

TECHNICAL MANUAL



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TECHNICAL MANUAL

CRITERION 90-1 AND 90-2

RECORD/PLAYBACK UNITS



HARRIS CORPORATION

Broadcast Products Division

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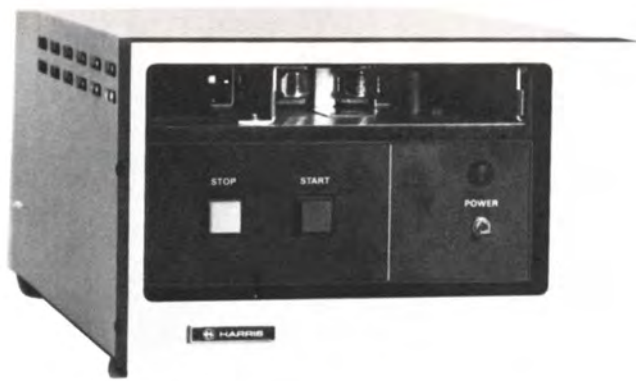
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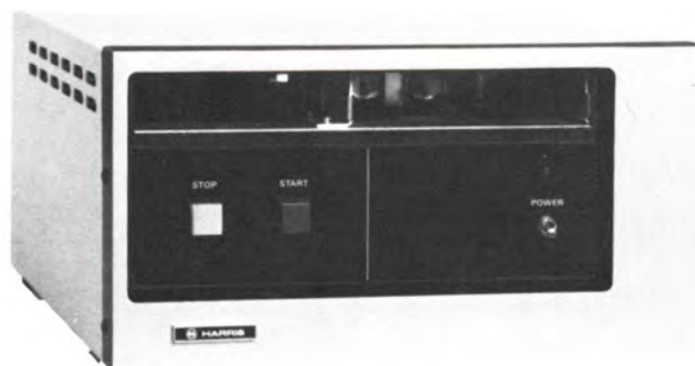
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CRITERION 90-1



CRITERION 90-2 RECORD/PLAYBACK



CRITERION 90-2 PLAYBACK

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Figure 1-1. Criterion 90-1 and 90-2 Record/Playback Units

SECTION I

DESCRIPTION AND SPECIFICATIONS

1-1. SCOPE.

1-2. This manual provides operating and maintenance information for the Criterion 90-1 playback unit, the Criterion 90-2 record/playback unit, and the Criterion 90-2 playback only unit (figure 1-1). Each of the units is available in either monophonic or stereophonic configuration. In addition, the units can also be specified by the customer for 117-volt, 50-Hz operation. The manufacturer's part number and NAB cartridge sizes for each configuration are listed in table 1-1.

Table 1-1. Criterion Cartridge Tape Units

UNIT	PART NO.	NAB CARTRIDGE SIZE
Criterion 90-1-Mono Playback	994 7993 001	A or B
Criterion 90-1-Stereo Playback	994 7994 001	A or B
Criterion 90-2-Mono Playback	994 7995 001	A, B, or C
Criterion 90-2-Stereo Playback	994 7996 001	A, B, or C
Criterion 90-2-Mono Record/Playback	994 7997 001	A, B, or C
Criterion 90-2-Stereo Record/Playback	994 7998 001	A, B, or C

1-3. The tape units use solid-state electronics, consisting of silicon transistors and integrated circuits, to provide temperature and gain stability.

1-4. The heart of the Criterion 90 machines is the synchronous hysteresis motor with direct capstan drive. The motor assembly is precisely mounted on a heavy half-inch aluminum deck plate, and uses a full-swing pressure roller to provide optimum tape accuracy.

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1-5. The high quality laminated heads employ an all-metal hyperbolic face to provide long wear and low oxide accumulation. Three tape guides, together with the playback and record heads assures the optimum in tape path guidance. The playback only model has a dummy head installed in the left head slot.

1-6. EQUIPMENT CHARACTERISTICS.

1-7. Table 1-2 lists the electrical and physical characteristics of the Criterion 90 playback and record unit.

Table 1-2. Criterion 90 Characteristics

FUNCTION	CHARACTERISTIC
Frequency Response	+2 dB at 300 to 15,000 Hz; +3 -2 dB at 50 Hz to 300 Hz.
Noise (Measured without muting)	55 dB, or better, below the reference level of 160 nWb/m at 1 kHz.
Muted Noise	Better than -75 dBm.
Equalization	Complies with NAB Recording and Reproducing Standards; CCIR equalization available on special order.
Output	+18 dBm clipping point, normally 0 dBm with standard NAB level recording. 600-ohm balanced impedance with 150-ohm operation.
Cue Signals	1000-Hz Primary, 150-Hz Secondary, and 8000-Hz Tertiary. The tertiary relay is available as optional equipment.
Tape Speed	7-1/2 inches per second; 3-3/4 or 15 inch on special order.
Tape Drive System	Direct capstan drive employing sealed ball bearings. Tape start and stop time is adjustable with a 0.08 second minimum.
Tape Speed Accuracy	0.1%, or better.
Wow and Flutter	0.15% NAB unweighted, or less.
Heads	NAB standard.
Remote Control	All control functions via ground switching.
Power Source	117 Vac <u>+10%</u> , 60 Hz; 50 Hz on special order.
Power Requirement	70 watts, maximum.
Ambient Temperature	55°C, maximum.

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Table 1-2. Criterion 90 Characteristics (Continued)

FUNCTION	CHARACTERISTIC
<p>Dimensions:</p> <p>Rackmount</p> <p>Desktop Cabinet</p> <p>Weight</p> <p>External 24 Volt DC Load Current</p>	<p>Height: 7 inches (17.78 cm) Width: 19 inches (48.26 cm) Depth: 15 inches (38.1 cm)</p> <p>Height: 5-1/2 inches (13.97 cm) Width: Criterion 90-1: 8-5/8 inches (21.91 cm) Criterion 90-2: 17-1/8 inches (43.82 cm) Criterion 90-2 Playback Only Model: 10-1/4 inches (26.04 cm) Depth: 15 inches (38.2 cm)</p> <p>Criterion 90-1: 23 lbs. (10.4 kg) Criterion 90-2 Record/Playback: 34 lbs. (15.4 kg) Criterion 90-2 Playback: 25 lbs. (11.3 kg)</p> <p>200 mA</p>

SECTION II
INSTALLATION

2-1. SCOPE.

2-2. This section contains information on the inspection, unpacking, and installation of the Criterion 90-1 and 90-2 Record/Playback units. Instructions for system interconnection are provided and include illustrations showing the cabling connections for the various equipment items. External connections are tabulated. During installation of the equipment, standard safety practices are to be used, and strict adherence to the cautionary notes specified in the text is stressed.

2-3. INCOMING INSPECTION AND UNPACKING.

2-4. Domestic shipment of the equipment is normally conducted via private carrier. Care should be exercised in unloading the equipment to prevent injury to personnel and damage to the equipment. Upon delivery, the shipping container should be examined for indications of possible mishandling. If damage is evident, immediately notify the carrier and Harris Corporation, Broadcast Products Division (refer to paragraph 2-8, Returns and Exchanges).

2-5. UNPACKING.

2-6. Proper handtools are to be used in unpacking the equipment. To prevent damage to the equipment finish, do not use a knife or other sharp utensil to remove the protective material. The containers are to be opened from the top, and the equipment carefully removed. The control tags attached to the equipment are to be checked against the Packing Check List to verify that the shipment is complete. Any discrepancy is to be reported immediately to Harris Corporation, Broadcast Products Division (refer to paragraph 2-8).

2-7. During removal of the system components from the containers, inspect them for obvious defects, missing parts, and loose or incorrect hardware. Operate the front panel controls and switches to ensure freedom of movement. Loosen the wing nut(s) at the rear of the unit, and remove the top access cover. Remove the fibreboard shipping holddown and ascertain that all printed circuit modules are installed and properly seated.

2-8. RETURNS AND EXCHANGES.

2-9. Equipment, damaged or undamaged, should not be returned until written approval and a Return Authorization is received from Harris Corporation, Broadcast Products Division. Special shipping instructions and coding will be provided to assure proper handling and prompt issuance of credit. Complete details regarding the circumstances and reasons for return are to be included in the request to return. Customized equipment and special order equipment is not returnable. In those instances where return or exchange of equipment is at the request of the customer, or the convenience of the

customer, a restocking fee will be charged. All returns will be sent freight prepaid and properly insured by the customer. When communicating with Harris Corporation, Broadcast Products Division, specify the Factory Order Number or Invoice Number.

2-10. INSTALLATION PROCEDURES.

2-11. GENERAL REQUIREMENTS.

2-12. The location of the Criterion 90 unit(s) in an individual station will be determined by the arrangement of the main control room facilities. The placement of equipment and wiring should be carefully planned before installation work is started. Care should be taken to provide for adequate ventilation.

WARNING

The protective covers on the under side of the chassis are for your protection. Do not operate equipment with covers removed.

2-13. MONOPHONIC PLAYBACK.

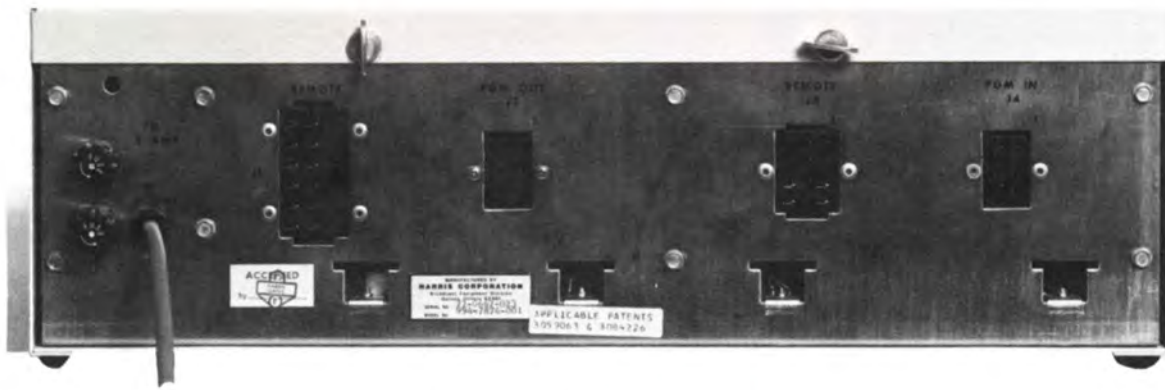
2-14. Connect a two-conductor shielded cable between the desired audio console input terminals and the 600-ohm program output terminals 3 and 5 of playback connector J2 (figure 2-1). The shield of the cable should be connected to terminal 1.

2-15. STEREOPHONIC PLAYBACK.

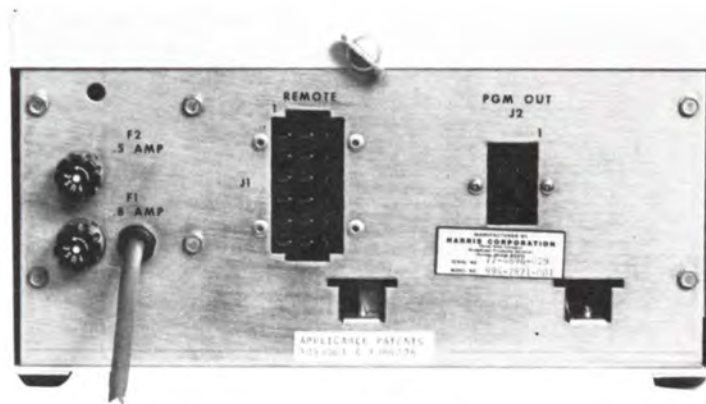
2-16. Connections for the stereo left channel are similar to the monophonic audio channel. The stereo right channel is connected to terminals 4 and 6 of J2 with pin 2 connected to the shield. Phasing should be carefully observed. Terminals 1, 3, and 5 for the left channel are identical to the right channel terminals. Refer to table 2-1.

2-17. PROGRAM OUTPUT IMPEDANCE.

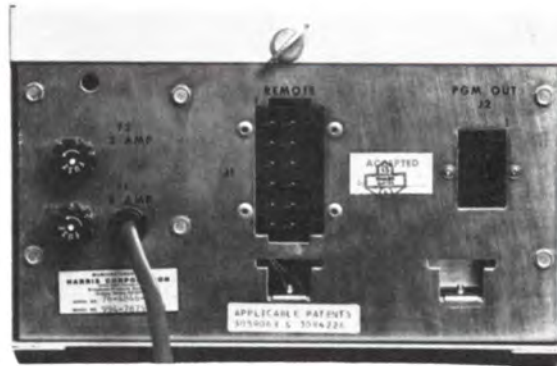
2-18. The output transformers, T2 and T3, are normally impedance matched to a 600-ohm line (figure 2-2). Impedance may be changed to 150 ohms by removing the jumper between terminals 4A and 5A (figure 2-2), and adding a jumper between terminals 3 and 4, and another jumper between terminals 5 and 6 at the bottom of the Record motherboard. The right program transformer T3, when used, can be changed by following these same directions.



CRITERION 90-2 RECORD/PLAYBACK



CRITERION 90-2 PLAYBACK

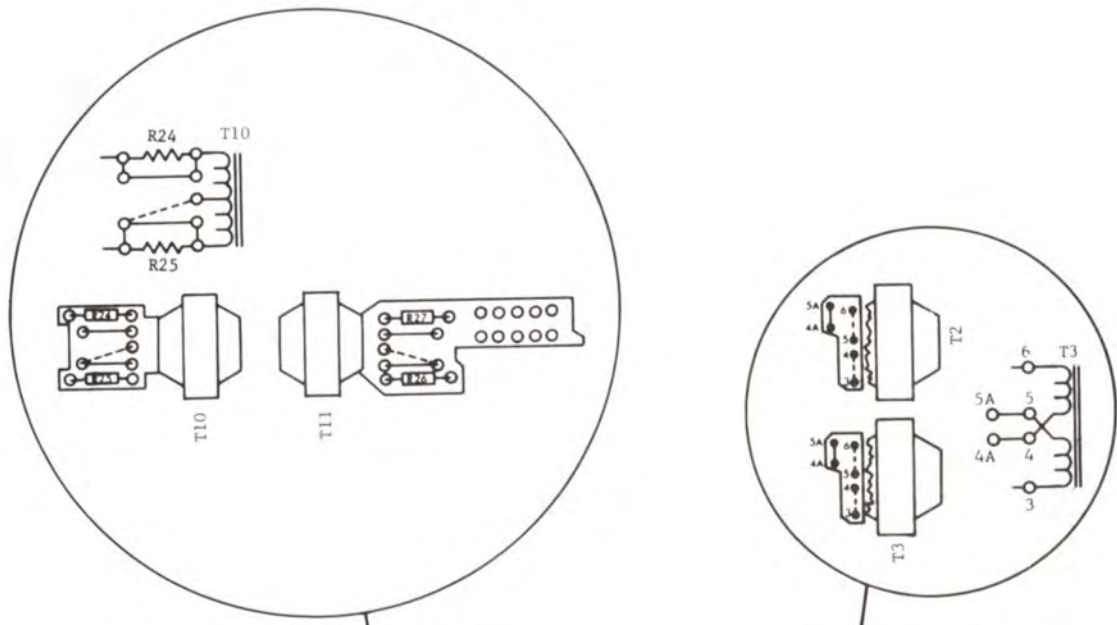


CRITERION 90-1

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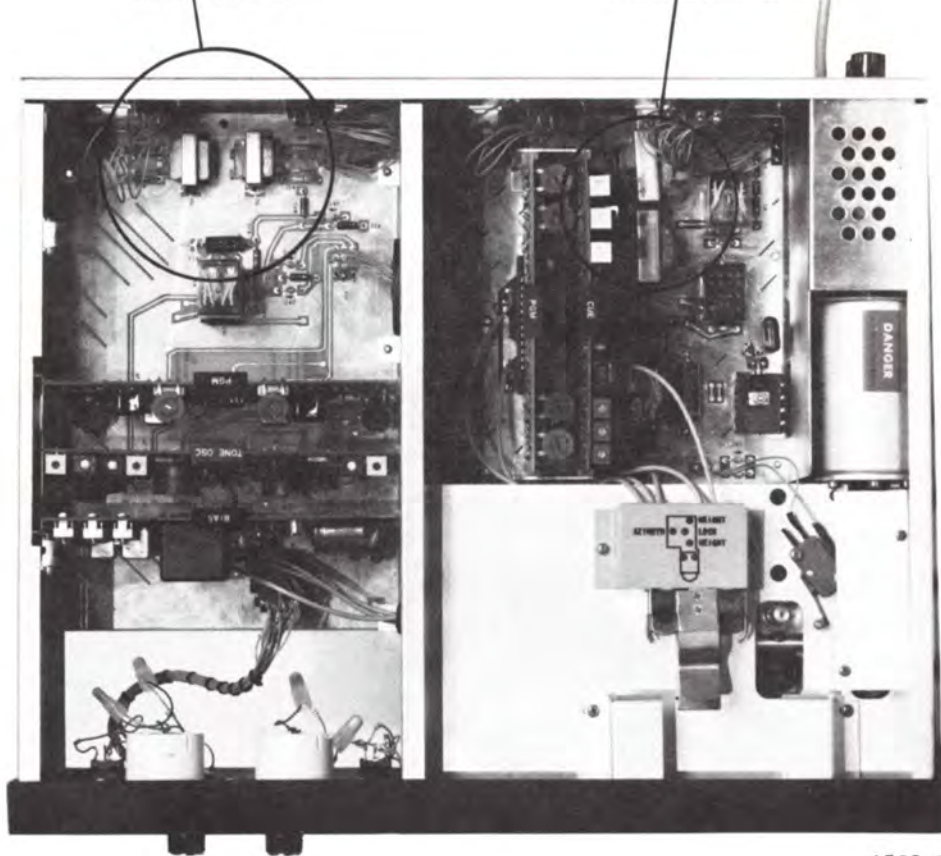
Figure 2-1. Criterion 90 Rear Panel Connections

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INPUT TRANSFORMERS

OUTPUT TRANSFORMERS



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Figure 2-2. Input/Output Transformer Connections

Table 2-1. Playback External Connections

TERMINAL	FUNCTION
J1-1	Ground
J1-2-3	Tertiary Cue Switching
J1-4-5	Secondary Cue Switching
J1-6	Primary Cue Stop
J1-7-1	Remote STOP
J1-8-1	Remote START
J1-9-11	Remote READY Indication
J1-10-11	Remote START Indication
J1-14	Bias Control
J1-15	Positive 24 Volts
J1-16	Cue Pre-Amp. Output (Logging)
J1-17	Logging IN
J2-1	Shield Ground
J2-3-5	Monophonic, or Left Stereo Program Output
J2-2	Shield Ground
J2-4-6	Right Stereo Audio Output (if used)

2-19. RECORD AMPLIFIER PROGRAM INPUT.

