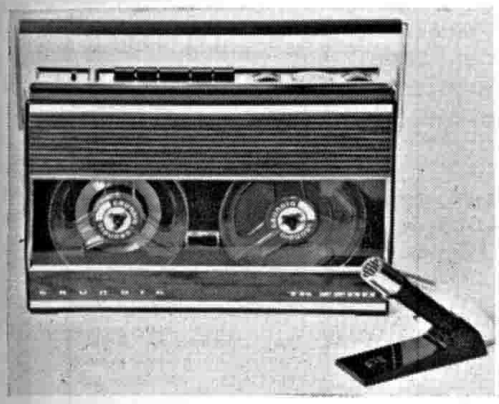


GRUNDIG TK2200

MANUFACTURER'S SPECIFICATION (9.5 cm/s). Battery powered ¼-track tape recorder. **Frequency range:** 40 Hz-15 kHz. **Signal-to-noise ratio:** 47 dB. **Wow and flutter:** ±0.25%. **Power supply:** Six U2 cells or equivalent, or TN12 mains power pack. **Tape speeds:** 9.5 and 4.75 cm/s. **Spool capacity:** 13 cm. **Weight:** 12.5 lb. **Dimensions:** 35 x 21 x 10.5 cm (l x w x h). **Price:** £96 12s. including purchase tax. **Manufacturer:** Grundig Werke GmbH, 851 Furth, Kurgartenstrasse 37, West Germany. **Distributor: Grundig (Great Britain) Ltd., London S.E.26.**

FIG. 2 GRUNDIG TK2200 RECORD/PLAY WOW AND FLUTTER

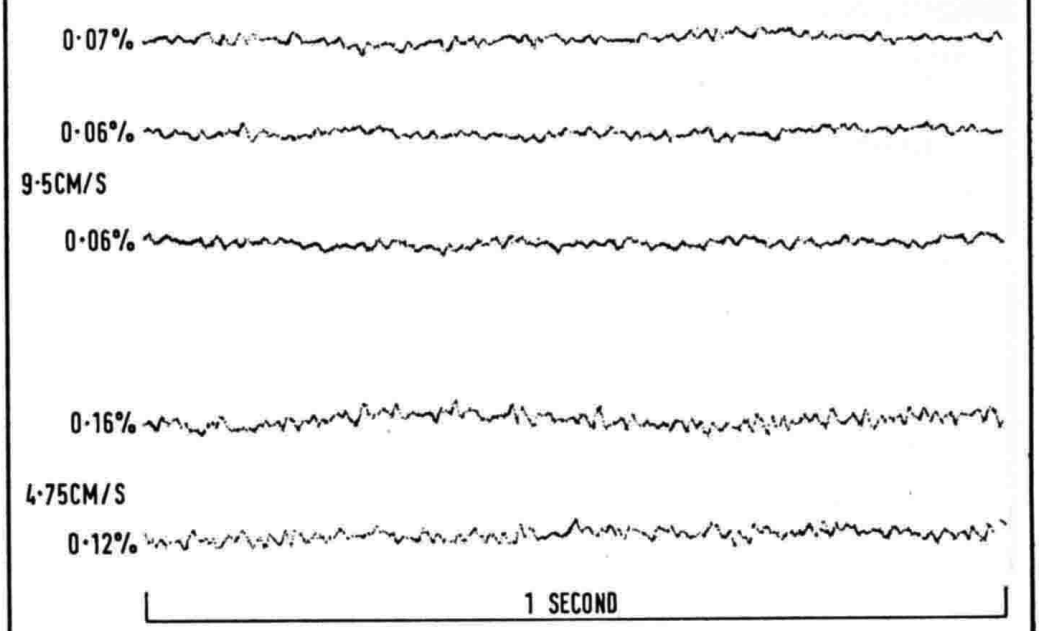
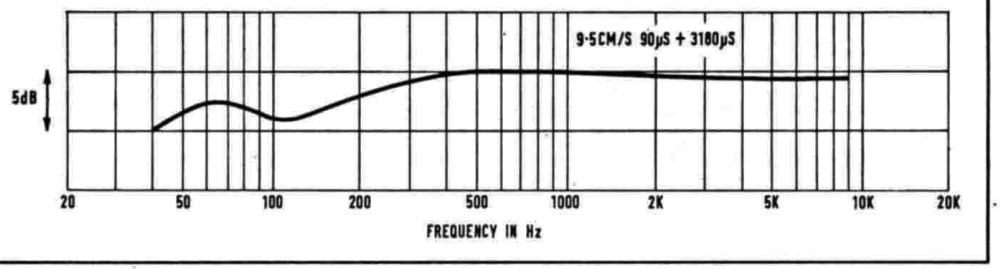


