

AMPEX

4890302

Model AG600 B
Recorder/Reproducer

Operation and Maintenance Manual

AMPEX

4890302-01

Model AG600 B
Recorder/Reproducer
Operation and Maintenance Manual

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LIST OF PAGES

PAGE NUMBER	CHANGE IN EFFECT	PAGE NUMBER	CHANGE IN EFFECT	PAGE NUMBER	CHANGE IN EFFECT	PAGE NUMBER	CHANGE IN EFFECT
Title "A" i-x		Section 4 10 pages					
Section 1 10 pages		Section 5 14 pages					
Section 2 4 pages		Section 6 6 pages					
Section 3 6 pages		Section 7 36 pages					

SAFETY & FIRST AID

Because personnel working with electronic equipment are exposed to the hazard of high voltage, it is imperative that all safety regulations be consistently observed, and that each individual has a clear understanding of basic First Aid methods.

The following typical hazards must be avoided at all times:

1 Do not attempt adjustment of unprotected circuit controls, or lead dress while the power is ON.

2 Do not change heavily loaded or overheated components without due precaution to avoid burns.

3 Do not assume that no dangerous voltage is present when the power is OFF. Charged capacitors may retain dangerous voltages for long periods, and should be discharged through a suitable resistor before any circuit points are touched.

4 At all times avoid placing any parts of the body in series between ground and circuit points, whether or not power is ON.

5 Do not assume that solid-state circuits and semiconductor cases carry only low voltages.

v 0 8 6 3 3

For their own protection, and the protection of others, all electronic personnel should become thoroughly familiar with the approved First Aid treatment of burns and shock. There are three principal degrees of burns, recognizable as follows:

1. A first degree burn reddens the skin
2. A second degree burn blisters the skin
3. A third degree burn chars the flesh and frequently places the victim in a state of shock accompanied by respiratory paralysis.

Respiratory paralysis in the victim can cause death within seconds, by suffocation. For this reason it is imperative that the approved method of artificial respiration be initiated immediately and continued until the victim's breathing is normal.

A muscular spasm or unconsciousness may render the victim unable to free himself of the electric power. If this is the case, turn the power OFF immediately.

CAUTION

DO NOT TOUCH HIM, OR YOU MAY SHARE HIS PREDICAMENT.

If the power cannot be turned OFF immediately, very carefully loop a dry rope, article of clothing, length of strong cloth, or a rolled-up newspaper around the victim and pull him free of the power. Carefully avoid touching him or his clothing.

The moment he is clear of the power, place him in a reclining position, cover him with a blanket (or newspapers) to keep him warm, and begin artificial respiration. At the first opportunity, enlist help in the summoning of a doctor. If a doctor cannot be summoned, transport the victim to the doctor, infirmary, or hospital. Be sure that the victim is kept well covered and warm while awaiting professional aid and treatment.

COMMUNICATING WITH AMPEX

SERVICE INFORMATION AND PARTS

FIELD ENGINEERING BULLETIN SERVICE (See note below)

Ampex provides a continuous technical support program for its products. This program is partially implemented through field engineering bulletins, which are published by the Ampex Technical Support Group. Approved modifications, information on special tools and accessories, and improved operating and maintenance techniques are typical of the information distributed in these bulletins.

If the installation of your system or accessory was supervised by an Ampex Field engineer, you will be sent these bulletins automatically. If this is not the case, contact the nearest Ampex field office or write to:

Ampex Corporation
Audio Technical Support Group
401 Broadway
Redwood City, California 94063 USA

SERVICE AND REPLACEMENT PARTS (See note below)

For service and replacement parts, contact your nearest Ampex field office. If the installation of your system or accessory was supervised by an Ampex field engineer, you will be sent information regarding the location of the nearest field office. Alternatively, write to the Technical Support Group at the address shown above.

NOTE

In order for the technical support program to function properly, the user must ensure that his communication is addressed to the proper department, and that it includes the following information, most of which can be obtained from the system identification nameplate on the equipment.

1. System name
2. Model number (including revision number)
3. System number
4. Serial number
5. Power requirements
6. System modifications and special accessories
7. Date of purchase
8. Name and address of your organization
9. Job function to which communication should be addressed
10. Physical location of equipment

COMMUNICATING WITH AMPEX

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Another part of the Ampex program of technical support for its products is the continuous revision and modification of instruction manuals as the equipment is improved or modified. In order to ensure that you always receive this information, write to:

Ampex Corporation
Audio/Video Technical Publications Department
401 Broadway
Redwood City, California 94063 USA

NOTE

In order to be sure that you always receive information applicable to your equipment, please include the following information when you write to us:

1. System name
2. Model number (including revision number)
3. Serial number
4. Power requirements
5. System modifications and special accessories
6. Approximate date of purchase
7. Name and address of your organization
8. Job function to which communication should be addressed

WARNINGS AND CAUTIONS

SUMMARY

The following general Warnings and Cautions must be adhered to during applicable handling, operation, and maintenance procedures. The Warnings and Cautions are repeated in this manual wherever they specifically apply; those that apply only under isolated conditions are in the text where applicable.

WARNINGS

- 1) Avoid body-contact with high-voltage circuits when energized; or serious injury could result.
- 2) Use only insulated tools to adjust potentiometers; or high-voltage shock can result.

CAUTIONS

- 1) Do not use pressurized air for cleaning; or dirt can be forced between bearing surfaces.
- 2) When the flutter-test tape is on the equipment, do not initiate the record mode; or the tape will be erased.
- 3) When cleaning the heads, use only the recommended solvent to avoid damaging the heads. Keep solvent off of plastic finishes and the capstan idler tire. Do not use metal tools which might scratch the heads.
- 4) Do not use head-cleaning solution on idler rubber tire or capstan; it will cause tire damage and tape slippage if applied.

5) International models have a 115 or 230 volt selector switch on the rear panel. This switch must be set to the line voltage, or extensive equipment damage can result.

TABLE OF CONTENTS

<u>Paragraph</u>	<u>Title</u>	<u>Page</u>
SECTION 1	DESCRIPTION	1-1
1.1	System	1-1
1.4	Tape Transport	1-1
1.9	Electronic Assembly	1-1
1.16	Accessories	1-4
1.17	Amplifier/Loudspeaker	1-4
1.19	Mixer	1-4
1.21	Meter Panel	1-4
1.23	Input Transformers	1-4
1.26	Microphone Preamplifier	1-4
1.30	Phonograph Pickup Preamplifier	1-6
1.32	Microphones	1-6
1.39	Head Demagnetizer	1-7
1.41	Rack Mounting Adapters	1-7
1.43	Specifications	1-7
SECTION 2	INSTALLATION	2-1
2.1	Unpacking	2-1
2.4	Mounting	2-1
2.7	Connecting	2-2
2.8	General	2-2
2.10	Control Cable Connections	2-2
2.15	Input-Signal Connections	2-2
2.19	Output-Signal Connections	2-2
2.22	Head Cable Connections	2-3
2.24	Power Connections	2-3
SECTION 3	OPERATING INSTRUCTIONS	3-1
3.1	Operating Controls and Indicators	3-1
3.2	Tape Transport	3-1
3.4	Electronic Assembly	3-2
3.6	Monitor Equipment	3-4
3.8	Operation	3-4
3.9	Tape Threading	3-4
3.11	Power Application	3-4

TABLE OF CONTENTS (Cont.)

<u>Paragraph</u>	<u>Title</u>	<u>Page</u>
SECTION 3 (continued)		
3.13	Speed and Equalization Selection	3-4
3.15	Recording	3-4
3.16	Reproducing	3-5
3.17	Fast-Winding	3-5
SECTION 4 PREVENTIVE MAINTENANCE AND CHECKOUT 4-1		
4.1	Eighth-Hour Cleaning	4-1
4.2	Heads	4-1
4.4	Tape Guide Elements	4-1
4.6	Eighth-Hour Demagnetizing	4-1
4.8	Monthly Cleaning	4-2
4.10	Lubricating	4-2
4.11	General	4-2
4.13	Capstan/Idler Sixth-Month Lubrication	4-2
4.15	Drive Motor Bearings	4-3
4.18	Performance Checkouts	4-3
4.20	Transport Checkout	4-3
4.21	Test Equipment	4-3
4.23	Tape Tension Check	4-3
4.29	Idler Pressure Check	4-5
4.34	Flutter and Wow Check	4-6
4.44	Electronic Checkouts	4-7
4.45	Test Equipment	4-7
4.47	Test Conditions	4-7
4.49	Power Supply Check	4-8
4.51	Frequency Response Check	4-8
4.53	Signal-To-Noise Check	4-9
4.55	Distortion Check	4-10
SECTION 5 CORRECTIVE MAINTENANCE 5-1		
5.1	Transport Mechanical Adjustments	5-1
5.2	Access	5-1
5.4	Fast-Winding Torques	5-1
5.6	Supply Reel Torques	5-1
5.8	Takeup Reel Torques	5-2
5.10	Capstan Thrust	5-2
5.12	Play Takeup Clutch	5-2
5.14	Turntable Height	5-3
5.16	Transport Disassembly	5-3
5.17	General	5-3
5.19	Removing Subplate	5-3

TABLE OF CONTENTS (Cont.)

<u>Paragraph</u>	<u>Title</u>	<u>Page</u>
SECTION 5 (continued)		
5. 22	Head Adjustments	5-3
5. 23	Head Azimuths	5-3
5. 25	Tape Guide	5-3
5. 29	Head Height	5-5
5. 34	Head Zenith and Tape Wrap	5-5
5. 39	Head Assembly Removal	5-6
5. 40	Head Stack Alteration.	5-6
5. 41	Electronic Alignment.	5-7
5. 42	Alignment Equipment.	5-7
5. 44	Alignment Conditions.	5-7
5. 46	Introduction	5-7
5. 50	Reproduce Head Azimuth	5-7
5. 53	Reproduce/Record Alignment	5-8
5. 54	Record-Head Azimuth	5-9
5. 56	Record Equalization	5-10
5. 58	Bias Oscillator Frequency	5-11
5. 61	Bias Symmetry	5-11
5. 64	Electronic Defects and Corrections	5-11
5. 65	Poor Frequency Response	5-11
5. 67	Signal Distortion.	5-12
5. 70	Excessive Noise	5-12
5. 72	Excessive Flutter/Wow.	5-12
SECTION 6 PRINCIPLES OF OPERATION. 6-1		
6. 1	Transport Operation	6-1
6. 2	Introduction	6-1
6. 5	Play Mode.	6-1
6. 7	Rewind Mode.	6-1
6. 9	Fast-Forward Mode	6-3
6. 11	Electronic Operation	6-3
6. 12	Record Circuit	6-3
6. 21	Reproduce Circuit	6-5
6. 24	Power Supply, Domestic	6-5
6. 27	Power Supply, International.	6-5
SECTION 7 PARTS LISTS AND DRAWINGS 7-0/00		

ILLUSTRATIONS

<u>Figure</u>	<u>Title</u>	<u>Page</u>
1-1	AMPEX AG-600B Recorder Reproducer	1-2
1-2	Tape Transport	1-3
1-3	Electronic Assembly	1-3
1-4	Typical Head Assembly	1-4
1-5	Microphone Impedance Changing	1-6
2-1	Mounting Dimensions	2-1
2-2	Electronic Assembly Connector Panel	2-2
2-3	Electronic Assembly (Rear)	2-3
3-1	Transport Controls	3-3
3-2	Electronic Assembly Controls	3-3
3-3	Tape Threading Path	3-4
4-1	Capstan and Idler Bearing Lubrication	4-2
4-2	Tape Tension Measurement	4-4
4-3	Idler Pressure Measurement	4-5
4-4	Capstan Idler Pressure Spring	4-6
4-5	Bias Filter Schematic	4-8
4-6	Bandpass Filter Schematic	4-8
5-1	Supply Torque Adjustment	5-1
5-2	Takeup Torque Adjustment	5-2
5-3	Capstan Thrust Adjustment	5-2
5-4	Turntable Height Adjustment	5-3
5-5	Transport Subplate Removal	5-4
5-6	Tape Guide Adjustments	5-4
5-7	Head Adjustments	5-5
5-8	Head Assembly Removal	5-6
5-9	Head Azimuth Adjustments	5-10
6-1	Transport Tape Drive	6-2
6-2	Electronic Circuit Diagram	6-4
6-3	Input Circuit, International Version	6-5
7-1	Tape Transport Assembly, Front	7-4
7-2	Tape Transport Assembly, Back	7-5
7-3	Play Takeup Arm	7-6
7-4	Capstan Idler Arm	7-7

ILLUSTRATIONS (Cont.)

<u>Figure</u>	<u>Title</u>	<u>Page</u>
7-5	Rewind Arm	7-8
7-6	Takeup Arm	7-9
7-7	Belt Idler Arm	7-10
7-8	Plate.	7-11
7-9	Motor	7-12
7-10	Microphone Preamplifier	7-15
7-11	Head Assembly, Full-Track	7-16
7-12	Head Assembly, Half-Track	7-17
7-13	Head Assembly, Two-Track	7-18
7-14	Head Assembly, Quarter-Track	7-19
7-15	Electronics, Front Panel Assembly	7-21
7-16	Electronics, Back Panel Assembly (Domestic)	7-23
7-17	Electronics, Back Panel Assembly (International).	7-25
7-18	Schematic Diagram, Master Electronics (Domestic).	7-31
7-19	Schematic Diagram, Master Electronics (International)	7-33
7-20	Schematic Diagram, Slave Electronics.	7-35
7-21	Response Curves	7-37
7-22	Record Printed Wiring Board.	7-39
7-23	Reproduce Printed Wiring Board.	7-39

TABLES

<u>Table</u>	<u>Title</u>	<u>Page</u>
1-1	Accessories	1-5
1-2	AA-620 Loudspeaker Specifications	1-5
1-3	AG-600B System Specifications	1-7
1-4	Tape Transport Specifications	1-8
1-5	Electronic Assembly Specifications	1-8
1-6	Microphone Preamplifier Specifications	1-9
1-7	Accessory Microphone Specifications	1-10
3-1	Tape Transport Controls and Indicators	3-1
3-2	Electronic Assembly Controls and Indicators	3-2
4-1	Tape Tension Requirements	4-4
4-2	Component Rotational Rates	4-7
4-3	Reproduce Signal/Noise from Peak Record Level	4-9

SECTION 1

DESCRIPTION

1.1 SYSTEM

1.2 The Ampex Model AG-600B Magnetic Tape Recorder/Reproducer (Figure 1-1) consists of a compact tape transport and one (for single-track) or two (for two-track) compact electronics processing units adaptable for either studio or portable use. The tape-drive system features a hysteresis-synchronous, two-speed, low-heat motor for smooth and efficient tape movement. The electronic circuits are all solid-state, to ensure high-level performance and dependability. The tape transport uses 1/4-inch tape on reels up to seven inches in diameter.

1.3 The AG-600B Recorder/Reproducer is available either in a Domestic type (105-125 volts, 60 Hz), or an International type (115 or 230 volts, 50 Hz). It may be purchased mounted in a portable case or unmounted (for mounting, with rack adaptors, in standard 19-inch racks).

1.4 TAPE TRANSPORT (Figure 1-2)

1.5 The tape transport provides two tape speeds (3-3/4 and 7-1/2 inches-per-second), and has a counter to indicate tape position.

1.6 All tape transport components are secured on two rigid castings to ensure precision tape handling. A drive clutch and two-speed drive motor (with a flywheel) ensures smooth tape handling.

1.7 Tape speed is selected by a two-position "EQUALIZATION" switch on the electronics unit(s). Electronic equalization is

automatically switched according to the "SLOW" or "FAST" speed selected.

1.8 Two switches, at the transport lower right, select operation modes: RECORD or PLAY; and REWIND or FAST FWD.

1.9 ELECTRONIC ASSEMBLY (Figure 1-3)

1.10 One-channel equipment has one main electronic assembly, and two-channel equipment has two electronic assemblies-- a master and a slave. The two electronic assemblies are identical except that power is connected to the slave through the master.

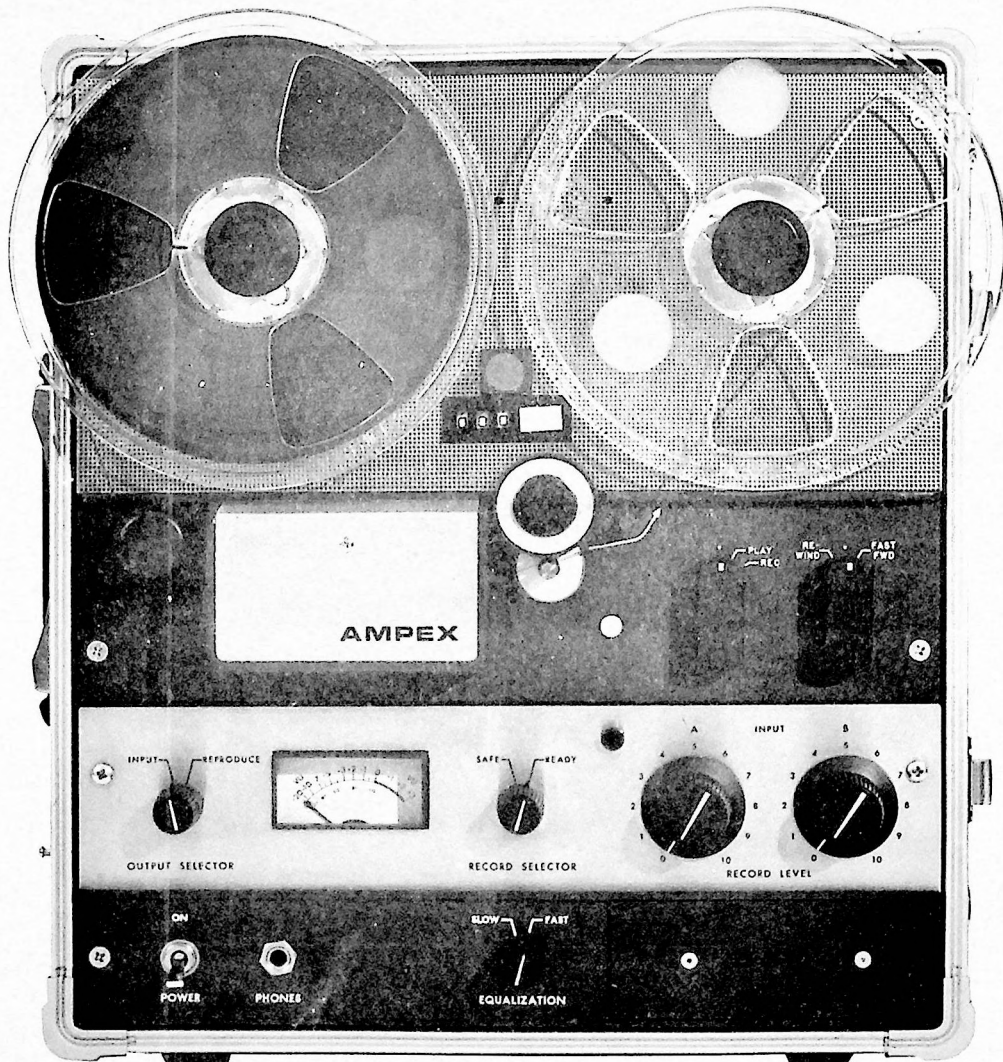
1.11 The two types of the master electronics assembly are Domestic, which requires line power of 105-125 volts at 60 Hz; and International, which has a switch to select either 115 or 230 volts at 50 Hz. Each type uses the same slave electronics assembly to adapt it for two-channel operation.

1.12 Each electronics assembly has two record-input connectors, so that two sound sources can supply the recorder. A dummy plug for either input receptacle is required when recording only from the other line. A microphone preamplifier is provided so that either input can be fed from a microphone.

1.13 Selector switches for the two tape speeds (with equivalent equalization), OUTPUT, RECORD, and RECORD LEVEL, are provided on the front panel.

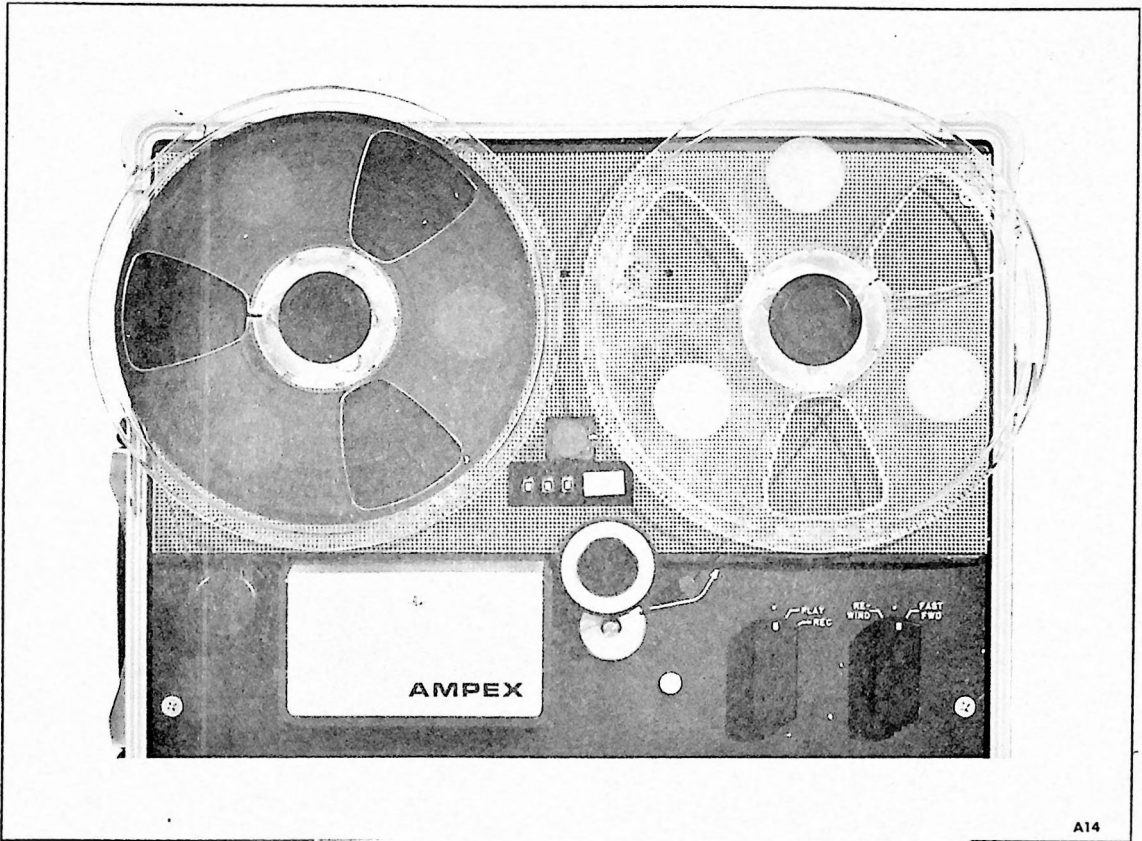
1.14 HEAD ASSEMBLIES (Figure 1-4)

1.15 Head assemblies for single-channel operation may be either full-track or half-



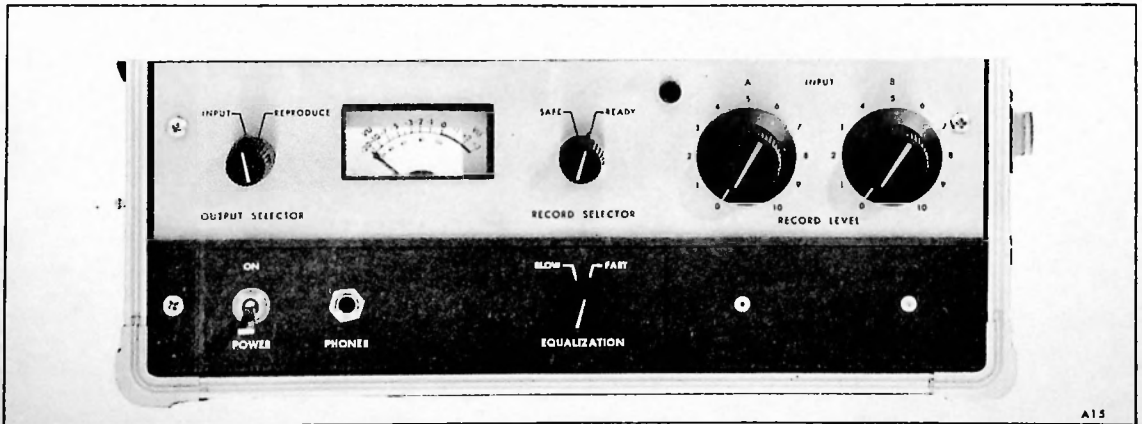
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Figure 1-1. AMPEX AG-600B Recorder/Reproducer



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Figure 1-2. Tape Transport



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Figure 1-3. Electronic Assembly

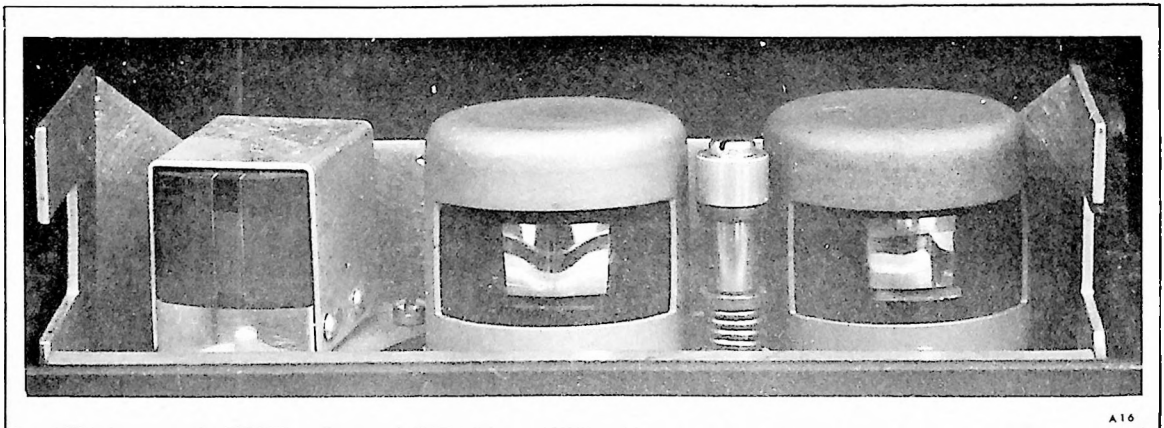


Figure 1-4. Typical Head Assembly

track. Heads for two-channel operation can be either standard two-track or quarter-track.

NOTE

The half-track heads are constructed as two-track heads, but only one head in each stack is connected for use.

1.16 ACCESSORIES (See Table 1-1)

1.17 AMPLIFIER/LOUDSPEAKER

1.18 Ampex Amplifier/Loudspeaker, Model AA-620, combines a 15-watt solid-state power amplifier with a dual loudspeaker for a professional-quality unit. It can be purchased in a carrying case if desired. For loudspeaker specifications, see Table 1-2.

1.19 MIXER

1.20 Ampex Mixer, Model AM-10, mixes one to four microphone inputs and two line inputs, and switches them between the two channel outputs. If more inputs are required, mixers may be coupled together to obtain the required total. Each input has a separate level control, and both output channel levels are controlled simultaneously by a master-gain control. Each microphone

input incorporates a plug-in preamplifier printed-circuit board, and each output has a similar plug-in mixer and line amplifier board.

1.21 METER PANEL

1.22 A two-channel meter panel, 4010098, is available for use with the AM-10 Mixer to provide a separate VU meter indication of each mixer output. A three-position switch sets the meters for a +4 dB, +8 dB, or +12 dB output.

1.23 INPUT TRANSFORMERS

1.24 For recording from an unbalanced line, the dummy plugs are used. For balanced-line recording, two input transformers are available to replace the dummy plugs.

1.25 Transformer 4580200-01 is a balanced-bridging transformer with unity gain and an input impedance of 20,000 ohms. The other transformer, 4580200-02, is a balanced-matching transformer, which provides a 14 dB gain and an input impedance of 600 ohms.

1.26 MICROPHONE PREAMPLIFIER

1.27 One microphone preamplifier, 4010066, is supplied for each electronic

Table 1-1. Accessories

DESCRIPTION	AMPEX MODEL or PART NO.
Mixer (for up to 4 microphone, and 2 line, inputs)	Model AM-10
Microphone Preamplifier	4010066
Microphone, 75-10,000 Hz	Model 802
Microphone, 45-15,000 Hz	Model 803
Head Demagnetizer	Model 820
Phonograph Preamplifier, RIAA	4010097
Meter Panel, VU	4010098
Amplifier/Loudspeaker	Model AA-620
Input Transformer, Balanced-Bridging (20,000 ohm impedance)	4580200-01
Input Transformer, Balanced-Matching (600 ohm impedance)	4580200-02
Reel, 7-inch, Small Hub (Spare)	4690069-10
Hardware Kit, Mounting	4010897-02

Table 1-2. AA-620 Loudspeaker Specifications

CHARACTERISTIC	REQUIREMENT
<u>Overall Frequency Response</u> (in free air)	Essentially flat acoustically. Range better than 65 to 10,000 Hz.
<u>Signal-to-Noise Ratio</u>	Amplifier noise, including hum, 80 dB below rated output.
<u>Distortion (amplifier)</u>	Total harmonic distortion less than 1% at full rated output.

assembly. If it is desired to record two inputs from microphones, another preamplifier is available as an accessory.

1.28 The preamplifier is wired so that a variable-gain control may be inserted between the two stages. When used with Ampex recorders (Models AG-440, AG-500, or AG-600), the record level control on the equipment is so connected, making the preamplifier a variable-gain device that accommodates a wide variety of professional-quality microphones.

