Model B-16

RECORDER/REPRODUCER



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SAFETY INSTRUCTIONS

WARNING

READ BEFORE OPERATING

- Read Instructions—All the safety and operating instructions should be read before the appliance is operated.
- Retain Instructions—The safety and operating instructions should be retained for future reference.
- Heed Warnings—All warnings on the appliance and in the operating instructions should be adhered to.
- Follow Instructions—All operating and use instructions should be followed.
- Water and Moisture—The appliance should not be used near water—for example, near a bathtub, washbowl, kitchen sink, laundry tub, in a wet basement, or near a swimming pool, etc.
- 6. Ventilation—The appliance should be situated so that its location or position does not interfere with its proper ventilation. For example, the appliance should not be situated on a bed, sofa, rug, or similar surface that may block the ventilation openings; or, placed in a built-in installation, such as a bookcase or cabinet that may impede the flow of air through the ventilation openings.
- Heat—The appliance should be situated away from heat sources such as radiators, heat registers, stoves, or other appliances (including amplifiers) that produce heat.
- Power Sources—The appliance should be connected to a power supply only of the type described in the operating instructions or as marked on the appliance.
- Power-Cord Protection—Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the appliance.

- Cleaning—The appliance should be cleaned only as recommended by the manufacturer.
- Nonuse Periods—The power cord of the appliance should be unplugged from the outlet when left unused for a long period of time.
- Object and Liquid Entry—Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through openings.
- Damage Requiring Service—The appliance should be serviced by qualified service personnel when:
 - A. The power-supply cord or the plug has been damaged; or
 - B. Objects have fallen, or liquid has been spilled into the appliance; or
 - C. The appliance has been exposed to rain; or
 - D. The appliance does not appear to operate normally or exhibits a marked change in performance; or
 - E. The appliance has been dropped, or the enclosure darnaged.
- 14. Servicing—The user should not attempt to service the appliance beyond that described in the operating instructions. All other servicing should be referred to qualified service personnel.

WARNING: To avoid possible electric shock hazard, do not expose this appliance to rain or moisture. There are no user serviceable parts inside. Refer servicing to qualified service personnel.

1. INTRODUCTION

Because the B-16 is so compact and affordable, it is the most versatile 16-track recorder made, and is very well suited for a number of professional applications.

More than any other factor, the multitrack tape machine is the key to the actual recording flexibility that any studio has to offer. Small studios struggling with eight tracks can now afford sixteen.

The B-16 will also fit nicely into the cramped confines of a remote truck. No need to submix everything when you have sixteen tracks available. Multitrack live recording dates have suddenly become straightforward.

Video post production rooms are another natural habitat of the B-16, as it comes pre-wired for SMPTE interlock. Extra dollars can be stretched from tight production budgets when you have your own in-house audio sweetening facility.

Finally, and perhaps most remarkable, the B-16 can be used easily by the musician, songwriter or producer who prefers to work alone. The operational logic is so well-designed, you don't need someone else to operate the recorder. In fact, there's an optional foot control that lets you punch-in and out when your hands are busy.

Regardless of your application, the B-16 will deliver outstanding performance and sound quality. It's development was made possible by innovative advances in head technology, record/reproduce electronics, the incoporation of Dolby C Noise Reduction and proven design principles of the half-inch tape transport.

The team of design engineers at Fostex today has been responsible for putting more multitrack recorders into the hands of more working professionals than from any other source.

The remarkable B-16 now stands as the hallmark of their many achievements in the manufacture of multitrack recorder/reproducers.

Like all professional tape recorders, the B-16 requires regular routine maintenance in order to perform at peak operating capability. Protect your investment and set up a regular schedule of maintenance as recommended in the last section of this manual.

2. SPECIFICATIONS

Tape 1/2 inch tape width, 1.5 mil base

(Ampex 456, Scotch 226 or equivalent)

Track format 16 track, 16 channel

Reel size 10 1/2 inch, NAB hub

Tape speed Fixed : 15 ips (38 cm/s)

Variable: 15 ips ±15%

Inputs (x16) -10dBV (0.3V)

Impedance: 25K ohms, unbal.

Outputs (x16) -10dBV (0.3V)

Load impedance: 10K ohm, unbal.