FIG. 3 GRUNDIG TK2200 PLAY ONLY RESPONSE (TEST TAPE TO LINE OUTPUT)



THE upright styling of this machine has allowed the loudspeaker to be placed on one side of the case and the spools and drive mechanism on the other. The controls are on the top of the recorder and the batteries, or power pack, are inserted by removing a slide plate at the bottom of the case. The tape motion controls are rectangular press buttons labelled *stop*, *start*, *pause*, *wind* and *rewind*, with a round press button for *record* which is locked down by simultaneous operation of the *start* key. A three-digit tape position indicator, with press button reset, is conveniently placed at the right hand end of the control area and this is driven from the take-up reel with 10 turns of the reel clocking up 7 digits. At the left hand of the panel is the playback volume control which looks like a double edge operated control, but the two drums are locked together. The other control, on the other side of the record level meter, is a true double control with the front drum operating as record level control and the rear one acting as playback tone control—bass cut on clockwise rotation and treble cut on anticlockwise rotation from a central level-response position.

Full wind or rewind of a 13 cm reel of LP tape (900 ft) took a fraction over two minutes in either direction, but wind or rewind on to a nearly full reel was rather sluggish and sometimes needed a helping hand to get things moving.

Long term tape speed was constant from beginning to end of reel but the mean speed at 9.5 cm/s was nearly 2% fast and is therefore near the top limit at this speed. At 4.75 cm/s the speed was 1.4% fast. This is one of the few recorders where the speeds *can* be adjusted by pre-sets in the motor control electronics, but I will leave Mr. Hellyer to sort out the exact procedure in his excellent service notes.

Short term speed fluctuations were extremely small as will be seen by the fluttergrams of **fig. 2.** The meter readings were very steady and it was not possible to phase the record and play cyclical speed variations to build up a steady high value. This shows that the speed fluctuations are fairly random in nature so that cumulative record-play adding is unlikely. A low wow and flutter test tape also read 0.06% RMS at 9.5 cm/s. At the lower speed, a 1.5 Hz wow can just be seen on the top trace, giving a cumulative reading of 1.6% RMS. This is much lower than the capstan rotation frequency and is probably due to a slightly eccentric pressure roller.

The contra-rotating flywheels seem to be effective in maintaining a constant tape speed despite severe agitation of the recorder. Shaking the recorder with a twisting motion in the plane of the flywheels, so that the take-up

(*continued on page 603*)

FIG. 4 GRUNDIG TK2200 RECORD/PLAY RESPONSE (LINE IN TO LINE OUTPUT)

