PLAIN TALK AND Technical Tips

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LUBRICATE OR NOT?

By following three simple rules the majority of mechanical devices can be properly maintained by the service technician.

Very often service problems arise because of too much lubrication, too little lubrication, and the lubricating of parts which should be free of lubrication.

The secret of knowing when and where to lubricate can be generalized as follows:

Slow moving parts are lubricated with heavy grade oil, fast moving parts are lubricated with a light non-gumming oil, and sliding parts — when lubrication is required — are lubricated with a clinging oil. It is important that the correct type of lubrication as well as the correct amount be employed.

The grease used on sliding surfaces should have a high melting point along with a medium consistency at room temperature; a grease that has a low melting point is likely to flow when the record changer or tape recorder heats up in use. A lubricant that has been found to be satisfactory for this purpose is "Cosmolube #1."

The trip slide of record changers requires *No* lubricant. This item is loose fitting and very light in weight. It is moved by the stylus riding in the record groove and serves to move only the trip pawl on the cycling gear. The addition of lubricant to the trip slide may cause dust to collect and necessitate an increased force being required to move it. If binding should occur as a result of a bent slide, replace the slide. (Lubrication is not a cure.)

No lubricant should be used on the pawls of the cycling gear. A light spring is used to restrict movement of these pawls. The pawls must be free enough to move from the force exerted by the movement of the trip slide but not free enough to move as the result of vibration. The application of oil to the tripping assembly may temporarily correct a failure to trip, but the accumulation of dust on the oiled surfaces will later cause a recurrence of the trouble.

Another example of no lubrication would be the drive belt used in the TCT-3 cartridge tape recorder. It is made of special material and should be cleaned only with soap and water.

Oil on rubber tire surfaces and rubber drive belts can deteriorate these parts due to the chemical action of the oil, and dust accumulation on over-oiled sur-

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SERVICE DATA SUBSCRIPTIONS

Now is the time to contact your local RCA Victor Distributor and arrange to renew your Service Data subscription.

Subscribing to RCA Victor Television and Radio/"Victrola" service data assures the service technician of complete technical literature covering RCA Victor Home Instrument products. Although the majority of subscribers are RCA Television and Radio/"Victrola" service dealers and independent service technicians, many others with varying interest also subscribe to RCA technical publications. Among these subscribers are engineers, technical schools, government activities, and other manufacturers.

Renewal Subscriptions

To renew a subscription that is currently in effect, the subscriber should notify his local RCA Victor distributor of his desire to renew. RCA Victor Distributors normally send a renewal reminder to the subscribers sometime during the month of April or May so that they can determine their new service data distribution requirements and process their mailing lists prior to the expiration of the current subscription year.

If your address has been changed, be sure to inform your local RCA Victor distributor of your new address.

A prompt reply to your distributor's solicitation will insure uninterrupted mailings of the valuable literature you use in servicing RCA Victor products.

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Figure 1 — RCA Victor Service Literature

CENTIGRADE OR FAHRENHEIT

Technical literature, concerning solid state devices, and other components such as capacitors, often makes reference to operating temperatures in terms of the "centigrade" scale. Most of us are more familiar with the Fahrenheit scale especially when we think of "room temperature" as being in the 60's and 70's; something cold or "freezing" in the 30's and something "hot" as being, say, over 100 degrees.

It's easy to convert any centigrade temperature to Fahrenheit or vice versa by using the familiar formulas:

$F=9/5\ C + 32$ and $C=5/9\ (F-32)$

As an approximate reference a comparison of centigrade to Fahrenheit is shown in the chart below:

Centigrade		Fahrenheit
100	WATER BOILS	212
		202
90		192
		182
80		172
		162
70		152
		142
60		132
		122
50		112
		102
40		92
		82
30		72
		62
20		52
		42
10		32
0	WATER FREEZES	

Figure 2 — Centigrade Compared To Fahrenheit

Notice that 25° C is just about at room temperature, and 40° C is just over 100° F. These are frequently used centigrade temperatures found in technical specifications of electronic components and solid state devices.

KEEP IT SAFE

All RCA Victor products undergo rigid and extensive tests to insure that the product meets all of the requirements set forth by the design engineers.

One such test is a safety check which is made to insure that no shock hazard exists. The service technician can keep an instrument safe by observing good workmanship and sound mechanical practices when performing service on the product. Here are a few pointers to follow in servicing:

Always use the *correct* replacement part.

Be sure to replace *all* insulating washers, insulating papers, and metal hardware removed during disassembly.

Connect all wiring, including grounds as you found them.

Don't substitute knobs from other models (some instruments have insulated knobs).

Exact values of resistors and capacitors help to maintain performance as well as safety features.

Failures in power transformers, and power circuits should be given special attention to be sure the original isolation and insulation is maintained.