System operating level OdB referenced to 320nWb/m of tape flux

Equalization IEC (infinitive + 35µs)

Overall frequency

response 40Hz - 18KHz, +3dB

Signal to noise ratio 80dB weighted, 60dB unweighted

(With built-in Dolby C)

Referenced to 3% T.H.D. level(10dB above operating

level) at 1 KHz

T.H.D. 1% at 1 KHz

Erasure 70dB at 1 KHz

Crosstalk 55dB at 1 KHz

Wow & flutter ±0.06% peak weighted (IEC/ANSI) measured with

flutter free tape

Power requirements 120V, 60Hz, 170W (U.S.A./Canadian model)

220V, 50Hz, 170W (European model)

240V, 50Hz, 170W (UK/Australian model)

Dimensions 445(W) x 430(H) x 235(D) mm

[17-1/2"(W) x 17"(H) x 9-1/4"(D)]

Weight 30kg (67 lbs)

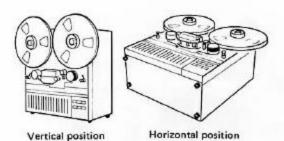


Fig. 3.1

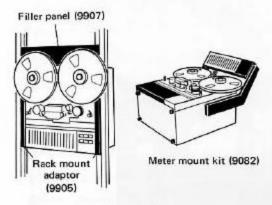


Fig. 3.2



Console (9080)

Fig. 3.3



Remote control unit (8090)

Fig. 3.4

3. INSTALLATION

3.1 Operating positions.

The B-16 can be used either vertically or horizontally.

Fig. 3.1

3.2 Rack mount/Meter bridge

It can be rack mounted by using the Model 9905 Rack Mount Adaptor (option).

When rack mounted, a 3-1/2" (88mm), 19" wide filler panel (option) is required to provide space for the reels at the top.

If the bar graph meters are difficult to see in the horizontal operating position, the meter can be changed to a more convenient position by using the Model 9082 Meter Mount Kit (option) as shown in Fig. 3.2.

CAUTION: Do not place anything on the hatched section as doing so will decrease heat sink efficiency.

3.3 Console mount

The B-16 can be used at any free angle by using the Model 9080 as shown in Fig. 3.3 (option).

3.4 Remote control unit Model 8090

The multi-cable from the Remote Control
Unit is plugged into the REMOTE CONTROL jack
(25) on the B-16 rear panel.

The Remote Control Unit can also be used on a mic stand by utilizing the bracket as shown in Fig. 3.4.

3.5 Line Amplifier Model 5030 (option)

This is a Unit for matching input and output impedances and levels.

