Platers Service Company

1511 ESPERANZA STREET • LOS ANGELES, CALIFORNIA 90023 • PHONE (213) 264-1880

3000 SUPPLY AVE 721 ~~6154~~ 6514

Dear Sir:

Enclosed is the material you requested regarding electroplating. A considerable amount of time has been spent compiling it to enable you to acquire the necessary equipment and supplies to enter the fascinating and profitable business of electroplating.

The enclosed data will undoubtedly save you much money--perhaps several hundred dollars--depending upon the size of the plating establishment you desire.

A recent survey made by Platers Service Company revealed the following interesting facts:

1. There exists an almost complete void of information available to anyone attempting to start a small plating shop.
2. The few trade publications available are usually of a highly technical nature and do not cater to the beginner.
3. Experienced platers are reluctant to give a helping hand to anyone, even though their shop may be hundreds of miles away from their nearest possible competition.

Because of the above void in the electroplating field we are offering this valuable information to help you get started.

May we offer you a few words of advice? Don't expect the plating business to be a short cut to the "pot of gold at the end of the rainbow." Plating is hard work and can be exasperating when things go wrong. On the other hand, it can be a most gratifying and profitable business if you have "what it takes" in common sense, willingness to work and ability to accept mistakes and come up smiling. A part time or full time plating venture can be the beginning of something better for you.

The enclosed material covers the most popular plating processes. Should you have a special process for which you wish to have prices and information, please write to our Technical Director, E. J. Barone, for assistance.

Successfully yours,

M. L. Aevart

M. L. Aevart, Manager

PART I

Equipment, Chemicals and Supplies

Platers Service Company, 1511 Esperanza St., Los Angeles, CA 90023

PLATING AND PROCESSING TANKS

The tanks used for processing work through the plating cycle may be constructed of a variety of materials. Both the type of chemical used and the operating temperature must be considered. Tanks may be constructed of wood, steel, stainless steel, fiberglass, polypropylene, polyethylene and other plastics. The wood tanks should have a suitable lining and all tanks must be suitably braced to be self supporting. The various types of tanks and their uses are listed below.

I. WOOD TANKS:

Wood tanks were, at one time, made of cypress because of its waterproof property. However, marine plywood which uses a water proof glue is very satisfactory providing the plywood is thick enough. A tank made of plywood may be coated with a waterproof varnish and be provided with a flexible plastic liner. Another method commonly used is to make a wood tank and coat the inside and outside with fiberglass in which case no varnish is necessary.

Probably, the simplest tank to home-fabricate would be varnished marine plywood. This must be supported with a frame stiffener around the rim and in the case of fairly large tanks (over 30" deep or long) an additional brace around the middle as a supporting girth. See the attached drawing for suggested construction. We would suggest 1/2" thick plywood for small tanks up to 30" longest dimension and thicker plywood for larger tanks.

Tanks made of plywood with flexible vinyl liners can be used for most all acid and alkaline solutions. Although vinyl liners are, supposedly, limited to 160° F., in this case higher temperature may be tolerated since the liner is supported by the wood tank. Wood tanks coated with fiberglass can not be used for alkaline solutions such as alkaline cleaners or cyanide type plating solutions.

Wood tanks are not recommended for the rinse tanks because of the difficulty of installing the outlets needed for a running rinse.

II. STEEL TANKS:

Welded steel tanks may be used up to 200° F. for all alkaline cleaner solutions and cyanide type plating solutions. However, bright plating solutions such as silver or copper solutions generally require plastic lined tanks because the bright finish may be impaired by minute traces of iron contamination. Rinse tanks following the foregoing alkaline type solutions can be constructed of steel.

III. STAINLESS STEEL TANKS:

Stainless steel tanks can be used up to 200° F. for all alkaline solutions such as recommended for plain steel above. This type construction is much higher priced than plain steel but longer tank life will be realized. In addition stainless steel can be used to contain nitric acid solutions. It is not satisfactory for muriatic or sulfuric acids.

IV. STEEL TANKS LINED WITH PVC:

These tanks have a lining of PVC on the inside which will resist common acids (except nitric acid) and alkalies but are limited to a maximum temperature of 150° F. They may be used for common acid type plating solutions, for acid dip tanks and for rinse tanks.

V. FIBERGLASS TANKS:

These tanks can be used for rinse tanks, muriatic and sulfuric acid dip tanks, and acid type plating solutions up to 180° F. (Not recommended for chrome plating solution.) Fiberglass tanks are not suitable for alkaline cleaner solutions nor cyanide plating solutions.

VI. POLYPROPYLENE TANKS:

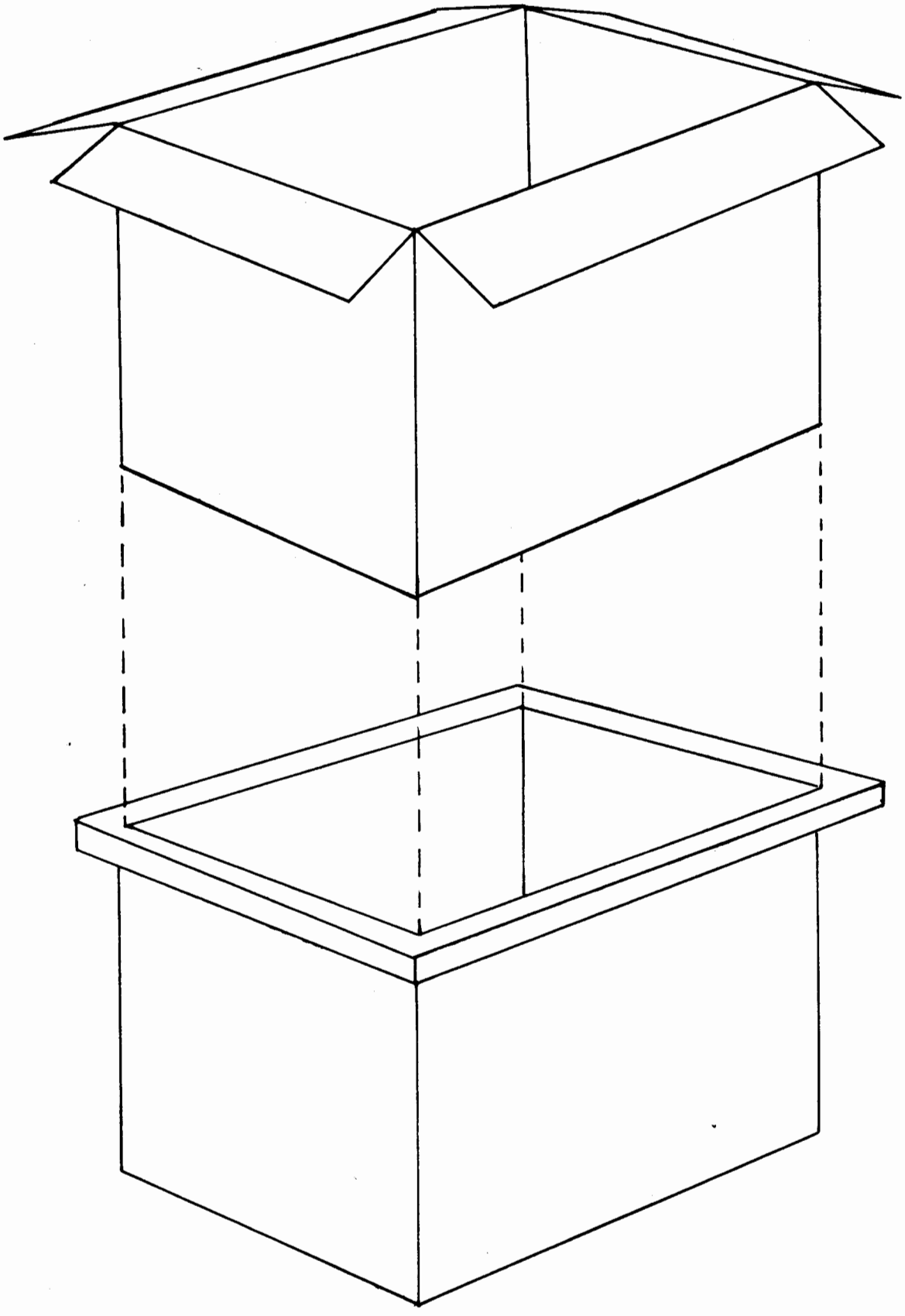
Polypropylene is the ideal tank material since it is not affected by acids or alkalies and can withstand termperatures of 180° F. As a consequence these tanks are satisfactory for all common plating solutions (except chrome) as well as for rinse tanks. It is not affected by the corrosive fumes in the plating room and chemical stains on the exterior surface are easily rinsed off. These tanks are plastic welded and hence can be made up in any specified size.

VII. POLYETHYLENE TANKS:

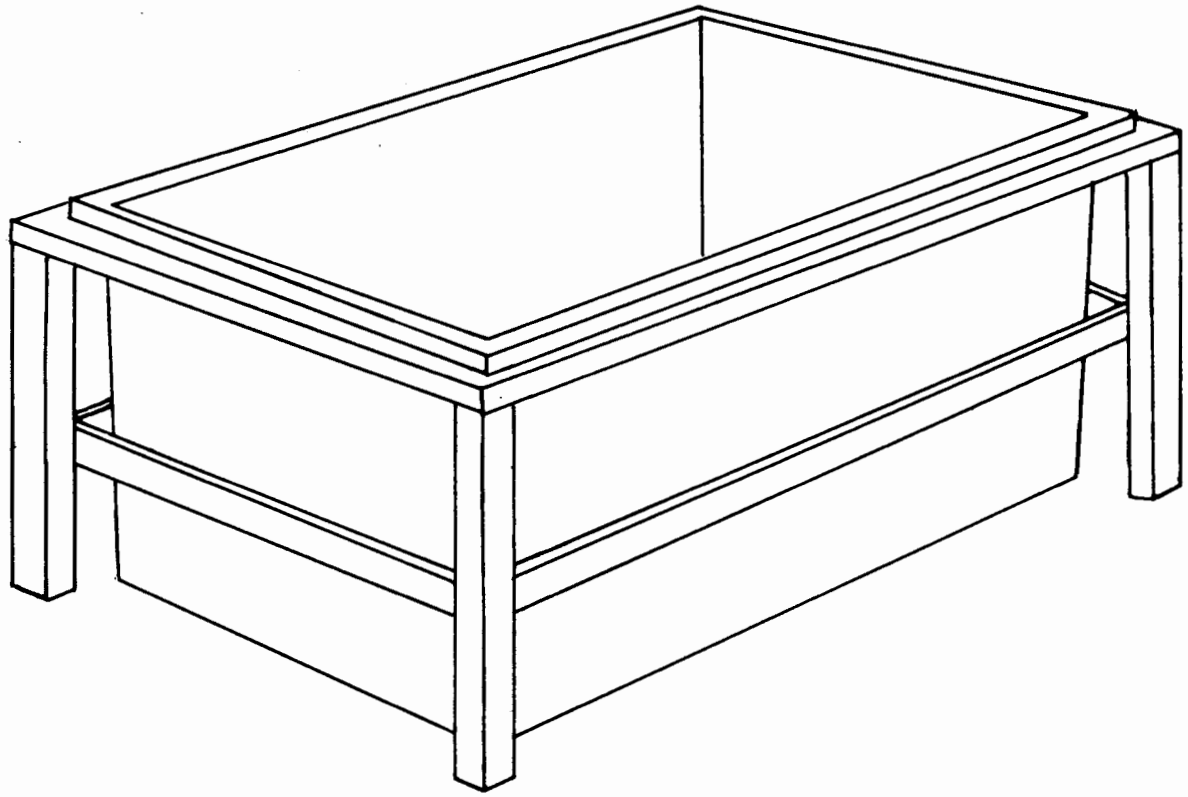
Tanks made of polyethylene are molded tanks and consequently are available in standard sizes only. They are resistant to all alkaline and acid solutions the same as the polypropylene tanks in Paragraph VI. However, they are limited to temperatures of 140° F.

