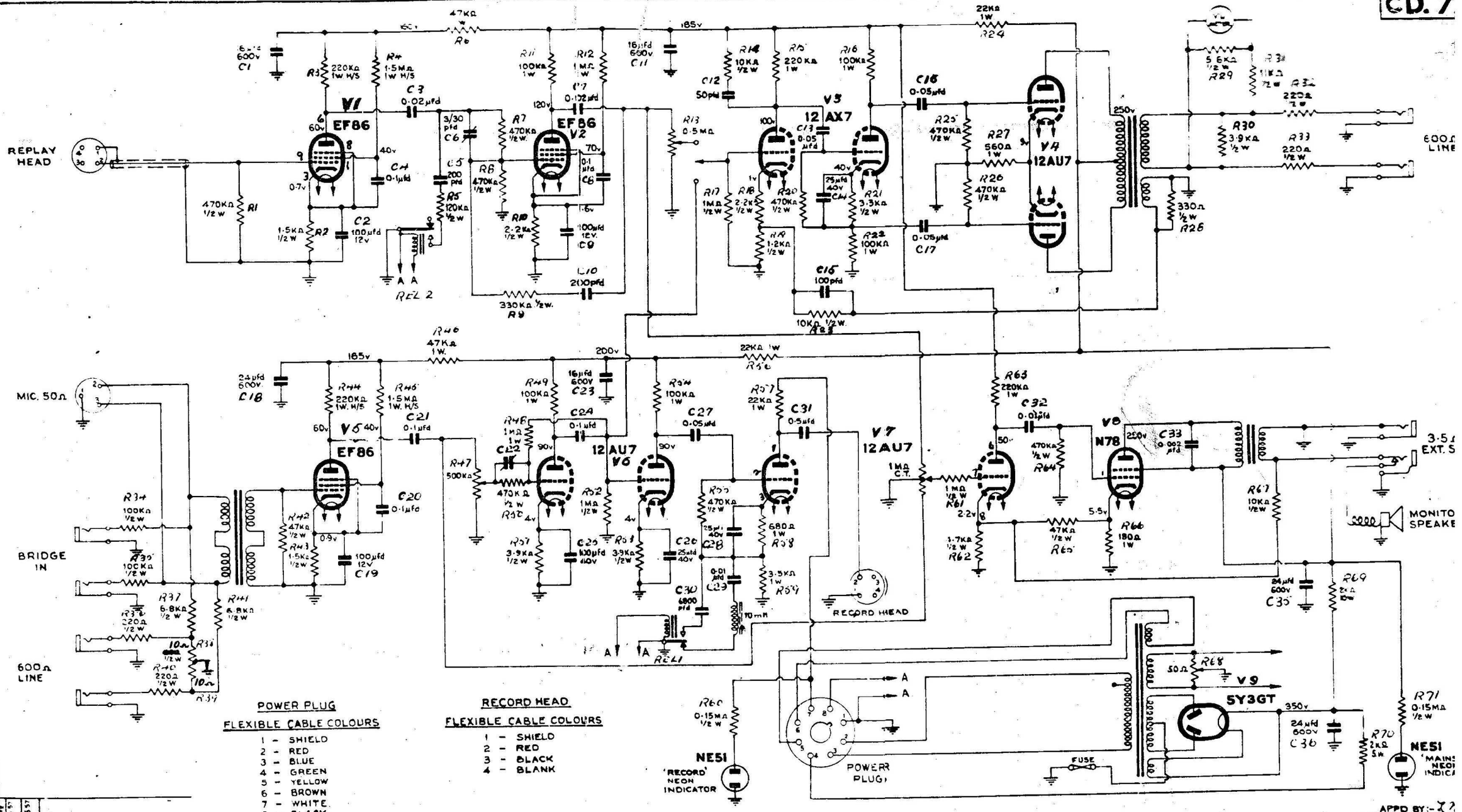
CIRCUIT DIAGRAM CD.77-2 | DRN BY JW | DATE 4-2-57

MK.II SERIES – TAPE TRANSPORT (FOR MODEL '77')

CHECKED BY:- J.T.M.

BYER INDUSTRIES PTY LTD
8 DORCAS ST, SOUTH MELBOURNE

CD.7



POWER PLUG FLEXIBLE CABLE COLOURS	
1	SHIELD
2	RED
3	BLUE
4	GREEN
5	YELLOW
6	BROWN
7	WHITE
8	BLACK

RECORD HEAD FLEXIBLE CABLE COLOURS	
1	SHIELD
2	RED
3	BLACK
4	BLANK

ISSUE	DATE
A	13.2.57
B	11.5.57

CIRCUIT DIAGRAM
CD.77-1

DRN BY 3W
DATE 20.2.57

TYPE '77' AMPLIFIER

BYER INDUSTRIES
8 DORCAS ST, STH MEL

APPD BY:-