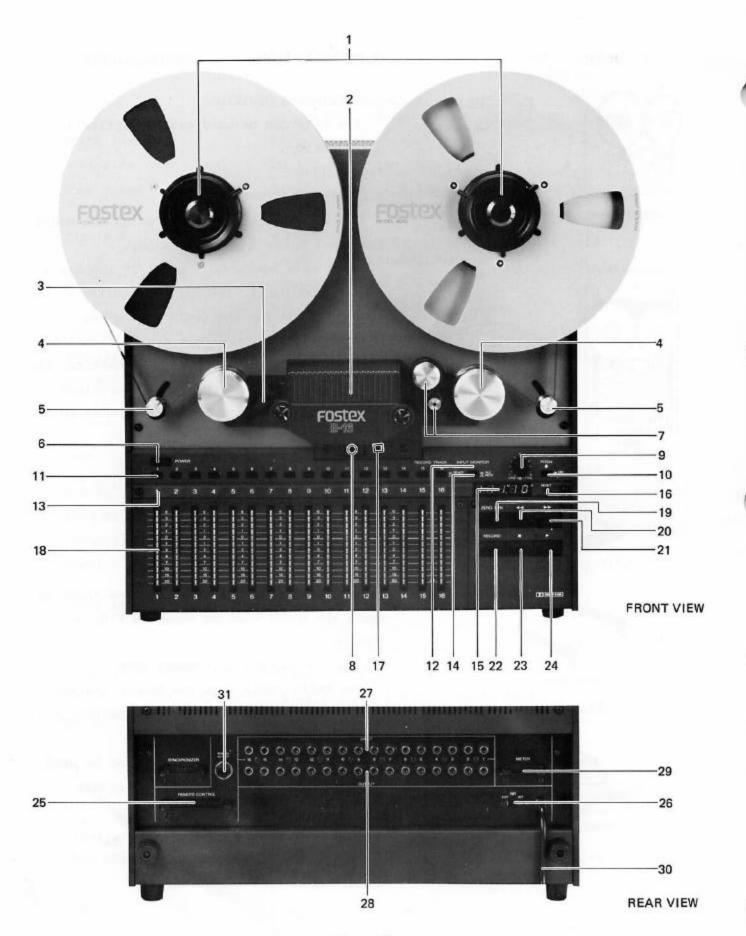


Fig. 4.1

4. THE CONTROLS AND THEIR FUNCTIONS

- 1) Reel holder
- 2) Head assembly
- 3) Tape presence sensor
 If tape is completely wound onto the other reel or if it is broken during operation, this sensor will be activated to put the transport in the STOP mode.
- 4) Idler roller
- 5) Tension roller
- 6) POWER switch
- 7) Capstan and pinch roller
- 8) Head shield gate
 This head shield gate located in front of the head can be manually raised or lowered. If it is in the lowered position, it can be raised by slightly depressing it to release the catch.
- 9) PITCH control knob Tape speed can be changed over a range of ±15% for sound pitch control during play or record. This control is dual concentric - the outer knob is for large changes and the inner knob is for trimming.
- 10) PITCH control switch

 NORMAL SPEED or VARIABLE SPEED of tape is selected by this switch.
- 11) RECORD TRACK selector

These 16 pushbuttons determine whether recording can commence on a given track.

The specific function also depends on whether or not tape is stopped or is advancing in the record ready mode.

a) If tape is stopped, depressing a RECORD TRACK button places the corresponding track in the record ready mode, and the LED above that track's LED meter will blink.

If the RECORD button only is depressed, the dB meter indications and signals from the OUTPUT jacks will change from tape out to input monitor only for those channels whose RECORD TRACK buttons are depressed, and if the INPUT MON switch is set to INDIV, the INPUT MON LED will change to blinking. This mode will be cancelled again by depressing the RECORD button but will not be cancelled by depressing any other buttons.

If the RECORD and PLAY buttons are subsequently depressed, recording,

the RECORD TRACK LED stops blinking and remains on, and the RECORD LED also turns on.

The dB meter indications will read the input signal of the channels placed in the record mode; the other channels will remain in the tape out signal monitor mode.

- b) If tape is rolling in the PLAY mode, depressing a RECORD TRACK button has the same effect as in a), above; it readies the track for recording. In this condition, the dB meter indications and signals to the output jacks will be tape out signal monitor for all channels.
- c) If tape is rolling in the record ready mode (i.e. RECORD and PLAY buttons have been depressed), the RECORD LED adjacent to the RECORD button will blink.

Subsequent depression of a RECORD TRACK button immediately causes that track to enter record mode; both the RECORD LED and the RECORD TRACK LED now remains on.

- 12) INPUT MONITOR LED (Green)
- 13) RECORD LED (Tracks 1 ∿ 16)
- 14) INPUT MONITOR selector
 - a) If the ALL function of this switch is depressed, all channels will read INPUT MONITOR and the green LED (12) will be lit.
 - b) If this switch is set at INDIV, individual channels can monitor input signals in the following way: Place the RECORD TRACK selector (11) to READY; when LED (13) is blinking,

depressing the REC (22) button only will make LED (12) blink and the B-16 output for that channel only will change from TAPE OUT to INPUT.

- c) Depressing the REC (22) button again will change the B-16 output from INPUT to TAPE OUT.
- d) Should the REC button only be depressed when the RECORD TRACK selector (11) is at SAFE, LED (12) will blink but the B-16 output will not change to INPUT.
- NOTE: If one channel is in the RECORD mode, depressing the RECORD TRACK selector button for another channel will change the monitor from TAPE to INPUT and this track will enter the RECORD mode, not RECORD READY.

- 15) Counter display
 - A five digit counter displays the hour, minute and second of tape travel. For positions below the zero point, a "-" is displayed before the hour digit.
- 16) RESET button

The counter display is set to zero by depressing this button.

17) CUE lever

Pushing this lever forward toward the head makes the tape lifters retract, allowing tape cueing during F.FWD or REW modes.