GENERAL:

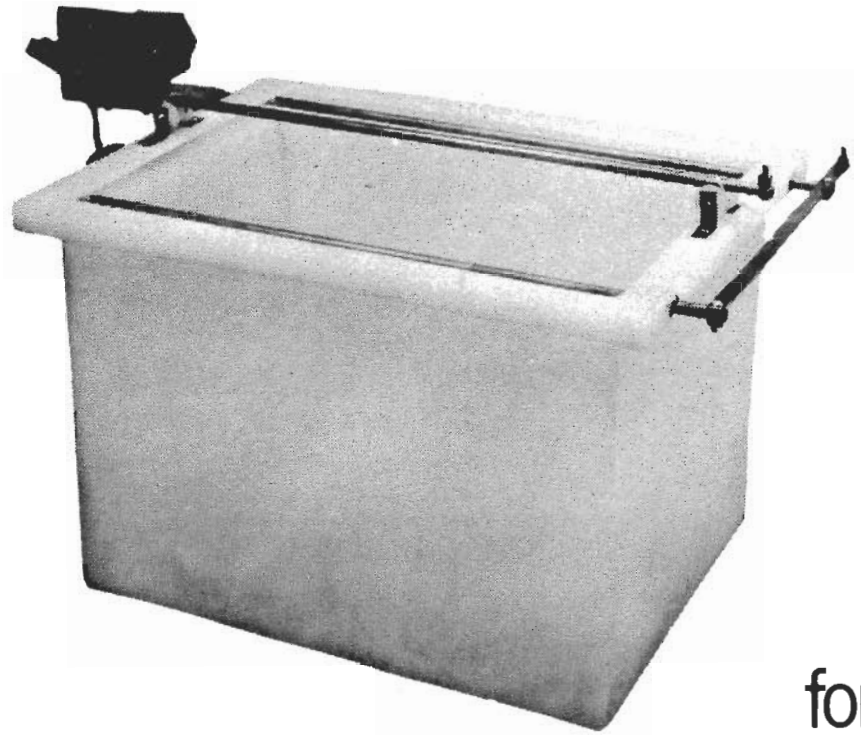
Probably the easiest "do-it-yourself" tank is the wood tank with the flexible plastic liner. If the capability of welding steel tanks is available these, of course, are preferable where they can be used. The same might be said for stainless steel tanks. The fiberglass tanks, polypropylene tanks and polyethylene tanks all require fabrication experience and facilities that puts them out of the "do-it-yourself" category.



Schematic Drawing of Wood Tank Showing Flexible Insert Liner.



Schematic Drawing Showing How to Reinforce a Tank with a Stand.



PLACO Heavy Duty PLASTIC TANKS

for Plating, Acid Dipping, Rinsing and Chemical Treatments

NO.	SIZE	GALS.	THICK-NESS	PRICE TANK ONLY	TANK W/3 COPPER RODS	TANK W/3 COPPER RODS AND AGITATOR	TANK W/3 COPPER RODS, AGITATOR, HEATER w/THERMOSTAT
PL10	18x14x12DP	10	1/4"	$30.00	$ 60.00	$120.00	$200.00
PL20	23x15x18DP	20	5/16"	60.00	95.00	155.00	245.00
PL30	23x18x24DP	30	5/16"	79.00	130.00	190.00	290.00

* PL10 and PL20 have 1000 Watt, 115 V. Heater; PL30 has 2000 Watt, 230 V. Heater. Specify SS Heater for Alkaline solutions; Quartz Heater for Acid Type solutions.

OUTSTANDING FEATURES:

1. Heavy wall. Model PL10 and PL20 are self-supporting. Model PL30 should have a supporting frame.

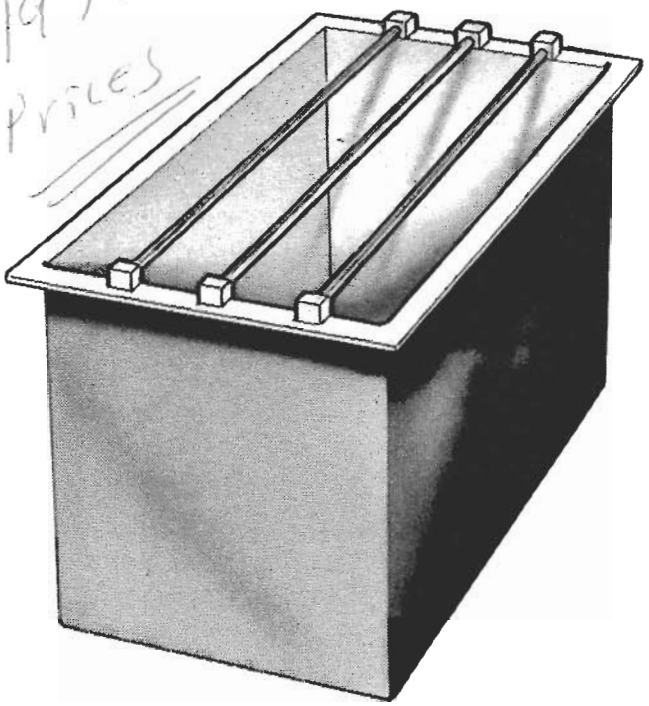
2. No welded seams. Absolutely leak proof.

3. Exclusive square channel type rim for base of mounting accessories.

4. Recommended for continuous use up to 140° F. maximum or intermittant use to 160° F. maximum.

Platers Service Company, 1511 Esperanza Street, Los Angeles, California 90023

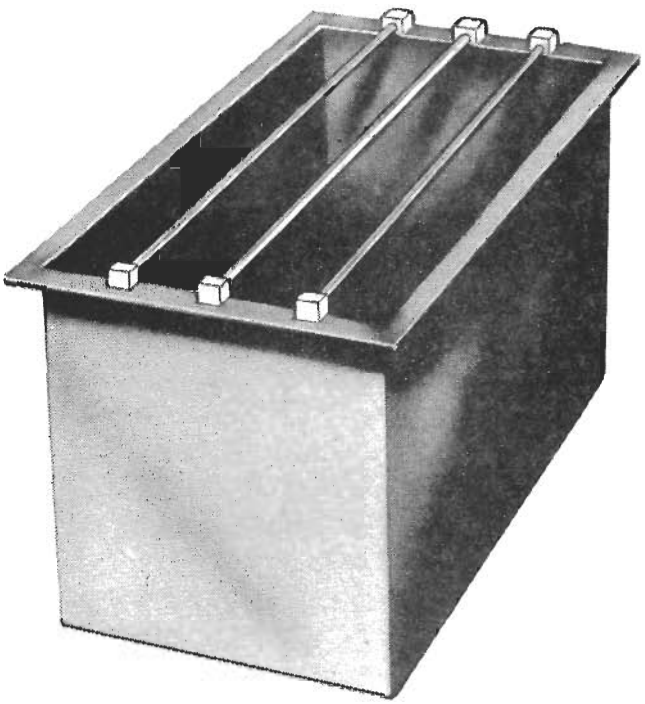
1979 Prices



PLACO
PVC LINED STEEL TANKS

Recommended for acid pickling solutions up to 150° F, ammonium persulphate solutions and all plating solutions up to 150° F.

MODEL NO.	SIZE L W D	MATERIAL THICKNESS MILD STEEL	TOP RIM	CAPACITY IN GALLONS	PRICE OF TANK ONLY	ROD DIA.	PRICE OF TANK WITH RODS & MOUNTS
LT-55	24x24x24"	14 ga	1½"	55 gal	$230.00	1/2"	$288.00
LT-68	30x24x24"	12 ga	1½"	68 gal	270.00	5/8"	334.00
LT-87	30x24x30"	11 ga	1½"	87 gal	304.00	5/8"	368.00
LT-109	30x30x30"	11 ga	1½"	109 gal	356.00	5/8"	420.00
LT-60	36x18x24"	11 ga	1½"	60 gal	280.00	5/8"	374.00
LT-80	36x24x24"	11 ga	1½"	80 gal	304.00	5/8"	398.00
LT-126	36x30x30"	3/16"	1½"	126 gal	460.00	5/8"	554.00
LT-150	36x36x30"	3/16"	1½"	150 gal	512.00	5/8"	606.00
LT-92	42x24x24"	3/16"	2"	92 gal	400.00	3/4"	499.00
LT-147	42x30x30"	3/16"	2"	147 gal	512.00	3/4"	611.00
LT-216	42x36x36"	3/16"	2"	216 gal	630.00	3/4"	729.00
LT-206	48x30x36"	3/16"	2"	206 gal	660.00	3/4"	766.00
LT-247	48x36x36"	3/16"	2"	247 gal	700.00	3/4"	806.00
LT-231	54x30x36"	3/16"	2"	231 gal	700.00	3/4"	849.00
LT-278	54x36x36"	3/16"	2"	278 gal	770.00	1"	919.00
LT-310	60x36x36"	3/16"	2"	310 gal	910.00	1"	1069.00
LT-370	72x36x36"	3/16"	2"	370 gal	1040.00	1"	1339.00
LT-438	72x36x42"	3/16"	2"	438 gal	1140.00	1"	1439.00



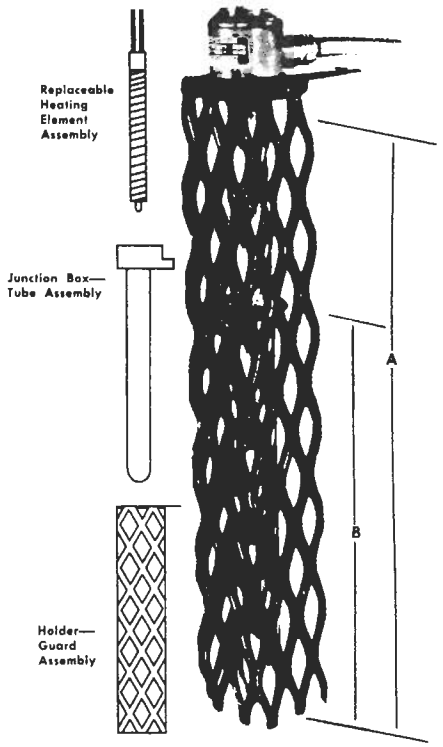
PLACO UNLINED STEEL TANKS

Recommended for soak cleaning, electro-cleaning, alkaline plating solutions and other non-corrosive applications.