2-20. Connect a two-conductor shielded cable between the desired audio input (monophonic or left stereo channel) to terminals 3 and 5 of J4 with the shield connected to terminal 1. For stereo operation connect the right channel audio to terminals 4 and 6 of J4, and the shield to terminal 1. The connections are listed in table 2-2.

2-21. RECORD AMPLIFIER INPUT IMPEDANCE.

2-22. The input transformers are normally connected to match a balanced 600-ohm line (figure 2-2). Impedance is changed to 150 ohms by reconnecting jumper(s) on the input to the transformer. Change to jumpers immediately next to resistors R24 and R26 so that the end of the jumper nearest to the particular transformer is connected to the vacant center terminal of the transformer. To change to 20k ohm bridging input, remove both jumpers for each transformer or four in all (refer to figure 2-2).

2-23. REMOTE CONTROL CONNECTIONS.

2-24. All control functions may be remotely controlled. Refer to tables 2-1 and 2-2 for the proper connections.

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Table 2-2. Record External Connections

TERMINAL	FUNCTION
J3-1	1-kHz Cue Inhibit
J3-2	1-kHz Cue Add
J3-3	Ground
J3-4-6	Remote 150-Hz Cue Keying
J3-5	Not Used
J3-6-7	Remote 8-kHz Cue Keying
J3-8	Not Used
J3-9-10	Remote Record SET
J3-11	Not Used
J3-12	Remote SET Indication
J4-1-2	Shield Ground
J4-3-5	Monophonic, or Left Stereo Audio Input
J4-4-6	Right Stereo Audio Input

SECTION III

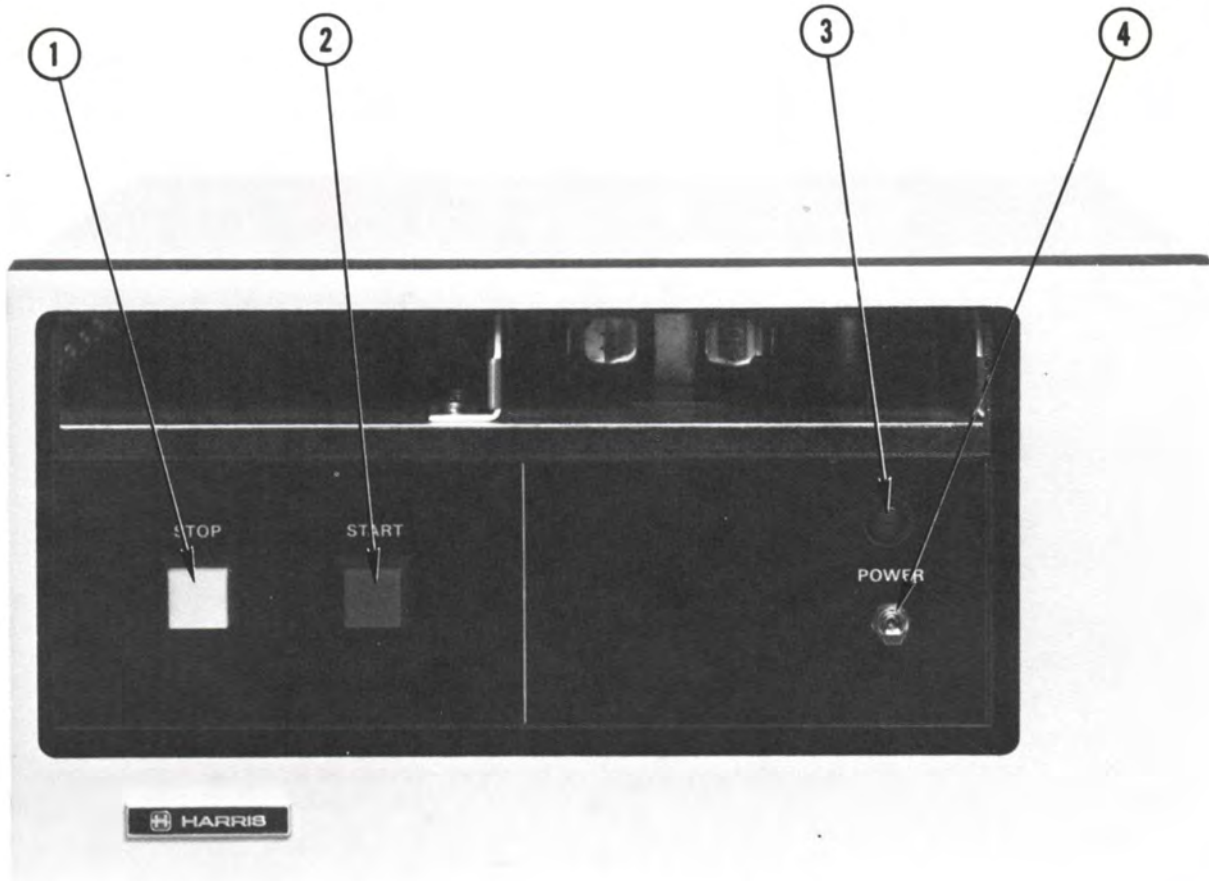
OPERATION

3-1. GENERAL.

3-2. This section provides information regarding the identification, location, and function of the controls and indicators on the Criterion 90 playback and record units. The section also contains information on playback and record operating procedures.

3-3. CONTROLS AND INDICATORS.

3-4. The controls for Criterion 90 playback units are shown in figure 3-1 and their functions are described in table 3-1. The record controls are illustrated in figure 3-2 and their functions are described in table 3-2.



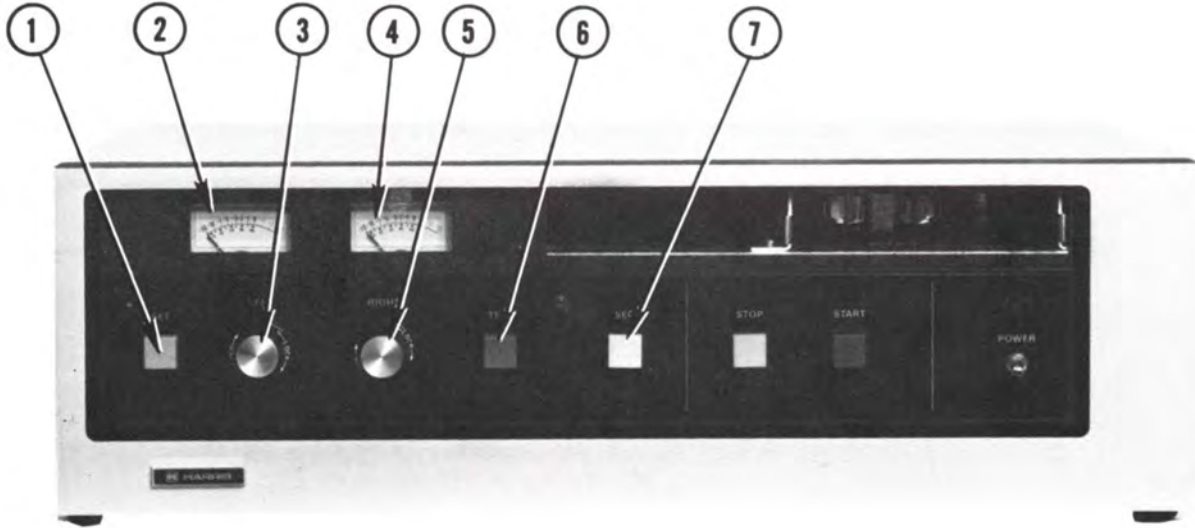
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Figure 3-1. Playback Controls and Indicators (Common to all Units)

Table 3-1. Playback Controls and Indicators

REF.	CONTROL/INDICATOR	FUNCTION
1	STOP (ready) indicator switch, S2	Pushbutton/indicator switch; when depressed manually stops the tape motion and energizes the muting of the audio outputs. Switch lights when a cartridge is properly inserted and the machine is in the READY condition. The lamp also lights when the Tertiary cue relay is activated.
2	START (run) indicator switch, S3	Pushbutton/indicator switch; when depressed, activates the run relay K1, the pinch roller solenoid, sets the tape in motion, and deenergizes the muting of the audio output. The switch lights when the tape is running. The lamp is brightened when the Secondary cue relay is activated.
3	POWER indicator, DS1	The POWER indicator lights indicating that the POWER switch has been set to the on position and the power supply is operational.
4	POWER switch, S4	Two-position toggle switch controlling application of primary power to the power supply.

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Figure 3-2. Record Controls and Indicators

Table 3-2. Record Controls and Indicators

REF.	CONTROL/INDICATOR	FUNCTION
1	SET indicator switch, S4	Pushbutton/indicator switch; when depressed places the unit in the record mode.
2	VU meter, M1	Indicates recording and playback level of the left record channel.
3	LEFT gain control adjust, AT1	Adjusts the recording level of the left control channel.
4	VU meter, M2*	Indicates recording and playback level of the right record channel.
5	RIGHT gain control adjust, AT2	Adjusts the recording level of the right record channel.
6	TERT indicator switch, S5	Pushbutton/indicator switch; when depressed keys the 8-kHz tertiary cue tone oscillator.
7	SEC pushbutton switch, S6	Pushbutton/indicator switch; when depressed keys the 150-kHz secondary cue tone oscillator.

* Meter M2 and control AT2 are not installed in monophonic units.

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3-5. PLAYBACK OPERATING PROCEDURE.

3-6. The routine for on-the-air playback of program material is described in the following procedural steps.

- a. Insert a recorded tape cartridge with the cartridge flush against the right-hand guide of the cartridge slot.
- b. Observe that the STOP (ready) indicator switch lights indicating that the cartridge is properly inserted and the unit is ready for on-the-air playback.
- c. Depress START switch. Tape motion will start and will continue until the primary cue tone is sensed by the cue head. The unit will stop with the tape in the correct position for the next playback.

3-7. RECORD OPERATING PROCEDURE.

3-8. Recording of one or more productions is performed in the following procedure.

- a. Insert a blank tape cartridge into the right side of the cartridge slot of the playback unit. Note that the STOP indicator lights indicating the cartridge is properly inserted. Depress the START switch on the playback unit, pre-run the cartridge for several seconds, and press the stop switch. This will ensure proper tape tension and travel.
- b. Momentarily depress the record SET switch noting that the switch lights.
- c. Adjust the INPUT control (s) for a 0 reading on the VU meter(s) at program peaks.
- d. Depress the START switch on the playback unit and start recording immediately.
- e. Upon completion of the recorded production, momentarily depress the STOP switch when more than one production is desired on the same tape cartridge.
- f. When recording more than one production on a single tape cartridge, follow the procedure specified in steps c. through e. for each recording. Upon completion of the final recorded production, allow the tape to continue running for several seconds, then depress the STOP switch. Then depress the START switch and allow the tape to run until it is stopped by the primary cue tone.

NOTE

The 1000-Hz primary cue tone is recorded automatically at the beginning of the recording. If desired, the secondary and tertiary cue tones may be inserted after the message has been completely recorded. This feature permits monitoring and accurate placement of the tones. The machine does not have to be in the record mode to record secondary or tertiary cue tones.

SECTION IV

THEORY OF OPERATION

4-1. PLAYBACK PROGRAM AMPLIFIER (MONOPHONIC OR LEFT STEREO CHANNEL).

4-2. Refer to the playback schematic diagram, figure 7-1. Transistors Q1 and Q2 is a bootstrap amplifier providing high dc stability. R2, R9, and C3 provide equalization, fixed for low frequencies of the NAB curve and adjustable at high frequencies, to compensate for head losses and to meet the 3-3/4, 7-1/2, or 15 IPS tape speed requirements. R1 and R4 provide local ac feedback to these stages to increase ac stability. Q3, Q4, Q5 and Q6 make up the complementary symmetrical output amplifier, utilizing heavy feedback for stability. The right channel program amplifier, when used, operates similarly.

4-3. The output transformer(s), mounted on the playback motherboard, is normally connected for a balanced output impedance of 600 ohms. A 150-ohm output impedance is available by changing jumper(s) in accordance with the procedure detailed in paragraph 2-17.

4-4. Light dependent resistors, LDR1 and LDR2 on the left and right program output lines, provide muting of the outputs except when the START switch has been depressed. With the run relay deenergized, voltage is not applied to the LDR's and their resistance is near infinity. When the run relay is energized, approximately +11 volts is applied to the LDR's and their resistance drops to near zero.

4-5. CUE SENSOR CARD.

4-6. The output of the playback head is equalized through amplifier U1 and applied to a buffer amplifier formed by a second section of U1. The buffer amplifier output is supplied as input to the three cue sensors across the sensitivity potentiometers (R10, R12 and R29), and is also routed via J6-12 and J1-16 to provide the Logging or Cue Amplifier output.

4-7. The cue signal from the buffer amplifier is then applied to the 1-kHz primary, 150-Hz secondary and 8-kHz tertiary cue sensor circuits, which are nearly identical. Each sensor circuit consists of an amplifier stage followed by a narrow bandpass filter permitting cueing only on those signals which fall within the NAB tolerance for cue frequencies. The center frequencies of the bandpass filters are set via potentiometers R18, R36, and R51 prior to delivery. The secondary cue sensor bandpass filter stage is followed by detector Q3 and relay driver Q4; the tertiary bandpass filter stage is followed by detector Q1 and relay driver Q2. The low output of the driver stage energizes either cue relay K2 or K3.

4-8. To prevent the primary cue sensor from responding to cue signals present at startup and to shape the primary cue pulse to a usable width, the primary cue bandpass filter is followed by timing circuits of quad voltage comparator U3 and associated components. The primary cue circuit is inhibited

for 1.75 +0.25 seconds after startup until capacitor C21 is charged via resistor R22. After the circuit is enabled, the detection of a primary cue tone will cause relay driver Q5 to conduct and, via J6-9, deenergize relay K1. The cue signal would then be immediately terminated by ground from K1-1 via J6-4, if it were not for the time constant of R63-C47. Relay driver Q5 is held on for approximately 20 milliseconds after the start of the primary cue signal until C47 charges positive through R63.

4-9. RECORD PROGRAM AMPLIFIER.

4-10. Refer to the record schematic diagram, figure 7-2. The input transformer(s) are mounted on the record motherboard. Normal connections are made to match a 600-ohm balanced line. 150-ohm and 20k ohm bridging is available by changing the jumper connections in accordance with the procedure detailed in paragraph 2-21. Integrated circuit U1 contains four amplifiers. Sections 2 and 3 are used to amplify and shape the incoming program signal to the NAB record curve. The variable inductor circuit allows approximately 6 dB of high frequency adjustment to compensate for head and tape variations. Amplifier sections 1 and 4 are used as meter drivers. When the recorder is SET, the meters monitor the program material at the input of the amplifier card. During playback, the meter driver input is switched by relay K1 to monitor the playback amplifier output. The playback signal must pass through the playback meter calibrator first, then the RECORD LEVEL calibrator. Therefore, any change in the RECORD LEVEL calibrator will also change the playback calibration.

4-11. BIAS OSCILLATOR.

4-12. Transistors Q1 and Q2 operate as a push-pull oscillator with T1 and C4 as a tuned load. The transformer output feeds trimmer capacitors C14, C15, and C16 to provide independent bias adjustments for each head section. Transistors Q3, Q4, and Q5 are saturated gates that are turned on (shunting bias to ground) in the playback mode and off when recording. To achieve maximum attenuation of the bias and signal to the program tracks of the record head during playback, an LDR is located in series with each track. The LDR is turned on and off by Q4 and Q5 which acts as a high series resistance into a low shunt resistance. The PGM inputs are brought into the bias card and passed through the bias traps to reduce the effects of high bias voltage on the program amplifier outputs. The cue bias gate is operated by a voltage from the tone oscillator card whenever a tone is generated. The bias oscillator operates continuously whenever ac power is applied to the Record/Playback unit.

4-13. THREE-TONE OSCILLATOR.

4-14. The 1-kHz primary, 150-Hz secondary, and 8-kHz tertiary tones are generated by three similar Colpitts oscillator/filter circuits (figure 2-2). The output circuit, U1A, is a common amplifier for all tones and its output is applied through a bias trap consisting of L4 and C18 to the record head. When power is applied to activate any oscillator circuit, it is also diode gated and routed via J7-7 to operate the cue bias gate. The automatic

1-kHz cue tone is timed by the charging of capacitor C29 through resistor R46. After the SET and the START switches are depressed, +24 volt power is applied via J7-3 and resistors R47, R48, and R49 to operate the 1-kHz oscillator (Q2 and U1D), and through resistor R46 to charge capacitor C29. When the capacitor is sufficiently charged that the voltage on the base of Q3 rises above 4.1 volts (in 0.5 to 0.75 seconds), the transistor is biased on dropping the voltage across R47, thereby stopping the oscillator.

4-15. The automatic cue tone can be inhibited if a remote switch is connected to ground J3-1 for a period of at least one second when starting a recording. The 1-kHz cue tone can be added at any time if a remote switch is connected to momentarily ground J3-2. When J3-2 is grounded, timing capacitor C29 is discharged and the oscillator operates until 0.5 to 0.75 second after the ground is removed.

4-16. Potentiometers R33, R14, and R12 set the output levels of the 1 kHz, 150 Hz, and 8 kHz oscillators, respectively. Tunable inductors L2, L1, and L3 trim the center frequencies of the oscillators while the center frequencies of the filters are set by potentiometers R35, R17, and R10.

4-17. CONTROL FUNCTIONS

4-18. When the POWER switch is in the ON position, ac power is applied directly to the drive motor, to the solenoid rectifier (CR1), and to power transformer T1. The main power supply develops a regulated (by U1) +24 volts. When a cartridge is properly inserted, the 24-volt power is switched by S1, to the coil of run relay K1 and illuminates the STOP switch (ready indication). When the START switch is depressed, ground is applied to the other side of the K1 coil to energize the relay. The relay is latched on via contacts 9 to 5 which hold ground on the coil.

4-19. If operating in playback and a secondary cue tone is sensed, a resistor is switched out and the START switch is illuminated more brightly during the tone. Also in playback, sensing of the tertiary tone causes the STOP indicator to light.

4-20. Operation of the record SET switch (or remote SET) energizes relay K10 which latches through contacts 8 and 12. It will remain in latched position until a grounding pulse is received through CR24 from the STOP switch, or when a primary cue tone is sensed. The SEC (150 Hz) and TER (8 kHz) cue switches are paralleled by connecting external controls to J1. Indicator lights may be connected across external control switches or the cue detector indications from the playback may be used as verification of good recorded cue tones.

