

## MAINTENANCE & REPAIR DATA

**Easily repair the  
top 75% of VCR  
problems**

**Sylvania®**  
Models VC4213ATO1, VC4223AT01

<b>CONTENTS</b>			<b>Care of the VCR</b>  Power Precautions  Safe Environment  Routine Cleaning  <b>2</b>	<b>Maintenance Schedule</b>      <b>3</b>	<b>How the VCR Works</b>      <b>4</b>	<b>Troubleshooting Flow</b>      <b>5</b>	<b>Troubleshooting</b> Start-Up Problems  Cassette Loading Problems  Tape Play Problems  Sound Problems  <b>6</b>	Picture Problems  What to Look for Inside the Unit     <b>7</b>					
<b>Servicing Guide</b>  How to Use Data  Before Taking Apart  Remove Power  Drain Charge  <b>8</b>			Demagnetize Heads  Working with Power  Disassembly Tools  <b>9</b>	<b>Audio &amp; Video Heads</b>  Cleaning the Audio/Control Head  Photo ID of Heads  <b>10</b>			Cleaning the Video Heads  Replacing Upper Drum  <b>11</b>	Cleaning the Full Erase Head  Replacing The Full Erase Head  <b>12</b>					
<b>Disassembly</b>  Top Cover  Bottom Cover  Front Panel  <b>16</b>			<b>Cleaners &amp; Lubricants</b>  Solvents Sticks & Swabs Cleaning Kits Cleaning Cassettes Grease & Oil  <b>17</b>			<b>Tape Transport Assembly</b>  Replacing the Reel Drive Assembly  Greasing the Tape Guide Tracks  <b>18</b>			Cleaning the Capstan Shaft  Cleaning/Replacing the Pinch Roller  Cleaning/Replacing the Impedance Roller  <b>19</b>	Replacing the Capstan Motor  Replacing the Loading Motor  <b>20</b>	Photo ID of Tape Transport (top view)     <b>21</b>	Replacing the Front Loading Belt Replacing the Loading Belt Replacing the Main Belt Replacing the Drive Belt  <b>22</b>	Photo ID of Tape Transport (bottom view)     <b>23</b>
<b>Mechanical Parts</b>  Mechanical Parts  <i>cont.</i>  <b>24</b>			Mechanical Parts     <b>25</b>	Photo ID of Parts     <b>26</b>	Photo ID of Parts     <b>27</b>	Photo ID of Parts     <b>28</b>	<b>Electrical Parts</b>  Resistors  Special Electrical Parts  Obtaining Parts  <b>29</b>			Semiconductors     <b>30</b>	Semiconductors <i>cont.</i>  Participating Vendors    <b>31</b>		

**WARRANTY WARNING:** Removal of the top or bottom covers or service work performed by anyone other than a manufacturer's authorized service representative may void the manufacturer's warranty on your VCR.

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**PROMPT™**  
PUBLICATIONS

- ***Troubleshooting common malfunctions***
- ***Guide to disassembly***
- ***Step-by-step servicing and repair***
- ***Mechanical and electrical parts lists***

VC R66022 Sylvania

CARE OF THE VCR

Power Precautions

- This VCR is equipped with a polarized AC plug made to fit into a polarized AC power outlet. Do not defeat the AC plug safety feature.
- Do not allow anything to rest on the AC power cord.
- Periodically examine the power cord for damaged or cracked insulation.
- During electrical storms, unplug the VCR to avoid power surges which could damage the machine.

Safe Environment

- The VCR cabinet is equipped with vents to prevent heat buildup. Never block, cover, or otherwise obstruct these vents with doilies, tapes, or other objects.
- Instruct small children not to drop or push objects into the vents. Better still, put the VCR out of their reach.
- Do not use liquids near the VCR. Do not put potted plants on the unit, because watering them

invites accidents. If liquid is accidentally spilled on or near the unit, unplug it from the wall outlet and allow it to dry normally. Do not use a blow dryer to dry it off, as some parts could be damaged by the concentrated flow of hot air.

- High humidity affects the delicate electronic parts in the VCR. Most units are equipped with dew sensors that prevent it from operating when the humidity is too high.

Routine Cleaning

- Dust the VCR as often as you would your fine furniture. Special dust covers are available commercially for further protection.
- When the cabinet needs a more thorough cleaning, first unplug the unit from the AC power supply. Do not spray pump or aerosol cleaners directly on the VCR. Instead, apply the cleaner to a soft cloth and then wipe the cabinet.
- *Hint:* Run a high quality blank tape through the unit once or twice a month to keep the audio/video heads clean.








*This VCRFACT was prepared at the offices of Howard W. Sams & Company by: Barry Buchanan, Tim Clensy, Dave Crouch, George Farrell, Wendy Ford, Bob Hamilton, Dan McGowan, and George Weliver. We welcome your feedback. Write to:*

*VCRFACTS Department WF  
Howard W. Sams & Company  
2647 Waterfront Parkway East Drive  
Indianapolis, IN 46214*

Item	Type No.	Mfr. No.	NTE No.	ECG No.	TCE No.
Q404	2SA933Q	4835-130-47442	NTE290A	ECG290A	SK9132
Q405	2SC1740Q	4835-130-47435	NTE85	ECG85	SK3124A
Q501	2SC1740Q	4835-130-47435	NTE85	ECG85	SK3124A
Q502 (1)	2SC1740Q	4835-130-47435	NTE85	ECG85	SK3124A
Q651	2SB1010Q	4835-130-47425			SK9454
Q652	2SD1384Q	4835-130-47432			SK9453
Q653	2SD2005Q	4835-130-47434			
Q701 (1)	2SD2005Q	4835-130-47434			
Q851 (1)	2SC1740Q	4835-130-47435	NTE85	ECG85	SK3124A
QR1,2	DTC124ES	4835-130-47244	NTE2357	ECG2357	SK9742
QR201	DTC124ES	4835-130-47244	NTE2357	ECG2357	SK9742
QR401,2	DTC124ES	4835-130-47244	NTE2357	ECG2357	SK9742
QR501	DTA124ES	4835-130-47243	NTE2358	ECG2358	SK9741
QR502,3,4	DTA124ES	4835-130-47243	NTE2358	ECG2358	SK9741
QR651	DTC124ES	4835-130-47244	NTE2357	ECG2357	SK9742
QR801	DTA124ES	4835-130-47243	NTE2358	ECG2358	SK9741
QR851 (1)	DTC124ES	4835-130-47244	NTE2357	ECG2357	SK9742

# For SAFETY use only equivalent replacement part.  
(1) USED MODEL VC4223.

Participating Vendors

Philips ECG, Inc. (A North American Philips Company) Distributor & Special Markets Div. 1025 Westminster Dr. Williamsport, PA 17701 717-323-4691			Semiconductors 		
EVG / A Division of Russell Industries, Inc. 3000 Lawson Blvd. Oceanside, NY 11572 516-536-5000		VCR Belts	Projector Recorder Belt Corp. P.O. Box 176 Rte 3, Hwy 59 Whitewater, WI 53190		VCR Belts
GC-THORSEN 1801 Morgan St. Rockford, IL 61105-1209 815-968-9661		VCR Belts	Thomson Consumer Electronics, Inc. Distributor and Special Products 2000 Clements Bridge Rd. Deptford, NJ 08096-2088 609-853-2555		Semiconductors
NTE Electronics, Inc. 44 Farrand St. Bloomfield, NJ 07003 201-748-5089		Resistors Semiconductors	Workman Electronic Products, Inc. 11917 County Rd. 10-2 Delta, OH 43515 800-537-7103 FAX 419-923-7145		VCR Belts



Semiconductors

Item	Type No.	Mfr. No.	NTE No.	ECG No.	TCE No.
D401 - 7	1SS254	4835-130-37145	NTE519	ECG519	SK3100
D501 - 4	1SS254	4835-130-37145	NTE519	ECG519	SK3100
D504 (1)	MTZ6.8B	4836-130-37333	NTE5014A	ECG5014A	SK6A8
D505 - 7	1SS254	4835-130-37145	NTE519	ECG519	SK3100
# D603,4	1N4003	4835-130-37047	NTE552	ECG552	SK9000
# D605	MTZ30A	4835-130-37335	NTE5035A	ECG5035A	SK30A
# D606	MTZ6.2B	4835-130-37336	NTE5013A	ECG5013A	SK6A2
# D607 - D614	1N4003	4835-130-37337	NTE552	ECG552	SK9000
D651	MTZ5.6B	4835-130-37329	NTE5011A	ECG5011A	SK5A6
D651 (1)	MTZ6.2A	4835-130-37399	NTE5013A	ECG5013A	SK6A2
D701 (1)	MTZ5.6B	4835-130-37329	NTE5011A	ECG5011A	SK5A6
D801 - 8	1SS254	4835-130-37145	NTE519	ECG519	SK3100
D810 (1)	1SS254	4835-130-37145	NTE519	ECG519	SK3100
D812	1SS254	4835-130-37145	NTE519	ECG519	SK3100
IC1	HA118041NT	4835-209-87272			
IC55	AN78L05	4835-209-87252	NTE977	ECG977	SK3462
IC151 (1)	BU4052B	4835-209-87277	NTE4052B	ECG4052B	SK4052B
IC201	BA7767AS	4835-209-87269			
IC401	MN6748FVAN	4835-209-47091			
IC402,3	BA728	4835-209-87262			
IC405	BA6219B	4835-209-87268			
IC501	MN187124FVCW	4835-109-87542			
IC501 (1)	CXP50116	4835-209-87541			
IC502	BA10339	4835-209-87261			
IC502 (1)	PST529D	4835-209-87266			
IC504	BA6209N	4835-209-87271	NTE519	ECG519	SK3100
IC505	PST529D-2	4835-209-87266			
# IC601,2	AN7812F	4835-209-87283	NTE966	ECG966	SK3592
# IC603	AN7818F	4835-209-87275	NTE958	ECG958	SK3699
IC651	AN7805F	4835-209-87259	NTE960	ECG960	SK3591
IC701	LA7210	4835-209-87273			
IC702	L5631	4835-209-87264	NTE615P	ECG615A	
IC703	AN78M05	4835-209-87274	NTE960	ECG960	SK3591
IC851 (1)	MN12872FVAB	4835-209-87278			
Q1	2SC1740Q	4835-130-47435	NTE85	ECG85	SK3124A
Q2	2SA1317S	4835-130-47422	NTE2362	ECG2362	
Q4	2SC1740Q	4835-130-47435	NTE85	ECG85	SK3124A
Q92	2SB1010Q	4835-130-47425			SK9454
Q92 (1)	2SA934Q	4835-130-47422	NTE294	ECG294	SK3841
Q98	2SC1740Q	4835-130-47435	NTE85	ECG85	SK3124A
Q201	2SC2060Q	4835-130-47427	NTE293	ECG293	SK3849
Q402	2SC1740Q	4835-130-47435	NTE85	ECG85	SK3124A

MAINTENANCE SCHEDULE

To keep your VCR in top working condition, we recommend the following periodic cleaning, lubricating, and part replacement schedule. The schedule is presented in number of tapes because every user's viewing habits are unique. For example, if you record or watch one 2-hour tape per evening, you should service a new unit after approximately 8

months (250 tapes). To simplify keeping track of the schedule, we recommend that you keep a log of any maintenance performed on the VCR.

Date purchased: \_\_\_\_\_  
From: \_\_\_\_\_  
Serial number: \_\_\_\_\_

Every	What to do	Which parts	How to	Date done
250 tapes	Clean	Audio/control head	See page 10	_____
		Capstan shaft	See page 19	_____
		Full erase head	See page 12	_____
		Pinch roller	See page 19	_____
		Impedance roller	See page 19	_____
		Reel assemblies	See page 13	_____
		Video heads	See page 11	_____
500 tapes	Grease	Loading cam	See page 23	_____
		Loading gear plate	See page 23	_____
		Right tape loading gear	See page 23	_____
		Tape guide tracks	See page 18	_____
	Oil	Reel assemblies	See page 13	_____
1000 tapes	Replace	Brake arm assemblies	See page 13	_____
		Capstan motor	See page 20	_____
		Reel drive assembly	See page 18	_____
		Drive belt	See page 22	_____
		Front loading belt	See page 22	_____
		Impedance roller	See page 19	_____
		Loading belt	See page 22	_____
		Main belt	See page 22	_____
		Pinch roller	See page 19	_____
		Back tension band	*	_____
		Upper drum	See page 11	_____
1500 tapes	Replace	Audio/control head	*	_____
		Drum ground	See page 11	_____
		Full erase head	See page 12	_____
		Loading motor	See page 20	_____
		Reel assemblies	*	_____

\*This operation requires delicate adjustments that should be attempted only if you have the training and special equipment for that purpose. See the manufacturer's documentation.