- 18) Bar graph meters These are peak indicating meters.
- 19) ZERO RETURN Depressing this button stops the tape at the "O" position of the tape counter.
- 20) REWIND button
 Tape is wound at high speed from the take-up reel to the supply reel by depressing this button.
- 21) F,FWD button Tape is wound at high speed from the supply reel to the take-up reel by depressing this button.
- 22) REC button

 This button has the function of putting the tape deck in RECORD mode when simultaneously depressed with the PLAY button and also to individually switch each channel to INPUT MONITOR (See above 14-b).
- Depressing this button once stops tape; depressing this button a second time releases both left and right reel brakes (both reels will pull tape in opposite directions and the tape will be stopped in a balanced state).

 This function allows manual editing of the tape but the CUE lever must be
- 24) PLAY button

pushed forward.

Depressing this button puts the tape deck in the PLAY mode and PLAY LED (green) will be lit. When both the ZERO RETURN button and then the PLAY button are depressed, the tape will rewind to the counter "0" position and will automatically enter the PLAY mode (the PLAY LED will then be lit). The PLAY LED will blink while tape is being rewound.

25) Remote control connector
For use with the Model 8090 Remote Control Unit.

26) NOISE REDUCTION INT/EXT selector

The Dolby C noise reduction circuit contained in the B-16 is switched in by setting this switch to INT. If this switch is set to EXT, this internal noise reduction circuit is bypassed and an external NR system can then be patched in.

- 27) INPUT jack
- 28) OUTPUT jack
- 29) Meter

The LED bar graph meter on the front panel can be lifted out and installed at another location such as a mixing console or video switcher. In choosing this method, the optional Model 9082 METER MOUNT KIT must be used.

- 30) AC cord
- 31) REMOTE PUNCH IN/OUT jack

Remote PUNCH IN/PUNCH OUT is accomplished by using the Model 8050 Foot switch.

Model 8090 Remote Control Unit

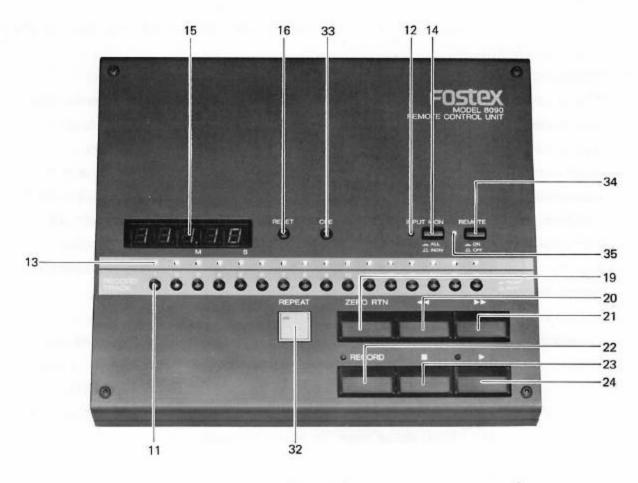


Fig. 4.2

All functions are the same with B-16 except for (32), (33), (34) and (35).

32) REPEAT switch

This control has the function of repeating the tape between the ZERO position and the CUE point memorized by the CUE button (33).

When this REPEAT button is depressed, the tape rewinds to the ZERO position and immediately enters the PLAY mode. Upon reaching the CUE position, the tape will again rewind to the ZERO position and then enter the PLAY mode. If the tape is at "-" display position of the counter, depressing this REPEAT button will have no effect.

The REPEAT mode can be cancelled by any transport button other than RECORD (ZERO RTN, F.FWD, REWIND, STOP and PLAY).

(33) CUE button

This button is for memorizing the tape position at which REWIND mode is entered from PLAY during the REPEAT mode.

This memorized CUE position will be renewed each time the CUE button is depressed.

Although the CUE button can be depressed during any mode to enter a new tape position, this function is not possible if the counter is showing a "-" position.

34) REMOTE switch

This selects whether the control should be at the B-16 or the Remote Control Unit in terms of the RECORD TRACK selector and the INPUT MONITOR selector.

When LED (35) is lit, the RECORD TRACK and INPUT MONITOR selectors can be controlled at the Remote Control Unit but not at the B-16.

The other control switches, however, can be operated at either the B-16 or the Remote Control Unit, as they are wired in parallel.

