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AUTOMATIC TRANSMISSION CLEANING SURVEY

THE FOLLOWING PAPER WAS DEVELOPED BY CONDUCTING A SURVEY OF THE GREATER LOS ANGELES AREA FOR THE CALIFORNIA A.T.R.A. CONVENTION AT DISNEYLAND, APRIL 22, 23 and 24, 1977

Mr. Evan Thomas, founder of A.T.R.A. in 1956, was prompted to conduct this survey after noting the following: time differences quoted by rebuilders of between 5 minutes and 2 hours in total cleaning time, and reported chemical costs ranging from 5 cents per transmission to $11.00 per transmission.

METHODS SURVEYED AND AVERAGE CLEANING COST PER UNIT

1 Pressure washer and solvent hand-scrubbed:
average cost per unit $33.60

2. Pressure washer and hot tank with aluminum or ferrous metal cleaner
average cost per unit $14.20

3. Pressure washer and cold tank:
average cost per unit $30.90

4. Jet cleaner (Turbo-Max, Roto-Jet, Storm Vulcan, American, Maryken and Roto-Matic)
average cost per unit, including purchase of cleaner $7 10

THE BIGGEST SINGLE AREA TO REDUCE REBUILDING COSTS IS IN CLEANING.
(Labor, material, and energy expended)

The energy crisis may totally change cleaning techniques in the future.

SURVEY METHOD

It is advisable to time-study the cleaning operation with a stop watch, or with a regular watch having a second-hand, measuring the total cleaning time for

1 Pre-cleaning.
2. Handling, in and out of cleaning devices.
3. Hand cleaning, including final spray wash.
4 Periodic hand cleaning during assembly
5. Individual component cleaning (valve bodies, etc.)

The accepted formula is to total the accumulated cleaning time, plus 25% for lost time (breaks, restroom, smoking), plus 15% due to the dirty unpleasant nature of the job. Take the mean, or average, from the dirtiest to the cleanest transmission (30,000-mile transmission compared to the 150,000-mile transmission). Also, consider types of soil and contaminents to be removed and the type of clientele. The degree of cleanliness varies if sold wholesale or if the transmission is painted over discolored aluminum. Some rebuilders feel that by painting the transmission, some ability to dissipate the heat is lost.

It is suggested that ten-time studies be made in order to establish the average time from the very dirty to the very clean.
Shop lay-out, which minimizes unnecessary handling, is important; such as, the location of the tear-down bench, steam cleaner, cleaning tank, method of loading, transportation to assemblers, intermediate and occasional cleaning during assembly

Obviously, all time studies should be stop-watched and totaled before applying the formula of cleaning time, plus 25% for lost time and 15% for unpleasant jobs. Next, multiply the average rate per minute or per hour, times the total average time, in minutes or fractions of an hour, and add 100% for shop overhead (sales and administration costs, and other fixed costs, such as rent, light, heat, etc.). Think of man-minutes, not time spent in tanks, etc., when totalling cleaning time.

In Evaluating Cleaning Methods, Variables to Weigh Are As Follows:

1. Degree or method of agitation—jet, air, mechanical, etc.
2. Temperature of solution (ambient or air temperature up to boiling.)
3. Time spent in solution.
4. Strength and types of chemical (pH) and attendant handling problems with various types of chemicals.

It is assumed that only automatic transmissions and torque converters are to be cleaned, and no effort is to be made toward discussing the problems and variations of techniques used where both engine components, as well as transmissions, are being cleaned intermittently

The typical evolution of a transmission shop as it grows from one-a-day to ten-a-day may be as follows:

HAND-SCRUBBING WITH SOLVENT

One to four transmissions a day usually includes steam cleaning or pressure washing first. This saves a lot of time.

Actual time spent	20 minutes
Allowance for lost time, 25%	5 minutes
Allowance for dirty work, 15%	3 minutes
	28 minutes

28/60 x $8.00 per hour x 2 for overhead (or plus 100%) = $7.20 steam cleaning costs.