MODEL NO.	SIZE L W D	MATERIAL THICKNESS MILD STEEL	TOP RIM	CAPACITY IN GALLONS	PRICE OF TANK ONLY	ROD DIA.	PRICE OF TANK WITH RODS & MOUNTS
T-55	24x24x24"	14 ga	1½"	55 gal	$ 70.00	1/2"	$128.00
T-68	30x24x24"	12 ga	1½"	68 gal	80.00	5/8"	144.00
T-87	30x24x30"	11 ga	1½"	87 gal	92.00	5/8"	156.00
T-109	30x30x30"	11 ga	1½"	109 gal	108.00	5/8"	172.00
T-60	36x18x24"	11 ga	1½"	60 gal	80.00	5/8"	174.00
T-80	36x24x24"	11 ga	1½"	80 gal	92.00	5/8"	186.00
T-126	36x30x30"	3/16"	1½"	126 gal	210.00	5/8"	304.00
T-150	36x36x30"	3/16"	1½"	150 gal	230.00	5/8"	324.00
T-92	42x24x24"	3/16"	2"	92 gal	150.00	3/4"	249.00
T-147	42x30x30"	3/16"	2"	147 gal	230.00	3/4"	329.00
T-216	42x36x36"	3/16"	2"	216 gal	284.00	3/4"	383.00
T-206	48x30x36"	3/16"	2"	206 gal	284.00	3/4"	390.00
T-247	48x36x36"	3/16"	2"	247 gal	316.00	3/4"	422.00
T-231	54x30x36"	3/16"	2"	231 gal	316.00	3/4"	465.00
T-278	54x36x36"	3/16	2"	278 gal	344.00	1"	493.00
T-310	60x36x36"	3/16	2"	310 gal	454.00	1"	613.00
T-370	72x36x36"	3/16	2"	370 gal	540.00	1"	839.00
T-438	72x36x42"	3/16	2"	438 gal	612.00	1"	911.00

PLACO
ELECTRICAL IMMERSION HEATERS

HEATERS FOR DIFFICULT ACID BATHS



FEATURES:

- Sealing cap filled with compound prevents the entrance of liquids and vapor.
- Portable, light-weight.
- Totally inert to all acid finishing and plating solutions (except HF and phosphatizing).

WATTS	VOLTS	DIMENSIONS		CATALOG NO.	PRICE COMPLETE	COMPLETE HEATER LESS GUARD	ELEMENT ONLY
		A	B				
1000	120/1 phase 240/1 phase	12"	6"	Q1-112 Q1-212	$51.00	$40.00	$27.00
2000	240/1 phase 480/1 phase	19"	11"	Q2-219 Q2-419	72.00	59.00	34.00
3000	240/1 phase 480/1 phase	22"	14"	Q3-222 Q3-422	84.00	62.00	38.00
4000	240/1 phase 480/1 phase	28"	19"	Q4-228 Q4-428	95.00	73.00	42.00
5000	240/1 phase 480/1 phase	34"	26"	Q5-234 Q5-434	106.00	84.00	48.00
6000	240/1 phase 480/1 phase	40"	31"	Q6-240 Q6-440	117.00	95.00	53.00
7500	240/1 phase 480/1 phase	47"	35"	Q75-247 Q75-447	139.00	101.00	58.00
9000	240/1 phase 480/1 phase	52"	38"	Q9-252 Q9-452	150.00	106.00	61.00
12000	240/1 phase 480/1 phase	70	57"	Q12-270 Q12-470	172.00	117.00	66.00

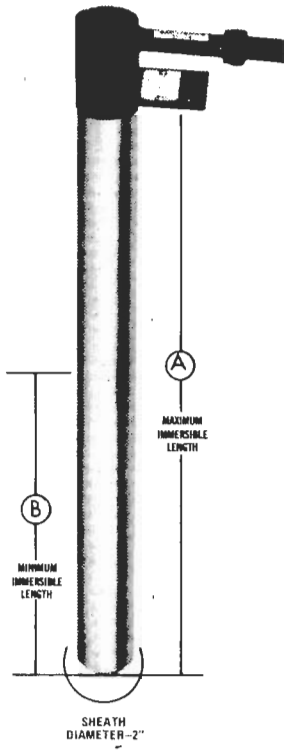
PLACO HEATERS FOR ALKALINE BATHS

FEATURES:

- A vapor proof junction box prevents entrance of vapors and liquids.
- Long life. The heaters are conservatively deisgned for safe operating temperatures with high grade resistance wire being used.
- Easily installed. Hang the heater over side of the tank and make electrical connection.
- Efficient operation. Heaters immersed directly into the liquid provide heat only where it is needed keeping heat cost to a minimum.

THERMOSTAT

CAT. NO.	TEMP. RANGE	VOLTS (SPECIFY)	AMPS	MAX.HTR. CAPACITY	PRICE
H-4	50° - 250°F	115 or 240	15	2Kw/120V	$27.50



WATTS	VOLTS	DIMENSION A	DIMENSION B	PLAIN STEEL PRICE	PLAIN STEEL NO.	STAINLESS PRICE	STAINLESS NO.	316 STAINLESS PRICE	316 STAINLESS NO.	TITANIUM PRICE	TITANIUM NO.
1000	120/1 ph 240/1 ph	14"	7"	$ 37.00	PS1-114S PS1-214S	$ 47.00	PS1-114-S4 PS1-214-S4	$ 52.00	PS1-114-S6 PS1-214-S6	$ 72.00	PS1-114-T PS1-214-T
2000	240/1 ph 480/1 ph	21"	9"	47.00	PS2-221S PS2-421S	64.00	PS2-221-S4 PS2-421-S4	67.00	PS2-221-S6 PS2-421-S6	91.00	PS2-221-T PS2-421-T
3000	240/1 ph 480/1 ph	26"	14"	51.00	PS3-226S PS3-426S	66.00	PS3-226-S4 PS3-426-S4	73.00	PS3-226-S6 PS3-426-S6	101.00	PS3-226-T PS3-426-T
4000	240/1 ph 480/1 ph	30"	18"	54.00	PS4-230S PS4-430S	70.00	PS4-230-S4 PS4-430-S4	79.00	PS4-230-S6 PS4-430-S6	108.00	PS4-230-T PS4-430-T
5000	240/1 ph 480/1 ph	35"	23"	60.00	PS5-235S PS5-435S	80.00	PS5-235-S4 PS5-435-S4	90.00	PS5-235-S6 PS5-435-S6	119.00	PS5-235-T PS5-435-T
6000	240/1 ph 480/1 ph	40"	28"	68.00	PS6-240S PS6-440S	89.00	PS6-240-S4 PS6-440-S4	99.00	PS6-240-S6 PS6-440-S6	131.00	PS6-240-T PS6-440-T
9000	240/1 ph 480/1 ph	54"	42"	88.00	PS9-254S PS9-454S	115.00	PS9-254-S4 PS9-454-S4	128.00	PS9-254-S6 PS9-454-S6	145.00	PS9-254-T PS9-454-T
12000	240/1 ph 480/1 ph	86"	56"	118.00	PS12-268S PS12-468S	157.00	PS12-268-S4 PS12-468-S4	175.00	PS12-268-S6 PS12-468-S6	224.00	PS12-268-T PS12-468-T

LABORATORY UNITS

STEEL AND STAINLESS STEEL

WATTS	VOLTS	DIA.	OVERALL LENGTH	MIN. IMMER. DEPTH	PLAIN STEEL PRICE	PLAIN STEEL NO.	STAINLESS STEEL PRICE	STAINLESS STEEL NO.
1000	120	1¼"	12"	7"	$34.00	C-1000S	$40.00	C-1000S4
500	120	1¼"	8"	4"	29.00	C-500S	35.00	C-500S4
250	120	5/8"	6"	2"	22.00	C-250S	26.00	C-250S4

QUARTZ

WATTS	VOLTS	DIA.	OVERALL LENGTH	MIN. IMMER. DEPTH	PRICE	CAT. NO.
1000	120	1	13"	7"	$29.00	M-1000
500	120	1	10"	5"	26.00	M-500
250	120	5/8	7"	3"	23.00	M-250

CHOOSING YOUR D.C. POWER SUPPLY

The D.C. power supply is undoubtedly the most important single piece of equipment in a plating facility.

Equipment manufacturers may refer to the D.C. power supply as a "plater" or a "rectifier" but its basic function is the same: to change the alternating current (AC) into direct current (DC) and reduce the voltage from 115 or 230 or 460 to the low level, that is required for various processes.

Small bench modesl are usually operated from 110/115 volt, single phase lines -- as available from ordinary household circuits. A unit of 150 amperes, 6 volt output should be about the highest rating for this AC line.

Units to 500 amperes may be operated from a 220V, single phase line, available in most areas.

Above limits are not an absolute formula but only listed as a general guideline.

Units of high current output (over 500 amperes) should be operated from a 220/240 volt, 3 phase service or 440/480 volt, 3 phase service.

This (3) phase electrical service is available in industrial/manufacturing areas; hardly ever in residential areas.

Choosing the most efficient and economical D.C. power supply will depend on these factors:

1. Process(es) involved.
2. Total area in square inches or feet to be processed per tank load.

As an example: if you want to silver plate some parts that would never exceed 1 square foot of area; a 15 amp, 0-4 volt D.C. power supply would be ample.

Conversely -- if you should try to hard chrome plate a part having 1 square foot of area; then you will need a 300 or 400 amp, 0 to 6 volt power supply and it should have low ripple D.C. output.

Above are the extreme examples. Silver requiring only 10 to 20 amps per square foot and hard chrome 250 to 350 amps per square foot.

Other important features in choosing a power supply would involve:

3. Voltage Control.
4. Type of rectification.
5. Accuracy of meters.
6. Maximum D.C. current (amperes).
7. Maximum D. C. volts.
8. Ripple (Filtered or Unfiltered).

Let's examine these features in some detail.

Voltage Control:

Controlling the D.C. volt/amperes to your plating tank is absolutely necessary. As voltage is raised, the amperage is also raised and vice versa. This may be accomplished by a stepless autotransformer or a tap switch in conjunction with tapped leads from the isolation main transformer.

The stepless control is preferred for small single phase units and even for large 3 phase units. As the power factor increases, a stepless autotransformer may become inadvisable because of cost and/or size.

The tap switch method is less costly on larger units and is entirely satisfactory for most processes. Some exceptions would be precision plating of electronic or other small parts.

Rectification:

The two most efficient rectifiers are selenium and silicon.

Silicon is the newest method and has no 'aging' factor, however, many manufactureres still use selenium.

Maximum D.C. Current:

Your D.C. power supply should be capable of at least 25% more D.C. output than your maximum requirements.

As an example: if you expect to have loads requiring 75 amps then a 100 amps unit should be considered. Operating at 75% to 80% of rated capacity will insure many extra years of trouble free service.

Maximum D.C. Volts:

Some percentage of extra D.C. volts is advisable -- but too much extra voltage can be detrimental, as well as costing more for the unit.

This is especially true of stepless autotransformer controlled units assuming the requirement is for operating copper plating tank -- 2 to 4 volts average requirement. A 0-6 volt D.C. power unit would be excellent -- but a 0-12 volt could cause problems, because your voltage control will be set at 1/3 to 1/2 of total winding causing premature wear and overheating of the carbon brushes.

Ripple:

The most controversial subject in the plating industry is the effectiveness of low ripple D.C. power output. (Filtered vs. Unfiltered.)

All of our solutions with the single exception of PLACO Hard Chrome, will operate with any power supply regardless of ripple.

