

by Peter Robertson



The UHER REPORT-L is the monophonic version of the current series of REPORT tape recorders. Other versions include the 4200 REPORT STEREO (a 2-track machine) and the 4400 REPORT STEREO (a 4-track machine). This high quality recorder is in use throughout the world by amateur recordists and broadcasting organisations alike. It is extremely versatile in its power supply arrangements, operating from dry-cells, rechargeable "dryfit" battery, AC mains of American or European standards, or 6 or 12 volt automobile batteries.

The tape transport operates from a solid-state electronic servo mechanism and pre-set adjustment of speed is available giving approximately $\pm 8\%$ of nominal correct speed. Servicing this beauty should not prove unduly difficult. The main printed circuit board hinges open to provide access to both component and wiring sides (warning: playback/record switch is normally inoperative when board is hinged open). The output amplifier and the motor drive servo boards are attached to the main tape deck via their transistor heat sinks and are connected into the main wiring harness by pin connectors. Each may be run for short periods whilst removed from the case yet still connected into the circuit.

Mechanically, the recorder seems to be very well built. There are two main low tension drive belts with a third used exclusively to drive a footage counter; this may be reset at any time from the front panel. Four tape speeds are available at all times at the front panel. The action of a mechanical pause button on the main recorder is duplicated electrically on the M514 microphone by a finger button. This results in economy of tape and battery power when recording in a sporadic manner. Neat nylon spool retaining clips enable the recorder to be operated in any position.

The quality and performance of this little tape recorder make it compatible with broadcasting studio recorders. It is currently selling at \$476 list, complete with microphone, battery, battery charger, carrying case, and cable.

FEATURES WE LIKED

1. A beautiful machine for the serious recordist. Carefully engineered and very well built.
2. Light weight — yet normally holds 5 inch reels with the lid closed.
3. Four speeds at the touch of a selector — will give up to eight hours recording on a double track tape at $1\frac{1}{16}$ ips
5. A variety of power sources may be used for driving this recorder, including the accessory socket in an automobile.
Electronic motor drive system.
7. Circuit boards easily accessible for servicing — some are hinged in circuit and some are plug and socket connected.
8. Batteries are easily replaced. Old cells are extracted by pulling on captive nylon tapes.
9. Microphone has built-in "pause" button to conserve batteries and tape.

10. VU meter doubles as a battery-checker by pulling RECORD LEVEL knob outwards. Batteries are only checked when on load.
11. Pulling on TONE control illuminates VU meter dial.
12. Large selection of matching accessories available such as microphones, stereo headphones, *Dryfit* re-chargeable battery, AC mains charger, car battery charger, car battery adaptors, foot switches, carrying cases and an automatic sound-controlled stop-start unit.

CIRCUIT DESCRIPTION

The all solid state circuitry is built on a number of printed circuit boards. The main circuit board contains the pre-amplifier for recording and playback, the erase and bias oscillator, and the VU meter driver. Two smaller printed circuit boards are edge-mounted on heat-sinks and connections are made via small plug-in strip connectors. A third printed circuit board contains all the frequency sensitive elements that are caused to change with differing tape speed selections. All the power line filters are built beneath the battery compartment.

PRE-AMPLIFIERS

Inputs are from the playback head via contacts 16,17 and 1,2 of the play-back/record switch during playback. During recording inputs are from microphone or the radio/ phono connector via selector K1 (front control) and contacts 2,3 of the play-back/record switch during recording. The microphone input is the most sensitive and works directly into the pre-amplifier with levels of around 0.001 volts into 1000 ohms. Next in order of sensitivity is the radio input designed to accept low level European radios at around 0.01 volts into 20K ohms. Lastly is the highest level phono of around 0.05 volts into 1 megohm. This should be suitable for high level crystal microphones and tuners.

The selected input is fed via DC isolating capacitor C9 to the base of npn transistor T1. T1 and T2 comprise the first section of the pre-amplifier; the second section comprising T3 and T4. T1 and T2 are connected in normal common-emitter configuration but with a number of negative feedback paths between them. During playback pre-set resistor R19 is used to adjust the negative feedback over the first stage. During record, R19 is disconnected and substituted by REC LEVEL control R22, and at the same time R21 is brought into the circuit. T3 and T4 are similarly connected as emitter-followers and these are both pnp types.

Output from the pre-amplifier section is routed to four areas after DC isolation by C23 as follows:-

- 1) To the accessory socket via R71 for feeding external power amplifiers or for dubbing to other recorders;
- 2) To the VU meter driver stage T9 via C11 and VU meter adjust control R11;
- 3) To the input of the internal loudspeaker 1 watt driver stages via TONE and VOLUME controls R48 and R51 respectively;
- 4) To the recording head where it is mixed with the recording bias from T8:

T8, operating as a transformer-coupled oscillator at around 50KHz, employs a triple-winding transformer in its collector circuit. The third winding is directly-coupled to the erase head and stepped down via R4 and C2 to feed bias to the recording head. This stage is switched off during playback by breaking the power rail at contacts 20, 21 on the main record-playback switch.

OUTPUT AMPLIFIER

The output amplifier, constructed on its own printed circuit board, plays no function in the operation of the tape recorder other than to provide power amplification of signals fed to it from the pre-amplifiers suitable for driving the internal loudspeaker up to levels of 1 watt. The stage comprises a conventional driver stage T5 DC coupled to a complementary pair, T6 and T7; in themselves low impedance coupled via C42 to the loudspeaker or low impedance headphones. The unit that we examined had a slightly different output amplifier from that shown in the circuit diagram, however the circuit seemed to be basically the same but with a different layout; check before assuming absolute similarity.

