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**MODEL 4701
AM-FM CARTRIDGE
STEREO SYSTEM
mobile**

**Manufactured and Distributed by
Hy-Gain de Puerto Rico, Inc.
P.O. Box 68 State Hwy. 31, Km. 4.0
Naguabo, Puerto Rico 00718**

EO-4701-C-100



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CHAPTER 1—GENERAL INFORMATION

Introduction

This service manual contains all the information needed to service and repair the Hy-Gain Model 4701 AM-FM 8 track cartridge stereo system. It includes an explanation of the theory of operation and alignment procedures. Revision, addendum, and errata sheets will be published as needed. Insert them as required in the manual. The radio section (AM-FM stereo) is receiver type certified by the Federal Communications Commission (FCC).

It is a compact in-dash mounted mobile unit, completely solid-state, and highly reliable with low power consumption. Use the unit with 12 VDC (nominal), negative ground *ONLY!*

Warranty Service Department

For help with technical problems, for parts information, and information on local and factory repair facilities, contact the National Service Manager. When you write, please include all pertinent information that may be helpful in solving the problem. Address the letter to:

Hy-Gain Warranty Service Department
4900 Superior Street
Lincoln, Nebraska 68504
ATTN: National Service Manager

The Warranty Service Department can repair any unit. Before shipping the unit contact the National Service Manager. Often a problem is field solvable with a little extra help. This can save lost time and shipping costs. Limit factory returns to the difficult problems.

How to Ship Returns

To return a unit, get a return authorization. This is important. Handling of the unit may be delayed if shipped without it. If the unit must be shipped immediately, telephone or telex the National Service Manager for expeditious service.

When you request authorization, notification of completion repairs may also be requested. The notification will include a copy of the bill. Paying the bill before the return of the unit can save the cost of a COD fee.

For warranty repair, prepare a letter in duplicate containing the following information (for out-of-warranty repair delete items 2 and 3):

1. your name and address
2. purchaser's name and address
3. proof of purchase
4. serial number
5. complete description of the problem
6. the return authorization

Check the unit to see that all parts and screws are in place and attach an envelope containing a copy of the letter directly to it so this information is not overlooked. Wrap the unit and the envelope in heavy paper or put it in a plastic bag. If the original carton is not available, place the unit in a strong carton at least six inches larger in all three dimensions than the unit. Fill the carton equally around the unit with resilient packing material (shredded paper, excelsior, bubble pack, etc). Seal the box with gummed paper tape, tie it with strong cord, and ship it by prepaid express, United Parcel Service, or insured parcel post to the address given previously. Mail the original of the letter in a second envelope to that same address.

It is important that the shipment be well packed and fully insured. Damage claims can delay repair and return of the unit. All claims must be settled between you and the carrier.

All shipments must be sent PREPAID. We *do not* accept collect shipments. After the unit has been repaired we will send it back COD unless the bill has been prepaid. Unclaimed or refused COD shipments will not be reshipped until payment is received in full. These items become the property of Hy-Gain 60 days after refusal or return and will be sold for payment of charges due.

Units with unauthorized field modifications cannot be accepted for repair.

Purchase of Parts

Parts can be purchased from any Hy-Gain Service Center or from the factory Warranty Service Department. When ordering, please supply the following information.

1. unit model number
2. unit serial number
3. part description
4. part number

Specifications

General

Power Requirements	12.0 VDC (nominal) (10.8 to 15.6 VDC) negative ground
Current Consumption	less than 2A (at maximum output) less than 4.5A (at plunger operation)
Load Impedance	4 ohms x 2, 8 ohms x 4
Power Output	more than 3 watts on each channel (at 10% distortion) More than 5 watts on each channel (at maximum volume)
Semiconductors	5 IC's, 12 transistors and 14 diodes
Weight	5 lbs., 10 oz.
Dimensions (HWD)	2 1/2" x 7 1/8" x 4 3/4"
Shaft Spacing	adjustable 5 1/4" x 6"

Tape Section

Reproduction System	8 track, 2 channel, 4 program stereo system
Tape Speed	standard 3 3/4 ips
Wow and flutter	less than 0.3%
S/N	more than 40 dB
Cross Talk	more than 30 dB (for adjacent channel) more than 40 dB (for adjacent track)
Frequency Range	50Hz to 10,000Hz

Radio Section

Circuit System	superheterodyne
Tuning System	FM manual micro tuning AM manual micro tuning
Receiver Range	FM 88 MHz to 108 MHz AM 530 kHz to 1605 kHz
Intermediate Frequency	FM 10.7 MHz AM 262.5 kHz
Maximum Sensitivity	AM less than 24 dB (15.85 uV) at 0.5W output
Quieting Sensitivity	FM less than 18 dB (7.94 uV) at 30 dB S/N AM less than 33 dB (44.67 uV) at 20 dB S/N
Image Rejection Ratio	FM more than 40 dB, AM more than 40 dB
IF Rejection Ratio	FM more than 70 dB, AM more than 40 dB
Selectivity	AM more than 20 dB (at +10 kHz detune)
AGC	AM more than 40 dB
AFC	FM 400 to 800 kHz
Separation	FM more than 20 dB
Fidelity	FM 100Hz to 7000Hz, AM 100Hz to 4000Hz

CHAPTER 2 — THEORY OF OPERATION

General

The theory of operation of the Hy-Gain 4701 AM-FM 8 track cartridge stereo system is divided into three sections: the AM receiver section, the FM receiver section, and the 8 track cartridge section.

Circuit Description

AM Section

With Power Switch, S6, in the "ON" position, AM-FM Selector Switch, S3, in the "AM" position, and the Tape-Radio Selector Switch, S4, in the "RADIO" position, the AM signal is received at the antenna, passes through the Antenna Matching circuit, L6, TC4, and is coupled to the base of RF Amplifier, Q9. From Q9 the signal is passed to the base of Converter, Q10, where the IF frequency of 262.5 kHz is developed. The IF signal then passes through IFT5 to the base of IF Amplifier, Q7. It is taken off the collector of Q7 and passes through IFT6 and Detector, D6 to pin 6 of IC4 and pin 6 of IC5 where it is amplified. The amplified audio signal is then passed out at pin 10 of both IC4 and IC5 to the speakers.