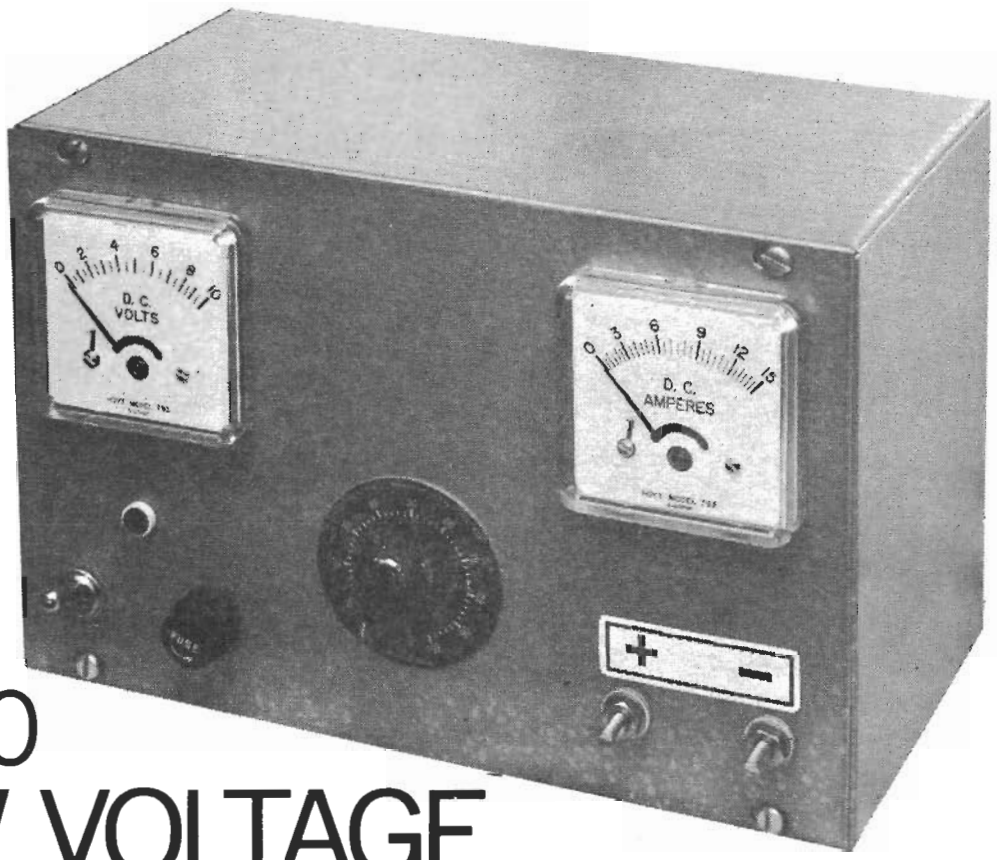
For hard chrome plating our LR1 single phase or our B3 Series must be used.

Should a unit of other manufacture be considered, then make certain the ripple is certified at less than 5% for hard industrial chrome processing.

All PLACO three phase input D.C. power units will have less than 5% ripple.

Should you require a D.C. power unit of different capacity or other specifications than listed -- be assured that we can supply you with minimum delay and at competitive prices.

We can also supply components for D.C. power units of any specification or rating. Electrical experience is strongly recommended for proper assembly of D.C. power equipment.



PLACO
LOW VOLTAGE
DC POWER SUPPLIES

For special processing requiring 1-4 volts; Electroforming, plating plaster, plastics, baby shoes and flowers. Precious metal recovery electrowinning from ore and silver recovery from photo solution. Ideal for silver, gold plating, etc.

MODEL B14

A.C. Input 110/120 V., 1 ph, 60 cycles, 1 Amp.

D.C. Output 15 Amps, 0-4 V.

Complete with 2" volt ammeters, stepless voltage control, full wave silicon rectifier, 5' line cord, switch, fuse and pilot lite.

Shipping weight 24 lbs. Price $145.00

MODEL B34

A.C. Input 110/120 V., 1 ph, 60 cycles, 2 Amps.

D.C. Output 30 Amps, 0-4 V.

Shipping weight 40 lbs. Price $180.00

MODEL B54

A.C. Input 110/120 V., 1 ph, 60 cycles, 5 Amps.

D.C. Output 75 Amps, 0-4 V.

Shipping weight 60 lbs. Price $305.00

MODEL B104

A.C. Input 110/120 V., 1 ph, 60 cycles, 10 Amps.

D.C. Output, 150 Amps, 0-4 V.

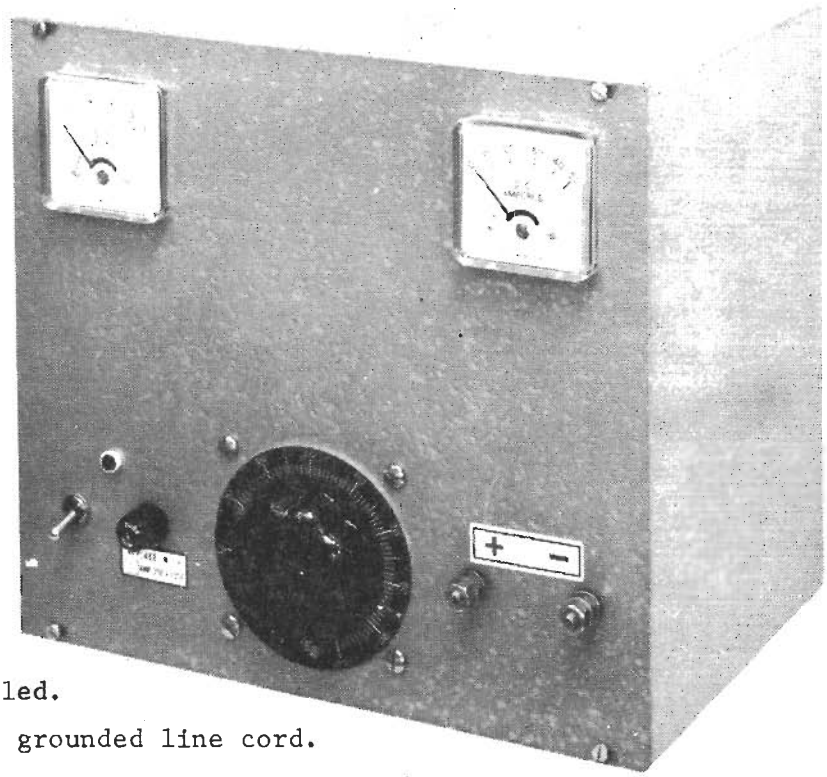
Shipping weight 110 lbs. Price $385.00

Other sizes to your requirements. Write for prices stating needed specifications.

Platers Service Company, 1511 Esperanza Street, Los Angeles, California 90023

PLACO DC POWER SUPPLIES

for All Plating Applications*



Silicon rectification - convection cooled.

Voltmeter and Ammeter complete with 5' grounded line cord.

Stepless, single knob control from 0-6 V. for precision processing.

MODEL B1-26

A.C. Input 110/120 V., 1 ph, 60 cycles, 3 Amps.

D.C. Output 0-25 Amps, 0-6 V.

Size 10"x7"x8" high.

Net weight 25 lbs. Shipping weight 35 lbs.

Price 185.00

MODEL B1-56

A.C. Input 110/120 V., 1 ph, 60 cycles, 5 Amps.

D.C. Output 0-50 Amps, 0-6 V.

Size 12"x8"x11" high.

Net weight 35 lbs. Shipping weight 45 lbs.

Price 250.00

MODEL B1-106 (Illustrated on next page.)

A.C. Input 110/120 V., 1 ph, 60 cycles, 10 Amps.

D.C. Output 0-100 Amps, 0-6 V.

Sloping Front Cabinet Size 18"x12"x12½" high.

Net weight 60 lbs. Shipping weight 90 lbs.

Price 345.00

MODEL B1-156 (Illustrated on next page.)

A.C. Input 110/120 V., 1 ph, 60 cycles, 13 Amps.

D.C. Output 0-150 Amps, 0-6 V.

Sloping Front Cabinet Size 18"x12"x12½" high.

Net weight 70 lbs. Shipping weight 100 lbs.

Price $435.00

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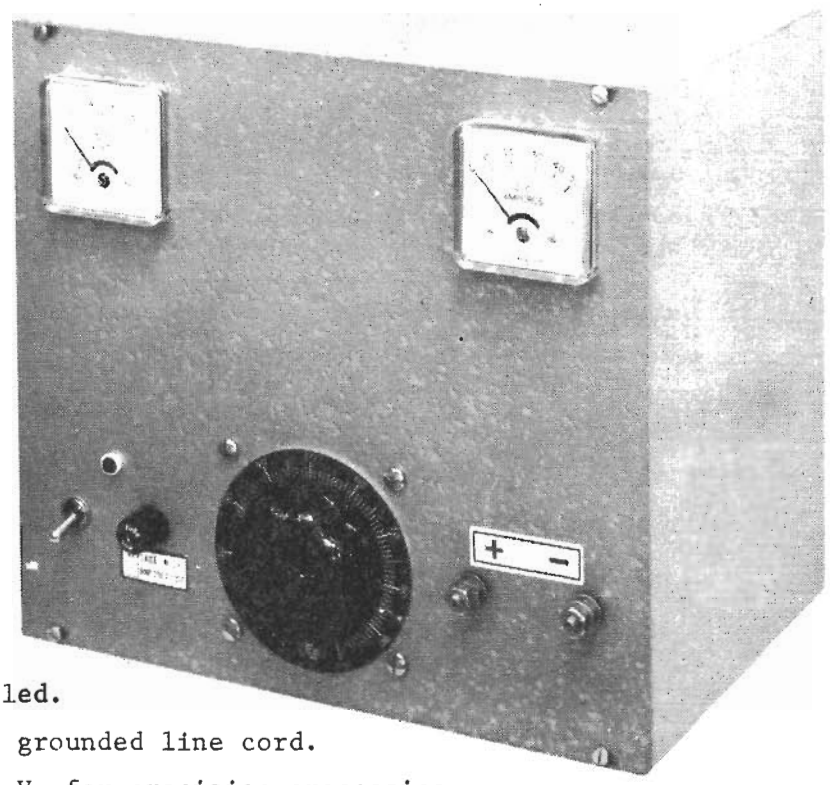
* Hard chrome plating requires low ripple D.C. Output, less than 5%. See Special Processing Units LR Series and P3, and P.D.

Platers Service Company, 1511 Esperanza Street, Los Angeles, California 90023

PLACO DC POWER SUPPLIES

for All Plating Applications*



Silicon rectification - convection cooled.

Voltmeter and Ammeter complete with 5' grounded line cord.

Stepless, single knob control from 0-6 V. for precision processing.

MODEL B1-26

A.C. Input 110/120 V., 1 ph, 60 cycles, 3 Amps.

D.C. Output 0-25 Amps, 0-6 V.

Size 10"x7"x8" high.

Net weight 25 lbs. Shipping weight 35 lbs.

Price 185.00

MODEL B1-56

A.C. Input 110/120 V., 1 ph, 60 cycles, 5 Amps.

D.C. Output 0-50 Amps, 0-6 V.

Size 12"x8"x11" high.

Net weight 35 lbs. Shipping weight 45 lbs.