1.29 The unit can be used to drive any amplifier with a 100,000-ohm input impedance, at a 0.1-volt rms level. When so used, the signal input is connected across pins 4 and 8, the unbalanced output is taken across pins 7 and 2 (ground). Power (+24 volts dc) is connected to pin 5 (with pin 2 again ground). The previously mentioned variable-gain control (100,000 ohms) is connected across pins 3 and 6. Pin 1 is connected to the case of the unit, and should also be grounded.

1.30 PHONOGRAPH PICKUP PREAMPLIFIER

1.31 An accessory RIAA phonograph preamplifier, 4010097, is available that allows

the line-input signal to be taken directly from a magnetic pickup. Crystal or ceramic pickups may be used if they are loaded with a 1,500-ohm resistor. The preamplifier operates directly from the pickup; if the phonograph signal has already been amplified, install the dummy plug instead of the preamplifier.

1.32 MICROPHONES (Figure 1-5)

1.33 Two optional Ampex dynamic microphones are available: Model 802, "Omnidirectional", and Model 803 "Cardioid". Both microphones are furnished with an adapter (that fits any standard 5/8" -27 thread microphone stand) and fifteen feet of two-conductor shielded cable.

1.34 The Model 802 microphone has an omnidirectional polar pickup pattern and may be used in the vertical position in the center of a group of performers, as well as in the conventional 'tilted' position. The Model 803 microphone has a cardioid single-direction pickup pattern to minimize undesired peripheral sounds and to avoid "feedback" from any loudspeakers in the system.

1.35 Model 802 (omnidirectional) has a frequency response of ± 3 dB from 75 to 10,000

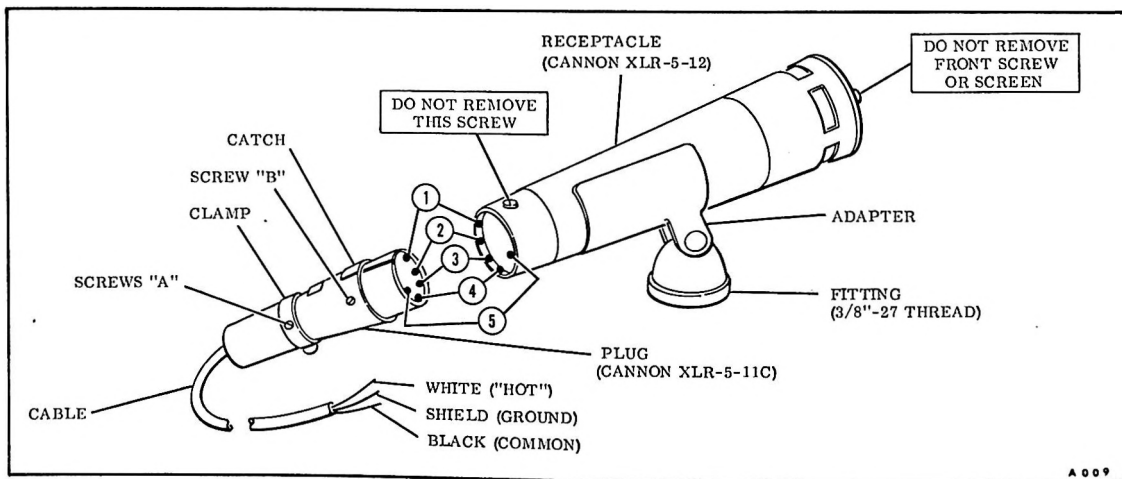


Figure 1-5. Microphone Impedance Changing

Hz; no lower than 7 dB at 50 or 20,000 Hz. Model 803 (cardioid) has an average front-to-back discrimination of 20 dB and frequency response is approximately ± 3 dB from 45 to 15,000 Hz.

1.36 Both microphones provide an output level of -55 dBm and are shipped with leads connected for an input system impedance of 150/250 ohms. For input systems of 30/50 or 20,000 ohms impedance, change microphone leads according to paragraph 1.37.

1.37 Microphone Impedance Selection
(See Figure 1-5)

1.38 To change the microphone to match the impedance of the input system, proceed as follows:

Step 1: Loosen the two cable clamp screws "A".

Step 2: Remove screw "B", then slide the plug housing away from the plug.

Step 3: Connect cable white lead to plug pin as follows:

a. For 30/50 ohms, pin 3.

b. For 150/250 ohms, pin 4.

c. For 20,000 ohms, pin 5.

Step 4: For unbalanced systems, strap pin 1 to pin 2 (or connect black lead to shield).

Step 5: Reinstall plug housing and cable clamp in reverse order to removal procedures.

1.39 HEAD DEMAGNETIZER

1.40 Demagnetization of the erase, record or reproduce head is easily accomplished with the Ampex Model 820 demagnetizer accessory.

1.41 RACK MOUNTING ADAPTERS

1.42 Rack mounting adapters are available for mounting the equipment in standard 19-inch racks. Rack adapter 4010078 is for one-channel equipment, and rack adapter 4010079 is for two-channel equipment.

1.43 SPECIFICATIONS

1.44 Requirements of significant parameters of the AG-600B recorder/reproducer are given in Tables 1-3 through 1-6

Table 1-3. AG-600B System Specifications

CHARACTERISTIC	REQUIREMENT
<u>Power Requirements</u>	Domestic: 105-125 volts ac, 60 Hz International: 105-125 volts ac, 50 Hz; or 220-240 volts ac, 50 Hz (selected by switch)
<u>Power Consumption</u>	Line power 115 volts ac, 50 or 60 Hz - One channel: 0.5 ampere Two channel: 0.5 ampere Line power 230 volts ac, 50 Hz - One channel: 0.3 ampere Two channel: 0.3 ampere

Table 1-4. Tape Transport Specifications

CHARACTERISTIC	REQUIREMENT
<u>Magnetic Tape</u>	Specifications are based on the use of professional-quality magnetic tape Ampex No. 631, or equivalent.
<u>Tape Width</u>	1/4-inch, either 1 mil or 1-1/2 mil base
<u>Reel Size</u>	7-inch EIA or 5-inch
<u>Tape Speed</u>	3-3/4 and 7-1/2 ips
<u>Flutter and Wow*</u>	7-1/2 ips: 0.15% rms 3-3/4 ips: 0.18% rms
<u>Tape Speed Accuracy</u>	7-1/2 ips: $\pm 0.25\%$ 3-3/4 ips: $\pm 0.4\%$
<u>Fast Winding Time</u>	60-Hz equipment: Approximately 90 seconds at <u>fast</u> speed; 180 at <u>slow</u> 50-Hz equipment: Approximately 108 seconds at <u>fast</u> speed; 216 at <u>slow</u>
*Using Ampex standard flutter test tape, and measured in accordance with ASA Standard Z57.1-1954 to include all components between 0.5 and 200 Hz.	

Table 1-5. Electronic Assembly Specifications

CHARACTERISTIC	REQUIREMENT
<u>Overall Frequency Response</u>	7-1/2 ips: ± 2 dB at 60 to 10,000 Hz $\pm 2-4$ dB at 30 to 15,000 Hz 3-3/4 ips: ± 2 dB at 50 to 7,500 Hz
<u>Output Level Before Clipping</u>	+24 dBm
<u>Even-Order Distortion</u>	Less than 0.4% second harmonic distortion of a 500-Hz signal recorded at normal operating level.

Table 1-5. Electronic Assembly Specifications (Continued)

CHARACTERISTIC	REQUIREMENT		
<u>Signal-to-Noise Ratio</u>			
<u>Tape Speed</u>	<u>Head</u>	<u>Equalization</u>	<u>Signal-to-Noise</u>
3-3/4 ips	Full Track	120 microsecs	55 dB
3-3/4 ips	Half Track, 2-Track, or Quarter Track	120 microsecs	50 dB
7-1/2 ips	Full Track	NAB	60 dB
7-1/2 ips	Half Track, 2-Track, or Quarter Track	NAB	55 dB
7-1/2 ips	Full Track	CCIR	57 dB
7-1/2 ips	Half Track, 2-Track, or Quarter Track	CCIR	52 dB
<u>Input Impedance</u>			
		With dummy plug: 100,000 ohms, unbalanced	
		With balanced-bridging transformer: 20,000 ohms, balanced	
		With balanced-matching transformer: 600 ohms, balanced	
<u>Input Sensitivity</u>			
		Signal levels as low as -18 dBm will provide normal operating level.	
<u>Output</u>			
		Nominal +4 dBm output into 600-ohm line, isolated from ground	

Table 1-6. Microphone Preamplifier Specifications

CHARACTERISTIC	REQUIREMENT
<u>Gain</u>	At least 57.5 dB
<u>Frequency Response</u>	±1 dB, 50 Hz to 15,000 Hz (500 Hz reference)
<u>Output Clipping Level</u>	Not less than 2.5 volts rms
<u>Signal-to-Noise Ratio</u>	Not less than 55 dB at maximum gain

Table 1-7. Accessory Microphone Specifications

Model	802 "Omnidirectional"	803 "Cardioid"
Type	Moving-Coil Dynamic	Cardioid Dynamic
Frequency Response	50 to 20,000 cycles: ± 3 dB from 70 to 10,000 cycles, down no more than 7 dB at 50 and 20,000 cycles, with output level smoothly rising approximately 5 dB between 50 and 20,000 cycles.	45 to 15,000 cycles: ± 5 dB from 60 to 8,500 cycles with output level smoothly rising approximately 3 dB between 45 and 15,000 cycles. Average front-to-back discrimination is 20 dB from 45 to 15,000 cycles.
Output Impedance	30/50, 150/250, and 20,000 ohms (selected by microphone plug connections).	30/50, 150/250, and 200,000 ohms (selected by microphone plug connections).
Output Level	-55 dBm/10 dynes/cm ²	-54 dBm/10 dynes/cm ²
Pickup Pattern	Omnidirectional	Cardioid
Hum	-120 dB (Ref. : 10 ⁻³ Gauss)	-120 dB (Ref. ; 10 ⁻³ Gauss)
Dimensions	1-18" diameter at top, 7" long (less plug)	1-1/2" diameter at top, 7-1/4" long (less plug)
Weight	8 oz. (without cable and plug)	11 oz. (without cable and plug)

SECTION 2

INSTALLATION

2.1 UNPACKING

2.2 Unpack the equipment carefully. Examine recorder for any sign of damage and check it against the packing list to determine that all items have been received. Immediately report any shortage or damage to the Ampex distributor and the transportation company.

2.3 After unpacking, remove all shipping materials (masking tape, rubber bands,

etc.) used to secure moving components during shipment.

2.4 MOUNTING

2.5 Portable equipment is shipped mounted in the case. Unmounted equipment can be installed in custom consoles, or in standard 19-inch racks with the mounting adaptors. Recorder mounting dimensions are given in Figure 2-1.

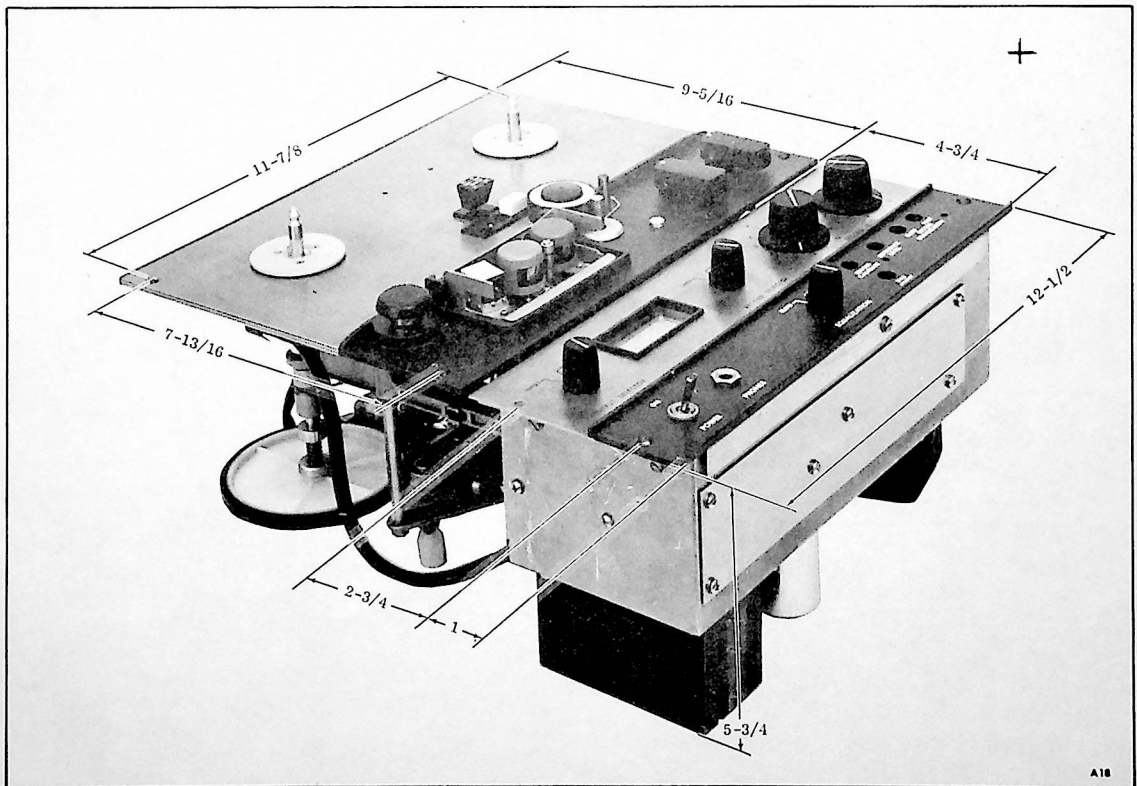


Figure 2-1. Mounting Dimensions

A18

2.6 In rack or console mounting, the tape transport and electronic assembly must be positioned to avoid lengthening the head cables (which would reduce the frequency response range).

2.7 CONNECTING

2.8 GENERAL

2.9 Portable equipment is shipped with connections completed between the tape transport and electronic assembly, so it is necessary only to connect the input and output signal lines (paragraphs 2.15 and 2.19) and the power cable (paragraph 2.24). When equipment is disassembled for maintenance, all disconnected connectors must be reconnected. Connectors mentioned in the following procedures are shown in Figures 2-2 and 2-3.

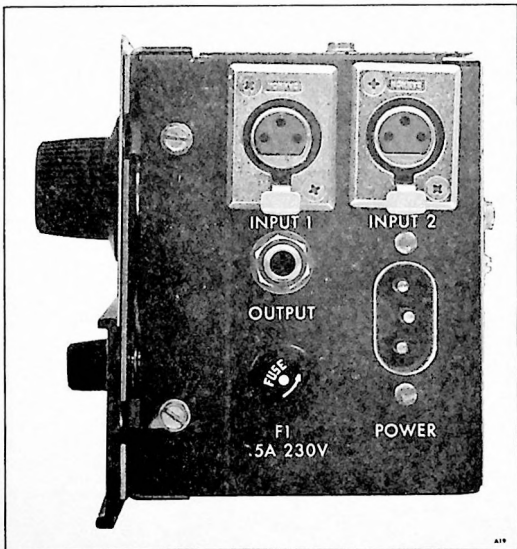


Figure 2-2. Electronic Assembly Connector Panel

2.10 CONTROL CABLE CONNECTIONS

2.11 One-Channel Equipment

2.12 Connect the tape transport 15-pin plug (on the captive cable) to receptacle J11 on the electronic assembly rear panel.

2.13 Two-Channel Equipment

2.14 Connect the tape transport 15-pin plug (on the captive cable) to the female 15-socket receptacle on the "Y" interconnecting cable. Connect the Y-cable 15-pin male plug to J11 on the master electronic assembly, and the 8-pin female receptacle to J11 on the slave electronic assembly.

2.15 INPUT-SIGNAL CONNECTIONS

2.16 Either, or both, of the input signal receptacles, "INPUT A" and "INPUT B", on each electronic assembly chassis may be used for the input signal(s); if both are used, the inputs are mixed and recorded on one tape track. Female receptacles are standard XL-type; mating male plugs are furnished with the equipment.

2.17 To connect an unbalanced-line input, wire the signal leads to pins 3 and 2 (ground), and the shield to pin 1; then jumper pins 1 and 2. For a balanced-line or microphone input, wire the leads and shield to the same pins and omit the jumper.

2.18 Dummy plugs, used in the INPUT ACCESSORIES sockets, are provided for unbalanced-line inputs. An accessory transformer, or preamplifier must be inserted in the INPUT ACCESSORY socket for a balanced-line or microphone input.

2.19 OUTPUT-SIGNAL CONNECTIONS

2.20 The OUTPUT connector is a telephone jack, with a mating plug furnished. For an unbalanced output, wire the "high" side of the signal to the plug tip, and the "low" side or ground to the plug body and to the ring connection. For an isolated or balanced output, wire one side of the line to the tip, the other side to the ring, and the shield to the shield connection.

2.21 A standard, two-circuit, phone plug may also be used. Wire the "high" side of the line to the tip, and the "low" side (or shield) to the sleeve (the "low" side is then

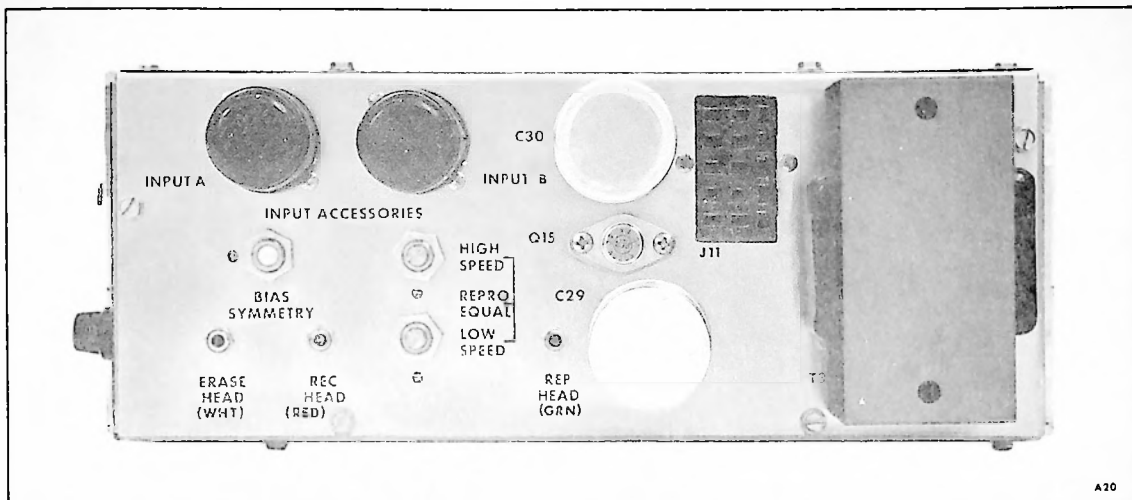


Figure 2-3. Electronic Assembly (Rear)

automatically connected to ground, providing an unbalanced output).

2.22 HEAD CABLE CONNECTIONS

2.23 The tape transport head cables (cap-tive) have colored plugs to distinguish each cable; the erase plug is white, record is red, and reproduce is green. On two-channel equipment an additional stripe on the head cables designates track two (the track closest to the top plate). Connect the head cables to the corresponding jacks on the electronic assembly.

2.24 POWER CONNECTIONS

2.25 Connect the 8-foot power cable from POWER receptacle J10 (on the electronic assembly) to the a-c power source.

2.26 International models are shipped with a 0.75-ampere fuse in the electronic assembly for a 115-volt ac source. If a 230-volt ac source is used, replace the fuse with the 0.5-ampere fuse from the recorder spare-plug kit.



INTERNATIONAL MODELS HAVE A 115-230 VOLT SELECTOR SWITCH ON THE REAR PANEL. THIS SWITCH MUST BE SET TO THE LINE VOLTAGE, OR EXTENSIVE EQUIPMENT DAMAGE CAN RESULT.

SECTION 3

OPERATING INSTRUCTIONS

3.1 OPERATING CONTROLS AND INDICATORS

3.2 TAPE TRANSPORT

3.3 Operating controls and indicators for the tape transport are shown in Figure 3-1 and described in Table 3-1.

Table 3-1. Tape Transport Controls and Indicators

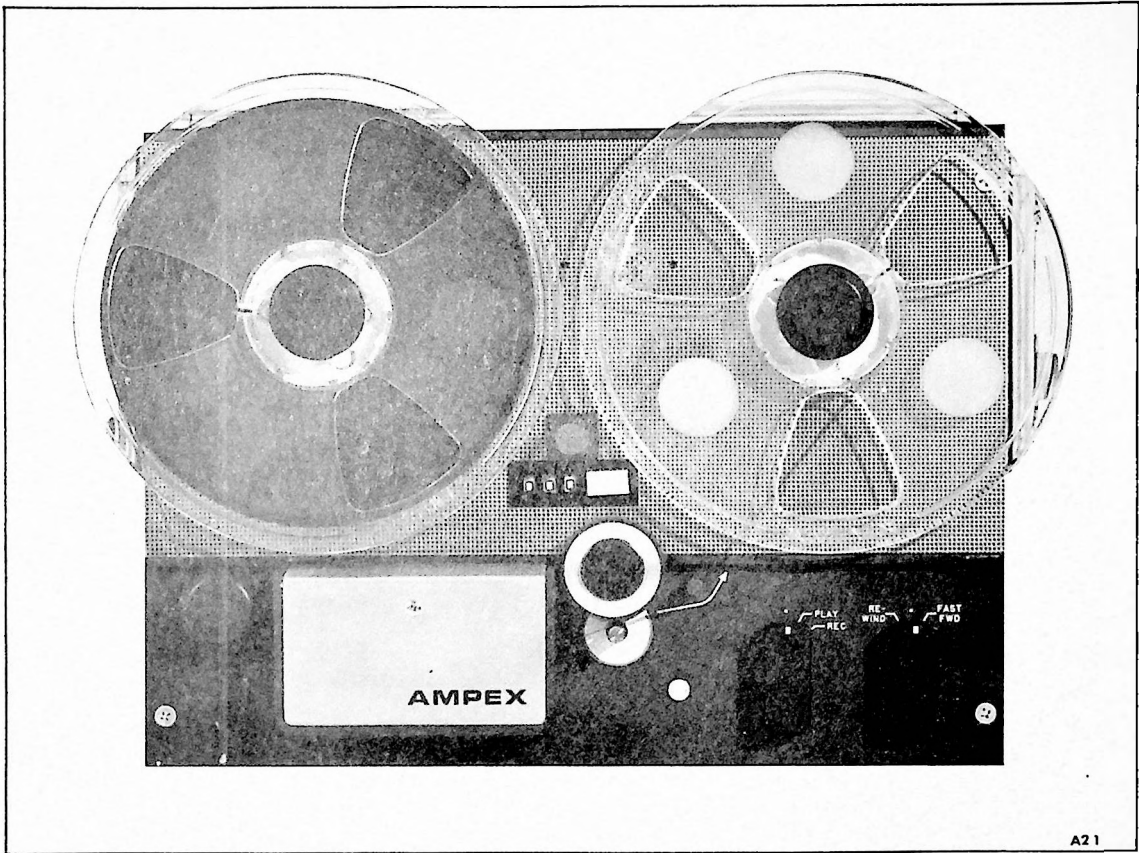
CONTROL OR INDICATOR	FUNCTION
PLAY/RECORD rotary switch	Controls tape motion and sets electronic assembly in the play or record mode (interlocked with REWIND/FAST-FWD switch).
REWIND/FAST-FWD rotary switch	Controls tape motion in fast-winding reverse (rewind) or forward modes (interlocked with PLAY/RECORD switch).
Record Safety Pushbutton	Safety feature to avoid entering the record mode accidentally. Must be pressed while PLAY/RECORD control is set at RECORD.
Tape Position Indicator Counter	Indicates tape position, to aid in returning to desired tape area. Pushbutton resets it to zero.

3.4 ELECTRONIC ASSEMBLY

3.5 Operating controls and indicators for the electronic assembly are shown in Figure 3-2 and described in Table 3-2.

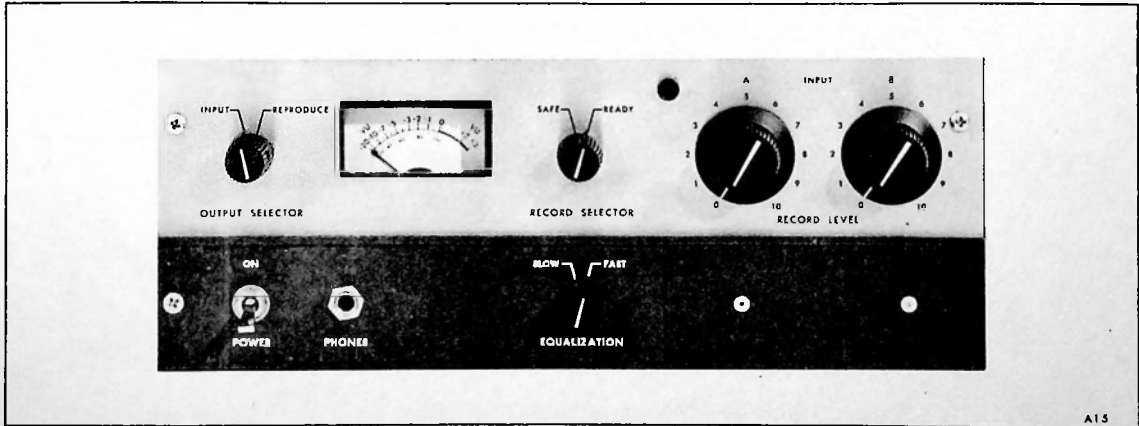
Table 3-2. Electronic Assembly Controls and Indicators

CONTROL OR INDICATOR	FUNCTION
POWER toggle switch	Controls power to electronic assembly and tape transport. On master assembly of a two-channel recorder, it routes power to the POWER switch on the slave assembly.
EQUALIZATION rotary switch	Selects equalization and tape speed for the SLOW (3-3/4 ips), or FAST (7-1/2 ips) speed.
OUTPUT SELECTOR rotary switch	Selects monitor signal (1) recording (INPUT) or (2) the recorded program (REPRODUCE).
VU meter	Monitors record or reproduce levels, as selected by the OUTPUT SELECTOR switch.
RECORD SELECTOR	Safety feature to avoid entering record mode accidentally. In SAFE position, the record mode is locked out; in RECORD position, the record mode can be entered.
RECORD LEVEL rotary controls (2)	Adjusts record level for INPUT A and INPUT B.



A21

Figure 3-1. Transport Controls



A15

Figure 3-2. Electronic Assembly Controls

3.6 MONITOR EQUIPMENT

3.7 The VU meter monitors the record or reproduce levels. For aural monitoring, a headset is plugged into the PHONES jack on the electronic assembly front panel. Signals to the VU meter and PHONES jack are switched, by the OUTPUT SELECTOR, between the record-input signal (INPUT) or the reproduced signal (REPRODUCE) for monitoring and comparing.

3.8 OPERATION

3.9 TAPE THREADING (See Figure 3-3)

3.10 Thread the tape as shown in Figure 3-3, and anchor it to the takeup reel hub. Manually turn the takeup reel until the supply reel moves, to remove tape slack.

3.11 POWER APPLICATION

3.12 To apply power to the equipment, set the electronic assembly POWER switch to ON. To energize both channels of a two-channel recorder, set both POWER switches to ON; the first POWER switch routes power to the tape transport and the POWER switch on the slave assembly.

3.13 SPEED AND EQUALIZATION SELECTION

3.14 With power applied, set the EQUALIZATION switch to HIGH for 7-1/2 ips, or LOW for 3-3/4 ips. The equalization for the speed set is automatically changed by the switching action.

3.15 RECORDING

Step 1: Thread blank tape, or tape recorded with obsolete material, on the tape transport per paragraph 3.9.

NOTE

Always bulk-erase any tape that was recorded on equipment with a different head configuration, to make sure that it is completely erased.

Step 2: Switch POWER to ON (refer to paragraph 3.11).

Step 3: Set EQUALIZATION for desired tape speed.

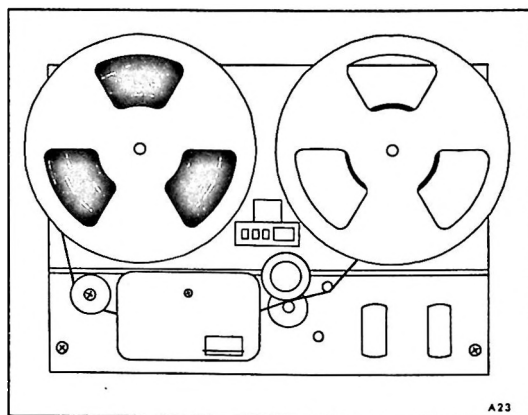


Figure 3-3. Tape Threading Path

Step 4: Set RECORD SELECTOR to RECORD. On two-channel equipment with both channels to be recorded, also set switch on slave electronic assembly to RECORD: if only one channel is to record, set switch on that electronic assembly to RECORD and the switch on the other electronic assembly to SAFE (refer to note after Step 8).

Step 5: Set OUTPUT SELECTOR switch to INPUT. Using a rehearsal-run or test signal, adjust the RECORD LEVEL control(s) so the VU meter indicates 0 on most audio peaks (maximum peaks can indicate +2 or +3).

Step 6: If both record inputs on an electronic assembly are used simultaneously, monitor a rehearsal-run signal, and set RECORD LEVEL for correct balance and a normal record level (as described in Step 5) for the combined inputs.

Step 7: Press RESET pushbutton on tape position indicator to set it to 000.

Step 8: At the tape transport, press record-safety pushbutton, and set PLAY-RECORD to RECORD (tape moves). If desired, compare the input and recorded signals by alternating the OUTPUT SELECTOR between INPUT and REPRODUCE.

NOTE

The tape can be placed in motion while the electronics is in the "SAFE" condition; therefore the equipment is ready to record immediately when the RECORD SELECTOR is changed from SAFE to RECORD.