FM Section

With Power Switch, S6, in the "ON" position, AM-FM Switch S3, in the "FM" position, and Tape-Radio Switch, S4 in the "RADIO" position, the signal is received at the antenna and is passed through the Antenna Matching circuit, TC1, to the emitter of the RF Amplifier, Q1. Q1 is in the circuit when the "DX" switch is in, to provide additional amplification for fringe reception, When the "DX" switch is out (local position), Q1 is bypassed. From Q1, the signal is passed to the base of the Mixer Stage, Q2. Q3 is the FM variable oscillator. An intermediate frequency of 10.7 MHz is provided by the combined action of Q2 and Q3 on the received frequency. The IF frequency (10.7 MHz) is then applied to the base of IF Amplifier, Q4. It is then filtered by IFT2 and 3, and applied to Limiters, Q5 and Q6. The signal is then applied to the base of IF Amplifier, Q7. It then goes through Ratio Detector, IFT4, D2, and D3. After being detected the signal goes to pin 2 of IC1. IC1 is a phase locked loop FM stereo demodulator with automatic stereo/monaural switching. The composite signal is applied to pin 2. VR2, R151 and C146 control the VCO oscillating frequency and channel separation. VR1, R149, R146 and C144 form a low pass filter to detect the 19 kHz pilot signal. The detected voltage drives the stereo indicator lamp. The left audio signal is then taken off at pin 4 of IC1 and goes to pin 6 of IC4, where it is amplified. It then goes out pin 10 of IC4 to the left speakers. The right signal is taken off IC1 at pin 5 and applied to pin 6 of IC5, amplified, goes out pin 10 of IC5 to the right speakers.

8 Track Stereo Tape Section

The input from the left track head is applied to pin 2 of IC2; amplified, leaves IC2 at pin 6 and is applied to pin 6 of IC4. It is amplified, leaves IC4 at pin 10 and is applied to the left speakers. The input from the right track head is applied to pin 2 of IC3, amplified, leaves IC3 at pin 6 and is applied to pin 6, IC5, where it is amplified. The signal then leaves IC5 at pin 10 and is applied to the right speakers.

Mechanical Tape Section

When a tape cartridge is placed in the tape transport, it trips switch 4 and switch 5. This causes B+ and bias voltages to be removed from the receiver sections. B+ and bias voltages are supplied to the Tape Head Amplifier, IC2 and IC3, through switch 4. Switch 5 supplies power to the drive motor and channel select components. The Automatic Channel Select is operated at the end of the tape by the Tape Sensor, D10. Current is drawn through the plunger when the Tape Sensor shorts across on the metallic leader at the end of the tape, which activates the channel select cam, automatically selecting the next program. When the Channel Select Switch is depressed, current is drawn through the plunger and the Channel Select Switch to ground, which activates the cam to select the next channel.

Miscellaneous

Q8 acts as an Electronic Switch to turn off the FM MPX section of the receiver when S3 is in the AM position. Q12 kills the audio amplifiers IC4, and IC5 whenever an interconnected CB unit is receiving or transmitting.

CHAPTER 3—ALIGNMENT

General

These procedures must be followed to align the Hy-Gain 4701 AM-FM 8 track cartridge stereo system. Alignment should not be undertaken unless the technician has adequate test equipment and a full understanding of the circuitry of the system.

These procedures are divided into three main sections: FM tuner alignment, AM tuner alignment, and cartridge mechanical alignment. See *Recommended Equipment* below for a complete list of equipment.

These procedures assume that proper voltages are present at all points in the unit. If not, troubleshoot before continuing.

Recommended Equipment

The following items of equipment are recommended for use in aligning the Hy-Gain 4701 AM-FM 8 track cartridge stereo system.

1. Sweep generator
2. FM signal generator
3. Oscilloscope
4. Dummy load
5. Millivoltmeter
6. FM stereo modulator
7. VOM 20 kohm/V
8. AM signal generator

All test equipment should be properly calibrated.

FM Section

FM IF Alignment

1. Connect the sweep generator output to TP1 and connect the vertical cable of the oscilloscope to TP2. Turn the FM indicator to high frequency side to a position where no interference is caused by broadcast signals.

2. With the sweep generator frequency set to 10.7 MHz, gradually increase the output level of the sweep generator until the waveform shown in Figure 3-1A appears on the CRT screen. Perform the adjustment with the generator output as small as possible and the oscilloscope vertical gain as high as possible.

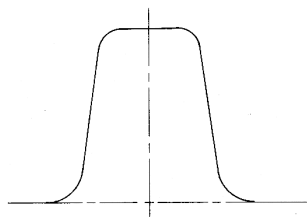


Figure 3-1A. FM IF Waveform

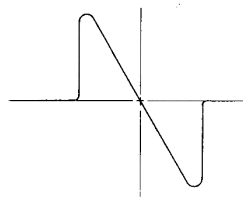


Figure 3-1B. FM S-Curve Waveform

3. Adjust IFT1 to obtain a symmetrical and clear waveform as shown in Figure 3-1A.

4. Shift the oscilloscope vertical cable from TP2 to TP3. Adjust IFT4 to obtain an S-curve waveform as shown in Figure 3-1B, with good upper/lower symmetry by adjusting the black core. For good linearity in the middle portion of the waveform adjust the blue core of IFT4.

RF Circuit Alignment

Refer to figure 3-2.

1. Set the receiver to the lowest receiver frequency and the FM signal generator to 87.5 MHz. Adjust the OSC Trimmer TC3 for maximum deflection on the millivoltmeter. Keep the volume and tone controls at maximum position.