Following the pre-cleaning or steam cleaning, some shops use solvent and hand-scrub all the transmission parts. Usually, the total time expended is between one hour and two hours, representing a cleaning cost of $33.60 labor, plus solvent at 25¢ per transmission This assumes a 55-gallon barrel of solvent costs $50.00 and will clean 200 transmissions before the solvent is contaminated.

HOT TANK CLEANING

A popular hot tank size is 36" by 36" by 42" holding about 100 gallons of a hot alkali solution. In granular form, it requires typically 2 to 8 ounces per gallon of water While the price is constantly changing in quantities of 100 lbs., the average cost is approximately 52¢ a pound. This hot solution temperature is maintained at 160 degrees to 190 degrees. The soaking time may vary from one to two hours, depending on the degree of contamination, operators' quality standards, and amount of post-cleaning hand scrubbing done. This hot aluminum solution is effective on non-ferrous metals (aluminum and cast aluminum), without fear of damaging aluminum threads and close tolerance parts.

Material cost, including steam-cleaning soap, is $1.00 per transmission. Time spent in loading, unloading, air-water post rinse, plus hand-cleaning is found to be an average of 30 minutes, or again, $11.20 labor, including lost time and overhead.*

When ordering hot or cold tank cleaning chemicals, it is a better value to order the chemicals dry in 250 or 500 pound drums, because in liquid form 40% to 50% of the bulk is water.

It should be noted that caustic-based compound should never be used on aluminum. Likewise, it has been found that to co-mingle caustic soda in a small percentage (10% has been attempted) with a phosphate base is impractical and should never be used, due to the effect on all tolerances of precision automatic transmission parts.

It has been established that by radically agitating a hot solution either vertically or horizontally by mechanical means, the soaking time can be reduced by 75%. An alternate method of agitation is by an air pipe at the bottom of the tank, with small holes drilled lengthwise across the pipe, and the drilled pipe running lengthwise across the bottom of the tank. This produces a rolling agitation that gives better results.

To the cost of labor and material, a rebuilder should add approximately $2.00 a day, if the tank is heated by gas, or $5.00 a day, if heated electrically. If a timer (for approximately $70.00) is installed, the energy source can be cut off at night an over the weekend. reducing by approximately 30% the cost of heating the tank. Stainless steel is not necessary when building a tank.

By building a heavy expanded metal separator 2½" above the floor of the tank, the transmision parts to be cleaned are kept out of the heavy residue and accelerates the cleaning time. Hot tanks lend themselves better to engine rebuilding where water jacket cleaning is more important. This survey indicated that from a quality standpoint, a hot tank used to clean ferrous metal is a poor compromise.

COLD TANK CLEANING

As the volume grows from 4 to 8 transmissions per week, usually a non-agitating cold chlorinated solution is used. The cost of a new charge of cold chlorinated solution in a 100-gallon tank (30" x 30" x 42") x $5.95 is $595.00. The material cost depends on how carefully the operator pre-cleans before placing the parts in the solution. It should run $6.50 per transmission, if the unit is pre-cleaned with a steam cleaner and $9.50 per transmission, if the unit is immersed directly into the cold tank or carburetor cleaner without pre-steam cleaning. Following a soak cycle of 1 to 2 hours, a post-wash of air and water is generally used to minimize crystallization of the chemical on the parts (salt residue). Immersing the parts, such as valve bodies, in a solvent and then spraying the valves with a substance

*60 minutes of stop-watched labor + 15 minutes + 9 minutes (84 divided by 60) x $8.00 = $11.20 + $11.20, overhead = $22.40 per hour

such as WD-40 is also good practice. Total hand scrubbing, handling time, pressure rinsing, including cleaning the valve bodies, is approximately 60 man-minutes or $22.40, including overhead. The average cold solution cost is $8.50 plus $22.40 labor, which totals **$30.90** per transmission.

Generally, a 1" to 3" water seal is used on a chlorinated solution to minimize evaporation. While agitation generally cuts the cleaning time down from 2 hours to 1 hour, the life of the solution is cut in half by forcing the lighter solvents to evaporate into the air This is not recommended by most manufacturers.