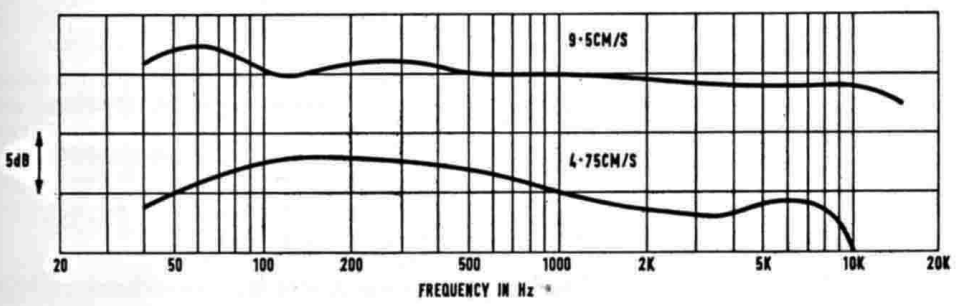
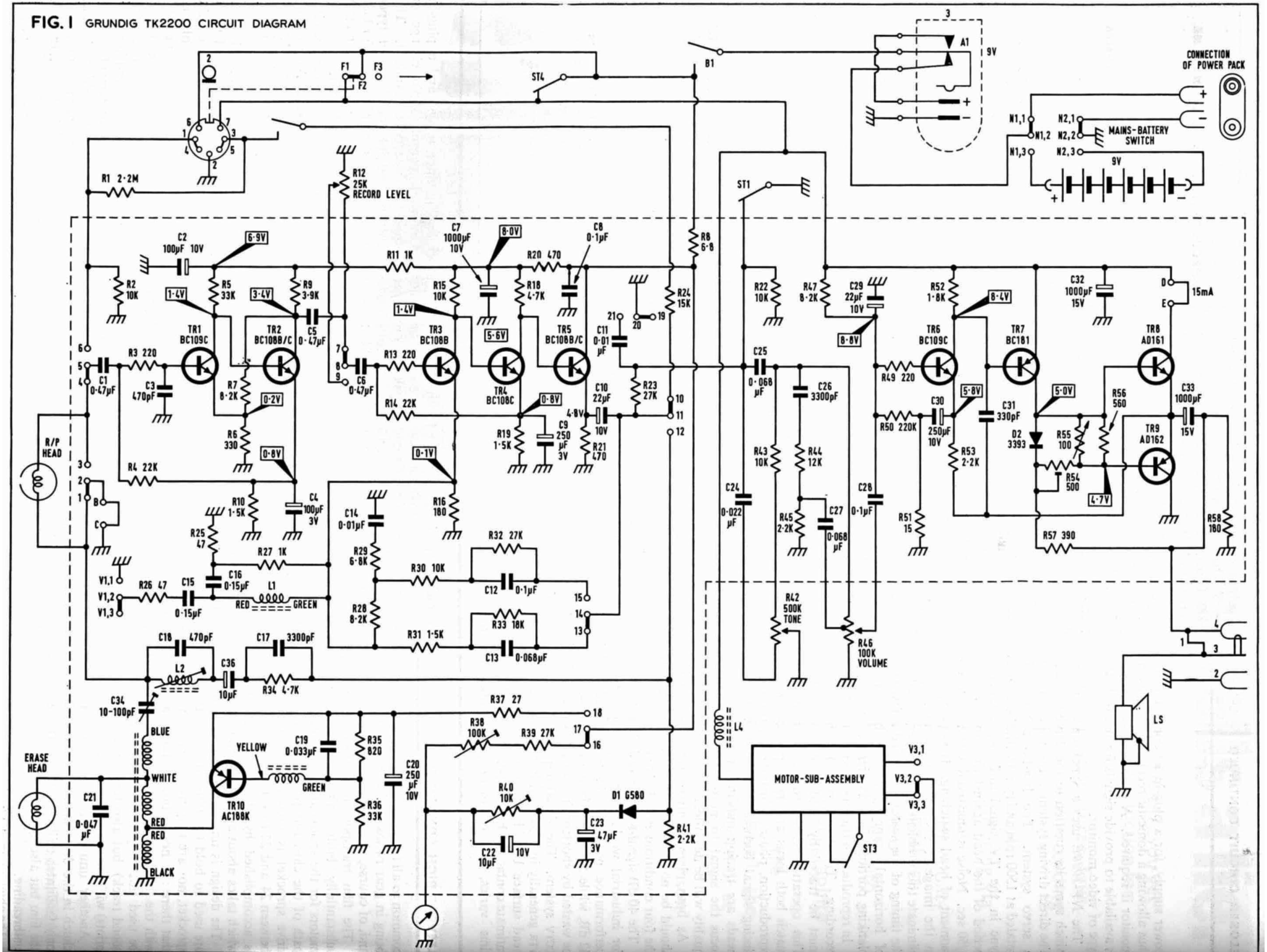