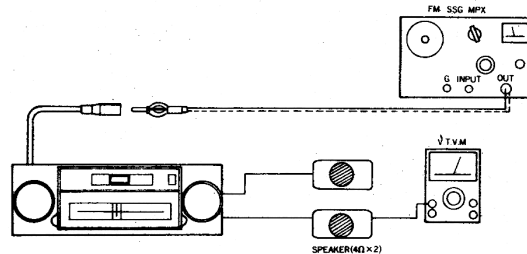


Figure 3-2. FM RF Circuit Equipment Set-Up

2. Set the FM signal generator frequency to 98 MHz, and position the dial pointer at 98 MHz. Adjust the ANT Trimmer TC1 and RF Trimmer TC2 for maximum deflection on the millivoltmeter. The quieting sensitivity should now be less than 18 dB at a 30 dB signal to noise ratio.

FM Multiplex Section Adjustment

1. To adjust the voltage controlled oscillator (VCO) connect a frequency counter to TP4, and adjust VR2 so that the frequency becomes exactly 19.0 kHz.
2. To adjust the indicator lamp sensitivity, connect an FM stereo composite signal generator to the antenna connector. Set the signal generator to the received frequency. Adjust the Stereo Indicator Trimmer Control, VR1, by turning it in the counterclockwise direction to a position where the stereo indicator lights. This adjustment of the lamp sensitivity must be performed after the adjustment of the VCO frequency. The sensitivity increases when VR1 is turned counterclockwise and decreases when VR1 is turned in a clockwise direction.

Alignment of AM Tuner

AM IF Alignment

1. Connect the output of the sweep generator to the RF coil through a capacitor of 0.01 μ F.
2. Connect the vertical terminal of the oscilloscope to the "hot" side of the volume.
3. When the sweep generator frequency is set to 262.5 kHz and its output level is increased, a waveform as shown in figure 3-3 is obtained.

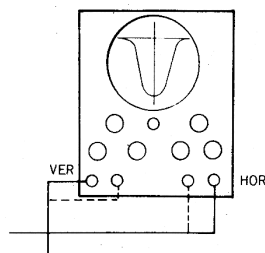


Figure 3-3. AM IF Waveform

4. Adjust the core of each IFT (IFT5 and IFT6) so that the peak of the waveform shown in figure 3-3 becomes maximum. At this time, the marker signal must be 262.5 kHz.

AM IF Alignment Precautions

1. Set the VOL Control to minimum and the TONE Control to maximum.
2. With the vertical gain control of the oscilloscope set to maximum, keep the output level of the sweep generator as small as possible.
3. Set the dial pointer of the radio to the high end. Though the position of the dial pointer affects the waveform, a good IF waveform is that which has no relation to the dial pointer setting and is stable. When making the waveform alignment, it is recommended that you check to see if the waveform is stable by slightly moving the dial pointer.

Adjustment Method Using a Signal Generator and Millivoltmeter

1. Connect the millivoltmeter to the output wire.
2. Set the signal generator to 262.5 kHz and connect its output to the antenna. Increase the output of the signal generator so that the millivoltmeter shows some deflection.
3. Adjust each IFT (IFT5 and IFT6) so that the audio output becomes maximum.
4. In this adjustment, the TONE Control of the receiver should be set to maximum and the VOL Control should be set to minimum.

RF Circuit Alignment

Refer to figure 3-4 for equipment set-up.

1. Connect a resistor dummy load to the audio output terminals and connect the millivoltmeter across the resistor.
2. Set the receiver's dial pointer to the maximum frequency point on the dial and set the AM signal generator to 1620 kHz. Adjust the OSC Trimmer, TC6, for maximum deflection on the millivoltmeter.

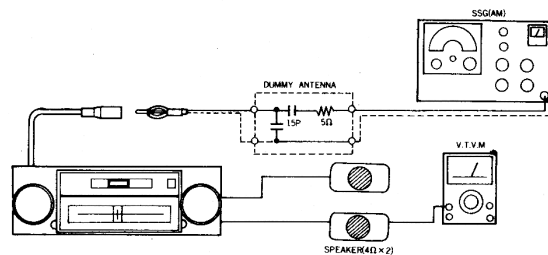


Figure 3-4. AM RF Circuit Equipment Set-Up

3. Adjust the RF Trimmer TC5 and ANT Trimmer TC4 for maximum deflection on the millivoltmeter.

Adjustment of the Antenna Trimmer

The Antenna Trimmer, TC4, must be adjusted after installing or after repairing the set; when the antenna or the antenna cable is replaced; or when the radio sensitivity is poor and noise is prominent.

1. Set the receiver VOL Control to maximum, the TONE Control to maximum, and the dial pointer to around 1400 kHz to receive white noise (hissing sound).
2. Adjust the Antenna Trimmer screw, TC4, as shown in figure 3-5 so that the noise output becomes maximum.

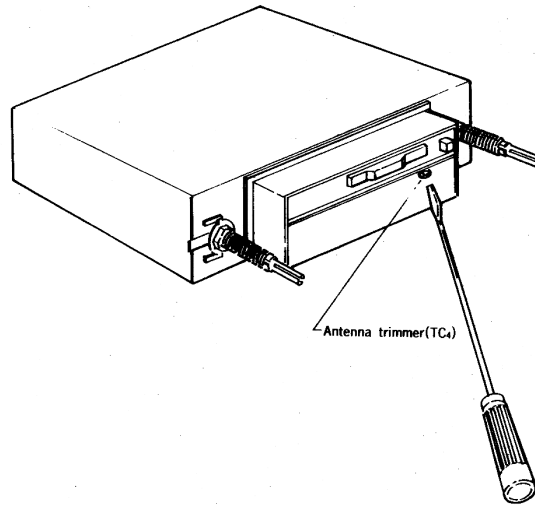


Figure 3-5. Antenna Trimmer Location

CHAPTER 4—TROUBLESHOOTING

Refer to the following troubleshooting charts for typical problems that may occur in this AM-FM 8 track cartridge stereo system.