# HOW THE VCR WORKS

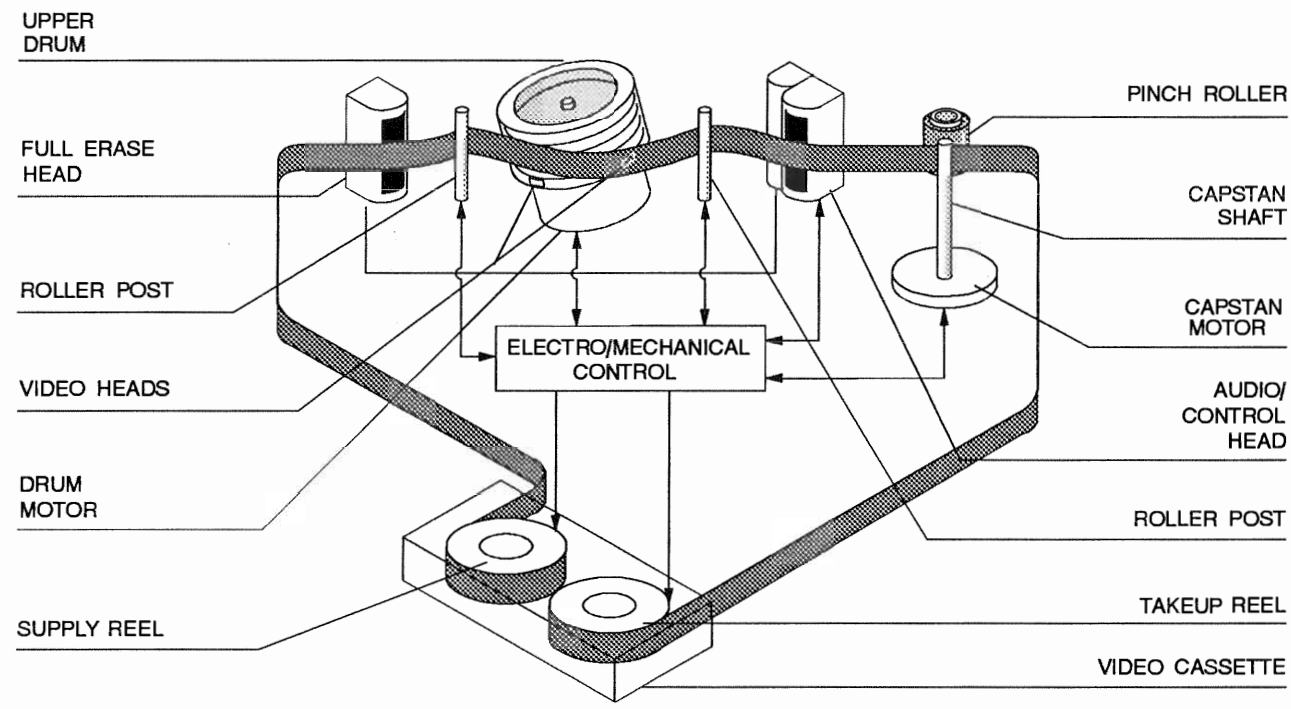
When you power up the VCR and insert a cassette, the cassette loading assembly pulls the cassette down and settles it onto the supply and takeup reel assemblies. When you push Record or Play, the upper drum, driven by the drum motor, starts to spin as the roller posts pull the tape out of the cartridge. The roller post move along the input/output tape guide tracks and wrap the tape approximately three-fourths of the way around the upper drum, which houses the video heads. At the same time, the drum motor unit begins to turn the capstan shaft. The pinch roller moves in and squeezes the tape against the capstan shaft so that the capstan motor can pull the tape through the machine. Meanwhile the takeup reel assembly is activated and rotates to pull the tape back into the cassette. Various rollers regulate the tension and the path of the tape.

As the tape moves through the tape path, it passes various heads whose function is to pick up, record, or

erase the electromagnetic signals on the tape. These are the signals that the VCR sends or receives from the TV monitor as pictures and sound. Accurate pictures and sound are possible because an electromechanical control (EMC) system carefully synchronizes the relative speeds of the drum motor (that moves the video heads) and the capstan motor (that pulls the tape).

When you select Rewind, the EMC system changes the direction the capstan motor turns, and a gear arrangement sets up for high-speed reverse tape travel. Brake pads and a back tension band slow the reel assemblies for a smooth flow of tape. An end-of-tape sensor controls shutoff at the end of the rewind.

Complex electronic circuitry coordinates the precise interaction of all these mechanisms. Quality output depends on aligning the mechanical parts to close tolerances and tightly controlling the signal levels.



# ELECTRICAL PARTS

Excluded from these lists are parts that are readily available through your local distributor.

## Resistors (Power and Special)

Item	Description	Mfr. No.	NTE No.
R461	10K 2% 1/5W CF	483511057214	
R462	10K 2% 1/5W CF	483511057214	
# R513	10K 5% 1/5W CF	483511057026	
# R513(1)	22K 5% 1/5W CF	483511057038	
# R523	3.3 5% 1W MF	483511687009	1W3D3
# R601	3.3M 10% 1/2W CC	483511047084	HW533
R603	1.5 5% 1W CF	483511027004	1W1D5
# For safety, use only equivalent replacement parts.			

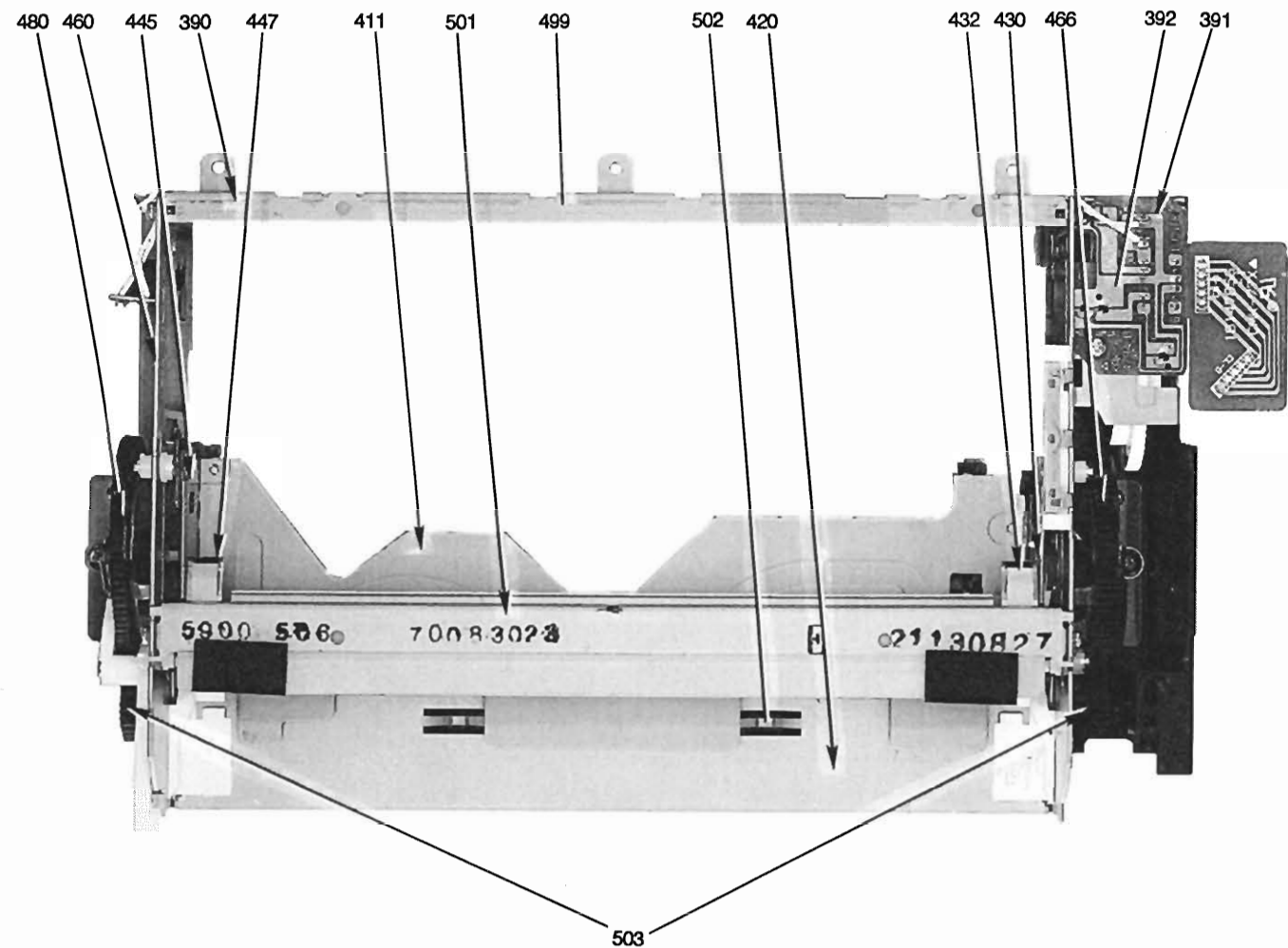
## Special Electrical Parts

Description	Mfr. No.
Cassette Switch/Sensor Connector Board (Model VC4223AT01)	483521437355 483521437369
Display/Control Board (Model VC4223AT01)	483521437352 483521437366
Drum Deck Connector Board (Model VC4223AT01)	483521437354 483521437368
Head Amp/Audio/Servo Board (Model VC4223AT01)	483521437349 483521437364
Power Supply Board	483521437345
Power Supply Connector Board (Model VC4223AT01)	483521437353 483521437367
System Control Board (Model VC4223AT01)	483521437351 483521437365
Video/Tuner Board (Model VC4223AT01)	483521437348 483521437363
Y/C Process Board	483521437341

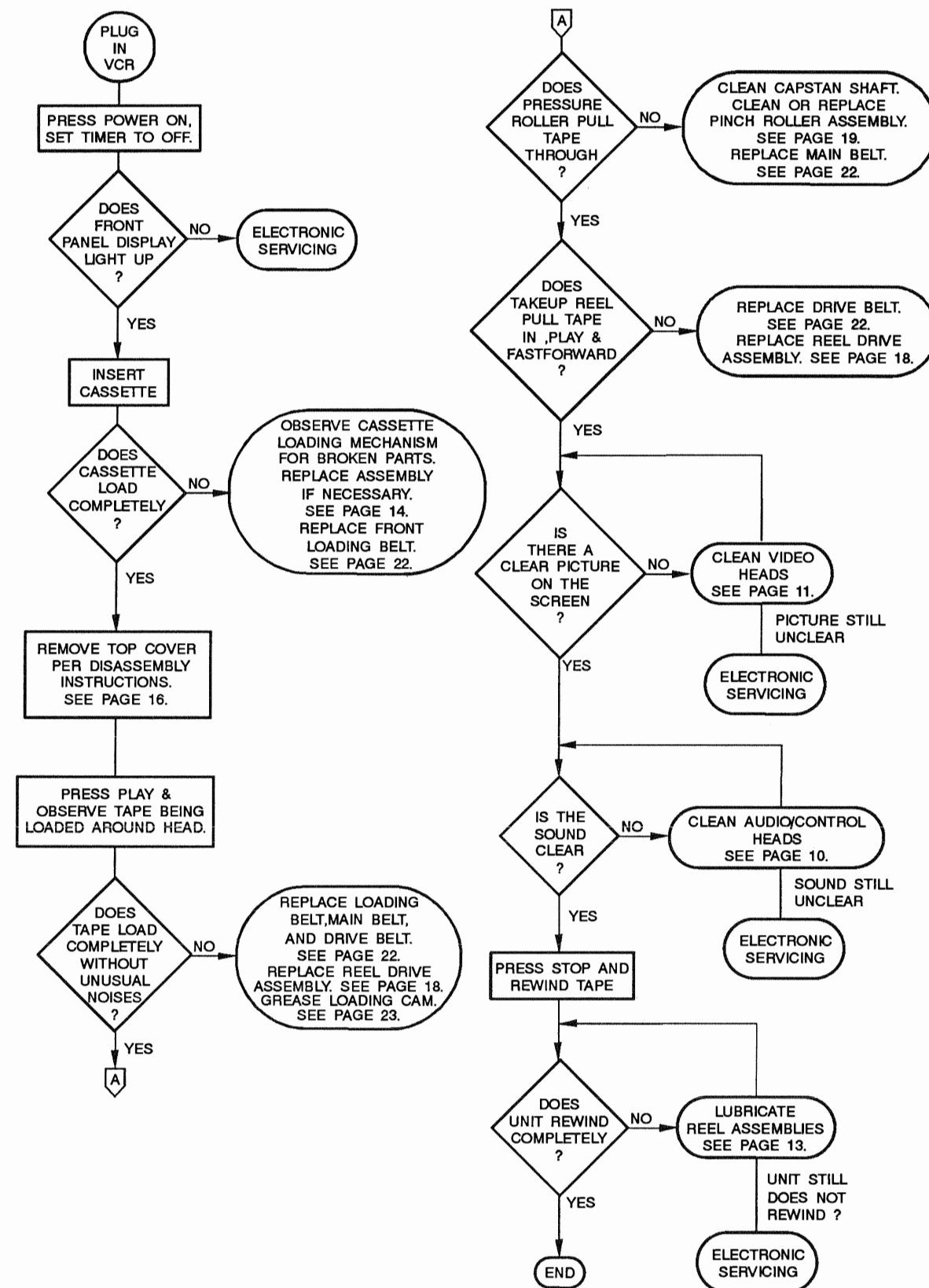
For information on the nearest  
Howard W. Sams & Company  
Authorized "Stocking Core" Distributor,  
call 317-298-5566.

