

Revox revival

We bring a Revox G36 valve tape recorder back to life.

● Richard Kelly relates its history.

● Philip Pimblott renovates our second hand sample.

● Noel Keywood measures its performance

Our renovated G36, ready for a new life

Richard Kelly

I have vague recollections from my boyhood of grey tape recorders in the science wing of my school. I can clearly recall thinking how chunky and well engineered they were - and who was this Willi Studer fellow?

Well, now I'm a bit wiser - because I know who Willi Studer is! He was responsible for producing much of the machinery once found in recording studios and to quite an extent is still to be found there. The tape decks in my school were of the Revox 36-series. I know not which models they were, but they gave me my first taste of high quality engineering - and from that time on I was determined to own one.

The first model was the A36 launched in 1954, followed by the B36 a year later. It was not until 1960 that the first stereo model, the D36 was introduced. Again, a year later this was superseded by the improved E36, which was then followed by the F36 in 1962. The last of the series - and the best of the bunch - was released in 1964, and this is the beast that I rescued from obscurity in my friend's warehouse - an Aladdin's cave that has supplied many pieces of equipment for my system.

Unfortunately, a Revox G36 holds its price over the years, providing that it has been well maintained; no amount of haggling could lower the price below £250. Having said that, I must point out that the G36 I was after was an absolutely mint example. It had lain unused in a huge, custom built radio-gram, apparently only installed because the owner wanted the full bees knees system of the day. Close inspection suggested it had seen little more use than merely demonstration by the salesperson of the time!

In standard specification, the Revox G36 is a fine machine, but with improvements and developments that have been bestowed upon the model by various engineers in studios around the world, its performance has been uplifted into the realms of high, high-end, but at a cost that is not prohibitive.

Having secured said machine, I got onto the 'phone to F.W.O. Bauch for their advice. They don't service or repair these old valve models any more and after much conferring between the engineers they recommended that I should contact Audio Laboratories (Leeds) and ask for Phil Pimblott. This I duly did and was delighted to find that not only was he familiar with the G36, but he was also clued up on modifications to the heads and signal path.

Leeds being in the land of my boyhood, a return visit seemed like a nice idea. The Revox is a big, awkward beast and there was some trepidation about consigning it to carriers. I went down to Kings Cross to catch the Inter-City Sleeper, but she wasn't there so I caught the train to Leeds instead! I spent a couple of joyful hours on one of BR's finest wondering how you can get a weekend in Paris for what they had stung me for!

Immaculate

Arriving at Audio Laboratories I was greeted by Phil Pimblott and his right hand man, Roy Walker. They apologised for the mess and offered me tea. I'm not sure, but I think they were having me on. The place was absolutely immaculate, as far as I could see. Not a single chopped out capacitor or resistor was lying around on the floor or on the benches, no loose wires were hanging around and everything that was not in use was in its allocated place. In fact, this place seemed to be nothing short of a Private Hospital Operating Theatre for your dying hi-fi - and no, they didn't know I was coming! This alone gave me a great sense of confidence in their operation. I'm a great believer in the adage of "tidy desk, tidy mind". Audio Laboratories are authorised by many manufacturers as a service centre, namely Revox, JBL, Quad, Aiwa, Akai, Pioneer, Nakamichi, Marantz, Yamaha, Sansui, Teac and Tascam.

Basically they are prepared to handle any job that you care to throw at them, and if they feel that they can't help, they will surely point you in the right direction. Sadly, this might mean that it's best if you by-pass the municipal rubbish dump! It is unfortunate, but some items are not worth the likely repair cost. I can only say that if you have a sick piece of hi-fi, then Dr Pimblott's surgery is one of the best places I have seen for a speedy recovery to good health. Our Revox came back gleaming and had actually been upgraded in performance to meet modern standards. It will probably see more use in the next few years than it has in the last twenty five. That's a tribute to Revox, Willi Studer and people who know about such things and care, like Phil Pimblott. ●





Richard with the G36 at Kings Cross Station, waiting for the train to Leeds.

