

Owner's Manual

A-Series Model

20

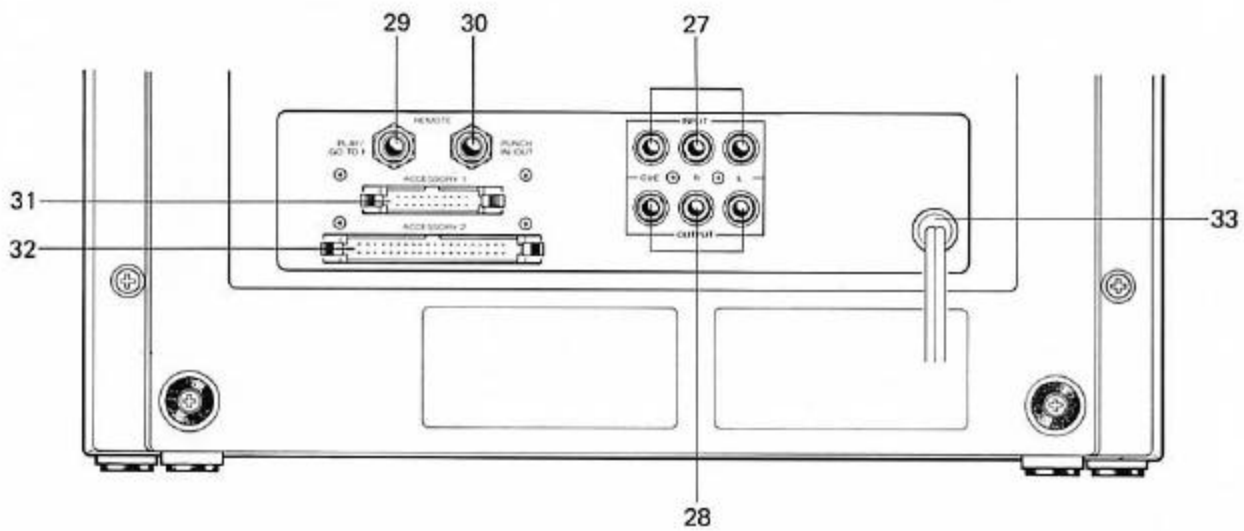
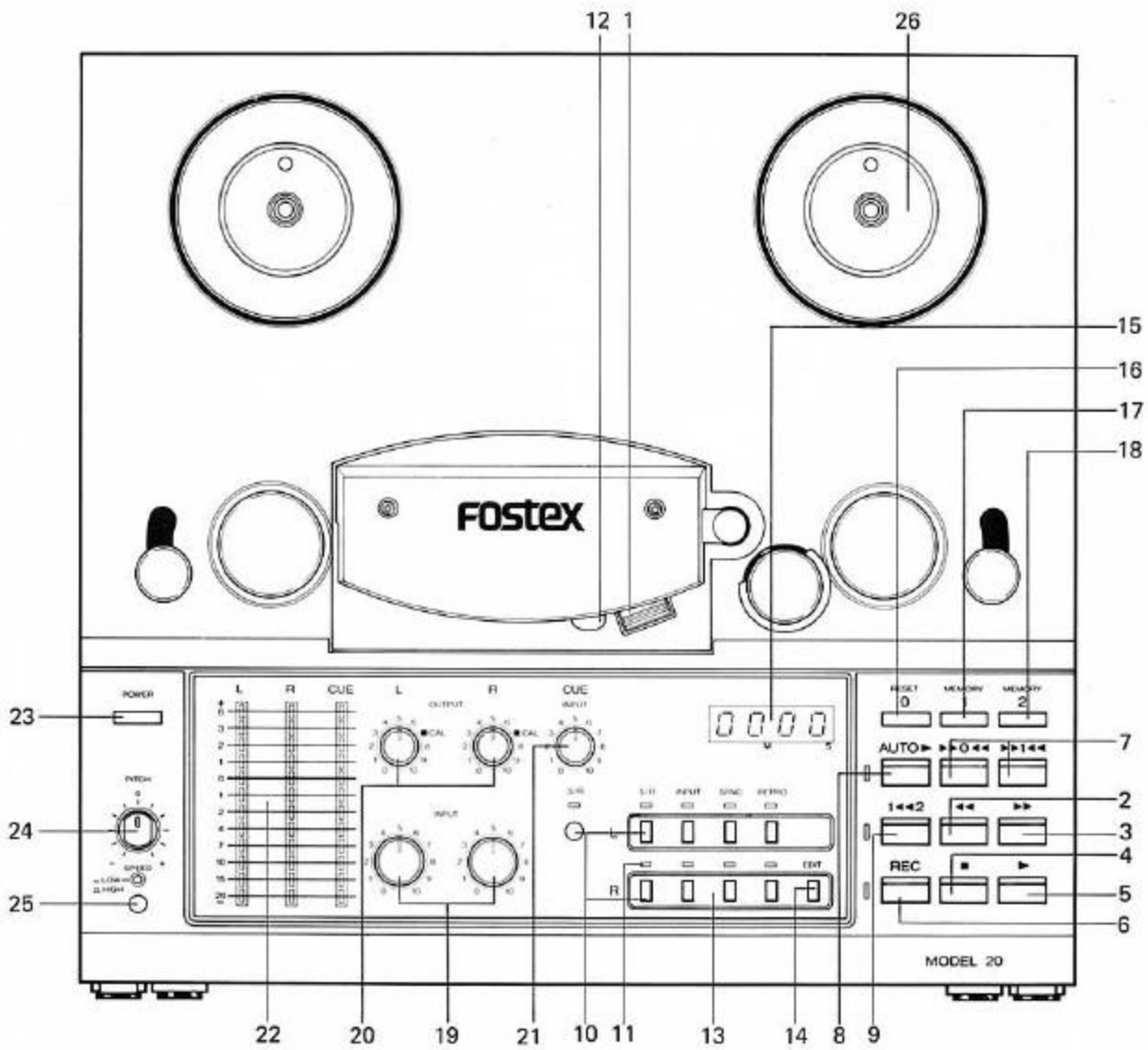
2 TRACK RECORDER/REPRODUCER



Fostex®

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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.



SECTION 1 THE CONTROLS AND THEIR FUNCTIONS

1. HEAD SHIELD GATE

The head shield gate is manually operated. If the gate is retracted down, a short downward push of its top edge will release its lock and the gate fully rise by spring action. To retract it, the gate is pressed down and will be locked at the limiting position.

2. REWIND BUTTON [◀◀]

Depressing this button transports tape at high speed from the right reel to the left reel.

3. Fast forward button [▶▶]

Depressing this button transports tape at high speed from the left reel to the right reel.

4. STOP BUTTON [■]

All modes of REWIND, F.FWD, RECORD, PLAY, LOCATE 0 and LOCATE 1 will be cancelled and tape stopped when this button is depressed.

5. PLAY BUTTON [▶]

Depressing this button puts the recorder in the play mode.

6. RECORD BUTTON [REC]

- With either L, R, both or CUE (time code) depressed, simultaneous depressing of both RECORD and PLAY buttons puts the tracks thus assigned in the record mode.
- with either L, R, both or CUE (time code) depressed and with the transport in the PLAY mode, simultaneously depressing of both RECORD and PLAY buttons puts those tracks thus assigned to the record mode (punch in).

7. LOCATE 0 [▶▶0◀◀] AND LOCATE 1 [▶▶1◀◀] BUTTON

When either the LOCATE 0 or LOCATE 1 button is depressed, the tape will search at FF or RWD, the tape timer zero second position when LOCATE 0 is depressed, or the tape position previously put into memory by depressing the MEMORY 1 button, then enter the STOP mode upon reaching the objective point.