FIG. 1 GRUNDIG TK2200 CIRCUIT DIAGRAM

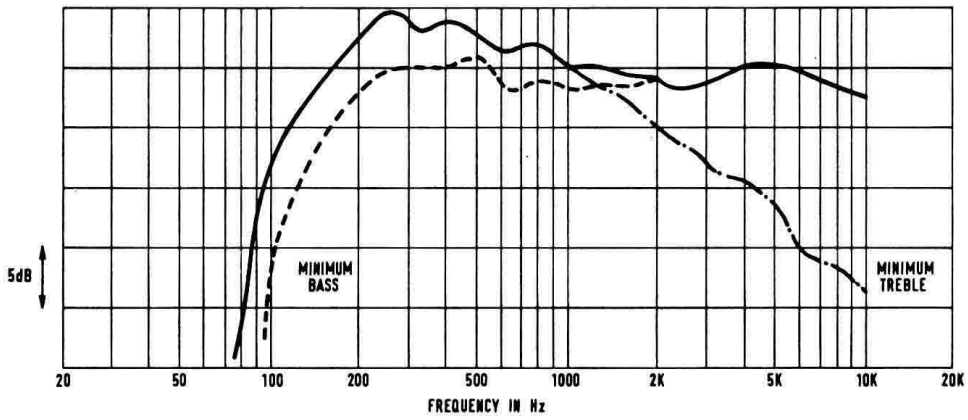


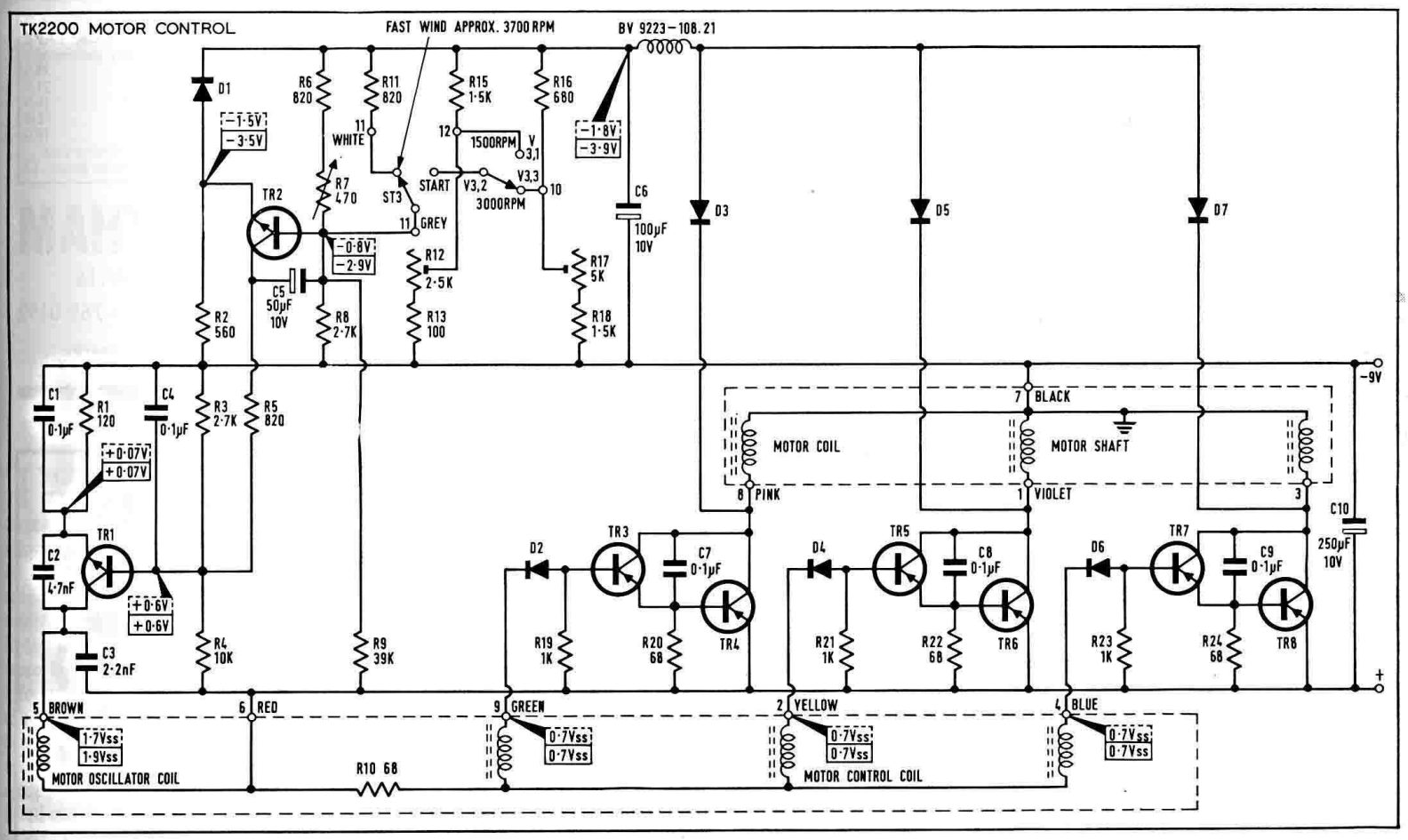
reel was momentarily stopped with a slight spillage of tape, produced no wow, in fact the only audible effect was a slight chirp as the take up reel rook up the slack and jerked the tape slightly.

Fig. 3 shows the playback response to line output while playing a 9.5 cm/s test tape recorded to the new 90 μS characteristic with bass pre-emphasis of 3180 μS. It will be seen that, despite the bass rise on the tape, the playback response falls slightly at low frequencies.

Fig. 4 shows that extra bass pre-emphasis is used in the recording process to give a more even response and that the high frequency

FIG. 5 GRUNDIG TK2200 ACOUSTIC RESPONSE (WHITE NOISE TO SPEAKER SOUND OUTPUT)





recording characteristic is close to the desired 90 μS response. At 4.75 cm/s, the response is not quite so level, but is within ±3 dB limits over the range 40 Hz to 9 kHz range.

System noise, with no tape passing the heads, was at the extremely low level of 47 dB below test tape level or 59 dB below peak recording level.

Recording distortion measurements at 1 kHz using BASF *LGS35* tape showed 3.5% third harmonic distortion with the record level meter pointer just entering the red sector of the scale. Unweighted noise after erasing peak recording was 55 dB below peak recording level.

The acoustic response of **fig. 5** was obtained by recording 25 one-third octave bands of

(*continued on page 605*)

FIG. 6 GRUNDIG GDM 305 MOVING COIL MICROPHONE (IK)