5. OPERATION

This section explains the actual operating procedures. Practice each procedure by referring to the numbers of each control which are the same with those in Section 4, THE CONTROLS AND THEIR FUNCTIONS.

5.1 Tape threading

Tape threading of the B-16 is very simple.

Thread the tape as shown in Fig. 5.1 making sure the tape passes through the Tape Presence Sensor (3), and that the Head Shield Gate (8) is in the lowered position.

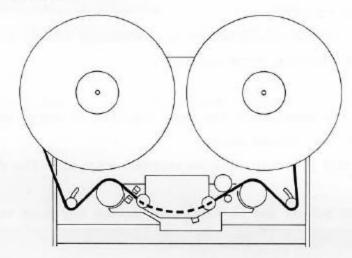


Fig. 5.1

The reel holder will firmly lock the reel by rotating it about 60° CW as shown in Fig. 5.2.

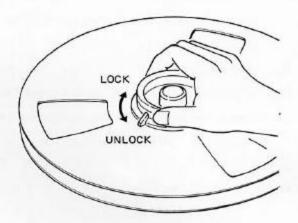


Fig. 5.2

CAUTION: Before putting the tape in motion, be sure the tape is taut with both left and right tension arms fully lifted.

5.2 Power on

A "0" will be shown in the "Second" digit of the Counter Display (15) when the POWER Switch (6), located under the left tension roller, is switched ON.

NOTE: The capstan will not rotate in modes other than PLAY or RECORD.

The bar graph meters will be lit momentarily when the POWER switch is turned on and will return to normal after the amplifiers are energized.

5.3 Transport tape motion operation

- 1) When the PLAY button (24) is depressed, the green LED at the upper left of this button will light, the capstan will begin to rotate, the pinch roller will be engaged and tape will be transported at constant speed.
 - CAUTION: When the red LED located above the PITCH control switch blinks, the transport is NOT set to 15 ips normal speed but is set at "variable speed."
- 2) When the STOP button (23) is depressed, the pinch roller disengages from the capstan, the brakes are applied and the tape stops.
- 3) If the STOP button is depressed again, the left and right brakes are released, the tape will be stopped by balanced tension from both reels, and thus manual editing becomes possible by using the CUE lever (17).
- 4) When the F.FWD button (21) is depressed, the tape lifter will push the tape away from the head surface and the tape will be transported at high speed from the left reel to the right reel.
- 5) When the REWIND button (20) is depressed, the tape lifter will push the tape away from the head surface and the tape will be transported at high speed from the right reel to the left reel.
- 6) If the STOP button is depressed during F.FWD or REWIND, tape will come to a smooth stop, the tape lifter will retract and the tape will come into contact with the head surface.
 - If the ZERO RETURN button is depressed immediately before the PLAY button, the tape will momentarily stop at the ZERO position, then enter the PLAY mode.
 - The green LED above the PLAY button will blink while the tape is returning to the ZERO position but will remain on upon entering PLAY.
- 7) When the ZERO RETURN button (19) is depressed, the tape immediately runs towards the counter ZERO position and stops there.
 - If a "-" is showing in the "hour" digit of the counter, the tape will enter F.FWD; but with normal indications in the counter, the tape will return to ZERO position in the REWIND mode.
 - If the PLAY button is depressed during F.FWD or REWIND, it will immediately

pass through the STOP mode and then automatically enter PLAY.

8) When the PLAY and RECORD (22) buttons are simultaneously depressed, any channel whose RECORD TRACK button is depressed and in the READY mode will enter the record mode and the RECORD LED will be lit. If all channels of the RECORD TRACK selector are set to SAFE, the RECORD LED will blink and tape will be transported in the record ready mode.

5.4 Recording

- Set the INPUT MONITOR selector (14) to ALL and check for proper input levels applied to the B-16 with the bar graph meters.
 It will be convenient for subsequent operations if the INPUT MONITOR selector is set to INDIV after this check.
- 2) Depress the RECORD TRACK selector (11) button for the channel to be recorded to put that track in the RECORD READY mode. When the button is depressed, the RECORD TRACK LED (13) will blink.
 Depress the RESET button (16) of the counter display (15) to set the record starting point to ZERO display.
- 3) Set the PITCH control switch (10) to NORMAL.
- 4) Simultaneously depress the PLAY (24) and RECORD (22) buttons and the channel whose RECORD TRACK selector button is depressed will enter record mode and the RECORD TRACK LED (13) will be lit. The output jack for the channel in the record mode will carry the input signal, but the other channels will remain at reproduce output.