8. AUTO PLAY [AUTO ▶] BUTTON

When this button is depressed, the LED at left of this button will be lit. When this LED is lit, the transport automatically enters PLAY mode at coming to a stop by the functions of the LOCATE 0, LOCATE 1 or the REPEAT button.

9. REPEAT [1◀◀2] BUTTON

The LED at left of this button will be lit when it is depressed. When this LED is lit, the tape in the PLAY mode in the section between MEMORY 1 and MEMORY 2 positions, will automatically go into RWD upon reaching the MEMORY 2 position and stop at arriving at the MEMORY 1 position. If the Auto Play button also is depressed beforehand, it will automatically enter PLAY mode from the above stop mode.

NOTE: The MEMORY 1 tape position will normally be located ahead of MEMORY 2. If this relationship is reversed and the REPEAT button is depressed, the tape timer LED will blink to indicate an error.

10. RECORD TRACK SELECTOR

The buttons for selecting the channel to be recorded and L is for left channel, R for right channel and CUE for time code channel.

- If, for example, the "L" REC TRACK button is depressed, the red LED above the RECORD TRACK button, will blink to indicate the record ready state. Under this condition, if the PLAY and RECORD buttons are simultaneously depressed, the channel (track) of the depressed REC TRACK button will go into the record mode and the red LED change from blinking to steady lighting.
- If the PLAY and RECORD buttons are simultaneously depressed without either of the REC TRACK buttons or CUE REC TRACK button being depressed, the RECORD LED at left of the RECORD button will light in green to indicate the record ready state. Under this condition, if the REC TRACK button is depressed, the LED above the RECORD TRACK button which correspond to the depressed channel, will light and the RECORD LED change color from green to red. If both L and R REC TRACK buttons or CUE REC TRACK button is released (cancelled) in the next step, the RECORD LED will change color to green thus changing from record mode to the record ready mode. With both L and R channels and CUE channel in record mode, and then, record mode of L channel only is cancelled, the RECORD LED will remain in steady lighting but the LED above the L channel RECORD TRACK button will be extinguished.

11. RECORD LED [RED]

This LED will be lit in green or red depending on the following conditions. It will not be lit in other conditions.

- * With none of the RECORD TRACK buttons depressed, this RECORD LED will be lit in green when the RECORD and PLAY buttons are simultaneously depressed.
- * When any one or more RECORD TRACK buttons are depressed, this RECORD LED will be lit in red when the RECORD and PLAY buttons are simultaneously depressed.

12. CUE LEVER

The lifter mechanism lifts the tape away from the head in the REWIND and F.FWD modes.

The cue lever is provided to allow tape cueing when the tape is thus lifted from the head. Shifting the cue lever moves the lifter pins toward the head and the tape will touch the head.

13. MONITOR SELECT [INPUT/SYNC/REPRO]

- * If the INPUT button is depressed, input signals of channels L & R will go to the rear panel OUTPUT jacks and also be monitored by the meter.
- * If the SYNC button is depressed, depending on whether the recorder is in the record mode or not, either the input signal or sync output is obtained at the OUTPUT jack and monitored by the meter.

When the SYNC button is depressed, the signals going to the OUTPUT jack and the meter will be, the input signal when in the record mode or, SYNC output when in other than the record mode.

- * If the REPRO button is depressed, playback output of the

reproduce head goes to the OUTPUT jack and the meter.
NOTE (Cue track monitoring):

Signals on the cue track picked up by the repro head can be monitored when both L and R audio tracks are selected to REPRO and both the audio and cue tracks are not in record mode.

In any other condition, it will be in sync mode and the sync signal on the cue track is picked up by the record head.

Input signals to the cue channel can be monitored by depressing the RECORD TRACK (S/R) button for cue track and depressing only the RECORD button [REC].

Depressing the RECORD button [REC] again returns it to sync mode.

In addition, as it is possible to record overall characteristics of the cue track while, at the same time, pick it up by the reproduce head for monitoring, this feature can be conveniently used for adjusting cue track bias and checking of overall frequency response.

Signals picked up by the cue track reproduce head is obtained at the cue track output jack and also monitored by the cue track meter when the monitor select buttons SYNC and REPRO, for the channel L audio track, are simultaneously depressed.

14. EDIT BUTTON [EDIT]

The EDIT switch is provided to facilitate precise splicing of tape after removing any unwanted section of tape.

When this switch is set to UP, the transport will be in normal operating mode, and when set to DOWN, the LED above the EDIT button will indicate the EDIT mode.

When in the EDIT mode, the transport will not go into any other mode except PLAY and STOP.

In the EDIT mode, the shut off switch linked to the right tension arm will be ineffective and therefore, the capstan motor will rotate upon switching on the power switch and the takeup reel remain stationary when the PLAY button is depressed. In this case, the mechanical brakes will be released but no power is applied to the take up reel motor and the takeup reel can be easily rotated by hand.

If EDIT is switched ON during the PLAY mode, tape will stop but if the PLAY button is depressed again, the tape will be transported at the play speed but will not be wound by the takeup reel. If EDIT is switched OUT under this condition, the transport goes to the stop mode. At this point, if tape slack is taken up so that the right tension arm is up, and then the PLAY button is depressed, the transport goes to normal play mode.

15. TAPE TIMER

A four digit counter to display the minute and second. For position display below the zero point, a "—" is displayed in front of the minute display.

16. RESET | 0 | BUTTON

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

17. MEMORY 1 BUTTON

The present time shown in the tape timer is stored in Memory 1 by depressing this button.

18. MEMORY 2 BUTTON

The present time shown in the tape timer is stored in Memory 2 by depressing this button.

19. INPUT LEVEL CONTROL [INPUT L/R]

These controls are for setting the input signal levels for the L and R audio channels. When a level of -10dBV (0.3V) is applied to the input, the INPUT knob should be at 7 on the knob scale.

CAUTION: When setting the input level control be sure the output level control is at calibration position.

20. OUTPUT LEVEL CONTROL [OUTPUT L/R]

These controls are for setting the output signal levels for the L and R audio channels. The OUTPUT knob should point to CAL on the knob scale at reproducing the test tape reference level.

As the meters are inserted at a point after the output level control, its indications will coincide with the output level. In other words, if the meter is indicating 0dB, the rated output level of -10dBV (0.3V) is obtained at the rear panel output jack.

21. CUE TRACK INPUT LEVEL CONTROL [CUE]

Control knob for setting the cue track recording signal level. It is set for an approximate 0dB reading on the meter.

22. LED BARGRAPH METER

These are peak reading meters.

The 0dB point on the meters correspond to 514nWb/m of tape flux for the L and R audio tracks and 320nWb/m for the CUE track.

23. POWER SWITCH [POWER]

AC power is applied to the unit and the tape timer will indicate "0" when this button is depressed.

The capstan motor will not rotate unless either the supply reel side or the takeup reel side tension arm is up, or in other words, unless the shut-off switch linked to the tension arm is on.

24. PITCH CONTROL KNOB [PITCH]

The 12 o'clock click action stop of this knob is the normal speed (38 cm/s or 19 cm/s) position, and speed can be varied -10% at CCW rotation, and $+10\%$ at CW rotation, respectively, of this knob.