4-21. When the STOP switch is depressed, run relay K1 is deenergized by shunting the +24V power to ground through resistor R6.

SECTION V

ADJUSTMENTS AND MAINTENANCE

5-1. PREVENTIVE MAINTENANCE.

5-2. RECORD/PLAYBACK HEADS.

5-3. As with any quality tape equipment, frequent checks of head alignment, condition, and cleanliness are imperative for optimum performance and trouble-free operation. Cleaning should be done with a soft dry cloth, or with cotton swabs, moistened with isopropyl alcohol. Degauss the heads after cleaning. Care must be exercised to prevent scratching the head face with gauges or tools.

5-4. CAPSTAN AND PINCH ROLLER.

5-5. The capstan shaft and pinch roller should be cleaned with a soft cloth, or cotton swabs, moistened with isopropyl alcohol. (Care must be exercised to prevent cleaning alcohol from running down the capstan shaft into the motor bearings.) Oil the pinch roller shaft with a drop of Gulf Harmony 44[®]. Wipe off excess oil. The motor bearings are lifetime lubricated and do not need special attention.

5-6. PINCH ROLLER CROSS SHAFT.

5-7. Periodically lubricate the pinch roller cross shaft with Gulfway 52[®] lubricant. Alternately lay the unit on each side and apply one drop of oil to each end of the cross shaft at the lower side of the opening. Allow the oil to run down around the shaft, then wipe off the excess oil.

5-8. HEAD REPLACEMENT AND ADJUSTMENT.

5-9. REPLACEMENT.

5-10. Remove head cover, cartridge hold-down spring, and tape guide. Remove two screws holding the head clamp in place. Using long nose pliers, carefully remove pin clip leads from rear of head. Holding new head in same position, replace pin clip leads (figure 5-1) in the same order they were removed. Replace head clamp and tighten screws with front face of the head approximately 3-7/16 inches from the front edge of the front panel. This assures correct penetration of head into the cartridge when running (figure 5-2).

5-11. Replace tape guide and cartridge hold-down spring. The bottom of all three fingers of the tape guide should reset on the deck surface. The tapered top and bottom surfaces of the small portion of gauge (Part No. 815 0842 001) (figure 5-3) are the GO/NO GO limits for the height of the tape

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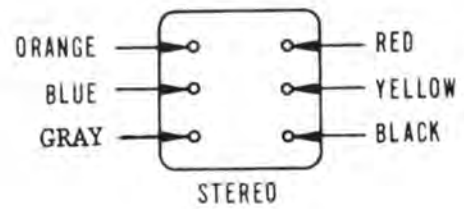
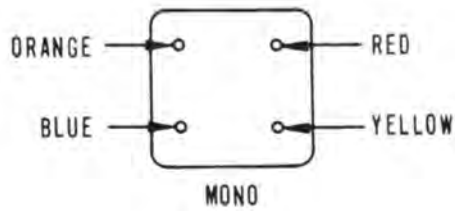


Figure 5-1. Head Wiring (Rear View)

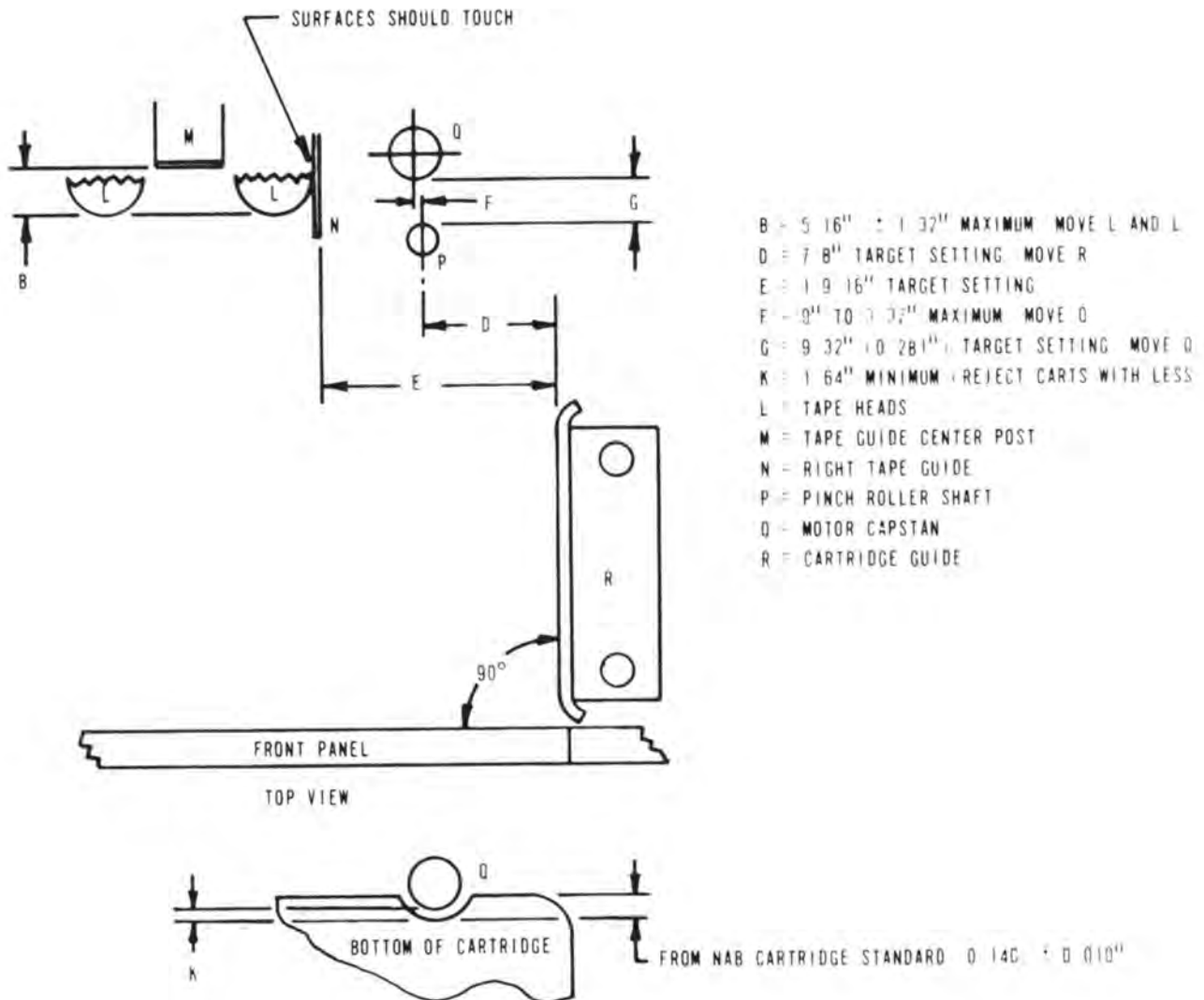


Figure 5-2. Criterion 90-1 and 90-2, Tape Deck Dimensions - 828 6862 001

guide openings. With the gauge resting on the deck surface, move the gauge from left to right in each of the three guide openings. Each guide opening should lie somewhere between the left and right hand vertical surfaces of the gauge.

5-12. HEIGHT ADJUSTMENT.

a. Remove the adjustment cover plate. Turn the lockscrew (figure 5-4) counterclockwise until the screw is well above the lock position (maximum down).

b. Adjust screw A for 9/16 inch height at the top of the upper track above the deck surface.

c. Adjust screw B for exact perpendicularity between the deck surface and pole faces. This may be done using a machinist's rule of good quality, 3/4 or 1 inch wide, and known to be square. Resting one edge of the rule on the deck surface, move the rule against the face of the head. At the point of perpendicularity, space should not be visible between the head and gauge, with the gauge resting flat on the deck.

d. As an alternate method of height adjustment, a strip of clear mylar may be prepared by removing the lubricant and oxide from a short length of 1/4 inch recording tape. Flux remover or shellac thinner will loosen the oxide (use in a well ventilated area) so that it may be wiped off the transparent mylar base. Position the mylar tape across the head faces and properly engage it in the tape guides (figure 5-5). This is the position of the tape when a cartridge is being played on the machine. In order to free one hand to make adjustments, fasten the mylar tape to the side of the guide bracket opposite from the head which is being adjusted. Proper tape position in the tape guide is at the point where minimum distortion of the tape is observed. Distortion of the tape is due to the tape contacting the guide, and is visible as a slight crinkle at either the top or the bottom of the tape. With one hand, hold the mylar in a position contacting the heads as shown in figure 5-5.

e. While holding the mylar in this position, alternately adjust screws A and B (figure 5-4) to position the tracks with respect to the tape. Screw A should be adjusted a small amount, then screw B should be adjusted an equal amount in the same direction. This procedure should be repeated until the correct height is obtained. Proper height is that at which the top of the upper pole piece is at the same level as the top of the tape, and the bottom of the lower pole piece is at the same level as the bottom of the tape.

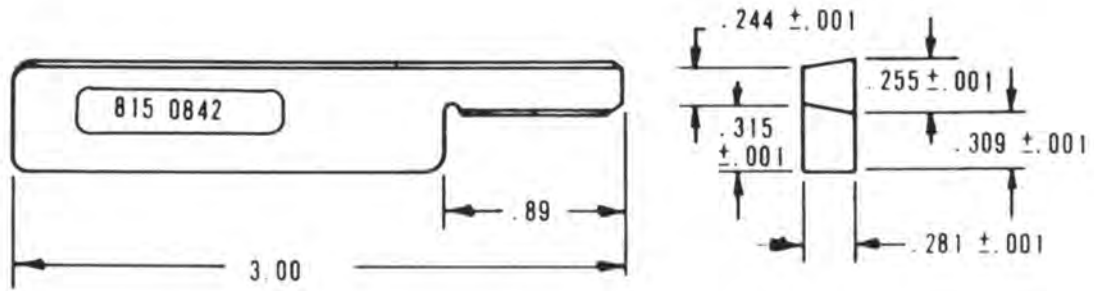


Figure 5-3. Head/Guide Height Gauge

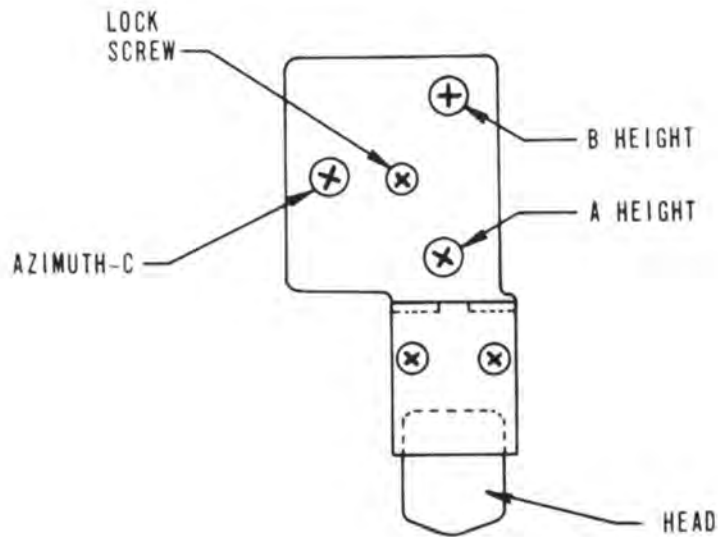


Figure 5-4. Head Adjustment

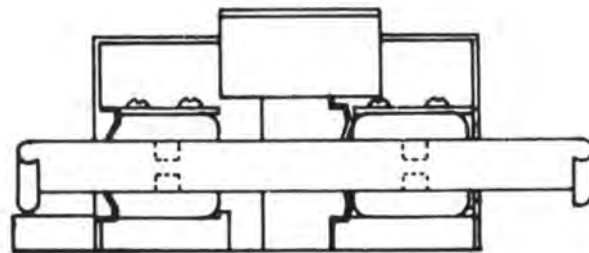


Figure 5-5. Head Assembly, Tape Guide

f. Recheck perpendicularity (step c. or d.). On playback only machines, dummy heads are used in the record head position to provide a uniform tape path. Perpendicularity should be set on this head also.

g. When adjustments are completed, remove the mylar strip and degauss the heads.

5-13. AZIMUTH ADJUSTMENT.

a. Insert a test tape, such as Harris test tape (Part No. 732 0373 000) or NAB test tape No. 3 (monophonic only), or 15-kHz tape (para. 3-5a.).

b. While monitoring the output of the PGM amplifier by connecting a meter at the rear of the machine at J2-5 and J2-6, adjust screw C (figure 5-4) of the playback head for maximum output level.

NOTE

Three peaks can be detected while making this adjustment. There is a minor peak 10 to 15 dB down on either side of the major peak. Adjust the head for the major peak only.

c. Tighten the lock screw for this head.

5-14. STEREO PHASE PLAYBACK ADJUSTMENT.

a. Set the left and right channels for equal outputs using a level set tape.

b. Connect the output of the right playback channel to the horizontal input of an oscilloscope. Adjust the oscilloscope gain for convenient setting (pattern A, figure 5-6).

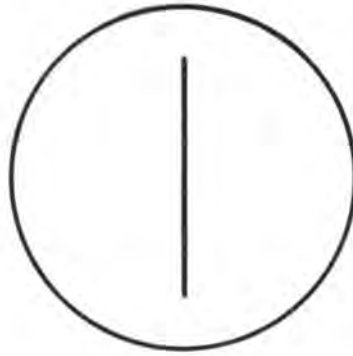
c. Disconnect the right playback channel from the oscilloscope and connect the left playback channel output to the vertical input of the oscilloscope. Adjust oscilloscope vertical gain to be similar to the horizontal (pattern B, figure 5-6).

NOTE

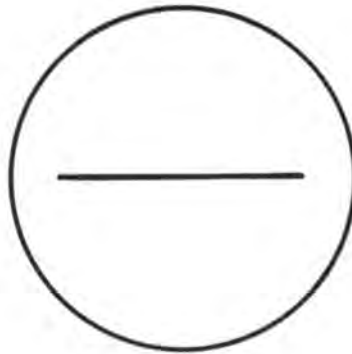
Maintain similar polarities at input, i.e., if the right channel + input is taken from J2-6, take the left channel + input from J2-5.

d. Reconnect the right playback channel to the oscilloscope horizontal input. Adjust screw C (figure 5-4) to obtain 0° phase shift at all frequencies (pattern C, figure 5-6).

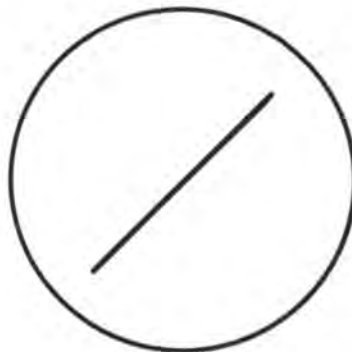
e. Tighten the head lockscrew.



A
RIGHT CHANNEL



B
LEFT CHANNEL



C
BOTH CHANNELS
0° PHASE SHIFT

1729-11

Figure 5-6. Stereo Phasing Patterns

5-15. DECK ADJUSTMENTS.

5-16. This part of the manual is a guide for maintenance of those parts of the deck assembly which affect tape drive. If wow, flutter, or other tape drive problems are encountered, it should first be determined if the cartridges are causing the problem before making any mechanical adjustment.

5-17. CROSS SHAFT ASSEMBLY.

5-18. The pinch roller mounting shaft is mounted on a rotating cross shaft and, therefore, occupies a fixed position with respect to the location of the cross shaft. If the pinch roller shaft has to be removed it can only be put back in one location and does not require adjustment. The cross shaft clamp does not locate the cross shaft, but is the means by which the solenoid engages the pinch roller to the capstan. For quieter operation the cross shaft-to-deck bearing surfaces are factory lubricated with Gulfway 52. This is a high viscosity oil which should be replaced after approximately 18 months of machine operation.

5-19. MOTOR POSITION.

5-20. The positioning of the drive motor for the Criterion 90 series of tape machines is not adjustable. During manufacture the motor is accurately positioned by means of extremely accurate machining of the deck plate.

5-21. SOLENOID ADJUSTMENT.

CAUTION

Do not energize the solenoid with the rubber pinch roller off its shaft.

5-22. The adjustment of the setscrew on the rear of the solenoid controls the escape of air, thus the effective damping. The position of the screw in the front of the solenoid determines the pinch roller pressure. The pinch roller shaft, with the solenoid engaged and the motor running, should come up to a distance of 0.281 inch as measured between the top of the capstan shaft and the top of the pinch roller shaft. The gauge (Part No. 815 0842 001) used in making this pressure adjustment is shown in figure 5-7.

5-23. An alternate method of checking for correct pinch roller pressure adjustment is by observing the amount of indentation of the rubber pinch roller when in contact with the motor capstan. There should be approximately 1/32 inch indentation of the roller. If it is determined that solenoid adjustment is required, perform the following procedure.

a. Loosen locknut using a thin 3/8-inch open end wrench. Hold solenoid plunger with 9/16-inch open end wrench on hex side.

WARNING: Disconnect primary power prior to servicing.

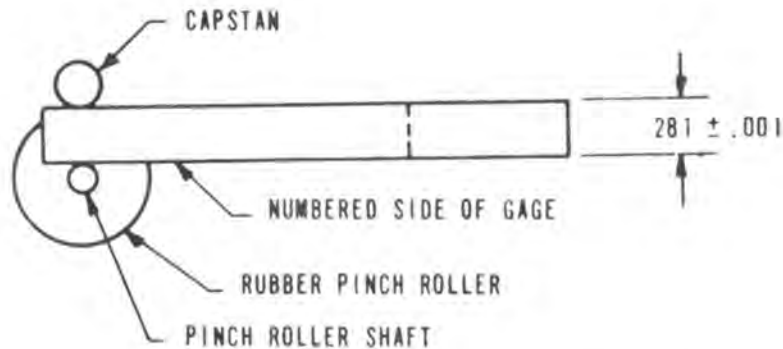


Figure 5-7. Pinch Roller Adjustment Gauge (Larger Portion of Gauge 815 0842 001)

b. Clip or tie the deck microswitch S1 closed, and depress START switch to energize solenoid. Turn screw into solenoid plunger for less pinch roller pressure, or out for more pressure.

c. Retighten the locknut.

NOTE

The solenoid plunger should not bottom out in the end of the bore. If solenoid plunger does bottom out, refer to paragraph 5-24.

d. If the pinch roller should fail to return to its rest position, the probable cause is a weak spring. The spring should be replaced. Unnecessary removal of solenoid plunger from bore should be avoided. Do not interchange plungers between machines.