Price 250.00

MODEL B1-106 (Illustrated on next page.)

A.C. Input 110/120 V., 1 ph, 60 cycles, 10 Amps.

D.C. Output 0-100 Amps, 0-6 V.

Sloping Front Cabinet Size 18"x12"x12½" high.

Net weight 60 lbs. Shipping weight 90 lbs.

Price 345.00

MODEL B1-156 (Illustrated on next page.)

A.C. Input 110/120 V., 1 ph, 60 cycles, 13 Amps.

D.C. Output 0-150 Amps, 0-6 V.

Sloping Front Cabinet Size 18"x12"x12½" high.

Net weight 70 lbs. Shipping weight 100 lbs.

Price $435.00

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* Hard chrome plating requires low ripple D.C. Output, less than 5%. See Special Processing Units LR Series and P3, and P.D.

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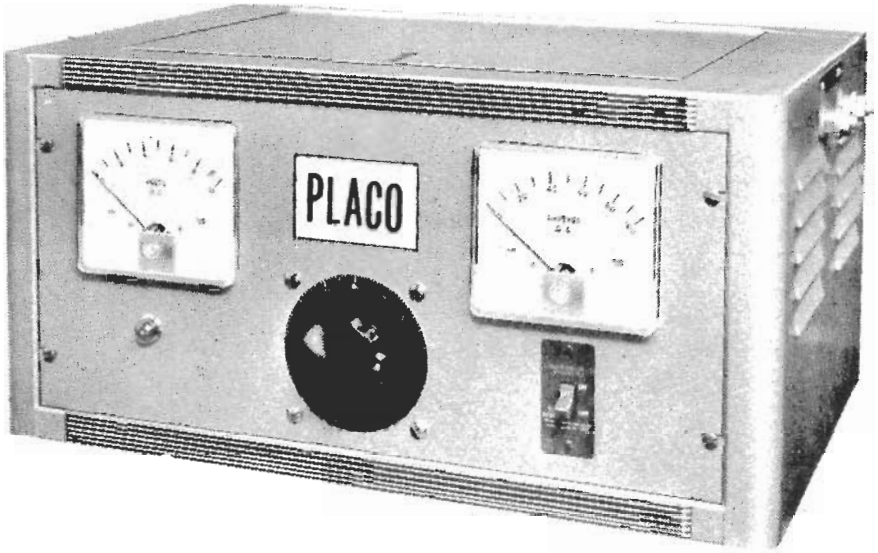


PLACO

FILTERED DC POWER UNITS

For Hard Industrial Chrome and other processes requiring low ripple D.C.

MODEL LR 1-57

A.C. Input 110/120 V., 1 ph, 60 cycles, 6 Amps.

D.C. Output 0-50 Amps, 0-6 V. less than 5% ripple.

Large 4-1/2" meters.

Cabinet Size: 22"x9"x15"

Price $345.00

MODEL LR1-107

A.C. Input 110/120 V., 1 ph, 60 cycles, 12 Amps.

D.C. Output 0-100 Amps, 0-6 V. less than 5% ripple.

Large 4-1/2" Meters.

Cabinet Size: 22"x11"x15"

Price $435.00

MODEL LR1-157

A.C. Input 110/120 V., 1 ph, 60 cycles, 18 Amps.

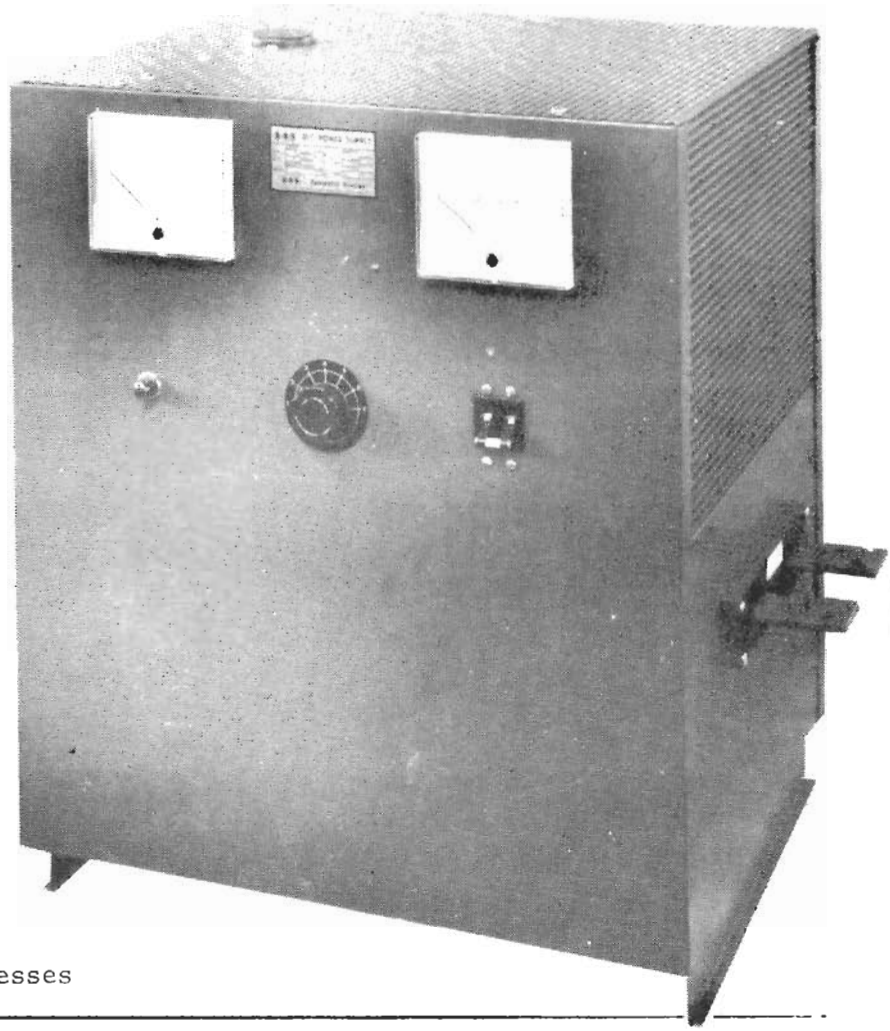
D.C. Output 0-150 Amps, 0-6 V. less than 5% ripple.

Large 4-1/2" Meters.

Cabinet Size: 22"x14"x15"

Price $575.00

PLACO DC POWER SUPPLIES for Electroplating



Alkaline Copper, Nickel, Bright

Chrome, Brass, Cadmium and other processes

MODEL P2-36

A.C. Input 220 V., 1 ph, 60 cycles, 14 Amps. D.C. Output 300 Amps, 2-6 V.

Large 4" meters, 7 position control, silicon full wave rectifier, fan cooled. Circuit breaker. Add $175.00 for Filter Section

This unit can process loads of 8-10 square feet copper, 6-8 square feet nickel, 2½-3 square feet bright chrome.*

Price $495.00 Encl.Size 22x18x27" high. Net weight 150 lbs. Shipping weight 200 lbs.

Also available for 110 V. operation. Add $40.00 (A.C. Input will be 28 Amps at 110 V.)

MODEL P2-56

A.C. Input 220 V., 1 ph, 60 cycles, 25 Amps. D.C. Output 500 Amps, 2-6 V.

Same specifications as P2-36. Add $225.00 for Filter Section

Price $675.00 Encl.Size 22x18x27" high. Net weight 165 lbs. Shipping weight 215 lbs.

This unit can process loads of 15 to 20 square feet copper, 10 to 15 square feet nickel, 4-5 square feet of bright chrome.*

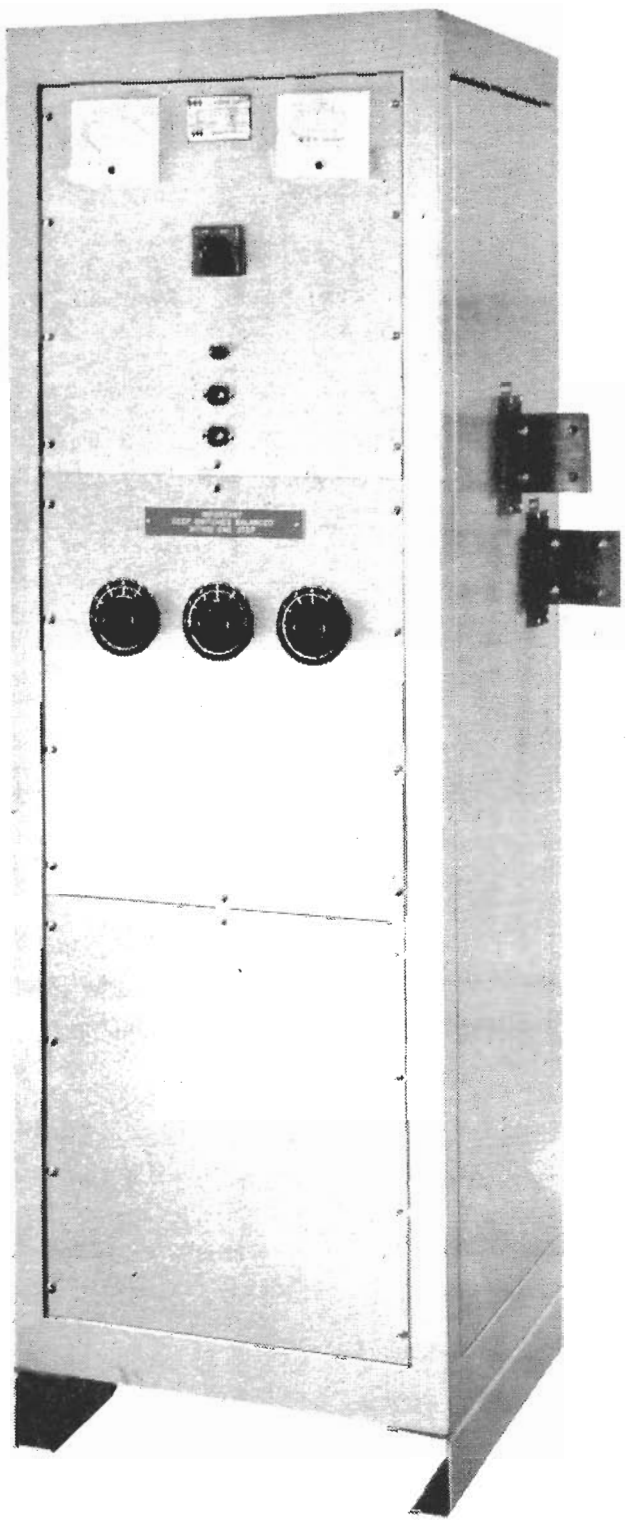
Above units are complete with 5' line cord ready to "plug in" to 220 V. receptacle and operate. Also available in kit form for your assembly. (See "D.C. Power Kits" for pricing.)

*Chrome plating results are better with filtered DC output or 3-phase AC input. Write for details.

Platers Service Company, 1511 Esperanza Street, Los Angeles, California 90023

PLACO 3-Phase Heavy Duty DC POWER UNITS

Less than 5% Ripple



MODEL P3-106

A.C. Input 220/240 or 440/480 V., 3 ph, 60 cycles, 20 Amps.

D.C. Output 1000 Amps, 2-6 V.