## Obtaining Parts

When ordering parts, state the model number, the part number, and the part description. For most mechanical parts and for special electronic parts, use only exact replacements from the VCR manufacturer. For semiconductors and VCR belts, comparable replacements are available from the participating vendors listed on page 31.



## TROUBLESHOOTING FLOW



# TROUBLESHOOTING

When your VCR malfunctions, there are three possible causes: operator problems, mechanical problems, and electrical/electronic problems. This troubleshooting guide will help you detect operator and mechanical problems that you can correct. If those corrections don't work, the problem is probably electrical and you should refer to the manufacturer's detailed specifications.

## Start-Up Problems

Power switch "on", nothing happens  
Clock display may or may not be lighted

Check that the unit is plugged in. Verify that there is power in the outlet. Inspect the AC power cord for cracks and breaks. Make sure the VCR's Timer function is set to Off. If you just brought the unit in from the cold, wait a half-hour to let any possible condensation evaporate. If these measures don't work, there may be a more serious electrical malfunction.

## Cassette Loading Problems

Tape loads but ejects immediately  
Cassette does not open for tape loading  
Power turns off after tape loading/unloading

Scan the cassette loading mechanism (page 15) for damaged front loading belt, dirty pulleys, cracked or stuck loading gears, an unhooked or missing release lever spring, broken or chipped gear teeth, or cracks in the loading track. Replace the entire assembly if defects are serious (page 14).

If problems persist, the end-of-tape sensor may be malfunctioning, an electrical-to-mechanical interface may be out of phase, or the tape transport mechanism may need to be realigned, all of which require the

manufacturer's data and should be attempted only if you have electronics training.

## Tape Play Problems

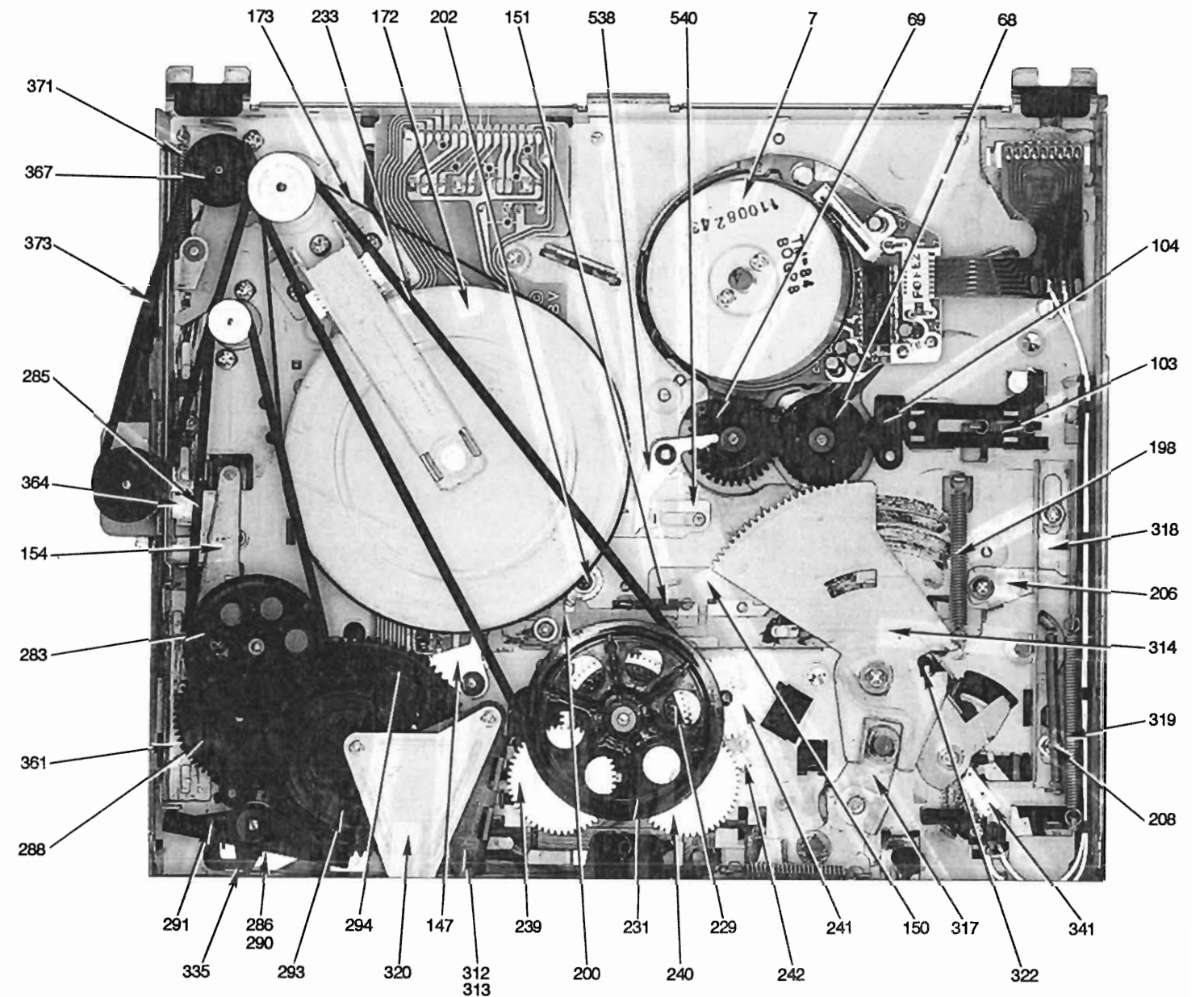
VCR "eats" tapes  
Rewind stops before end of tape  
Play, fast forward, rewind functions are slow or don't work  
Squealing noises

Tape winding and speed problems suggest malfunctions in the various rollers, the capstan motor, or the cassette takeup assemblies. Check the reel drive assembly for wear (page 18). Oil the two reel assembly shafts (page 13). Clean the impedance roller (page 19), the pinch roller (page 19), and the capstan shaft (page 19). Check the drive, loading, and main belts and clean the associated pulleys (page 22,23). If none of these remedies are effective, the problem is probably electrical.

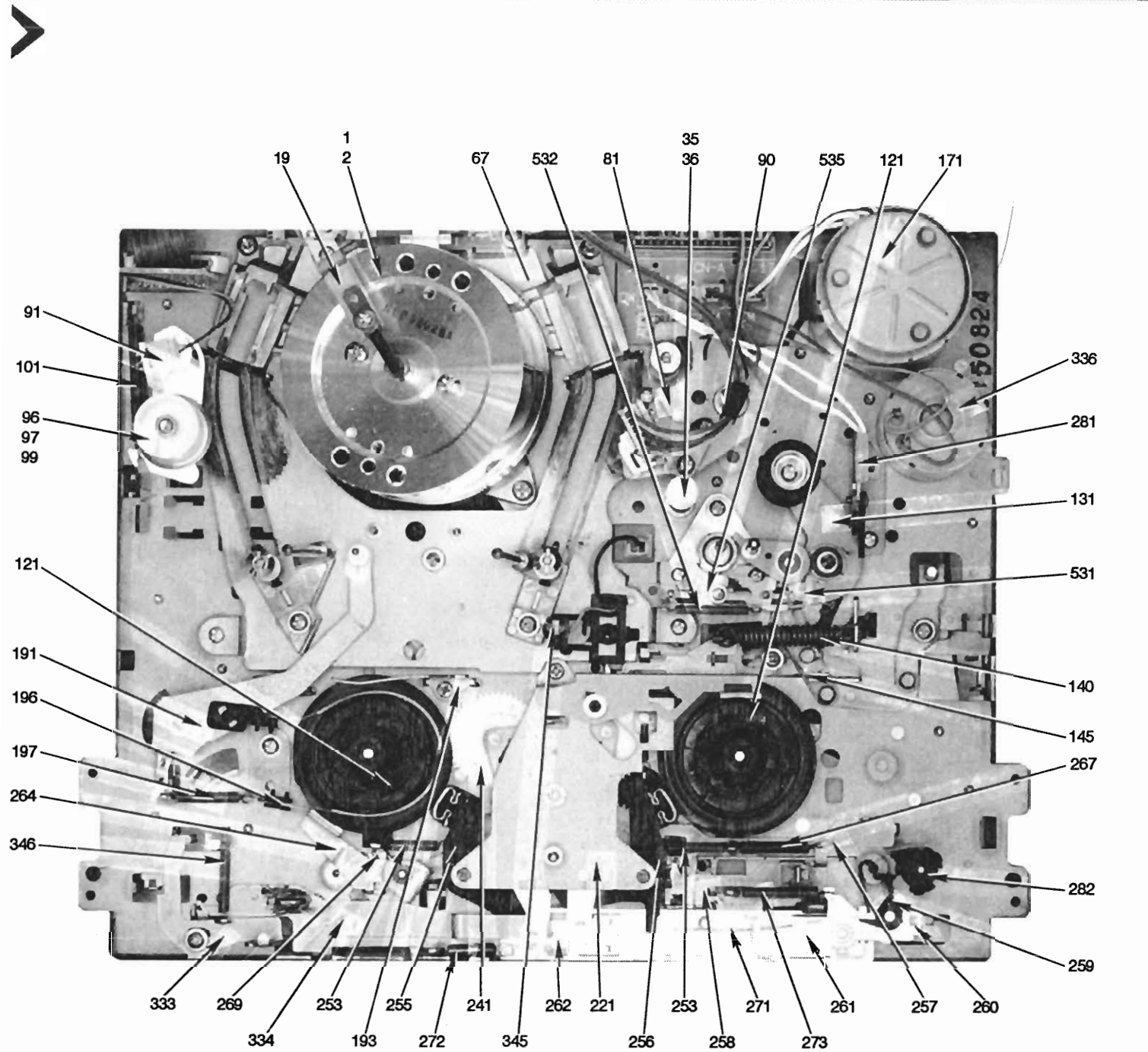
## Sound Problems

No audio in playback  
Volume too low or fluctuates  
Buzz, hum, or previous soundtrack present  
Popping or static sounds  
Wow and flutter

First try another tape to see if the problem disappears. Adjust the audio controls on the TV and try different audio switches on any stereo that is hooked up to the VCR. Clean the audio/control and full erase head (page 10,12). Check and clean the pinch roller and impedance roller (page 19). Check the main and drive belts for breaks or wear and replace if necessary (page 22,23).







### Picture Problems

- VCR on, but no picture
- "Snow" on video screen
- "Noise" bars at top or bottom
- Intermittent jagged lines
- Horizontal lines that follow a set path, then disappear (indicating scratched tape)
- Bending images

Make sure the TV controls are set so that normal television signals are received clearly. Make sure the TV/VCR switches are in the VCR position on both units. Check the connections to the VCR. Try a different tape in the VCR. Adjust the VCR's tracking control, if your model has one. Check for electrical interference from an appliance operating nearby. Look for foreign objects in the unit, and clean any debris from the tape guide tracks (page 21). Clean the video heads (page 11). Clean all the other parts of the tape path: full erase head, impedance roller, audio/control head, capstan shaft, and pinch roller (pages 10,12,19). Most picture problems will be solved by one of these remedies. If not, electronic servicing is probably needed. (Note: There may be incompatible circuitry in recent VCR models when used with older TV sets.)