5-24. Perform the following procedure only if the solenoid plunger bottoms out in the end of the bore.

- a. Remove pinch roller and washers.
- b. Loosen two cross shaft clamp screws.
- c. Manually depress plunger into solenoid. With pinch roller shaft approximately 1/8 inch from vertical (leaning toward the motor capstan), tighten the two shaft clamp screws.
- d. Reinstall pinch roller and washers.

5-25. ELECTRICAL ADJUSTMENTS.

5-26. ADJUSTMENT LOCATIONS AND FUNCTIONS.

5-27. Figures 5-8 through 5-12 illustrate the locations of the electrical adjustments. Tables 5-1 through 5-5 explain the functions of the electrical adjustments.

5-28. CUE SENSOR ADJUSTMENT.

NOTE

Use a nonmetallic screw driver when making all adjustments.

a. Adjust potentiometers R10, R29, and R42 fully CW. Then adjust each potentiometer 1/3 turn CCW.

b. Insert a 1-kHz threshold cartridge (recorded -7 dB from operating level and exactly on frequency) and connect VTVM to read ac rms voltage at junction of R19 and U2-9.

c. Start unit and adjust potentiometer R18 for peak reading on VTVM.

d. Adjust R10 as required for the tape deck to just cue off.

e. Insert a 150-Hz threshold cartridge (recorded -7 dB from operating level and exactly on frequency) and connect VTVM to read ac rms voltage at junction of R49 and U2-5.

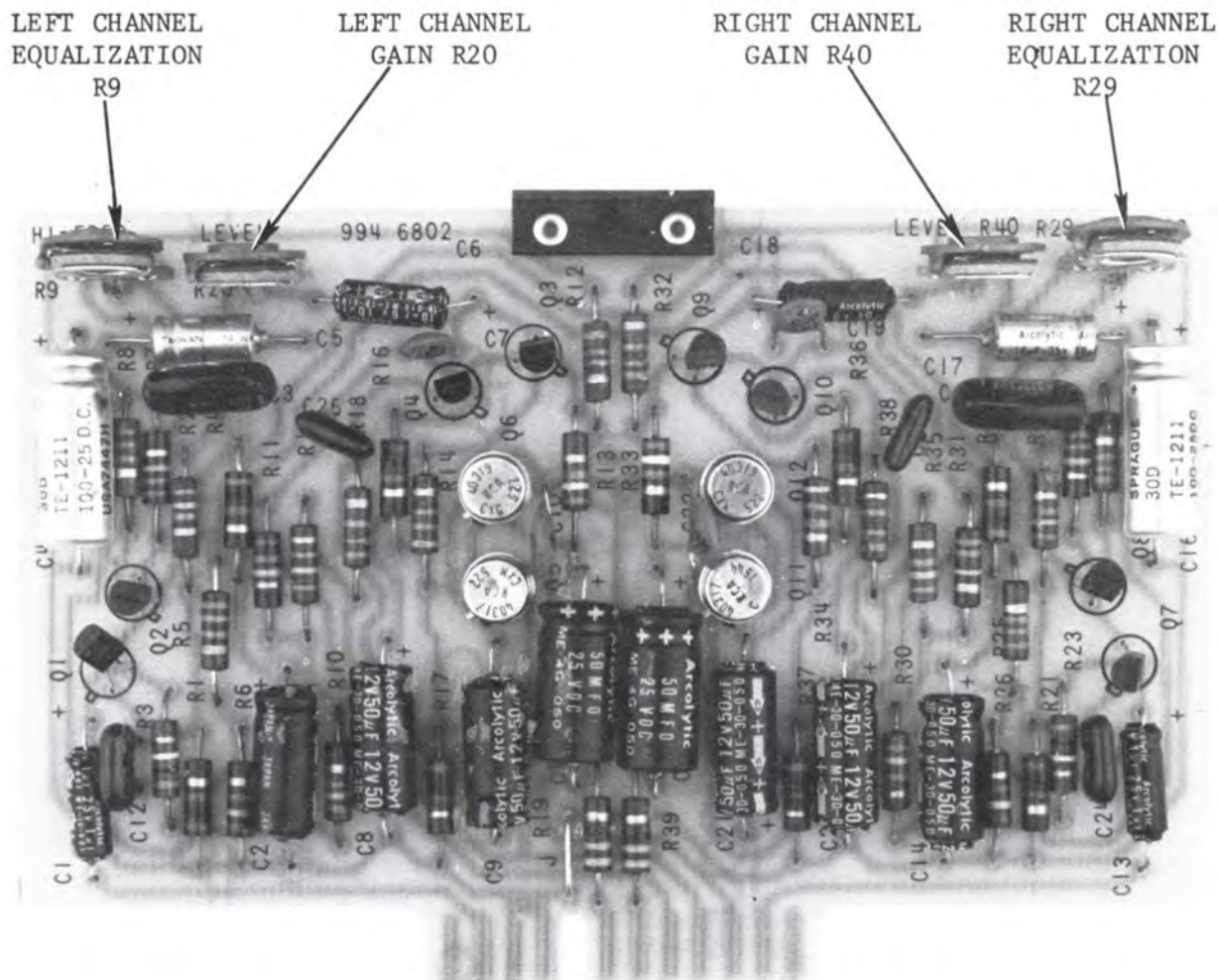
f. Start unit and adjust R51 for peak reading on VTVM.

g. Adjust R42 as required to energize relay K3 or to brighten START indicator.

h. Insert a 8-kHz threshold cartridge (recorded -7 dB from operating level and exactly on frequency) and connect VTVM to read ac rms voltage at junction of R37 and U2-10.

i. Start unit and adjust potentiometer R36 for peak reading on VTVM.

j. Adjust R29 as required to energize relay K2 or to illuminate the STOP indicator.



NOTE: COMPONENTS ON RIGHT HALF OF BOARD NOT PRESENT ON MONO PLAYBACK AMPLIFIER.

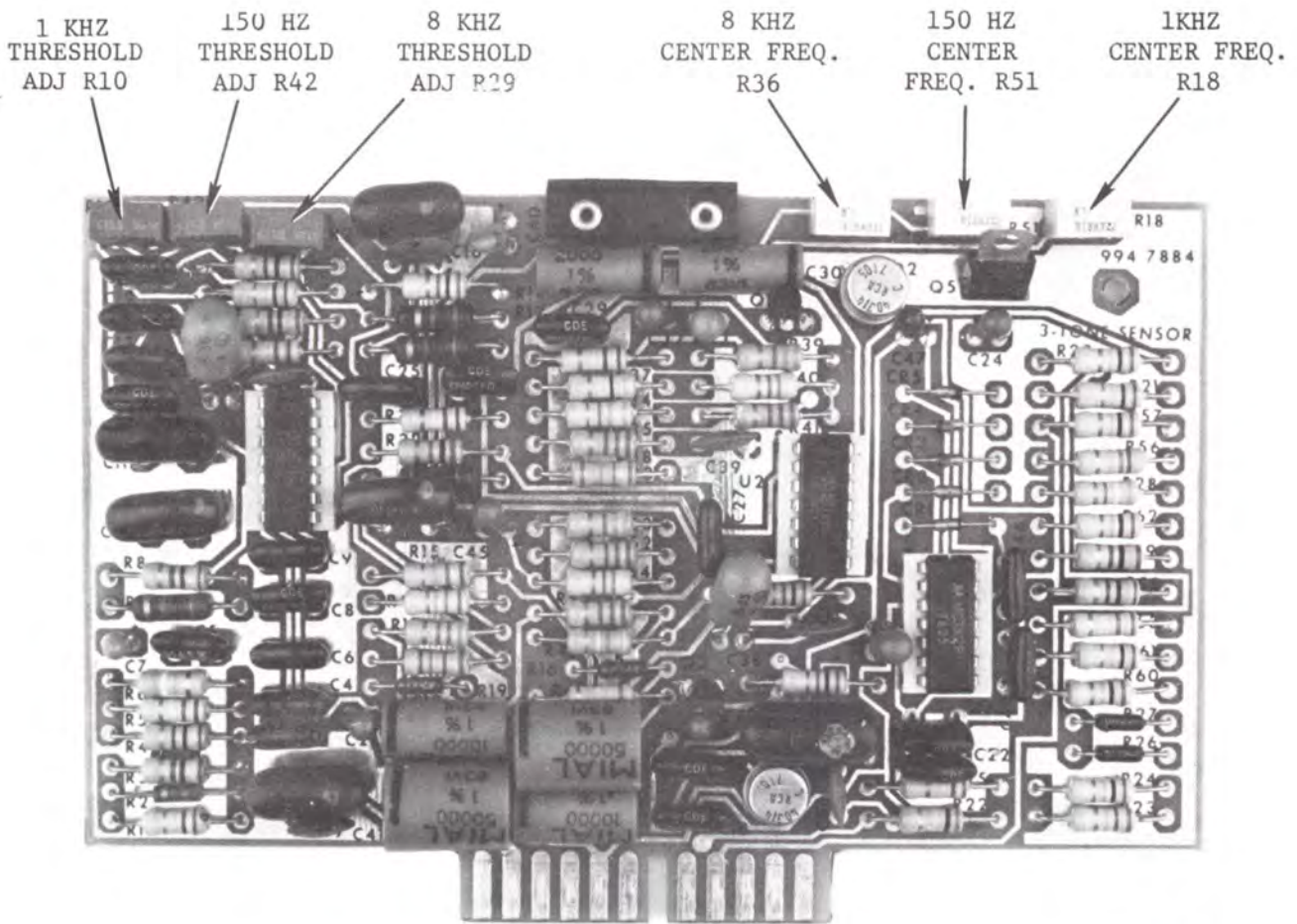
1729-6

Figure 5-8. Stereo Program Amplifier, Adjustment Locations

Table 5-1. Stereo Program Amplifier Adjustments (Figure 5-8)

CONTROL	FUNCTION
High Freq, R9	Left channel high frequency equalization; adjust for flat response.
Level, R20	Left channel gain control.
Level, R40	Right channel gain control.
High Freq, R29	Right channel high frequency equalization; adjust for flat response.

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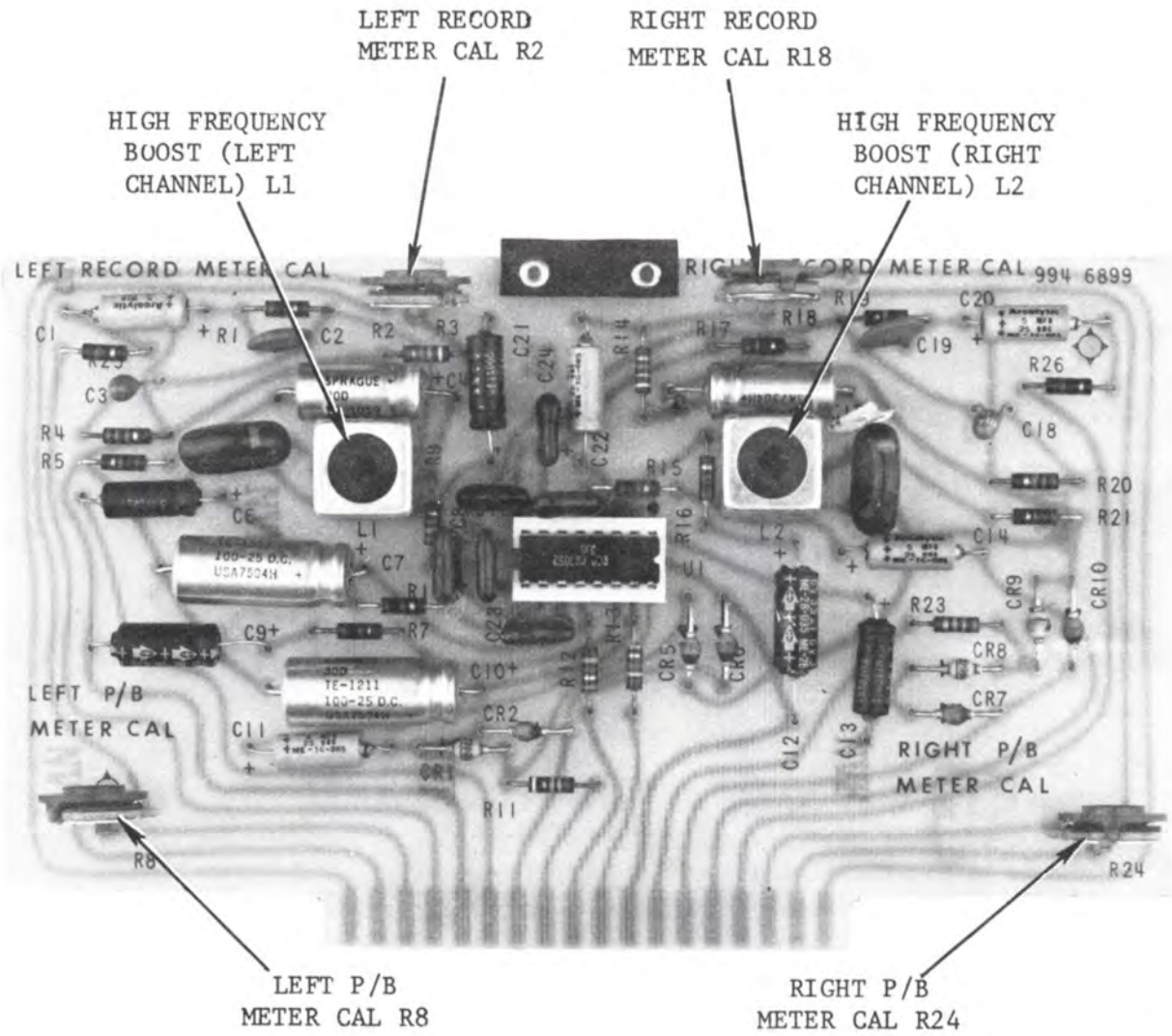
Figure 5-9. Cue Sensor, Adjustment Locations

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Table 5-2. Cue Sensor Adjustments (Figure 5-9)

CONTROL	FUNCTION
1 kHz Threshold Adj, R10	While operating with Threshold Tape, adjust so that unit shuts off.
150 Hz Threshold Adj, R42	While operating with Threshold Tape, adjust to brighten START indicator.
8 kHz Threshold Adj, R29	While operating with Threshold Tape, adjust to illuminate READY indicator.
8 kHz Center Freq Adj, R36	Adjusts center frequency of 8-kHz filter.
150 Hz Center Freq Adj, R51	Adjusts center frequency of 150-Hz filter.
1 kHz Center Freq Adj, R18	Adjusts center frequency of 1-kHz filter.
	<p style="text-align: center;">NOTE</p> <p>R36, R51 and R18 are set at the factory and should only be adjusted to 1% accuracy frequency standards.</p>

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1729-8

Figure 5-10. Record Program Amplifier, Adjustment Locations

Table 5-3. Record Program Amplifier Adjustments (Figure 5-10)

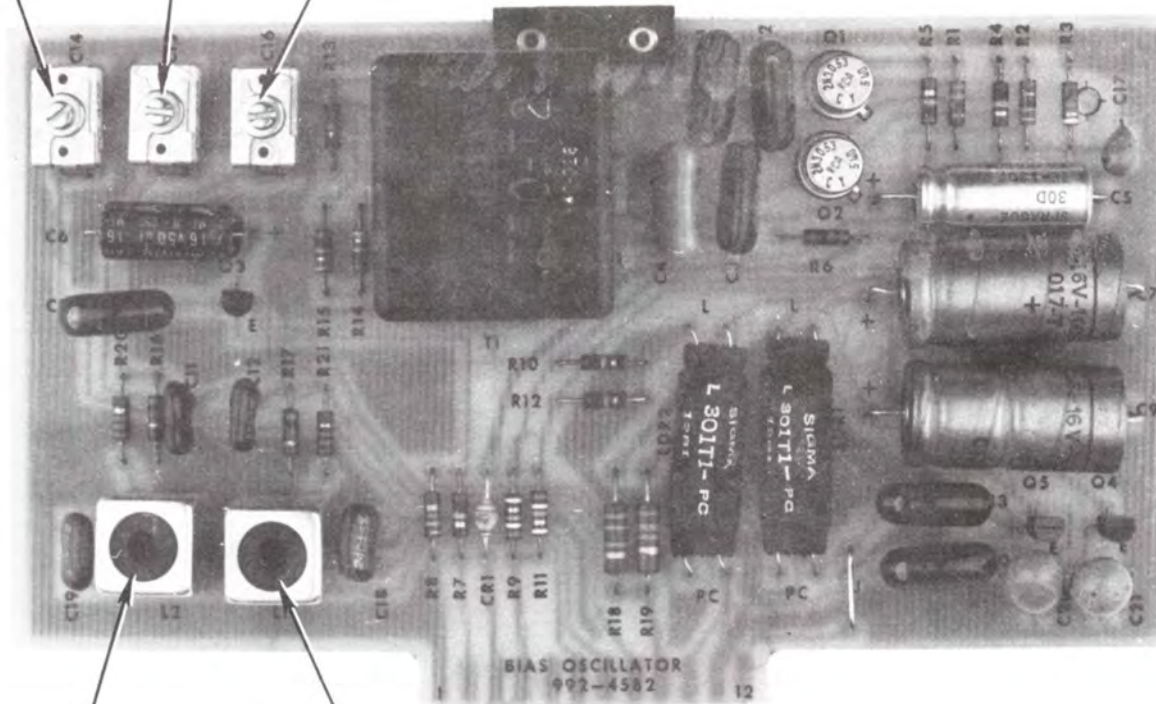
CONTROL	FUNCTION
High Frequency Boost, L1	Adjust left channel for a flat response at 15 kHz.
Left Record Meter Cal, R2	Adjust zero reference of left record channel with desired input.
Right Record Meter Cal, R18	Adjust zero reference of right record channel with desired input.
High Frequency Boost, L2	Adjust right channel for a flat response at 15 kHz.
Right P/B Meter Cal, R24	Adjust zero reference of right playback channel to desired output level.
Left P/B Meter Cal, R8	Adjust zero reference of left playback channel to desired output level.