It should be noted that the life of any solution may be extended by taking out the sludge and removing the sediment from the bottom of the tank. It is also possible to put a sludge pan on the bottom of the cold tank to catch most of the sludge, so that it can be removed. This gives the cold tank solution more ionization and, therefore, better cleaning. By lifting out the tray with the help of "lift rings" and tilting the sediment tray slightly toward the drain holes, the sediment can then be removed, additional solution added, and the life of the solution extended.

There is a new solution and a new agitation tank that is rather expensive, but very effective, which will be discussed at the convention. It can be used cold or, for better results, heated to 140 degrees.

JET CLEANERS

Our survey shows that there is a decided swing toward the jet cleaner as the volume exceeds 5 transmissions a week. It is most desirable to measure the total daily costs of purchasing and operating a jet cleaner. One chemical engineer reported that, with his chemical in a hot tank, cleaning time took 1 to 2 hours. Using the same chemical, he could get the same results in a jet cleaner, but the cleaning time would be cut down to 12.5 minutes.

Obviously, the seemingly sizable cost of $5,000, including sales tax and installation, appears very high, but most rebuilders do not equate or measure the cost of labor, material, and gas to clean with a steam cleaner used in conjunction with a hot or cold tank. When the daily cost of a jet cleaner to buy and operate over a five-year period (many jet cleaners are still in operation after ten years) is measured, it is easy to justify the $5,000 cost of a jet cleaner

An accountant can show where the $5,000 initial cost is reduced to approximately $2,500 through the Federal Investment Tax Credit and by depreciating the jet cleaner over 5 years. On this basis,with Uncle Sam paying $2,500 of the $5,000 and dividing the remainder by the number of working days in the 5-year period, suddenly $5,000 shrinks to $2.00 a day, including carrying or finance charges. The $2,500 divided by 1500 days (300 working days a year, times 5 years) equals $1.66 per day, plus carrying charges. The cost of soap or cleaning compound is 35¢ a day, and gas is $1.00 a day The carrying charges are approximately 50¢ a day, so that the total cost of cleaning per day is.

Cost of machine	$1.66
Cost of gas	$1.00
Cost of chemical	$0.35
Carrying charge (if financed)	$0.34
Total daily cost	$3.35

By further automation of a "feed and control system" to maintain the proper pH of the cleaning solution, a further savings is realized. This feed and control unit can be used with either a granular or liquid chemical, works in a hot or cold tank, or jet cleaner, sells for $350.00 and is made by Magnis.

On approximately 1 in 30 transmissions that are particularly dirty, a pre-soak chlorinated (carburetor cleaner) solution is desirable to totally eliminate hand cleaning It is found through the survey that with a jet cleaner, total man-minutes are reduced to 5 to 15 minutes per transmission.

FRINGE BENEFITS OF A JET CLEANER

1 Each rebuilder puts a different value on time lost in a hot or cold tank. If the cleaning cycle averages 15 minutes (a low of 5 minutes and a high of 30 minutes was reported on the survey) in a jet cleaner, what dollar value can be put on the time saved between the "remove and replace" and the customer down time?

Whether the rebuilder is selling at the wholesale or retail level, customer "down time" is a significant factor in building a business. Obviously, the time lost in a hot or cold tank is more important where a customer rebuild is being done, as opposed to rebuilding for stock on an exchange basis.

2. It is likewise up to the rebuilder to evaluate the effect on his men by eliminating the most unpleasant job in rebuilding—hand-scrubbing. Pleasant working conditions and better shop morale is something that each shop owner hopes to attain. Many shops quote that by using a jet cleaner, their men change from parts cleaners to full time rebuilders. Figures of 50% to 100% increases in productivity are often quoted, or, in a four-man shop, one man can be eliminated due to the purchase of a jet cleaner

3. Many rebuilders put a high value on a cleaner shop. The elimination of a dirty steam-cleaning area, a mess around the hot or cold tanks, the smell of carburetor cleaner, cracked and bleeding hands—all of these factors seem to influencing the rebuilder to evolve from his old cleaning methods to the jet steam cabinet.