4" Meters, Three (3) 7 position tap switches providing 21 steps of voltage.

Silicon fan cooled rectifier, circuit breaker.

Price $1275.00 Net weight 545 lbs.

Encl. size: 23x23x52" high. Shipping wt. 650 lbs.

Plating capability for all industrial or decorative processes.

Maximum area: Bright chrome 10 square feet, hard industrial chrome 5 square feet.

MODEL P3-156

A.C. Input 220/240 or 440/480 V., 3 ph, 60 cycles, 30 Amps.

D.C. Output 1500 Amps, 2-12 V.

Same specifications as P3-106.

Price $1675.00 Net weight 750 lbs.

Same size enclosure. Shipping wt. 850 lbs.

This model will process large parts including auto bumpers.

MODEL PD9-29

A.C. Input 220/240 or 440/480 V., 3 ph, 60 cycles, 60 Amps.

D.C. Output 2000 Amps, 1.5 to 9 V.

4" Meters, three (3) 7 position tap switches with Hi-Lo Switch to provide 42 steps from 1.5 to 9V.

Price $2250.00 Net weight 900 lbs.

Encl. size: 23x23x71" high. Shipping wt. 1050 lbs.

This model is adequate for all types of processing including larger bumpers with chrome.

PLACO D.C. POWER UNITS
COMPONENT KITS
Filtered D.C. Output for Hard Chrome and Special Processing Requiring Low Ripple

(A.C. Input 110/120 Volts, 1 phase, 60 cycles.)

50A 0-6 Volts
(Same Components as LR1-57)

50-C	Silicon Rectifier	$ 15.75
T50-C	Transformer	51.50
C-50	Choke	49.00
31500	Capacitor	12.50
50-20	Resistor	1.00
T-1-124 (501)	Stepless Autotransformer Voltage Controller	23.50
520-10	Voltmeter	21.75
520-50	Ammeter	20.25
N51	Pilot Lite	1.50
S10	Switch	.75
F-1	Fuse Holder and Fuse	.85
LR1-57K		$198.35

100A 0-6 Volts
(Same Components as LR1-107)

100-C	Silicon Rectifier	$28.75
T-106-C	Transformer	77.00
C-100	Choke	72.00
31500	Capacitor	12.50
50-20	Resistor	1.00
T-1-116-U	Stepless Autotransformer Voltage Controller	32.00
520-10	Voltmeter	21.75
520-100	Ammeter	20.25
100-50	MV Shunt and Leads	11.75
N51	Pilot Lite	1.50
S10	Switch	.75
F-1	Fuse Holder and Fuse	.85
LR-107K		$280.10

150A 0-6 Volts
(Same Components as LR1-157)

150-C	Silicon Rectifier	$ 35.80
T-156-C	Transformer	127.00
C-100	Choke	114.00
(2) 31500	Capacitors	25.00
T-1210	Stepless Autotransformer Voltage Controller	48.00
520-10	Voltmeter	21.75
520-150	Ammeter	20.25
150-50	MV Shunt and Leads	11.75
N51	Pilot Lite	1.50
S15	Switch	1.10
F-1	Fuse Holder and Fuse	.85
LR1-157K		$407.50

You can order the complete set of components or individual components should you have some of the parts available.

(See Page 22 for Schematic Drawings)

GENERAL PURPOSE
PLACO D.C. POWER UNITS
COMPONENTS KITS

(A.C. Input 110/120 Volts, 1 phase, 60 cycles.)

25A 0-6 Volts
(Same Components as in our B1-26)

30-C	Silicon Rectifier	$11.25
T-26-C	Transformer	39.00
T-1-121 (251)	Stepless Autotransformer Voltage Controller	16.00
H10	Voltmeter	4.75
H25	Ammeter	4.75
N51	Pilot Lite	1.50
S10	Switch	.75
F-1	Fuse Holder and Fuse	.85
B1-26K		$73.85

100A 0-6 Volts
(Same Components as in our B-106)

100-C	Silicon Rectifier	$ 28.75
T-106-C	Transformer	77.00
T-1-116-U	Stepless Autotransformer Voltage Controlle	32.00
H10	Voltmeter	4.75
H100	Ammeter	9.50
N51	Pilot Lite	1.50
S10	Switch	.75
F-1	Fuse Post and Fuse	.85
B1-106K		$155.10

50A 0-6 Volts
(Same Components as B1-56)

50-C	Silicon Rectifier	$ 15.75
T-50-C	Transformer	51.50
T-1-124 (501)	Stepless Autotransformer Voltage Controller	23.50
H10	Voltmeter	4.75
H50	Ammeter	4.75
N51	Pilot Lite	1.50
S10	Switch	.75
F-1	Fuse Holder and Fuse	.85
B1-56K		$103.35

150A 0-6 Volts
(Same Components as B1-156)

150-C	Silicon Rectifier	$ 35.80
T-156-C	Transformer	127.00
T-1210	Stepless Autotransformer Voltage Controller	48.00
520-10	Voltmeter	21.75
520-150	Ammeter	20.25
150-50	MV Shunt and Leads	11.75
N51	Pilot Lite	1.50
S15	Switch	1.10
F-1	Fuse Post and Fuse	.85
B1-156K		$268.00

You can order the complete set of components or individual components should you have some of the parts available.

(See Page 22 for Schematic Drawings)

LOW VOLTAGE
PLACO D.C. POWER UNITS
COMPONENT KITS

(A.C. Input 110/120 Volts, 1 phase, 60 cycles.)

Assemble your unit from our standard components and save.

You can order the complete set of components or individual components should you have some of the parts available.

15A 0-4 Volts
(Same Components as in our B14)

15-C	Silicon Rectifier	$ 6.50
T-14-C	Transformer	26.00
T-1-120	Stepless Autotransformer Voltage Controller	14.00
H10	Voltmeter	4.75
H15	Ammeter	4.75
N51	Pilot Lite	1.50
S10	Switch	.75
F-1	Fuse Post and Fuse	.85
B14-K		$59.10

75A 0-4 Volts
(Same Components as in our B54)

75-C	Silicon Rectifier	$ 24.50
T-54-C	Transformer	66.25
T-1-124	Stepless Autotransformer Voltage Controller	23.50
H10	Voltmeter	4.75
H75	Ammeter	6.50
N51	Pilot Lite	1.50
S10	Switch	.75
F-1	Fuse Post and Fuse	.85
B54-K		$128.60

30A 0-4 Volts
(Same Components as in our B34)

30-C	Silicon Rectifier	$11.25
T-34-C	Transformer	32.50
T-1-121	Stepless Autotranformer Voltage Controller	16.00
H10	Voltmeter	4.75
H30	Ammeter	4.75
N51	Pilot Lite	1.50
S10	Switch	.75
F-1	Fuse Post and Fuse	.85
B34-K		$72.35

150A 0-4 Volts
(Same Components as in our B104)

150-C	Silicon Rectifier	$ 35.80
T-104-c	Transformer	112.00
T-1-116-U	Stepless Autotransformer Voltage Controller	32.00
520-10	Voltmeter	21.75
520-150	Ammeter	20.25
150-50MV	Shunt and Leads	11.75
N51	Pilot Lite	1.50
S15	Switch	.75
F-1	Fuse Post and Fuse	.85
B1-155K		$236.65

(See Page 22 for Schematic Drawings)

General Purpose
PLACO D.C. POWER UNITS
Component Kits

300 Amps–2 to 6 Volts

(Same components as our P2-36.)

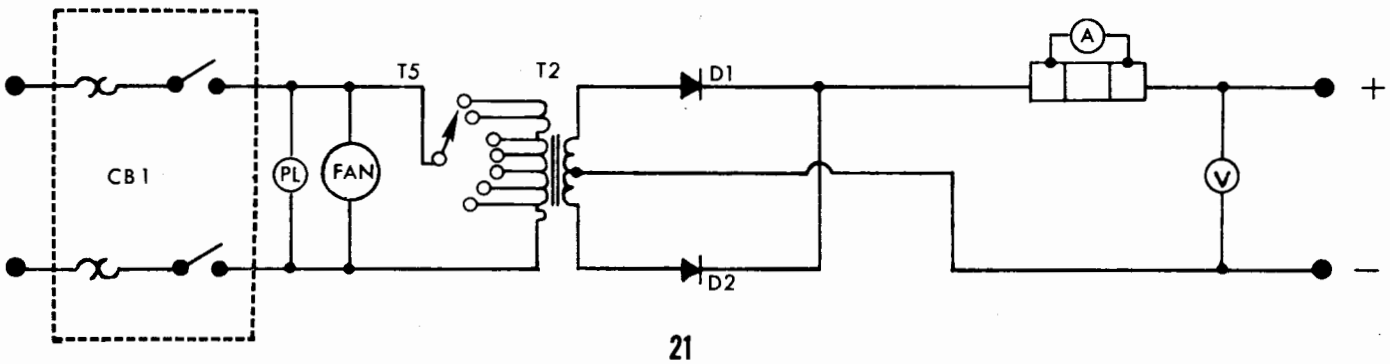
300C	Silicon Rectifier	$ 66.50
T-3006CT	Transformer	195.00
T5 111-8	Tap Switch	12.75
841-300A	Ammeter	20.25
841-10V	Voltmeter	21.75
S-300-50MV	Shunt	17.25
N-51	Pilot Light	1.50
15A	Circuit Breaker	12.50
F552	Fan	12.75
P2-36K	Complete Kit	$ 360.25

Also available with components for 110V operations at additional charge of $40.00.

500 Amps–2 to 6 Volts – Tap Switch

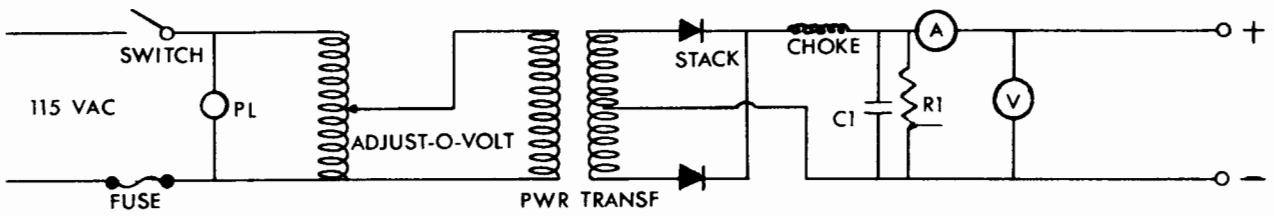
(Same components as our P2-56.)