Step 9: Set PLAY-RECORD switch to neutral to stop tape motion and drop-out the record mode.

3.16 REPRODUCING

Step 1: Thread the recorded tape on the tape transport. Set RECORD SELECTOR to SAFE.

Step 2: Set POWER to ON.

Step 3: Set EQUALIZATION for tape speed at which the tape was recorded.

Step 4: Set OUTPUT SELECTOR to REPRO (There is no reproduce output when OUTPUT SELECTOR is at INPUT).

Step 5: Set PLAY/RECORD to PLAY (tape moves).

Step 6: To stop tape, set PLAY/RECORD to neutral.

3.17 FAST-WINDING

3.18 The fast-winding switch is interlocked with the play-and-record switch, so it is impossible to enter the opposite mode while either switch is activated.

3.19 To rapidly move the tape from the supply to the takeup reel, set REWIND/FAST-FWD to FAST-FWD. To rapidly move the tape from the takeup to the supply reel, set the control to REWIND. Switching is possible without waiting for tape motion to stop, so the tape can be quickly moved to a desired point, using the tape-position indicator as a guide.

3.20 To stop either fast-winding mode, reset REWIND/FAST-FWD to neutral.

SECTION 4

PREVENTIVE MAINTENANCE AND CHECKOUT

4.1 EIGHTH-HOUR CLEANING

4.2 HEADS

4.3 Clean heads, and all other components in the tape threading path, after each eight hours of operation, or oftener if visual inspection indicates the need. This is to remove the oxide (deposited from the magnetic tape) which will degrade equipment performance as it accumulates. Remove the head shield and clean each head thoroughly with a cotton-tipped applicator dampened with Ampex Head Cleaner (4010823 or 087-007). Leave head shield off until heads are demagnetized (paragraph 4.6).

CAUTION

WHEN CLEANING THE HEADS, USE ONLY THE RECOMMENDED SOLVENT, TO AVOID DAMAGING THE HEADS. KEEP SOLVENT OFF PLASTIC FINISHES AND THE CAPSTAN IDLER TIRE. DO NOT USE METAL TOOLS WHICH MIGHT SCRATCH THE HEADS.

4.4 TAPE GUIDE ELEMENTS

4.5 Use isopropyl alcohol to clean all tape-guiding elements, the capstan, and the capstan idler.

CAUTION

DO NOT USE HEAD-CLEANING SOLUTION ON IDLER RUBBER TIRE, OR CAPSTAN; IT WILL CAUSE TIRE DAMAGE AND TAPE SLIPPAGE IF APPLIED.

4.6 EIGHTH-HOUR DEMAGNETIZING

4.7 Head and other components in the tape threading path can acquire permanent magnetization that increases signal noise and distortion, and partially erases high frequencies on recorded tapes. Demagnetize components after each eight hours of operation, or oftener if required, using an Ampex Head Demagnetizer (4010820), or equivalent, as follows:

Step 1: Turn equipment power off, and remove any recorded tape near the transport (tape could be partially erased by the demagnetizer).

Step 2: Cover the demagnetizer tips with pressure-sensitive tape (to prevent scratching the heads) and connect the demagnetizer to a 110-120 volt ac-power source.

Step 3: Simultaneously and lightly touch the two demagnetizer tips to the two faces of one head.

Step 4: With a slow, even motion, move the tips up and down the stack several times. Slowly withdraw the demagnetizer (slow withdrawal is required for effective demagnetization).

Step 5: Repeat steps 3 and 4 at each head stack and tape guide (on the reel idler and takeup tension arm).

Step 6: Move the demagnetizer at least three feet from the recorder, then de-energize it.

Step 7: Re-install the head shield.

4.8 MONTHLY CLEANING

4.9 Once a month, or as required, use a vacuum cleaner or a brush to remove all contamination from the tape transport interior. If necessary, moisten the brush with isopropyl alcohol to clean parts. Do not use pressurized air for cleaning, because dirt can be forced between bearing surfaces.

4.10 LUBRICATING

4.11 GENERAL

4.12 The only components requiring lubrication are bearings in the capstan drive-motor, and capstan idler. Ampex Lubricating Oil (4010825 or 087-579) should be used for the drive motor and capstan idler. (Equivalent oils are Esso Standard Oil Co., Teresso No. 47; and Socony Mobil Oil Co., Mobiloil DTE, Medium.)

4.13 CAPSTAN IDLER SIXTH-MONTH LUBRICATION (See Figure 4-1)

4.14 Every six months, or after each 1,000 hours of operation (whichever occurs first), lubricate the capstan and capstan idler as follows:

Step 1: Pry off rubber cap in capstan idler center.

Step 2: Remove the clip that secures the idler on its shaft. Use care to retain all washers or shims (which must be re-installed in the same positions), then lift the idler from its shaft.

Step 3: Pry off the plug button from around the capstan and remove the felt washer beneath it (do not put lubricant on the washer).

Step 4: Apply as much oil as the bearing will accept, then carefully wipe off excess oil. Re-install the felt washer and the plug button around the capstan.

Step 5: Install all washers and shims in original positions, and slide the capstan idler on the shaft. Place two drops of oil around the inner bearing surface, then rotate the idler to work the oil in. Wipe off excess oil. Replace the idler clip and the rubber cap.

Step 6: Carefully clean the capstan idler tire with isopropyl alcohol to remove any oil or other contamination including fingerprints.

Step 7: Lubricate the capstan lower bearing through the oil hole (see Figure 4-1) with exactly four drops of oil.

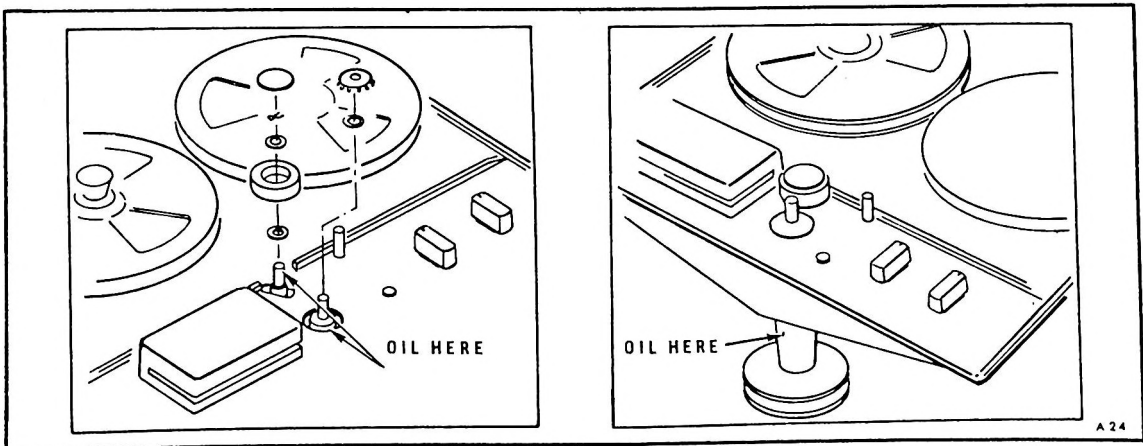


Figure 4-1. Capstan and Idler Bearing Lubrication

4.15 DRIVE MOTOR BEARINGS

7-1/2 ips, Catalog No. 01-31326-01

4.16 Lubricate upper and lower drive motor bearings after each 2,500-hour operating period, or every year (whichever occurs first). For lubrication, the drive motor must be removed from the transport (refer to paragraph 5.16).

3-3/4 ips, Catalog No. 01-31336-01

7. Flutter Bridge, Mincom Model 8155-01 or 8100-W; or Gotham Audio Model ME102B.

8. Technician hand tools

4.17 An oil tube is provided at each end of the motor. Apply four or five drops of oil to each bearing, while rotating the motor shaft to work the oil in; then wipe off excess oil.

4.23 TAPE TENSION CHECK (See Table 4-1 and Figure 4-2)

4.18 PERFORMANCE CHECKOUTS

4.24 Introduction

4.19 These checkouts should be regularly scheduled to determine when tape transport adjustment/alignment is required. Adjustment/alignment procedures are given in paragraph 5.41. Erased tape or blank tape can be used for the performance checks, or recorded tape can be erased during the recording portion of the procedure. Always bulk-erase any tape that was recorded on equipment with a different head configuration, to make sure that it is completely erased.

4.25 Tape tension is measured by determining the drive and holdback brake torque at each reel. Torque of the turntable pulling the tape is measured by holding the spring scale stationary against the motor drive force; torque of the turntable supplying tape is measured by the force required to rotate the reel in the normal direction (see Figure 4-2).

4.26 Torques are given in ounce-inches and in ounces. If an EIA reel, with a 2-1/4-inch diameter hub is used, the ounce indication on the spring scale applies. For any other hub size, multiply the spring scale indication by the hub radius for the ounce-inch figure.

4.20 TRANSPORT CHECKOUT

4.27 Supply Turntable Tension

4.21 TEST EQUIPMENT

Step 1: Install empty reel on supply turntable and turn power ON.

4.22 Obtain the following test equipment, or equivalent:

1. Feeler Gauge, 0.015 inch
2. Spring Scale, 0-to-16 ounce
3. Spring Scale, 0-to-6 pound
4. Reel, EIA 2-1/4-inch diameter hub
5. Cord or string, about 30 inches long, with small loop tied in one end
6. Ampex Standard Flutter Tape:

Step 2: Wrap cord counterclockwise around reel hub with cord loop at free end.

Step 3: Insert spring scale hook in cord loop and set EQUALIZATION switch for desired speed.

Step 4: Hold the scale stationary and set switch to REWIND. Tap reel lightly (to ensure a true reading) and compare scale indication to Table 4-1 requirements for rewind takeup tension.

Table 4-1. Tape Tension Requirements

TURNTABLE	MODE	TORQUE		TENSION DESIGNATION
		Ounce-inches*	Ounces (EIA Reel)	
Supply	Play (3-3/4 ips)	4.6-5.8	4.5	Holdback
	Fast Fwd. (7-1/2 ips)	0.75-1.25	0.67-1.1	Holdback
	Rewind	5.6-6.8	5-6	Takeup
Takeup	Play (3-3/4 ips)	2-3.5	1.75-3.1	Takeup
	Fast Fwd. (7-1/2 ips)	5.6-6.8	5-6	Takeup
	Rewind	0.75-1.25	0.67-1.1	Holdback

*For other than EIA reels, multiply scale indication by the reel hub radius to obtain ounce-inches.

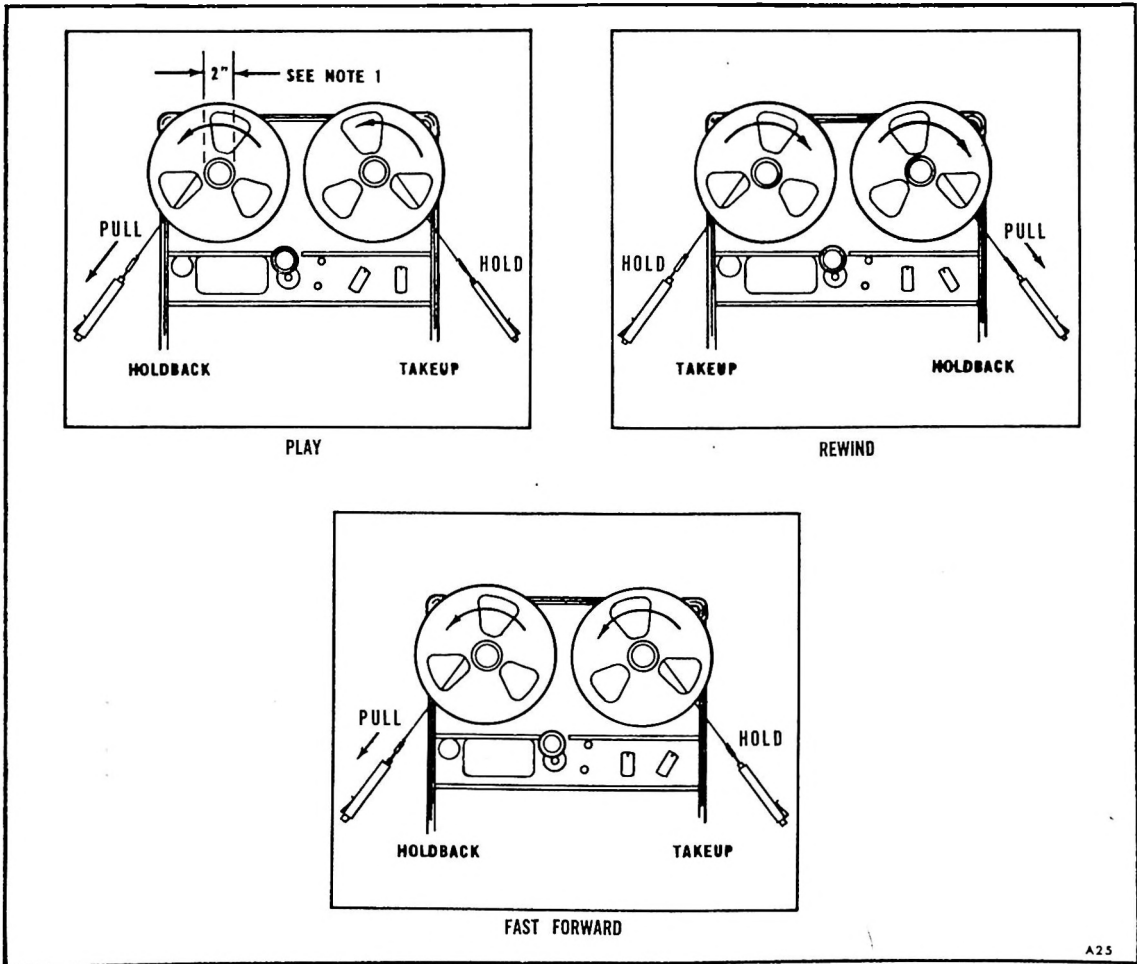


Figure 4-2. Tape Tension Measurement

Step 5: With spring scale still attached to cord, set switch to FAST FWD.

Step 6: Pull the scale slowly and steadily, then check scale indication to Table 4-1 requirements for fast-forward holdback tension.

Step 7: Set REWIND/FAST-FWD switch to neutral (dot).

Step 8: Set PLAY/REC to PLAY and pull the scale in a slow but steady motion. Check scale indication to Table 4-1 requirements for play holdback tension.

Step 9: Set PLAY/REC to neutral (dot).

Step 10: If necessary, adjust tension per paragraph 5.8.

Step 11: Repeat this procedure after any tension adjustment, and for the other tape speed.

4.28 Takeup Turntable Tensions

Step 1: Install empty reel on takeup turntable and turn power ON.

Step 2: Wrap cord clockwise around reel hub with cord loop at free end.

Step 3: Insert spring scale in cord loop and set EQUALIZATION switch for desired speed.

Step 4: Hold the scale stationary and set PLAY/REC to PLAY. Tap reel lightly (to ensure a true reading) and compare scale indication to Table 4-1 requirements for play takeup tension.

Step 5: Return PLAY/REC to neutral (dot) position.

Step 6: Set REWIND/FAST-FWD to REWIND. Pull scale slowly and steadily (reel turns clockwise), then

check scale indication to Table 4-1 requirements for rewind holdback tension.

Step 7: Set REWIND/FAST-FWD to neutral (dot).

Step 8: If necessary, adjust tension per paragraph 5.9.

Step 9: Repeat this procedure after any tension adjustment and for the other tape speed.

4.29 IDLER PRESSURE CHECK (See Figure 4-3)

4.30 To check the capstan idler pressure against the capstan, tie the cord or twine ends together to form a continuous loop. Place the loop around the capstan idler shaft between the idler and the arm.

4.31 Turn power ON. Insert the hook on the 0-to-6 pound spring scale in the loop, and pull the loop taut in the direction of normal capstan idler movement 90° to the arm (the scale will then be about over the tape-position indicator counter).

4.32 Initiate play mode. Pull on the scale, in the direction of normal capstan idler movement, until the idler doesn't contact the capstan. Read the scale indication just as the idler leaves the capstan (idler rotation stops). The scale should indicate 5, ±0.5, pounds.

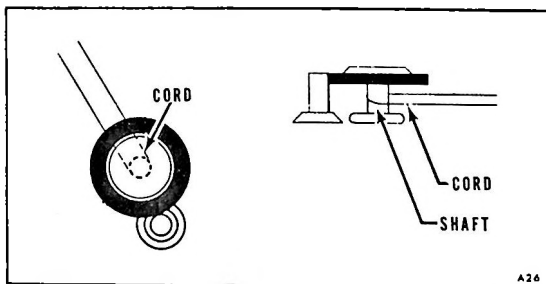


Figure 4-3. Idler Pressure Measurement

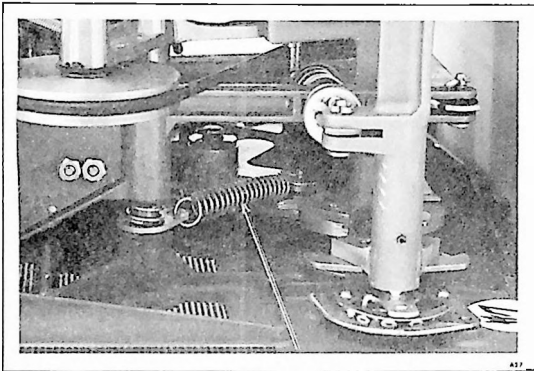


Figure 4-4. Capstan Idler Pressure Spring

4.33 Since there is no adjustment for idler pressure, the pressure spring (see Figure 4-4) must be replaced to correct the pressure.

4.34 FLUTTER AND WOW CHECK

4.35 Test Tape Requirements

4.36 This check must be made with Ampex Standard Alignment Test Tapes. These tapes, recorded on very precise equipment, have an inherent flutter below 0.03% rms (which can be ignored). Alignment test tapes must be used only at the speed they are made for. The tapes must be correctly handled and stored to retain their accuracy. The following requirements should especially be followed:

a. Clean and demagnetize equipment heads and other tape-handling components before installing the test tape (refer to paragraph 4.2).

b. Never store test tapes in areas where there are temperature or humidity extremes, or magnetic field sources such as magnets, motors, transformers, generators, loudspeakers, etc.

c. Remove test tapes from equipment only after a normal play run (never after a fast-winding mode).

4.37 Tape Degradation

4.38 After extensive use, flutter indications may increase even though actual flutter remains unchanged. Flutter increase is caused by: demagnetization of the recorded signal from repeated runs; tape deformation due to tape tension; changes in temperature and humidity; poor head-to-tape contact; and increased dropouts resulting from tape wear.

4.39 Test Procedures

4.40 This procedure applies to the use of the Mincom 8100-W flutter bridge. If a different flutter bridge is used, the manufacturer's instructions should be followed. Check tape flutter as follows, on correctly-aligned equipment:

Step 1: Disconnect all equipment interconnections except that for the power.

Step 2: Thread the flutter-test tape on the equipment with the tape on the takeup turntable. Rewind the tape to reel on the supply turntable (this allows the flutter tape to be stored without rewinding).

CAUTION

WHEN THE FLUTTER-TEST TAPE IS ON THE EQUIPMENT, DO NOT INITIATE THE RECORD MODE, OR THE TAPE WILL BE ERASED.

Step 3: Connect the flutter bridge SIGNAL INPUT connector to the electronics OUTPUT connector.

Step 4: Set PLAY/REC to PLAY.

Step 5: Set the flutter meter FLUTTER WEIGHTING control to NAB UNWTD; the DEMOD INPUT SELECT to 100 MV - 5V EXT SIGNAL; the METER SELECT to DEMOD; and FLUTTER % FULL SCALE to 0.3%.

Step 6: Read indication on the FLUTTER meter and if necessary, reposition the FLUTTER % FULL SCALE control. Flutter indication should meet specifications (Table 1-1, Section I).

Step 7: When the tape is completely wound on the takeup reel, stop the recorder, remove the reel, label or mark the reel "Rewind Before Using", and store it in a safe place.

Step 8: To correct excessive flutter, refer to paragraph 4.41 and then 5.72.

4.41 Flutter Analysis Aids

4.42 As an aid in determining flutter causes, a sound-and-vibration analyzer (such as General Radio Type 1564-A) can be used to isolate flutter to certain frequencies, by connecting the analyzer to the flutter bridge output. Compare the results with the rotational rates in Table 4-2 for a possible indication of the source of flutter problems.

4.43 If flutter is caused by the supply turntable assembly, the frequency will be low

when the tape quantity on the supply reel is large, and will gradually increase as the tape quantity gets smaller. The takeup turntable assembly seldom causes appreciable flutter, because it is isolated from the heads by the capstan. If it causes flutter, the frequency change would vary inversely to that of the supply turntable (high with a small tape quantity on the takeup reel, and decreasing as the quantity increases).

4.44 ELECTRONIC CHECKOUTS

4.45 TEST EQUIPMENT

4.46 Obtain the following test equipment, or equivalent:

1. Signal Generator, Hewlett-Packard Model 200C
2. Vacuum Tube Voltmeter, AC, Hewlett-Packard Model 400D
3. Wave analyzer (if available)
4. Bias Filter (see Figure 4-5)
5. Bandpass Filter (see Figure 4-6)

4.47 TEST CONDITIONS

4.48 Check that the following test conditions are met:

1. Line Output terminated in 600 ohms

Table 4-2. Component Rotational Rates

COMPONENT	TAPE SPEED	
	7-1/2 ips	3-3/4 ips
	ROTATIONAL RATE (rps)	
Capstan	9.5	4.8
Capstan Idler	1.6	0.8
Motor Pulley	30	30
Drive Belt	5.6	2.8
Motor	30	30
Rotary Guide	3.8	1.9

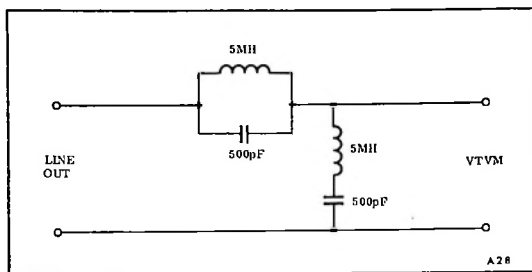


Figure 4-5. Bias Filter Schematic

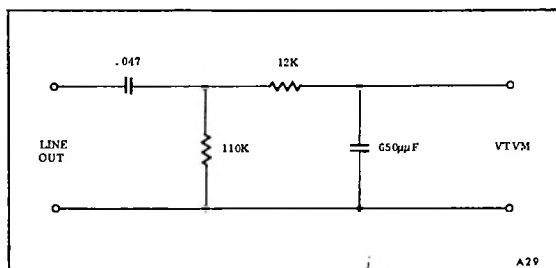


Figure 4-6. Bandpass Filter Schematic

2. Dummy plug installed (instead of accessory)
3. Heads cleaned and demagnetized
4. Covers installed on electronic assemblies.
5. Magnetic tape, Ampex 631, or equivalent, installed

4.49 POWER SUPPLY CHECK

4.50 The power supply operation can be easily checked at an input-accessory socket on the electronic assembly. The power supply cannot be adjusted.

Step 1: Remove one of the dummy plugs from INPUT ACCESSORY (J5 or J7).

Step 2: Turn power ON.

Step 3: Initiate the record mode (tape is not required on the transport).

Step 4: Connect a dc voltmeter between accessory socket pin 5 (counted counterclockwise from the socket key) to chassis ground. Voltage should be 22 to 24.5 volts; otherwise, it is necessary to record the tape, rewind it, and then make the response run.

4.51 FREQUENCY RESPONSE CHECK

4.52 This check can be made while simultaneously recording and reproducing using a bias filter (see Figure 4-5).

Step 1: Connect the signal generator to pins 1 and 3 of either INPUT connector (A or B). Set the generator to 500 Hz, at a nominal 1-volt level.

Step 2: Connect the bias filter to the OUTPUT connector, and the vtvm to the filter output.

Step 3: Set OUTPUT SELECTOR to INPUT. Adjust applicable RECORD LEVEL to indicate a -10 dBm output on the vtvm. Set OUTPUT SELECTOR to REPRODUCE.

Step 4: Set EQUALIZATION switch for desired tape speed.

Step 5: Install blank tape on transport and initiate the record mode.

Step 6: During this simultaneous recording and reproducing, change the signal generator frequency in even steps through the response spectrum of the tape speed (refer to Section 1). Response indicated on the vtvm should remain within specifications.

Step 7: To check at the second tape speed, repeat Steps 4, 5, and 6.

Step 8: On two-channel equipment, repeat the procedure for the second channel.

Step 9: Perform corrective action per paragraph 5.65.

4.53 SIGNAL-TO-NOISE CHECK (See Table 4-2)

4.54 This check requires the use of an output bandpass filter (Figure 4-6).

Step 1: Connect the signal generator to either INPUT connector (A or B). Set the generator to 500 Hz, at a nominal 1-volt level.

Step 2: Connect the bandpass filter to the OUTPUT connector, and the vtvm to the filter output.

Step 3: Set OUTPUT SELECTOR to INPUT, and adjust applicable RECORD LEVEL to indicate a +10 dBm output on the vtvm.

Step 4: Set EQUALIZATION switch for desired tape speed.

Step 5: Install blank tape on transport, and initiate the record mode to record a tape section with the 500-Hz signal.

Step 6: Stop transport and rewind tape to the beginning of the recording just made.

Step 7: Remove the signal generator from the input, then set OUTPUT SELECTOR to REPRODUCE.

Step 8: Initiate the record mode, with no input signal. While thus erasing the 500-Hz signal, check noise level indicated on vtvm and add 10 dB. The result should be within the specifications given in Section 1.

NOTE

Signal-to-noise ratio is computed from peak record level (6 dB higher than normal); therefore the signal-to-noise ratio is 10 dB above the vtvm indication, and the vtvm indication must be increased by 10 dB.

Step 9: Check at the other tape speed by repeating steps 4 through 8.

Step 10: On two-channel equipment, repeat the procedure for the second channel.

Table 4-3. Reproduce Signal/Noise from Peak Record Level

TAPE SPEED	HEAD TRACK TYPE	Signal/Noise Reproduce (from 3% level)
7-1/2 ips (NAB)	Full	62 dB
	Half, Double, Quarter	60 dB
7-1/2 ips (CCIR)	Full	62 dB
	Half, Double, Quarter	57 dB
3-3/4 ips (120 USEC)	Full	62 dB
	Half, Double, Quarter	60 dB

Step 11: To check reproduce noise, remove the tape and connect the vtvm through the bandpass filter to the OUTPUT receptacle. Initiate the play mode. The signal-to-noise ratio should be as shown in Table 4-3 (the figures are also computed from peak level, as explained in the above note).

Step 12: Correct the signal-to-noise ratio per paragraph 5.70.

4.55 DISTORTION CHECK

4.56 For accurately checking distortion, use a wave analyzer which measures individual distortion products (instruments that

measure total harmonic distortion are affected by tape noise and modulation noise). Also, to avoid error, use a signal generator with less than 0.1% distortion.

4.57 To check distortion, record a 500-Hz signal on blank tape, at normal operating level, then reproduce the signal. The second harmonic content should not exceed 0.4%, and the third should be 0.6 to 1.1%.

4.58 Check reproduce distortion on a unit that is correctly adjusted, and has a head track configuration identical to the recorder head that recorded the tape. For possible distortion corrections, refer to paragraph 5.67.

SECTION 5
CORRECTIVE MAINTENANCE

5.1 TRANSPORT MECHANICAL ADJUSTMENTS

5.2 ACCESS

5.3 Tension adjustments require access to the back of the transport, so the equipment must be removed from its portable case or other mounting.

5.4 FAST-WINDING TORQUES

5.5 Holdback torques in the rewind and fast-forward modes are determined by the friction between the holdback brakes and plastic sleeves on the turntable shafts. If these tensions are incorrect, the spring-mounted holdback brake assembly must be replaced.

5.6 SUPPLY REEL TORQUES (See Figure 5-1)

5.7 The play holdback and rewind takeup tensions are adjusted simultaneously by repositioning the supply collar. The adjustment range is limited by the fact that the supply clutch tire must be completely engaged by the rewind idler tire (during the rewind mode).

Step 1: Loosen the setscrew on the supply collar.

Step 2: Push the collar up to increase torque, or down to decrease torque.

Step 3: Check that the setscrew is opposite the turntable shaft flat, then tighten it.

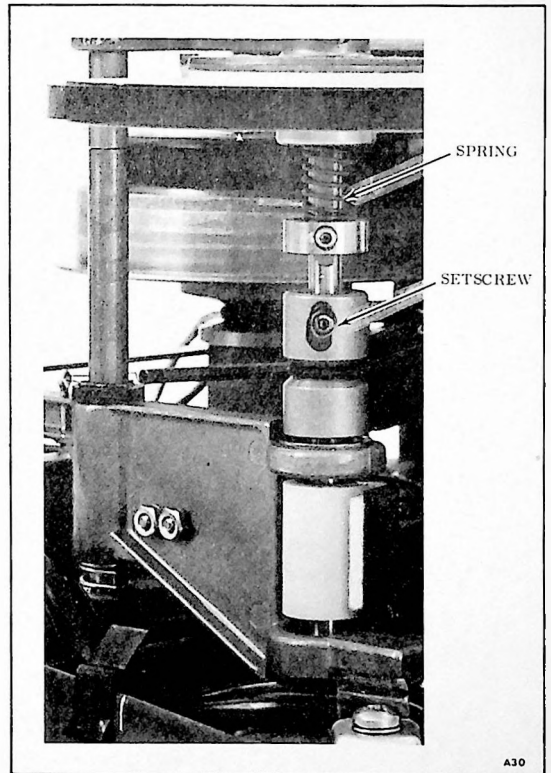


Figure 5-1. Supply Torque Adjustment

Step 4: Re-check play holdback and rewind takeup torques (paragraph 4.28).