Trouble	Circuit	Faulty parts, cause	Corrective action
Does not operate	Power supply circuit	Fuse blown Connection to the power supply faulty Choke L10 open Coil L11 open Radio-Tape switch S4 faulty Radio switch S3 faulty	Replace Make secure connection Replace Replace Replace Replace
	Output circuit	Power IC4, (IC5) faulty Output capacitor C318, (C148) faulty Speaker voice coil open Improper connection of speaker connecting wires	Replace Replace Replace speaker Make secure connection
	Preamp circuit	Preamp IC2, (IC3) faulty Head lead open Radio-Tape switch S4 faulty Head dirty Head faulty or scratched	Replace Replace or resolder Replace Clean with head cleaner Replace
	MPX circuit	MPX IC1 faulty Semifixed resistor VR2 faulty	Replace Replace
	Detector circuit IF circuit, RF circuit	Antenna receptacle open Series coil L6 open Transistor Q1 through Q7, Q9, Q10 faulty Micro tuner coil open Coil L5 open	Replace Replace Replace Replace Replace
Sound is distorted	Output circuit	Power IC4, (IC5) faulty Speaker faulty C318, C418 capacitance changed	Replace Replace Replace
	Preamp circuit	Preamp IC2, (IC3) faulty Head faulty Head dirty	Replace Replace Clean the head

Trouble	Circuit	Faulty parts, cause	Corrective action
Oscillates	FM/AM detector circuit, IF circuit, RF circuit	ANT, RF trimmer (TC1, TC2) misadjusted Transistors Q1 through Q7, Q9 through Q11 deteriorated FM micro tuner ground lead open D2, D3, D6 faulty	Readjust Replace Resolder Replace
	Preamp circuit, output circuit	Speaker faulty Preamp IC2, (IC3) or power IC4, (IC5) faulty	Replace Replace
	Power supply circuit	C503, C504 capacitance down Q11 faulty	Replace Replace
	Preamp circuit, output circuit	Externally connected capacitors to preamp IC's and power IC's capacitance down or open	Replace
	IF circuit, RF circuit	Ground lead between FM micro tuner coil and power board open	Replace, solder
Stereo effect is absent	MPX circuit	MPX circuit misadjusted MPX IC1 faulty	Readjust Replace
AFC does not function	AFC circuit	Diode D1 faulty Resistors R102, R131, open C111 capacitance down or open	Replace Replace Replace
Stereo indicator does not light	Indicator circuit	Stereo indicator lamp open R146 open MPX IC1 faulty	Replace Replace Replace
Motor does not operate	Motor circuit	Motor faulty R602 faulty Tape microswitch (S4, S5) faulty Tape mechanism faulty	Replace Replace Replace Replace
Too much wow, flutter	Tape mechanism	Motor faulty Flywheel capstan faulty Oil leakage causing belt slippage	Replace Replace Replace belt