### WHAT TO LOOK FOR INSIDE THE UNIT

#### Dirty Heads and Rollers

The various heads and rollers often pick up electromagnetic debris after hours of close contact with moving tapes. This debris consists of magnetic oxides that appear as a dusty film.

#### Worn Rubber Parts

Belts, tires, and other rubber parts that are worn appear dry and dull. If you carefully stretch and bend them, you may find tiny hidden cracks. Don't replace these until you locate the proper replacement parts, as the VCR may still operate even with worn parts. When you do replace them, remove and replace one at a time to avoid confusion.

#### Broken or Chipped Gears

Look for missing teeth, cracks, and other breaks in the system of plastic gears. Some of these may be deep inside the unit and can only be repaired by a trained technician.

#### Foreign Objects

People report finding everything from marbles to peanut butter and jelly sandwiches in the units they've had to repair. But look also for smaller pieces of debris such as sprung springs and chips from plastic parts.

#### Proper Sequence of Operation

Observe the unit in operation to see whether the proper sequence of events occurs as described in "How the VCR Works."

#### Burns, Smoke, or Smells

If you find these, don't attempt any repairs unless you are qualified. These symptoms spell DANGER.

How to Use This Data

- The troubleshooting and servicing information in this VCRFACT is to help you find and correct common mechanical problems in the cassette loading and tape transport mechanisms and to show you how to clean the audio and video heads.
- These types of problems account for 75% of VCR malfunctions and can easily be fixed by a home electronics hobbyist or audio buff who has completed at least a high school science course.
- The remaining 25% of malfunctions are electronic and involve working with live power or fine-tuning adjustments using highly specialized measurement equipment. These problems, and any that require extensive disassembly, should be tackled only if you have special training in electricity and electronics. You will need to refer to schematics and adjustment details furnished in the manufacturer's documentation.
- Use the table of contents at the back of this VCRFACT to locate the information you need to perform a specific servicing task. If you wish to purchase the manufacturer's documentation for electronic repairs, write to:

Service Company  
Technical Puplicaion Dept.  
P.O.Box 555, Old Andrew Johnson Hwy.  
Jefferson City, TN. 37760

- Take a careful look at the assembly before removing anything. Note which parts are involved and how they interconnect. If you must disconnect any wires, tape a note to the end of each wire to remind you where it attaches. Be especially wary of any part replacement or servicing that requires extensive disassembly in the guts of the machine. Attempt such tasks only if you are qualified.
- Do not set out to tighten what appear to be loose screws, nuts, or knobs. Some of the adjustments in a VCR are so critical that a simple half-turn on any of them could require lengthy realignment using very specialized technical equipment.

Remove AC Power

- Always unplug the VCR before servicing. Qualified service technicians may wish to troubleshoot by running a videotape through the machine while the covers are off. Do not attempt this unless you have special training in electricity and electronics. Live power is involved and there is danger of shock in untrained or careless hands.
- For added protection even if you do not intend to work with live power, operate the equipment on an outlet that has a ground fault interrupt (GFI) detector. The fault detector will sense when an electrical connection is disrupted and will shut off power to the equipment.

Drain Electrostatic Charge

- Semiconductor devices like VCRs are easily damaged by static electricity. You can pick up an electrostatic charge simply by walking across a carpet, changing position in a fabric or plastic covered chair, combing your hair, or just brushing off your clothes.
- Before handling printed circuit boards (for example, during disassembly), drain off any

Before Taking Apart an Assembly

- Whether you are troubleshooting, cleaning, or simply observing the internal workings of the VCR, realize that this is a complex piece of equipment that is easily damaged by careless handling. Do not attempt any task that you are not confident you can complete successfully.

Ref.No.	Mfr. No.	Description	Ref.No.	Mfr. No.	Description
335	483552617007	Record Actuate Spoke	501	483546697032	Upper Plate
336	483528097004	Dew Sensor	502	483552617008	Synchronize Shaft
341	483526717001	Leaf Switch	503	483552237114	Synchronize Gear (A)
345	483546477064	Lamp Board	531	483546697033	RG Slide Plate
346	483549297105	Record Lever Spring	532	483549297107	RG Slide Spring
361	483540297259	Eject Actuator	535	483540297263	RG Arm Semi Assembly
364	483546697029	Loading Brake Plate	538	483540297261	RG Actuate Arm
367	483546477065	E Idler Arm Assembly	540	483540297262	RG Actuator
371	483549297106	Idler Arm Spring			
373	483535837078	Front Loading Belt****			
390	483569127043	Front Loading Mechanism			
391	483546477071	Cassette Load Bracket Assembly			
392	483552827007	Front Loading Clutch Assembly			
411	483546477066	Cassette Holder Assembly			
420	483546477067	Front Angle Assembly			
430	483546477068	Right Side Plate Assembly			
432	483546697031	Cassette Push Plate			
445	483546477069	Left Side Plate Assembly			
447	483546697031	Cassette Push Plate			
460	483546477073	Right Frame Assembly			
466	483552237115	Right Lift Gear Assembly			
480	483546477072	Left Frame Assembly			
499	483528097005	End Sensor Wire			

\* Main belt also available from EVG, a Division of Russell Industries (No. 1407-80), GC Thorsen (No.1424-18), PRB (No. FRM11.5), Workman (1407-73).

\*\* Drive belt also available from EVG, a Division of Russell Industries (No. 1407-171), GC Thorsen (No.1425-47)

\*\*\* Loading belt also available from EVG, a Division of Russell Industries (No. 1407-161), GC Thorsen (No.1425-32), PRB (No. OA7.4), Workman (1407-161).

\*\*\*\* Front loading belt also available from EVG, a Division of Russell Industries (No. 1407-481), GC Thorsen (No. 1425-41), PRB (No. SC46.5), Workman (1407-450).



MECHANICAL PARTS

The reference numbers of this list are keyed to photographs of the chassis showing the location of each part. The photos appear on pages 26 thru 28.

You may obtain these parts from the manufacturer or an authorized service center. Use only the exact replacements.

Ref.No.	Mfr. No.	Description	Ref.No.	Mfr. No.	Description
1	483569127044	Cylinder Assembly	233	483535837076	Drive Belt**
2	483569127041	Upper Drum	239	483552237111	Play Gear Assembly
7	483521437174	TM84 Motor	240	483552237112	Reverse Fast Forward Gear Assembly
19	483529087033	Drum Ground	241	483552237109	Return Gear Assembly
35	483540297234	Tape Guide	242	483540297247	Return Arm
36	483549297083	Tape Guide Spring	253	483549297096	Brake Arm Spring
67	483546477054	Loading Base Assembly	255	483546477059	Supply Brake Arm Assembly
68	483552237106	Left Loading Gear Assembly	256	483546477061	Takeup Brake Arm Assembly
69	483552237107	Right Loading Gear Assembly	257	483546647015	Lifter Brake
81	483546477056	Head Base Assembly	258	483546647016	Lifter Brake Actuator
90	483549297088	Head Spring	259	483540297249	Trigger Hook
91	483546477055	Full Erase Plate Assembly	260	483540297248	Trigger Lever
96	483552877033	Impedance Roller	261	483546697026	Brake Plate
97	483553087066	Impedance Roller Sleeve	262	483546647014	Brake Actuate Base
99	483549297086	Tape Guide Flange Spring	264	483546647017	Supply Soft Brake
101	483549297085	Full Erase Plate Spring	267	483549297099	Lifter Brake Actuator Spring
103	483549297087	Full Actuate Spring	269	483549297101	Supply Soft Brake Spring
104	483540297236	Full Erase Lever	271	483549297102	Trigger Lever Spring
121	483552817108	Reel Assembly	272	483549297097	Brake Actuate Base Spring
131	483546477057	Pinch Roller Arm Assembly	273	483549297098	Brake Plate Spring
140	483549297091	Pinch Roller Spring	281	483536127041	Loading Motor Assembly
145	483540297237	Pinch Actuate Arm	282	483546477063	Trigger Bearing Assembly
146	483549297089	Pinch Actuate Arm Spring	283	483552887012	Loading Pulley
147	483540297239	Pinch Crank	285	483535837077	Loading Belt***
150	483540297238	Pinch Slider	286	483540297251	Search Arm (B)
151	483549297092	Pinch Slider Spring	288	483552237113	Loading Gear
154	483540297241	Pinch Cam Lever	290	483540297252	Brake Actuate Arm
171	483536127039	Capstan Motor Assembly	291	483540297253	Eject Actuate Arm
172	483552867002	Capstan Flywheel	293	483552837007	Loading Cam
173	483535837075	Main Belt*	294	483546477062	S Brush
191	483540297245	Back Tension Arm	312	483540297255	Loading Lever Semi Assembly
193	483540297242	Back Tension Support	313	483552877034	Cam Roller
196	483546317003	Back Tension Band	314	483540297254	Loading Gear Plate
197	483549297094	Band Holder Spring	317	483540297256	Loading Actuate Lever Semi Assembly
198	483549297093	Back Tension Spring			
200	483546697025	Back Tension Change Plate	318	483546697028	Loading Actuate Plate Semi Assembly
202	483540297244	Back Tension Return Lever			
206	483540297243	Back Tension Lever	319	483549297103	Loading Actuate Spring
208	483549297095	Back Tension Actuate Plate Spring	320	483546697027	Loading Lever Reinforce Plate
221	483546477058	Reel Drive Assembly	322	483549297104	Loading Gear Plate Spring
229	483552237108	Clutch Assembly	333	483540297257	Record Lever
231	483552887011	Middle Pulley Assembly	334	483540297258	Record Actuator

electrostatic charge on your body by touching a known earth ground. Examples of grounds are a plumbing pipe or the metal screws on the coverplates of wall switches and receptacles. Anti-static devices (e.g., a wristband) are available commercially for people who do a lot of work with electronic parts.

Demagnetize the Heads

- The buildup of magnetic tape coating material on the upper cylinder and video heads eventually may cause them to become polarized. This will make the heads less and less sensitive to the minute values of information on the tape.
- You can use a demagnetizer to neutralize the charged particles on the heads. This restores their sensitivity and gives better results from head cleaning. But make sure you hold the demagnetizer at least an inch away from the delicate video heads.
- Avoid using magnetized materials anywhere near the VCR. Even a magnetized screwdriver could cause havoc.

Working with Power

CAUTION: Do not work with electrical and electronic parts unless you are qualified by special training.

- Upon completion of service, replace all insulators, knobs, and shields, and restore to their original position any wires that you moved.
- Before returning the VCR to service, perform an AC leakage test using an AC voltmeter with at least 5000 ohms per volt sensitivity. Connect a 0.15µF AC capacitor in parallel with a 1500-ohm 10-watt resistor from a good earth ground to all exposed metal parts on the VCR cabinet. A voltmeter reading higher than 0.3 volts RMS across the 10-watt resistor indicates a shock hazard and must be corrected.