Step 5: Repeat Steps 1 through 4 until torques are within tolerances. If correct torques cannot be obtained, the spring force is incorrect, or the clutch disc facing is worn or

contaminated with oil and dirt; re-
place defective spring or disc facing.

5.8 TAKEUP REEL TORQUES (See
Figure 5-2)

5.9 Adjust play takeup tension by adjust-
ing the play takeup collar clearance per para-
graph 5.12. Adjust the fast-forward takeup
clutch per paragraph 5.6.

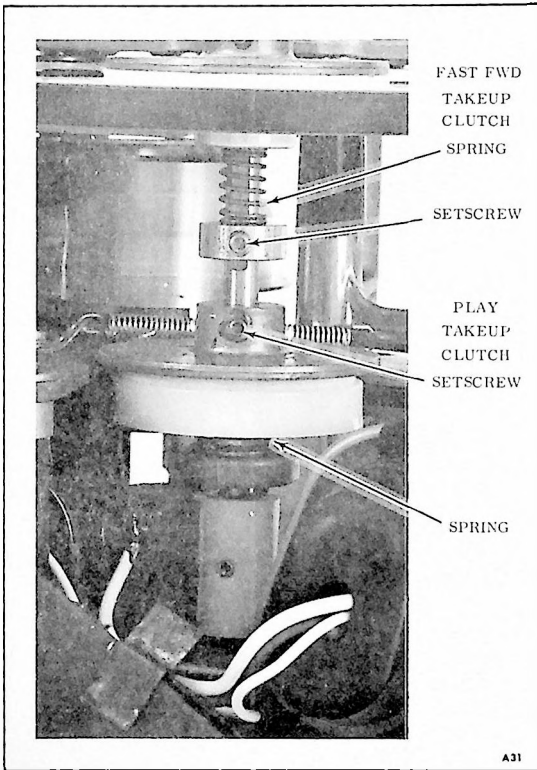


Figure 5-2. Takeup Torque Adjustment

5.10 CAPSTAN THRUST (See Figure 5-3)

5.11 The capstan thrust is applied by a
hardened steel ball pressing against a nylon
disc. The required end play, 0.003 to 0.005
inch, is set as follows:

Step 1: Cover the nylon thrust disc
with heavy coat of wheel-bearing

grease (sub-zero) and insert it in the
the threaded subplate hole over the
capstan shaft.

Step 2: Insert the setscrew until it
bottoms against the thrust disc.

Step 3: Maintain a slight downward
pressure on the setscrew, then
screw it out 1/4 turn.

Step 4: Carefully tighten the set-
screw locking nut, checking that the
adjustment does not change.

5.12 PLAY TAKEUP CLUTCH (See Figure
5-2)

5.13 The play takeup clutch assembly con-
sists of a felt-faced aluminum disc and a
spring-loaded clutch plate. A 0.015-inch
clearance is required between the bearing
end and the disc bottom. This clearance
(not measurable with a gauge) can be accu-
rately set as follows:

Step 1: Loosen the setscrew on the
disc hub. Insert a 0.015-inch feeler
gauge between the thrust washer (on
the inner race of the lower ball bear-
ing of the takeup turntable pivot) and
the oilite bushing.

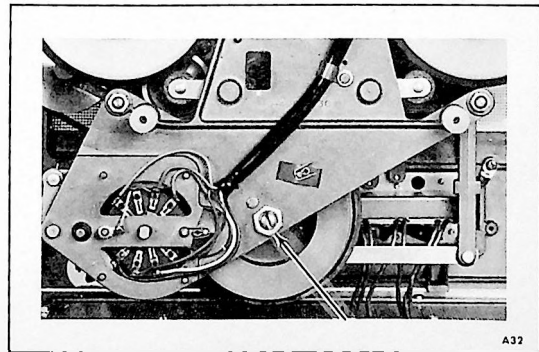


Figure 5-3. Capstan Thrust Adjustment

Step 2: Push the aluminum disc down until it firmly bottoms on the bushing end and hold it in that position while tightening the setscrew.

Step 3: Remove the feeler gauge (the conical spring will push the bushing from the disc, thus setting the clearance). If tension is not corrected, the clutch disc facing may be worn or contaminated, or the spring below the clutch may be applying incorrect force; replace defective felt or spring.

5.14 TURNTABLE HEIGHT (See Figure 5-4)

5.15 Adjust the distance from the turntable top surface to the metal grille to 0.125 (± 0.008) inch with lamicoïd washers of the correct number and thickness.

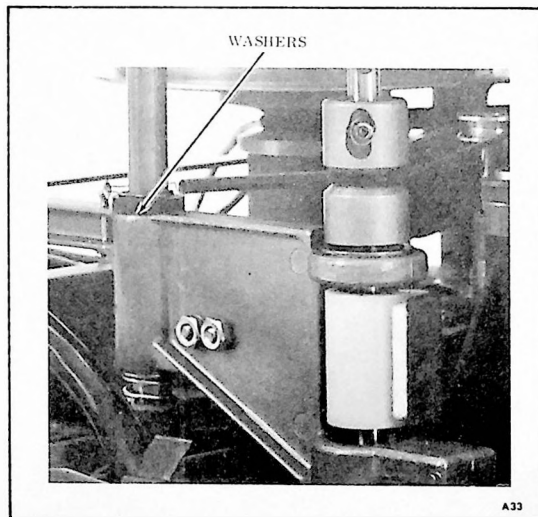


Figure 5-4. Turntable Height Adjustment

5.16 TRANSPORT DISASSEMBLY

5.17 GENERAL

5.18 During the disassembly procedures, always note the number, type, and location of washers, shims, etc. To replace lost

or damaged small hardware, kit 4010897-02 (containing an assortment of mounting hardware) is available from Ampex.

5.19 REMOVING SUBPLATE (See Figure 5-5)

5.20 The subplate must be removed for disassembly of parts beneath the tape transport casting. Remove the three subplate mounting nuts, then remove the coterpin and clevis pin that hold the slide lever to the lower yoke of the rewind/fast-forward actuator. This frees the subplate. Do not remove or loosen the capstan-thrust adjustment screw; if the screw setting is changed, adjust capstan thrust per paragraph 5.10.

NOTE

The nylon thrust discs beneath the subplate are coated with grease and will normally stick in position when the plate is lifted. However, if they fall be sure to retrieve them.

5.21 Re-install the subplate with the PLAY/REC control set at PLAY.

5.22 HEAD ADJUSTMENTS

5.23 HEAD AZIMUTH

5.24 Reproduce-head and record-head azimuth adjustments are given in electronic maintenance, paragraphs 5.50 and 5.54 respectively.

5.25 TAPE GUIDE (See Figure 5-6)

5.26 The tape guide between the record and reproduce heads can be adjusted both in height and position.

5.27 To check the guide height, remove the head cover and shield. Install tape on transport and initiate the play mode at 7-1/2 ips. The tape should track in the middle of the guide sleeve with no deviation from a

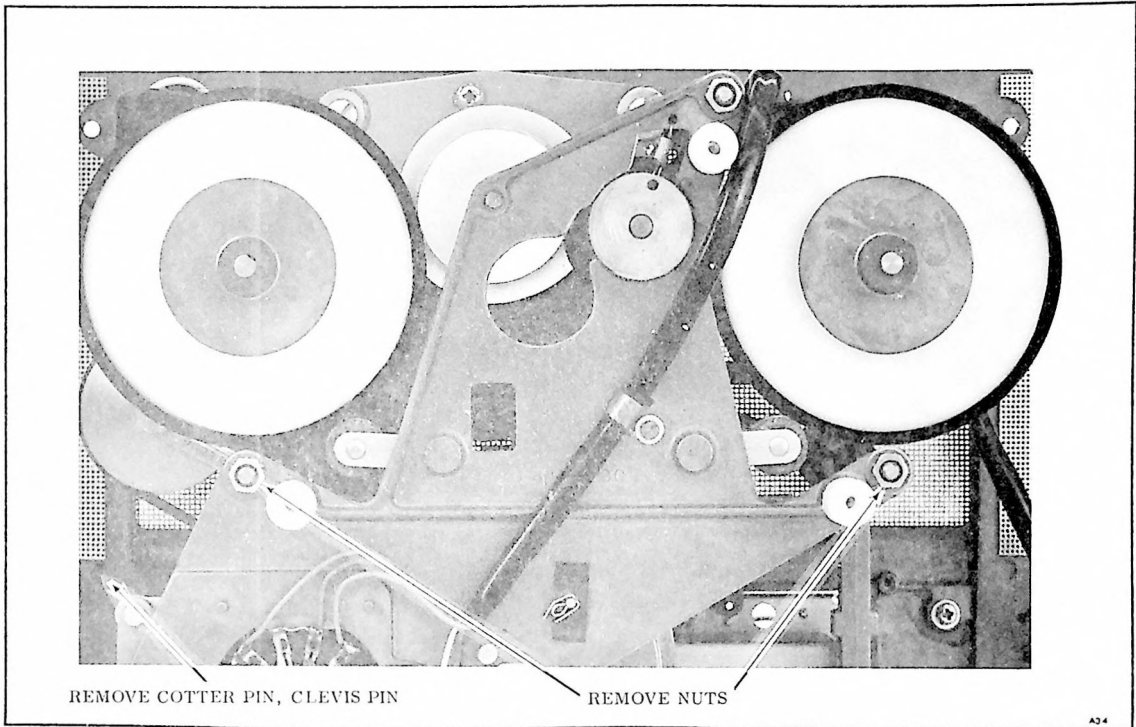


Figure 5-5. Transport Subplate Removal

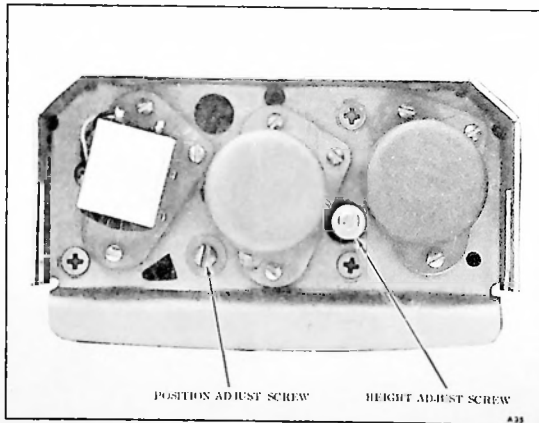


Figure 5-6. Tape Guide Adjustments

straight line as it enters and leaves the guide. Adjust the height as necessary by turning the screw at the guide top in (to lower) or out (to raise).

5.28 To check the tape guide position, use a ruler or straightedge which will not scratch the heads. Place this straightedge between the faces of the record and reproduce head stacks so it just touches the tape guide sleeve. If this is impossible, loosen the position screw and use a small screwdriver to move the lever adjustment and correctly position the guide.

5.29 HEAD HEIGHT (See Figure 5-7)

5.30 Introduction

5.31 Head heights are precisely factory-adjusted, so readjustment is usually required only when a head stack is changed. Before adjusting head heights, check that the tape guide height (refer to paragraph 5.25) is correct.

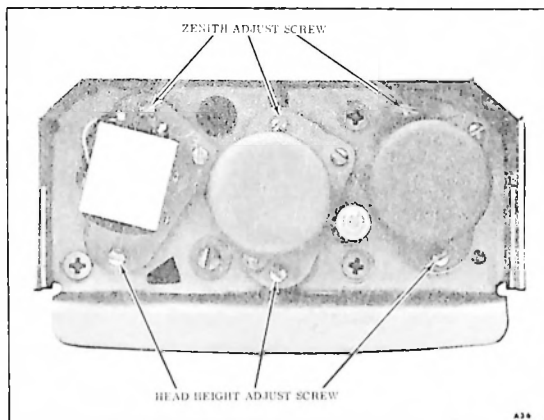


Figure 5-7. Head Adjustments

5.32 Full-Track and Half-Track Heads

Step 1: Remove the head cover and head shield (refer to Steps 1 and 2, paragraph 5.39).

Step 2: Coarsely adjust the head height and azimuth, in the direction indicated by checks, by turning the three height-adjust screws an equal number of turns.

Step 3: Install tape on transport and initiate the play mode at 7-1/2 ips.

Step 4: Turn the height-adjust screw counterclockwise until the head laminations are even with the tape top edge.

Step 5: While carefully counting the number of turns, turn the height-

adjust screw clockwise until the head laminations are even with the tape bottom edge.

Step 6: Turn the height-adjust screw counterclockwise half the number of turns counted in Step 5 (this centers the heads to the tape).

Step 7: Adjust head azimuth per paragraph 5.54 or 5.58 and head zenith per paragraph 5.34 (there may be some interaction between the height and zenith alignments).

5.33 Quarter-Track Heads

Step 1: Perform Steps 1, 2, and 3 of paragraph 5.32.

Step 2: Adjust the height-adjust screw until the mu-metal portion of the stack upper head is exactly even with the tape top edge.

Step 3: On a quarter-track erase head, turn the height-adjust screw 1/8 turn (45°) counterclockwise to move the erase head top slightly above the tape top edge (this is required because the erase head is slightly wider than the record and reproduce heads).

5.34 HEAD ZENITH AND TAPE WRAP (See Figure 5-7)

5.35 The head gap must be centered in the tape contact area, and the tape must contact the head top and bottom equally.

5.36 To check tape wrap and head zenith, lightly cover the head face with grease pencil or crayon. Install tape on transport, start it in high speed motion, and stop it after ten seconds. Lift the tape from the head; the head area visibly cleaned by the tape should be centered on the head gap (this checks tape wrap). The head tape-contact area should also be equally clean at the top and bottom (this checks head zenith).

5.37 If adjustment is necessary, turn the zenith-adjust screw in small increments. To move the top of the head out (toward the tape), turn the zenith-adjust screw out; turn it in to move the top of the head in (away from the tape). Recheck and re-adjust as necessary, using the grease-pencil method, until zenith is correct.

5.38 Check head height and azimuth alignment and adjust as necessary per paragraphs 5.29 and 5.54 or 5.56.

5.39 HEAD ASSEMBLY REMOVAL (See Figure 5-8)

Step 1: Disconnect all head cables from the electronic assemblies.

Step 2: Remove the head cover and head shield.

Step 3: Remove the three mounting screws to release the head assembly from the transport casting.

Step 4: Lift the head assembly from the casting, guiding the cables through the casting hole.

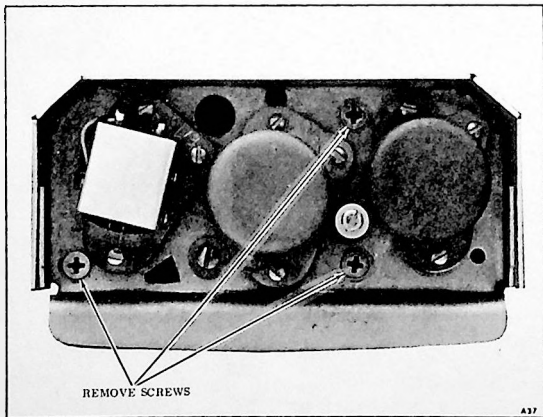


Figure 5-8. Head Assembly Removal

5.40 HEAD STACK ALTERATION (See Figures 7-11 through 7-14)

Step 1: Remove the head assembly from transport per paragraph 5.39.

Step 2: Remove the cover on the cable assembly bracket (item 10, Figures 7-11 through 7-14).

Step 3: On the head stack to be altered, unsolder the leads from the terminals in the cable assembly bracket.

Step 4: Being careful not to lose released springs, remove the three screws from the head stack and lift the head stack from the base, guiding the leads through the base hole.

Step 5: Insert the leads on the new head assembly through the base hole, mount the new assembly on the base (with the three screws previously removed), and insert the mounting springs between the head stack and base.

Step 6: Twist the new head leads together, cut them to length, then strip the ends 1/8-inch. Lay the leads in the terminals, check connections against Figures 7-11 through 7-14, then solder leads to terminals.

Step 7: Re-install the cover on the cable assembly bracket, remount the head assembly on the transport, and re-connect all head cables to the electronic assemblies.

Step 8: Check and adjust head height per paragraph 5.29, head zenith per paragraph 5.34, and head azimuth per paragraph 5.54 or 5.56.

5.41 ELECTRONIC ALIGNMENT

5.42 ALIGNMENT EQUIPMENT

5.43 Obtain the following alignment equipment, or equal:

1. D-C Voltmeter, 20,000 ohms-per-volt
2. A-C Vacuum Tube Voltmeter, Hewlett-Packard Model 400 D
3. Signal Generator, Hewlett-Packard Model 200 C
4. Wave Analyzer (if available)
5. Electronic Counter (if available)
6. Bias Filter (see Figure 4-6)
7. Bandpass Filter (see Figure 4-7)
8. Normal tools used by technician
9. Ampex Standard Alignment Tapes, as applicable (refer to paragraph 4.35):

7-1/2 NAB: No. 01-31321-01

7-1/2 CCIR: No. 01-31323-01

3-3/4 ips (120 Usec): No. 01-31331-01

3-3/4 ips (200 Usec): No. 01-31334-01

5.44 ALIGNMENT CONDITIONS

5.45 Check that the following conditions are met:

1. Line output terminated in 600 ohms
2. Dummy plug in input socket (not an accessory item)
3. Heads cleaned and demagnetized (paragraph 4.1 and 4.6)

4. Covers installed on electronics, unless otherwise indicated

5. Ampex No. 631, or equivalent, tape installed

5.46 INTRODUCTION

5.47 These procedures will usually correct any deficient operation revealed during operation or in checkout procedures. Corrective action given in paragraphs 5.56 and 5.58 is rarely required.

5.48 If the recorder will usually be operated at one tape speed, that speed should be used for the alignment run (bias level set and record level calibrated). Reproduce equalization only should then be adjusted for the other speed.

5.49 When both speeds are to be used about equally, alignment should be started at the 7-1/2 ips speed, to provide optimum setting for bias and record levels.

5.50 REPRODUCE HEAD AZIMUTH

5.51 The VU meter on the electronic assembly is very useful for aligning two-channel equipment, because the output of each head can be measured simultaneously to easily determine the optimum setting.

5.52 Standard alignment tapes for 3-3/4 and 7-1/2 ips tape speeds have all tones (except the last) recorded at 10 dB below operating level, so, in Step 7, it may be necessary to turn the reproduce level control fully clockwise (not to exceed 0 on the VU meter). This screwdriver-adjusted control is beneath a small cover (on the front panel) which must be removed.



DO NOT ADJUST ANY HEAD ASSEMBLY SCREW OTHER THAN THE ONE FOR AZIMUTH ADJUSTMENT.

Step 1: Remove the head cover mounting screw, and lift the head cover off. Remove the two screws at the back (reel side) of the head assembly, and lift the head shield off.

Step 2: Turn power ON. At the tape transport, set EQUALIZATION switch for desired tape speed.

Step 3: Set the RECORD SELECTOR to SAFE.



BE SURE EACH RECORD SELECTOR SWITCH IS AT SAFE, TO PREVENT ACCIDENTALLY ENTERING THE RECORD MODE AND ERASING THE STANDARD TAPE.

Step 4: Set OUTPUT SELECTOR to REPRODUCE.

Step 5: Thread the standard alignment tape (corresponding to the tape speed) on the tape transport.

NOTE

Announcements recorded on the standard tape can be monitored through headsets connected to the PHONES jack, or through an external amplifier/loudspeaker connected to the output.

Step 6: Initiate the reproduce mode. As the first tone reproduces, adjust REPRODUCE LEVEL control(s) for any convenient reference indication on the VU meter(s).

Step 7: The second tone on the tape is the reproduce head azimuth tone. As this tone reproduces, turn the

azimuth-adjust screw on the reproduce head (see Figure 5-9) for maximum VU meter indications. On two-channel equipment, adjust screw to the optimum setting for both heads in the stack.

NOTE

If the azimuth is far out of adjustment, minor peaks will appear on each side of the correct setting. Correct adjustment results in an output signal markedly higher than the minor peaks.

Step 8: Re-install the head shield and head cover.

NOTE

If reproduce/record alignment is to be made, leave test equipment connected, the front panel cover removed, and the alignment tape installed.

5.53 REPRODUCE/RECORD ALIGNMENT

Step 1: Connect the vtvm to the OUTPUT connector. Then repeat steps 2, 3, 4, and 5 of paragraph 5.50.

Step 2: Initiate the reproduce mode. As the first tone reproduces, adjust the REPRODUCE LEVEL control for any convenient reference indication on the vtvm.

Step 3: After the first tape tone, there is a series of tones used to check reproduce high-frequency equalization. As these tones reproduce, adjust the appropriate HIGH-FREQ EQUAL control (at the back of the electronic assembly) for the flattest possible response within specifications, but do not move response more than ± 2 dB from the theoretical curves in Figure 7-21.

NOTE

The test tape is recorded full track. When reproduced by a half-track or multi-track head, the "fringing" effect produces invalid response at frequencies below 700 Hz (15 and 7-1/2 ips) or 500 Hz (3-3/4 ips). This effect, which results in high indications in the lower frequencies, does not occur when tapes are recorded and reproduced with heads mounted in the same configuration.

Step 4: As the final tape tone reproduces, adjust the REPRODUCE LEVEL control for a +4 dBm indication on the vtvm (the equipment VU meter should indicate 0, $\pm 3/4$, dB).

NOTE

This REPRODUCE LEVEL control setting must not be changed until the record level is calibrated in Step 13.

Step 5: After the alignment tape is completely wound on the takeup reel, interchange the reels. Initiate the play mode to wind the alignment tape back to its original reel.

Step 6: With the vtvm still connected to the OUTPUT connector, connect the signal generator to either INPUT connector (A or B).

Step 7: Set the signal generator to provide a nominal 1-volt rms output at the following frequency: for 7-1/2 ips, 500 Hz; for 3-3/4 ips, 250 Hz.

Step 8: Thread blank tape on the transport.

Step 9: At the electronic assembly, set OUTPUT SELECTOR to REPRODUCE and RECORD SELECTOR to RECORD. On two-channel equipment, leave the RECORD SELECTOR on the second electronic assembly in the SAFE position, so that it will not record.

Step 10: Remove the small cover, secured by two screws, from the electronic assembly front panel.

Step 11: Initiate the record mode and adjust the applicable RECORD LEVEL control for any convenient vtvm reference indication.

Step 12: Set BIAS ADJUST for a peak vtvm indication.

Step 13: Set the signal generator to 500 Hz, at a nominal 1-volt level. Adjust RECORD LEVEL for a +4 dBm indication on the vtvm.

Step 14: Set OUTPUT SELECTOR to INPUT. Adjust RECORD CAL for a 0 indication on the VU meter.

Step 15: Repeat Steps 1, 2, 3, and 5, at the second tape speed, using the corresponding standard alignment tape and HI FREQ EQUAL control.

Step 16: On two-channel equipment, repeat the entire procedure for the second channel.

5.54 RECORD-HEAD AZIMUTH (See Figure 5-9)

5.55 Equipment VU meters can be used in making this adjustment.

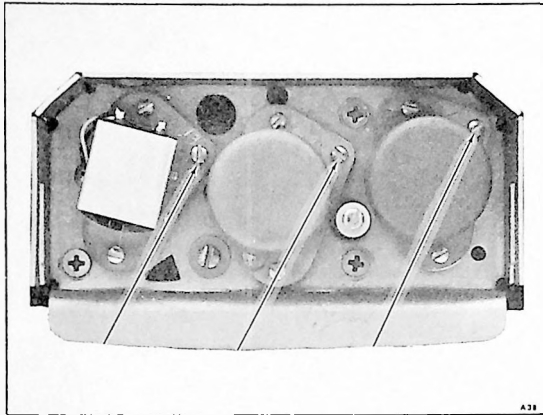


Figure 5-9. Head Azimuth Adjustments

CAUTION

DO NOT ADJUST ANY HEAD ASSEMBLY SCREW OTHER THAN THE ONE FOR AZIMUTH ADJUSTMENT, OR IT MAY BE NECESSARY TO ADJUST HEAD HEIGHT.

Step 1: On one-channel equipment, connect the signal generator to either INPUT connector (A or B). On two-channel equipment, connect the signal generator to the input of both channels.

Step 2: Set the signal generator to a nominal 1-volt rms output level at the following frequency: for 7-1/2 ips, 15,000 Hz; for 3-3/4 ips, 7,500 Hz.

Step 3: At the electronic assembly, set RECORD SELECTOR to RECORD and OUTPUT SELECTOR to INPUT.

Step 4: Adjust RECORD LEVEL control(s) for a -10 indication on the VU meter(s). Set OUTPUT SELECTOR to REPRODUCE.

Step 5: Thread blank tape on the transport.

Step 6: Initiate the record mode (both channels on two-channel equipment).

Step 7: During this simultaneous recording and reproducing, adjust the record head azimuth screw for a maximum indication on the vtvm. On two-channel equipment, adjust screw for the optimum setting of both heads in the record stack.

NOTE

If the azimuth is far out of adjustment, minor peaks will appear on each side of the correct setting. Correct adjustment results in an output signal markedly higher than the minor peaks.

5.56 RECORD EQUALIZATION

5.57 This adjustment will be simplified by using a bias filter as shown in Figure 4-5. Otherwise, a trial-and-error method must be used, in which the tape is recorded at different settings of the REC EQUALIZATION control, and then is reproduced to determine the correct setting (this requires several record and reproduce runs before the correct adjustment can be determined). With the bias filter, proceed as follows:

Step 1: Connect the bias filter to the OUTPUT connector and the vtvm to the filter output.

Step 2: Connect the signal generator to either INPUT connector (A or B) and set it to 500 Hz, at a nominal 1-volt level.

Step 3: Turn power ON. Set EQUALIZATION switch for tape speed desired.

Step 4: Remove the small cover (secured by two screws) from the electronic assembly front panel.

Step 5: Set the signal generators to provide a 1-volt rms output at the following frequency: for 7-1/2 ips, 15,000 Hz; for 3-3/4 ips, 8,000 Hz.

Step 6: Thread blank tape on the transport. Set the OUTPUT SELECTOR to INPUT and adjust RECORD LEVEL control for a -10 dBm indication on the vtvm.

Step 7: Initiate the record mode, then set OUTPUT SELECTOR to REPRODUCE.

Step 8: During this simultaneous recording and reproducing, change the signal generator frequency over the response spectrum top end for this tape speed (refer to Specifications in Section 1). Adjust the REC EQUALIZATION control that corresponds to the speed setting, to obtain the flat-test possible high-frequency response at 500 Hz, within specifications.

Step 9: Repeat Steps 3, 4, 5, and 6 at the second speed.

Step 10: On two-channel equipment, repeat the procedure for the second channel.

5.58 BIAS OSCILLATOR FREQUENCY

5.59 This seldom-required adjustment is made at the factory, using an electronic counter. If such a counter is available, connect it across R41 on the record printed-wiring board (with the record head connected). Initiate the record mode (on one channel at a time, on two-channel equipment). Adjust the tuning slug in transformer T1, on the same board, for a bias frequency as close as possible to 100,000 Hz. On two-channel equipment, the frequencies of the bias oscillators in the two electronic assemblies must be identical within $\pm 1,000$ Hz.

5.60 On two-channel equipment, if an electronic counter is not available, adjust the bias oscillator frequency when a beat

frequency becomes noticeable; minimize it as follows: slowly and carefully adjust the tuning slugs, alternating between the two oscillators.

5.61 BIAS SYMMETRY

5.62 This seldom-required adjustment is made at the factory, using a signal generator with a second harmonic distortion less than 0.2%, and a wave analyzer. The BIAS SYM control, on the back panel of the electronics assembly, is adjusted for minimum second harmonic distortion of a 500 Hz signal, placing only one channel at a time in the record mode.

5.63 If a wave analyzer is not available, do not change the control setting unless some component in the bias-and-erase oscillator requires replacement. After such corrective maintenance, monitor the output through a high-gain amplifier and loudspeaker (or headset) while simultaneously recording and reproducing, with no input signal. Adjust the BIAS SYM control for minimum popping and hissing noise. If the BIAS SYM control has no audible effect, leave it in the mid-position.

5.64 ELECTRONIC DEFECTS AND CORRECTIONS

5.65 POOR FREQUENCY RESPONSE

5.66 Any of the following corrective actions may be required to bring the equipment within specifications:

- a. Heads, clean/demagnetize per paragraph 4.1 and 4.6.
- b. Head azimuths, adjust per paragraphs 5.54 and 5.58.
- c. Bias level, adjust per paragraph 5.56.
- d. Reproduce equalization, adjust per paragraph 5.56.

e. Record calibration, adjust per paragraph 5.56.

f. Record equalization, adjust per paragraph 5.61.

g. Play holdback tape tension, adjust per paragraph 5.6.

h. Signal generator, adjust for a flat output.

i. Head heights unequal, adjust per paragraph 5.29.

j. Tape low in grade, replace with recommended tape (or equivalent).

d. Erase current not at peak; increase as necessary.

e. Head cables being rubbed by transport moving parts; eliminate rubbing.

f. Head azimuth incorrectly adjusted; correct per paragraph 5.54.

g. Head height incorrectly adjusted; correct per paragraph 5.29.

h. Tape wrap or head zenith incorrectly adjusted; correct per paragraph 5.34.

i. Record or reproduce level incorrectly adjusted; correct per paragraph 5.56.

5.67 SIGNAL DISTORTION

5.68 Excessive second harmonic distortion is usually caused by magnetized heads, or a malfunctioning bias oscillator, bias amplifier, record amplifier, or reproduce amplifier.

5.69 Third harmonic distortion may result from the type of magnetic tape used, the bias setting, or the accuracy of the "normal operating level" adjustment. Most tape will have a 500-Hz third-harmonic distortion of 0.6% to 1.1% at operating level.

5.70 EXCESSIVE NOISE

5.71 If the signal-to-noise ratio fails to meet the Section 1 specifications, check for all possible causes, including the following:

a. Heads need cleaning or demagnetizing; correct per paragraphs 4.1 and 4.6.

b. Magnetic tape not as specified; replace with recommended tape, or equivalent.

c. External fields from nearby motors, generators, etc; provide shielding or separate the equipment.