25. TAPE SPEED SELECT [SPEED HIGH/LOW]

HIGH position is for 15 ips (38 cm/s) and LOW for 7-1/2 ips (19 cm/s). Equalization of the record/reproduce amplifier is also switched, linked with tape speed selection. If LOW SPEED is selected, the green LED above this switch will be lit. The equalizer is NAB or IEC standard.

26. REEL CLAMPER

The reel is secured to the reel turntable by CW rotation of this clamper.

27. INPUT JACK

28. OUTPUT JACK

29. GO TO 1/PLAY

The Model 8051 Foot Switch is plugged in here to control the Model 20. When the Model 20 is in the stop mode, stepping on the foot pedal puts the transport in PLAY mode.

When in other than the stop mode, the function is same as LOCATE 1, Item 7), above, whereby the Memory 1 tape position is searched in F.FWD or RWD and stopped at the objective point.

30. PUNCH IN/OUT SWITCH

This switch is used with the Model 8051 Foot Switch to control the Model 20. When Model 20 is in the PLAY mode, stepping on the foot pedal once induces Punch-in and stepping on it again induces Punch-out.

With the Model 8051 plugged in and transport in the RECORD mode, stepping on the foot pedal induces Punch-out.

31. ACCESSORY 1

The receptacle for connecting the Synchronizer. Please inquire your nearest Fostex dealer or service station for details on the Synchronizer.

The Model 8031 Remote Tape Control Unit is also connected here.

32. ACCESSORY 2

This receptacle is for connecting an external operating switch for controlling the Model 20.

Please inquire your nearest Fostex dealer or service station for details.

33. AC POWER CORD

SECTION 2 INTRODUCTION

The Fostex Model 20 is a 3-head Stereo Mastering Recorder with full synchronous reproduce capability and a separate, center track designed to carry SMPTE Time Code. The 2-speed transport is controlled by a microprocessor which, in turn, can be run by an external synchronizer for absolutely precise operation. This is the ideal stereo mastering machine for music videos. The perfect on-stage sync controller. The steady, reliable 2-track. Ready for high tech interface and world class performance. The Model 20.

The Model 20 tape play/record speeds are 15 ips (38 cm/s) and 7-1/2 ips (19 cm/s). It has very low wow and flutter, and a high signal-to-noise ratio.

Of special interest to musicians and songwriters is a remote FOOT SWITCH that tape locate & play. Thus, hands remain free for playing instruments, etc. during punch-ins and punch-outs and overdub. A PITCH control varies both the record and playback speed, and is useful for a variety of effects such as tuning or retiming programs.

Fostex's engineers have designed the 20 to meet the special needs of the serious small studio or production facility. It combines ease of operation, excellent flexibility and low operating costs in an extremely reliable package. Your 20 will provide years of top audio performance with a minimum of servicing. Routine maintenance takes less time because Fostex provides easy access to the transport and record/reproduce amplifiers.

HOW TO USE THIS MANUAL

While it may be possible to "get by" without reading this manual, the utmost in creative results can only be obtained when one is thoroughly acquainted with the 20 and its full capabilities. We suggest quickly reading this manual once

before using the 20 then re-reading the manual later, after becoming familiar with the basic functions of the machine.

Section 1 contains brief descriptions of each feature. This is handy for quick reference, although for a more detailed step-by-step guide to connections, recording and playback, consult Sections 3 and 4. The rest of the manual deals with more specialized areas such as editing (Section 5), creative use of the pitch control (Section 6), and maintenance (Section 7).

Routine maintenance procedures, such as degaussing and cleaning, should be done on a regular basis. Alignment can be done regularly, or may be needed less often, depending on the demands of the application, environmental factors, and whether tape formulations change. Servicing should be referred only to qualified service personnel.

SECTION 3 INSTALLATION

Unpack the unit, and, before making any electrical connections, inspect for any evidence of possible shipping damage. Save all packing materials at least until you have verified that the unit is working properly. If there is any evidence of damage due to rough handling, consult your FOSTEX dealer before connecting or operating the unit.

CABLES

The Model 20 has high impedance unbalanced inputs and outputs. It is recommended that all cables be kept to the shortest practical length, with a maximum of 10 feet (3 meters). Use only high quality cables with tightly braided shields, multiple-stranded center conductors, and low internal capacitance, such as Fostex Models 8841-8842. Such cables minimize high frequency losses, and reduce susceptibility to hum. Separate input cables from output cables by at least a few inches, and keep all signal cable away from AC power cords by the greatest practical distance. If AC and signal cables must intersect, they should cross at right angles.

RECORD INPUTS

The two Model 20 INPUT jacks are unbalanced, high impedance RCA type phono jacks which accept nominal -10 dBV (0.3V) line level signals from a low or high impedance source.

If the mixer has $+4$ dBm (1.23 V) line level outputs, it is necessary to reduce this level by installing 10 or 15 dB attenuation pads between the mixer outputs and the 20 inputs.

Such pads are commercially available.

Microphones cannot be connected directly to the 20 unless a microphone preamplifier is used to increase the signal level. However, many electric musical instruments (e.g., electronic piano, synthesizer, etc.) can be connected directly to the recorder inputs.

CAUTION: Never connect a speaker-level output, such as the output of a power amplifier or guitar amplifier, to the INPUT jacks of the 20 unless a suitable direct box is used. The direct box should attenuate the signal to a suitable -10 dBV level, which prevents overdriving the recorder. The direct box also should include an isolation transformer, which avoids hum by preventing ground loops and also avoids electrical shock hazard.

OUTPUTS

The two LINE OUTPUT jacks of the 20 are unbalanced RCA type phono jacks that deliver nominal -10 dBV (0.3V) line level signals to any high impedance mixer or monitor amplifier inputs. The SMPTE output connects to a synchronizer.

NOTE: Most mixers with line inputs rated at $+4$ dBm nominal level do have input trim or gain controls that can be set for the necessary increased sensitivity to accommodate the recorder's -10 dBV outputs. If the sensitivity cannot be increased, it is O.K. to use the $+4$ dBm inputs, but there may be some degradation of S/N ratio.

For $+4$ dBm interface, we recommend the Fostex Model 5030.