CHAPTER 5—CHARTS AND DRAWINGS

Component Outline, P.C. Boards, Model 4701

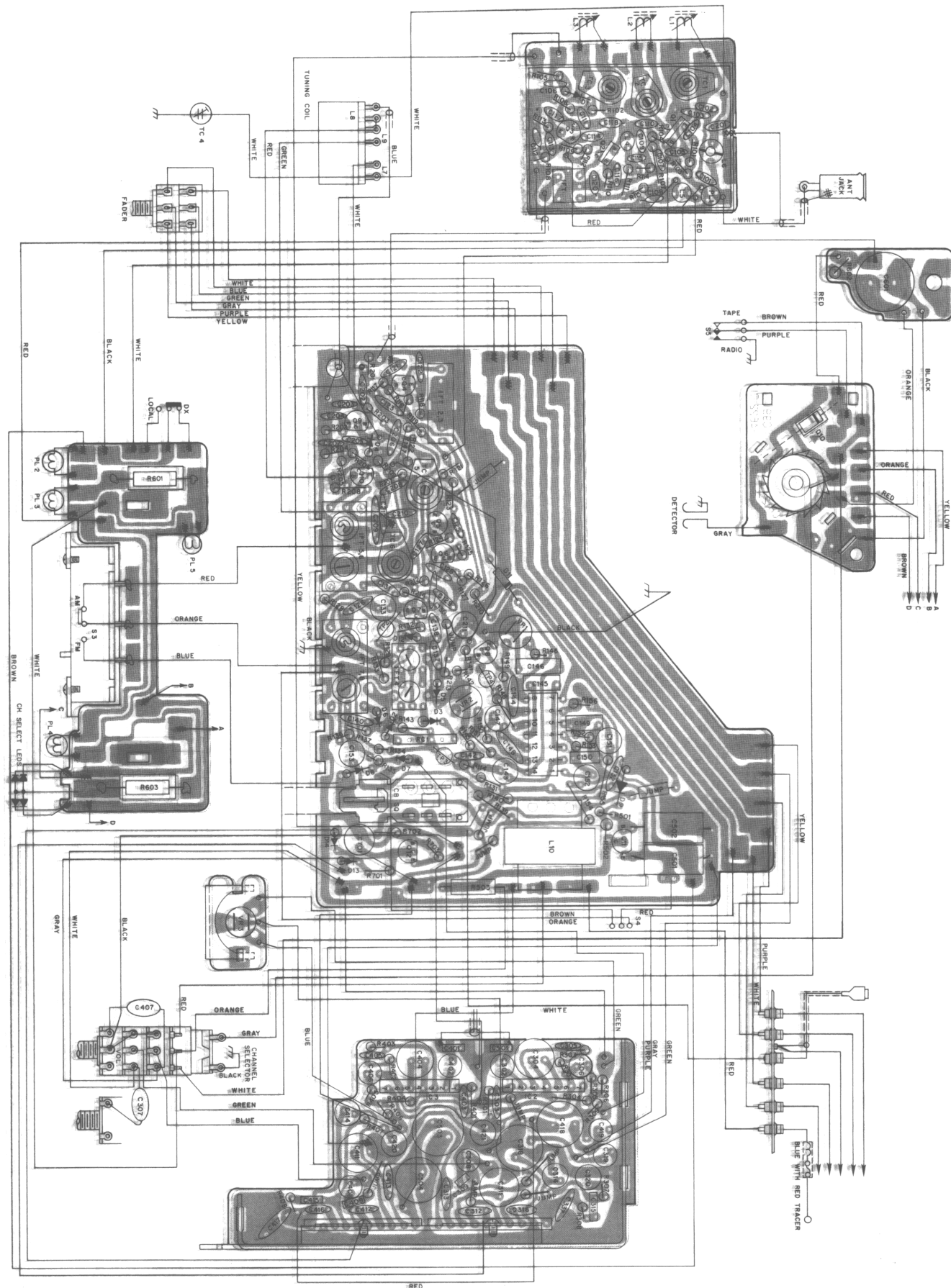


Figure 5-1. Component Outline, P.C. Boards, Model 4701

Parts List

Main Unit, Electrical Section

Reference Designator	Description	Part No.
C101	22 pF, 50V, ceramic disc	151-2201-13
C102	15 pF, 50V, ceramic disc	151-1501-13
C103	39 pF, 50V, ceramic disc	151-3901-13
C104	3 pF, 50V, ceramic disc	151-3097-13
C105	.001 uF, 50V, ceramic disc	160-1022-05
C106	.001 uF, 50V, ceramic disc	160-1022-05
C107	.001 uF, 50V, ceramic disc	160-1022-05
C108	.001 uF, 50V, ceramic disc	160-1022-05
C109	22 pF, 50V, ceramic disc	151-2201-13
C110	6 pF, 50V, ceramic disc	151-6097-13
C111	3 pF, 50V, ceramic disc	151-3097-13
C112	.001 uF, 50V, ceramic disc	160-1022-05
C113	22 pF, 50V, ceramic disc	151-2201-13
C114	.001 uF, 50V, ceramic disc	160-1022-05
C115	330 pF, 50V, ceramic disc	160-3312-05
C116	.001 uF, 50V, ceramic disc	160-1022-05
C117	4 pF, 50V, ceramic disc	151-2096-70
C118	1 pF, 50V, ceramic disc	151-1097-13
C119	(not used)	
C120	.001 uF, 50V, ceramic disc	160-1022-05
C121	22 pF, 50V, ceramic disc	151-2201-13
C122	.01 uF, 50V, polyester	141-1033-11
C123	.01 uF, 50V, polyester	141-1033-11
C124	(not used)	
C125	.001 uF, 50V, polyester	141-1023-11
C126	(not used)	
C127	.01 uF, 50V, polyester	141-1033-11
C128	.01 uF, 50V, polyester	141-1033-11
C129	.01 uF, 50V, polyester	141-1033-11
C130	180 pF, 50V, ceramic disc	160-1812-05
C131	.01 uF, 50V, polyester	141-1033-11
C132	.039 uF, 50V, polyester	141-3933-13
C133	10 uF, 10V, electrolytic	180-1064-22
C134	(not used)	
C135	(not used)	
C136	.022 uF, 50V, polyester	141-2233-12
C137	220 pF, 50V, ceramic disc	160-2212-05
C138	100 pF, 50V, ceramic disc	160-1012-05
C139	(not used)	
C140	.01 uF, 50V, polyester	141-1033-11
C141	(not used)	
C142	.0015 uF, 50V, polyester	141-1523-11
C143	1 uF, 50V, electrolytic	180-1054-62
C144	0.2 uF, 50V, ceramic disc	043-0020-00
C145	.033 uF, 50V, polyester	141-3333-13
C146	510 pF, 50V, ceramic disc	151-5111-13
C147	1 uF, 50V, electrolytic	180-1054-62
C148	0.2 uF, 50V, ceramic disc	043-0020-00
C149	.047 uF, 50V, polyester	141-4733-13
C150	.047 uF, 50V, polyester	141-4733-13
C151	.47 uF, 50V, electrolytic	180-4744-62
C152	.47 uF, 50V, electrolytic	180-4744-62
C153	1 uF, 50V, electrolytic	180-1054-62
C201	82 pF, 50V, ceramic disc	151-8201-13
C202	.01 uF, 50V, polyester	141-1033-11
C203	.0033 uF, 50V, polyester	141-3323-11
C204	.0047 uF, 50V, polyester	141-4723-11
C205	180 pF, 50V, ceramic disc	160-1812-05
C206	.039 uF, 50V, polyester	141-3933-13
C207	.0039 uF, 50V, polyester	141-3923-11
C208	.0047 uF, 50V, polyester	141-4723-11
C209	180 pF, 50V, ceramic disc	160-3312-05