5.72 EXCESSIVE FLUTTER/WOW

5.73 Excessive flutter can be caused by any component that affects the tape motion, but is usually caused by the following (replace all defective parts):

a. Oxide or dirt: on components in the tape-handling path (see paragraph 4.1).

b. Drive motor: not in synchronism (too-low voltage); excessive tape tension (see paragraph 4.23); defective motor capacitor; bearings defective or need lubrication (see paragraph 4.15); motor shaft bent; dragging belt-tension idler; drive motor otherwise defective; or dirty/worn belt.

c. Supply turntable: excessive or erratic holdback tension (see paragraph 4.23).

d. Capstan idler: defective rubber tire; bearing defective or needs lubrication (see paragraph 4.13); pressure incorrectly adjusted (see paragraph 4.29).

e. Reel idler: bent shaft; flywheel not balanced.

f. Head assembly: poor tape guiding (see paragraph 5.25 and 5.34).

g. Tape scrape: warped/damaged reels or incorrect turntable height (see paragraph 5.14).

SECTION 6

PRINCIPLES OF OPERATION

6.1 TRANSPORT OPERATION

6.2 INTRODUCTION (See Figure 6-1)

6.3 The tape transport uses a two-speed synchronous motor and a system of pulleys, belts, and clutches to drive the reel turntables and the capstan. The three modes of tape motion (play, rewind, and fast-forward) are set by two controls on the tape transport; the neutral position for each control is marked by a dot.

6.4 Power is applied to the drive motor when the POWER switch is turned to ON. The capstan (16, Figure 6-1) is immediately driven by a nylon belt (3) between the motor pulley (8) and the capstan flywheel. A second belt (14), in a groove of the capstan flywheel, drives the play takeup pulley (13). The shock-relief brake rollers (2 and 12) are moved against the fast-forward and rewind rubber-tired clutches (4 and 9). Both turntables remain motionless, with the machine in standby condition.

6.5 PLAY MODE

6.6 Since the capstan is rotating when the machine is in standby, the tape rapidly accelerates to play speed, set by the EQUALIZATION switch, when the PLAY/REC switch is moved to PLAY. Other resulting action is as follows:

1. The play takeup pulley (13) and belt (14) contact the play takeup clutch (11).
2. The shock-relief brake roller (12) releases from the fast forward clutch tire (9).

3. The capstan idler (15) engages the capstan (16), which drives the tape, pulling the tape from the supply turntable and feeding it to the takeup turntable.

4. The shock-relief brake roller (2) remains engaged with the rewind clutch tire; therefore slippage occurs between the clutch and brake disc. The friction produced in this slippage, and the friction produced by the rewind-holdback brake (6) on the plastic drum (5), provide the required tape holdback tension.

6.7 REWIND MODE

6.8 The REWIND/FAST-FWD control can be operated only when the PLAY control is in neutral. When the REWIND/FAST-FWD control is turned to REWIND, the following occurs:

1. Both shock-relief brake rollers (2 and 12) release.
2. The rewind idler (7) is clamped between the motor pulley (8) and the rewind clutch tire to drive the rewind turntable.
3. Holdback tension is provided by the holdback brake (10, on the takeup assembly) as tape is pulled from the takeup turntable.

NOTE

Fast-wind speed is halved when EQUALIZATION switch is set to SLOW.

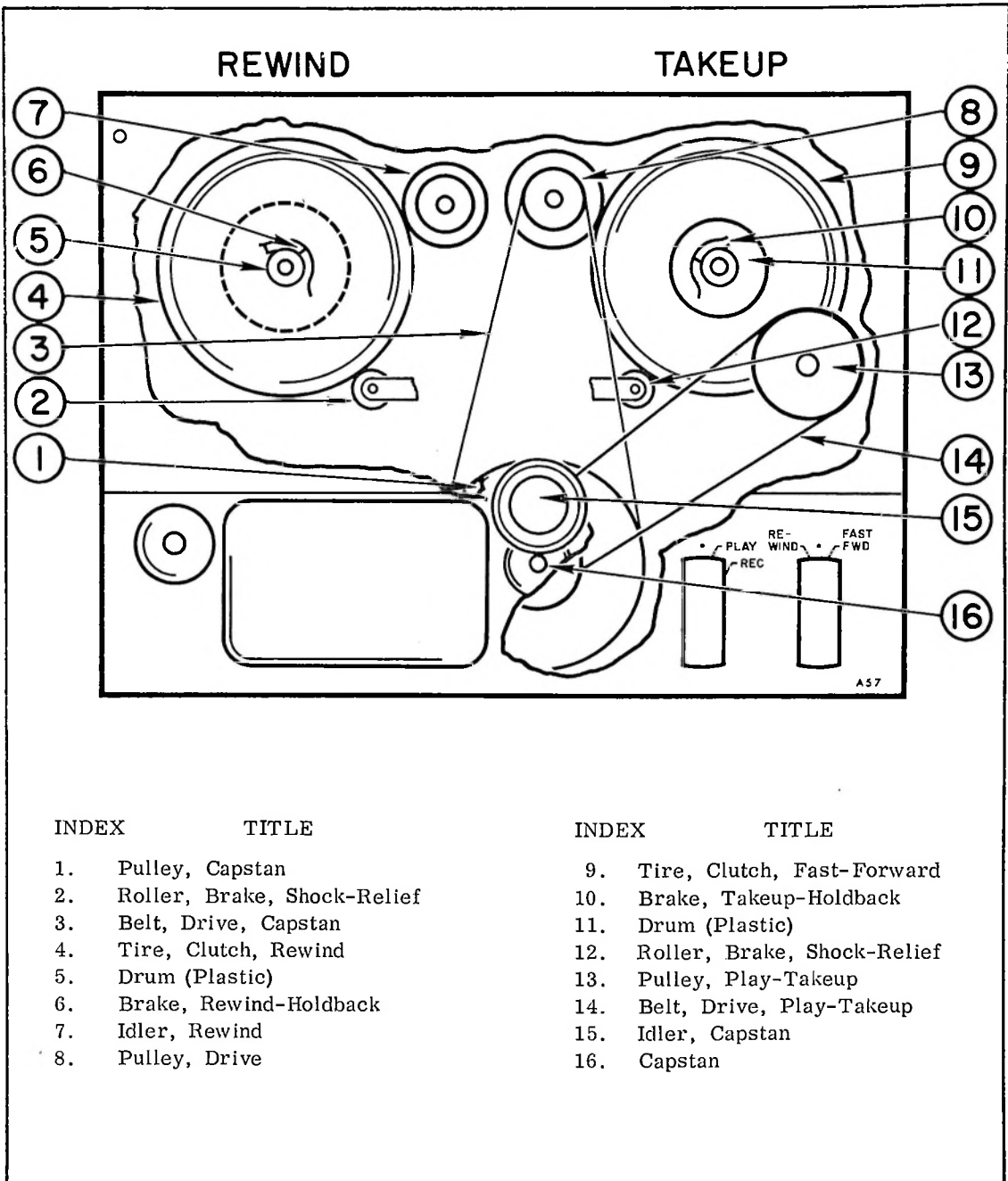


Figure 6-1. Transport Tape Drive

6.9 FAST-FORWARD MODE

6.10 When the REWIND/FAST-FWD control is turned to FAST FWD, the following occurs:

1. Both shock-relief brake rollers (2 and 12) release.
2. The rubber-tired fast forward clutch (9) contacts the motor pulley (8) to drive the takeup turntable.
3. Holdback tension is provided by the holdback brake (6, on the supply turntable) as tape winds on the takeup turntable.

6.11 ELECTRONIC OPERATION (See Figure 6-2)

NOTE

Schematic diagrams are provided in Section 7.

6.12 RECORD CIRCUIT

6.13 The signal to be recorded enters receptacles J4 (input A) and/or J6 (input B), and then goes to INPUT ACCESSORY sockets J5 and/or J7, respectively. Either a dummy plug, an accessory transformer, or a microphone (refer to Section 1) must be inserted in J5 and J7 to complete the signal paths.

6.14 One side of the signal connects to the accessory sockets at pin 4, leaves at pin 3, connects across the RECORD LEVEL control, returns to socket pin 6, and finally leaves at pin 7. This allows a record-level control to be connected between the two amplifier stages of the microphone preamplifier. The preamplifier thus functions as a variable-gain device usable with a wide range of microphones.

6.15 After the accessory socket and level control, the two input signals are connected together through a resistive mixing circuit to the base of amplifier stage Q8; the col-

lector load for Q8 consists of the base circuit of emitter-follower stage Q9. Q9 output signals are 'record' and 'record monitor'.

6.16 The record signal is connected to contacts of EQUALIZATION switch S2, for switching to the HIGH or LOW motor speed and record-equalization circuits. The equalization circuit consists of a resistor R29 which is shunted by resistor R56 and then capacitor C25 (high speed), or C26 (low speed), as selected by the switch. The record-monitor signal is connected, through resistor R51 and RECORD CAL control R50, to contacts of the OUTPUT SELECTOR switch. When that switch is at INPUT, the signal proceeds through the final three stages of the reproduce circuit (refer to paragraph 6.21) to the VU meter and output line for monitoring and calibration purposes.

6.17 In the record signal path, emitter-follower stage Q10 follows the record equalization circuit. The signal is then amplified in a constant-current amplifier stage, Q11 and Q12, in which Q12 acts as current booster for Q11. The circuit has a high ac impedance (to provide a current insensitive to head impedance changes, which occur when signal frequency changes), but a low dc impedance (so the dc operating voltage is fully utilized). The signal then proceeds through a bias trap (L1, C15), is mixed with the ac bias, and continues to the record head.

6.18 The record amplifier is energized through contacts of the RECORD SELECTOR switch S4 and PLAY/RECORD switch S5. In the record mode, this shifts the dc bias on transistor Q10, causing it, and subsequently Q11 and Q12, to conduct; when the switch contacts are open, the three transistors are cut off. Therefore, the amplifier operates only in the record mode.

6.19 Transistors Q13 and Q14 form the bias-and-erase oscillator, a conventional push-pull circuit connected as a tuned flip-flop. It is energized only in the record mode, through contacts of the RECORD SELECTOR and PLAY/RECORD switches.

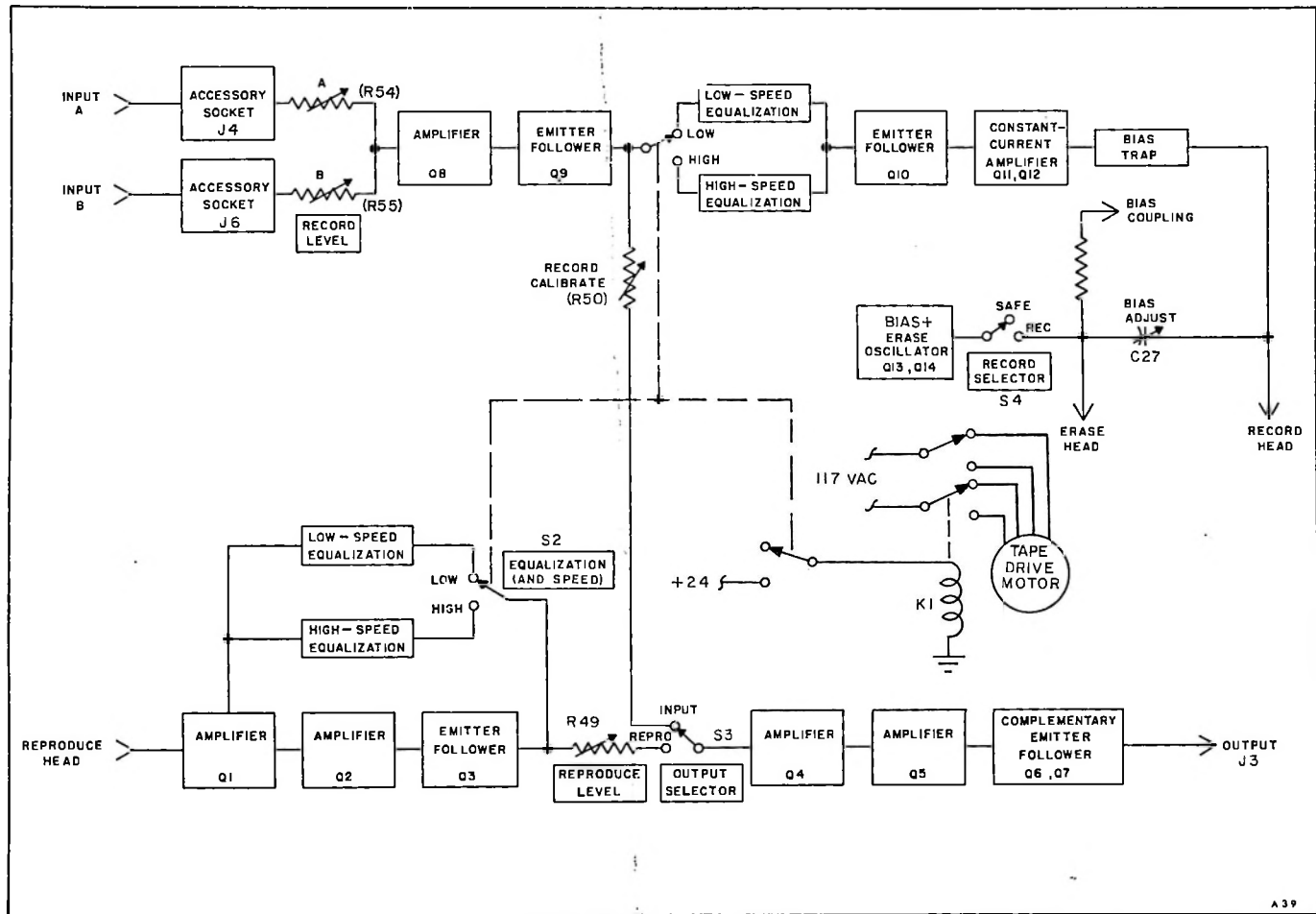


Figure 6-2. Electronic Circuit Diagram

Symmetry of the output waveform is adjusted by resistor R62, and the frequency is adjusted by a tuning slug in transformer T1 (nominal bias frequency is 100,000 Hz).

6.20 The bias-and-erase oscillator output proceeds from the secondary of T1 to the RECORD SELECTOR switch S4. When the switch is at RECORD, the bias current passes through capacitor C28 to the erase head. Another leg is adjusted by capacitor C27, mixed with the record signal and routed to the record head. In addition, a bias line passes through resistor R58 to pin 7 of receptacle J11. In two-channel equipment, pin 7 is connected to the bias oscillator output in the slave electronic assembly; which locks the two oscillator frequencies together so that no beat frequency is generated.

6.21 REPRODUCE CIRCUIT

6.22 From the reproduce head, the recorded signal passes through two amplifier stages (Q1 and Q2) and an emitter-follower stage (Q3). The reproduce equalization circuits connect from the emitter of Q3, through EQUALIZATION switch S2, and then to the emitter of Q1. Variable resistor R47 (high speed) or R48 (low speed) is used for circuit equalization.

6.23 From emitter follower Q3 the signal proceeds through the REPRODUCE LEVEL control R49 and OUTPUT SELECTOR switch S3. The switch must be set at REPRODUCE

during playback. When this switch is at INPUT, the record monitor circuit connects through two amplifier stages (Q4 and Q5), a complementary emitter-follower stage Q6/Q7, and a transformer, to the VU meter and OUTPUT connector J3. Headsets with at least 4 ohms impedance can be used to monitor the output at PHONES jack J2 (series-connected with resistor R52 across the output transformer primary).

6.24 POWER SUPPLY, DOMESTIC

6.25 The ac line power is connected to the master electronic assembly; one side (fused by F1) connects through power switch S1 across the power transformer, T3, primary.

6.26 Diodes CR2 and CR3 provide full-wave rectification at the center-tapped secondary of T3. Transistor Q15 is a series (emitter-follower) power transistor. Zener diode VR1 holds the Q15 base (and thus the emitter) at a constant potential of 23.4 volts $\pm 5\%$.

6.27 POWER SUPPLY, INTERNATIONAL

6.28 The international type of recorder differs only in the power input; a selector switch on the electronic assembly back must be set to correspond with the ac-power line voltage of 115 or 230 volts.

6.29 Line power, connected to receptacle J10, is controlled by switch S1 and fused by F1.

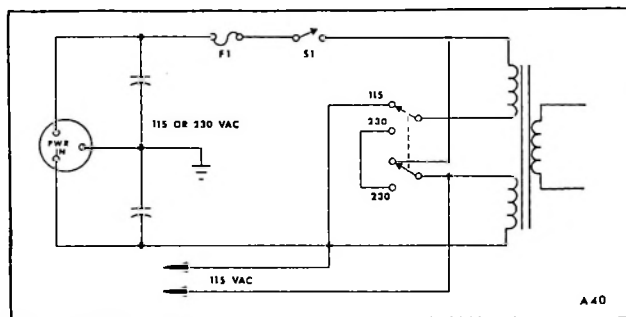


Figure 6-3. Input Circuit, International Version

6.30 The ac power connects across the two primary windings of power transformer T3, and the 115V-230V switch is connected between the windings. In the 230V switch position, the windings are connected in series

across the power line and 115 volts ac (at the windings junction) is routed to the transport. In the 115V switch position, the two windings are connected in parallel, and both sides of the line are routed to the transport.

SECTION 7

PARTS LISTS AND DRAWINGS

7.1 INTRODUCTION

7.2 All component parts lists are referenced to the applicable drawing(s).

7.3 When ordering replacement parts from the Ampex Professional Audio Distributor, always include the Ampex part number and the model and serial numbers. Distributors can often provide a convenient replacement parts service.

AMPEX

MODEL AG-600B RECORDER/REPRODUCER
Single-Channel, 3-3/4 - 7-1/2 IPS
4010135 (Ref. D)

-01	-02	-03	-04	-05	-06	-07	-08	-09	-10	-11	-12	DESCRIPTION	Ampex Part No.
X												NAB, Full-Track, Unmounted, 60 Hz	4010135-01
	X											NAB, Full-Track, Portable, 60 Hz	4010135-02
		X										NAB, Half Track, Unmounted, 60 Hz	4010135-03
			X									NAB, Half-Track, Portable, 60 Hz	4010135-04
				X								NAB, Full Track, Unmounted, 50 Hz	4010135-05
					X							NAB, Full-Track, Portable, 50 Hz	4010135-06
						X						NAB, Half Track, Unmounted, 50 Hz	4010135-07
							X					NAB, Half Track, Portable, 50 Hz	4010135-08
								X				CCIR, Full-Track, Unmounted, 50 Hz	4010135-09
									X			CCIR, Full-Track, Portable, 50 Hz	4010135-10
										X		CCIR, Half-Track, Unmounted, 50 Hz	4010135-11
											X	CCIR, Half Track, Portable, 50 Hz	4010135-12
1	1	1	1									Tape Transport, 60 Hz	4020302-01
				1	1	1	1	1	1	1	1	Tape Transport, 50 Hz	4020302-02
1	1											Head Assembly, Full-track	4020191-03
		1	1									Head Assembly, Half-track	4020191-04
1	1	1	1									Electronics Assembly, NAB, Master	4020257-25
				1	1	1	1					Electronics Assembly, NAB, Int'l	4020257-27
								1	1	1	1	Electronics Assembly, CCIR, Int'l	4020257-30
1	1	1	1	1	1	1	1	1	1	1	1	Head Cover Assembly	4041023-01
2	2	2	2	2	2	2	2	2	2	2	2	Knob, Holddown, Black	4130028-20
				1								Case, Portable	4150233-01
1	1	1	1	1	1	1	1	1	1	1	1	Shield, Head-cover	4290430-10
1	1	1	1	1	1	1	1	1	1	1	1	Reel, Standard, 7-inch, Blank	4690069-10
												Instruction Manual	4890302
1	1	1	1	1	1	1	1	1	1	1	1	Microphone Preamplifier	4010066-02
1	1	1	1	1	1	1	1	1	1	1	1	Cord Set, Power, 8-foot	084-027
1	1	1	1									Plug Kit	4050256-10
				1	1	1	1	1	1	1	1	Plug Kit	4050256-40
2	2	2	2	2	2	2	2	2	2	2	2	Connector, Audio, 3-socket, Female	145-009
				1	1	1	1	1	1	1	1	Fuse, 0.5-ampere, Slo-blo	070-026
1	1	1	1	1	1	1	1	1	1	1	1	Connector, Telephone-plug	149-004

AMPEX

MODEL AG-600B RECORDER/REPRODUCER
Dual-Channel, 3-3/4 - 7-1/2 IPS
4010136 (Ref. B)

-01	-02	-03	-04	-05	-06	-07	-08	-09	-10	-11	-12	DESCRIPTION	Amper Part No.
X												NAB, Two Track, Unmounted, 60 Hz	4010136-01
	X											NAB, Two Track, Portable, 60 Hz	4010136-02
		X										NAB, Quarter Track, Unmounted, 60 Hz	4010136-03
			X									NAB, Quarter Track, Portable, 60 Hz	4010136-04
				X								NAB, Two Track, Unmounted, 50 Hz	4010136-05
					X							NAB, Two Track, Portable, 50 Hz	4010136-06
						X						NAB, Quarter Track, Unmounted, 50 Hz	4010136-07
							X					NAB, Quarter Track, Portable, 50 Hz	4010136-08
								X				CCIR, Two Track, Unmounted, 50 Hz	4010136-09
									X			CCIR, Two Track, Portable, 50 Hz	4010136-10
										X		CCIR, Quarter Track, Unmounted, 50 Hz	4010136-11
											X	CCIR, Quarter Track, Portable, 50 Hz	4010136-12
1	1	1	1									Tape Transport, 60 Hz	4020302-01
				1	1	1	1	1	1	1	1	Tape Transport, 50 Hz	4020302-02
1	1			1	1			1	1			Head Assembly, Two-track	4020192-02
		1	1			1	1			1	1	Head Assembly, Quarter-track	4020194-02
1	1	1	1									Electronics Assembly, NAB, Master	4020257-25
1	1	1	1	1	1	1	1	1	1	1	1	Electronics Assembly, NAB, Slave	4020257-26
				1	1	1	1					Electronics Assembly, NAB, Int'l	4020257-27
							1	1	1	1	1	Electronics Assembly, CCIR, Slave	4020257-29
							1	1	1	1	1	Electronics Assembly, CCIR, Int'l	4020257-30
1	1	1	1	1	1	1	1	1	1	1	1	Head Cover Assembly	4041023-01
1	1	1	1	1	1	1	1	1	1	1	1	Cable Assembly, Electronics Interconnect	4050098-04
2	2	2	2	2	2	2	2	2	2	2	2	Knob, Holddown, Black	4130028-20
		1	1		1		1		1		1	Case, Portable	4150232-01
1	1	1	1	1	1	1	1	1	1	1	1	Shield, Head-cover	4290430-10
1	1	1	1	1	1	1	1	1	1	1	1	Reel, Standard, 7-inch, Blank	4690069-10
1	1	1	1	1	1	1	1	1	1	1	1	Instruction Manual	4890302
1	1	1	1	1	1	1	1	1	1	1	1	Cord Set, Power, 8-foot	084-027
2	2	2	2	2	2	2	2	2	2	2	2	Microphone Preamplifier	4010066-02
1	1	1	1									Plug Kit	4030256-20
				1	1	1	1	1	1	1	1	Plug Kit	4050256-50
4	4	4	4	4	4	4	4	4	4	4	4	Connector, Audio, 3-socket, Female	145-009
2	2	2	2	2	2	2	2	2	2	2	2	Connector, Telephone-plug	149-004
				1	1	1	1	1	1	1	1	Fuse, 0.5-ampere, Slo-blo	070-026

AMPEX

ELECTRONICS ASSEMBLY

4020257 (Ref. N)

-25	-26	-27	-28	-29	-30	DESCRIPTION	Amplex Part No.
X						Electronics Assembly, NAB Master (For Schematic, see Fig. 7-18)	4020257-25
	X					Electronics Assembly, NAB Slave (For Schematic, see Fig. 7-20)	4020257-26
		X				Electronics Assembly, NAB International (For Schematic, see Fig. 7-19)	4020257-27
			X			Electronics Assembly, CCIR Master (For Schematic, see Fig. 7-18)	4020257-28
				X		Electronics Assembly, CCIR Slave (For Schematic, see Fig. 7-20)	4020257-29
					X	Electronics Assembly, CCIR International (For Schematic, see Fig. 7-19)	4020257-30
2	2	2	2	2	2	Dummy Plug Assy	4030034-30
1						Panel Assy, Rear, Domestic. Details on Figure 7-16	4050251-13
	1					Panel Assy, Rear, Domestic. Details on Figure 7-16	4050251-11
			1			Panel Assy, Rear, Domestic. Details on Figure 7-16	4050251-12
		1	1		1	Panel Assy, Rear, Domestic. Details on Figure 7-16	4050251-14
1		1	1		1	Panel Assy, Front, Master. Details on Figure 7-15	4050400-09
	1	1		1		Panel Assy, Front, Slave. Details on Figure 7-15	4050400-10
1	1	1				Board Assy, Printed Wiring, Record, NAB	4050404-07
			1		1	Board Assy, Printed Wiring, Record, CCIR	4050404-08
				1	1	Panel Assy, Rear, International. Details on Figure 7-17	4050405-09
					1	Panel Assy, Rear, International. Details on Figure 7-17	4050405-10
		1				Chassis, Electronics, Master	4290621-01
	1			1		Chassis, Electronics, Slave	4290621-02
		1		1		Chassis, Electronics, International	4290621-03
1	1	1	1	1	1	Cover, Chassis Top	4290624-01
1	1	1	1	1	1	Cover, Chassis Bottom	4290632-01
1	1	1	1	1	1	Cover Plate, Decorative	4290631-01
1	1	1	1	1	1	Transformer, Output (T2)	4580193-01
1	1	1	1	1	1	Phone Jack	4630041-10
1	1	1	1	1	1	Shield, Record Board	4600054-01
1	1	1	1	1	1	Shield, Input Ampl	4600057-01
1	1	1	1	1	1	Shield, Record Head	4600058-01
1	1	1	1	1	1	Board Assy, Printed Wiring, Reproduce	4050403-03
1	1	1	1	1	1	Capacitor, 36pF, 500V, ±5% (C35)	034-942
2	2	2	2	2	2	Capacitor, Ceramic, 0.005UF, 1400V (C31, C32)	030-465
1	1	1	1	1	1	Resistor, Composition, 680 ohm, ±10%, 1/2W (R53)	041-046
1	1	1	1	1	1	Fuse, 3/4A, Slo-blo (F1)	070-048
1	1	1	1	1	1	Fuse Post	085-001
2	2	2	2	2	2	Connector, Audio Receptacle, 3-socket (Input A & B)	146-998

FOR INDEX, SEE
PAGE 7-13

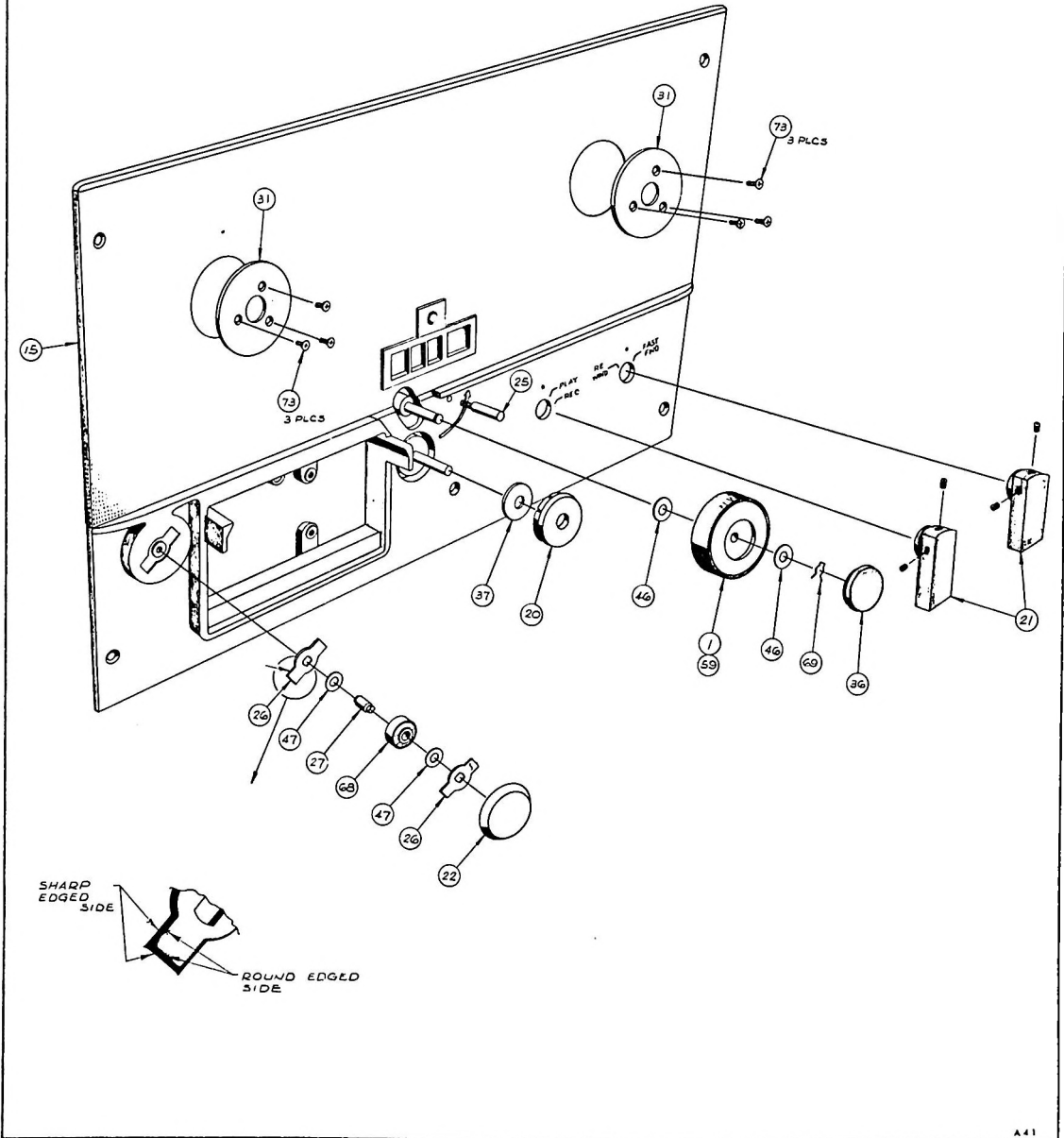
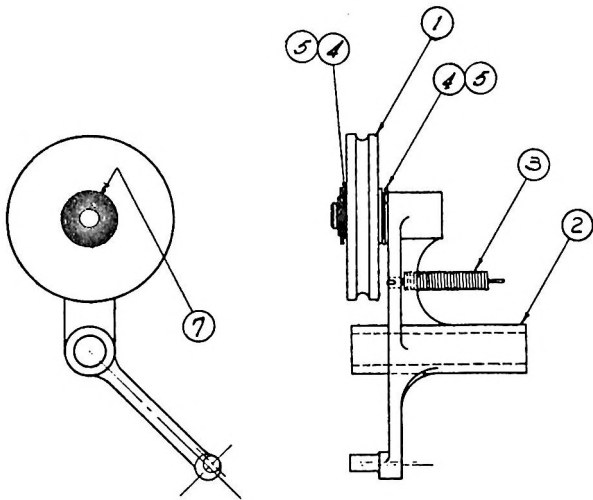