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CUE BIAS
LEVEL C14

LEFT BIAS
LEVEL C15

RIGHT BIAS
LEVEL C16



RIGHT BIAS
TRAP L2

LEFT BIAS
TRAP L1

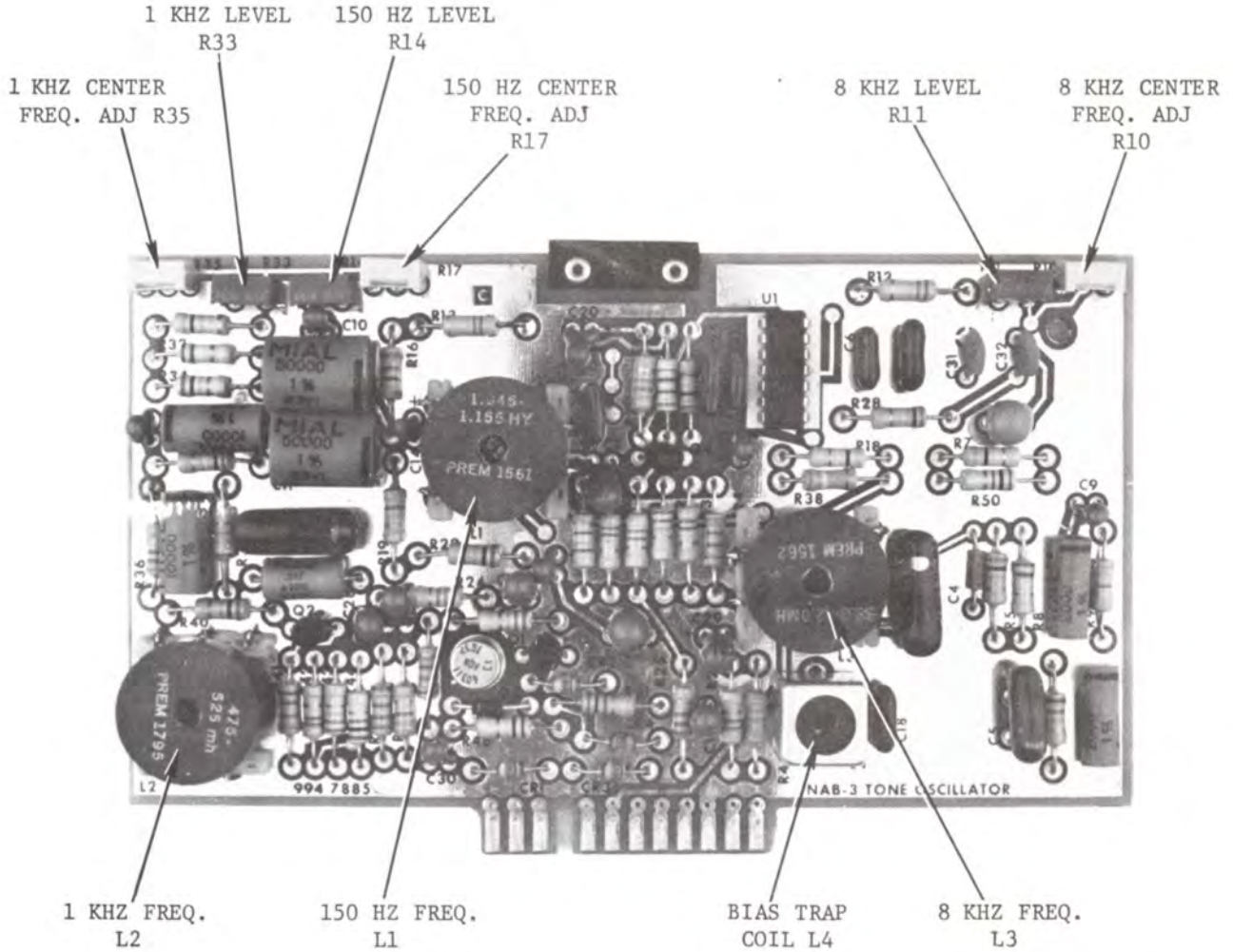
1729-9

Figure 5-11. Bias Oscillator, Adjustment Locations

Table 5-4. Bias Oscillator Adjustments (Figure 5-11)

CONTROL	FUNCTION
Cue bias level, C14	Adjust for 1 dB overbias at 1 kHz with J3-2 shorted to ground.
Left bias level, C15	Adjust for 1 dB overbias at 1 kHz (monitoring playback amplifier).
Right bias level, C16	Adjust for 1 dB overbias at 1 kHz (monitoring playback amplifier).
Right bias trap, L2	Adjust for minimum bias at recording amplifier C14.
Left bias trap, L1	<p>Adjust for minimum bias at recording amplifier C6.</p> <p style="text-align: center;">NOTE</p> <p>1 dB overbias means increasing bias level lowering the 1-kHz audio signal 1 dB from peak. Ensure that the tape normally used at your station is being used to set your bias levels.</p>

1729



1729-10

Figure 5-12. Three-Tone Oscillator, Adjustment Locations

Table 5-5. Three-Tone Oscillator Adjustments (Figure 5-12)

CONTROL	FUNCTION
Center Freq Adj, R35	Adjust filter to center frequency of 1 kHz.
Level, R33	Sets the 1 kHz oscillator output level.
Level, R14	Sets the 150 Hz oscillator output level.
Center Freq Adj, R17	Adjust filter to center frequency of 150 Hz.
Level, R11	Sets the 8 kHz oscillator output level.
Center Freq Adj, R10	Adjust filter to center frequency of 8 kHz
Frequency, L2	Adjust oscillator to correct 1 kHz frequency.
Frequency, L1	Adjust oscillator to correct 150 Hz frequency.
Frequency, L3	Adjust oscillator to correct 8 kHz frequency.
Bias Trap, L4	Adjust bias trap to minimum bias at pin 5 of U1.

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5-29. RECORD/PROGRAM AMPLIFIER ALIGNMENT.

5-30. After replacing the record heads, it is necessary to check the bias adjustment to maintain proper frequency response and output. Use the type of tape normally used because different types of tape require different bias levels for optimum performance. The following procedure should be used when bias adjustments are required.

a. Connect output of playback to console, or VU meter, with proper input impedance. Connect an audio oscillator set at 1000 Hz to the record amplifier input.

b. Insert an erased cartridge into the unit. Ensure that the cartridge is erased to prevent cue out of the unit. The following steps are for the mono, or left channel. Equivalent right stereo channel controls are shown in parenthesis.

c. While recording at 1000 Hz with -10 dB output level, adjust trimmer C15 (C16) on the bias card for maximum playback level. Continue CW adjustment to overbias until output drops 1 dB from maximum.

d. Adjust oscillator frequency to 15 kHz. Adjust azimuth of record head to peak (on output meter).

e. With the audio oscillator output retained at 15 kHz, adjust L1 (L2) on recording amplifier as required to obtain -10 dB output level.

f. Turn RECORD LEVEL control completely off. Connect an oscilloscope, or high impedance ac voltmeter, to the negative end of C6 (C14) on the record/program amplifier and adjust bias trap L1 (L2) on the bias card for minimum reading. Switch input to 1000 Hz, then to 15 kHz, then to 7 kHz and verify that output levels do not change by more than ± 2 dB.

g. Set the RECORD LEVEL control for 0 dB output at 1000 Hz. Adjust R2 (R18) on the PGM amplifier for 0 indication on the left meter. Using this recording, or any other reference level test tape in the playback only mode, adjust R8 (R24) for 0 indication on the left meter. If higher or lower playback levels are desired, the meters may be adjusted accordingly. The meter playback calibration may be changed without affecting the record calibration, but changing the record calibration will seriously affect the playback calibration.

h. Repeat the above procedure for the right channel of stereo machines.

5-31. PLAYBACK PROGRAM AMPLIFIER ADJUSTMENTS.

5-32. Each channel of the playback amplifier has two controls for alignment of the output level and the high frequency response. The controls are adjusted by the following procedure using NAB specified test tapes.

5-20

WARNING: Disconnect primary power prior to servicing.

a. Insert the 1-kHz Level Set test tape into the machine, and depress the START pushbutton.

NOTE

The previously specified 700 Hz test tape may be used. However, the 700 Hz tape may have been recorded at either 160 nWb/m or 185 nWb/m, while the 1-kHz tape is specified (NAB, 1975) at 160 nWb/m.

b. Connect a VTVM to the left channel output connections J2-3 and -5, and adjust potentiometer R20 on the playback amplifier board to obtain the required level.

c. Connect the VTVM to the right channel output J2-4 and -6 and adjust potentiometer R40 for a balanced output.

d. Remove the Level Set test tape and insert the high frequency test tape (12 to 15 kHz).

NOTE

To preclude head and tape saturation, the high frequency is normally recorded -10 dB low with reference to the 1-kHz test tone.

e. With the VTVM connected to the right channel output, depress the START pushbutton. Adjust potentiometer R29 for flat response taking into consideration the recording level of the tape which will normally be -10 dB down from the 1 kHz level.

f. Adjust the left channel potentiometer R9 to obtain a balanced output.

g. Disconnect the VTVM.

5-33. CUE FREQUENCY AND RECORD LEVEL ADJUSTMENTS.

NOTE

This procedure should not be performed until alignment of playback program amplifier (paragraph 5-31) is completed.

a. Connect a short from J3-2 to ground. SET and START the recorder.

b. Connect a frequency counter to the junction of C26 and R39. Adjust L2 as required to obtain a counter indication of 1000 \pm 5 Hz.

c. Connect VTVM to junction of C22 and R37 and adjust R35 for peak rms indication on VTVM.

d. Remove short at J3-2 and connect frequency counter to junction of C14 and R19. Depress and hold SEC pushbutton and adjust L1 as required to obtain a counter indication of 150 Hz.

e. Connect VTVM to junction of C10 and R15 and, with SEC pushbutton depressed, adjust R17 for peak rms indication on VTVM.

f. Connect frequency counter to junction of C5 and R5. Depress and hold TERT pushbutton and adjust L3 as required to obtain a counter indication of 8000 \pm 20 Hz.

g. Connect VTVM to junction of C9 and R11 and, with TERT pushbutton depressed, adjust R10 for peak rms indication on VTVM.

h. Short out C29 on the tone oscillator card (connect J3-2 to ground) to cause the 1-kHz oscillator to operate continuously and jumper the cue head output into the left program amplifier.

i. SET and START the recorder. Adjust C14 on the bias card for maximum output on the program channel.

j. On the tone oscillator, adjust R33 fully CCW. Connect oscilloscope or high impedance voltmeter to junction of R27 and C35. Adjust bias trap L4 for maximum reading.

k. Monitor the record output of the program amplifier with the VTVM. Adjust R33 for an output of 0.0 dBm.

l. Remove short on J3-2.

m. Depress SEC pushbutton and adjust R14 for a +6.0 dBm indication on the VTVM.

n. Depress TEST pushbutton and adjust R11 for a -10.0 dBm indication on the VTVM.

5-34. OPERATING VOLTAGES.

5-35. All dc voltages listed below were measured to ground with a high impedance test meter. Allow for circuit loading if using a 20k ohm/per/volt VOM or low impedance test meter

a. Monophonic Program Amplifier (994 6801 001) and Stereophonic Program Amplifier (994 6802 001).

<u>Transistor</u>	<u>Emitter</u>	<u>Base</u>	<u>Collector</u>
Q1,Q7	0.03V	0.6V	4.0V
Q2,Q8	3.40V	4.0V	8.8V
Q3,Q9	0.70V	1.3V	2.6V
Q4,Q10	2.00V	2.6V	11.0V
Q5,Q11	11.00V	11.8V	24.0V
Q6,Q12	11.00V	11.0V	0

b. Cue Sensor (994 7871 001).

Integrated Circuit U1 and U2

<u>Pin No.</u>	<u>Voltage (Approx)</u>
1,2,3,6,8,11,12,13	0.5 Vdc
4,5,9,10	12.0 Vdc
7	0.0 Vdc
14	24.0 Vdc

Integrated Circuit U3

<u>Pin No.</u>	<u>Voltage (Approx)</u>
1,2,5,8,11,12,13	0.0 Vdc
3,14	24.0 Vdc
4,9,10	13.0 Vdc
6	10.0 Vdc
7	0.0 Vdc

Integrated Circuit (U1, LM301A)

<u>Pin No.</u>	<u>Voltage</u>
1	1.3V
2	12.0V
3	10.0V
4	0
5	1.2V
6	4.0V to 14V
7	22.0V
8	13.0V

c. Record/Program Amplifier (994 6899 001).

<u>Pin No.</u>	<u>Voltage</u>
1	7.4V
2	Gnd
3	2.1V
4	2.5V
5	Gnd
6	7.4V
7	2.2V
8	2.6V
9	2.6V
10	2.2V
11	7.4V
12	14.0V
13	2.6V
14	2.2V
15	12.9V
16	7.5V

NOTE

Signal Out, J29, pin 6 and pin 14 is approximately 0.6V p-p with M1 and M2 set to 0 at 700 Hz.

d. Bias Oscillator (992 4582 001).

<u>Transistor</u>	<u>Emitter</u>	<u>Base</u>	<u>Collector</u>
Q1	2.65V	2.4V	23.1V
Q2	2.65V	2.4V	23.1V
Q3	3.10V	2.6V	3.0V
Q4	0.00V	0.7V	0.0V
Q5	0.00V	0.7V	0.0V
Q6	10.50V		
Q7	10.50V		

Q4, Q5: 24V p-p in RUN
 Q3: 24V p-p when cue bias is "on"

Transformer T1

<u>Pin No.</u>	<u>Voltage</u>
1-2	40V p-p AC
2-3	40V p-p AC
4-6	360V p-p AC

e. Tone Oscillator (994 7885 001)

Transistor

Q1	0.8 Vdc, 1.5V p-p	1.3 Vdc, 1V p-p	9.8 Vdc, 6V p-p
Q2	0.8 Vdc, 1.1V p-p	1.1 Vdc, 0.6V p-p	9.0 Vdc, 4V p-p
Q4	0.8 Vdc, 1.4V p-p	1.1 Vdc, 0.9V p-p	9.0 Vdc, 6V p-p
Q3	3.0 Vdc	3.6 Vdc (+18V pulse on start)	3.3 Vdc (18V on start)

Integrated Circuit U1

<u>Pin No.</u>	<u>Voltage (Approx)</u>
1,2,3,6,8,11,12,13	0.6 Vdc
4,5,9,10	12.0 Vdc
7	0.0 Vdc
14	24.0 Vdc



SECTION VI

PARTS LIST

6-1. INTRODUCTION.

6-2. This section provides a description, reference designator, and order number for replaceable electrical parts and assemblies necessary for proper maintenance of the Criterion 90-1 and Criterion 90-2 cartridge tape playback record units. Table 6-1 lists the assemblies having replaceable parts, the number of the table listing the parts, and the page number on which the table is located. Indenture of the assembly nomenclature in table 6-1 signifies the equipment level within the overall equipment configuration.

NOTE

Actual component values may vary slightly from component values listed on schematics and parts list. Due to industry-wide shortages, it is sometimes necessary to use parts other than those specified. In every case, however, a substitute part is selected for conformance to overall design specifications so that equipment performance is not affected.

6-3. REPLACEABLE PARTS SERVICE.

6-4. Replacement parts are available 24 hours a day, seven days a week from the Harris Service Parts Department. Telephone 217-222-8200 to contact the Service Parts Department, or address correspondence to Service Parts Department, Harris Broadcast Products Division, Harris Corporation, 123 Hampshire Street, Quincy, Illinois 62301.

6-5. TECHNICAL ASSISTANCE.

6-6. Technical assistance and troubleshooting recommendations are available from Harris Field Service Department during normal working hours. Emergency technical service is available 24 hours a day. Telephone 217-222-8200 to contact the Field Service Department or address correspondence to Field Service Department, Harris Broadcast Products Division, Harris Corporation, 123 Hampshire Street, Quincy, Illinois 62301.

Table 6-1. Replaceable Parts List Index

TABLE NO.	UNIT NOMENCLATURE	PART NO.	PAGE
6-2	Criterion 90-1 and 90-2 Playback Chassis		6-3
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6-4	Stereo Program Amplifier	994 6802 001	6-12
6-5	Cue Sensor Board	994 7884 001	6-16
6-6	Record/Program Amplifier	994 6899 001	6-22
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6-8	Tone Oscillator Module	994 7885 001	6-27
6-9	Auxiliary Equipment		6-31

Table 6-2. Criterion 90-1 and 90-2 Playback Chassis

REF. SYMBOL	HARRIS PART NO.	DESCRIPTION	QTY.
<u>PLAYBACK MOTHER-BOARD</u>			
C1,C2	516 0080 000	Capacitor, 0.01 uF, 600V	2
C3,C4	522 0376 000	Capacitor, 1100 uF, 50V	2
C5	508 0279 000	Capacitor, 0.033 uF, 100V	1
C6	524 0175 000	Capacitor, 200 uF, 200V	1
C8	506 0005 000	Capacitor, 0.1 uF, 200	1
C9	526 0094 000	Capacitor, 0.1 uF, 50V	1
C10	506 0007 000	Capacitor, 0.01 uF, 50V	1
C12 thru C15	516 0375 000	Capacitor, 0.01 uF, 50V	4
CR1	384 0319 000	Bridge Rectifier	1
CR2,CR3	384 0352 000	Diode, 1N4246	2
CR5	384 0353 000	Diode, 1N4247	1
CR6 thru CR8	384 0352 000	Diode, 1N4246	3
J1	612 0466 000	Socket, 18 Conductor	1
J2	612 0461 000	Socket, 6 Conductor	1
J5,J6	612 0508 000	Socket, PC Board	2
K1	574 0162 000	Relay, 4 PDT, 24V	1
K2,K3	574 0162 000	Relay, Optional	X
L1,L2	494 0227 000	RF Choke, 2.2 mH	2
LDR1,LDR2	670 0026 000	Resistor, Light Dependent	2
P10	610 0720 000	Plug, 9-pin	1
P11	610 0719 000	Plug, 3-pin	1

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Table 6-2. Criterion 90-1 and 90-2 Playback Chassis (Continued)

REF. SYMBOL	HARRIS PART NO.	DESCRIPTION	QTY.
P12	610 0718 000	Plug, 2-pin	1
P13	610 0721 000	Plug, 12-pin	1
R1	542 0061 000	Resistor, 150 ohm, 12W	1
R3	540 0035 000	Resistor, 270 ohm, 1/2W, 5%	1
R4,R5	540 0025 000	Resistor, 100 ohm, 1/2W, 5%	2
R6	540 0311 000	Resistor, 130 ohm, 1/2W, 5%	1
R7	540 0032 000	Resistor, 200 ohm, 1/2W, 5%	1
R8	540 0023 000	Resistor, 82 ohm, 1/2W, 5%	1
R9	542 1141 000	Resistor, 10k ohm, 3-1/4W, 5%	1
R10,R11	540 0043 000	Resistor, 560 ohm, 1/2W, 5%	2
S1	604 0472 000	Microswitch, U36-1101-D8	1
T1	472 0714 000	Power Transformer	1
T2	478 0316 000	Output Transformer	1
T3	478 0316 000	Output Transformer ²	1
U1	382 0261 000	Integrated Circuit, U7824UC	1
XK1 thru XK3	404 0161 000	Relay Socket	3
XU1	404 0654 000	Heatsink	1