Philip Pimblott

The Revox '36' series of open reel tape recorders ended with the G model I renovated for this report. It is an all-valve design, except for the power supply. The transport is made by Willi Studer of Switzerland and uses three motors to provide two speeds, 3.75ips and 7.5ips (inches per second linear tape speed). Three heads are fitted, so off-tape monitoring is possible.

This stereo recorder is a remarkable design. Weighing, cased, getting on for half a hundredweight, the unit is based on a heavy gauge, double chassis construction, the upper chassis being the mechanical department and the lower chassis housing the 12-valve electronics and solid state power supply.

The transport mechanics feature a strong and rigid arrangement of independent spooling motors, tape guides, pressure roller assembly and direct drive capstan motor. Bolted to this upper chassis there are also twin differential band-brakes, a detachable headblock, the main control switchbank and a pair of V.U. meters.

Of special interest are the three motors. All are of the celebrated outer-rotor design from Papst. They combine smooth power with rugged build. The two spooling motors are identical, but the capstan motor is anything but conventional. Although a split-phase design, it has two speeds and direct drive and speed control of an AC motor is no doddle.

Poles

The potential difficulty is elegantly overcome by designing the motor as a twelve pole unit, switchable to six pole format! On a 50Hz supply a twelve pole motor will run at 500 r.p.m. and a six

pole motor at 1,000 r.p.m. Bingol Two speeds, one exactly double the other - and no belts, gears or idlers in sight. The design tricks don't end here, however. Mounted co-axially with its shaft and coupled to it via special compliant membranes is a balanced annular flywheel, the couplings and coupled mass forming an effective low-pass filter, leading to exemplary flutter characteristics.

Also solenoid operated are the twin band-brakes, arranged to give a differential braking effect, the 'trailing' brake always doing the hardest work in order to maintain tape tension whilst decelerating.

good common sense design and proven circuitry

Sense and Circuitry

Sporting twelve modern B9A valves, the electronic section is an area of good common sense design and proven circuitry. Revox used high quality low-noise resistors, close tolerance equalisation capacitors, a push-pull bias oscillator and a push-pull (sadly, mono) monitor amplifier.

This design is over a quarter of a century old and some aspects may seem, well, odd. For example, no true Tape/Source monitoring is possible even though this is a 3-head design. The V.U. meters will not monitor the playback signal. This was all quite normal for the time, in what was essentially a sophisti-

cated domestic tape recorder. It makes no difference to performance, but you do have to learn how to drive it.

So much for the overview of Revox's '36' series tape recorder. The specific model sent to me by Hi-Fi World was, fortunately, a late Series 2 chassis in very good order. I was asked to restore the machine to good order, and bring it up to, and if possible beyond, original specification.

As with all high-voltage equipment, great personal care has to be taken when working on it. We also must remember to ensure that the equipment doesn't damage itself as well. Some basic safety checks before any power is applied are therefore mandatory. We did a 1KV flash test from the (shorted together) mains cable to the machine's metal chassis. All was well here so resistance checks were then made on the motor-start and switch suppression capacitors. Any shorts here could be disastrous but again, all was OK. A few more resistance measurements within the electronics convinced us that, fortunately, there were no short circuit capacitors.

As far as was known, this recorder hadn't been used for a long time. There was a distinct chance therefore that some of the electrochemical capacitors inside might have deteriorated and they might not re-form. If this happened, large currents would flow through the capacitors causing them to give off gas and eventually explode. When one of these things explodes it's not only a nerve jarring event but it also splatters a gooey, corrosive paste all over the nearby innards, as well as plastering them with shredded aluminium foil! This is definitely something to be avoided and the trick is to power-up the equipment in gentle stages, pausing to check the leakage current as you go.

Checks

Some rapid voltage checks were made around all relevant valve pins, revealing a few suspicious areas but nothing disastrous. The machine was then de-powered and left to stand for a few hours. The valves themselves looked little used but all were found to be fully operational.