Figure 3-1 Typical production set-up: mixdown

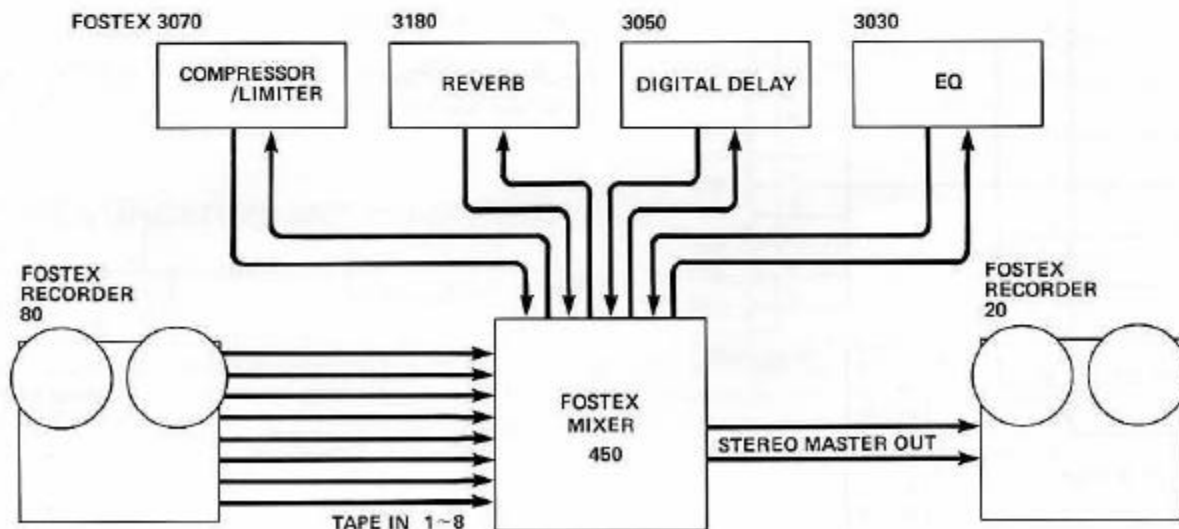
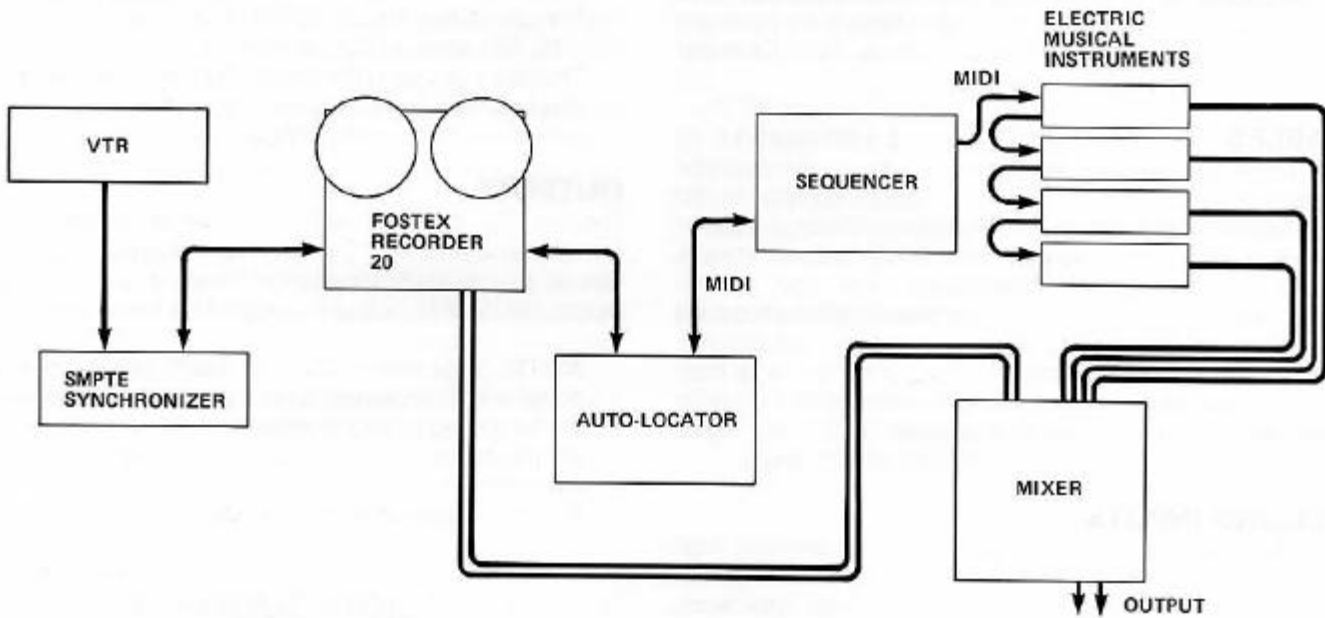


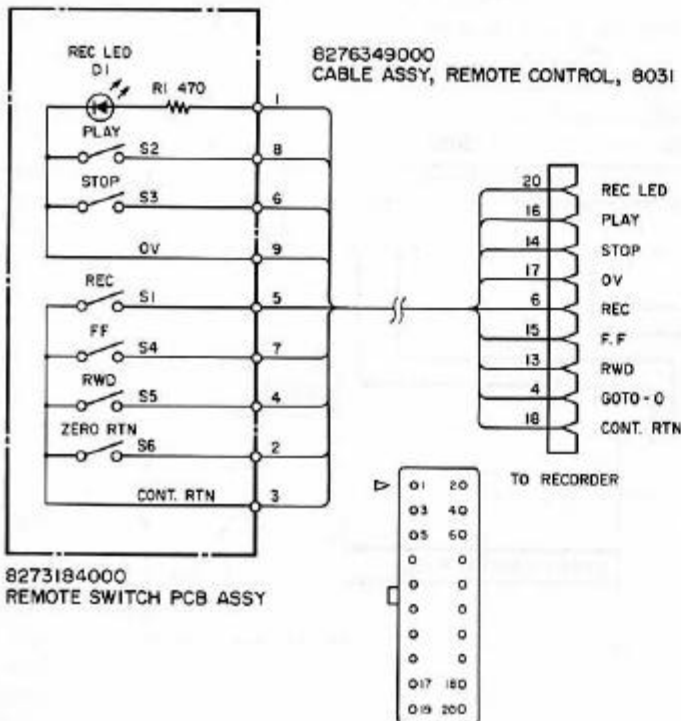
Figure 3-2 Typical post-production set-up.



REMOTE CONTROL CONNECTION

The optional Model 8031 Remote Control Unit plugs into the multi-pin connector on the 20 rear panel. This hand-held unit provides remote control of transport functions (RECORD, STOP, PLAY, F.FWD, REWIND, ZERO RETURN).

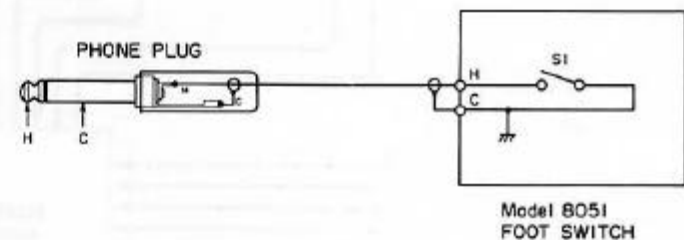
Figure 3-3



REMOTE PUNCH IN/OUT AND LOCATE 1 AND PLAY SWITCHING

A standard phone jack accepts the cable from the remote punch in/out and locate 1 and play switch. As an alternative to the foot switch, a convenient panel-mounted or hand-held switch can be constructed. Some people like to build such switches into the mixer; the optional remote control unit is ideal, since it also contains full transport control capability. However, in the absence of the remote control unit, a low-cost remote punch-in switch can be constructed using any good quality (momentary type) switch. Wire it to a standard 1/4" tiple sleeve phone plug as shown in Figure 3-4, and plug it into the 20 foot switch jack. Non-illuminated indicator-type pushbutton may be used.

Figure 3-4, Schematic for a panel mounted remote punch-in switch.



AC CONNECTIONS

Before plugging the recorder into an AC outlet, make sure the voltage and frequency are correct. It is usually a good idea to connect the mixer and the recorder to the same AC outlet, or at least the same leg of the AC service, as this minimizes any potential difference between chassis grounds in the equipment and thus minimizes hum. This is especially important if the mixer has grounded (3-prong) AC cords.