Table 6-2. Criterion 90-1 and 90-2 Playback Chassis (Continued)

REF. SYMBOL	HARRIS PART NO.	DESCRIPTION	QTY.
<u>DECK ASSEMBLY</u>		(REFER TO FIGURE 6-1)	
1 (CRI. 90-1)	916 8295 001	Deck Plate	1
(CRI. 90-2)	916 8296 001	Deck Plate	1
2	828 7990 001	Cartridge Guide	2
3	811 0044 401	Cartridge Pad	1
4	928 7128 001	Head Support	2
5	815 2256 001	Head Clamp	2
6	456 0082 000	Spring	4
7	823 0041 401	Tape Guide	1
8	811 0045 401	Cartridge Spring	1
9	811 0046 401	Cartridge Spring Plate	1
10	815 2259 001	Support Post	1
11	730 1376 000	Monophonic Playback Head	1
	730 1371 000	Stereophonic Playback Head	1
12	730 1375 000	Dummy Head (Playback Only)	1
	730 1429 000	Monophonic Record Head	1
	730 0730 000	Stereophonic Record Head	1
13	829 0375 001	Head Shield	1
14	816 8181 001	Cross Shaft	1
15	358 1626 000	Pinch Roller Shaft	1
16	994 6886 002	Pinch Roller Replacement Kit	1
17	916 3579 002	Cross Shaft Clamp	1
18	335 0024 000	Nylon Washer	1
19	456 0033 000	Solenoid Return Spring	1

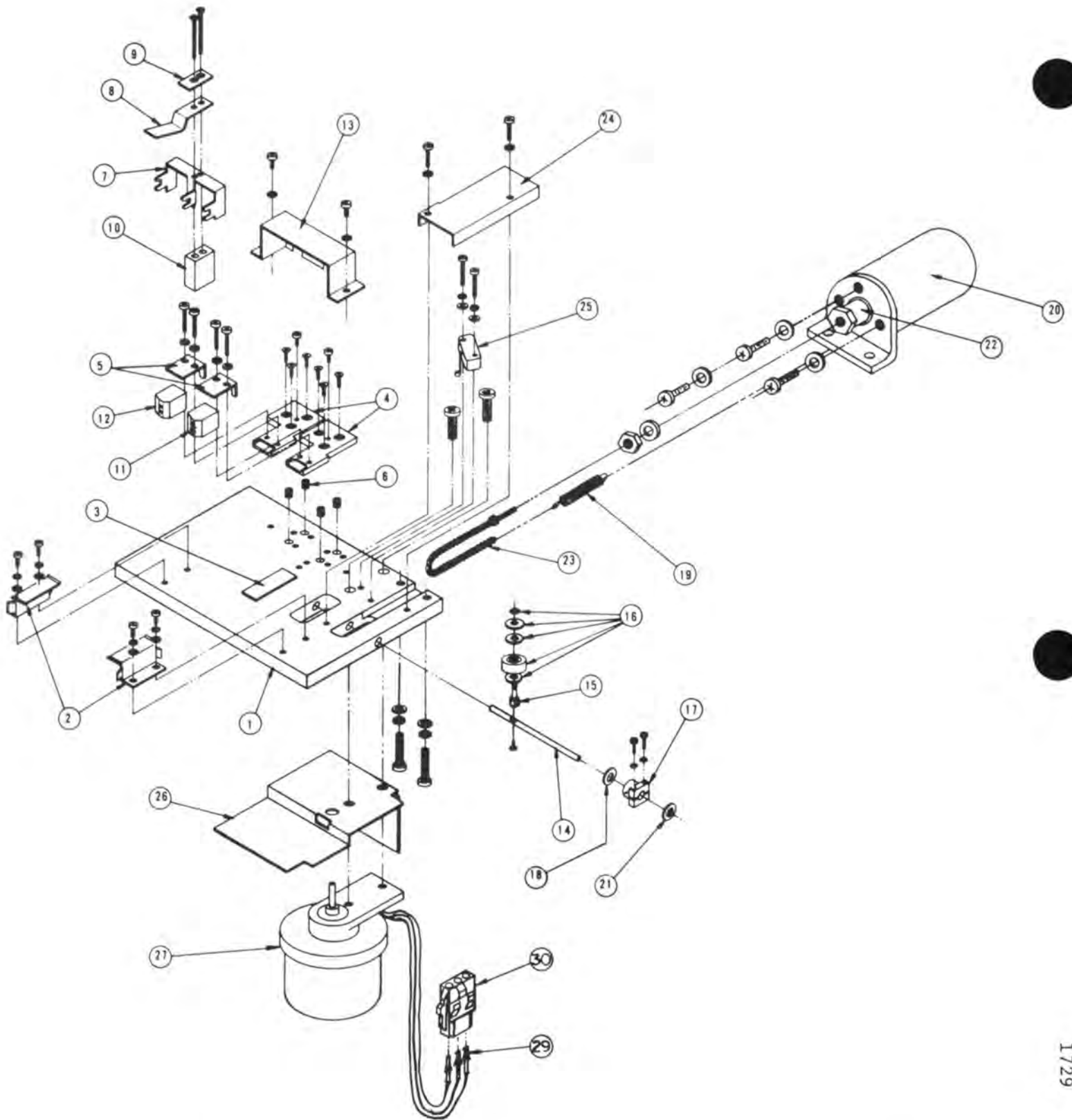


Figure 6-1. Criterion 90-1 and 90-2 Exploded View - 839 3439 001

Table 6-2. Criterion 90-1 and 90-2 Playback Chassis (Continued)

REF. SYMBOL	HARRIS PART NO.	DESCRIPTION	QTY.
<u>DECK ASSEMBLY</u>			
Cont'd			
20	590 0033 000	Solenoid	1
21	335 0151 000	Nylon Washer	1
22		Solenoid Plunger (Part of Solenoid)	
23	916 3580 002	Drive Chain Assembly	1
24	827 7414 001	Drive Cover	1
25	604 0472 000	S1, Deck Switch	1
26	839 1936 001	Motor Shield	1
27	436 0124 000	Motor, 60 Hz, 7-1/2 inch per sec.	1
	436 0123 000	Motor, 50 Hz, 7-1/2 inch per sec.	1
28	073 0001 016	Lubricant	
29	354 0613 000	Pins for Motor Plug	3
30	612 0857 000	Motor Plug	1
<u>FRONT PANEL</u>			
AT1	550 0338 000	Potentiometer, 500 ohm, 2W ³	1
AT2	550 0338 000	Potentiometer, 500 ohm, 2W ⁴	1
C11	506 0005 000	Capacitor, 0.1 uF, 200V	1
DS1 thru DS3	396 0229 000	Lamp, 28V	3
DS4 thru DS6	396 0229 000	Lamp, 28V ³	3
M1	632 0699 000	Meter, 0-200 milliamperes ³	1
M2	632 0699 000	Meter, 0-200 milliamperes ⁴	1
R10	540 0886 000	Resistor, 82 ohm, 1/4W, 5%	1

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Table 6-2. Criterion 90-1 and 90-2 Playback Chassis (Continued)

REF. SYMBOL	HARRIS PART NO.	DESCRIPTION	QTY.
<u>FRONT PANEL</u>			
<u>Cont'd</u>			
S2,S3	604 0861 000	Switch	2
S5 thru S6	604 0861 000	Switch ³	3
S7	604 0860 000	Switch, Power	1
XDS1	406 0480 000	Indicator, Red	1
	598 0340 000	Lens, Orange (SET)	1
	598 0336 000	Lens, White SEC	1
	598 0338 000	Lens, Blue (TER)	1
	598 0337 000	Lens, Green START	1
	598 0339 000	Lens, Yellow STOP	1
<u>BACK PANEL</u>			
F1	398 0053 000	Fuse, 0.8 ampere, slo-blo	1
F2	398 0049 000	Fuse, 0.5 ampere, slo-blo	1
XF1, XF2	402 0023 000	Fuseholder	2
<u>RECORD MOTHER-BOARD³</u>			
C20	522 0242 000	Capacitor, 25 uF, 25V	1
CR20 thru CR23	384 0352 000	Diode, 1N4246	4
CR24	384 0353 000	Diode, 1N4247	1
J3	612 0464 000	Socket, 12 Conductor	1
J4	612 0461 000	Socket, 6 Conductor	1
J7,J8	612 0508 000	Socket, PC Board, 12 Conductor	2

Table 6-2. Criterion 90-1 and 90-2 Playback Chassis (Continued)

REF. SYMBOL	HARRIS PART NO.	DESCRIPTION	QTY.
<u>RECORD MOTHER-BOARD³ Cont'd</u>			
J9	612 0498 000	Socket, PC Board, 12 Conductor	1
K10	574 0162 000	Relay	1
P14	610 0722 000	Plug, 20 Conductor	1
R20	540 0034 000	Resistor, 240 ohm, 1/2W, 5%	1
R21	540 0025 000	Resistor, 100 ohm, 1/2W, 5%	1
R22,R23	540 0032 000	Resistor, 200 ohm, 1/2W, 5%	2
R24,R25	540 1111 000	Resistor, 10k ohm, 1/2W, 5%	2
R26,R27	540 1111 000	Resistor, 10k ohm, 1/2W, 5% ⁴	2
T10	478 0315 000	Transformer, audio input	1
T11	478 0315 000	Transformer, audio input ⁴	1
XK10	404 0161 000	Relay Socket	1
<u>NOTES:</u>			
1. C-90-2 Record/Playback unit only.			
2. Stereo units only.			
3. C-90-2 Record/Playback units only.			
4. C-90-2 Record/Playback Stereo unit only.			

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Table 6-3. Monophonic Program Amplifier Module - 994 6801 001

REF. SYMBOL	HARRIS PART NO.	DESCRIPTION	QTY.
C1	522 0232 000	Capacitor, 1 uF, 25V	1
C2	522 0208 000	Capacitor, 50 uF, 12V	1
C3	508 0210 000	Capacitor, 0.015 uF, 100V	1
C4	522 0246 000	Capacitor, 100 uF, 25V	1
C5	522 0239 000	Capacitor, 10 uF, 25V	1
C6	522 0175 000	Capacitor, 10 uF, 6V	1
C7	516 0055 000	Capacitor, 0.001 uF, 1 kV	1
C8,C9	522 0208 000	Capacitor, 50 uF, 12V	2
C10	516 0063 000	Capacitor, 0.002 uF, 1 kV	1
C11	522 0244 000	Capacitor, 50 uF, 25V	1
C12	500 0908 000	Capacitor, 470 pF, 500V	1
C25	500 0761 000	Capacitor, 150 pF, 500V	1
Q1 thru Q4	380 0115 000	Transistor, 2N5088	4
Q5	380 0050 000	Transistor, RCA 40317	1
Q6	380 0044 000	Transistor, RCA 40319	1
R1	540 0025 000	Resistor, 100 ohm, 1/2W, 5%	1
R2	540 0055 000	Resistor, 1.8k ohm, 1/2W, 5%	1
R3	540 0097 000	Resistor, 100k ohm, 1/2W, 5%	1
R4	540 0032 000	Resistor, 200 ohm, 1.2W, 5%	1
R5	540 0057 000	Resistor, 2.2k ohm, 1/2W, 5%	1
R6	540 0045 000	Resistor, 680 ohm, 1/2W, 5%	1
R7	540 0081 000	Resistor, 22k ohm, 1/2W, 5%	1
R8	540 0057 000	Resistor, 2.2k ohm, 1/2W, 5%	1

Table 6-3. Monophonic Program Amplifier Module - 994 6801 001 (Continued)

REF. SYMBOL	HARRIS PART NO.	DESCRIPTION	QTY.
R9	550 0272 000	Potentiometer, 10k ohm, 1/4W	1
R10	540 0069 000	Resistor, 6.8k ohm, 1/2W, 5%	1
R11	540 0075 000	Resistor, 12k ohm, 1/2W, 5%	1
R12	540 0027 000	Resistor, 120 ohm, 1/2W, 5%	1
R13	540 0058 000	Resistor, 2.4k ohm, 1/2W, 5%	1
R14	540 0071 000	Resistor, 8.2k ohm, 1/2W, 5%	1
R15	540 0052 000	Resistor, 1.3k ohm, 1/2W, 5%	1
R16	540 0025 000	Resistor, 100 ohm, 1/2W, 5%	1
R17	540 0032 000	Resistor, 200 ohm, 1/2W, 5%	1
R18	540 0027 000	Resistor, 120 ohm, 1/2W, 5%	1
R19	540 0013 000	Resistor, 33 ohm, 1/2W, 5%	1
R20	550 0272 000	Potentiometer, 10k ohm, 1/4W	1

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Table 6-4. Stereo Program Amplifier Module - 994 6802 001

REF. SYMBOL	HARRIS PART NO.	DESCRIPTION	QTY.
C1	522 0232 000	Capacitor, 1 uF, 25V	1
C2	522 0208 000	Capacitor, 50 uF, 12V	1
C3	508 0210 000	Capacitor, 0.015 uF, 100V	1
C4	522 0246 000	Capacitor, 100 uF, 25V	1
C5	522 0239 000	Capacitor, 10 uF, 25V	1
C6	522 0175 000	Capacitor, 10 uF, 6V	1
C7	516 0055 000	Capacitor, 0.001 uF, 1 kV	1
C8,C9	522 0208 000	Capacitor, 50 uF, 12V	2
C10	516 0063 000	Capacitor, 0.002 uF, 1 kV	1
C11	522 0244 000	Capacitor, 50 uF, 25V	1
C12	500 0908 000	Capacitor, 470 pF, 500V	1
C13	522 0232 000	Capacitor, 1 uF, 25V	1
C14	522 0208 000	Capacitor, 50 uF, 12V	1
C15	508 0210 000	Capacitor, 0.015 uF, 100V	1
C16	522 0246 000	Capacitor, 100 uF, 25V	1
C17	522 0239 000	Capacitor, 10 uF, 25V	1
C18	522 0175 000	Capacitor, 10 uF, 6V	1
C19	516 0055 000	Capacitor, 0.001 uF, 1 kV	1
C20,C21	522 0208 000	Capacitor, 50 uF, 12V	2
C22	516 0063 000	Capacitor, 0.002 uF, 1 kV	1
C23	522 0244 000	Capacitor, 50 uF, 25V	1
C24	500 0908 000	Capacitor, 470 pF, 500V	1

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Table 6-4. Stereo Program Amplifier Module - 994 6802 001 (Continued)

REF. SYMBOL	HARRIS PART NO.	DESCRIPTION	QTY.
C25,C26	500 0761 000	Capacitor, 150 pF, 500V	2
Q1 thru Q4	380 0115 000	Transistor, 2N5088	4
Q5	380 0050 000	Transistor, RCA 40317	1
Q6	380 0044 000	Transistor, RCA 40319	1
Q7 thru Q10	380 0115 000	Transistor, 2N5088	4
Q11	380 0050 000	Transistor, RCA 40317	1
Q12	380 0044 000	Transistor, RCA 40319	1
R1	540 0025 000	Resistor, 100 ohm, 1/2W, 5%	1
R2	540 0055 000	Resistor, 1.8k ohm, 1/2W, 5%	1
R3	540 0097 000	Resistor, 100k ohm, 1/2W, 5%	1
R4	540 0032 000	Resistor, 200 ohm, 1/2W, 5%	1
R5	540 0057 000	Resistor, 2.2k ohm, 1/2W, 5%	1
R6	540 0045 000	Resistor, 680 ohm, 1/2W, 5%	1
R7	540 0081 000	Resistor, 22k ohm, 1/2W, 5%	1
R8	540 0057 000	Resistor, 2.2k ohm, 1/2W, 5%	1
R9	550 0272 000	Potentiometer, 10k ohm, 1/4W	1
R10	540 0069 000	Resistor, 6.8k ohm, 1/2W, 5%	1
R11	540 0075 000	Resistor, 12k ohm, 1/2W, 5%	1
R12	540 0027 000	Resistor, 120 ohm, 1/2W, 5%	1
R13	540 0058 000	Resistor, 2.4k ohm, 1/2W, 5%	1
R14	540 0071 000	Resistor, 8.2k ohm, 1/2W, 5%	1
R15	540 0052 000	Resistor, 1.3k ohm, 1/2W, 5%	1
R16	540 0025 000	Resistor, 100 ohm, 1/2W, 5%	1

Table 6-4. Stereo Program Amplifier Module - 994 6802 001 (Continued)

REF. SYMBOL	HARRIS PART NO.	DESCRIPTION	QTY.
R17	540 0032 000	Resistor, 200 ohm, 1/2W, 5%	1
R18	540 0027 000	Resistor, 120 ohm, 1/2W, 5%	1
R19	540 0013 000	Resistor, 33 ohm, 1/2W, 5%	1
R20	550 0272 000	Potentiometer, 10k ohm, 1/4W	1
R21	540 0025 000	Resistor, 100 ohm, 1/2W, 5%	1
R22	540 0055 000	Resistor, 1.8k ohm, 1/2W, 5%	1
R23	540 0097 000	Resistor, 100k ohm, 1/2W, 5%	1
R24	540 0032 000	Resistor, 200 ohm, 1/2W, 5%	1
R25	540 0057 000	Resistor, 2.2k ohm, 1/2W, 5%	1
R26	540 0045 000	Resistor, 680 ohm, 1/2W, 5%	1
R27	540 0081 000	Resistor, 22k ohm, 1/2W, 5%	1
R28	540 0057 000	Resistor, 2.2k ohm, 1/2W, 5%	1
R29	550 0272 000	Potentiometer, 10k ohm, 1/4W	1
R30	540 0069 000	Resistor, 6.8k ohm, 1/2W, 5%	1
R31	540 0075 000	Resistor, 12k ohm, 1/2W, 5%	1
R32	540 0027 000	Resistor, 120 ohm, 1/2W, 5%	1
R33	540 0058 000	Resistor, 2.4k ohm, 1/2W, 5%	1
R34	540 0071 000	Resistor, 8.2k ohm, 1/2W, 5%	1
R35	540 0052 000	Resistor, 1.3k ohm, 1/2W, 5%	1
R36	540 0025 000	Resistor, 100 ohm, 1/2W, 5%	1
R37	540 0032 000	Resistor, 200 ohm, 1/2W, 5%	1
R38	540 0027 000	Resistor, 120 ohm, 1/2W, 5%	1

Table 6-4. Stereo Program Amplifier Module - 994 6802 001 (Continued)