Figure 7-1. Tape Transport Assembly, Front

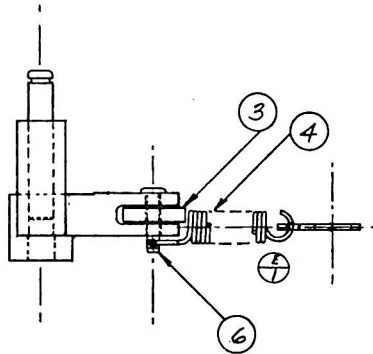
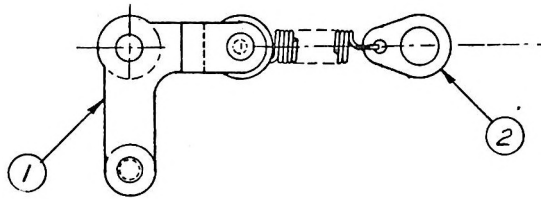
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PAGE 7-13



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Figure 7-3. Play Takeup Arm

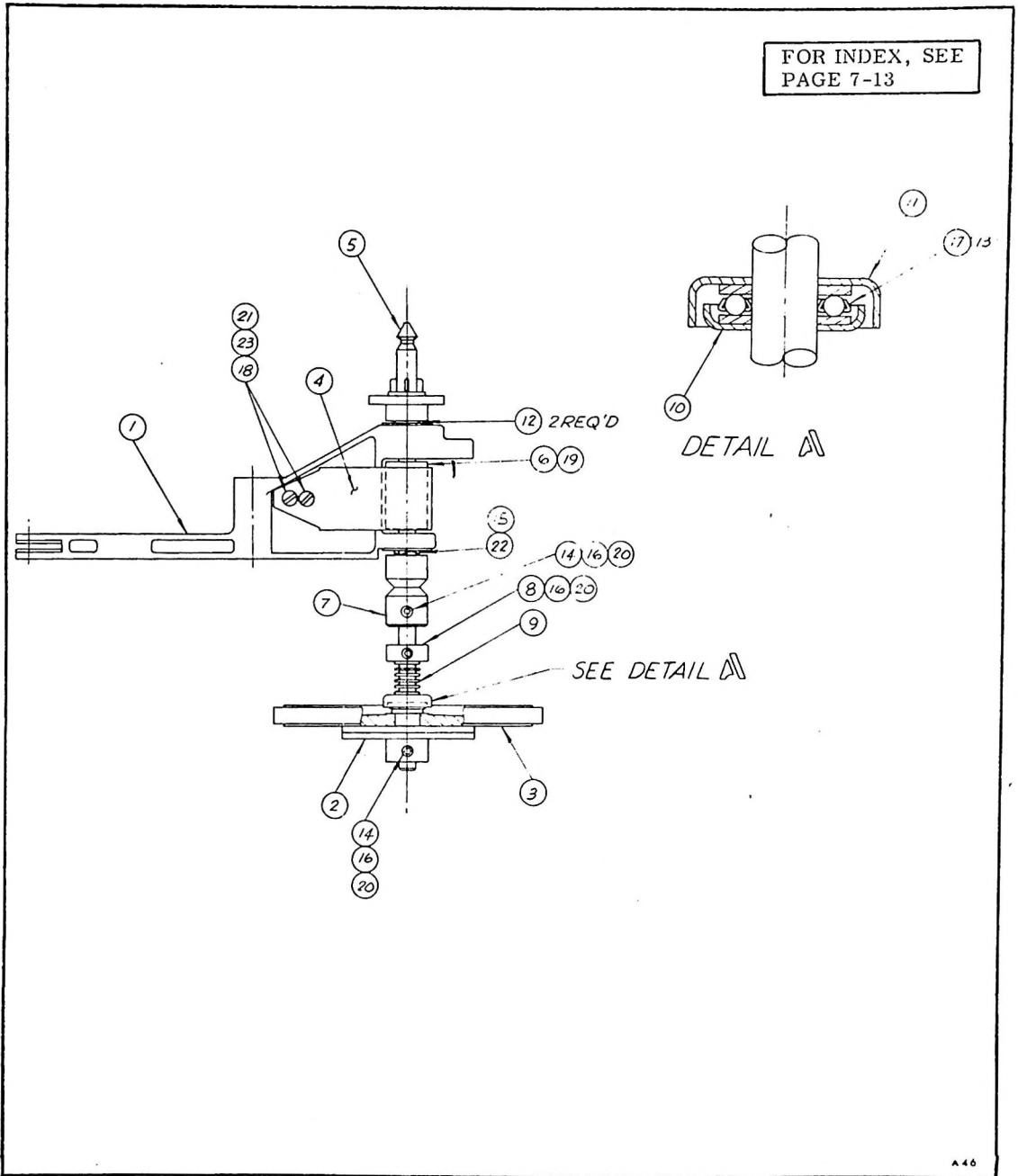
FOR INDEX, SEE
PAGE 7-13



A45

Figure 7-4. Capstan Idler Arm

FOR INDEX, SEE
PAGE 7-13



A46

Figure 7-5. Rewind Arm

FOR INDEX, SEE
PAGE 7-13

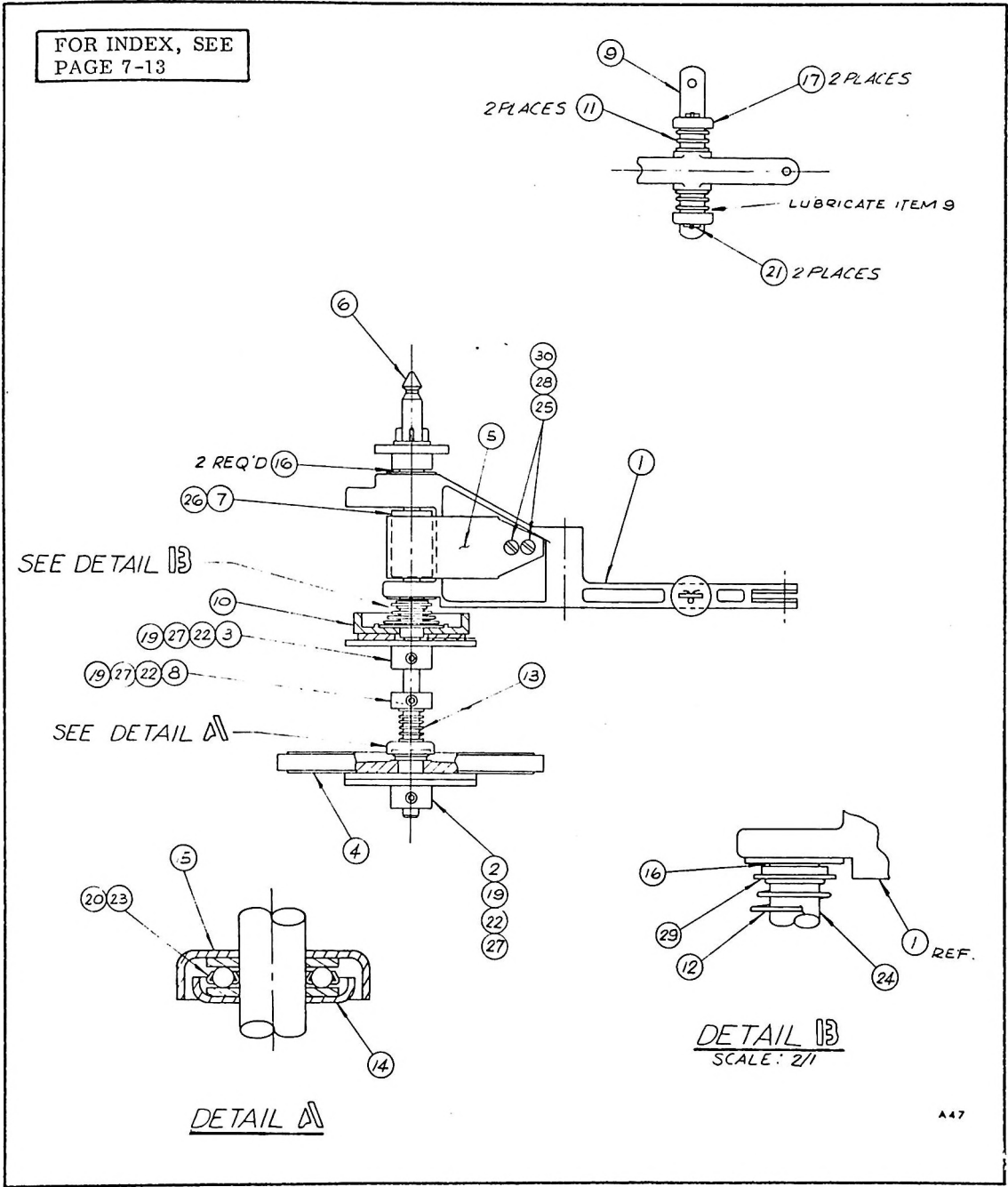
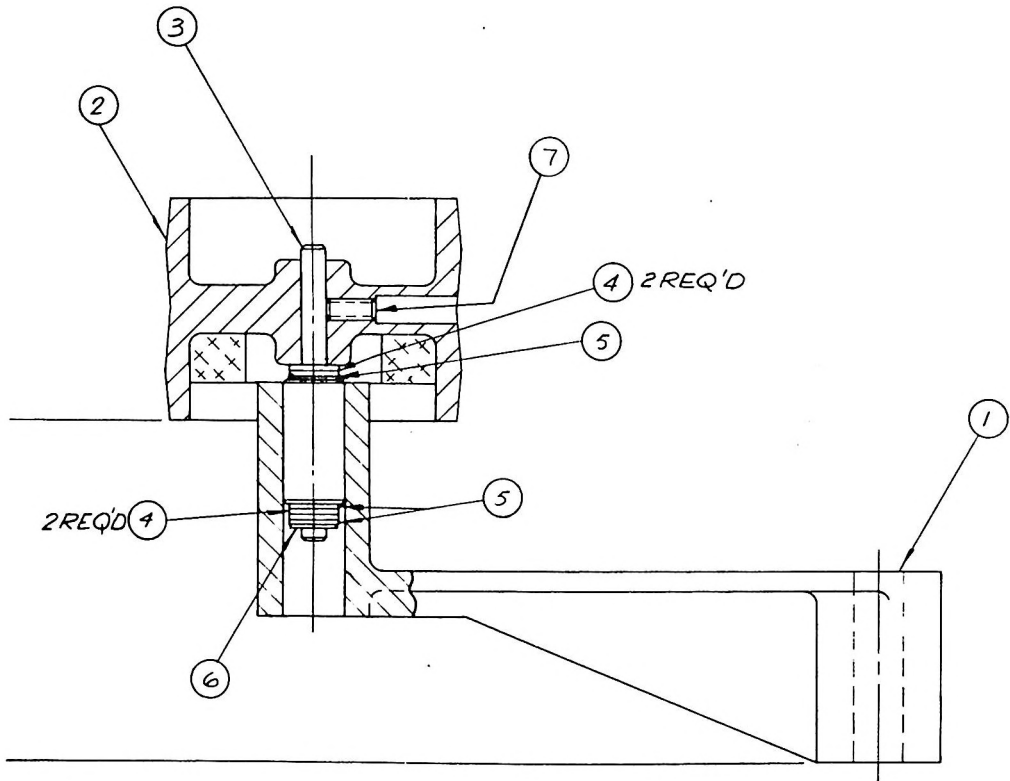


Figure 7-6. Takeup Arm

FOR INDEX, SEE
PAGE 7-13



A48

Figure 7-7. Belt Idler Arm

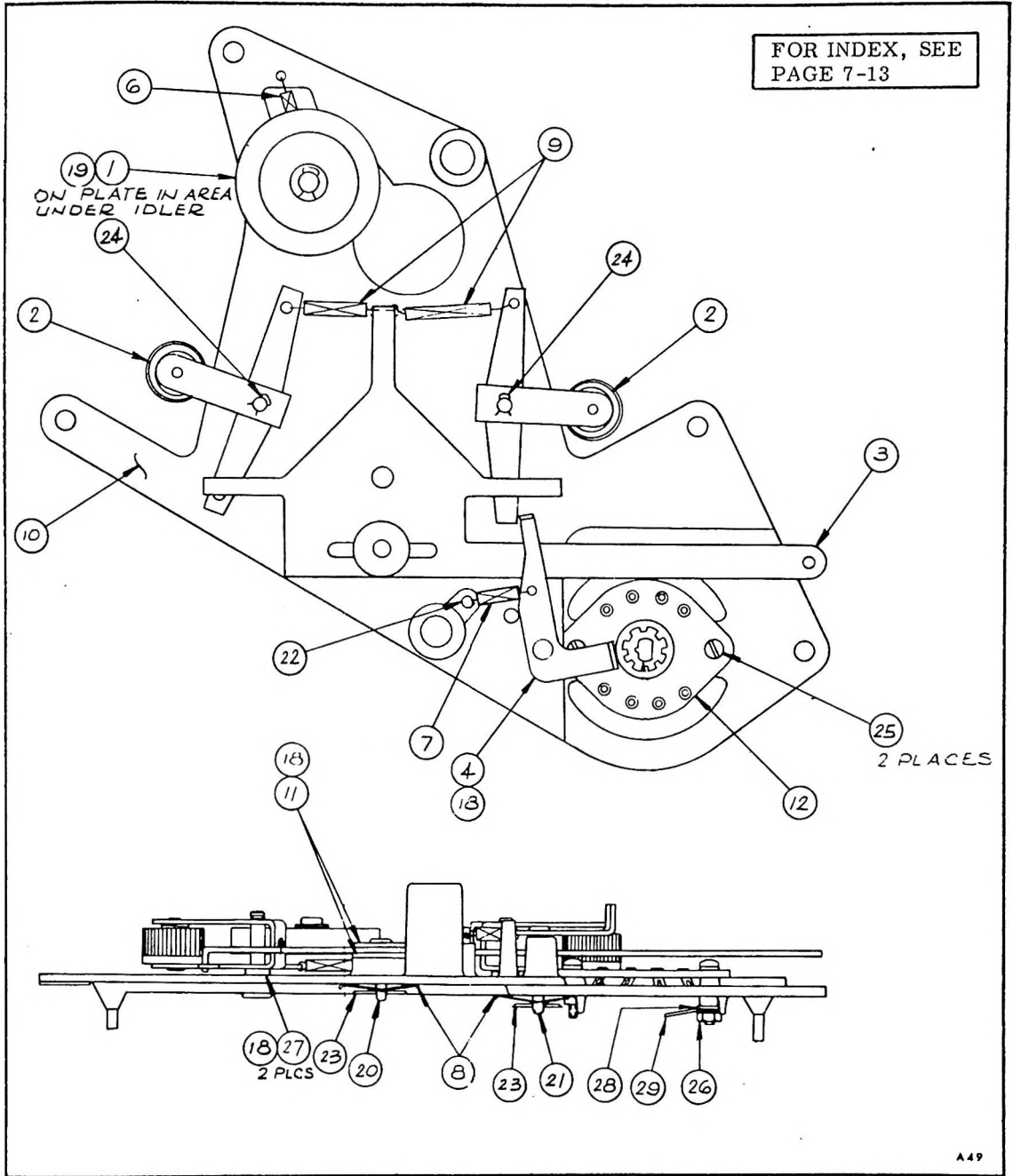


Figure 7-8. Plate

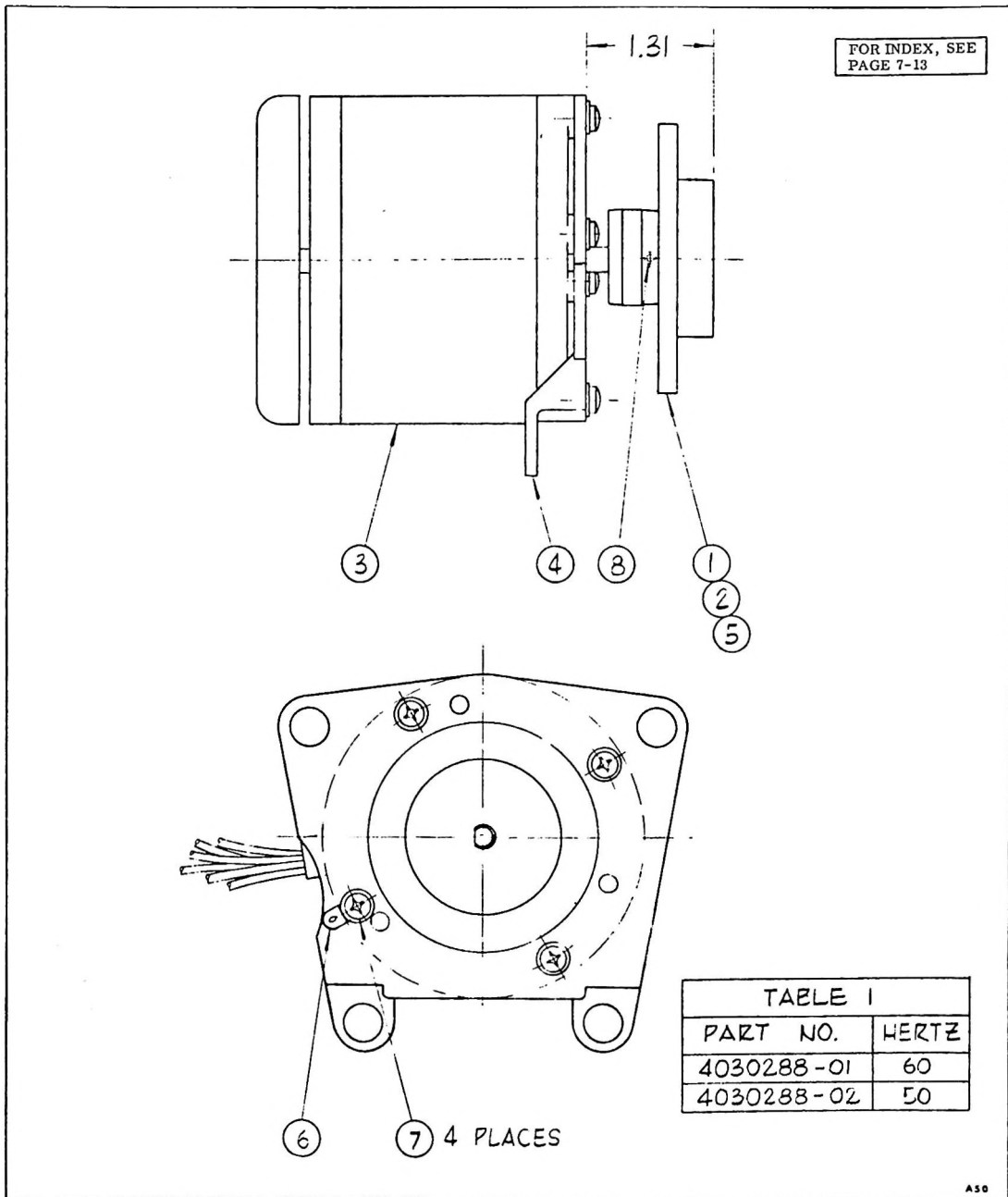


Figure 7-9. Motor

Ref.	Qty	DESCRIPTION	Amplex Part No.
	1	Printed Circuit Board, assembly	4050409-01
C1	2	Capacitor, tantalum; 39 mfd, ±20%, 6 vdcw	037-452
C2	2	Capacitor, tantalum; 0.22 mfd, ±20%, 25 vdcw	037-450
C3	1	Capacitor, tantalum; 68 mfd, ±20%, 20 vdcw	037-451
C4	-	Same as C2	
C5	1	Capacitor, ceramic disc; .0022 mfd, ±10%, 500 vdcw	030-102
C6	-	Same as C1	
Q1	2	Transistor, silicon; low noise, low level	014-658
Q2	-	Same as Q1	
R1	2	Resistor, fixed, comp; 470,000 ohms, ±5%, 1/2w; RC20GF474J	041-029
R2	1	Resistor, fixed, comp; 27,000 ohms, ±5%, 1/2w; RC20GF273J	041-015
R3	1	Resistor, metal film; 22,100 ohms, ±1%, 1/4w	057-208
R4	1	Resistor, fixed, comp; 620 ohms, ±5%, 1/2w; RC20GF621J	041-006
R5	1	Resistor, fixed, comp; 9,100 ohms, ±5%, 1/2w; RC20GF912J	041-373
R6	1	Resistor, fixed, comp; 1.3 meg ohms, ±5%, 1/2w; RC20GF135J	041-377
R7	-	Same as R1	
R8	1	Resistor, metal film; 47,500 ohms, ±1%, 1/4w	042-482
R9	1	Resistor, fixed, comp; 1,800 ohms, ±5%, 1/2w; RC20GF182J	041-009
R10	1	Resistor, fixed, comp; 22,000 ohms, ±5%, 1/2w; RC20GF223J	041-016
T1	1	Transformer, microphone	4580197-01
	2	Sockets, transistors	150-103
	1	Can, plug-in	4280201-10

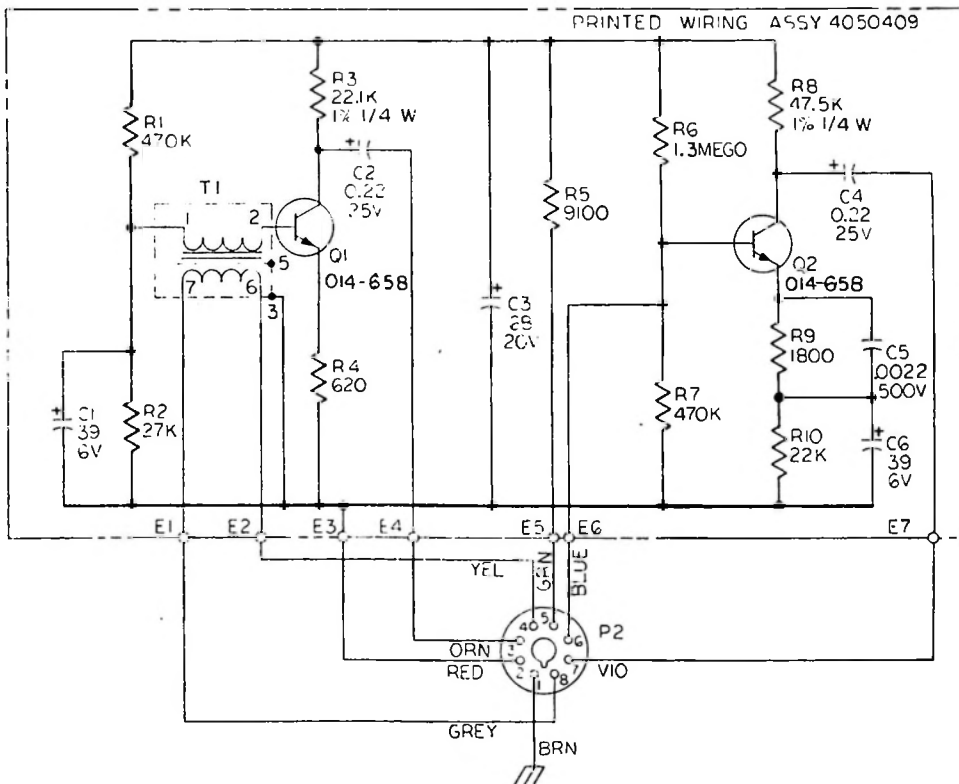
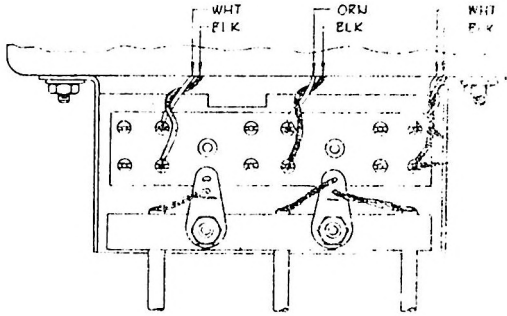
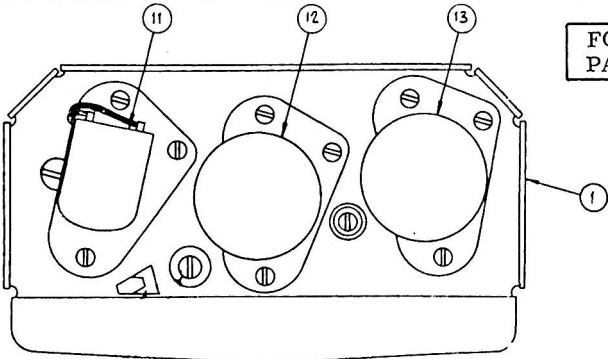


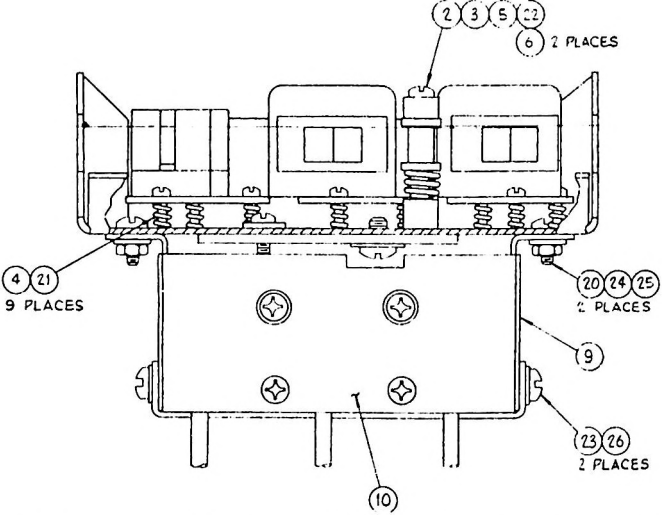
Figure 7-10. Microphone Preamplifier

A51

FOR INDEX, SEE
PAGE 7-19



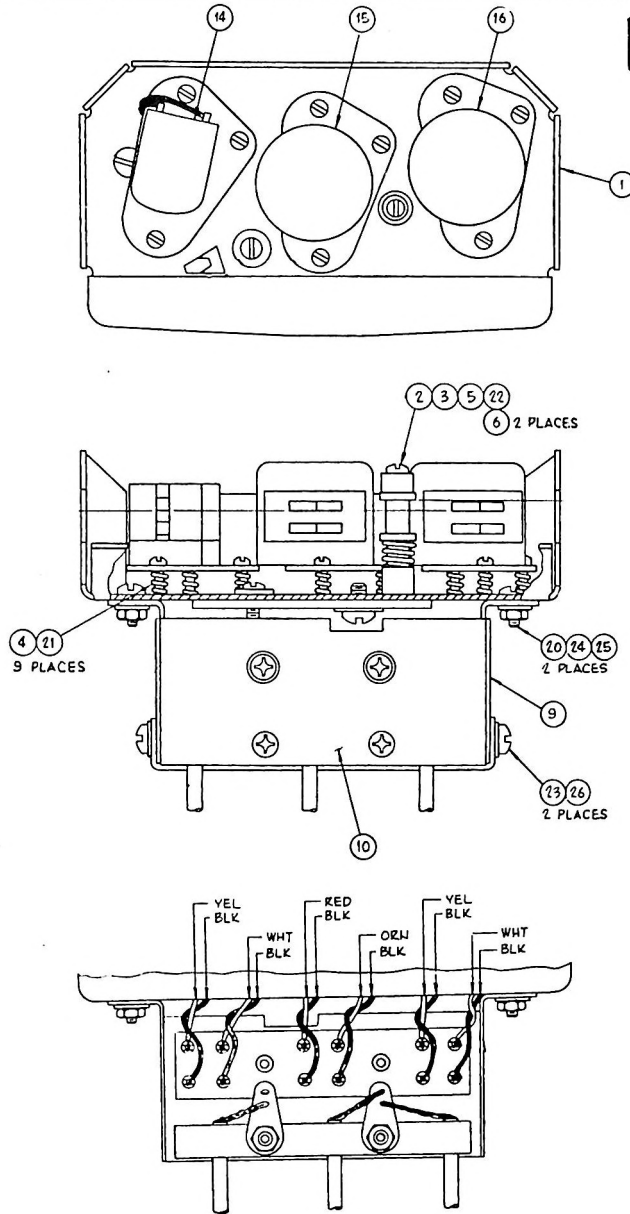
REAR VIEW
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A52