Many more items could be listed, including the importance of good soldering techniques and the use of proper tools for each job; but it can all be summarized in just a few words—*use common sense.* Respect the engineering effort that goes into a product — keep it safe.

DELAY LINE SYMPTOMS

Do you remember why a delay line is used in color receivers? The delay line enables the brightness and chrominance (color) signals to reach the picture-tube control elements in the correct time relation. Correct time delay results in color that "fits" or registers with the black-and-white picture. Incorrect time delay results in color that is displaced to the left or right of the black-and-white components of the picture. However, faults in the delay line usually do not result in mere errors in timing. Timing errors, but with no other visible defects, can come about when the delay line cable is too long or too short, but is otherwise undamaged — an unlikely fault. Possible faults in the delay line are an open, or an internal short. External faults can be caused by open connections or incorrect termination.

An open delay line interrupts the signal path in the Y channel. The symptoms are loss of picture accompanied in some instances by loss of brightness (no raster), or low brightness.

An improperly terminated delay line results in the reflection of energy back and forth from the ends of the delay line. A poor termination can result from an open terminating network at the output end of the line; or from an ungrounded shield on the delay line. The symptoms are multiple, evenly spaced ghosts or reflections in the picture. The condition looks exactly like ghosts. But the clue to delay line trouble is that there are several ghosts — all evenly spaced. While on the subject of the delay line, it should be mentioned that poor "fit" can be introduced due to improper time delay in the *chrominance* channel. A change in the bandwidth of the chrominance channel due to severe misalignment can result in a change in over-all time delay. One of the symptoms might be a right or left shift in color information with respect to the monochrome components of the picture. Other symptoms will accompany this condition, however. These are poor color resolution (color does not "fill in" small colored objects in the picture) and cross talk between the color-difference signals. Crosstalk appears as incorrect colors at vertical edges of colored objects.

"STABILIZING" OF TRANSISTORS

A transistor is more sensitive to temperature effects than a vacuum tube. This is simply because the transistor normally operates near room temperatures, and any temperature *change* originating either within the transistor or external to the transistor can represent a fairly high percentage of its operating temperature. Since a vacuum tube operates at very high temperatures, slight changes are more or less insignificant.

As a result of this property, transistor circuits will incorporate refinements which minimize or overcome the effect of temperature variations. These circuits can be in addition to those circuits we consider "signal carrying." A circuit is said to be "stabilized" when temperature effects are minimized.

The emitter-base junction of a transistor is the critical area because its resistance lowers when it heats, this in turn causes more current and still more heat. A common approach is to simply employ a series resistor in the emitter lead, this permits the emitter-base junction resistance to represent a smaller portion of the total emitter circuit resistance which lessens the overall effect of variations in junction resistance. Other approaches include the use of external devices such as diodes and thermistors.

Diode Stabilization

The illustration below shows how a detector circuit may be stabilized against temperature variations by a semiconductor diode. This diode is made of the same materials as the transistor and thus has identical temperature characteristics. It is placed across the emitter-base junction of the detector, and fed with a constant current.

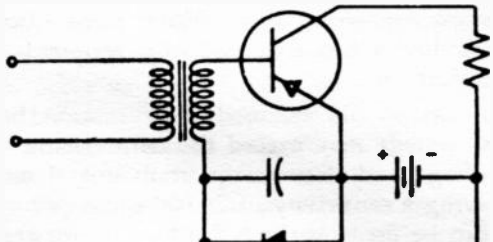

Figure 3 — Diode Stabilization

The forward bias for the transistor is the voltage drop across the diode. As the temperature rises, the voltage drop across the diode falls, and this reduces the transistor forward bias at the required rate. Note that the diode is biased in the forward direction by the supply voltage source. Since the diode impedance in the forward biased condition is very low, base current variations flowing through the diode produce negligible voltage variations across it.

Thermistor Stabilization

Thermistors are resistors made out of semiconductor materials, and have negative temperature coefficients of resistance. A typical thermistor used for bias stabilization might have about 200 ohms at room temperature (25°C.) and goes down to about 10 ohms at 70°C.

The circuit below shows how a thermistor is used for temperature compensation of a class B push-pull amplifier.

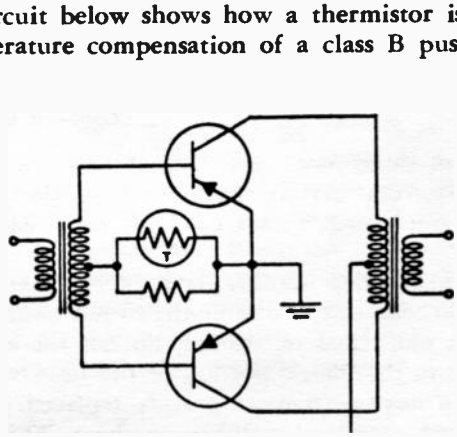

Figure 4 — Thermistor Stabilization

The forward bias for the transistors is the voltage drop across the thermistor. The current through the thermistor is kept relatively constant by the high series resistance. Therefore, the voltage drop across it is proportional to its resistance. As the temperature rises, its resistance decreases, lowering the voltage drop across it and lowering the forward bias for the transistors.