REF. SYMBOL	HARRIS PART NO.	DESCRIPTION	QTY.
R39	540 0013 000	Resistor, 33 ohm, 1/2W, 5%	1
R40	550 0272 000	Potentiometer, 10k ohm, 1/4W	1

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Table 6-5. Cue Sensor Module - 994 7884 001

REF. SYMBOL	HARRIS PART NO.	DESCRIPTION	QTY.
C1	508 0261 000	Capacitor, 0.02 uF, Mylar	1
C2	526 0050 000	Capacitor, 1 uF, 35V	1
C3	500 0759 000	Capacitor, 100 pF, Mica	1
C4	500 0801 000	Capacitor, 2 pF, Mica	1
C5	500 0819 000	Capacitor, 51 pF, Mica	1
C6	500 0756 000	Capacitor, 330 pF, Mica	1
C7	526 0310 000	Capacitor, 0.22 pF, Mica	1
C8	500 0759 000	Capacitor, 100 pF, Mica	1
C9	500 0803 000	Capacitor, 5 pF, Mica	1
C10	508 0279 000	Capacitor, 0.033 uF, Mylar	1
C11	508 0215 000	Capacitor, 0.01 uF, Mylar	1
C12	500 0759 000	Capacitor, 100 pF, Mica	1
C13	500 0808 000	Capacitor, 20 pF, Mica	1
C14	516 0375 000	Capacitor, 0.01 uF, Disc	1
C15	526 0093 000	Capacitor, 15 uF, 35V	1
C16	500 0375 000	Capacitor, 0.01 uF, Disc	1
C17	508 0261 000	Capacitor, 0.02 uF, Mylar	1
C18	500 0759 000	Capacitor, 100 pF, Mica	1
C19,C20	508 0529 000	Capacitor, 0.01 uF, 1%, Polystyrene	2
C21	526 0049 000	Capacitor, 6.8 uF, 35V	1
C22,C23	500 0759 000	Capacitor, 100 pF, Mica	2
C24	526 0050 000	Capacitor, 1.0 uF, 35V	1

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Table 6-5. Cue Sensor Module - 994 7884 001 (Continued)

REF. SYMBOL	HARRIS PART NO.	DESCRIPTION	QTY.
C25	500 0784 000	Capacitor, 300 pF, Mica	1
C26	500 0759 000	Capacitor, 100 pF, Mica	1
C27	500 0802 000	Capacitor, 3 pF, Mica	1
C28	500 0210 000	Capacitor, 0.015 uF, Mylar	1
C29	500 0759 000	Capacitor, 100 pF, Mica	1
C30,C31	508 0533 000	Capacitor, 0.002 uF, 1% Polystyrene	2
C32	526 0050 000	Capacitor, 1 uF, 35V	1
C33	526 0311 000	Capacitor, 2.2 uF, 35V	1
C34	500 0210 000	Capacitor, 0.015 uF, Mylar	1
C35	500 0759 000	Capacitor, 100 pF, Mica	1
C36	500 0827 000	Capacitor, 130 pF, Mica	1
C37	516 0375 000	Capacitor, 0.01 uF, Disc	1
C38	526 0093 000	Capacitor, 15 uF, 35V	1
C39	516 0375 000	Capacitor, 0.01 uF, Disc	1
C40	526 0331 000	Capacitor, 0.33 uF, 50V	1
C41,C42	508 0532 000	Capacitor, 0.05 uF, 1% Polystyrene	2
C43	500 0759 000	Capacitor, 100 pF, Mica	1
C44	526 0050 000	Capacitor, 1 uF, 35V	1
C45	526 0048 000	Capacitor, 10 uF, 20V	1
C46	500 0759 000	Capacitor, 100 pF, Mica	1
C47	526 0094 000	Capacitor, 0.1 uF, 50V	1

Table 6-5. Cue Sensor Module - 994 7884 001 (Continued)

REF. SYMBOL	HARRIS PART NO.	DESCRIPTION	QTY.
C48	500 0759 000	Capacitor, 100 pF, Mica	1
C49,C50	516 0375 000	Capacitor, 0.01 uF, Disc	2
CR1 thru CR5	384 0205 000	Diode, 1N914	5
Q1	380 0112 000	Transistor, 2N5087	1
Q2	380 0053 000	Transistor, 40314	1
Q3	380 0112 000	Transistor, 2N5087	1
Q4	380 0053 000	Transistor, 40314	1
Q5	480 0179 000	Transistor, MPS U45	1
R1	540 1159 000	Resistor, 100k ohm, 1/2W, 5%	1
R2	540 1320 000	Resistor, 5.1 Megohm, 1/2W, 5%	1
R3,R4	540 1162 000	Resistor, 1 Megohm, 1/2W, 5%	2
R5	540 1319 000	Resistor, 510k ohm, 1/2W, 5%	1
R6	540 1147 000	Resistor, 27k ohm, 1/2W, 5%	1
R7	540 1173 000	Resistor, 2 Megohm, 1/2W, 5%	1
R8	540 1162 000	Resistor, 1 Megohm, 1/2W, 5%	1
R9	540 1102 000	Resistor, 100 ohm, 1/2W, 5%	1
R10	550 0711 000	Potentiometer, 10k ohm, 1/2W	1
R11	540 1159 000	Resistor, 100k ohm, 1/2W, 5%	1
R12	540 1173 000	Resistor, 2 Megohm, 1/2W, 5%	1
R13	540 1162 000	Resistor, 1 Megohm, 1/2W, 5%	1
R14	540 1102 000	Resistor, 100 ohm, 1/2W, 5%	1
R15	540 1222 000	Resistor, 62k ohm, 1/2W, 5%	1

Table 6-5. Cue Sensor Module - 994 7884 001 (Continued)

REF. SYMBOL	HARRIS PART NO.	DESCRIPTION	QTY.
R16	548 1340 000	Resistor, 402k ohm, 1/4W, 5%	1
R17	540 1127 000	Resistor, 820 ohm, 1/2W, 5%	1
R18	550 0865 000	Potentiometer, 1k ohm, 1/2W	1
R19	548 1170 000	Resistor, 200k ohm, 1/4W, 5%	1
R20	540 1111 000	Resistor, 10k ohm, 1/2W, 5%	1
R21	540 1159 000	Resistor, 100k ohm, 1/2W, 5%	1
R22	540 1144 000	Resistor, 200k ohm, 1/2W, 5%	1
R23	540 1184 000	Resistor, 15k ohm, 1/2W, 5%	1
R24	540 1111 000	Resistor, 10k ohm, 1/2W, 5%	1
R25	540 1210 000	Resistor, 150k ohm, 1/2W, 5%	1
R26,R27	548 1133 000	Resistor, 13k ohm, 1/4W, 5%	2
R28	540 1137 000	Resistor, 3.9k ohm, 1/2W, 5%	1
R29	550 0711 000	Potentiometer, 10k ohm, 1/2W	1
R30	540 1319 000	Resistor, 510k ohm, 1/2W, 5%	1
R31	540 1173 000	Resistor, 2 Megohm, 1/2W, 5%	1
R32	540 1162 000	Resistor, 1 Megohm, 1/2W, 5%	1
R33	540 1208 000	Resistor, 11k ohm, 1/2W, 5%	1
R34	540 1251 000	Resistor, 300k ohm, k/2W, 5%	1
R35	540 1216 000	Resistor, 330 ohm, 1/2W, 5%	1
R36	550 0865 000	Potentiometer, 1k ohm, 1/2W	1
R37	540 1210 000	Resistor, 150k ohm, 1/2W, 5%	1
R38	540 1182 000	Resistor, 2.2k ohm, 1/2W, 5%	1

WARNING: Disconnect primary power prior to servicing.

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Table 6-5. Cue Sensor Module - 994 7884 001 (Continued)

REF. SYMBOL	HARRIS PART NO.	DESCRIPTION	QTY.
R39	540 1165 000	Resistor, 3.3k ohm, 1/2W, 5%	1
R40	540 1114 000	Resistor, 4.7k ohm, 1/2W, 5%	1
R41	540 1182 000	Resistor, 2.2k ohm, 1/2W, 5%	1
R42	550 0711 000	Potentiometer, 10k ohm, 1/2W	1
R43	540 1319 000	Resistor, 510k ohm, 1/2W, 5%	1
R44	540 1173 000	Resistor, 2 Megohm, 1/2W, 5%	1
R45	540 1162 000	Resistor, 1 Megohm, 1/2W, 5%	1
R46	540 1102 000	Resistor, 100 ohm, 1/2W, 5%	1
R47	540 1147 000	Resistor, 27k ohm, 1/2W, 5%	1
R48	540 1198 000	Resistor, 470k ohm, 1/2W, 5%	1
R49	540 1142 000	Resistor, 240k ohm, 1/2W, 5%	1
R50	540 1129 000	Resistor, 1.5k ohm, 1/2W, 5%	1
R51	550 0865 000	Potentiometer, 1k ohm, 1/2W	1
R52	540 1182 000	Resistor, 2.2k ohm, 1/2W, 5%	1
R53	540 1165 000	Resistor, 3.3k ohm, 1/2W, 5%	1
R54	540 1114 000	Resistor, 4.7k ohm, 1/2W, 5%	1
R55	540 1182 000	Resistor, 2.2k ohm, 1/2W, 5%	1
R56	540 1171 000	Resistor, 12k ohm, 1/2W, 5%	1
R57	540 1111 000	Resistor, 10k ohm, 1/2W, 5%	1
R58,R59	540 1162 000	Resistor, 1 Megohm, 1/2W, 5%	2
R60	540 1111 000	Resistor, 10k ohm, 1/2W, 5%	1
R61	540 1159 000	Resistor, 100k ohm, 1/2W, 5%	1

Table 6-5. Cue Sensor Module - 994 7884 001 (Continued)

REF. SYMBOL	HARRIS PART NO.	DESCRIPTION	QTY.
R62	540 1111 000	Resistor, 10k ohm, 1/2W, 5%	1
R63	540 1212 000	Resistor, 220k ohm, 1/2W, 5%	1
U1,U2	382 0212 000	Integrated Circuit, LM3900	2
U3	382 0461 000	Integrated Circuit, LM3302N	1
XQ2	404 0198 000	Transipad	1
XQ4	404 0198 000	Transipad	1
XU1,XU2,XU3	404 0305 000	Socket, Integrated Circuit, 14 Pin	3

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WARNING: Disconnect primary power prior to servicing.

Table 6-6. Record/Program Amplifier - 994 6899 001

REF. SYMBOL	HARRIS PART NO.	DESCRIPTION	QTY.
C1	522 0236 000	Capacitor, 5 uF, 25V	1
C2	516 0899 000	Capacitor, 0.0043 uF	1
C3	526 0050 000	Capacitor, 1 uF, 35V	1
C4	522 0160 000	Capacitor, 100 uF, 3V	1
C5	508 0191 000	Capacitor, 0.0068 uF, 100V	1
C6	522 0236 000	Capacitor, 5 uF, 25V	1
C7	522 0246 000	Capacitor, 100 uF, 25V	1
C8	500 0817 000	Capacitor, 47 pF, 500V	1
C9	522 0180 000	Capacitor, 35 uF, 6V	1
C10	522 0246 000	Capacitor, 100 uF, 25V	1
C11	522 0236 000	Capacitor, 5 uF, 25V	1
C12	522 0180 000	Capacitor, 35 uF, 6V	1
C13,C14	522 0236 000	Capacitor, 5 uF, 25V	2
C15	500 0817 000	Capacitor, 47 pF, 500V	1
C16	508 0191 000	Capacitor, 0.0068 uF, 100V	1
C17	522 0160 000	Capacitor, 100 uF, 3V	1
C18	526 0050 000	Capacitor, 1 uF, 35V	1
C19	500 0899 000	Capacitor, 0.0043 uF	1
C20,C21,C22	522 0236 000	Capacitor, 5 uF, 25V	3
C23,C24	500 0817 000	Capacitor, 47 pF, 500V	2
C25,C26	500 0811 000	Capacitor, 27 pF, 500V	2
CR1,CR2	384 0352 000	Diode, 1N4246	2

Table 6-6. Record/Program Amplifier - 994 6899 001 (Continued)

REF. SYMBOL	HARRIS PART NO.	DESCRIPTION	QTY.
CR5 thru CR10	394 0352 000	Diode, 1N4246	6
L1,L2	492 0363 000	Inductor, Variable	2
R1	540 0936 000	Resistor, 10k ohm, 1/4W, 5%	1
R2	550 0272 000	Potentiometer, Trimmer, 10k ohm	1
R3	540 0928 000	Resistor, 4.7k ohm, 1/4W, 5%	1
R4	540 0920 000	Resistor, 2.2k ohm, 1/4W, 5%	1
R5	540 0916 000	Resistor, 1.5k ohm, 1/4W, 5%	1
R7	540 0888 000	Resistor, 100 ohm, 1/4W, 5%	1
R8	550 0392 000	Potentiometer, Trimmer, 100k ohm	1
R9	540 0898 000	Resistor, 270 ohm, 1/4W, 5%	1
R10	540 0912 000	Resistor, 1k ohm, 1/4W, 5%	1
R11	540 0939 000	Resistor, 13k ohm, 1/4W, 5%	1
R12,R13	540 0908 000	Resistor, 680 ohm, 1/4W, 5%	2
R14	540 0928 000	Resistor, 4.7k ohm, 1/4W, 5%	1
R15	540 0912 000	Resistor, 1k ohm, 1/4W, 5%	1
R16	540 0888 000	Resistor, 100 ohm, 1/4W, 5%	1
R17	540 0898 000	Resistor, 270 ohm, 1/4W, 5%	1
R18	550 0272 000	Potentiometer, Trimmer, 10k ohm	1
R19	540 0936 000	Resistor, 10k ohm, 1/4W, 5%	1
R20	540 0920 000	Resistor, 2.2k ohm, 1/4W, 5%	1
R21	540 0916 000	Resistor, 1.5k ohm, 1/4W, 5%	1
R23	540 0939 000	Resistor, 13k ohm, 1/4W, 5%	1

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Table 6-6. Record/Program Amplifier - 994 6899 001 (Continued)

REF. SYMBOL	HARRIS PART NO.	DESCRIPTION	QTY.
R24	550 0392 000	Potentiometer, Trimmer, 100k ohm	1
R25,R26	540 0881 000	Resistor, 51 ohm, 1/4W, 5%	2
U1	382 0120 000	Integrated Circuit, CA3052	1
XU1	404 0306 000	Socket, Integrated Circuit	1

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Table 6-7. Bias Oscillator Module - 992 4582 001

REF. SYMBOL	HARRIS PART NO.	DESCRIPTION	QTY.
C1	508 0076 000	Capacitor, 0.005 uF, 100V	1
C2	508 0215 000	Capacitor, 0.01 uF, 100V	1
C3	508 0076 000	Capacitor, 0.005 uF, 100V	1
C4	508 0500 000	Capacitor, 0.022 uF, 100V	1
C5	522 0258 000	Capacitor, 50 uF, 50V	1
C6	522 0227 000	Capacitor, 50 uF, 15V	1
C7	522 0511 000	Capacitor, 300 uF, 25V	1
C8	508 0215 000	Capacitor, 0.01 uF, 100V	1
C9	522 0511 000	Capacitor, 300 uF, 25V	1
C10	508 0215 000	Capacitor, 0.01 uF, 100V	1
C11,C12	500 0817 000	Capacitor, 47 pF, 500V	2
C13	508 0215 000	Capacitor, 0.01 uF, 100V	1
C14 thru C16	500 1200 000	Capacitor, 1.5-20 pF, Trimmer	3
C17	526 0333 000	Capacitor, 15 uF, 20V	1
C18,C19	500 0830 000	Capacitor, 240 pF, 500V	2
C20,C21	526 0057 000	Capacitor, 100 uF, 20V	2
CR1	384 0352 000	Diode, 1N4246	1
L1,L2	492 0363 000	Inductor	2
LDR1,LDR2	670 0026 000	Light Dependent Resistor	2
Q1,Q2	380 0049 000	Transistor, 2N3053	2
Q3	380 0508 000	Transistor, MPS4356	1
Q4,Q5	380 0158 000	Transistor, 2N5550	2

Table 6-7. Bias Oscillator Module - 992 4582 001 (Continued)

REF. SYMBOL	HARRIS PART NO.	DESCRIPTION	QTY.
R1,R2	540 0876 000	Resistor, 33 ohm, 1/4W, 5%	2
R3	540 0888 000	Resistor, 100 ohm, 1/4W, 5%	1
R4,R5	540 0936 000	Resistor, 10k ohm, 1/4W, 5%	2
R6	540 0872 000	Resistor, 22 ohm, 1/4W, 5%	1
R7	540 0936 000	Resistor, 10k ohm, 1/4W, 5%	1
R8	540 0928 000	Resistor, 4.7k ohm, 1/4W, 5%	1
R9	540 0945 000	Resistor, 24k ohm, 1/4W, 5%	1
R10	540 0936 000	Resistor, 10k ohm, 1/4W, 5%	1
R11	540 0945 000	Resistor, 24k ohm, 1/4W, 5%	1
R12,R13	540 0936 000	Resistor, 10k ohm, 1/4W, 5%	2
R14,R15	540 0943 000	Resistor, 20k ohm, 1/4W, 5%	2
R16,R17	540 0984 000	Resistor, 1 Megohm, 1/4W, 5%	2
R18,R19	540 0044 000	Resistor, 620 ohm, 1/2W, 5%	2
R20,R21	540 0920 000	Resistor, 2.2k ohm, 1/4W, 5%	2
T1	478 0319 000	Transformer, Bias Oscillator	1

Table 6-8. Three-Tone Oscillator Module - 994 7885 001

REF. SYMBOL	HARRIS PART NO.	DESCRIPTION	QTY.
C1,C2	526 0049 000	Capacitor, 6.8 uF, 35V, Tant.	2
C3	516 0399 000	Capacitor, 0.0082 uF, Paper, 10%	1
C4	516 0520 000	Capacitor, 1000 pF, 100V, 10%	1
C5	508 0210 000	Capacitor, 0.015 uF, 100V	1
C6	500 0759 000	Capacitor, 100 pF	1
C7,C8	508 0533 000	Capacitor, 0.002 uF, Polystyrene	2
C9,C10	526 0050 000	Capacitor, 1 uF, 35V, Tant.	2
C11,C12	508 0532 000	Capacitor, 0.05 uF, Polystyrene	2
C13	500 0759 000	Capacitor, 100 pF	1
C14	526 0316 000	Capacitor, 0.47 uF, 35V, Tant.	1
C15	526 0050 000	Capacitor, 1 uF, 35V, Tant.	1
C16,C17	526 0049 000	Capacitor, 6.8 uF, 35V, Tant.	2
C18	500 0784 000	Capacitor, 300 pF	1
C19	500 0759 000	Capacitor, 100 pF	1
C20	526 0050 000	Capacitor, 1 uF, 35V, Tant.	1
C21	526 0109 000	Capacitor, 22 uF, 35V, Tant.	1
C22	526 0050 000	Capacitor, 1 uF, 35V, Tant.	1
C23,C24	508 0529 000	Capacitor, 0.01 uF, Polystyrene	2
C25	500 0759 000	Capacitor, 100 pF	1
C26	508 0292 000	Capacitor, 0.068 uF	1
C27	508 0363 000	Capacitor, 0.047 uF, 200V	1
C28	526 0049 000	Capacitor, 6.8 uF, 35V, Tant.	1

