

Chemicals for Electronics Servicing

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What you will need for:

cleaning
degreasing
lubricating
insulating
heat-sinking
protection
conduction
soldering
cementing
component debugging
shielding
paint removing

ELECTRONICS servicing requires the use of a number of specially formulated chemicals. If you do a lot of servicing work, you will need cleaners, lubricants, insulating chemicals, adhesives, etc. On the other hand, if your

needs are minimal, you might be able to get by with only a few general-purpose chemicals. Bear in mind that best results are obtained by using the types and kinds of chemicals specially formulated for given jobs.

It is well to have some chemicals in both liquid and aerosol-spray form. Special packaging of many chemicals in dispenser vials, syringes, squeeze tubes and bottles, and pen oilers offer convenience in portability and application.

Keeping It Clean. Fundamental to all electronics servicing is to have on hand a wide variety of cleaners and degreasers. A service technician is often called upon to clean TV tuners, volume and tone control potentiometers, switch and relay contacts, and chassis and cases. It is quite common to restore an erratic TV tuner simply by cleaning away gummy residues and oxides from switch contacts.

Aerosol-spray and liquid cleaners include degreasing cleaners that leave no residue, and the polishing cleaners that leave behind a light protective lubrication. Most aerosol cleaners come with an extension tube that allows the user to pinpoint a confined blast of the cleaner and to get into otherwise inaccessible locations in a chassis.

To clean a tuner, you start by blowing out loose dust, using *WEP Air Blast* (Workman Electronic Products) or a similar compressed-air product. If the tuner's switch contacts are not visibly worn or oxidized, you can use a degreasing cleaner, such as *GC Nuvi-Tran* and *Tuner Bath* (GC Electronics) and *WEP Ultra Wissh* and *Miracle Bath*, etc. These nonresidue cleaners are specially formulated not to detune critical circuits or induce drift. If the tuner's contacts seem worn or oxidized, a lubricating and polishing cleaner with silicone, such as *WEP Super Wissh* or *GC Spra-Lube*, is called for. Foaming cleaners, such as *GC Magic Vista* and *WEP Lubrite*, lift off dirt and lubricate and polish the switch contacts. Lubricating cleaners usually do not induce drift or instability. If this should occur, you can use a degreasing cleaner on neutralizing and trim capacitors.

All parts of a TV tuner should be cleaned, including the fine-tuning mechanism, shafts and bearings, and grounding wipers. Lubricate the mechanical portions where required. For big cleaning jobs, you should use a nonflammable liquid cleaner like *GC Chloro-Kleen*.

De-Ox-Id is an effective cleaner in an oil base that loosens oxides and leaves a light lubricant on switch contacts. This cleaner should be applied sparingly on switch and relay contacts, after first removing dust and grime with *GC Replay-Kleen*. You can usually restore scratchy volume and tone controls by injecting a

drop or two of *De-Ox-Id* inside them and on the shaft bushings. Touch up rough relay contacts with the burnisher supplied in the *GC Contact Burnishing Kit*, which also includes a cleaning solvent. Faulty toggle switches used in light-duty applications are usually dirty, rather than worn. Try working in some *De-Ox-Id* along the solder lugs or other opening to clear up the problem.

Oxide build-up on audio and video tape heads impairs frequency response. Use a cleaner that is especially formulated for tape heads and does not harm tape, plastics, or paint. You may prefer to brush clean tape heads with *GC Magnetic Head Cleaner*. Record discs should also be cleaned periodically. You can use cleaner/lubricators like *Disc-washer*, *Sound Guard*, *Rek-O-Magic Reco Kleen* or others with built-in anti-static chemical.

Smooth Running. Lubricants for electronics servicing are highly refined oils and greases that provide high lubrication, rust inhibition, and stable viscosity over a wide temperature range. Additives minimize oxidation, foaming, and gumming.

Always apply lubricants sparingly since any excess may drip or creep from the point of application onto nearby rubber parts and insulation, causing damage. Most lubricants are convenience packaged in unbreakable pocket pen oilers and vials, plastic squeeze bottles, and aerosol-spray cans. Greases are packaged in bottles, syringes, and squeeze tubes.