SECTION 4 RECORDING AND PLAYBACK

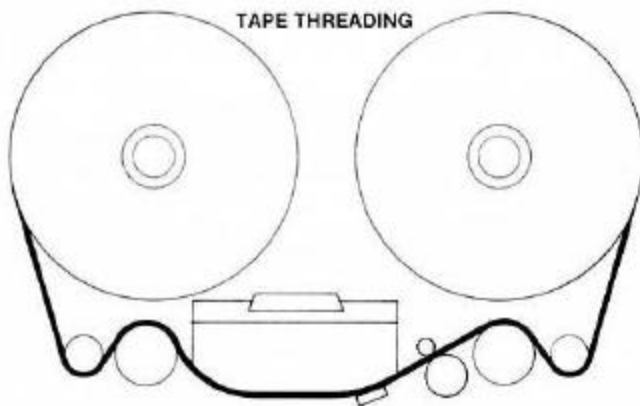
WHAT KIND OF TAPE TO USE

A 7" reel of 1 mil tape, which is about 1800 feet long (550 meters), plays for 22 minutes at the standard 15 ips (38 cm/s) speed of the Model 20. Tapes thinner than 1 mil are not recommended since they are more susceptible to wear, stretching and breakage.

LOADING TAPE ON THE TRANSPORT

Thread a blank tape on the transport (refer to Figure 4-1). We recommend using Ampex 457, Scotch 227, or an equivalent tape formulation; the bias and EQ are factory aligned for these premium quality tapes. If another tape is used, it will be necessary to realign the electronics (See section 7).

Figure 4-1. Tape threading path.



TAPE IDENTIFICATION AND REFERENCE TONES

It is a good idea to use the first minute or two of recording time to record an identifying label (ID), stating the title, date, artist, noise reduction, and other pertinent information. Do this on all tracks. Whether or not a voice identification (ID) is recorded, many engineers like to record standard level reference tones so that during future playback of the tape, the recorder (this same unit or any other 1/4" 2-track, can be precisely aligned to yield identical frequency response and track-to-track levels. Follow the same steps outlined in the recording procedure (next) but before beginning to record the actual program, record the voice and/or tones. Use any suitable test oscillator such as the

PLACEMENT AND MOUNTING CONSIDERATIONS

The 20 can be operated in a vertical, horizontal or tilted position. Be sure that it is firmly supported, however, and that adequate ventilation space is provided. Also, be sure there is adequate clearance for the larger tape reels.

Fostex TT-15 (it can be routed through one of the mixer's inputs for easy assignment to all tracks). We suggest recording 20 seconds of each of the following tones at 0 dB level:

- | | |
|------------------|--|
| 1 kHz | (for checking the reproduce amp level) |
| 10 kHz or 15 kHz | (for checking the high frequency EQ) |
| 100 Hz or 50 Hz | (for checking the low frequency EQ) |

RECORDING

1. Choose the specific track or tracks to be recorded by depressing L or R RECORD MODE button(s). The LED(s) indicating record ready will blink.
2. On the same track(s) to be recorded, depress the INPUT selector button so the meters and recorder output are monitoring the input to the track(s).
3. When recording the time code track, depress the RECORD mode button for the time code track and the LED located above this button will blink.
4. When the RECORD button only is depressed with RECORD mode button for the time code track depressed, the LED on the left side of the RECORD button will blink in green and the time code input signal can be monitored at the recorder output and by the meter.
5. Press the RESET button to zero the counter so it will be easy to return to the beginning of the recording.
6. Set levels with the input level control so that the meters of those tracks to be recorded show peaks at +3 dB to +6 dB.
7. When ready to begin recording, simultaneously press the PLAY and RECORD buttons. (Alternately, press the PLAY button, then step on the REMOTE foot switch.) The LED on the left side of the RECORD button will be lit in red.
8. To end the recording, press the STOP button.

NOTE: One generally listens to the tracks as they are being recorded. This can be accomplished by monitoring the output from the mixer to the recorder, but a better approach is to set up the mixer so that it is monitoring both outputs from the recorder. Then, set up the recorder so that its outputs carry the signal(s) being recorded, as well as any previously recorded tracks. The recorder settings necessary are included in the following procedures.

CHECKING THE RECORD TRACKS

1. Press the LOCATE 0 button to rewind the tape.
2. Release the RECORD MODE button(s) to prevent accidental erasure of the track(s).
3. Depress the SYNC or REPRO button so the meters and output jack will pick up the playback signal, not the input.
4. Press the PLAY button and listen to the recording.
If the recording track must be redone, simply repeat the initial recording procedure: re-recording on the same track will erase the previous "take." It is not usually necessary to re-record any identification or reference tones; just begin recording after the ID and/or tones.

RECORDING ADDITIONAL TRACKS (SYNC RECORDING)

1. Depress the SYNC button of a previously recorded track so playback from this track will be monitored on the meter and at the recorder output jack.
2. Select the track to be recorded using the RECORD MODE selector buttons.
3. Set the level with the input control so that the meter of the track to be recorded show peaks at +3 to +6 dB.
4. When ready to begin recording, simultaneously press the PLAY and RECORD buttons. (Alternatively, press the PLAY button, then step on the REMOTE foot switch.)
5. To end the recording, press the STOP button.

PUNCH-INS

Punch-ins are overdubs that are begun somewhere in the middle of a take, and on a track that already has been recorded. The purpose is to replace a portion of an otherwise satisfactory track.

For greatest convenience, there are two basic ways to enter record mode. Punch-in procedure "A" is used by someone whose hands are free to operate the recorder.

Procedure "B" is for a performer whose hands are unavailable, hence a foot switch is used. In either case, a monitor system will be required (e.g., mixer, amplifier and speakers or headphones).

When the 20 is in any mode except record mode, the outputs carry the tape playback (reproduce amp) signal. When switched to record mode, the outputs of those channels actually recording are switched to source monitoring (the input to the channel also appears at the output jack).

Although the 20 automatically switches to source monitor when recording, sometimes this capability is desired without actually recording, as during a rehearsal. In this case, depress the INPUT selector to obtain source monitoring (not playback) when *not* in record mode.

Punch-in procedure "A"

1. Rewind to a point prior to where the punch-in will take place.
2. Release all RECORD MODE selector buttons so that both tracks are in safe mode; the RECORD ready LEDs should not be illuminated.
3. Depress the SYNC buttons so playback will be heard from both tracks. The INPUT buttons may, of course, be depressed when necessary to monitor the record inputs but the sync button should be depressed during re-recording.

4. Simultaneously press the RECORD and PLAY buttons to initiate *playback*, then the LED on the left side of RECORD button will be lit in green, and the recorder is in record ready mode.
5. To commence the punch-in, press the RECORD MODE button(s) for the appropriate track(s); the red LED will stay on. The output signal of the recording channel automatically changes from tape out to source monitor.
6. To end the punch-in, either press STOP, or release the RECORD MODE button.

NOTE: A variation of this procedure allows the RECORD MODE selector(s) to be preset for recording on the desired channel(s). In that case, press PLAY to begin playback, then press PLAY and RECORD simultaneously to begin the punch-in.

7. For this procedure, the transport is put in the PLAY mode, and tape outputs, including the track being recorded, can be monitored. The musicians then perform by listening to these signals through an externally mixed cue feed.
8. Punch-in can be cancelled by either depressing the STOP button or releasing the RECORD MODE button.

Punch-in procedure "B"

1. Rewind to a point prior to where the punch-in will take place.
2. Depress RECORD MODE button for the tracks you want to fix. The LED whose track is selected should blink.
3. Depress SYNC selector buttons.
4. Press the PLAY button to roll tape.
5. To commence the punch-in, step on the remote foot switch.
6. To end the punch-in, step on the foot switch a second time.

SMPTE RECORDING AND PLAYBACK

When you are ready to record SMPTE Time Code on the 20's center track, connect a code generator to the SMPTE input, and the SMPTE output to an external synchronizer. Apply an SMPTE signal to the time code channel. Put recorder in the RECORD READY mode by depressing the RECORD mode button for the time code channel and monitor the time code input signal and gradually increase the SMPTE level control until the CT bar graph reads 0 dB. Zero the counter at the beginning and make the recording of the time code. Your counter readings can now be referenced to the SMPTE track for total transport control during playback.