Most thermistors have a higher negative temperature coefficient of resistance than germanium. When used alone, the thermistor would reduce the transistor bias too rapidly. It is therefore shunted by a fixed resistor, as shown. By selecting the correct value of the fixed resistor, the desired rate of bias change may be obtained. For example, suppose that a thermistor used alone changed from 200 ohms to 100 ohms over a certain temperature range. This is a two-to-one change. If the thermistor is paralleled with a 100-ohm resistor, then the "cold" resistance of the combination is about 67 ohms, and the "hot" resistance of the combination is 50 ohms, which is a much smaller change.

Remember that in transistor circuits, some of the refinements and additional components serve to accomplish stabilization. The service technician must consider the stabilizing circuitry as well as the signal circuits when servicing solid state circuitry.

FOCUS VOLTAGE

The focus anode serves as one of the accelerating anodes in the color picture tube. Loss of focus voltage has the same effect as loss of the first anode voltage on black-and-white picture tubes. This means that a loss of focus voltage can result in a loss of brightness in a color receiver.

Older color receivers employ a potentiometer in a voltage divider network to provide variable focus voltage. A pitted or noisy potentiometer results in erratic or intermittent changes in focus. This type of control does not respond to conventional cleaning and lubricating techniques; control replacement is recommended.

Later color receivers which use a focus coil circuit do not give this kind of trouble.

Be sure to consider the focus circuit when loss of brightness is encountered.

LUBRICATE OR NOT?

(Continued from page 1)

faces can cause more serious problems than the lack of lubrication. Avoid the use of solvents for oil/grease since these agents can also react with rubber parts.

When cleaning record/playback or erase heads of tape recorders use a soft cloth, cotton swab, or pipe cleaner, moistened in alcohol; do not use a brush as damage to the plastic portion of the head will result.

When any mechanical part is replaced, clean the associated parts and re-lubricate them. This will insure a smooth-operating mechanism.

Always refer to the Service Data for particulars on lubrication, cleaning and maintenance of tape recorders and record changers.

Remember, the use of lubricants is not a "cure-all" for mechanical defects.

SERVICE DATA SUBSCRIPTIONS

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New Subscriptions

New subscriptions to RCA Victor service data can be arranged for any time of the year by contacting your local RCA Victor Distributor. New subscribers automatically receive all publications covering Television and Radio /"Victrola" instruments produced during the current subscription year. The subscription year extends from July 1 to June 30 of the following year.

A subscription includes a complement of Television service data, Television service tips, Television parts tips, Radio/"Victrola" service data, Radio/"Victrola" parts tips covering all RCA Victor Home Instrument products produced during the subscription year. Monthly issues of "Plain Talk and Technical Tips" are also included in a service data subscription. The literature is mailed directly to the subscriber at approximately monthly intervals.

TRANSISTOR SERVICING TIPS

In many respects a transistor is a more rugged device than a vacuum tube; this is particularly true from a mechanical standpoint. However, the transistor, being small in size, and usually found in compact circuit areas, requires that the service technician observes the best practices and is aware of the precautions involved in the servicing of transistor circuitry.

The following simple rules and procedures, should be followed when servicing transistorized equipment.

Be careful when working with transistors, since they may be damaged with even momentary overloads. This is in marked contrast with tubes which bear moderate overloads for longer periods.

Never work on transistorized equipment with the power on.

Guard against shorts. A short between the collector and base of a transistor may damage it and often other transistors associated with it, as in the case of direct coupled stages or those in the power amplifier output stage. Such shorts occur even in the time it takes for a dropped screwdriver to glance off a pair of socket terminals, or to short a lead or terminal to the chassis.

A transistor may be damaged if its base is placed at or near the collector potential. Therefore, make sure the base leg of the biasing circuit is not open on the emitter side.

When replacing power transistors be sure there are no metal shavings on heat sinks or mica insulators which might cause shorts or prevent adequate heat dissipation.

Use silicone grease between heat sinks and transistors as well as on both sides of mica insulators for better heat conduction.

Always use long-nosed pliers or other heat sink when soldering transistors (or other low-wattage components). Grasp the lead to be soldered between the transistor case and the soldering iron. This prevents heat from reaching the transistor junction and damaging it.

Be sure there are no leakage paths to the AC line through test equipment or soldering irons since line voltage applied across two transistor terminals could cause breakdown.

Ohmmeters should be used with caution because their test voltage may exceed the emitter-base breakdown voltage and destroy the transistor. Usually a VOM having a sensitivity of 20,000 ohms per volt or greater can be used on the RX 100 scale for short or open checks.

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