5.5 Overdub

- Set the INPUT MONITOR selector (14) to INDIV and depress the RECORD TRACK selector (11) button for the channel to be recorded, in order to put that track in the RECORD READY state. The RECORD TRACK LED (13) for the channel whose (11) button is depressed will blink.
- 2) In this state, if the RECORD button (22) only is depressed, the INPUT MONITOR LED (12) will blink, and the output of the channel whose RECORD TRACK LED is blinking will change to input signal.
 - The bar graph meter (18) indication will also read input levels.
- 3) If the RECORD button is depressed again, the INPUT MONITOR LED will light and all channels will be in the SYNC state.

4) Simultaneously depressing the RECORD (22) button and the PLAY (24) button puts the B-16 in the record mode. The output jack of the channel in the record mode will carry the input signal and the meters will also indicate the input signal level. The output for other channels will be for SYNC playback signal but the meter will indicate the playback level.

5.6 Punch-In/Out

- The channel for punch-in is put to record READY by depressing the RECORD TRACK selector (11) button. The RECORD TRACK LED (13) for that track will blink.
- 2) Set the INPUT MONITOR selector (14) to INDIV.
- Depress the PLAY button (24).
 Playback signals for all channels, including that for punch-in, can be monitored.
- 4) While in this state, depress the RECORD button (22) only. The INPUT MONITOR LED (12) will blink and the input signal for the channel to be punched—in only can be monitored. Depressing the RECORD button once again cancels input monitor for the channel to be punched—in and all channels will change to playback signal monitor. Consequently, the output of the channel put in the record READY state for punch—in by depressing the RECORD TRACK selector, and the bar graph meter indications, are alternately switched between the input signal and the playback signal each time the RECORD button only is depressed, which allows free access to tape cue and rehearsal monitoring for the musicians during punch—in.
- 5) Punch-in is accomplished by simultaneously depressing the RECORD and PLAY buttons when the tape reaches the point for punch-in.
 Punch-out is done by either releasing the RECORD TRACK selector button set to READY or depressing the STOP button.
- 6) A REMOTE PUNCH IN/OUT jack (31) is provided on the B-16 rear panel. The Model 8050 Foot Switch is plugged in here and, as mentioned before, when the tape reaches the desired point, the foot switch is stepped on for punch-in and stepped on once again for punch-out.
- 7) There is another method for punch in/out.
 The RECORD and PLAY buttons are simultaneously depressed while all channels of the RECORD TRACK selector are in SAFE.
 The red LED at upper left of the RECORD button will blink. Outputs of all channels will be SYNC and the playback signal is indicated by the bar graph meter.

Now, if the RECORD TRACK selector button is depressed for READY, the signal will be punched-in and punched-out when it is released.

During this procedure, the INPUT MONITOR should be set to ALL.

5.7 Reproduce

- 1) Set all RECORD TRACK selector (11) buttons to SAFE (all buttons released).
- 2) Set the INPUT MONITOR selector (14) to INDIV.
- 3) Set the PITCH control switch (10) to NORM.
- 4) Depressing the PLAY button puts the tape deck in the PLAY mode and the playback signal is obtained at OUTPUT jack (28).
 The bar graph meter will indicate the playback level.
- 5) Playback of tape between the zero position and cue position can be repeated by using the Model 8090 Remote Control Unit. Refer to page 8, THE CONTROLS AND THEIR FUNCTIONS for details.

6. ROUTINE MAINTENANCE

Troubles and down time can be prevented by routine maintenance. Periodically follow the maintenance list below.

6.1 Tape path cleaning

Magnetic recording tape, no matter how good in quality, will always shed some of its oxide coating as it travels past the tape guides and head assembly. Whenever a small particle of oxide (or dust, dirt, etc.) comes between the head and the tape, audible performance can be degraded, especially at high frequencies.

Standard tape head cleaning solvents are available from most Fostex dealers. An ideal solvent consists of 100% pure isopropyl alcohol.