Dispensing high-quality instrument oil, the *Reach-All* pen oiler with steel extension tube permits application of one drop at a time or less. Also dispensing high-quality general-purpose oil, the *Zoom-Spout Oiler* has a 7" (17.8-cm) flexible extension spout that reaches into normally inaccessible places with ease. *WEP's Lub-A-Kit* is a pocket-size lubrication kit that includes vials of instrument oil and liquid graphite, as well as dry graphite that is dispensed in puffs from a squeeze tube.

Although general-purpose oils do a creditable or superior job in most applications, special-purpose oils are available for special applications. The *GC No. 9400 Electronic Oils* kit, for example, includes radio-TV, phono, tape-recorder, penetrating, and driplless oils, plus liquid graphite. Driplless oil should be used wherever messy oil creeping must be avoided, such as on cabinet hinges, topside tape deck drives, etc. Liquid graphite can be used to lubricate

locks, slides, hinges, pushbutton switch mechanisms (mechanical portions only) with a thin film of lubricant that does not foul easily with grit.

Lubricants in aerosol spray cans allow large areas to be sprayed for lubrication and rust prevention. For spraying smaller areas, the spray extension tube that comes with the aerosols can be used. The *WEP Spray Oil* dispenses general-purpose oil with a silicone additive. Silicone spray oils like the *GC Sili-Spra* provide a light lubrication and long-lasting protection. *Sili-Spra* can be applied in a light, medium, or heavy coating by adjusting its three-way spray valve. An unusually slippery silicone lubricant, *WEP Slic-Spra* lubricates and protects as well as eliminates sticking. It also protects rubber and leather and waterproofs fabrics.

You will need several grades and types of grease for record-changer mechanisms, switch and relay contacts, and other mechanical devices that require no-flow lubrication. Light greases for switch contacts and controls, such as *GC Lube-Rex* and *Contact Dope*, lubricate and protect self-wiping contacts. You can also use *Lube-Rex* on gears, bearings, and slides.

Greases in squeeze tubes, like *Lubriplate* and *Phonolube*, are easy to apply as needed and tuck away unobtrusively in a tool caddy. *WEP Precision Grease* comes in a syringe, which precludes messy over-lubrication. This grease is free of zinc and metal oxides, which would impair high-frequency operation.

Insulating Chemicals. Problems with insulation are likely to occur in the high-voltage section of a TV receiver. Arcing and corona discharge result when the insulation on the flyback transformer or horizontal output transformer peels, cracks, or melts off. If the flyback transformer is still operative, repairs can be made with any of several chemicals.

When repairing a flyback transformer, the first thing to do is check out the horizontal output tube and circuit to correct the fault that caused the problem. Then, clean the high-voltage cage and components inside it with a nonresidue cleaner. You may be able to remove portions of the cage or the entire cage by unsoldering two wires. Spray or brush onto the flyback transformer's windings several coats of *GC Red-X*, *GC HV Corona Dope*, *WEP Corona Dope* or similar product. If thick pieces of insulation have peeled off the windings, make repairs with *GC High-Voltage Putty*. Then check for corona discharge in a darkened room; apply *High-Voltage Putty* and/or corona dope as required. (CAUTION: Readers not familiar with TV receiver circuits and safe working practices around high voltages should not open the high-voltage cage or attempt such repairs.)

A fast-drying coil dope, *GC Polystyrene Q-Dope*, insulates and protects r-f, uhf, and vhf coils without affecting Q. Insulate and protect motor windings and transformers with *GC Red GLPT Insulating Varnish*. *GC Liquidope*, a versatile general-purpose transparent coil



Chemicals galore assist you in servicing today's electronics. They include lubricants, contact cleaners, component coolers, etc.