POWER SUPPLIES

DC power can be obtained from 5 flashlight cells (7.5v total) or from a 6 volt Uher *Dryfit* storage battery. The latter should prove the most attractive to the serious recordist as it can be recharged without removing from the case. When the *Dryfit* type Z211 battery is installed, contact K9 is closed automatically to enable external charging to take place from the accessories connector. A zener diode is connected across the supply to protect the recorder against accidental application of high external voltage; this regulates at between 7.3 and 7.7 volts. The machine may be divested of batteries altogether by installing the Z114 battery charger in the battery box and using it as an AC power supply.

MOTOR DRIVES

The capstan and transport drive system is a very successful combination of electro-mechanical items and electronic solid-state circuits. The single drive motor is specially built with a permanent magnet rotor, three stationary armature windings, and a centrifugal distributor. The entire motor is encased in a mu-metal shield to eliminate radiation from the AC flowing in the armature windings and is also neatly shock-mounted to the tape deck main frame. Output from the motor shaft is coupled to a four-stepped flywheel (for four speeds) by a low tension belt. The flywheel is mounted in a pendulum bearing and rotates at a constant speed irrespective of the actual tape speed selected. Anti-static brushes are mounted adjacent to this drive belt.

The distributor on the motor shaft is used to start the motor only and it becomes inoperative once the motor approaches operational speed. This was checked by disconnecting the grounded arm of the distributor whilst the motor was running with absolutely no effect to the system. When running speed has been attained each armature receives current from a control transistor T11, T13, or T15. The control from this transistor is obtained from another motor winding via a further emitter-follower transistor T10, T12, or T14. T16 and T17 constitute a current supply source for one of each pair of control transistors.

This supply source may be pre-set by R53 which will determine the running speed of the motor. This works very well in practice and the adjustment is not sluggish and is quick to respond to corrections. The series connection of T16 is by-passed by K6 and R63 to cause a rapid increase in motor speed during fast-forward and rewind modes only.

ELECTRICAL PERFORMANCE

Four overall frequency response runs were performed; one run for each of the four available tape speeds. Prior to running the response checks the heads were demagnetised and the VU meter calibration was checked. A 10 mV 1 kHz signal injected into Radio socket pins 1 and 2 was recorded and at the same time a VTVM, connected across the accessories socket pins 2 and 3, was adjusted to read 1.4 volts by means of the REC LEVEL control. R11 was adjusted to bring the VU meter pointer to 0db. To record test tones it was now necessary to reduce the signal input by 20db and proceed normally from there.

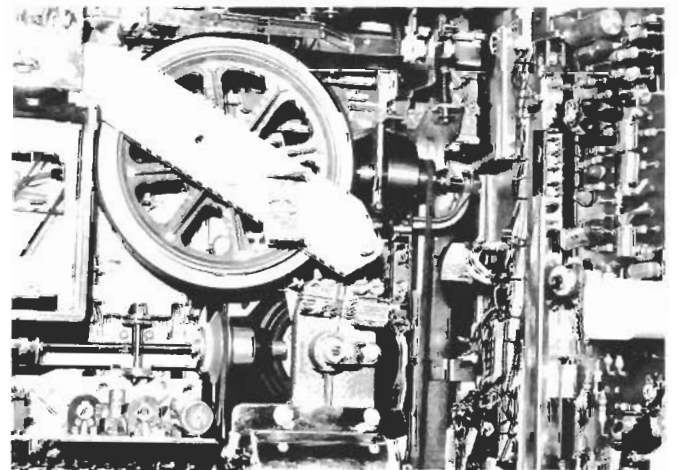
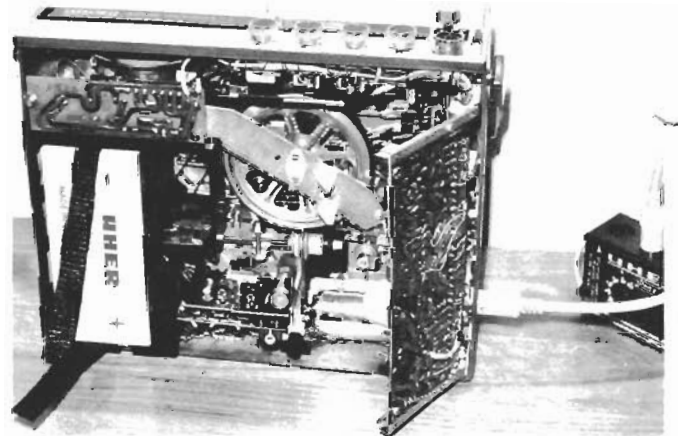
At 7½ ips the low frequency response at 50Hz rose slightly to 1.5db and at 20kHz it was -3db relative to 1kHz. This was better than the maker's specifications.

At 3 ips we could not quite achieve the maker's specifications at the high end. At 50Hz the response rose slightly to 1.5db and at 10 kHz it was -5db; still quite good for this tape speed.

At 1½ ips the low frequency response rose to 2db at 50Hz and dropped to -3db at 5kHz; quite good for this tape speed and very close to maker's specifications. Above this frequency there was quite a sharp drop off.

At ¾ ips the low frequency response rose to 2.5db at 50Hz and fell to -5db at 3kHz. As might be expected the response fell quite sharply above this frequency.

Flutter and Wow were not measured on this particular machine, however measurements made on a REPORT-S recorder indicated flutter at 0.15%. The REPORT-L has a more sophisticated electronic servo action than the REPORT-S and there is no suggestion that it is any worse than the earlier machine. This is an excellent figure for this type of distortion. ☐



Above: With the base removed the battery compartment is accessible and the printed circuit board hinges out. At the right is the battery charger.

Below: Components are mounted on the underside of the printed circuit board. The compactness of this machine is clearly shown.