Whilst the valves were out the pins were cleaned and a quick dab of cleaning fluid applied to each valve socket. This was a convenient time also (by now the capacitors had completely discharged) to take a few more resistance measurements on the anode load, screen feed and cathode resistors to see if anything could account for the voltage discrepancies we had noted earlier. Nothing was found amiss in this area but a resistor in the H.T. section had risen (the G36 has no less than five different feeds of high voltage from its power supply).

This problem overcome, it was now time to check the critical bits; the values of the capacitors in the record and playback equalizer circuits. All seemed well.

At around this point it was noted that the speed change and record mode push buttons seemed unduly stiff. These buttons operate rotary-type wafer switches via a couple of push rods. Although the switches are visible, they are not easy to work on in-situ, so they were unscrewed from the chassis for better access. Both switches had a paste of dust and old grease in them which was duly removed with lubricated solvents.

The action was too smooth in fact! This G36 had a grubby little ball bearing about 3mm diameter Sellotaped to its head cover. This had puzzled us at first, but now the penny dropped! The ball bearing had fallen out of the switch's index mechanism, thus giving the unwanted no-click feel. A few moments of fiddling and cursing saw the ball back in its place and its retainer firmly in position.

With these below stairs dramas over, it was time to revisit the top deck and attend to the heads.

Heads

The G36 has a removable headplate from which are suspended the independent erase, record and playback heads. Some years ago Willi Studer, Swiss manufacturers of the transport mechanism and the heads, decided to

re-design those for the G36, following the general form of current A77/B77/PR99 heads. Magnetic materials, winding and manufacturing techniques have advanced enormously since the original designs, so fitting new heads to the G36 brings it up to modern specification.

The new heads were fitted and mechanically aligned. This is a fiddly process as they are all adjustable for height, zenith, yaw (wrap) and azimuth. The first two parameters can be set using gauges on an inert machine. Wrap can be set by eye on the erase head, but wrap and azimuth for the record and play heads can only be set with the machine in operation.

With this task completed, the tape guides were meticulously cleaned and the end-of-tape (e.o.t.) switch looked at. During its production run the G36 has had three different sorts of 'e.o.t.' sensor: a photo-electric trip built into the right hand guide pillar, a mechanical lever plus microswitch and this present arrangement, a sensing lever operating a (frankly) Heath Robinson switch made from thin, springy, goldplated phosphor-bronze wire. Adjustment is a matter of bending and tensioning the thing in various contours until it operates satisfactorily.

With valves replaced and pinch roller squeaky clean we were ready for the big switch-on, but not before removing all tapes from the vicinity and thoroughly de-gaussing the complete tape path.

After all the work, the big moment arrived: brake tensions were OK, pinch roller pressure was OK, a blank tape was on the machine and it had been quietly warming up for ten minutes. A firm push on the start button and we were off!

Calibration

First the e.o.t. device needed a lot of adjustment, accompanied by appropriate expletives. The playback calibration tape was on next, so that azimuth and wrap angles of the playback head could be precisely set. There is no adjustment as such for output level, nor indeed any provision for doing so. This recorder was designed for domestic use, where precise levels were not held to be vital. However, fine adjustment of level and balance is possible by component selection but this particular recorder did not need it.

After level setting came replay equalization checks. Again, there is no provision except by component changing for adjusting the replay equalization, but again this particular G36 with its new heads gave no trouble. It was necessary though to remove the original loading capacitors (C40 and C49) and to fit 220Kohm damping resistors across the head.

Changing to a blank tape of the type to be used for recording, the first task was to adjust the record head's wrap and azimuth. When adjusting the play head we used a calibration tape as our measuring tool. The record head has then to be adjusted to give optimum results on playback, which is why the

playback head must be perfectly set initially.

Final calibration of these machines to original specification is fairly straightforward. The original specification is well within the machine's capabilities; the bias is adjustable and it's not difficult to achieve a good, wide frequency response. Neither is it difficult to achieve the specified distortion level.