500C	Silicon Rectifier	$ 87.50
T-5006CT	Transformer	260.00
TS212-7	Tap Switch	16.50
841-500A	Ammeter	20.25
A-500-50MV	Shunt	19.00
N-51	Pilot Light	1.50
H25A	Circuit Breaker	12.50
F552	Fan	12.75
	Voltmeter	21.75
P2-56K	Complete Kit	$ 451.75

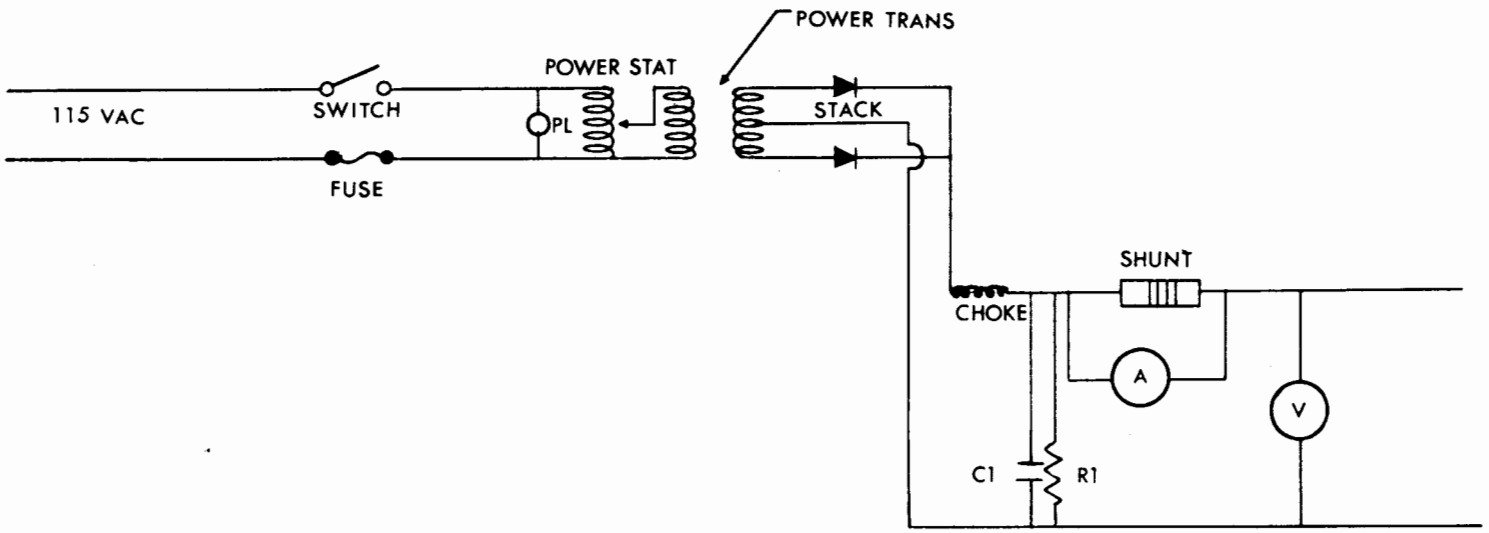


SCHEMATIC DRAWINGS FOR DC POWER UNIT COMPONENT KITS

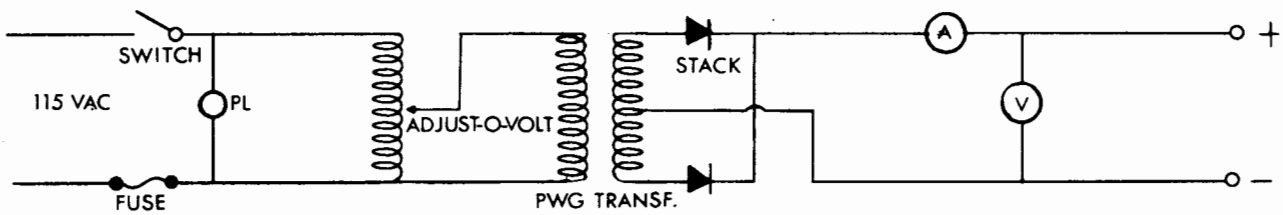
FOR KIT NO. LR1-57K



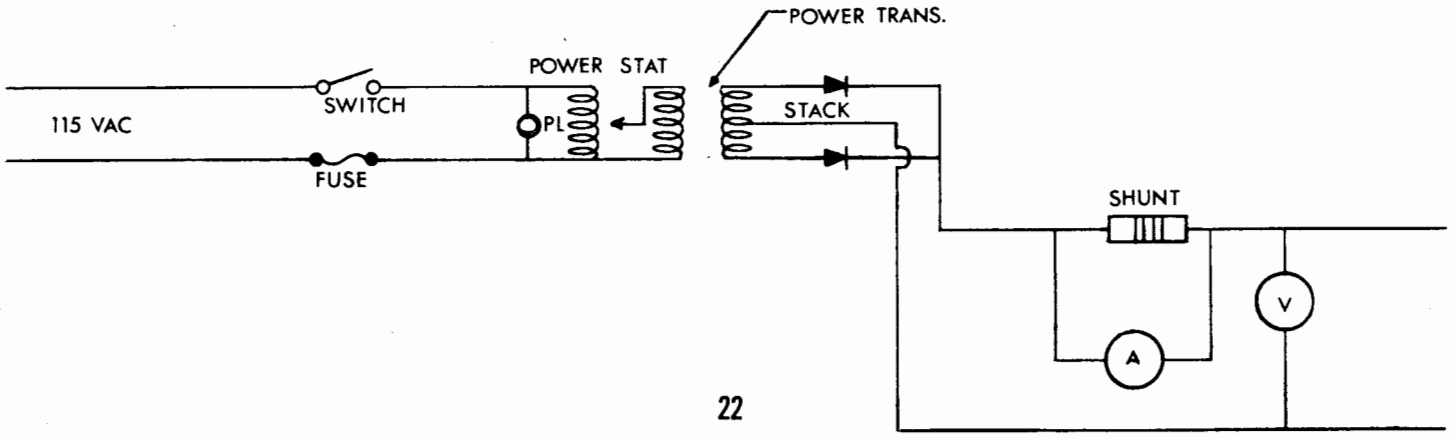
FOR KIT NO. LR-107K and NO. LR1-157K



FOR KIT NO. B1-26K • NO. B1-106K • NO. B1-56K • NO. B54K • NO. B34K • NO. B14K



FOR KIT NO. B104-K and NO. B1-156K



PLACO READY-TO-USE CHEMICALS

These cleaning and plating chemicals are sold as a prepared mixture. Simply pour the chemicals into the proper tank, add one gallon of water per one gallon of chemical mixture, stir and let settle.

SOLUTION	CATALOG NUMBER	DESCRIPTION	1-4 GALS PER GAL.	5-9 GALS PER GAL.	10 GALS UP PER GAL.
Cleaner	GP40	General purpose electro-cleaner	$ 1.50	$ 1.40	$ 1.25
Bright Copper	BC701	Alkaline bright copper solution	9.50	9.25	9.00
Acid Copper	BA702	Acid copper for plating on non-metallic items and for electroforming	6.50	6.25	6.00
Bright Nickel	BN711	Needs no buffing. Ideal underplate for chrome, silver, gold, etc.	12.00	11.50	11.00
Bright Chrome	BC721	For all decorative chrome plating. Must have nickel base plate.	12.00	11.50	11.00
Yellow Gold	G731	For all decorative finishes on jewelry, trophies, giftware.	Write for Prices		
Silver	S741	For all purpose decorative and industrial silver plating	Write for Prices		
Brass	BR751	Decorative yellow brass. Must have bright nickel base plate	9.50	9.25	9.00

POLISHING, BUFFING AND FINISHING SUPPLIES

BUFFS

CATALOG NUMBER	DESCRIPTION	PRICE EACH
12BS	12" Sewed Buff	$3.80
12BL	12" Loose Buff	3.70
8BS	8" Sewed Buff	1.80
8BL	8" Loose Buff	1.75
6BS	6" Sewed Buff	1.70
6BL	6" Loose Buff	1.60

TAMPICO SCRATCH BRUSHES

CATALOG NUMBER	DESCRIPTION	PRICE EACH
8TB	White Tampico Brush Sections* 1/2" Thick (1/2" Arbor)	$5.00

*Multiple sections are assembled on lathe spindle to give required brush wheel thickness.

BUFFING EQUIPMENT

CATALOG NUMBER	DESCRIPTION	PRICE EACH
BM75	3/4 H.P. Buffing Lathe, 110 volt or 220 volt single phase motor	$75.00

POLISHING AND BUFFING COMPOUNDS

CATALOG NUMBER	DESCRIPTION	PRICE EACH
VF400	(very fine) Lea Compounds (greaseless type) Used on Sewed or Loose Buffs. Coarse grade for removing deep cuts, scratches and imperfections. Fine grades for satin or matte finishes.	$3.50
MF270	(medium fine)	3.50
M240	(medium)	3.50
MC200	(med. coarse)	3.50
C120	(coarse)	3.50
T200	Tripoli Compound for copper, brass, aluminum, die castings	3.75
WD210	White Diamond for color buffing copper, brass, aluminum die castings	3.75
CR220	Chrome Rouge for color buffing steel, stainless steel, chrome	3.75
AW230	For color buffing copper, brass, aluminum, die castings	3.75
GR240	Rouge for gold, brass and copper	5.00

ALL PRICES ARE F.O.B. LOS ANGELES, CALIFORNIA

ANODES

PLATING SOLUTION	CATALOG NUMBER	DESCRIPTION	3x9 EACH	3x12 EACH	3x18 EACH
Bright Copper	BC101	Copper Anodes are 1/4" thick and with hooks	$ 8.50	$11.50	$17.00
Acid Copper	AC102	Same as previous	8.50	11.50	17.00
Bright Nickel	BN103	Nickel Anodes are 1/8" thick and include bags and hooks	14.00	20.00	28.00
Bright Chrome	BC104	Sawtooth Lead Anodes with hooks	8.00	10.50	16.00
Yellow Gold	AU105	Stainless Steel Anodes 1/16" thick with hooks	7.25	9.00	14.50
Silver	AG106	2x4 x 1/16" thick	Write for prices.		
		2x8 x 1/16" thick			
Brass	CZ107	3/16" thick with hook	7.50	11.00	15.00

PURE PLATING CHEMICALS

CHEMICAL	2 LB. PACKAGE	5 LB. PACKAGE	10 LB. PACKAGE
Boric Acid	$ 2.30	$ 5.50	$10.00
Chromic Acid	4.80	11.00	20.00
Copper Cyanide	9.60	21.00	40.00
Copper Sulphate	2.50	6.00	11.00
Nickel Sulphate	8.00	18.00	34.00
Nickel Chloride	8.00	18.00	34.00
Potassium Cyanide	8.00	18.00	34.00
Potassium Carbonate	2.80	6.50	12.00
Rochelle Salts	6.00	13.50	25.00
Sodium Cyanide	5.00	11.00	20.00
Sodium Carbonate	2.50	6.00	11.00
Zinc Cyanide	8.00	18.00	34.00

ALL PRICES ARE F.O.B. LOS ANGELES, CALIFORNIA

PLATING EQUIPMENT GUIDE

TYPE OF PLATING	TANK CONSTRUCTION	OPERATING TEMPERATURE	AGITATION MOTOR ON CATHODE ROD	D.C. VOLTS	DC AMPS PER SQ. FT. OF SURFACE PLATED	TYPE OF ANODES	PLATING TIME FOR AVERAGE THICKNESS
Cyanide Copper	Steel Stainless Steel PVC Lined Steel Polyethylene Polypropylene PVC Lined Wood	120°-150°	Yes	2-4	10-40	Copper	10-25 min.
Bright Nickel	PVC Lined Steel Polyethylene Polypropylene PVC Lined Wood	130°-150°	Yes	2-4	20-50	Nickel	10-20 min.
Decorative Chrome	PVC Lined Steel Polyethylene Polypropylene PVC Lined Wood	105°-110°	No	2-5	100-150	Lead with 6% Antimony	1-2 min.
Brass	Steel Stainless Steel PVC Lined Steel Polyethylene Polypropylene PVC Lined Wood	110°-130°	Yes	2-3	5-15	Brass 80% Copper 20% Zinc	15-30 min.
Acid Copper	PVC Lined Steel Polyethylene Polypropylene PVC Lined Wood	Room Temp. 70°-90°	Yes	1-2	20-50	Copper	15-30 min.
Cadmium	Steel Stainless Steel Polyethylene Polypropylene	Room Temp. 70°-90°	No	2-4	20-40	Cadmium	15-30 min.
Silver	Stainless Steel PVC Lined Steel Polyethylene Polypropylene	Room Temp. 70°-90°	Yes	1-2	5-15	Pure Silver	20-40 min.
Cyanide Gold	PVC Lined Steel Polyethylene Polypropylene	80°-120°	Yes	2-6	5-10	Stainless Steel	5-20 min.
Zinc	Steel Stainless Steel Polyethylene Polypropylene	Room Temp. 70°-90°	Optional	2-6	20-50	Zinc	15-30 min.