DISASSEMBLY TOOLS

For the mechanical servicing described in these pages, you will need these items:

- 5 millimeter nut driver
- Small point phillips screwdriver
- Medium point phillips screwdriver

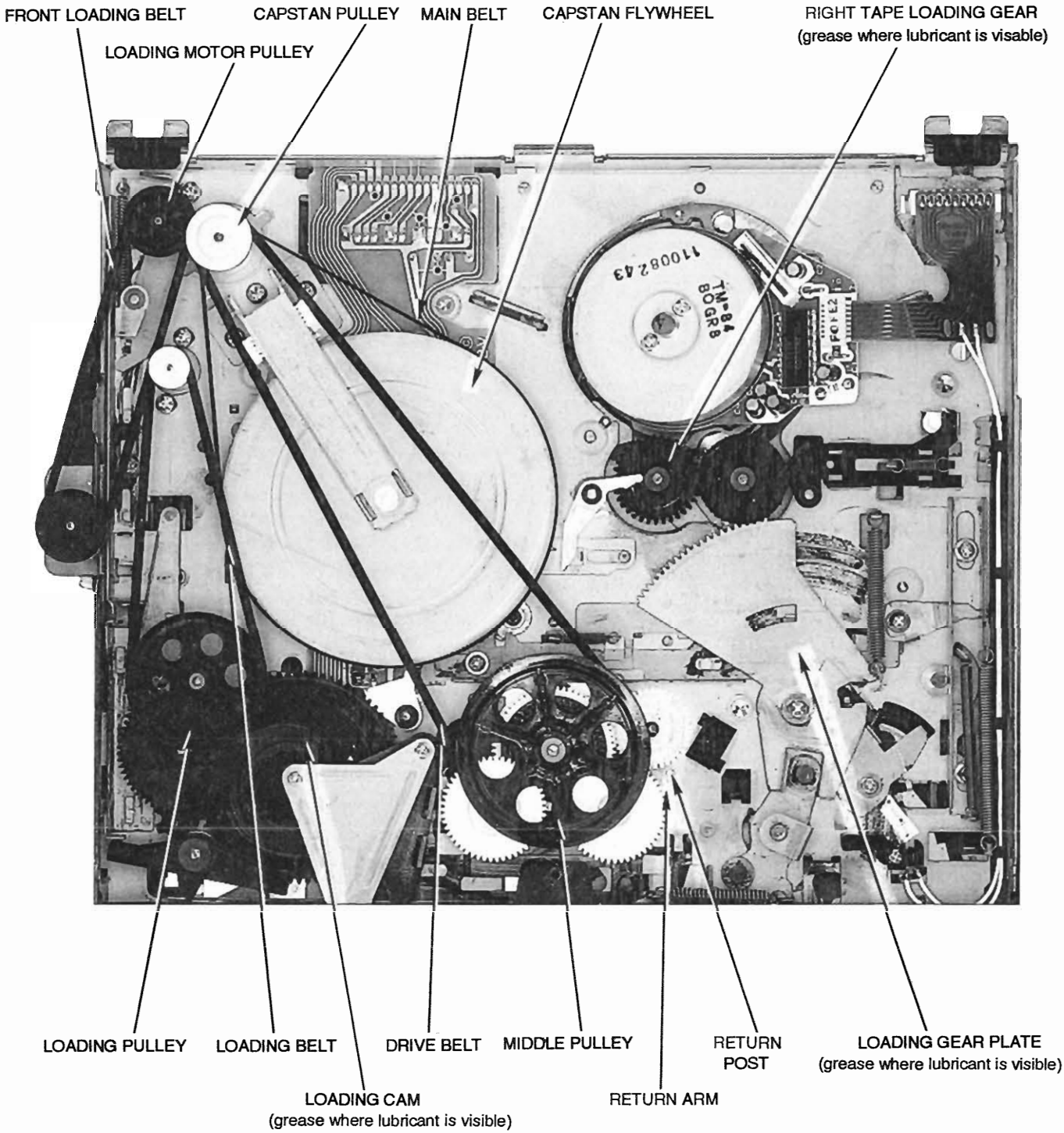
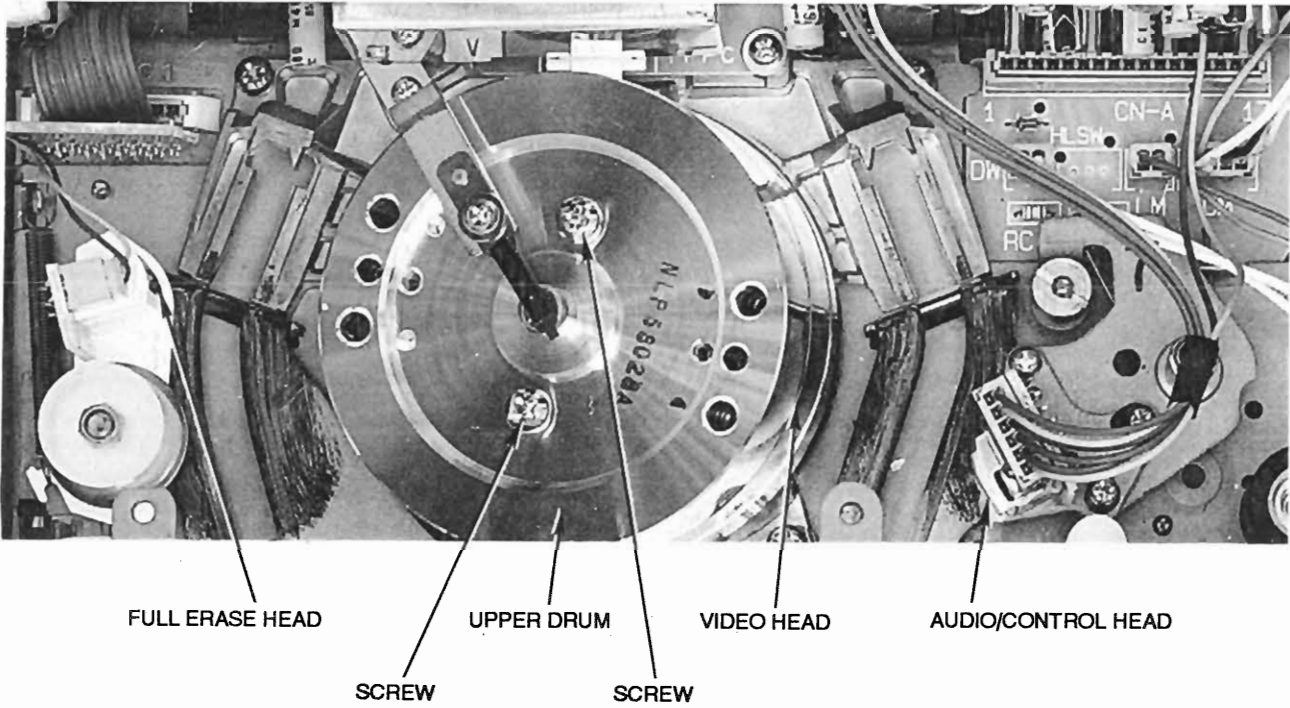
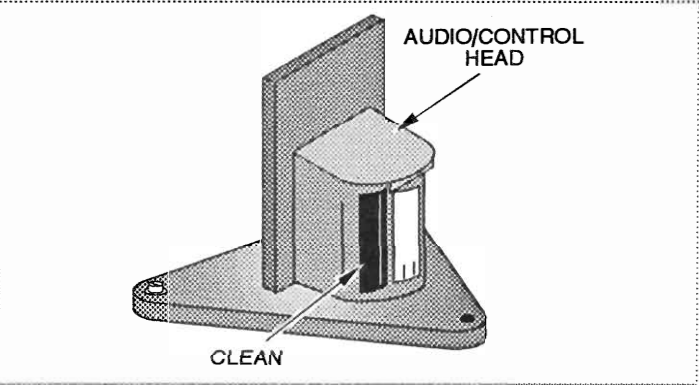
# AUDIO & VIDEO HEADS

Removing the magnetic oxide buildup on the heads can solve many picture and sound problems. Before cleaning the video, audio, or full erase heads, read about cleaning materials on page 17. Follow the basic disassembly instructions on page 16. The instructions given here assume you are cleaning manually rather

than using a tape cleaning cassette. If your VCR shows no improvement after cleaning, you may need to replace the heads, as described in this section, the problem may lie in the electronic circuitry, in which case you will need to refer to the manufacturer's documentation.

## Cleaning the Audio/Control Head

- 1. Remove the top cover. Using a head cleaning stick dampened with cleaning solvent, gently rub the audio/control head in the same direction as the tape travels during forward play.
- 2. Do not rub up and down on the head, or use more than a gentle pressure.



### Replacing the Front Loading Belt

1. Remove the bottom cover.
2. Remove the old front loading belt from the eject pulley and the front loading clutch pulley.
3. Clean the eject pulley and front loading clutch pulley with a swab and cleaning solvent. Make sure they are dry before you install the new belt.
4. Carefully place the new front loading belt around the eject pulley and front loading clutch pulley. Be sure not to nick, cut, or overstretch the new belt.

### Replacing the Loading Belt

1. Remove the bottom cover.
2. Remove the old loading belt from the loading pulley and the loading motor pulley.
3. Clean the loading pulley and loading motor pulley with a swab and cleaning solvent. Make sure they are dry before you install the new belt.
4. Carefully place the new loading belt around the loading pulley and loading motor pulley. Be sure not to nick, cut, or overstretch the new belt.

### Replacing the Main Belt

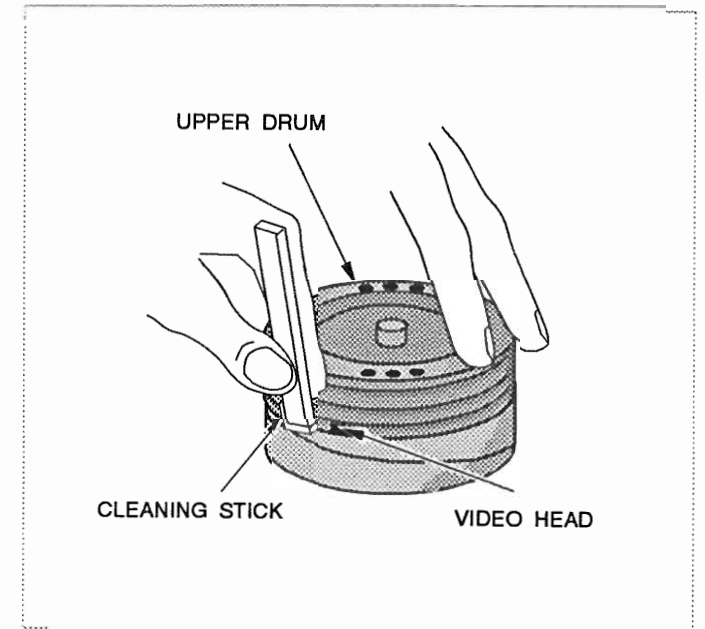
1. Remove the bottom cover. Remove the drive belt.
2. Remove the old main belt from the capstan pulley and the capstan flywheel.
3. Clean the capstan pulley and capstan flywheel with a swab and cleaning solvent. Make sure they are dry before you install the new belt.
4. Carefully place the new main belt around the capstan pulley and capstan flywheel. Be sure not to nick, cut, or overstretch the new belt.

### Replacing the Drive Belt

1. Remove the bottom cover.
2. Remove the old drive belt from the capstan pulley and the middle pulley.
3. Clean the capstan pulley and middle pulley with a swab and cleaning solvent. Make sure they are dry before you install the new belt.
4. Carefully place the new drive belt around the capstan pulley and middle pulley. Be sure not to nick, cut, or overstretch the new belt.

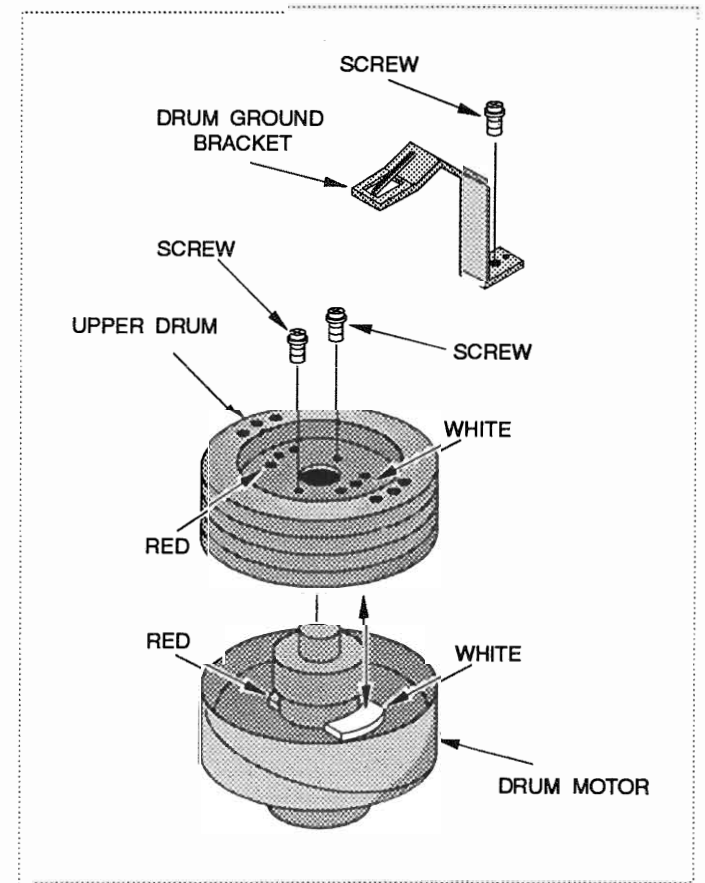
### Cleaning the Video Heads

1. Remove the top cover. Hold the top of the upper drum so it will not turn during cleaning. *Do not touch the video heads.*
2. Using a head cleaning stick dampened with cleaning solvent, gently rub the video heads in the same direction as the tape travels.
3. Do not rub up and down on the heads or use more than the gentlest pressure.
4. If tape buildup does not immediately rub off, continue rubbing gently until the head is clean.
5. Avoid getting head cleaner on any plastic surface.