Tantalisingly, this machine can do yet greater things with good modern tape, than its original designers ever envisaged. The G36 has been extensively re-worked, most notably in the U.S.A. Here in the U.K., Tim De Paravicini has rebuilt many of these recorders, removing the unwanted speaker drive amplifier, building in an improved record amplifier and line output stages, incorporating line/tape monitor switching, re-cabling with high-definition cable, replacing significant signal-carrying resistors and capacitors with Holco and Wondercap components and fitting new input and output sockets. All this adds up to a tidy sum, but the G36 offers a unique platform for such work.

Buying Tips

First of all make sure that a likely candidate is a G36, and not an earlier model. At first glance in the back of a dusty secondhand shop it may be possible to make a mistake here. Earlier models had a magic eye level indicator, which should give the game away. The real problem is, however, that earlier models only take 10" reels, not the now standard 10.5in NAB spool.

It's not likely that you'll be able to delve inside the unit but at least ask for a demo, and check for yourself the feel and action of the main control switchbank. If any of the switches do not work, forget it. Check the e.o.t. sensor. If it doesn't cancel the main switchbank first time, forget it. Both of these tests, if negative, could indicate a problem with the switchbank. New switchbanks are difficult to find and even if you could get one, replacement takes at least a couple of days of unpleasant and costly work.

Listen to the motors. If they are rattling or grating look on the machine with suspicion. In fact, use a screwdriver as a listening rod and put it as near as you can to the top of the capstan bearing. If that seems to be where the rattle's coming from, forget it.

There are many good G36's still about. If the sweet sound of yesteryear appeals, then a G36 could make you very happy ●

Typical Spares Prices

(supplies are not guaranteed)

Record or Playback Head	£120
Erase head	£66
Pinch roller	£38
Brake band	£8
" drum	£20
Main switch bank	£120
Spooling motor	£101
Capstan motor	£101

Warning

Underneath the plastic top plate of the G36 you will find a small leaf switch. It is immediately behind the headblock, just about in the centre of everything. Don't touch it. It's got the mains on it and it bites. If you are handling the machine uncased the whole of the left hand side can bite. There's mains on the contacts of the main switchbank and there's nearly 300v DC on the tags of the big smoothing capacitors which are, of course, facing outwards waiting for you to grab them!

Noel Keywood

The crash of levers and whirring of great reels of tape is an experience I left behind twenty five years ago. Operating the Revox G36 open reel tape recorder jolted my memory: I once owned a German Korting valve tape recorder, bought second hand for me by my father. It lasted just months before the modifications started!

Similarly, the G36 proved to be a machine that needs understanding and some effort if it is to give of its best. Unlike our Leak Troughline tuner, which anyone can buy and use with fantastic results, the G36 is a specialised and difficult piece of equipment to operate successfully. I wondered whether ours had seen so little use because of this. In good condition and well aligned, this open reel recorder can provide superb results - and at reasonable cost. Apparently, it is now being sought after by knowledgeable studios in their quest for a simple but effective valve tape recorder capable of offering a professional performance, with valve standards of clarity and sweetness.

As Richard Kelly explains, our machine was expertly restored and calibrated by Philip Pimblott of Audio Laboratories (Leeds). Philip is quite a tape expert, fluent in matters like record and replay equalisation accuracy. I was impressed by his detailed appreciation and analysis of the G36. Owners or prospective owners would be wise to use his services, since tape recorders are a specialised subject beyond the abilities of normal repair centres. Our Revox was highly specialised in places too, I was to find out!

I fitted the machine into a case and bought a new (7in) reel of Maxell XL-I 35-90B tape for £7.50. You tend to get blank stares instead of blank tape when asking for open reels these days! I found Hi-Fi Care (Tel: 071-637-8911) in Tottenham Court Road, London kept a stock of tapes, plus blank reels. The G36 will take 10.5in NAB reels or normal 7in reels.