Pc board chemicals include silicone grease heat-sink compounds, conductive paints, silicone resin lacquer board coating and solvent.

coating, shrinks on drying and tightens loose coil windings. You can use it in TV receiver high-voltage cages as a corona dope and in many other applications. *GC Liquid-Tape* is a black viscous high-voltage coating that is strong and pliable and will not chip, crack, or peel. It can be used to coat fraying motor-lead wires, as a sealant to exclude moisture, as a paint-on insulator, etc.

Insulating and Dipping Varnish from GC has an exceptionally high dielectric strength (2000 volts/mil), penetrates well and insulates and moisture proofs field coils, power and output transformers, filter chokes, linearity chokes, width coils, etc. Among the aerosol-spray insulating coatings are *GC Insul-Volt* and *Koloid K-29*, which are general-purpose coatings for electrical windings. Al-

though the various insulating coatings have a common job to perform, their differences in drying rates, penetrating quality, temperature range, toughness, flexibility, etc., will influence your choice for a particular application.

Chemicals for PC Work. An indispensable chemical for servicing solid-state circuits, silicone-grease heat-sinking compound insures efficient heat transfer from transistor cases to heat sinks. It is applied between the case of the transistor and the heat sink and does not melt or run or freeze over a wide temperature range. *GC Z5 Transistor Silicone Compound*, a transparent grease, and *WEP Silicone Lube* are free of metals and oxides. They can also be used as anti-corona compounds and

protective lubricants. *GC Z9 Silicone Super Heat Sink Compound* contains metal oxides that effectively increase the thermal conductivity of the grease.

Liquid solder fluxes that can safely be used on printed circuit boards are *GC Print Kote* and *Liquid Solder Fluxes*. These solutions contain rosin as the active agent. In a pinch, you can make a better than passable solder wick by dipping small-size tinned wire braid into these solutions. The potent noncorrosive *Soldering Paste* from GC effectively tins soldering iron tips. If you must use this paste on an electrical connection, thoroughly clean the connection to remove all traces of the flux.

Resin lacquer coatings that are often applied to printed circuit boards to protect the foil traces from oxidizing foul solder wicks and impede desoldering. The coatings can be removed with *Print-Kote Solvent* and replaced with *Silicone Resin Lacquer*, both from GC.

Conductive paint permits a foil trace on a pc board to be touched up, without having to go to the bother of soldering. It can also be used to paint a conductive shield or draw a ring around the input terminals of a sensitive component. *GC Copper Print* consists of copper particles suspended in a fast-drying binder. This paint requires very thorough mixing before and during use to keep the copper particles in suspension.

Silver Print paint, also by GC, is costlier but much easier to use than is *Copper Print*. *Silver Print* consists of finely divided silver particles in a somewhat more fluid binder. More like an ink than a paint, *Silver Print* mixes easily and stays in suspension during use. *Silver Print* can be applied with the finest of brushes and even ruling pens and compasses used by draftsmen. To develop a feel for conductive paints, paint a few lines of varying widths, lengths, and weights and measure the resistance, which may vary between a few milliohms to tens of ohms for thin films.

Cements and Adhesives. You will need at least one of three classes of cements and adhesives to repair loud-speaker cones, control knobs, and equipment cases and cabinets. The super-strength epoxy and cyanoacrylate cements are invaluable but cannot be used on porous materials. The plastic-base cements with solvent agents are inexpensive but cure slowly when bonding nonporous materials and most have low initial bonding strength. In the last group are the contact cements that bond almost all materials with good initial



Servicing adhesives include plastic base cements, rubber base contact cements, and the super-strength epoxy and cyanoacrylate adhesives.

bonding strength but are not well suited for small-area, high-stress bonds.

The latest of the super-strength "miracle" adhesives, the cyanoacrylates (such as *GC Permabond* and *WEP Quick Bond*), are thin-film adhesives that bond nonporous materials almost instantly. These cements flow readily into hairline cracks but will not fill in larger voids or tolerate dirty or ill-fitting surfaces. You can obtain maximum bonding strength with the aid of a highly effective surface cleaner and activator supplied in the *Workman No. 33-102 Bond-Solv Kit*. In addition to *Quick Bond* adhesive, the kit includes *Bond-Fix* solvent for cleaning and activating the surfaces; *Bond-Solv*, a true solvent for releasing cured bonds and cleaning up; and the unique *Pro-Bond Industrial Syringe* with flexible needle that applies the adhesive without waste. With the *Workman* kit, you can bond plastics, metals, rubber, vinyl, nylon, Teflon, polyethylene, and even some silicone materials.