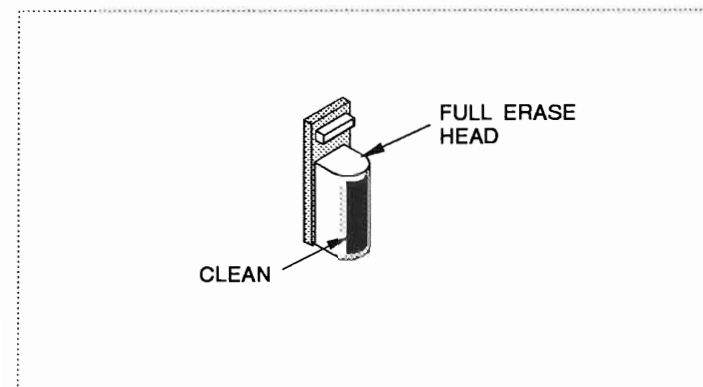


### Replacing the Upper Drum

1. Remove the top cover. Remove the screw securing the drum ground, and remove the drum ground.
2. Remove the two screws securing the upper drum to the drum motor, and lift the upper drum up to remove it.
3. Install the replacement upper drum by aligning the white and red video heads, located on the bottom of the upper drum, with the white and red connector boards on the lower drum. *Do not touch the video heads.*
4. Install the two screws securing the upper drum to the drum motor. Alternately tighten the screws until both screws are equally tightened. Install the drum ground and tighten the screw.
5. Before you reinstall the top cover, load a blank tape and make a recording. Play it back to test the replacement upper drum and video heads. Watch for signs of curling or creasing as the tape travels. This may indicate a mechanical alignment problem that will require specialized tools and measurement equipment.





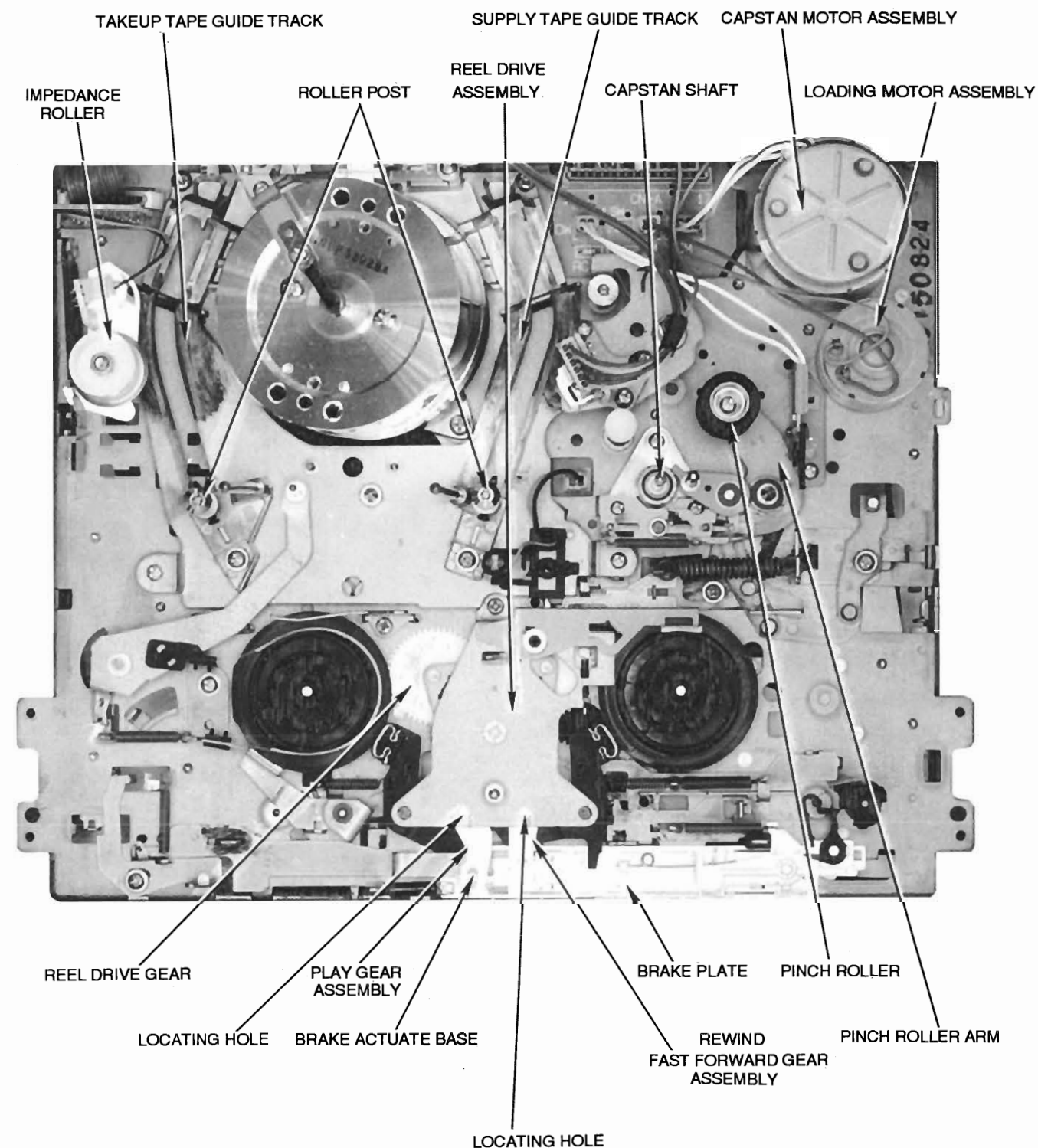
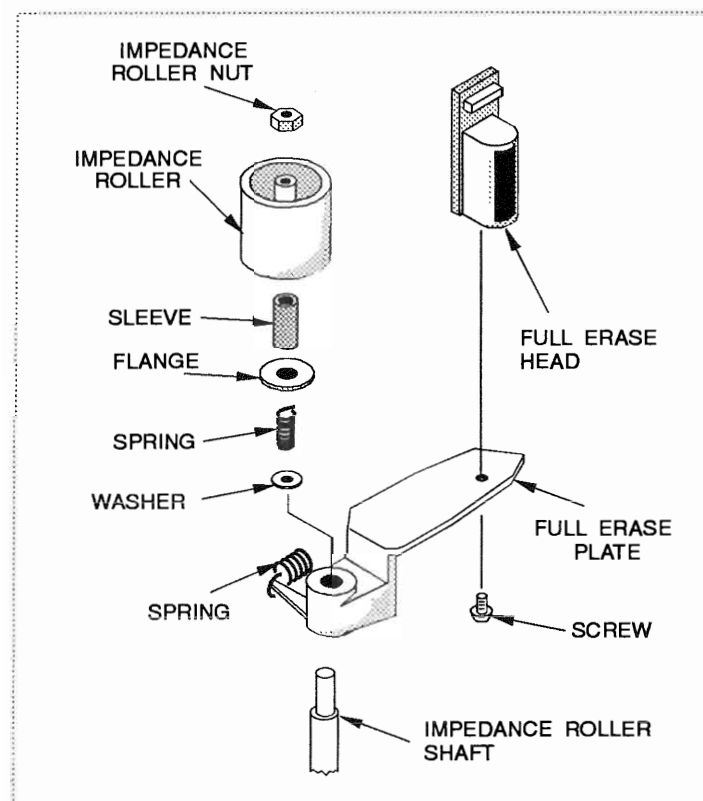


### Cleaning the Full Erase Head

1. Remove the top cover. Using a head cleaning stick dampened with cleaning solvent, gently rub the full erase head in the same direction as the tape travels.
2. Avoid scratching or denting the smooth face of the erase head.

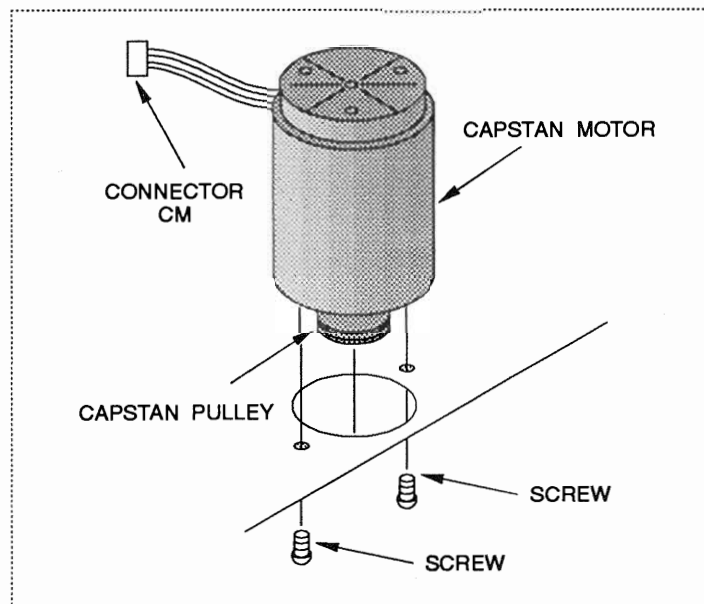
### Replacing the Full Erase Head

1. Remove the top cover. Disconnect the full erase head electrical connector, and remove the spring between the full erase plate and the chassis.
2. Record the number of turns required to remove the impedance roller nut so that it can be properly reinstalled. Remove the impedance roller nut, impedance roller, sleeve, flange, spring, and washer from the impedance roller shaft.
3. Slide the full erase plate off of the impedance roller shaft and remove the screw, securing the full erase head, from the bottom of the full erase plate.
4. Position the replacement full erase head on the full erase plate and replace the screw.
5. Slide the washer, spring, flange, sleeve, and impedance roller onto the impedance roller shaft.
6. Install the impedance roller nut and tighten it the same number of turns that was required to remove it. Reconnect the full erase head electrical connector.
7. After replacing the full erase head, load a cassette and play it. Ensure that the tape does not ride over or under the impedance roller. If the tape rides too high, turn the impedance roller nut counter-clockwise to properly adjust the impedance roller. If the tape rides too low, turn the impedance roller nut clockwise to properly adjust the impedance roller.



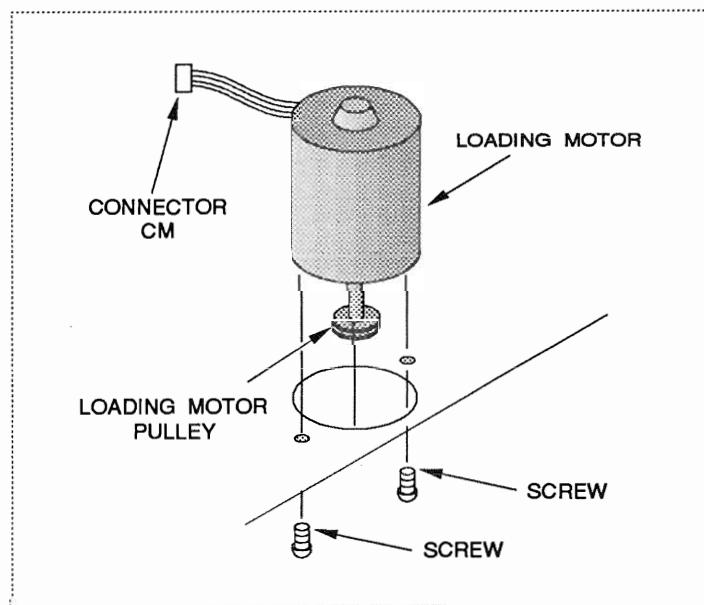
## Replacing the Capstan motor

1. Remove the top and bottom covers.
2. Disconnect connector CM from the base board.
3. Remove the drive belt and the main belt from the capstan pulley.
4. Remove the two screws, securing the capstan motor, from the bottom of the chassis and remove the capstan motor.
5. Install the replacement capstan motor and tighten the two screws. Reinstall the main belt and the drive belt onto the capstan pulley.
6. Reconnect connector CM to the base board.