Two Track

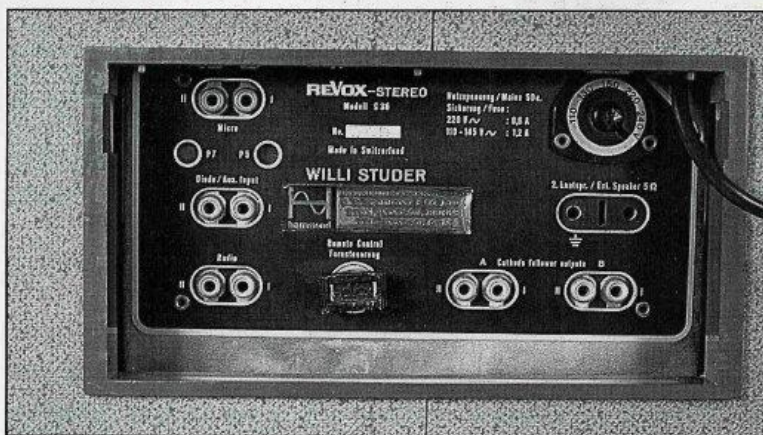
Our machine was a two track recorder, which means it lays down two tracks for stereo across the full tape width. Run at maximum speed of 7.5ips, this gives 45 minutes of playing time. It can be doubled by using 10.5in reels or by changing speed to 3.75ips, the latter resulting in reduced sound quality. Four track machines are also available that offer double the playing time, with the inconvenience of turning the tape over but, again, they suffer reduced audio quality. We decided at the outset to try and get the best quality achievable, hence our choice of twin track run at full speed. This proved wise, since without noise reduction there isn't much dynamic range to spare.

Full technical details of the G36 are to be found in the Measured Performance section. Providing bias is finely tuned to match a tape in, frequency

response measures flat within tight 1dB limits from 35Hz to 20kHz, which is fine for professional recording purposes.

For optimum performance, bias tuning is necessary, which is why I feel the G36 is not easy to exploit to the full unless you know a thing or two about tape recorders. Luckily, tuning is relatively straightforward: the plastic base is removed by undoing four screws, revealing the left and right

a simple but effective tape recorder capable of offering a professional performance, with valve standards of clarity and sweetness.



channel bias adjuster pots. They are easy to get at with the recorder standing upright and, this being a three head machine, adjustment is best carried out 'on the fly', whilst in record mode. A simple audio oscillator and meter are all that's needed in the way of tools. Just remember the valves have up to 265 volts on them!

I found that with XL-I tape our machine would hit +9 above 0VU for the industry standard 3% distortion limit, but the meters only go up to +3, leaving 6dB of usable headroom out of the meter's range. The 0VU point can be easily reset to compensate for this however, according to the tape being used. Revox recommend 0VU is set -7dB below the 3% THD limit to account for meter ballistics.

All this - plus a lot more! - is in the service manual. Owners should have one, or use the services of Revox (UK) or Phil Pimblott, who is recommended by them. Revox prefer Phil to work on the G36, by the way, because he is something of a valve expert. In addition,

Tim de Paravicini of Esoteric Audio Research also rebuilds and modifies the G36, for £200 to £400. There is a six to eight week delay for the G36 modifications, because of their complexity.

With hiss at -57dB below 0VU when using either Maxell XL-I or TDK LX-35, our G36 with its modern heads had a dynamic range of 66dB in all. That's almost the same amount of hiss as produced by a cassette deck with Dolby B noise reduction. As such, hiss can be heard, but it is faint.

There was no problem in getting highs onto tape: treble level measured only -2dB less at 10kHz than at 300Hz, meaning it offers clean, clear treble.

Speed stability proved exceptionally good too and I suspect this is where the G36 in particular scores over other models of the day. All the same, the simple, heavy mechanical transport controls seem archaic, as does the mechanical tape counter. This recorder has a fine Studer transport, with independent reel motors and a direct drive capstan motor. Fast reeling gets quite frightening. As a spool empties, it

speeds up to reach a frantic scream. I found myself stopping the transport before the end of a tape, just to ensure the tape didn't whip through the head block assembly like a cable parting under strain!