Figure 7-11. Head Assembly, Full-Track

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PAGE 7-19

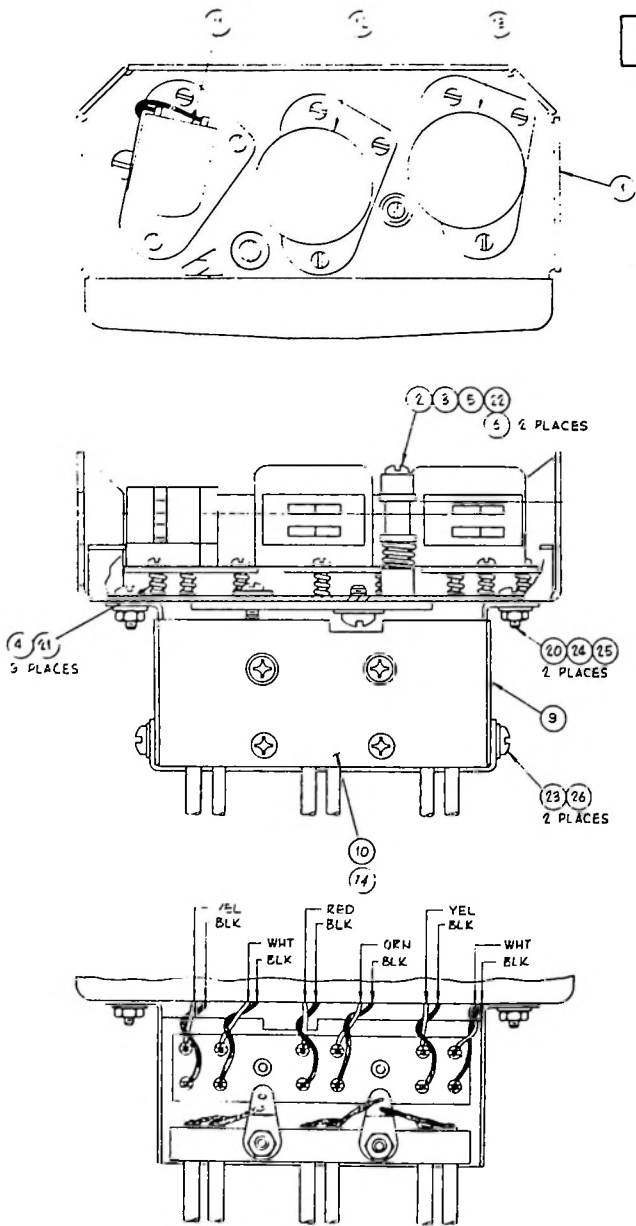


REAR VIEW
COVER REMOVED FOR CLARITY

A 53

Figure 7-12. Head Assembly, Half-Track

FOR INDEX, SEE
PAGE 7-19



REAR VIEW
COVER REMOVED FOR CLARITY

A54

Figure 7-13. Head Assembly, Two-Track

HEAD ASSEMBLIES
4020191 (Ref. B), 4020192 (Ref. B)
4020194 (Ref. B)

Item	Channels				DESCRIPTION	Ampex Part No.
	1ch FT	2ch HT	2ch 2T	2ch QT		
	X				Head Assembly, Single-channel, Full-track (see Fig. 7-11)	4020191-03
		X			Head Assembly, Single-channel, Full-track (see Fig. 7-12)	4020191-04
			X		Head Assembly, Dual-channel, Two-track (see Fig. 7-13)	4020192-02
				X	Head Assembly, Dual-channel, Quarter-track (see Fig. 7-14)	4020194-02
1	1	1	1	1	Base Assembly, Head-housing	4030088-01
2	1	1	1	1	Cap, Tape-guide	4100063-01
3	1	1	1	1	Sleeve, Tape-guide	4200055-01
4	9	9	9	9	Spring, Head-mounting	4270024-20
5	1	1	1	1	Spring, Tape-guide	4270114-01
6	2	2	2	2	Washer, Tape-guide	4440137-01
9	1	1	1	1	Cover, Cable-bracket	1232344-01
10	1	1			Bracket and Cable Assembly	1232346-01
10			1	1	Bracket and Cable Assembly	1232346-04
11	F				Head Stack, Erase, Full-track	1232357-01
11			1		Head Stack, Erase, Two-track	1232360-01
11				1	Head Stack, Reproduce, Quarter-track	1232363-01
12	1				Head Stack, Record, Full-track	1232358-01
12			1		Head Stack, Record, Two-track	1232361-01
12				1	Head Stack, Record, Quarter-track	1232363-02
13	1				Head Stack, Reproduce, Full-track	1232359-01
13			1		Head Stack, Reproduce, Two-track	1232362-01
13				1	Head Stack, Erase, Quarter-track	1232363-03
14		1			Head Stack, Erase, Half-track	1232360-01
15			1		Head Stack, Record, Half-track	1232361-01
16		1			Head Stack, Reproduce, Half-track	1232362-01

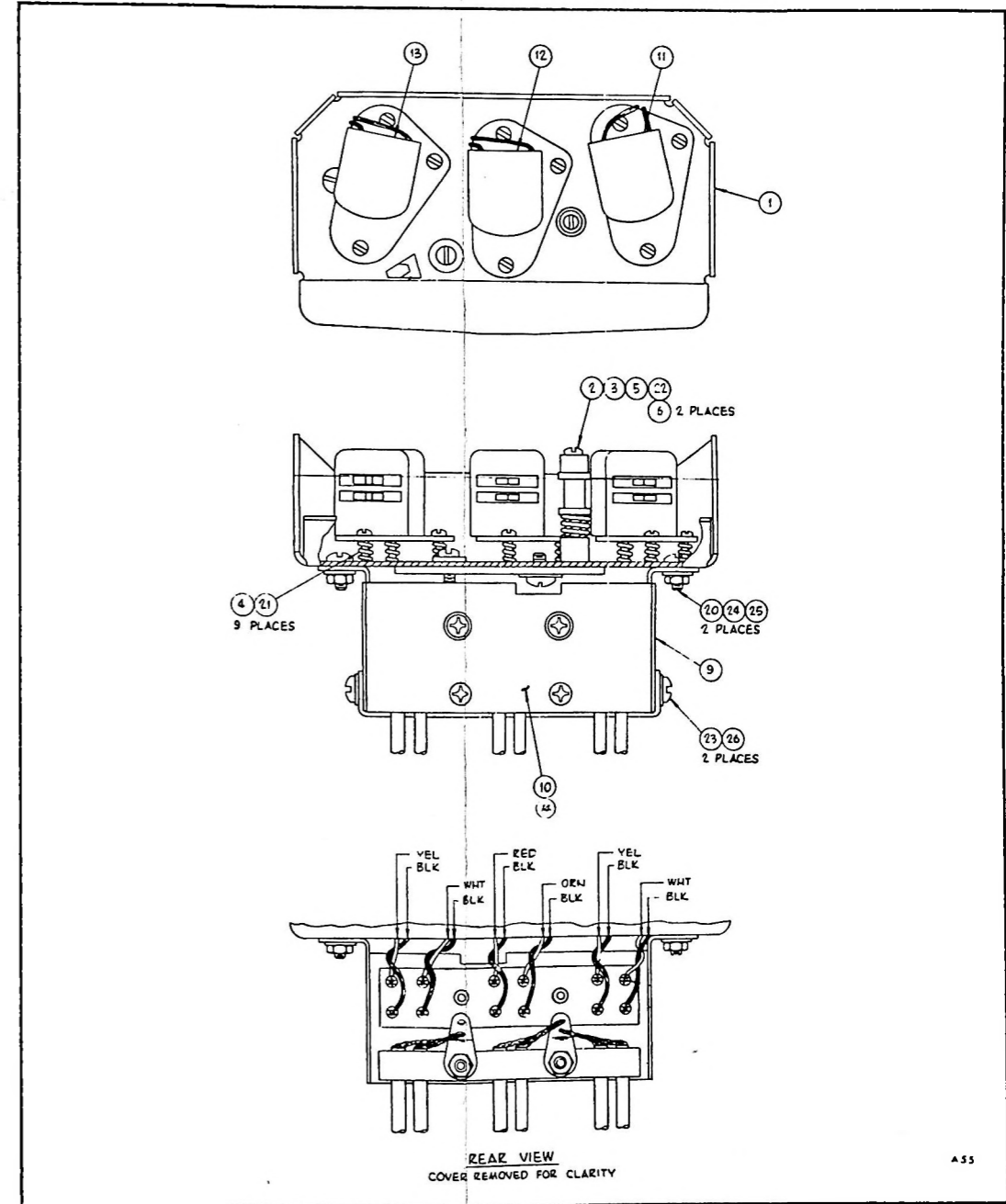


Figure 7-14. Head Assembly, Quarter-Track

PANEL ASSEMBLY, FRONT (DOMESTIC)
4050400 (Ref. J)

Item	MST	SLV	DESCRIPTION	Amplex Part No.
	-09	-10		
1	1	1	Bracket Assembly, Equalization	4050402-01
2	1	1	Harness Assembly, Front Panel, Master	4050428-01
3	1	1	Harness Assembly, Front Panel, Slave	4050428-02
4	1	1	Jewel, Pilot Lamp, Red	4110258-02
5	1	1	Escutcheon, Meter Window	4110261-01
6	1	1	Meter, VU (M1)	4140019-01
7	1	1	Panel, Backing	4290623-01
8	1	1	Panel, Front Top	4290625-01
9	1	1	Panel Assembly, Front	4041038-01
10	1	1	Lamp, Meter (DS1)	4610081-01
11	1	1	Lamp, Record (DS2)	4610082-01
12	2	2	Switch, Selector (S2, S4)	4620196-02
15	2	2	Knob, Skirted, Pointer	6000009-20
16	3	3	Knob, Pointer	6000005-20
20	1	1	Resistor, Composition, 120 ohm, 1W, 10% (R63)	041-578
22	1	1	Capacitor, Electrolytic, 500UF, 15V (C22)	031-297
23	1	1	Capacitor, Mica, 0.0025UF, 5%, 500V (C28)	034-994
24	1	1	Resistor, Composition, 220 ohm, 10%, 1/2W (R52)	041-040
25	1	1	Resistor, Composition, 470 ohm, 10%, 1/2W (R58)	041-044
26	1	1	Resistor, Composition, 18k ohm, 10%, 1/2W (R56)	041-063
27	1	1	Resistor, Composition, 33k ohm, 10%, 1/2W (R51)	041-066
29	2	2	Resistor, Variable, 100k ohm, 2W, 10% (R54, 55)	044-015
30	1	1	Switch, Toggle (S1)	120-999
31	1	1	Switch, Selector (S3)	122-323
32	1	1	Jack, Phone (with mounting hardware) (J2)	148-015
34	1	1	Terminal Strip, A1, A1, G (TB5)	180-024
35	1	1	Terminal Strip, D, A1 (TB4)	180-027
49	1	1	Terminal Strip, A1, D, A1 (TB6)	180-023
52	1	1	Resistor, Composition, 22 ohm, 1/2W, 10% (R68)	041-033

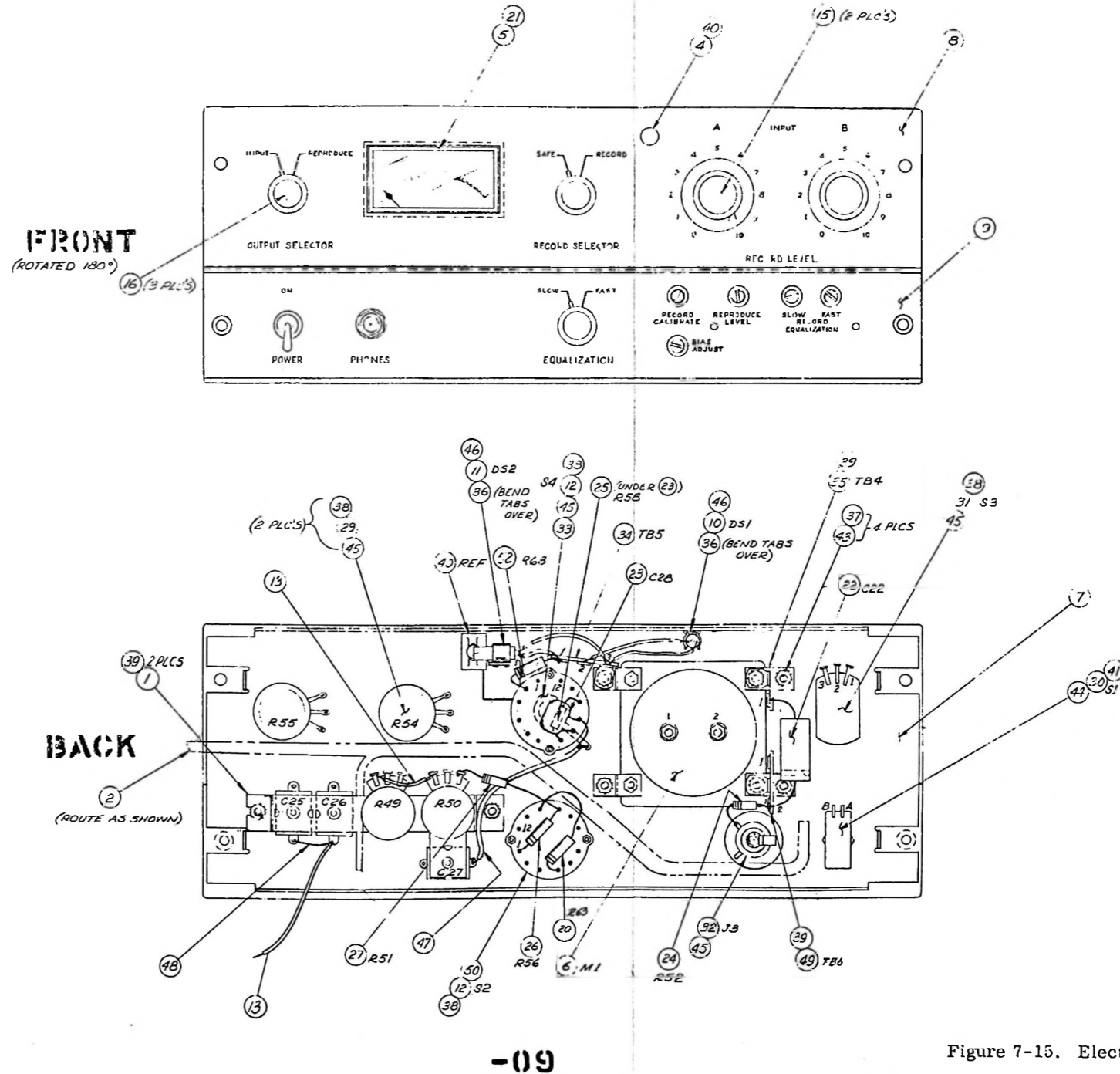
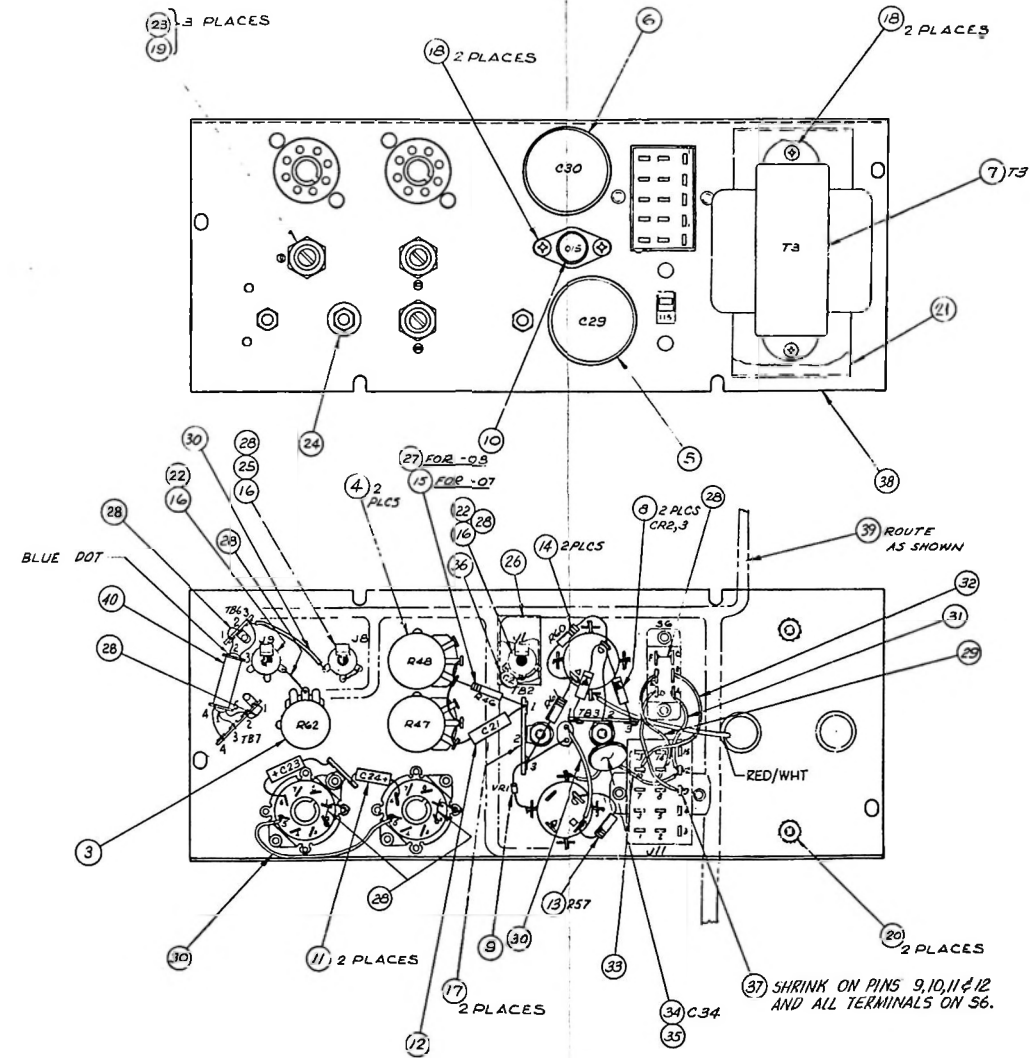


Figure 7-15. Electronics, Front Panel Assembly

AG-600B
 PANEL ASSEMBLY, REAR (INTERNATIONAL)
 4050405(Ref. H)

Item	NAB -09	CCIR -10	DESCRIPTION	Ampex Part No.
3	1	1	Potentiometer, 25 ohm (R62)	4520149-10
4	2	2	Potentiometer, 50k (R47, 48)	4520151-01
5	1	1	Capacitor, 500-500-200-200UF, 25V (C30)	4550147-01
6	1	1	Capacitor, 1000-500UF, 35V (C29)	4550147-02
7	1	1	Transformer, Power (International) (T3)	4580195-01
8	2	2	Diode, Rectifier, CD451 (CR2, 3)	013-678
9	1	1	Diode, Zener, 24V, 5% (VR1)	013-712
10	1	1	Transistor (with mounting hardware) (Q15)	014-587
11	2	2	Capacitor, Electrolytic, 1UF, 25V (C23, 24)	031-294
12	1	1	Capacitor, Mylar, 0.01UF, 5%, 100V (C21)	035-732
13	1	1	Resistor, Composition, 120 ohm, 10%, 1/2W (R57)	041-039
14	2	2	Resistor, Composition, 220 ohm, 10%, 1/2W (R60, 61)	041-040
15	1	-	Resistor, Composition, 360k, 5%, 1/2W (R46)	041-590
16	3	3	Connector, Telephone-Jack (with mounting hardware) (J1, 8, 9)	148-142
21	1	1	Shield, Transformer	4600056-01
26	1	1	Shield, Head-Jack, Reproduce	4600059-01
27	-	1	Resistor, Composition, 2.2M ohm, 10%, 1/2W (R46)	041-086
34	1	1	Capacitor, Ceramic, 0.005UF, 1400V (C34)	030-465
36	1	1	Capacitor, Mica, 390pF, 500V, 5% (C2)	034-288
38	1	1	Rear Panel Subassembly (International)	4040934-03
39	1	1	Harness Assembly	4050427-06
40	1	1	Relay, Single-Pole, Double-Throw	020-642



COLOR	TERMINATION
RED	TB3-1
RED	TB3-3
RED / WHT	CHASSIS GRD (AS SHOWN)
WHT	S6-A
GRN	S6-B
GRN / VEL	S6-D
BLK	S6-E

ASSY NO.	DESCRIPTION
4050405-09	N A B
4050405-10	CCIR

Figure 7-17. Electronics, Back Panel Assembly (International)

AMPEX

AG-600B SYSTEM ELECTRONIC COMPONENTS (1 of 3)

(On Electronics Assembly unless noted otherwise)

Ref. No.	-25	-26	-27	-28	-29	-30	DESCRIPTION	Location	Amplex Part No.
	X						Electronics Assembly, NAB Master		4020257-19
		X					Electronics Assembly, NAB Slave		4020257-20
			X				Electronics Assembly, NAB International		4020257-21
				X			Electronics Assembly, CCIR Master		4020257-22
					X		Electronics Assembly, CCIR Slave		4020257-23
						X	Electronics Assembly, CCIR International		4020257-24
C1	2	2	2	2	2	2	Capacitor, Tantalum; 10 mF, ±20%, 6V	Repro. P.W.B	037-398
C2	1	1	1	1	1	1	Capacitor, Mica; 390pF, ±5%, 500V	Bk. Panel	034-288
C3	1	1	1	1	1	1	Capacitor, Electrolytic; 100mF, -10+75%, 12V	Repro. P.W.B.	031-191
C4	1	1	1	1	1	1	Capacitor, Mica; 100pF, ±5%, 500V	Repro. P.W.B.	034-177
C5	4	4	4	4	4	4	Capacitor, Tantalum; 15mF, ±20%, 15V	Repro. P.W.B.	037-446
C6	X	X	X	X	X	X	Same as C5	Repro. P.W.B.	
C7	3	3	3	3	3	3	Capacitor, Tantalum; 3.3mF, ±20%, 35V	Repro. P.W.B.	037-618
C8	X	X	X	X	X	X	Same as C5	Repro. P.W.B.	
C9	X	X	X	X	X	X	Same as C5	Repro. P.W.B.	
C10	X	X	X	X	X	X	Same as C7	Repro. P.W.B.	
C11	1	1	1	0	0	0	Capacitor, Mylar; 0.018mF, ±5%, 100V	Rec. P.W.B.	055-105
C12	1	1	1	1	1	1	Capacitor, Mylar; 0.1mF, ±10%, 100V	Rec. P.W.B.	055-106
C13	1	1	1	1	1	1	Capacitor, Mica; 20pF, ±5%, 500V	Rec. P.W.B.	034-944
C14	X	X	X	X	X	X	Same as C1	Rec. P.W.B.	
C15	1	1	1	1	1	1	Capacitor, Mica; 500pF, ±5%, 300V	Rec. P.W.B.	034-933
C16	X	X	X	X	X	X	Same as C7	Rec. P.W.B.	
C17	1	1	1	1	1	1	Capacitor, Mylar; 6800pF, ±5%, 100V	Rec. P.W.B.	055-103
C18	2	2	2	2	2	2	Capacitor, Mylar; 5600pF, ±5%, 100V	Rec. P.W.B.	055-102
C19	X	X	X	X	X	X	Same as C18	Rec. P.W.B.	
C20	1	1	1	1	1	1	Capacitor, Mylar; 7500pF, ±5%, 50V	Rec. P.W.B.	055-212
C21	1	1	1	1	1	1	Capacitor, Mylar; 0.01mF, ±5%, 100V	Bk. Panel	035-732
C22	1	1	1	1	1	1	Capacitor, Electrolytic; 500mF, -10+100%, 15V	Fr. Panel	031-297
C23	2	2	2	2	2	2	Capacitor, Electrolytic; 1mF, -10+75%, 25V	Bk. Panel	031-291
C24	X	X	X	X	X	X	Same as C23	Bk. Panel	
C25	1	1	1	1	1	1	Capacitor, Variable; 25pF to 250pF, 350V (Equalization)	Fr. Panel	4540314-01
C26	2	2	2	2	2	2	Capacitor, Variable; 50pF to 350pF, 350V (Equalization)	Fr. Panel	4540314-02
C27	X	X	X	X	X	X	Same as C26	Fr. Panel	
C28	1	1	1	1	1	1	Capacitor, Mica; 0.0025mF, ±5%, 500V	Fr. Panel	034-994
C29	1	1	1	1	1	1	Capacitor, 2-Section, Electrolytic; 100-500mF, 35V	Bk. Panel	4550147-02
C30	1	1	1	1	1	1	Capacitor, 4-Section, Electrolytic; 500-500-200-200mF, 25V	Bk. Panel	4550147-01
C31	3	-	3	3	-	3	Capacitor, Ceramic; 0.005 mF, ±20+80%, 1400V	Pwr. Rec.	030-465
C32	X	-	X	X	-	X	Same as C31	Pwr. Rec.	
C33	-	-	-	-	-	-	(Tape Transport Assy items 48 and 49)	Motor Cap.	
C34	X	1	X	X	1	X	Same as C31	Bk. Panel	
C35	1	1	1	1	1	1	Capacitor, 36pF, ±5%, 500V (Tape Trans.)	Relay Box	034-942
C36	4	4	4	4	4	4	Capacitor, 0.1mF, -10+250%, 500V,	Relay Box	030-032
C37	X	X	X	X	X	X	Same as C36	Relay Box	
C38	X	X	X	X	X	X	Same as C36	Relay Box	
C39	X	X	X	X	X	X	Same as C36	Relay Box	
C40-42	3	3	3	3	3	3	Capacitor, 0.0047μF, 500V	Bk. Panel	030-008
CR1	1	1	1	1	1	1	Diode, Silicon; Small Signal, Switching, CD458	Rec. P.W.B.	013-599
CR2	2	2	2	2	2	2	Diode, Silicon; Large Signal Rectifier, CD451	Bk. Panel	013-678
CR3	X	X	X	X	X	X	Same as CR2	Bk. Panel	
CR4	-	-	-	-	-	-	Same as CR2 (Tape Transport)	Relay Box	
DS1	1	1	1	1	1	1	Lamp, Meter	Fr. Panel	4610081-01
DS2	1	1	1	1	1	1	Lamp, Record	Fr. Panel	4610082-01
F1	1	1	1	1	1	1	Fuse, Slo-blo; 0.75 Ampere (For 115 VAC operation, see Note 1)	Chassis	070-048
J1	3	3	3	3	3	3	Connector, Telephone-jack	Bk. Panel	148-142
J2	1	1	1	1	1	1	Connector, Telephone-jack	Fr. Panel	148-015
J3	1	1	1	1	1	1	Connector, Telephone-jack	Chassis	4630041-10
J4	2	2	2	2	2	2	Connector, Audio; 3-Socket, Female	Chassis	146-998
J5	2	2	2	2	2	2	Socket, Octal	Bk. Sub-panel	150-023
J6	X	X	X	X	X	X	Same as J4	Chassis	
J7	X	X	X	X	X	X	Same as J5	Bk. Panel	
J8	X	X	X	X	X	X	Same as J1	Bk. Panel	
J9	X	X	X	X	X	X	Same as J1	Bk. Panel	
J10	1	-	1	1	-	1	Connector, ac, 3-Pin, Male	Chassis	147-396
J11	1	1	1	1	1	1	Connector, Receptacle, 15-Socket, Female	Bk. Sub-Panel	146-002
J11	1	1	1	1	1	1	Connector, Receptacle, 8-Socket, Female	Bk. Sub-Panel	146-006

AMPEX

AG-600B SYSTEM
ELECTRONIC COMPONENTS (2 of 3)
(On Electronics Assembly unless noted otherwise)