OVER AND OVER

Invariably in production and post-production work, you're likely to encounter a section where you have to go back and forth, over and over, until it's right. In this case, take advantage of the 20's multi-function transport control circuitry.

Set Memory 1 at the beginning of the section, Memory 2 at the end; then push 1 ◀◀2.

Whether before or after the selected part, press AUTO and the transport will find the beginning, play till the end, and then shuttle back and forth automatically until you tell it to stop. Your 20 takes predictable care of the cueing, all by itself.

Synchronizer use

The Model 20 can be used with the majority of synchronizers on the market today, such as — BTX Shadow, EECO, Adams-Smith, Audio-Kinetic's Q-Lock, and the SMPL System. In addition, many of the video editors can control the Model 20. The synchronizer port pin-out information is shown in the back of the Model 20 service manual. If you want to make your own cables, the connectors are available from our parts department.

SECTION 5 EDITING

Once a tape has been recorded, it may be necessary to rearrange the order of some takes, splice two different reels of tape together, or, to add leader tape between takes on a given tape. All these operations are considered to be editing. To edit a tape, one should have the following materials available:

1. A splicing block. Such as the Fostex Model 7930. This is usually made of aluminum, with a groove to hold the tape, and one or more grooves cut across the length of the block to guide the cutter.
2. A sharp, non-magnetic single-edged razor blade. To be sure the blade has no residual magnetism, it can be demagnetized in much the same way that the head assembly is demagnetized (Section 7). Be sure to hold the blade securely, however, since a demagnetizer may pull strongly on the blade.

NOTE: A magnetized razor blade will cause an audible "click" or "pop" at the point of the splice. Do not use scissors.

3. A sharp white or yellow grease pencil to mark the intended splice point on the back of the tape.
4. A roll of 1/2" wide (1.3 cm) splicing tape. Splicing tape is specially manufactured for joining magnetic tape; it is thin, and has an adhesive that will adhere to the tape backing, yet not seep out of the splice under the typical pressures and temperatures encountered.

CAUTION: Never use conventional cellophane tape or packaging tapes for splicing. Some of the adhesive on such tapes may ultimately contaminate the recording tape, and may leave deposits on the tape heads and guides.

5. A supply of plastic or paper leader tape; plastic is stronger, but paper is easier to write upon with a pen or pencil, and is thus handy for making notes.

HIGH SPEED SEARCHING FOR AN EDIT POINT

You can search for the end of a take or the beginning of another take in either fast forward or rewind mode.

1. Turn down the monitor amplifier volume most of the way.
2. Press the REWIND or F.FWD button, and press the CUE

The SMPTE time code is normally recorded on the center track at about -4 to 0 on the Model 20's bar graph meter. For proper time code reading, we cannot over-emphasize the importance of keeping the heads and the tape guides as clean as possible!

NOTE: Tape sync (FSK signal) may, of course, be recorded on the center control track.

- lever toward the head assembly so that the tape lightly rests on the record/play head.
3. A high-pitched screech will be heard during the program, with a moment of silence at the end of the program; at that point, hit the STOP button. Since the tape will probably overshoot the intended edit point, it may be necessary to use the opposite fast wind mode momentarily, then press STOP again.
4. For more precise location of the edit point, rewind slightly, then use PLAY to find the exact edit point and press STOP. (NOTE: Return the monitor volume to normal once fast-winding in cue mode has been completed. This procedure will protect your tweeters.)

SPILLING AN UNWANTED SEGMENT OF THE TAPE

It may be desirable to "dump" a portion of the tape, such as a long pause or an unwanted segment of the program. First locate the beginning of the segment as indicated in the previous procedure.

1. Press down the head gate so it retracts and latches down. The edit point on the tape will be in contact with the record/play head (the head nearest to the takeup reel). Mark the back of the tape at the edit point with a grease pencil, then allow some slack and cut the tape.
2. Press the EDIT button to release the takeup reel tension (the reel brakes are still engaged).
3. To spill "unwanted" tape and find the next edit point, press the PLAY button. When the desired second edit point is heard, press STOP.
4. Splice the ends of tape from the two reels together, inserting a piece of leader tape between takes if desired.
5. Disengage the EDIT button and resume normal operation by taking up any slack so the tension arm sensors are actuated.

SECTION 6 CREATIVE USE OF THE PITCH CONTROL

The PITCH control can be used during recording or playback. Normally, these operations should be done with PITCH centered for two reasons, (a) tapes are made at calibrated speeds, and (b) the record/play equalization is properly aligned only at the normal running speed. There are instances when different speeds are useful.

RETIMING

If a recording has been made, say for a 60-second advertisement, and the overall program is a few seconds too short or too long, the PITCH control can be used during remixing to adjust the overall play time. The shift up or down in the frequency of the program should not be disturbing so long as a relatively small correction is used, say less than 5% (less than half the maximum speed deviation). A 5% speed change on a 60 second tape will add or subtract 3 seconds. In a longer program, say a 20 minute segment, a 5% change in length will amount to a full minute.

RETUNING

Suppose the initial track is recorded with the performer out-of-tune. During subsequent overdubs, it may be impractical or

impossible to re-tune the instruments to match the detuned original track. In this case, adjust the PITCH control up or down so that the playback pitch equals the pitch of the instrument which cannot be retuned. Then make the overdub at that speed. Subsequent overdubs and/or the mixdown can be done either at standard speed or the modified speed, as desired.

SPEEDING UP A PERFORMANCE WITHOUT CHANGING THE PITCH

When a performer wishes to play a complex passage at a tempo that would normally be difficult, if not beyond his ability, the PITCH control can be put to good use.

The technique is best used during an overdub, where at least one recorded track is available for a frequency reference. When making the overdub, set the PITCH control so it slows down the tape (rotate CCW). The performer then plays in tempo with the slowed down tape. During this operation, be sure the instrument is tuned to the lower pitch heard in the monitors.

For playback, return the PITCH control to the normal setting (centered). The overdub will now be heard in-tune, at normal pitch, and at a faster tempo than it was actually performed.

SECTION 7 ROUTINE MAINTENANCE

Cleaning the heads and other parts in the tape path, demagnetizing this area, and checking the electronic alignment (bias, level and equalization) are necessary procedures, and should be done on a regular basis. Periodically, check the brake torque and pinch roller pressure.

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, hair, etc.) comes between the head and the tape, audible performance can be degraded, especially at high frequencies.

If the oxide should be scraped off a portion of the tape backing, there will be a momentary loss of sound (a drop out). Drop-outs are permanent flaws in the tape, and must be avoided. Clean guides and heads are less apt to scratch the tape.

Fostex makes special cleaning solvents available from most Fostex dealers. An ideal solvent consists of 100% pure isopropyl alcohol. Rubbing alcohol *should not* be used; even though it is isopropyl, it usually contains water and oils which will leave an unwanted residue after cleaning.

CAUTION: Never use organic solvents such as methylethyl 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.

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.)

The exterior of the 20 can be wiped with a cloth that is moistened with a weak detergent and water solution. Do not use solvents, oils, waxes or spray-on cleaners.