Cyanoacrylate cement must never be spread on the surfaces to be joined because it dries too rapidly. Apply a drop in a puddle on only one surface and firmly press the parts together to spread the adhesive. Although developing high strength in seconds, allowing the bond to cure overnight will insure maximum strength.

Epoxy cement, also a super-strength adhesive, cures by chemical action between epoxy resin and a hardener mixed in equal proportions before use. Standard epoxy cements cure overnight. You may, however, find it more convenient to use the "five-minute" epoxies, such as *GC's Quik-Stik* and *WEP's Double Barrel Epoxy*, the latter dispensed from a double syringe to assure mixture of the proper proportions of resin and hardener. Epoxy cement readily fills in gaps and voids between the surfaces to be joined and cures without serious shrinkage or loss of bonding strength. Cleaning up of cured excess epoxy is difficult. Therefore, it is always good policy to clean away any excess promptly, before the cement has had time to cure. Although it is preferably used on nonporous materials, epoxy cement can be used on dense woods like maple, ash, etc.

Less expensive plastic-based cements are well suited for many repairs. The fast-drying *GC Radio-TV Service Cement* is ideal for cementing speaker cones and grille cloth, but it dries slowly on nonporous materials. A general-purpose cement for plastics, *GC Plastic Cement* bonds acetates, butyrates, phe-

nolics, and vinyls. Special-purpose plastic cements include *Bakelite Cement*, which bonds such thermoplastics as the ureas and phenolics, *Acrylic Cement*, which bonds such thermoplastics as *Lucite* and *Plexiglass*, and *Vinylite Cement*, which welds or bonds vinylite. All three are available from *GC*, as is *Magnetic Cement*, which bonds broken loopsticks, yoke cores, and other ferromagnetic materials.

Contact cements are rubber based. They must be applied to both surfaces that are to be joined and allowed to dry until tacky before pressing the two surfaces together. You can use contact cements on grille cloths, paper, rubber, wood, plastics, and metals. A high-grade general-purpose contact cement available under the name *Plybond* from *GC* surpasses ordinary contact cements. Special-purpose contact cements include *GC Rubber To Metal Cement* and *Ne-O-Prene Cement*. An aerosol spray cement, such as *WEP Stik-E-Wipe*, makes cementing a tube-replacement chart or schematic diagram to a cabinet a no-mess snap of a job.

Miscellaneous Chemicals. You can spend a lot of time tracking down an intermittent transistor, capacitor, resistor, or other component. But you can also save a lot of time by using a circuit cooler, such as *GC Zero-Mist Circuit Cooler* or *WEP Super Freeze-It*, which are aerosol spray refrigerants that almost instantly cool the suspected component to below freezing. In use, when the heat-related intermittent component is cooled and circuit operation returns to normal, you have located the fault.

You can replace peeling or flaking picture tube coating with *GC No. 49-12* aerosol *Television Tube Coat* or *No. 49-2* brush-on *Tube Coat*. The conductive coating often flakes off where it contacts a grounding spring or wiper. Incidentally, this chemical can also be sprayed or painted on the inside surfaces of a plastic case to form an electrostatic shield. As a last resort, you can use *Tube Coat* to repair breaks or worn spots of the carbon element in a volume or tone control.

You can safely remove enamel from the thin wire used in r-f coils and chokes by applying *Strip-X*, which removes enamel, Formvar, Formex, and other such coatings. Other useful chemicals include *WEP Lubricant & Moisture Displacer*, which clears electrical short circuits due to moisture, and *GC Liquid Non-Slip*, which eliminates slippage of dial cables and belts. ◇