Reference Designator	Description	Part No.
C210	27 pF, 50V, ceramic disc	153-2702-13
C211	22 uF, 10V, electrolytic	180-4764-22
C212	100 pF, 50V, ceramic disc	160-1012-05
C301	510 pF, 50V, polyester	141-5111-13
C302	4.7 uF, 16V, electrolytic	180-4754-32
C303	33 pF, 50V, ceramic disc	151-3301-13
C304	100 uF, 10V, electrolytic	180-1074-22
C305	.015 uF, 50V, polyester	141-1533-11
C306	4.7 uF, 16V, electrolytic	180-4754-32
C307	.047 uF, 50V, polyester	141-4733-13
C308	2.2 uF, 50V, electrolytic	180-2254-62
C309	.0015 uF, 50V, polyester	141-1523-11
C310	(not used)	
C311	100 uF, 10V, electrolytic	180-1074-22
C312	33 pF, 50V, ceramic disc	151-3301-13
C313	.022 uF, 50V, polyester	141-2233-12
C314	47 uF, 10V, electrolytic	180-4764-22
C315	.01 uF, 50V, polyester	141-1033-11
C316	100 pF, 50V, ceramic disc	160-1812-05
C317	0.2 uF, 50V, ceramic disc	043-0020-00
C318	470 uF, 10V, electrolytic	180-4774-22
C319	1 uF, 50V, electrolytic	180-1054-62
C320	47 uF, 10V, electrolytic	180-4764-22
C401	510 pF, 50V, polyester	141-5111-13
C402	4.7 uF, 16V, electrolytic	180-4754-32
C403	33 pF, 50V, ceramic disc	151-3301-13
C404	100 uF, 10V, electrolytic	180-1074-22
C405	.015 uF, 50V, polyester	141-1533-11
C406	4.7 uF, 16V, electrolytic	180-4754-32
C407	.047 uF, 50V, polyester	141-4733-13
C408	2.2 uF, 50V, electrolytic	180-2254-62
C409	.0015 uF, 50V, polyester	141-1523-11
C410	(not used)	
C411	100 uF, 10V, electrolytic	180-1074-22
C412	33 pF, 50V, ceramic disc	151-3301-13
C413	.022 uF, 50V, polyester	141-2233-12
C414	47 uF, 10V, electrolytic	180-4764-22
C415	.01 uF, 50V, polyester	141-1033-11
C416	100 pF, 50V, ceramic disc	160-1812-05
C417	0.2 uF, 50V, ceramic disc	043-0020-00
C418	470 uF, 10V, electrolytic	180-4774-22
C419	1 uF, 50V, electrolytic	180-1054-62
C420	47 uF, 10V, electrolytic	180-4764-22
C421	47 uF, 10V, electrolytic	180-4764-22
C501	33 uF, 10V, electrolytic	180-3364-22
C502	33 uF, 10V, electrolytic	180-3364-22
C503	470 uF, 10V, electrolytic	180-4774-32
C504	220 uF, 16V, electrolytic	180-2274-32
C601	470 uF, 16V, electrolytic	180-4774-32
C701	33 uF, 10V, electrolytic	180-3364-22
D1	1S2790, silicon	001-0130-00
D2	1N60, germanium	001-0020-00
D3	1N60, germanium	001-0020-00
D4	1S953, silicon	001-0151-00
D5	1N34A, germanium	001-0010-00
D6	1N34A, germanium	001-0010-00
D7	1S953, silicon	001-0151-00
D8	1S953, silicon	001-0151-00
D9	HZ9B, zener	001-0101-01
D10	10D4, germanium	001-0077-00
D11	1S953, silicon	001-0151-00
D12	1S953, silicon	001-0151-00
D13	1S953, silicon	001-0151-00
D14	1S953, silicon	001-0151-00

Reference Designator	Description	Part No.
IC1	MPC1026C .....	.051-0086-00
IC2	TA7120P .....	.051-0020-02
IC3	TA7120P .....	.051-0020-02
IC4	TA720P .....	.051-0055-03
IC5	TA720P .....	.051-0055-03
IFT1	if transformer .....	.005-0698-00
IFT2,3	if transformer .....	.005-0706-00
IFT4	if transformer .....	.005-0684-00
IFT5,6	if transformer .....	.005-0550-01
L1, L2, L3, L7, L8, L9	6 coil-m-tuner .....	.933-0106-02
L4	rf coil .....	.010-1570-01
L5	rf coil .....	.010-1180-00
L6	(not used)	
L10	choke .....	.009-0592-01
L11	coil .....	.010-1610-00
M	DC motor .....	.960-3054-00
PL1	neon lamp, located in fm tuner section .....	.017-0321-01
PL2	stereo indicator lamp .....	.017-0313-01
PL3	am indicator lamp .....	.017-0313-01
PL4	fm indicator lamp .....	.017-0313-01
PL5	dial lamp .....	.017-0323-00

NOTE: all resistors are 5%, 1/4w, unless otherwise noted.

R101	1k	111-1021-22
R102	100k	111-1041-22
R103	8.2k	111-8221-22
R104	8.2k	111-8221-22
R105	100k	111-1041-22
R106	15k	111-1531-22
R107	180	111-1811-22
R108	4.7k	111-4721-21
R109	8.2k	111-8221-22
R110	1k	111-1021-22
R111	22k	111-2231-22
R112	180	111-1811-22
R113	3.3k	111-3321-22
R114	4.7k	111-4721-21
R115	180	111-1811-22
R116	8.2k	111-8221-22
R117	2.2k	111-2221-22
R118	1k	111-1021-22
R119	180	111-1811-22
R120	390	111-3911-22
R121	100	111-1011-22
R122	(not used)	
R123	33k	111-3331-22
R124	1k	111-1021-22
R125	33k	111-3331-22
R126	180	111-1811-22
R127	22k	111-2231-22
R128	68k	111-6831-22
R129	390	111-3911-22
R130	(not used)	
R131	470k	111-4741-22
R132	100	111-1011-22
R133	100	111-1011-22
R134	100	111-1011-22
R135	10k	111-1031-22
R136	560k	111-5641-22