## Replacing the Loading Motor

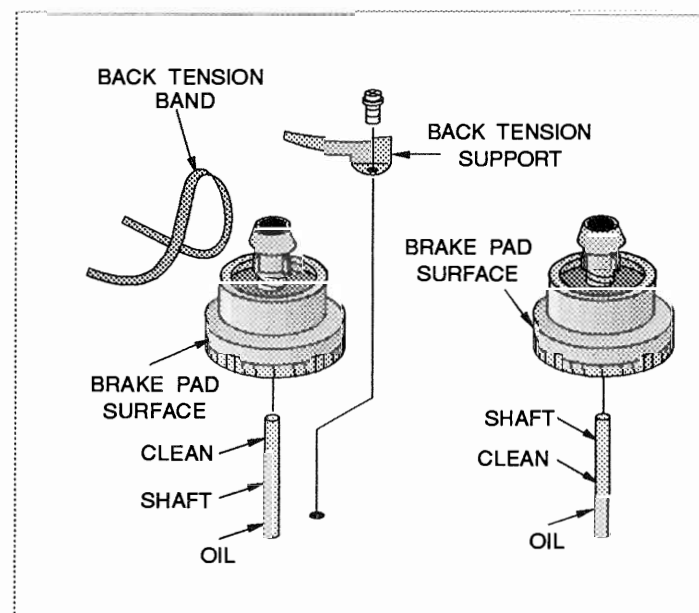
1. Remove the top and bottom covers.
2. Disconnect connector LM from the base board.
3. Remove the loading belt from the loading motor pulley.
4. Remove the two screws, securing the loading motor, from the bottom of the chassis and remove the loading motor.
5. Install the replacement loading motor and tighten the two screws. Reinstall the loading belt onto the loading motor pulley.
6. Reconnect connector LM to the base board.



# CASSETTE HOLDER ASSEMBLY

## Cleaning the Reel Assemblies

1. Remove the top cover, following the disassembly instructions on page 16.
2. Use a cleaning swab slightly dampened with a solvent that won't harm plastic.
3. Wipe the brake surfaces of the supply reel and takeup reel assemblies, being careful not to wet the brake pads. Don't run a tape until the pads are dry and free of cleaning solution.

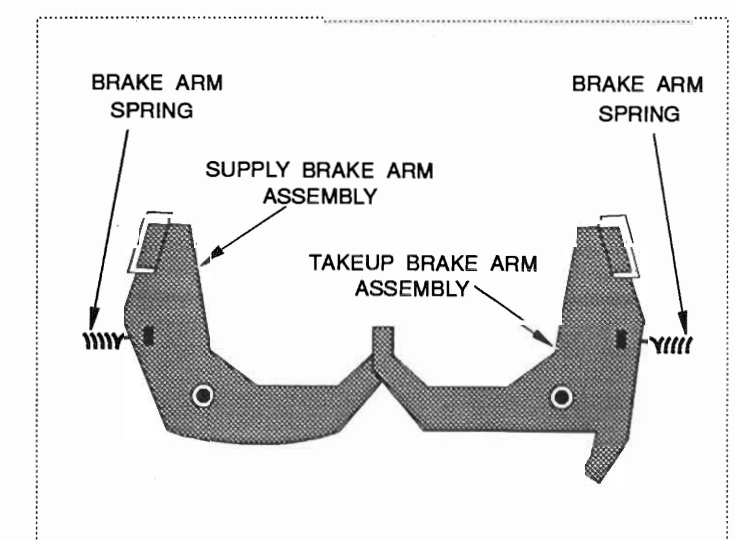


## Oiling the Reel Assemblies

1. Remove the top cover, cassette loading mechanism, and the reel drive assembly.
2. Remove the screw securing the back tension support and remove the support. Reposition the back tension band so that the supply reel assembly can be removed.
3. Move the brake arm assemblies away from the reel assemblies and slide the supply and takeup reel assemblies off of the shafts. Be careful not to lose the washers that are located under the reel assemblies.
4. Clean the shafts with a cleaning swab and solvent. After the solvent dries apply oil to the shafts.
5. Reinstall the washers and reel assemblies onto the shafts and clean the reel assemblies.
6. Reposition the back tension band around the supply reel assembly. Reinstall the back tension support and tighten the screw.
7. Reinstall the reel drive assembly and the cassette loading assembly.

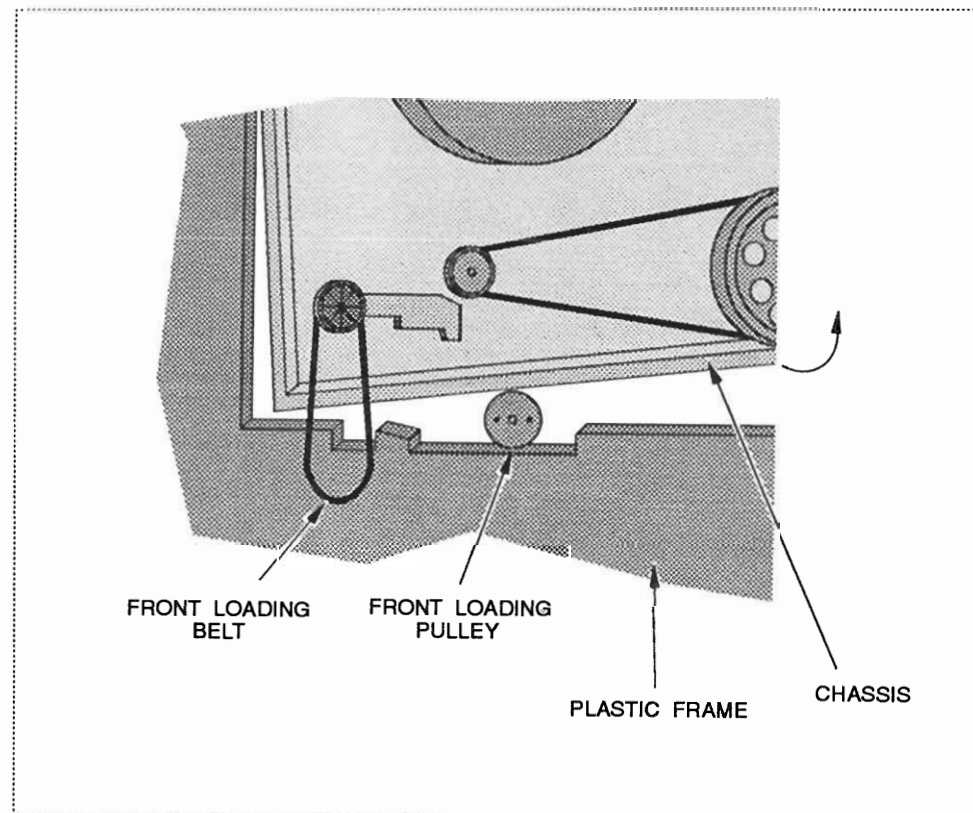
## Replacing the Brake Arm Assemblies

1. Remove the top cover, the cassette mechanism, and the reel drive assembly.
2. Remove the brake arm springs from the supply and takeup brake arm assemblies. Note how the brake arm assemblies are positioned. Remove the brake arm assemblies.
3. Install the replacement supply and takeup brake arm assemblies. Reinstall the brake arm springs.



## Replacing the Cassette Loading Mechanism

1. Although it is possible to replace individual parts in this assembly, such replacements should be attempted only if you have the special equipment necessary to align the parts properly. Others should consider replacing the entire assembly.
2. Remove the top, bottom, and front covers.
3. Remove the two side chassis screws. Loosen the rear chassis screw as much as possible without allowing the screw to come into contact with the Head Amp/Audio/Servo Board.
4. Remove the four screws securing the cassette loading mechanism. Remove the screw from the cassette loading mechanism ground wire. Remove the screw from the front loading board. Slide the cassette loading mechanism far enough towards the front of the VCR to release the tabs from the slots in the chassis.
5. Remove the screw securing the end sensor to the left side of the cassette loading mechanism and the screw securing the start sensor to the right side. Remove the sensor wires from the tabs on the top of the cassette loading mechanism.
6. Set the VCR on its right side and remove the front loading belt.
7. Remove the cassette loading mechanism by carefully moving the chassis up and out just far enough to allow the front loading pulley room to slide between the chassis and the plastic frame. Carefully remove the cassette loading mechanism from the unit.
8. Install the replacement cassette loading mechanism by following the above procedures in the reverse order.

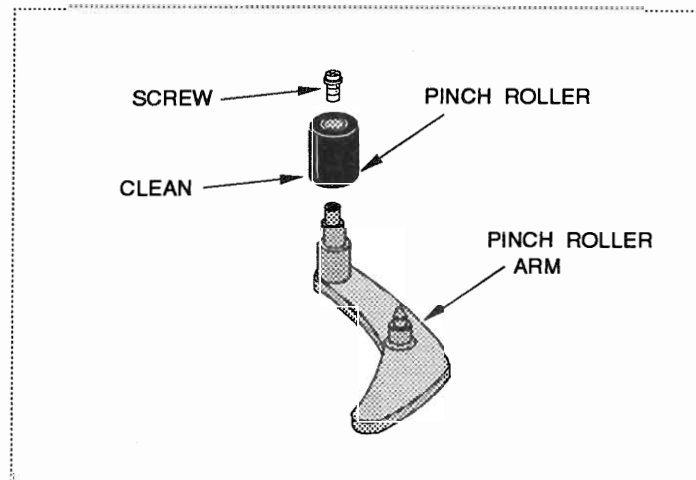


## Cleaning the Capstan Shaft

1. Remove the top cover. Clean the capstan shaft next to last because, next to the pressure roller, it is the part of the tape path most likely to accumulate debris.
2. Wipe the shaft in the direction of forward tape travel, using a swab dampened with cleaning solvent. Do not let excess liquid run along the shaft into the dust seals.
3. Make sure the shaft is dry before inserting a test cassette.

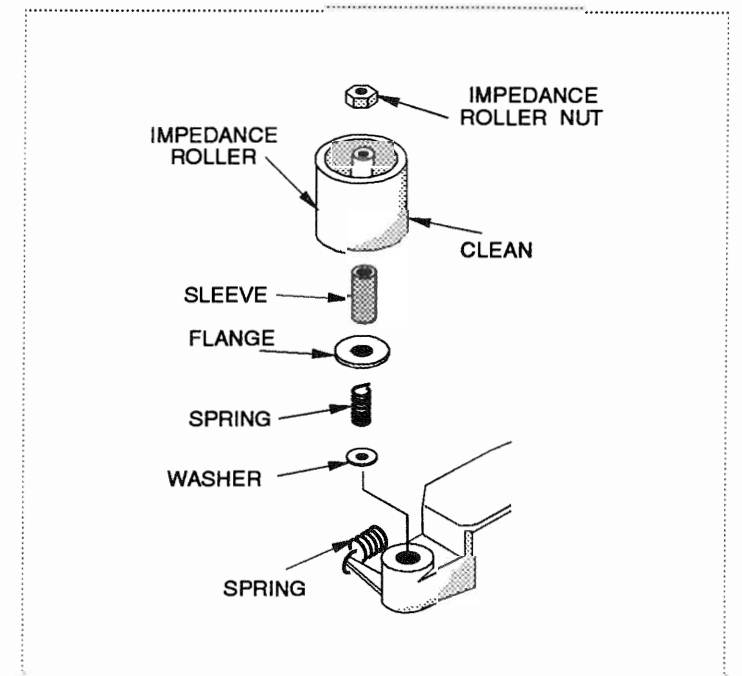
## Cleaning and Replacing the Pinch Roller Assembly

1. Remove the top cover. The pinch roller is made of rubber. Rubber can be dissolved by alcohol, so clean this part only if it looks dirty.
2. If it does need to be cleaned, clean it last, because it will blacken the cleaning swab and load it with debris. Wipe with a solvent in the direction of tape travel. After cleaning, wipe away any residual alcohol quickly and completely.
3. To replace the pinch roller, remove the screw securing the pinch roller to the pinch roller arm.
4. Install the replacement pinch roller onto the pinch roller arm and tighten the screw.



## Cleaning and Replacing the Impedance Roller

1. Remove the top cover. Clean the impedance roller using a head cleaning stick dampened with cleaning liquid.
2. Gently rub only in the direction of forward tape travel, taking care not to scratch or dent the smooth surface of the roller.
3. To remove the impedance roller, record the number of turns required to remove the impedance roller nut so that it can be properly reinstalled. Remove the impedance roller nut and impedance roller.
4. Place the replacement impedance roller onto the shaft. Install the impedance roller nut and tighten it the same number of turns that was required to remove it.
5. Load a cassette and play it. Ensure that the tape does not ride over or under the impedance roller. If the tape rides too high, turn the impedance roller nut counterclockwise to properly adjust the impedance roller. If the tape rides too low, turn the impedance roller nut clockwise to properly adjust the impedance roller.