CAUTION: Never use organic solvents such as methyl-ethyl ketone (MEK), lacquer thinner, acetone, etc. These can dissolve the materials that bind the heads together, and, if spilled, can mar or deform plastic parts.

- Cleaning the heads and tape guides
 All heads and guides in the tape path must be cleaned after each 6 hours of operation or before starting a new session.
- Cleaning the pinch rollerClean at least once after each full day of use.
- Cleaning the capstan
 Clean this at the same time the heads are cleaned.

Wipe the heads, tension arm rollers, tape guides, pinch roller, and capstan with a common cotton swab, moistened with the head cleaning fluid or alcohol. Allow the parts to air dry before threading a tape. (The process should be repeated until the swab no longer shows evidence of the reddish-brown oxide, and until the heads are shiny and clean.)

6.2 Demagnetizing

Some of the tape's magnetic field will be transferred to nearby metal parts. In other words, the head and other components in the tape path will become magnetized resulting in degradation of signal-to-noise ratio, an increase of distortion, and partial erasure of high frequencies on recorded tapes. The purpose of demagnetization (degaussing) is to neutralize residual magnetism in the vicinity of the tape path.

All heads and tape guides should be demagnetized after each eight hours of operation or before starting a new session of recording.

- 1) Be sure to switch off the recorder.
- 2) Have all tapes at least 5 or 6 feet away when demagnetizing because the demagnetizer's magnetic field will damage them.
- 3) Slowly wave the tip of the demagnetizer up and down in front of each head, then, slowly move it away. (Slow movement is recommended as any abrupt motion can remagnetize the head). Take your time and repeat the process on the other heads.

After you finish work on all heads and guides, withdraw the demagnetizer a arms-length, switch it off, and unplug the cord.

6.3 Checking reproduce alignment

After cleaning and demagnetizing the transport, set the NR INT/EXT selector
on the rear of the recorder to EXT, and thread a reproduce alignment tape
on the recorder.

Reproduce alignment tape: Fostex Model 9200, or, MRL 31J329, $\frac{1}{2}$ " TAPE WIDTH, 00-35 μ S, 320 nWb/m, Magnetic Reference Lab.

- 2) Be sure all RECORD TRACK selectors are released (SAFE mode), and INPUT MONITOR selector is in INDIV position. Then play the tape.
- 3) All 16 meters should indicate 0 dB levels during the reference 1 KHz tone playback. If not, adjust the reproduce amplifier level (REP CAL, Fig.6.1). Access to these adjustments is obtained by swinging down the front panel of the recorder.
- 4) Similarly during playback of the 1 KHz and 10 KHz tones, the meters should all indicate the level specified for the alignment tape. If not, adjust the playback equalization (REP EQ, Fig.6.1)
- NOTE 1: By removing the two screws (F), the amplifier panel hinged at the lower side, can be swung down to make adjustments from the front side.
- NOTE 2: When using the MRL 31J329 tape, connect an AC voltmeter to the output of each channel for adjusting as the frequency response alignment level of this tape is -10 dB.

6.4 Checking record alignment

- After performing the reproduce check, thread a blank recording tape on the transport.
- Depress all RECORD TRACK selectors (READY mode), and depress the INPUT MONITOR selector (INDIV mode).

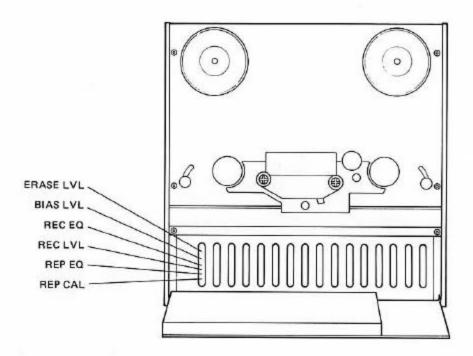


Fig. 6.1

Apply a 1 KHz signal to the recorder inputs at nominal -10dBV level. The 16 meters should indicate 0 dB.

- 3) Record a length of 1 KHz tone, then play it back. If the level is not 0 dB, adjust the record level (REC LEVEL) as required.
- 4) Reset the oscillator and record tones from 40 Hz to 18 KHz.
- 5) Playback the recording and check the frequency response. If it is not within the specified performance, adjust the recording equalization (REC EQ), and fine tune the bias (BIAS LEVEL) as necessary.

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