In use, two weaknesses quickly made themselves apparent. Most alarming was an immediately obvious lack of bass in recordings, not indicated by measurement. I guessed this was due to amplifier mismatching - and I was right. The 'cathode follower' outputs must see a minimum load impedance of 100kohm, a very high figure for modern transistor amplifiers. To get around this problem I inserted 100k series buffer resistors in each output before the feed went to our resident Deltec amplifier. This restored the bass, at the expense of level. Luckily, the Deltec was sensitive enough to compensate.

There is a loudspeaker amplifier within the G36 and some models have a monitoring loudspeaker on-board. Power is 6watts into 5ohms. For best quality, the output from the power

The rear connecting panel complete with inscriptions for the valve age. The 'cathode follower' output (see text) is at the right.

amplifier should not be used to get around the matching problem.

Another weakness was lack of full erasure with XL-I. Phil Pimblott warned me of this; I heard all sorts of funny sounds coming off tape after one pass. A modern high coercivity tape needs at least two passes for full erasure, which is a lengthy business. Bulk erasure is best used when a perfectly silent tape is required.

After sorting out the niggles and finely tuning the bias on both channels I recorded a number of our best Compact Discs. These offer quite a challenge - and to make matters worse I used TDL Studio 4 loudspeakers which are capable of reproducing deep bass. The main attribute of this recorder proved to be its superbly clear, natural and open sounding mid-band. Why studios are beginning to value it I can understand: modern transistor amplifiers still do not commonly sound so spacious and natural, which suggests that

modern tape recorders are compromised by their electronics. I should say at this point that in my view, this is due mainly to unsatisfactory design. Solid state can work well, but it takes more effort and knowledge than is often applied.

I heard some blemishes at spectrum extremes, but they were subjectively benign. Deep bass is slightly curtailed and bass definition blurred by a small amount. In spite of the very high measured treble overload figures, I also detected some coarsening and splashing of treble, at least when using high recording levels (necessary to minimise hiss). In spite of this, the G36 provides excellent recording quality. There is magic in its sound, attributable to the use of a high quality transport, fine tape heads and of course, simple valve amplifiers. Anyone who wants to make superb live recordings in terms of spaciousness and clarity should consider a Revox G36 ●

For Revox G36 service and repair, contact:

Philip Pimblott,
Audio Laboratories (Leeds),
3 Kildare Terrace,
Whitehall Road,
Leeds LS12 1DB.
Tel: 0532 440378

Revox is imported by:

F.W.O. Bauch Ltd.,
49 Theobald Street,
Borehamwood, Herts. WD6 4RZ.
Tel: 081 953 0091

Revox G36 improvements can be carried out by:

Tim De Paravicini,
Esoteric Audio Research,
Unit 11, Stukeley Meadows
Industrial Estate,
Huntingdon, PE18 6ED.
Tel: 04804 53791

Measured Performance

All performance figures relate to our two track model (Serial No 38259 - prior to supersonic response peak mods.), used at 7.5ips with a new reel of Maxell XL-I 35-90B back coated ferric tape, for which bias had been carefully set.

Frequency response can be seen in the high resolution analysis. It can be adjusted to flatness from 35Hz to 20kHz within 1dB limits, which is an excellent performance. Just a small movement on either bias adjuster pot. produces a large change in treble output, so there is plenty of range, but care must be taken. Fall off in output at response extremes is rapid, so the -3dB frequency response limits are little better than the ones I quote.