# TAPE TRANSPORT ASSEMBLY

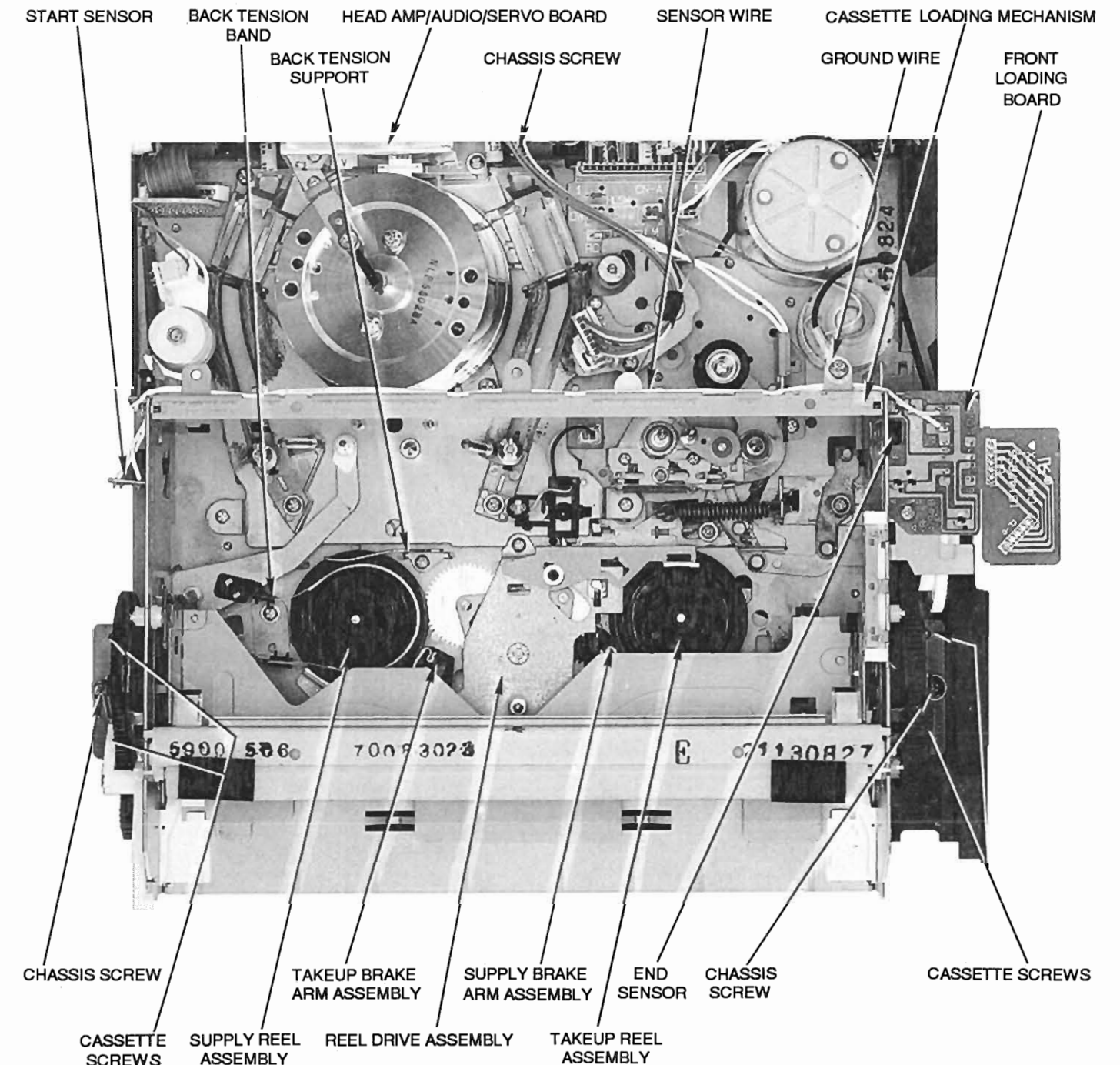
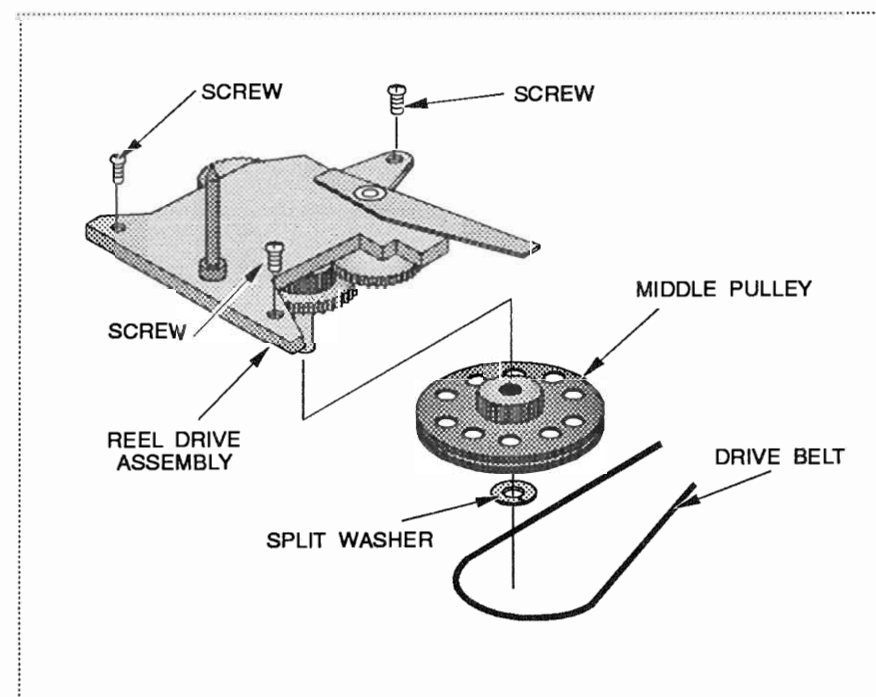
## Replacing the Reel Drive Assembly

1. Remove the top and bottom covers. Remove the cassette loading mechanism.
2. Remove the drive belt from the middle pulley. Remove the split washer that secures the middle pulley and remove the middle pulley.
3. Remove the three screws that hold the reel drive assembly to the chassis and remove the reel drive assembly.
4. Position the replacement reel drive assembly onto the chassis. Ensure that the posts on the play and rewind fast forward gear assemblies properly engage the locating holes in the reel drive assembly (page 21). Place the slots in the play and rewind fast forward gear assemblies onto the posts on the brake actuate base and the brake plate respectively (page 21).
5. Install the two front reel drive assembly screws but do not tighten them. Put the reel drive gear shaft into the hole in the return arm, and ensure that the return arm is placed to the left of the return post (page 23).

6. Install the rear reel drive assembly screw and tighten the three reel drive assembly screws. Install the middle pulley and split washer onto the shaft and replace the drive belt onto the middle pulley.

## Greasing the Input/Output Tape Guide Tracks

1. Wipe away the old grease from the tape guide track surfaces and around the guide roller bases (See page 21). Do not loosen any screws on the guide roller bases or on the V-stopper pieces that receive them when the VCR is operating. These positions are set at the factory using special tools and fixtures.
2. Apply new grease to the track surfaces, using a thick film to achieve smooth movement of the left and right loading blocks. Do not get grease on the roller posts or on any other surfaces over which the tape travels.
3. Clean the roller post with a swab dampened with cleaning solvent.

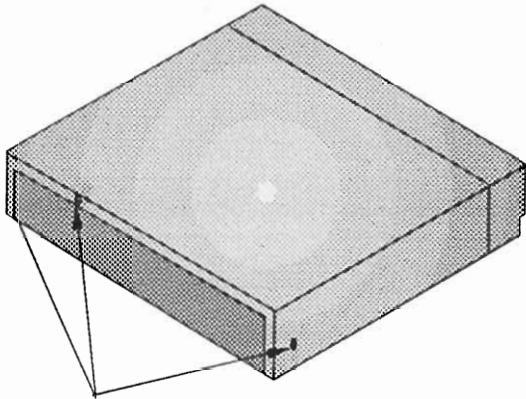


# DISASSEMBLY

This section explains the preliminary disassembly required for most cleaning, troubleshooting, and servicing of the VCR. Any additional disassembly required to access specific parts is explained along with the specific procedures. Before beginning, read the "Servicing Guide" section on pages 8 and 9.

## Top Cover

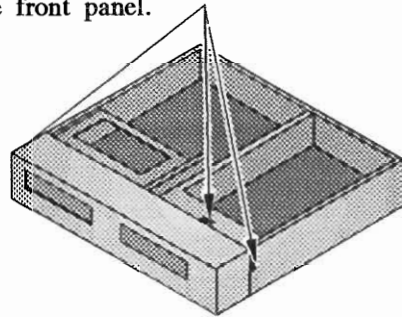
- 1 Place the VCR in a normal upright position.



- 2 Remove the two screws securing the top cover and remove the top cover.

## Front Panel

- 1 Remove the top and bottom covers.
- 2 Place the VCR in a normal upright position.
- 3 Release the three locking tabs on top of the front panel.

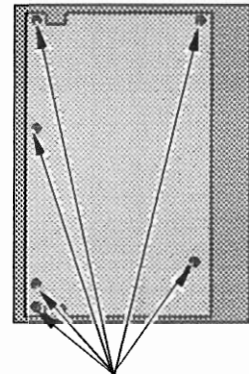


- 4 Tilt the panel forward until the three tabs on the bottom release.

**CAUTION:** Before disassembling any part of the VCR, unplug the AC power cord and touch ground to discharge any static electricity.

## Bottom Cover

- 1 Stand the VCR with the tape loading side down.



- 2 Remove the six screws securing the bottom cover and remove the bottom cover.

# CLEANERS AND LUBRICANTS

## Solvents

- Choose a cleaning solvent that does not leave a residue. Denatured alcohol, methyl alcohol, and typewriter cleaner are suitable. Isopropyl (rubbing) alcohol is sometimes used. The solvent must dry without leaving a residue, so wipe up excess solvent right away.
- When using any cleaning solvent, be sure your work area is well ventilated.
- Solvent may damage plastic parts, so wipe up any solvent that touches them.

## Sticks and Swabs

- You may clean VCR heads with cellular foam swabs, chamois leather cloth, or a special lint-free cloth. Do not use ordinary cotton swabs, because they shred and leave a residue in the tape path or on the video heads. Special cotton swabs are available on which the cotton is tightly wound. You may use these to clean the tape path *but not* the video heads.

## Cleaning Kits

- Local electronics supply stores and VCR sales outlets stock cleaning kits that contain sufficient materials for one or more jobs.

## Cleaning Cassettes

- Special cassettes are available for cleaning the video heads. There are three types of cassettes: a "wet" cleaning type and two "dry" cleaning types.
- Wet cleaning tapes are made of a chamois material that may be thicker than ordinary videotape. You moisten it with a few drops of cleaning liquid, insert the cassette into the VCR, and set the unit in

Play or Record mode. As the moistened chamois travels the normal tape path, it passes over the video and audio heads and wipes them clean. *Caution:* Wet cleaning cassettes have been known to unscrew or break tape guides, lodge under the video heads, and damage the assembly. Use the cassette with the thinnest possible chamois.

- One type of dry cleaning cassette uses a fibrous material that cleans by rubbing the heads as it passes over them.
- The other type of dry cleaning cassette uses a fine abrasive that cleans by scraping the accumulated oxides from the heads. This abrasive type of cassette should be used sparingly--a few seconds of use are equivalent to many hours of wear from a normal videotape. It should be used only when the VCR shows signs of a clogged head (for example, snow in the picture, or no video).
- If you decide to clean with a cassette, follow the manufacturer's instructions carefully.

## Grease & Oil

- Before you lubricate, clean off the old lubricant with a dry cotton swab. In applying the new lubricant, use only enough to do the job. It's easy to overdo, especially with oil, because it seeps and moves around so easily. Use no spray lubricants, and take care not to get grease or oil on belts, pulleys, or rubber tires.
- When oiling is recommended, use one-half to one drop of lightweight, good quality machine oil. The reel tables may require two drops.
- When greasing is recommended, use manufacturer's recommended grease or white lithium grease. Sometimes different kinds of greases are specified for different operations. Some greases react with plastics and metals and may cause problems. Petroleum-based greases tend to gum up more quickly than synthetic ones.