DEMAGNETIZATION

When a recording is made, the record/play head applies a powerful magnetic field to the tape. Iron oxide or similar magnetic particles in the recording tape store a portion of that magnetic field (this is the recording). It is a necessary law of physics that, as the recorded tape is subsequently played, some of the tape's magnetic field will be transferred to nearby metal parts. This residual magnetism is undesirable because it, in turn, can partially erase a tape. The purpose of demagnetization (degaussing) is to neutralize residual magnetism in the vicinity of the tape path.

Demagnetizing with a device such as Fostex Model 8080 is accomplished by bringing a strong alternating magnetic field (created by a demagnetizer) near the head area, then withdrawing the field slowly. It is very important that this procedure be done carefully, and that no tapes be within 2 feet (0.6 meters) of the demagnetizer when it is operating. It is also important to turn off the 20 when the demagnetizer is turned on. Demagnetize after every 8 hours of use.

CAUTION: Demagnetizers are not dangerous devices but if used improperly they can instantly erase a valuable tape, and can permanently magnetize metal parts—the opposite of the desired result. NEVER TURN ON OR EVEN PLUG IN

A DEMAGNETIZER UNLESS IT IS AT LEAST 3 FEET (1 METER) AWAY FROM THE 20. ALSO, NEVER TURN THE DEMAGNETIZER OFF UNTIL IT IS WITHDRAWN TO AN EQUAL DISTANCE OF AT LEAST 3 FEET. If the demagnetizer should be turned on or off near-by the 20, it may impart a magnetic charge to the heads or tape guides which is too strong to be removed by the same demagnetizer.

NOTE: Some demagnetizers do not have on/off switches.

CHECKING REPRODUCE ALIGNMENT

1. After cleaning and demagnetizing the transport, thread a reproduce alignment tape on the recorder.
Reproduce alignment tape (NAB):
Fostex Model 9101A (15 ips/38 cm/s) and (7-1/2 ips/19 cm/s)
or • [MRL 21J205 (15 ips/38 cm/s)]
[MRL 21J204 (7-1/2 ips/19 cm/s)], Magnetic Reference Lab. All specs are identical with Model 9101A except for ref. fluxivity which is 250 mWb/m and thus its reproduce output level will be 5.5 dB lower.
For wow/flutter measurement:
Fostex Model 9102A (15 ips/38 cm/s) and (7-1/2 ips/19 cm/s)
or • [STL # 53-1 (15 ips/38 cm/s)]
[STL #52-1 (7-1/2 ips/19 cm/s)], Standard Tape Lab.
2. Be sure all RECORD MODE selectors are released (safe mode), both REPRO buttons depressed, and SPEED selector set to HIGH.
Then, thread the 15 ips alignment tape on the recorder and play the tape.
3. Both meters should indicate 0 dB (+4 dB for time code track) levels during playback of the 1 kHz reference tone. If not, adjust the reproduce amplifier level for a 0 dB reading by the REP LEVEL pot (R203, 10K Ω , B). These pots are accessible by removing the bottom plate of the recorder.
4. Similarly, during playback of the 100 Hz and 10 kHz tones, both meters should indicate levels specified for the alignment tape. If not, adjust the playback equalization by the REP EQ HI pot (R201, 5K Ω , B). (Figure 7).
5. Set the INPUT/SYNC/REPRO selector to SYNC but all other controls as set in above item 2, and play the alignment tape again.
6. As before, all meters should indicate 0 dB levels during playback of the 1 kHz reference tone. If not, adjust the reproduce amplifier level for 0 dB, in the same way as for above REPRO mode checking and adjusting, by the SYNC LEVEL pot (R208, 10K Ω , B). Then, adjust the reproduce frequency response by the SYNC EQ HI pot (R206, 5K Ω , B).
7. Switch tape speed to LOW (7-1/2 ips), reproduce the 7-1/2 ips NAB alignment tape and check in same way as for high speed (15 ips).
If meter reading is off spec, set MONITOR selector to REPRO and adjust reproduce frequency response by the REP EQ LO pot (R202, 5K Ω , B).
Then, set the MONITOR selector to SYNC and adjust the reproduce frequency response again by the SYNC EQ LO pot (R207, 5K Ω , B).

NOTE: After adjusting the EQ pots, reproduce the reference level to check for a 0 dB reading, if necessary, readjust the pots.

CHECKING RECORD ALIGNMENT

1. After performing the reproduce check, thread a blank recording tape on the transport (Ampex 457 or Scotch 227 is recommended) and set speed selector to HIGH (15 ips).
2. Depress all RECORD MODE selectors (ready mode), and depress both INPUT buttons (INPUT mode).
3. Apply a 1 kHz signal to the recorder inputs at nominal -10 dBV level. Both meters should indicate 0 dB. If not, adjust to 0 dB by the INPUT control knob on the trim panel. (see Figure 8.)
4. Depress both REPRO buttons of the INPUT/SYNC/REPRO selectors, put transport in the record mode and adjust the REC LEVEL pot (R210, 2K Ω , B) for a 0 dB meter reading.

OVERALL FREQUENCY RESPONSE CHECK

1. Apply the input signal to INPUT L jack and connect an AC voltmeter to OUTPUT L. Then, put channel L in the record mode, and set the INPUT/SYNC/REPRO selector to REPRO.
Switch tape SPEED selector to HIGH, apply a -20 dBV (0.1 V) signal of 30 Hz through 22 kHz to the INPUT jack, put transport in record mode, and check the overall frequency response.
Normal response, with reference to 1 kHz, the response is within ± 3 dB throughout the range of 30 Hz through 22 kHz. (50 Hz ~ 12.5 kHz ± 3 dB, for time code track).
If necessary, adjust the REC EQ HI pot (R211, 2K Ω , B). Repeat for channel R.
2. Switch tape SPEED to LOW, apply a -20 dBV (0.1 V) signal of 30 Hz through 22 kHz to the INPUT jack, put transport in record mode, and check the overall frequency response.
Normal response, with reference to 1 kHz, the response is within ± 3 dB throughout the range of 30 Hz through 20 kHz. (50 Hz ~ 6.3 kHz ± 3 dB, for time code track).
If necessary, adjust the REC EQ LO pot (R212, 1K Ω , B), channel R.

BIAS LEVEL AND RECORD LEVEL ADJUSTMENTS

Switch tape SPEED to LOW and thread a blank tape on the transport.

Apply a 6.3 kHz signal of approximately -20 dBV (0.1 V) to the INPUT jack and connect an AC voltmeter to the OUTPUT jack corresponding to the above INPUT jack.

Switch the INPUT/SYNC/REPRO selector to REPRO and depress the REC MODE button for the channel whose bias current is to be adjusted. Put transport in record mode, and after temporarily rotating the BIAS LEVEL trimmer (C101, 150PF) fully CCW, slowly rotate it CW while watching the AC voltmeter. Fix the pot when the reading passes the peak and reaches 4 dB below peak level.

After completing bias level adjustments, check the overall frequency response for 15 ips and 7-1/2 ips speeds.