Revox recommend bias is used to adjust frequency response, even though bias should ideally be preset and record equalisation changed. After bias adjustment was completed, MOL315 was +9dB and SAT10k +7dB above nominal 0VU, giving a 2dB overdrop at high frequencies. This suggests bias is a bit low for optimal exploitation of the tape's properties, somewhere around 6dB overdrop being common. However, there is no mention of record equalisation adjustment and I doubt whether enough high frequency gain is available in the record amps to give the boost that increased bias would demand. As matters stand, however, the G36 will accept very strong treble signals without suffering tape saturation. This can be valuable with close miked Rock and even strong vocals.

Revox recommend 0VU is set -7dB below MOL315 to account for record level meter ballistics. Our machine was -9dB below. Hiss measured -57dB down, giving a good dynamic range of 66dB in all. There was some measured hum, probably due to imperfect shielding in our old case (yet to be checked!). However, in critical listening tests absolutely no hum was heard. Subjectively, hiss was slight and had that smooth, unobtrusive quality that comes from tape moving smoothly over good heads.

Channel separation was satisfactory, being -41dB at 1kHz and -35dB at 10kHz. These are not wonderful figures but imaging was unaffected. Crosstalk in fact only

lessens stage width and it wasn't bad enough to compromise the G36 subjectively in this respect.

I noticed that tape guidance was imprecise when fast reeling. The tape rode up and down, causing edge damage. This resulted in some slight low rate cyclic drift, a little wow and even flutter. Using a new tape (Maxell XL-I, which is back coated) improved matters, drift becoming unmeasurable (less than 0.02%), with wow and flutter lessening appreciably, as the chart shows. These are extremely low values, giving an overall DIN weighted wow and flutter figure of just 0.03%. Obviously, high quality recordings should be made on new tapes. Luckily, at £7.50 for a 45 minute reel, cost is hardly prohibitive.

	damaged tape	new tape
Drift	0.1	0.02
Wow	0.03	0.015
Flutter	0.18	0.12

Fast reeling caused edge damage to the tape, which affected speed stability slightly. A new tape should be used for best results.

The speed stability analysis demonstrates negligible drift by the sharpness of the test tone peak at right. At either side are 2Hz (FM) sidebands caused by the pinchwheel and, further out and clearly visible, 17Hz sidebands caused by the motor capstan. The latter are primarily responsible for measured flutter. These are very good figures; in use the G36 gives a clean, stable sound.

Output is 700mV (0VU) into a load higher than 100kohms. Low loads result in bass loss and must be avoided. Various reactive elements are in the output line (capacitor, bias trap, etc) so inputs should be resistive or buffer resistors must be employed.

Inputs are very sensitive, 'diode' needing just 3mV (adjustable down to 50mV, into 47kohm), 'radio' 20mV (into 1Mohm) and mic. 3mV. The handbook states that low impedance dynamic microphones must be used with transformers. I suspect that modern mics are best connected through their own low noise preamplifiers to the 'radio' input.

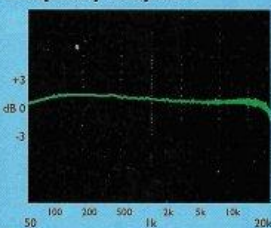
In most areas the G36 puts up a very

good performance by modern standards. Ours, which had been expertly serviced, exceeded all the manufacturer's quoted performance figures. Prospective owners only need bear in mind that it takes expert attention to keep a deck like this in such good form over a long period ●

Test Results

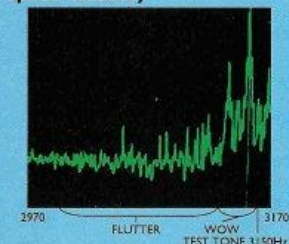
Frequency response	35Hz-20kHz
Separation (1kHz)	45dB
Hiss (below 0VU as set)	-57dB
Dynamic range	66dB
Speed variations (DIN total)	0.03%
Drift	unmeasurable
Wow	0.03%
Flutter	0.12%
MOL/SAT	315/10k
	+9dB/+7dB
Output	700mV into 100kohms
Input	3mV-50mV

Frequency Response



Flat frequency response up to 20kHz

Speed Stability



Capstan flutter spikes at 17Hz

