

THE BROADCAST RECORDER



Over-all view of the new Berlant BR-1 broadcast recorder with the company's MCM-2 mixer shown at right.

By
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A NEW professional tape recorder, designed to meet the specialized requirements of broadcast and recording studio engineers as well as the advanced audiophile, has recently made its appearance.

Since the keynote of the design was dependability and freedom from maintenance problems, all clutches, belts, pulleys, idlers, and similar components have been eliminated in the construction of this recorder.

To achieve the requisite simplicity, the two reels had to be mounted directly on the capacitor start-and-run induction torque motors which were designed to perform the spooling operations with maximum efficiency. In addition, the tape drive capstan had to be constructed as an integral part of the synchronous drive, with no decoupling to introduce errors of timing or motion.

The main panel, upon which all mechanical components are assembled, was designed for pressure die casting in aeronautical aluminum alloy to combine rigidity, stability, dimensional accuracy, smooth finish, and high impact strength.

The recorder's "Unisync" drive is an innovation in the field of tape metering accuracy. This combination of drive capstan, two-speed (600 and 1200 rpm) hysteresis synchronous motor, flywheel, and cooling blower is engineering as a single integrated unit. The capstan is the exposed end of a precision-ground shaft supported in line-bored, self-lubricated bearings mounted in a flanged aluminum mounting sleeve.

On the outside of this bearing mount is fixed the field structure (stator) of the motor. The nickel cobalt hysteresis rotor ring is shrunk-fit into a die-cast housing designed for maximum flywheel effect and ribbed to act as a blower. Because the diameter of the rotor is outside the field, efficiency is high and an extremely cool running

Technical details on a recently-introduced professional unit that eliminates clutches, pulleys, idlers, belts, etc.

mechanism results. The entire rotor construction is dynamically balanced as a unit and mounted solidly to the main panel by four bolts.

Each reel-moving assembly is mounted directly on the motor and contains a 3-inch diameter steel brake drum. A brake arm, pressure die-cast of *Zamak III* alloy, brings a thick white long-staple felt pad against the drum. Both brakes are actuated by a common tension spring, with differential to keep the tape taut in braking established by the self-energizing action of the brakes. Wear of the pads increases clearance and does not require readjustment.

The tape is stripped from the reels over ball-bearing metal rollers with the tension arms concentrically pivoted to bear against the back of the tape. A *Microswitch*, mounted behind the panel, serves as a power cut off switch in the event of tape run-out or failure. The tension arms swing to a lock position for straight-line loading of the tape through the head assembly, then unlock to provide filter action.

The transducers, or heads, are mounted on a precision pressure die-cast ribbed mount which has provision for positioning and adjusting five heads with accurate guides for locating the tape's course through the assembly. The mount is fastened to the main panel by three clamp screws. Electrical connection to the heads is by means of individual slip connectors. The added flexibility offered by the provision for two additional heads can be indicated by a few examples. An extra playback before the usual combination of erase, record, and playback heads permits the simultaneous broadcast of a delayed broadcast while erasing the tape and recording an incoming

signal—thus permitting one recorder to do the work of two. Or, a combination of single and dual-track erase and record heads gives a choice of dual-track recording for library requirements or single-track master recording with instant switch selection. Other possible combinations provide a choice of single track or stereo-binaural recording and use of multiple playback heads for echo and reverberation effects.

Tape contact with the heads is accomplished by a pressure die-cast *Zamak* shield mount that wraps the tape into an arc contact with the pole faces of the heads. A hum shield is mounted in close contact on the head shield of the playback heads. The shields are held in place by tapered spiral coil springs and snap lock retainer clips. No pressure pads are used in normal audio work. In fast-forward and rewind position the tape clears the heads, close enough for audible location of selections, but without contact to cause excessive wear. Movement of this mount is automatically controlled by the operation of the control levers.

All controls for the drive mechanism are included in one coaxial lever system located in the center of the panel. The tape drive lever moves to the right for "Run." This closes the head pressure mechanism, wrapping the tape into contact with the heads. Moving the lever to the left from "Stop" to "Cue" also wraps the tape around the heads but does not close the pressure roller against the capstan. Since the brakes are released and the spooling motors powered, the reels may be freely rotated to locate any desired point for cueing or editing. Swinging

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the lever further to the left opens the head-closing mechanism wide to give full access to the heads and tape for marking or cutting and simultaneously brakes the motors to hold the reels. Actuation of the head-closing and pressure-roller mechanism is controlled by a die and cams solidly positioned on the control lever shaft by a D-shaped hole. The cams actuate the mechanism by means of grooved cam-follower rollers. The mechanism is simple, positive, and not subject to abnormal wear.

The tape spooling control lever of the coaxial system is interlocked to the tape drive control lever by a positive pivot action so that neither lever can be operated unless the other is in the "Stop" position. Moving the lever releases the brakes and varies the balance of torque in the spooling motors by means of a rheostat to give control of the rewind speed in either direction. This permits the user to rapidly shuttle the tape to locate any desired point on the reel preparatory to utilizing the "Cue" position of the tape drive control lever.

The "Record" function is controlled by a rectangular push-button located in the lower head cover. This button is positively interlocked to prevent accidental erasure of the tape. It will not function in the "Run" position. The tape drive control lever must be in the "Stop" position and the "Record" button held down while the lever is moved

to "Run." Returning the lever to the "Stop" position automatically releases the "Record" button and, since this must be done in order to place the recorder in "Cue" or "Rewind" condition, this operation is virtually foolproof.

The design of the magnetic transducers used in this broadcast recorder was a direct outgrowth of the specialized requirements of the motion picture industry's rigorous requirements for "CinemaScope" sound, a four-channel stereophonic system using magnetic sound tracks on both sides of the sprocket holes.