Reference Designator	Description	Part No.
R137	22k	111-2231-22
R138	(not used)	
R139	5.6k	111-5621-22
R140	5.6k	111-5621-22
R141	100k	111-1041-22
R142	47k	111-4731-22
R143	22k	111-2231-22
R144	15k	111-1531-22
R145	68k	111-6831-22
R146	82k	111-8231-22
R147	33k	111-3331-22
R148	100k	111-1041-22
R149	82k	111-8231-22
R150	1k	111-1021-22
R151	15k	111-1531-22
R152	3.9k	111-3921-22
R153	3.9k	111-3921-22
R154	3.9k	111-3921-22
R155	3.9k	111-3921-22
R156	120, 1/2w	110-1212-42
R201	4.7k	111-4721-21
R202	100	111-1011-22
R203	6.8k	111-6821-22
R204	3.3k	111-3321-22
R205	100	111-1011-22
R206	12k	111-1231-22
R207	2.2k	111-2221-22
R208	5.6k	111-5621-22
R209	100	111-1011-22
R210	39	111-3901-22
R211	150k	111-1541-22
R212	22k	111-2231-22
R213	10k	111-1131-22
R301	68k	111-6831-22
R302	10k	111-1131-22
R303	150k	111-1541-22
R304	15k	111-1531-22
R305	5.6k	111-5621-22
R306	8.2k	111-8221-22
R307	33	111-3301-22
R308	47k	111-4731-22
R309	1k	111-1021-22
R401	68k	111-6831-22
R402	10k	111-1031-22
R403	150k	111-1541-22
R404	15k	111-1531-22
R405	5.6k	111-5621-22
R406	8.2k	111-8221-22
R407	33	111-3301-22
R408	47k	111-4731-22
R501	820, 1/2w	110-8212-42
R502	1k, 1/2w	110-1022-42
R503	56, 1/2w	110-5602-41
R601	68, 1/2w	110-6802-41
R602	2.2, 1w	114-2292-52
R603	820, 1/2w	110-8212-41
R701	1k	111-1021-22
R702	150k	111-1541-22
R703	47k	111-4731-22
TC1	trimmer	004-1494-00
TC2	trimmer	004-1498-00
TC3	trimmer	004-1496-00
TC4	trimmer	004-1494-00

Reference Designator	Description	Part No.
TC5	trimmer	004-1496-00
TC6	trimmer	004-1502-00
VR1	10k, variable resistor	012-3394-00
VR2	10k, variable resistor	012-3394-00
VR3	100k, variable resistor	012-3511-00
VR4	30-30k, 50-50k stacked, variable resistor	012-3444-00
VR5	50-50k, stacked, variable resistor	012-3391-00

Main Unit, Mechanical Section

Reference Designator	Description	Part No.
1	escutcheon assy	370-3017-02
2	button	382-0110-03
3	molded part	335-0843-00
4	dustproof cover	320-0228-03
5	back plate	374-0701-00
6	pilot lamp	017-0313-01
7	led	001-0140-00
8	switch	013-1120-02
9	rubber part	345-2731-01
10	rubber part	345-2732-01
11	molded part	335-0842-00
12	pressed part	330-5955-01
13	upper case	310-0874-00
14	switch	013-3286-00
15	dial pointer	376-0787-00
16	pressed part	330-5682-01
17	spring	750-1771-00
18	machined part	341-1144-00
19	e-ring	743-1500-01
20	dial cord	830-0500-81
21	eyelet	748-2003-04
22	spring	750-1772-00
23	rubber part	345-2692-01
24	pilot lamp	017-0323-00
25	pilot lamp socket	070-0952-00
26	filter assy	944-0468-01
27	variable resistor	012-3391-00
28	IC (TA7205)	051-0055-02
29	tape mechanism assy	930-0441-00
30	special nut	722-0020-00
31	special washer	745-0400-00
32	pressed part	330-5671-00
33	front cover	308-0871-01
34	special washer	745-0320-00
35	variable resistor	012-3511-00
36	variable resistor	012-3444-00
37	molded part	335-0844-00
38	molded part	335-0845-00
39	6 coil manual tuner	933-0106-02
40	pressed part	330-5935-00
41	trimmer	004-1494-00
42	pressed part	330-5954-00
43	lower case	311-0896-02
44	setplate	286-3678-00
45	guide label	285-0656-00
46	molded part	335-0818-00
47	speaker lead	851-2173-00
48	speaker lead	851-2173-01

Reference Designator	Description	Part No.
49	A-lead.....	850-1865-02
50	coil	010-1610-00
51	fuse, 5A	120-0050-03
52	A-lead.....	850-1957-00
53	paper part	347-0610-00
54	guide label.....	285-0160-00
55	guide label.....	285-0611-00
56	pressed part	330-5956-01
57	main p.c. board.....	099-4819-00
58	amplifier p.c. board	099-4624-03
59	screw, machine M3x4	714-3004-81
60	screw, machine M2.6x3	714-2603-11
61	screw, machine M2x4	714-2004-11
62	spring washer M2	741-2000-21
63	toothed washer M3	742-3000-21
64	taptight M3x5	731-3005-80
65	taptight M3x6	731-3006-80
66	knob	380-3531-00
67	knob	380-3532-01

Tape Mechanism

Reference Designator	Description	Part No.
1	deck plate assy	960-3005-00
2	roller assy	960-3006-00
3	spring	750-1764-00
4	molded part	631-0207-00
5	tape guide	605-0037-00
6	molded part	631-0208-01
7	contact	630-0973-00
8	spring	750-1651-00
9	holder assy	960-3007-01
10	head	011-0243-00
11	shielded wire	815-1355-01
12	spring	750-1765-00
13	special screw	716-0304-00
14	cam ratchet	608-0041-00
15	special washer	746-0626-00
16	plunger	015-0215-00
17	spring	750-1767-00
18	DC motor	960-3054-00
19	toothed washer M3	742-3000-20
20	spring	750-1654-00
21	belt	602-0042-00
22	housing assy	960-3008-00
23	flywheel	6111-0044-00
24	diode, D10, 10D4	001-0077-00
25	ceramic capacitor, C601	165-3934-02
26	switch assy	960-3009-01
27	switch	013-3284-00
28	case	630-0976-00
29	switch	013-3285-00
30	taptight M3x5	731-3005-80
31	taptight M3x10	731-3010-80
32	screw, tap M2.6x6	702-2606-11
33	screw, machine M2.6x5	714-2605-81
34	screw, machine M2.6x16	715-2616-11
35	e-ring M2.5	743-2500-00
36	e-ring M3	743-3000-00