Table 6-8. Three-Tone Oscillator Module - 994 7885 001 (Continued)

REF. SYMBOL	HARRIS PART NO.	DESCRIPTION	QTY.
C29	526 0101 000	Capacitor, 47 uF, 6V, Tant.	1
C30	526 0049 000	Capacitor, 6.8 uF, 35V, Tant.	1
C31,C32	516 0375 000	Capacitor, 0.01 uF, 50V	2
C33	526 0093 000	Capacitor, 15 uF, 35V, Tant.	1
C34	526 0050 000	Capacitor, 1 uF, 35V, Tant.	1
C35	526 0817 000	Capacitor, 47 pF, 500V	1
CR1 thru CR4	384 0352 000	Diode, 1N4246	4
CR5	386 0081 000	Diode, Zener, 3.6V	1
L1	492 0369 000	Inductor, Variable, 1.045 to 1.15 mH	1
L2	492 0368 000	Inductor, Variable, 475 to 525 mH	1
L3	492 0367 000	Inductor, Variable, 38 to 42 mH	1
L4	492 0363 000	Inductor, Variable, 81k to 20k uH	1
Q1,Q2	380 0111 000	Transistor, 2N3417	2
Q3	380 0143 000	Transistor, 40311	1
Q4	380 0111 000	Transistor, 2N3417	1
R1	540 1114 000	Resistor, 4.7k ohm, 1/2W, 5%	1
R2	540 1160 000	Resistor, 22k ohm, 1/2W, 5%	1
R3	540 1179 000	Resistor, 3.6k ohm, 1/2W, 5%	1
R4	540 1180 000	Resistor, 360 ohm, 1/2W, 5%	1
R5	540 1111 000	Resistor, 10k ohm, 1/2W, 5%	1
R6	540 1202 000	Resistor, 51k ohm, 1/2W, 5%	1
R7	540 1251 000	Resistor, 300k ohm, 1/2W, 5%	1

Table 6-8. Three-Tone Oscillator Module - 994 7885 001 (Continued)

REF. SYMBOL	HARRIS PART NO.	DESCRIPTION	QTY.
R8	540 1210 000	Resistor, 150k ohm, 1/2W, 5%	1
R9	540 1216 000	Resistor, 330 ohm, 1/2W, 5%	1
R10	550 0865 000	Potentiometer, 1k ohm, Variable	1
R11	550 0711 000	Potentiometer, 10k ohm, Variable	1
R12	540 1122 000	Resistor, 47k ohm, 1/2W, 5%	1
R13	540 1108 000	Resistor, 36k ohm, 1/2W, 5%	1
R14	550 0711 000	Potentiometer, 10k ohm, Variable	1
R15	540 1210 000	Resistor, 150k ohm, 1/2W, 5%	1
R16	540 1138 000	Resistor, 3k ohm, 1/2W, 5%	1
R17	550 0865 000	Potentiometer, 1k ohm, Variable	1
R18	540 1251 000	Resistor, 300k ohm, 1/2W, 5%	1
R19	540 1108 000	Resistor, 36k ohm, 1/2W, 5%	1
R20	540 1111 000	Resistor, 10k ohm, 1/2W, 5%	1
R21	540 1177 000	Resistor, 180 ohm, 1/2W, 5%	1
R22	540 1160 000	Resistor, 22k ohm, 1/2W, 5%	1
R23	540 1179 000	Resistor, 3.6k ohm, 1/2W, 5%	1
R24	540 1114 000	Resistor, 4.7k ohm, 1/2W, 5%	1
R25,R26	540 1182 000	Resistor, 2.2k ohm, 1/2W, 5%	2
R27	540 1159 000	Resistor, 100k ohm, 1/2W, 5%	1
R28	540 1144 000	Resistor, 200k ohm, 1/2W, 5%	1
R29	540 1113 000	Resistor, 18k ohm, 1/2W, 5%	1
R30	540 1130 000	Resistor, 620 ohm, 1/2W, 5%	1
R31	540 1116 000	Resistor, 1k ohm, 1/2W, 5%	1

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WARNING: Disconnect primary power prior to servicing.

Table 6-8. Three-Tone Oscillator Module - 994 7885 001 (Continued)

REF. SYMBOL	HARRIS PART NO.	DESCRIPTION	QTY.
R32	540 1131 000	Resistor, 30k ohm, 1/2W, 5%	1
R33	550 0711 000	Potentiometer, 10k ohm, Variable	1
R34	540 1111 000	Resistor, 10k ohm, 1/2W, 5%	1
R35	550 0865 000	Potentiometer, 1k ohm, Variable	1
R36	540 1127 000	Resistor, 820 ohm, 1/2W, 5%	1
R37	540 1144 000	Resistor, 200k ohm, 1/2W, 5%	1
R38	540 1318 000	Resistor, 390k ohm, 1/2W, 5%	1
R39	540 1143 000	Resistor, 24k ohm, 1/2W, 5%	1
R40	540 1111 000	Resistor, 10k ohm, 1/2W, 5%	1
R41	540 1180 000	Resistor, 360 ohm, 1/2W, 5%	1
R42	540 1179 000	Resistor, 3.6k ohm, 1/2W, 5%	1
R43	540 1160 000	Resistor, 22k ohm, 1/2W, 5%	1
R44	540 1102 000	Resistor, 100 ohm, 1/2W, 5%	1
R45	540 1109 000	Resistor, 33k ohm, 1/2W, 5%	1
R46	540 1159 000	Resistor, 100k ohm, 1/2W, 5%	1
R47	540 1119 000	Resistor, 1.8k ohm, 1/2W, 5%	1
R48	540 1165 000	Resistor, 3.3k ohm, 1/2W, 5%	1
R49	540 1106 000	Resistor, 6.2k ohm, 1/2W, 5%	1
R50	540 1102 000	Resistor, 100 ohm, 1/2W, 5%	1
U1	382 0212 000	Integrated Circuit, LM3900	1
XU1	404 0305 000	Socket, Integrated Circuit, 14-Pin Dipole	1

Table 6-9. Auxiliary Equipment Criterion 90-1 and 90-2

REF. SYMBOL	HARRIS PART NO.	DESCRIPTION	QTY.
	929 0406 001 (Criterion 90-1) 929 0428 001 (Criterion 90-2 Play) 939 1962 001 (Criterion 90-2 Rec/Play)	Case, Deskmount	
	424 0100 000	Rubber Feet, Gray	
	610 0482 000	Plug, 6 Pin, latching (mates with J2-Playback, J4-Record Amp)	
	610 0516 000	Plug, 18 Pin, latching (mates with J1-Playback)	
	610 0484 000	Plug, 12 Pin, latching (mates with J3-Record Amp)	
	358 1829 000	Wing Head Screw	

SECTION VII

DIAGRAMS

7-1. INTRODUCTION.

7-2. This section provides schematic diagrams necessary for maintaining the Criterion 90-1 and 90-2 Record/Playback Units. The following diagrams are contained in this section.

<u>Figure</u>	<u>Title</u>	<u>Page</u>
7-1	Criterion 90-1 and 90-2 Playback	7-3/7-4
7-2	Criterion 90-2 Record	7-5/7-6

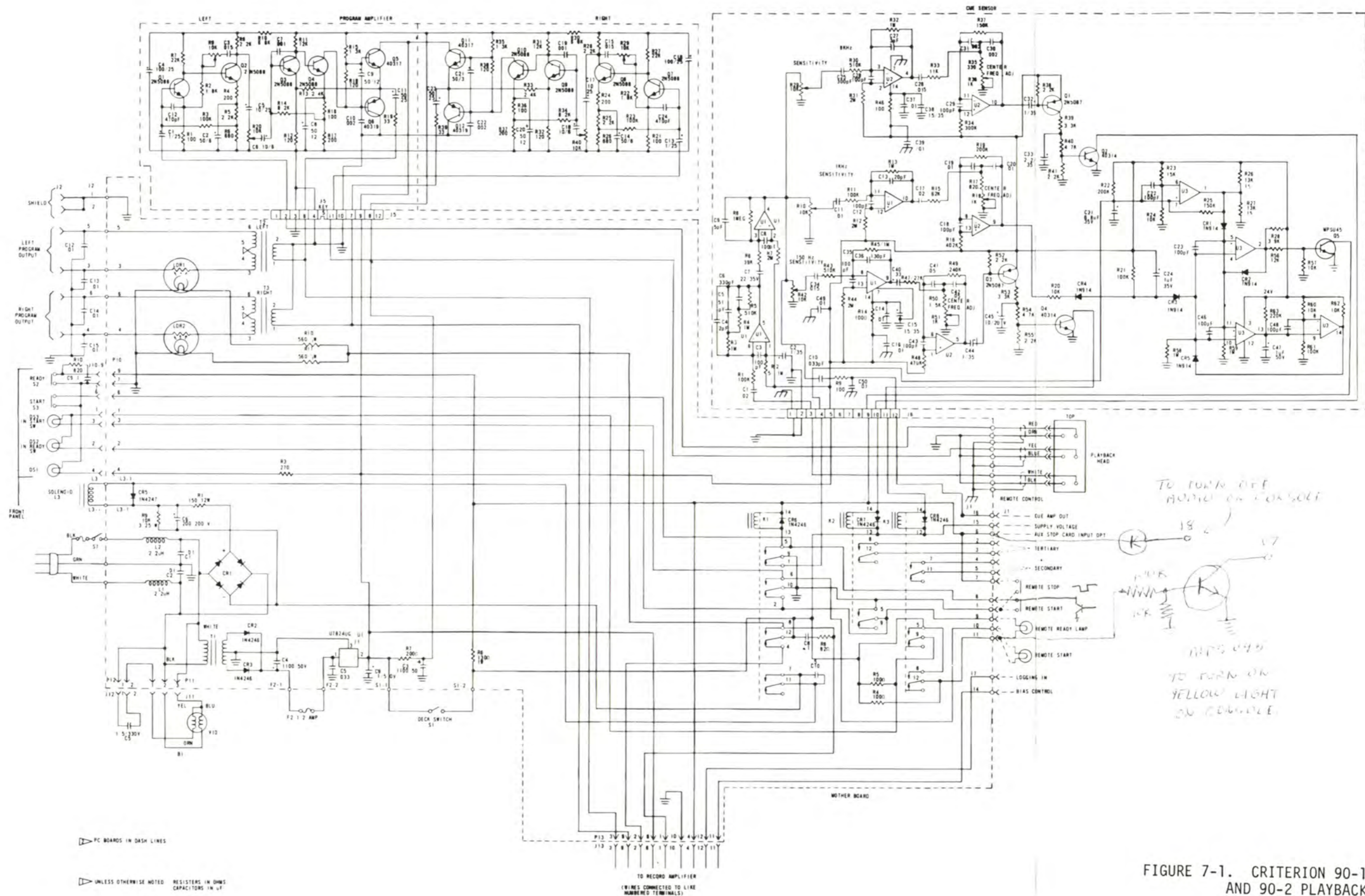


FIGURE 7-1. CRITERION 90-1 AND 90-2 PLAYBACK 852 8088 001

If You Didn't Get This From My Site,
Then It Was Stolen From...
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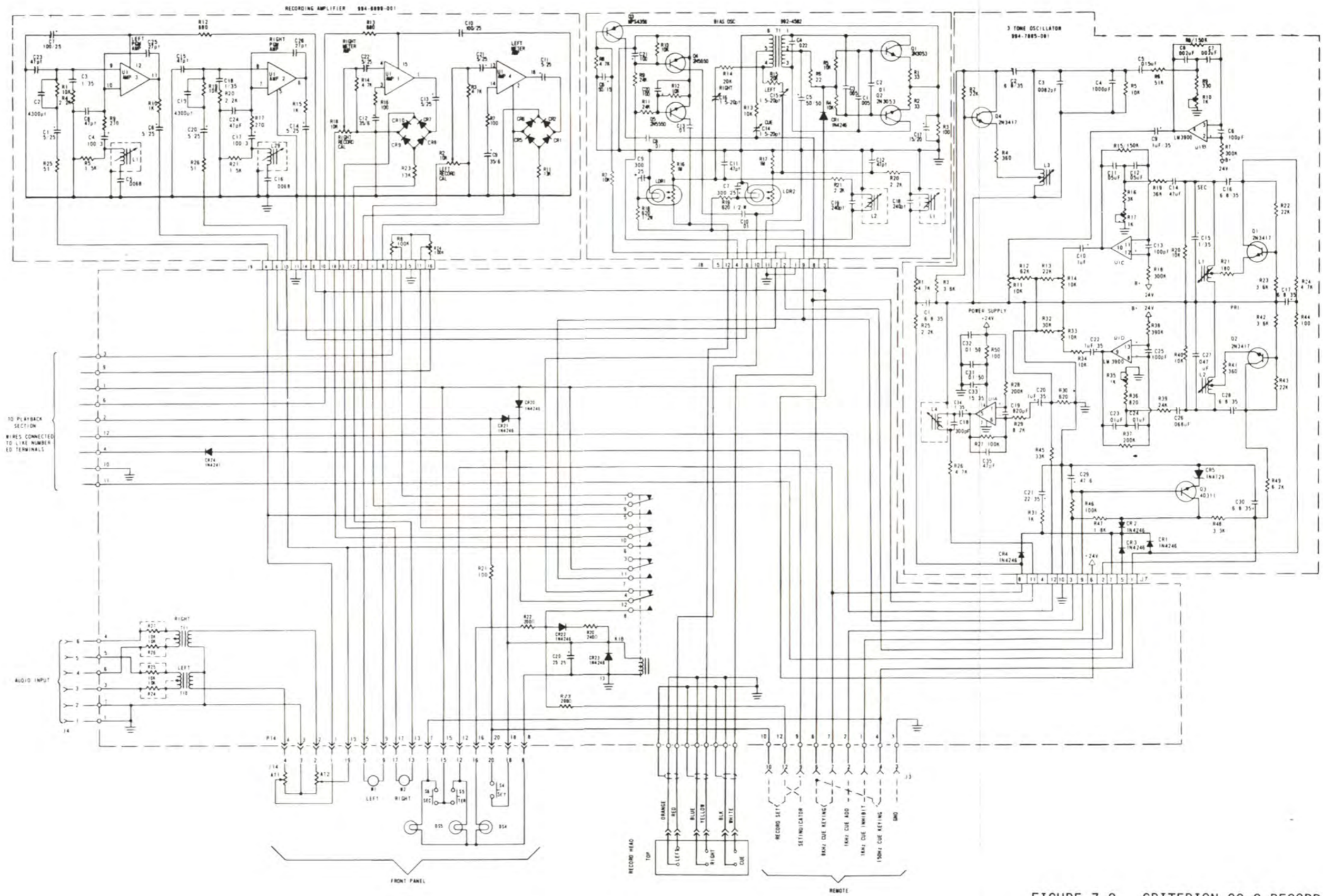


FIGURE 7-2. CRITERION 90-2 RECORD 852 8089 001

CRITERION 90 TEST REPORT

MODEL # 994-7994-001 SERIAL # 78-8851-008

TESTED BY



COMMUNICATIONS AND INFORMATION HANDLING

HEAD ALINGMENT

CORRECT DEPTH
 CORRECT HEIGHT
 CORRECT AZIMUTH

FRONT PANEL OPERATION

REMOTE OPERATION

PINCH ROLLERS

CORRECT PRESSURE
 CORRECT START TIMING
 CORRECT STOP TIMING

PLAYBACK FUNCTIONS

SIGNAL-TO-NOISE LEFT -52db RIGHT -52db
 DISTORTION LEFT 1.2% RIGHT 1.2%
 MAX. GAIN LEFT +11.2db RIGHT +14.0db (INPUT 1 kHz @ 160nW/M)
 FLUTTER .13

FREQUENCY RESPONSE

	REF	15k	12k	10k	7.5k	5k	2.5k	1k	500	250	100	50
LEFT CH.	0	0	0	+1.2	+1.3	+1.5	+1.3	0	+1.0	-1.0	+1.2	0
RIGHT CH.	0	0	+1.3	+1.7	+1.0	+1.2	+1.0	+1.2	+1.5	0	+2.0	+1.0

PHASING

1 kHz CUE SENSOR
 (-7DB THRESHOLD)

8 kHz CUE SENSOR
 (-17DB THRESHOLD)

150 Hz CUE SENSOR
 (-1DB THRESHOLD)

RECORD FUNCTIONS

DISTORTION LEFT _____ RIGHT _____
 SIGNAL TO NOISE LEFT _____ RIGHT _____

FREQUENCY RESPONSE

(RECORD THROUGH PLAYBACK)

	REF	15k	12k	10k	7.5k	5k	2.5k	1k	500	250	100	50
LEFT CH.												
RIGHT CH.												

PHASING

1 kHz CUE GENERATOR
 (0DB)

8 kHz CUE GENERATOR
 (-10DB)

150 Hz CUE GENERATOR
 (+6DB)

TECHNICAL MANUAL
CRITERION 90-1 AND 90-2
RECORD/PLAYBACK UNITS

ADDENDUM

Excessive remote indicator lamp/relay loads will cause the C90-1/C90-2 power supplies to fall out of regulation and false cueing of the Secondary cue sensor.

C90-1/C90-2 playback machines provide up to 105 ma. @ 24V for external lamps and/or relays with a minimum (117V -10%) 105V AC line, up to 170 ma. with a 110V AC line. Typical 28V @ 40 ma. lamps draw 32 ma. @ 24V, permitting up to 3 lamps with a 105V and up to 5 lamps with a 110V AC line.

C90-2 record/playback machines provide up to 125 ma. with a minimum 105V AC line and up to 195 ma. with a 110V AC line. This permits the use of up to 4 lamps with a 105V and up to 6 lamps with a 110V AC line.

HARRIS



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