All of the electronic components of the broadcast recorder are mounted on a 5 1/4" inch by 19 inch relay rack panel, connected to the drive mechanism by multiple contact connectors. This amplifier panel contains the power supply, erase and bias supply amplifiers, the record amplifier, playback preamplifiers, and output amplifier. All low-level circuit filaments are filtered d.c.

The microphone input is a three-contact jack, feeding a high-gain triode stage through an octal plug that is adapted for a highly shielded microphone input transformer with input windings for 50 and 250 ohm inputs, balanced and unbalanced. The output of this stage is bridged by a bridging input for high-level unbalanced signals. The record amplifier is a straightforward triode cascade system with equalization to conform to the NARTB

curve effected by a selective feedback circuit over the last two stages.

The erase and bias amplifier is a balanced push-pull Colpitts circuit, feeding the bias to the record head from a separate winding on the oscillator coil through a bias level control.

The playback preamplifier is of all-triode cascade design and conforms strictly to the NARTB playback curve.

The metering circuit is of the v.t.v.m. type, with a selective switch to measure bias current, record current, and output level. The bias reading has an adjustment by which the meter reading is set to 100 after the proper bias has been determined for any given type of tape. This makes it possible to check the bias supply easily without reference to an arbitrary value.

The output amplifier is fed through a fader control, taking its signal from either the input or tape playback preamplifier. This permits making A-B checks during a recording with no click to indicate switching surges. The output stage is a cathode follower, with a plug-in transformer provision for zero-level, 600-ohm balanced line operation.

From the foregoing details, it becomes obvious that this new broadcast recorder offers many advantages to the recording engineer and the serious audiophile.

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PROFESSIONAL USERS NET PRICES Effective May 15, 1954 (Prices subject to change without notice)

Cat. No.

- BR-1 BROADCAST RECORDER: 7 1/2 and 15 i.p.s. Complete, consisting of separate drive mechanism and amplifier. Rack panel or horizontal mounting, single track heads\$545.00
- BR-2 BROADCAST RECORDER: Same as BR-1, except with dual track heads\$545.00
- BRA-1 BROADCAST RECORDER, AUTOMATIC: Same as BR-1, except with push button solenoid controls for record, stop and run\$695.00
- MCM-2J BASIC MIXER, fitted with 3-contact telephone jacks.\$137.50
- MCM-2C MIXER, fitted with Cannon XL connectors.....\$145.00
- T-3344 INPUT TRANSFORMER: Full frequency response shielded plug-in transformer for matching high impedance input to 50/250 ohm microphones.....\$18.00
- BRDC-1 CARRYING CASE for Broadcast Drive Mechanism.\$47.50
- BRAC-1 CARRYING CASE for Broadcast Amplifier and Multi-Channel Mixer\$47.50
- CC-1 CARRYING CASE for Amplifier\$24.50
- T-2560 OUTPUT TRANSFORMER: Full frequency response plug-in transformer for matching cathode follower output to 600 ohm balanced line output\$25.00
- L-69 LOSSER PAD: To attenuate high impedance high level signals to match microphone level. Attenuation can be set at zero db, 25 db, or 50 db\$7.50
- E-47 PHONO EQUALIZER: Matches variable reluctance pickup to microphone input\$7.50
- CC-1 CARRYING CASE for Mixer, MCM-2\$24.50

SPECIFICATIONS BR-1

TAPE SPEEDS:

Instant selection of 15"/Sec. or 7.5"/Sec.

FREQUENCY RESPONSE:

±2 db from 40 to 15,000 C P S at 15"/Sec.

±2 db from 40 to 10,000 C P S at 7.5"/Sec.

SIGNAL TO NOISE RATIO:

55 db as measured by proposed NARTB standard (400 C P S at 3% T.H.D.)

TOTAL HARMONIC DISTORTION:

2% at zero V.U.

TIMING ACCURACY:

Better than 99.8%.

TOTAL FLUTTER AND WOW:

Less than 0.1% RMS at 15"/Sec. Less than 0.2% RMS at 7.5"/Sec.

REWIND AND FAST FORWARD:

Less than 60 secs. for 2500 feet. FROM STOP TO 15"/SEC.: 0.1 second.

HEAD MOUNTING:

Interchangeable Bracket mounting up to FIVE heads.

METER INDICATION:

Bias current, record level, output level.

MONITOR OUTPUT:

From tape or input signal.

INPUT IMPEDANCE:

One megohm on high impedance microphone input. 50/250 ohms balanced or unbalanced with plug in transformer #T-3344. 200,000 ohms unbalanced bridging input.

INPUT SENSITIVITY:

55 db on microphone input. 0.1 volt on bridging input.

OUTPUT IMPEDANCE:

Cathode follower. 600 ohms balanced output with plug in transformer #T2560.

OUTPUT LEVEL:

2 volts from cathode follower output.

Zero DBM across 600 ohm line.

FILAMENT SUPPLY:

D.C. on all filaments.

DIMENSIONS:

Drive mechanism, 14"x 19". Mounting Depth, 6" below panel. Amplifier, 5 1/4"x 19". Mounting depth, 6" below panel.

WEIGHT:

Drive mechanism, 35 Lbs. Amplifier, 10 Lbs.

TUBE LIST:

2-12AX7; 1-12AT7; 2-12AU7; 1-12BH7; 1-6X5GT

POWER REQUIRED:

160 watts, 60 cycles, 115 volts.

BERLANT ASSOCIATES 4917 West Jefferson Blvd., Los Angeles 16, California

MANUFACTURERS OF *Concertone* — WORLD'S FOREMOST HIGH FIDELITY TAPE RECORDERS AND ACCESSORIES