MAIN UNIT Exploded View

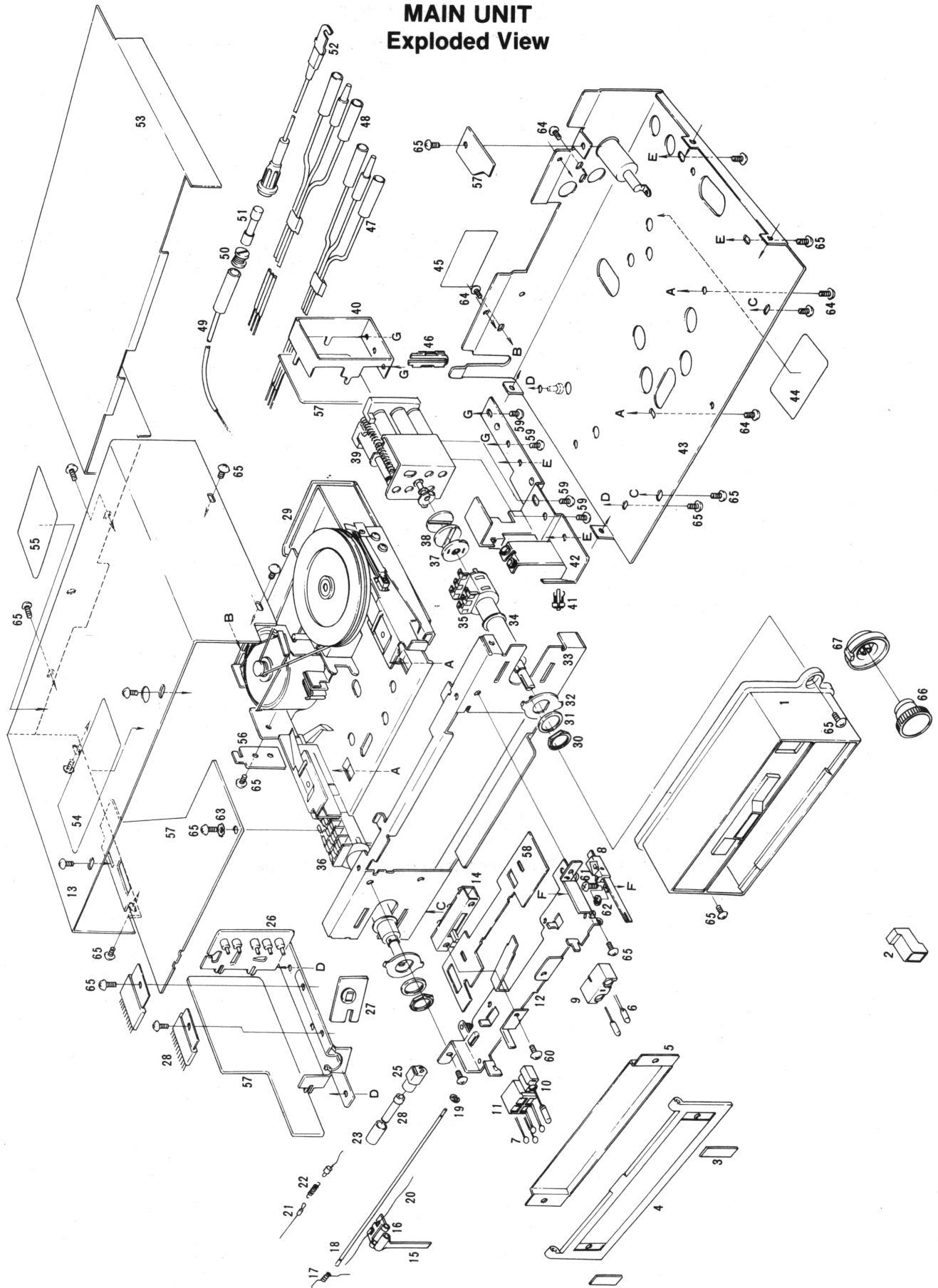


Figure 5-2. Main Unit, Exploded View

TAPE MECHANISM Exploded View

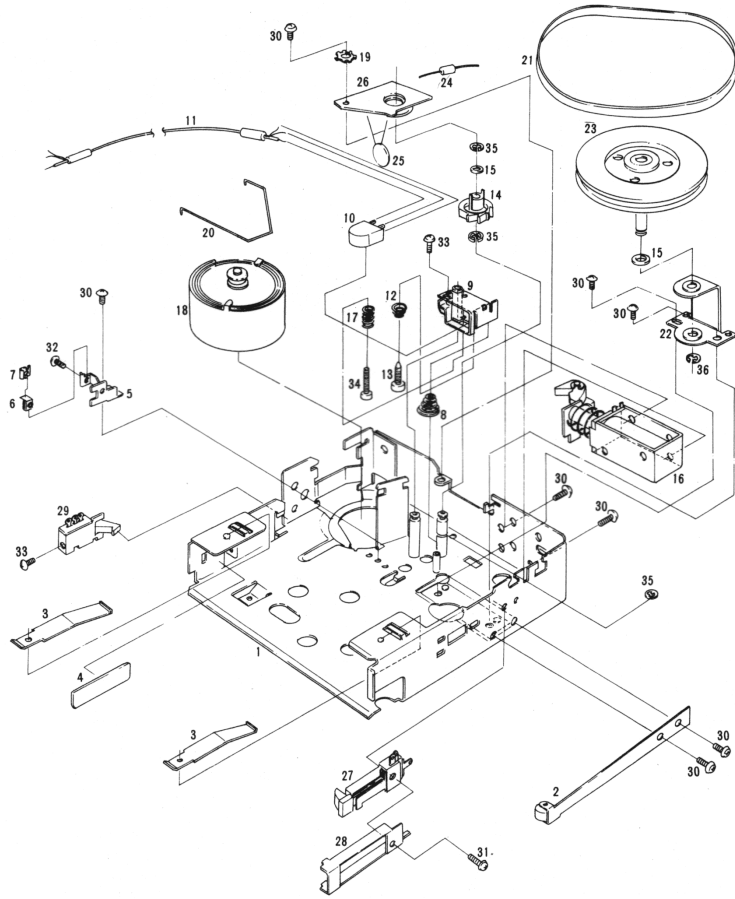


Figure 5-3. Tape Mechanism, Exploded View

Schematic Diagram, Model 4701

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