4. Many rebuilders emphasize that the bright metal look of the external parts is a further aid to selling their rebuilt transmissions.

5. The flooding action of the relatively clean phosphate using a jet cleaner, letting the "heavies" settle to the bottom or be removed by a trap or filter, does a far better job of cleaning than a hot tank. If the cold tank or hot tank isn't serviced monthly, the chlorinated solution is working on the bottom residue rather than on the transmission parts.

6. On extremely cooked or badly-varnished transmissions, a 10-minute pre-soak, using a cold chlorinated tank, with the parts in a wire basket, cuts down the 30-minute jet cleaning time by dissolving the worst of the material prior to jet cleaning.

Turbo-Max, of Orange, California, the most popular cleaner in the southwestern United States, has **two new refinements of adaptors** that come as an accessory to their unit, or can be installed on any jet cleaner.

1. The torque converter flushing attachment for $350.00 saves both space and money with the same non-ferrous hot solution flushing out completely any foreign material trapped in the sealed converter.

2. The handspray gun adaptor, driven off the main pump, directs a stream of hot cleaning solution into blind passages and crevices not totally cleaned by the jet spray action. This further minimizes final handcleaning or cold tank pre-soaking prior to jet cleaning.

Time does not permit exploring the advantages of leasing vs. a conditional sales contract in buying the various types of cleaning machines on the market. Many find that a 3- to 5-year lease with roughly $480.00 down, reduces the net payments to less than $90.00 per month for a jet cleaner with a $1.00 purchase option at the end of the lease. This survey seems to indicate that the lowest initial capital outlay, buying the cheaper cleaning equipment, often creates the largest monthly cleaning cost.

RESULTS OF SURVEY

The survey of the transmission rebuilders in the greater Los Angeles area indicates the cleaning materials used and the usage of the various types of cleaning equipment are:

Method	Number of Transmissions Built Weekly 5 to 10 Units	11 to 20 Units
1 Hand scrubbing with non-inflammable cleaning solvent	36 rebuilders	3 rebuilders
2. Hot tank with hand-held pressure washer*	30 rebuilders	33 rebuilders
3. Cold tank with hand-held pressure washer*	48 rebuilders	54 rebuilders
4. Jet cleaner	27 rebuilders	156 rebuilders

*Pressure washer = steam cleaner. high pressure washer or air and water gun.

COMPARISON

BASED UPON THE PREVIOUS DATA, IT APPEARS THAT THE LABOR COST OF EACH METHOD IS AS FOLLOWS:

Summary	Solvent Hand Scrub	Hot Tank	Cold Tank with Steam Cleaner	Jet Clean
Cost, labor and material	$33.60	$14.20	$30.90	$7.10
Working conditions	Poorest	Hot & Poor Quality	Unpleasant	Best
Minimum original investment	$500.00	$1,000.00	$2,000.00	$5,000.00
Average shop floor space required	200 feet	200 feet	300 feet	100 feet
Estimated cost of space, $20.00 per square foot	$4,000	$4,000	$6,000	$2,000

IN CONCLUSION: If more than a half-hour per day is spent in transmission cleaning, or if a volume of one transmission per day is rebuilt, then the purchase of a jet cleaner can be justified; cost per unit including purchase of jet cleaner, $7.10.

1. Any saving in floor space means said space may be used to more productive advantage.
2. In today's labor market, it is hard to locate operators who will energetically take to any kind of adverse working conditions.
3. Building and renting costs force management ot make use of all available shop floor space. Some rebuilders relate to each shop square feet of floor space as generating approximately $75.00 to $100.00 per year. Therefore, even a $100.00 to a $150.00 saving per month (by using jet) could mean another $7,500 to $10,000 in potential productivity per year as a result of the saving of shop floor space.

It is apparent from the above analysis that as a shop grows to one or more transmissions a day, the jet cleaner, combining heat, pressure, and chemical reaction into the least floor space, and accomplished in a fraction of the other methods' time, is the most economically feasible.

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