Ref. No.	-25	-26	-27	-28	-29	-30	DESCRIPTION	Location	Ampex Part No.
K1	-	-	-	-	-	-	Relay, TPD1 (Tape Transport)	Relay Box	020-144
K2	1	1	1	1	1	1	Relay, SPDT	Bk. Panel	
L1	1	1	1	1	1	1	Inductor, Fixed: 5mH, ±5%	Rec. P. W. B.	051-342
M1	1	1	1	1	1	1	Meter, VU	Fr. Panel	4140019-01
P1	-	-	-	-	-	-	Plug (On Tape Transport Captive Cable)		
Q1	4	4	4	4	4	4	Transistor, Silicon: npn, Low-noise, Low-level	Repro. P. W. B.	014-698
Q2	x	x	x	x	x	x	Same as Q1	Repro. P. W. B.	
Q3	4	4	4	4	4	4	Transistor, Silicon: pnp, CD524	Repro. P. W. B.	014-652
Q4	x	x	x	x	x	x	Same as Q3	Repro. P. W. B.	
Q5	x	x	x	x	x	x	Same as Q1	Repro. P. W. B.	
Q6	1	1	1	1	1	1	Transistor, Silicon: npn, 800mW, CD38	Repro. P. W. B.	014-247
Q7	2	2	2	2	2	2	Transistor, Silicon: pnp, 300mW, 2N3638	Repro. P. W. B.	014-611
Q8	x	x	x	x	x	x	Same as Q1	Rec. P. W. B.	
Q9	x	x	x	x	x	x	Same as Q3	Rec. P. W. B.	
Q10	x	x	x	x	x	x	Same as Q3	Rec. P. W. B.	
Q11	x	x	x	x	x	x	Same as Q7	Rec. P. W. B.	
Q12	1	1	1	1	1	1	Transistor, Silicon: npn, 800mW	Rec. P. W. B.	014-247
Q13	2	2	2	2	2	2	Transistor, Silicon: npn, 2N2102	Rec. P. W. B.	014-329
Q14	x	x	x	x	x	x	Same as Q13	Rec. P. W. B.	
Q15	1	1	1	1	1	1	Transistor, Silicon: npn: Power, 40250	Bk. Panel	014-587
R1	3	3	3	3	3	3	Resistor, Composition: 270,000 ohm, ±10%, 1/2W; RC20GF274K	Repro. P. W. B.	041-077
R2	3	3	3	3	3	3	Resistor, Composition: 82,000 ohm, ±10%, 1/2W; RC20GF823K	Repro. P. W. B.	041-071
R3	1	1	1	1	1	1	Resistor, Composition: 1,800 ohm, ±10%, 1/2W; RC20GF182K	Repro. P. W. B.	041-051
R4	4	4	4	4	4	4	Resistor, Composition: 100,000 ohm, ±10%, 1/2W; RC20GF104K	Repro. P. W. B.	041-072
R5	1	1	1	1	1	1	Resistor, Composition: 39,000 ohm, ±10%, 1/2W; RC20GF393K	Repro. P. W. B.	041-067
R6	4	4	4	4	4	4	Resistor, Composition: 220 ohm, ±10%, 1/2W; RC20GF221K	Repro. P. W. B.	041-040
R7	x	x	x	x	x	x	Same as R4	Repro. P. W. B.	
R8	2	2	2	2	2	2	Resistor, Composition: 2,200 ohm, ±10%, 1/2W; RC20GF222K	Repro. P. W. B.	041-052
R9	4	4	4	4	4	4	Resistor, Composition: 22,000 ohm, ±10%, 1/2W; RC20GF223K	Repro. P. W. B.	041-064
R10	3	3	3	3	3	3	Resistor, Composition: 10,000 ohm, ±10%, 1/2W; RC20GF103K	Repro. P. W. B.	041-060
R11	2	2	2	2	2	2	Resistor, Composition: 560,000 ohm, ±10%, 1/2W; RC20GF564K	Repro. P. W. B.	041-081
R12	x	x	x	x	x	x	Same as R11	Repro. P. W. B.	
R13	1	1	1	1	1	1	Resistor, Composition: 330,000 ohm, ±10%, 1/2W; RC20GF334K	Repro. P. W. B.	041-078
R14	2	2	2	2	2	2	Resistor, Composition: 1,000 ohm, ±10%, 1/2W; RC20GF102K	Repro. P. W. B.	041-048
R15	1	1	1	1	1	1	Resistor, Composition: 4,700 ohm, ±10%, 1/2W; RC20GF472K	Repro. P. W. B.	041-056
R16	2	2	2	2	2	2	Resistor, Composition: 15,000 ohm, ±10%, 1/2W; RC20GF153K	Repro. P. W. B.	041-062
R17	x	x	x	x	x	x	Same as R14	Repro. P. W. B.	
R18	x	x	x	x	x	x	Same as R8	Repro. P. W. B.	
R19	2	2	2	2	2	2	Resistor, Composition: 680 ohm, ±10%, 1/2W; RC20GF681K	Repro. P. W. B.	041-046
R20	1	1	1	1	1	1	Resistor, Composition: 360 ohm, ±5%, 1/2W; RC20GF361J	Repro. P. W. B.	041-362
R21	2	2	2	2	2	2	Resistor, Composition: 10 ohm, ±10%, 1/2W; RC20GF100K	Repro. P. W. B.	041-032
R22	x	x	x	x	x	x	Same as R21	Repro. P. W. B.	
R23	x	x	x	x	x	x	Same as R2	Rec. P. W. B.	
R24	x	x	x	x	x	x	Same as R2	Rec. P. W. B.	
R25	1	1	1	1	1	1	Resistor, Composition: 390,000 ohm, ±10%, 1/2W; RC20GF394K	Rec. P. W. B.	041-079
R26	3	3	3	3	3	3	Resistor, Composition: 33,000 ohm, ±10%, 1/2W; RC20GF333K	Rec. P. W. B.	041-066
R27	x	x	x	x	x	x	Same as R16	Rec. P. W. B.	
R28	1	1	1	1	1	1	Resistor, Composition: 330 ohm, 10%, 1/2W; RC20GF331K	Rec. P. W. B.	041-042
R29	x	x	x	x	x	x	Same as R1	Rec. P. W. B.	
R30	2	2	2	1	1	1	Resistor, Composition: 180,000 ohm, ±5%, 1/2W; RC20GF184J	Rec. P. W. B.	041-026
R31	x	x	x	-	-	-	Same as R30	Rec. P. W. B.	
R32	x	x	x	x	x	x	Same as R10	Rec. P. W. B.	
R33	x	x	x	x	x	x	Same as R9	Rec. P. W. B.	
R34	x	x	x	x	x	x	Same as R1	Rec. P. W. B.	
R35	x	x	x	x	x	x	Same as R26	Rec. P. W. B.	
R36	x	x	x	x	x	x	Same as R4	Rec. P. W. B.	
R37	x	x	x	x	x	x	Same as R4	Rec. P. W. B.	
R38	x	x	x	x	x	x	Same as R10	Rec. P. W. B.	
R39	1	1	1	1	1	1	Resistor, Composition: 62 ohm, ±5%, 1/2W; RC20GF620J	Rec. P. W. B.	041-534
R40	x	x	x	x	x	x	Resistor, Composition: 430 ohm, ±5%, 1/2W; RC20GF431J	Rec. P. W. B.	041-379
R41	x	x	x	x	x	x	Same as R40	Rec. P. W. B.	
R42	2	2	2	2	2	2	Resistor, Composition: 12 ohm, ±5%, 1/2W; RC20GF120J	Rec. P. W. B.	041-963
R43	x	x	x	x	x	x	Same as R42	Rec. P. W. B.	
R44	x	x	x	x	x	x	Same as R9	Rec. P. W. B.	
R45	x	x	x	x	x	x	Same as R9	Rec. P. W. B.	
R46	1	1	1	-	-	-	Resistor, Composition: 360,000 ohm, ±5%, 1/2W; RC20GF364J	Bk. Panel	041-590
R46	-	-	-	1	1	1	Resistor, Composition: 2.2 megohm, ±10%, 1W; RC32GF225K	Bk. Panel	041-086
R47	4	4	4	4	4	4	Resistor, Variable, Potentiometer, 50,000 ohm, ±20%, 1/4W	Bk. Panel	4520151-01
R48	x	x	x	x	x	x	Same as R47	Bk. Panel	

AMPEX

AG-600B SYSTEM ELECTRONIC COMPONENTS (3 of 3)

(On Electronics Assembly unless noted otherwise)

Ref. No.	-25	-26	-27	-28	-29	-30	DESCRIPTION	Location	Ampex Part No.
R49	x	x	x	x	x	x	Same as R47	Fr. Panel	
R50	x	x	x	x	x	x	Same as R47	Fr. Panel	
R51	x	x	x	x	x	x	Same as R26	Fr. Panel	
R52	x	x	x	x	x	x	Same as R6	Fr. Panel	
R53	x	x	x	x	x	x	Same as R19	Side Panel	
R54	2	2	2	2	2	2	Resistor, Variable; 100,000 ohm, ±10%, 2W; Audio Taper	Fr. Panel	044-015
R55	x	x	x	x	x	x	Same as R54	Fr. Panel	
R56	1	1	1	1	1	1	Resistor, Fixed, Composition; 18,000 ohm, ±10%, 1/2W; RC20GF183K	Fr. Panel	041-063
R57	1	1	1	1	1	1	Resistor, Fixed, Composition; 120 ohm, ±10%, 1/2W; RC20GF121K	Bk. Panel	041-039
R58	1	1	1	1	1	1	Resistor, Fixed, Composition; 470 ohm, ±10%, 1/2W; RC20GF471K	Fr. Panel	041-044
R59	1	1	1	1	1	1	Resistor, Fixed, Composition, 22 ohm, ±5%, 1/4W	Rec. PWB	041-418
R60	x	x	x	x	x	x	Same as R6	Bk. Panel	
R61	x	x	x	x	x	x	Same as R6	Bk. Panel	
R62	1	1	1	1	1	1	Resistor, Variable, Potentiometer, Wirewound; 25 ohm, ±20%, 2W; Linear	Bk. Panel	4520149-10
R63	1	-	1	1	-	1	Resistor, Fixed, Composition; 120 ohm, ±10%, 1W	Fr. Panel	041-578
S1	1	1	1	1	1	1	Switch, Toggle	Fr. Panel	120-999
S2	2	2	2	2	2	2	Switch, Selector	Fr. Panel	4620196-02
S3	1	1	1	1	1	1	Switch, Selector	Fr. Panel	122-323
S4	x	x	x	x	x	x	Same as S2	Fr. Panel	
S5	-	-	-	-	-	-	Play-Record Switch (Tape Transport)	Fr. Panel	4620197-01
S6	-	-	1	-	-	1	Switch, Slide, DPDT	Bk. Panel	120-510
T1	1	1	1	1	1	1	Coil, Oscillator	Rec. P.W.B.	4580196-01
T2	1	1	1	1	1	1	Transformer, Output	Side Panel	4580193-01
T3	1	1	-	1	1	-	Transformer, Power	Bk. Panel	4580194-02
T3	-	-	1	-	-	1	Transformer, Power	Bk. Panel	4580195-01
R68	1	1	1	1	1	1	Resistor, Composition, 22 ohm, ±10%, 1/2W	Fr. Panel	041-033
VR1	1	1	1	1	1	1	Diode, Silicon, Zener; 24V, ±5%, 2W	Bk. Panel	013-712
MISCELLANEOUS COMPONENTS OF ELECTRONICS ASSY									
14	14	14	14	14	14	14	Socket, Transistor	Gen. Use	150-103
1		1	1	1	1	1	Fuse Post		085-001
1	1	1	1	1	1	1	Shield, Record P. W. B.		4600054-01
1	1	1	1	1	1	1	Shield, Input-Amplifier		4600057-01
1	1	1	1	1	1	1	Shield, Record Head		4600058-01
1	1	1	1	1	1	1	Shield, Head-Jack Reproduce		4600059-01
-	-	1	-	-	-	1	Shield, Transformer		4600056-01
1	1	1	1	1	1	1	Jewel, Pilot-Lamp, Red	Fr. Panel	4110258-02
2	2	2	2	2	2	2	Knob, Skirted Pointer	Fr. Panel	6000005-20
3	3	3	3	3	3	3	Knob, Pointer	Fr. Panel	6000009-20
2	2	2	2	2	2	2	Dummy Plug	Fr. Panel	4030034-30
1	1	1	1	1	1	1	Socket, Relay	Relay Box	150-992

NOTES

1) For 230 VAC operation, change F1 to 0.5 ampere fuse provided in polyethylene bag.

2) For location of components on the circuit boards, see Figures 7-22 and 7-23.

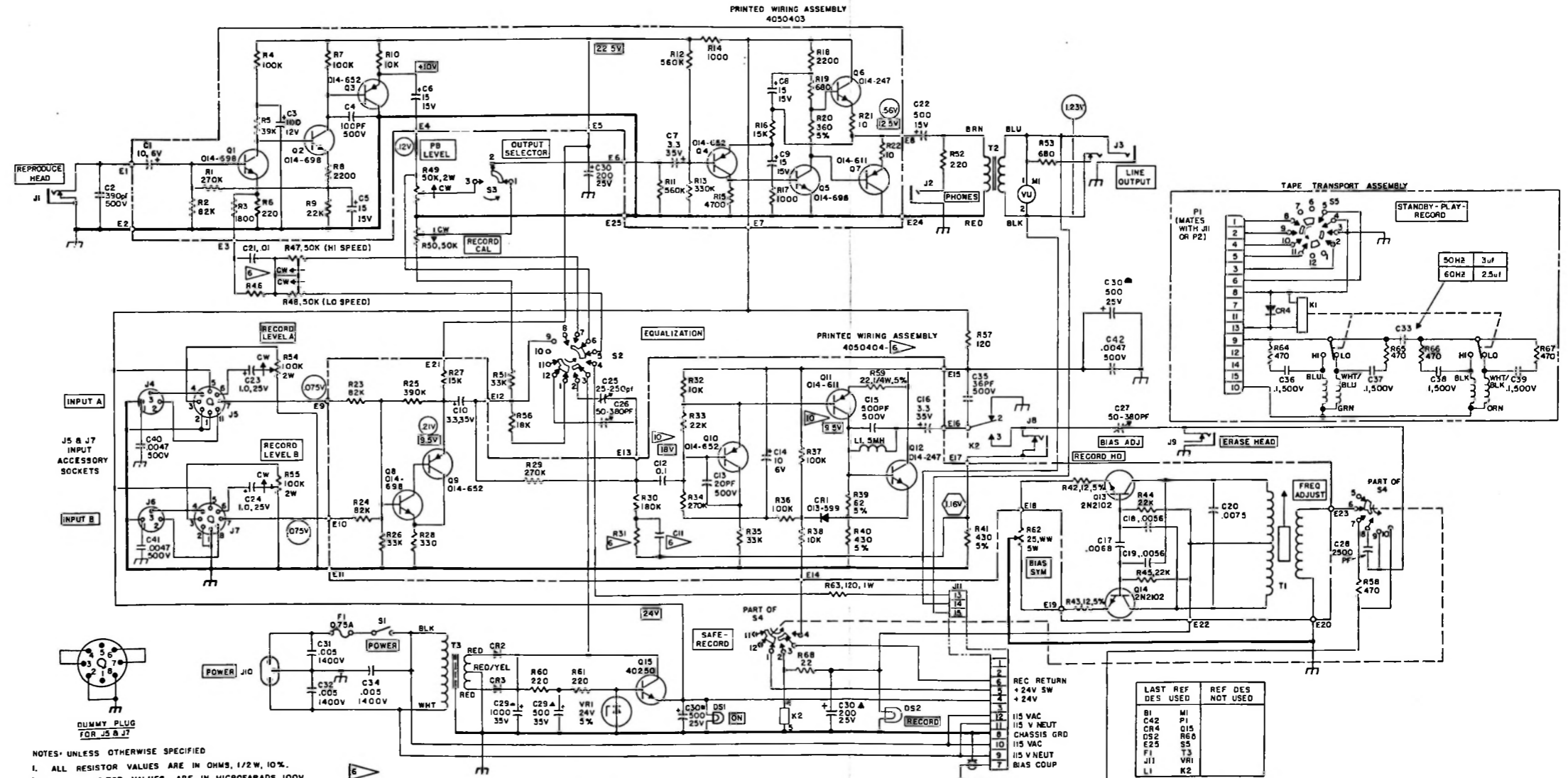
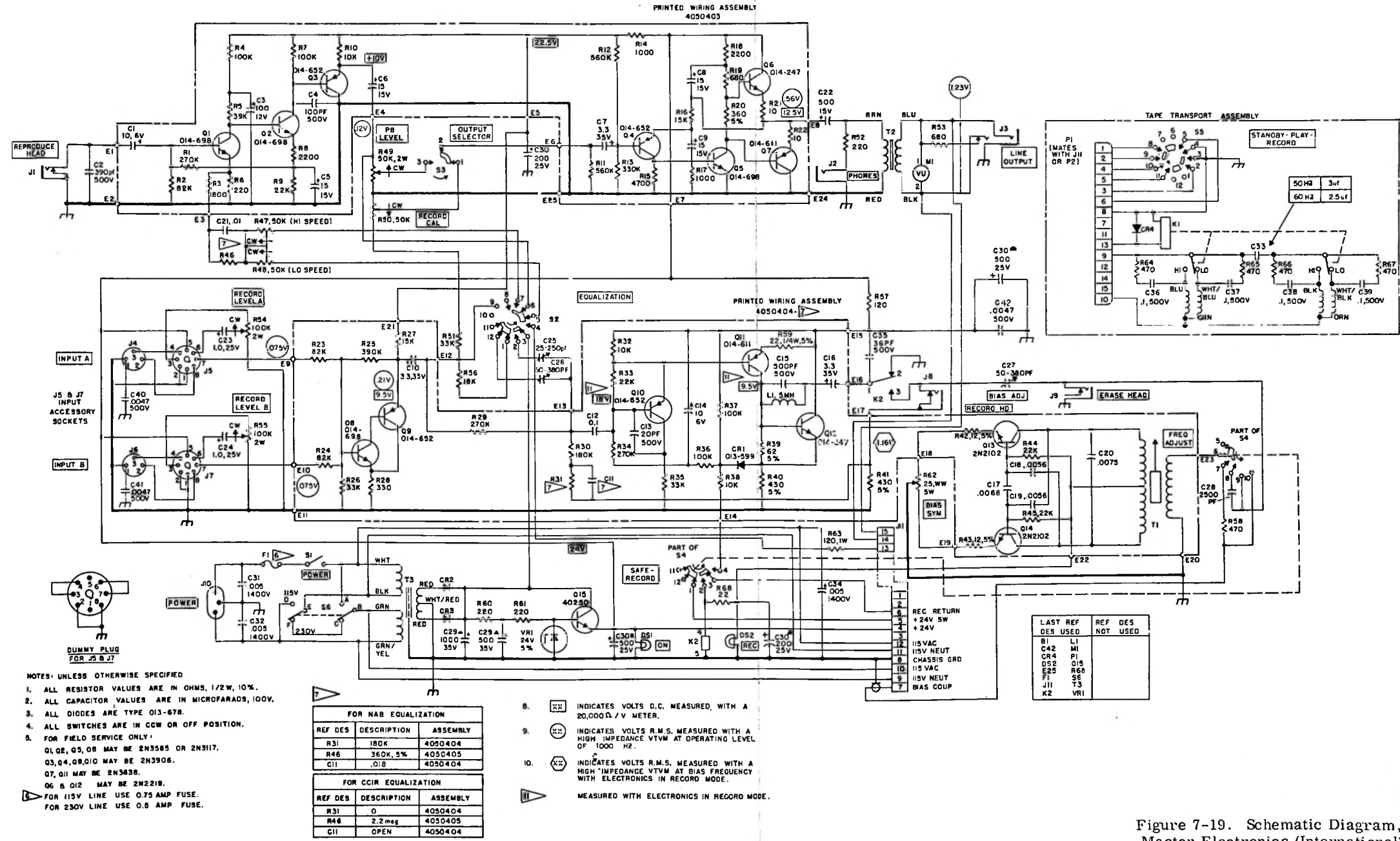


Figure 7-18. Schematic Diagram, Master Electronics (Domestic)



- NOTES: UNLESS OTHERWISE SPECIFIED
1. ALL RESISTOR VALUES ARE IN OHMS, 1/2W, 10%.
 2. ALL CAPACITOR VALUES ARE IN MICROFARADS, 100V.
 3. ALL DIODES ARE TYPE Q13-67B.
 4. ALL SWITCHES ARE IN CGW OR OFF POSITION.
 5. FOR FIELD SERVICE ONLY:
 Q1, Q2, Q5, Q8 MAY BE 2N3585 OR 2N3117.
 Q3, Q4, Q9, Q10 MAY BE 2N3906.
 Q7, Q11 MAY BE 2N3638.
 Q6 & Q12 MAY BE 2N2219.
 FOR 115V LINE USE 0.75 AMP FUSE.
 FOR 230V LINE USE 0.5 AMP FUSE.

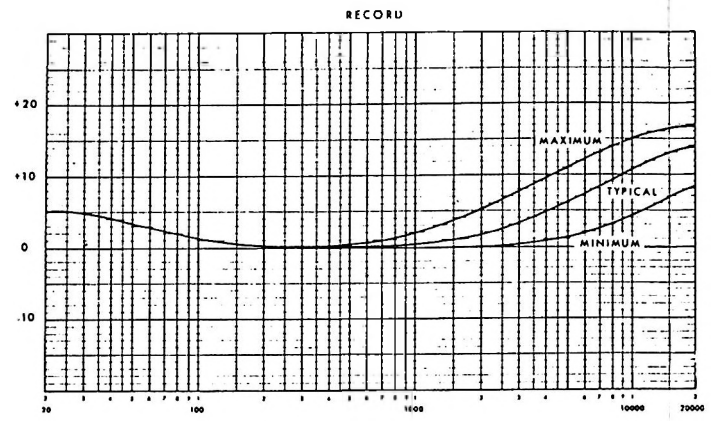
FOR NAB EQUALIZATION		
REF DES	DESCRIPTION	ASSEMBLY
R31	180K	4050404
R46	360K, 5%	4050405
C11	.018	4050404

FOR CCIR EQUALIZATION		
REF DES	DESCRIPTION	ASSEMBLY
R31	0	4050404
R46	2.2 meg	4050405
C11	OPEN	4050404

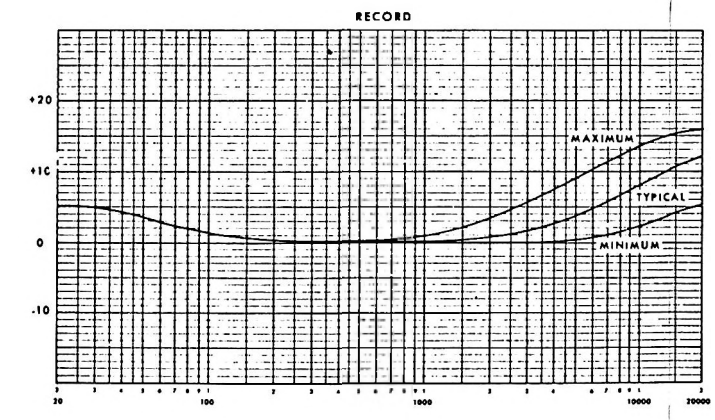
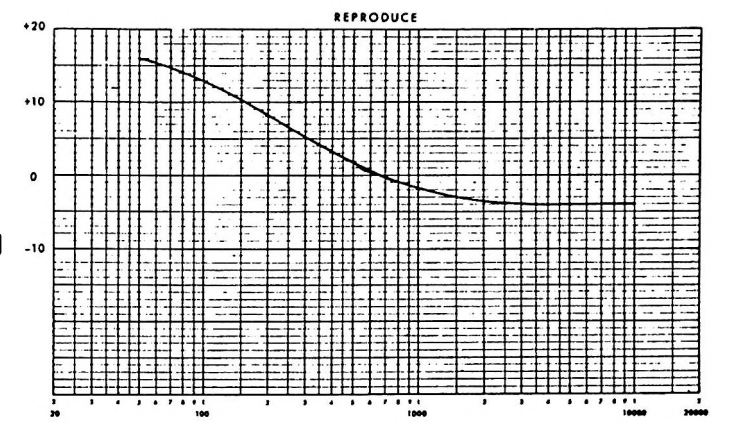
8. INDICATES VOLTS D.C. MEASURED, WITH A 20,000Ω / V METER.
9. INDICATES VOLTS R.M.S. MEASURED WITH A HIGH IMPEDANCE VTVM AT OPERATING LEVEL OF 1000 HZ.
10. INDICATES VOLTS R.M.S. MEASURED WITH A HIGH IMPEDANCE VTVM AT BIAS FREQUENCY WITH ELECTRONICS IN RECORD MODE.
- MEASURED WITH ELECTRONICS IN RECORD MODE.

LASTY DES USED	REF	DES	REF DES NOT USED
C42	M1		
CR4	P1		
D52	O15		
E25	R61		
F1	SE		
J11	T3		
K2	VRI		

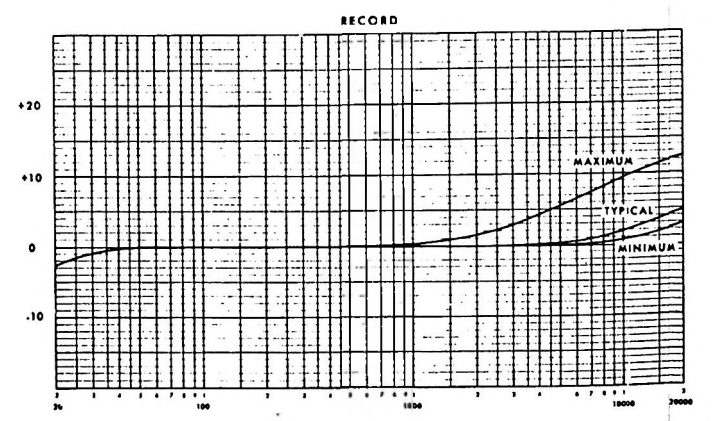
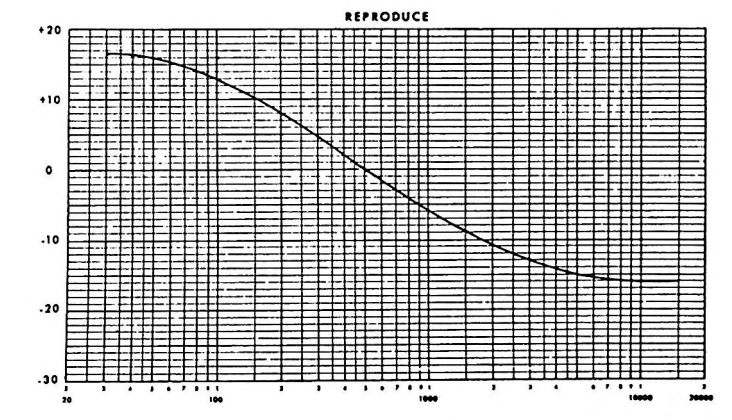
Figure 7-19. Schematic Diagram, Master Electronics (International)



3 1/4 ips (200 usec)



7 1/2 ips NAB



7 1/2 ips CCIR

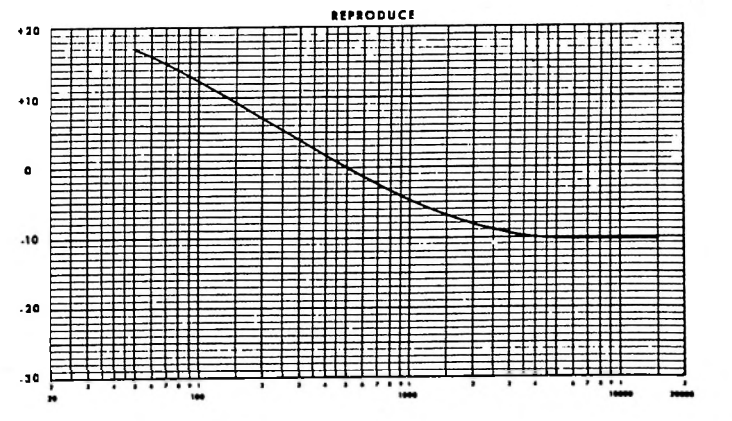
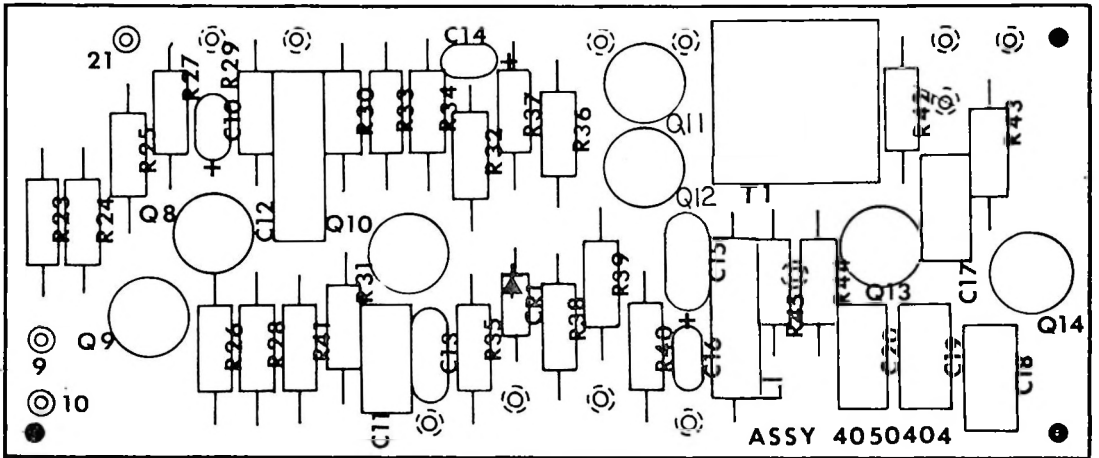


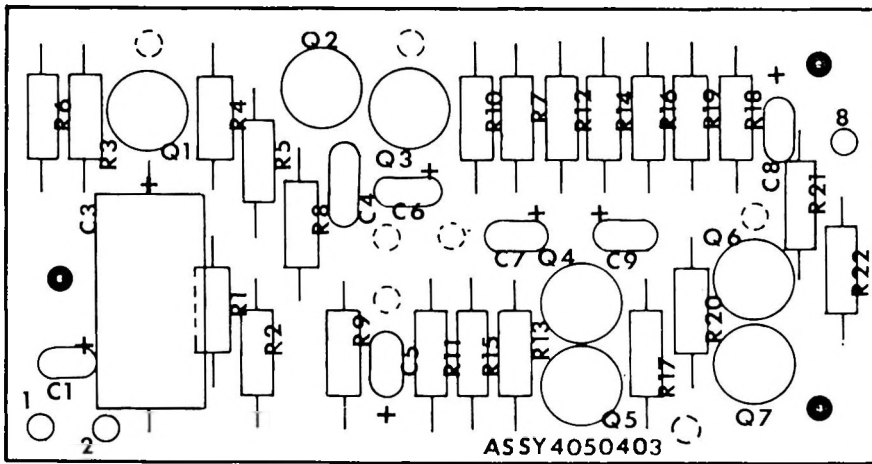
Figure 7-21. Response Curves

A56



NOTES:
 R31 is R32 on -4 version only
 Part numbers are given on page 7-26
 (Ref. C)

Figure 7-22. Record Printed Wiring Board



NOTE:
 Part numbers are given on page 7-26
 (Ref. D)

Figure 7-23. Reproduce Printed Wiring Board