Figure 7-1 Reproduce alignment

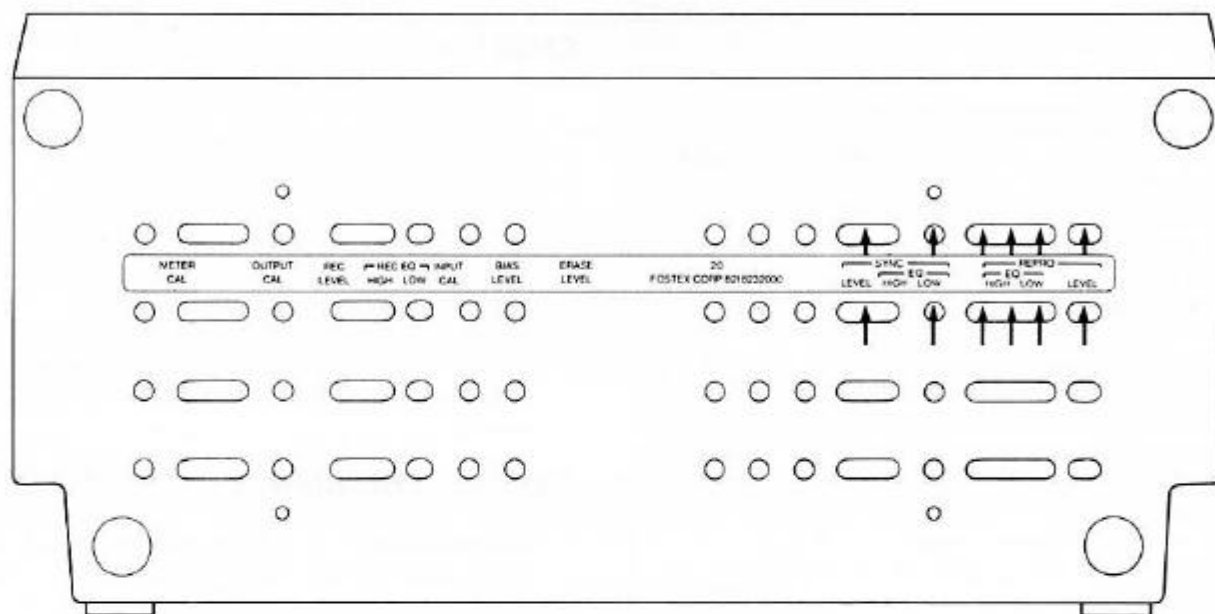
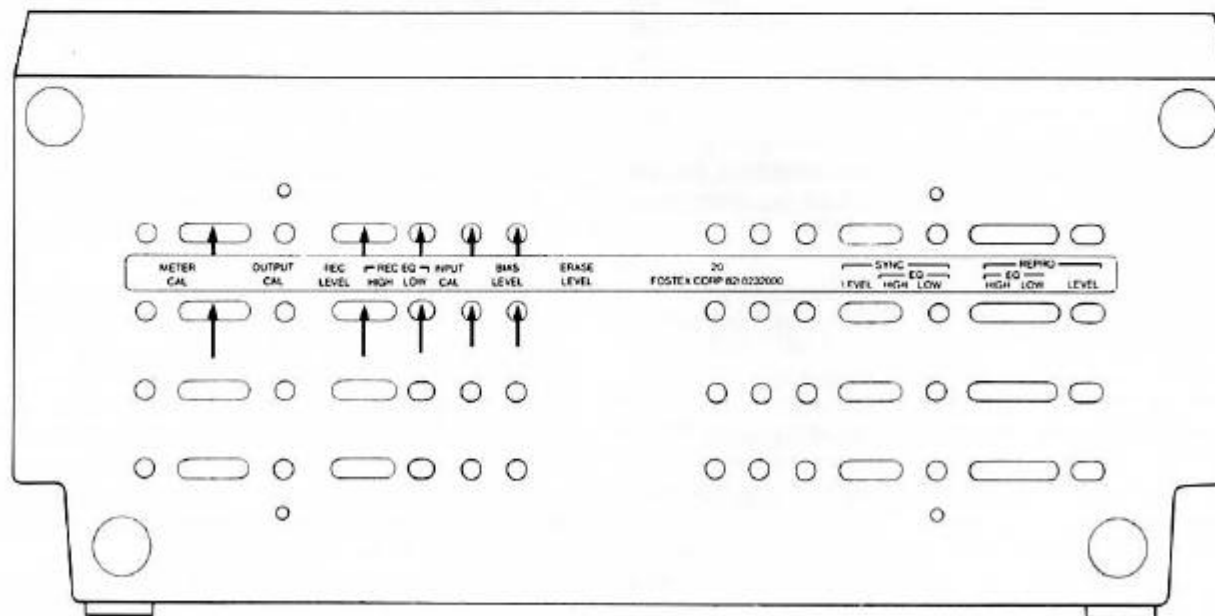


Figure 7-2 Record alignment



SECTION 8 SPECIFICATION

TAPE FORMAT	1/4 inch tape width, 1 mil base 2 track, 2 channel w/center track for time code
REEL SIZE	7 inch
TAPE SPEED	15 and 7-1/2 ips (38 and 19 cm/s) $\pm 0.5\%$
PITCH CONTROL	$\pm 10\%$
LINE INPUT	-10dBV (0.3V), impedance: 30K Ω , unbalanced
LINE OUTPUT	-10dBV (0.3V), load impedance: 10K Ω or higher, unbalanced
RECORD LEVEL CALIBRATION	0dB referenced to 514 nWb/m of tape flux (L,R TRK) 0dB referenced to 320 nWb/m of tape flux (CUE TRK)
EQUALIZATION	NAB or IEC
WOW & FLUTTER	$\pm 0.06\%$ peak (IEC/ANSI), weighted at 15 ips. $\pm 0.12\%$ peak (IEC/ANSI), weighted at 7-1/2 ips, measured with flutter test tape
STARTING TIME	Less than 0.5 sec.
FAST WIND TIME	140 seconds for 1800 ft. of tape
FREQUENCY RESPONSE	Both SYNC & REPRO for L/R channels: 30Hz ~ 22kHz, at 15 ips, ± 3 dB 30Hz ~ 20kHz, at 7-1/2 ips, ± 3 dB Both HIGH & LOW speeds for CUE REPRO: 50Hz ~ 12.5kHz Both HIGH & LOW speeds for CUE SYNC: 50Hz ~ 6.3kHz
SIGNAL TO NOISE RATIO	L, R TRK: 70dB weighted, 67dB unweighted at 15 ips and 7-1/2 ips, referenced to 3% T.H.D. level at 1kHz CUE TRK: 63dB weighted, 58dB unweighted at 15 ips and 7-1/2 ips, referenced to 3% T.H.D. level at 1kHz
T.H.D.	Less than 1% at 1kHz, 0dB
ERASURE	Better than 70dB at 1kHz
CROSSTALK	CUE TRK \rightarrow L, R TRK, better than 70dB/1kHz with all channels in REC mode
POWER REQUIREMENTS	120V AC, 60Hz, 44W (U.S.A./Canada models) 220V AC, 50Hz, 44W (European models) 240V AC, 50Hz, 44W (UK/Australian models)
DIMENSIONS, overall	14"(W) x 13-1/2"(H) x 8-1/2"(D)
WEIGHT	29 lbs (13kg)

SAFETY INSTRUCTIONS

WARNING

"READ BEFORE OPERATING"

1. Read Instructions—All the safety and operating instructions should be read before the appliance is operated.
2. Retain Instructions—The safety and operating instructions should be retained for future reference.
3. Heed Warnings—All warnings on the appliance and in the operating instructions should be adhered to.
4. Follow Instructions—All operating and use instructions should be followed.
5. 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.
7. Heat—The appliance should be situated away from heat sources such as radiators, heat registers, stoves, or other appliances (including amplifiers) that produce heat.
8. 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.
9. 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.
10. Cleaning—The appliance should be cleaned only as recommended by the manufacturer.
11. Nonuse Periods—The power cord of the appliance should be unplugged from the outlet when left unused for a long period of time.
12. Object and Liquid Entry—Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through openings.
13. 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 damaged.
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.

Fostex

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