PART II

Copper-Nickel-Chrome Plating

Platers Service Company, 1511 Esperanza St., Los Angeles, CA 90023

COPPER-NICKEL-CHROME PLATING
FOR DECORATIVE FINISH

INTRODUCTION

Our discussion of electroplating is divided into four sections which are

SECTION I - Preparation of base metal

SECTION II - Pretreatment prior to plating

SECTION III - The electroplating operation

SECTION IV - List of equipment and supplies

SECTION I

PREPARATION OF BASE METAL

It is important to remember that "the quality of the finished plate is determined by the quality of the finish on the base metal." A rough, pitted, scratched or dull finish on the base metal which is to be plated will show the same defects on the final plated surface.

This section discusses mechanical preparation such as polishing and buffing of the base metal and lists equipment involved for this operation.

There are three successive stages in the polishing-buffing operation, designated as (1) polishing, (2) buffing and (3) coloring.

1. Equipment:
   - A. Buffing lathe which is sometimes called a "polishing jack." These units may be bench mounted or floor mounted and may run from 1/2 H.P. for light buffing to 7-1/2 H.P. for heavy work as auto bumpers.
   - B. Cloth buffs for all three operations are available in many types. As a starter we recommend two types: sewed buffs for the polishing operation, and loose buffs for both the buffing and coloring operation.
   - C. Three different compounds for the three operations are available and although they are different in character they are all designated as buffing compounds by common practice. For polishing we recommend the greaseless or Lea compounds, for buffing "Tripoli or white Diamond" grease compounds are used, and for coloring or "color buffing" chrome rouge, Acme white finish or jewelers rouge would be used.
2. Procedures:

   Polishing would be done on a sewed buff wheel coated with a greaseless type compound such as Lea compound. In larger production shops a supply of polishing wheels are prepared by coating the face of the wheel with glue and rolling it in emery to produce a dry cutting surface. The purpose of the polishing operation is to remove pits, scratches or casting defects.

   The second stage or "buffing" operation is done on a loose buff using a grease type buffing compound. Tripoli or White Diamond is applied to the buff face for buffing copper or brass, White Diamond is used for buffing aluminum and die castings as well as copper

and brass. In fact, the Tripoli and White Diamond compounds are interchangeable depending on personal preference and type of finish desired. In applying buffing compound the bar of compound is held against the face of the spinning buff wheel. Heat generated by friction causes the grease binder to melt and coat the buff surface. Always buff in a direction at right angles to the previous operation. All scratches resulting from the polishing operation are "buffed" out and a bright lustrous finish is produced In many cases this finish is satisfactory for plating. Buffing compounds for use on steel or stainless steel are a special type using aluminum oxide as the abrasive and these are usually designated as steel or stainless steel compounds.

The third stage or coloring operation is done on a soft cotton loose buff or sometimes on a flannel buff wheel. The coloring compound such as rouge or Acme white finish is applied to the face of the buff the same as described under the buffing operation.

There are occasions when the three finishing operations may be shortened to one step or eliminated entirely. If the parts are newly fabricated and are being plated for corrosion resistance only, they may not require mechanical finishing prior to plating.

SECTION II

PRETREATMENT PRIOR TO PLATING

This section covers cleaning, rinsing and pickling the metal surface before the actual plating. In order to be successfully plated the surface must be "chemically and physically clean." If the surface to be plated has any dirt, dust particles, rust, oxides, finger marks, or grease a correspondingly poor plate will result.

Our typical copper-nickel-chrome plating system shows the electro-cleaner tank as Item 1.

1. Equipment needed for electro cleaning, rinsing and acid dipping includes a plain steel cleaner tank or drum of suitable size to accomodate the parts being plated.

   One copper anode rod with insulator mounts to prevent electrical contact with the tank wall.

   One gas burner to heat the tank or drum to about 160°-180° F. Steel, or preferably stainless steel, electric immersion heaters may also be used to heat this solution.

   The cleaner solution consists of a general purpose cleaner such as Placo GP40.

   A cold running rinse tank (Item 2). This may be a common vinyl waste basket or equivalent. This too must be large enough to completely immerse the work being plated. An overflow outlet should be provided to maintain the running rinse.

   An acid dip tank (Item 3) made of plastic or suitable acid proof materials. The vinyl waste basket mentioned above is satisfactory for this step. No overflow outlet is needed.

   To make up the acid dip a 25% to 40% solution of muriatic acid or a 10% to 15% solution or sulfuric acid may be used.

   Another rinse tank made of acid proof materials same as Item 2 is satisfactory.

2. Procedure: The parts being cleaned may be scrubbed with a cotton swab to speed up the removal of surface dirt and then followed by "electrocleaning." The electro cleaner tank should be made up with equal parts of Place GP40 and water, and heated to about 170° F. The work is suspended from the anode rod by means of copper wire,

copper hook or plating rack. A direct current power source such as the rectifier (Item 11) is connected to the anode rod and the circuit is completed by connecting the steel tank wall to the negative outlet on the rectifier. The gassing action caused by the electrolysis of the cleaner solution produces a beneficial scrubbing action which tends to lift off the dirt particles as the gas bubbles break free from the surface. No rule can be given as to the length of time necessary to electroclean the metal surfaces. This is related to the type and amount of dirt to be removed. For practical purposes we can say that 2 to 5 minutes should suffice.

The electrocleaning step is followed by an immersion of 10 to 30 seconds in the running rinse tank (Item 2). All the film of cleaner solution that is carried out of the cleaner tank must be rinsed off in this step.

Step three (Item 3 in our drawing) is an acid dip to remove chemical stains such as oxides, rust, sulfides, etc. This is normally an immersion of 10-20 seconds but if the part is badly rusted a longer immersion may be necessary. Some safety rules must be followed in handling or mixing acids.

1. Always wear rubber gloves.
2. Always wear safety goggles or transparent face shield.
3. Always pour the acid slowly into the water; never pour water into the acid. In mixing some acids such as sulfuric acid excessive heat is generated. In these cases mix the acid and water in small quantities with stirring between additions and allow to cool somewhat before further additions.
4. Be sure to rinse off all traces of the acid film on the surface before immersing parts in the plating solution.

Step four (Item 4 in our drawing) is a cold running rinse the same as Item 2 and it is here that all the acid must be rinsed off the work.

SECTION III

THE ELECTROPLATING OPERATION

We have seen in Sections II and III how the surface of the metal is buffed and cleaned prior to the actual plating operation. If our preparation has been done properly the metal surface should be bright and lustrous and completely clean. We are, now, ready for the successive plating tanks.

1. Equipment:

Copper plating tank (Item 5 Drawing No. 1) requires a plain steel tank or drum the same as Item 1.

Two copper anode rods with insulation mounts.

One copper cathode rod with insulation mounts.

One gas burner to heat the tank or drum to about 140°-160° F. Stainless steel electric immersion heaters may also be used to heat this solution.

Two or more copper anodes.

Sufficient cyanide copper plating solution to fill the plating tank and some extra solution to maintain the bath for about one month should be purchased.

Rinse tank same as Item 2.

Nickel plating tank (Item 7 Drawing No. 1) must be made of acid proof materials. A simple "do-it-yourself" nickel plating tank would be a wood tank of suitable size with a flexible vinyl liner such as Type II shown in catalog. Of course, other acid resistant tanks such as welded polypropylene, molded polyethylene, or PVC lined steel tanks may be used for larger or more expensive plating systems.

Two copper anode rods with insulation mounts.

One copper cathode rod with insulation mounts.

Quartz type electric immersion heater.

Thermostatic control.

Two or more nickel anodes.

Sufficient prepared bright nickel plating solution to fill the platting tank and enough extra solution to maintain the bath for about one month should be purchased.

Rinse tank same as Item 2.

Chrome plating tank (Item 9 Drawing No. 1) must also be made of acid proof materials. The same type tanks as described for nickel plating (Item 7) may be used.

Two copper anode rods with insulation mounts.

One copper cathode rod with insulation mounts.

Quartz type electric immersion heater.

Two or more lead anodes.

Sufficient prepared chrome plating solution to fill the plating tank and enough extra solution to maintain the bath for about one month should be purchased.

Rinse tank same as Item 2.

2. Plating Procedures:

We left the work in Section III in the rinse tank (Item 4 Drawing 1). It should now be transferred to the plating tank and suspended from the center cathode rod of the copper plating tank (Item 5 Drawing 1). To demonstrate the method of suspending the work in the plating solution, see Drawing No. 2. In this illustration the part is suspended by a copper wire. Several strands of wire must be used to carry the necessary currents used in plating. Generally a copper hook or "plating rack" is used. Before hanging the work in the plating tank the rectifier switch should be turned to the "On" position and as soon as the part has been hung from the cathode rod, the rectifier should be adjusted to the proper cathode current density. Since we already know from Drawing No. 2 that the part being plated is the cathode, the term "cathode current density" means the amperes per square foot of cathode surface being plated. For example, if we have a flat metal sheet 6"x12" this would be a cathode area of 1/2 square foot on each side or a total of one square foot to be plated. Since copper is usually plated in the range of 30 Amps per square foot, it would be necessary, in this case, to adjust the rectifier to 30 Amps. At the cathode current density of 30 Amps per square foot the copper plate will build up to .0005" in about 12 minutes. This is an average plate thickness, and unless other specifications are to be considered, the 12 minutes of copper plating is sufficient. The Placo prepared bright copper solution BC701 will give a bright shiny plate with no subsequent buffing needed if the plating operation has been done properly and if the copper solution is made up correctly. If the plate has a dull finish and it becomes necessary to color buff the copper, the part must go through the cleaning cycle again to remove grease buffing compounds.

After copper plating the part must be rinsed off thoroughly in the cold rinse tank, Item 6 Drawing No. 1.

The piece is now ready for nickel plating in Item 7. The handling procedure is the same here as in the copper plating tank except that the cathode current density is about 40 Amps per square foot and the

solution is operated at 130° to 140° F. After attaching the copper suspension wire to the cathode rod in the nickel plating tank it should be plated for about 15 minutes at 40 Amps per square foot. The bright nickel plating solution, if properly operated, will result in a bright shiny plate ready for the subsequent rinsing and chrome plating.

The piece is next rinsed thoroughly in Item 8 Drawing 1 and transferred to the chrome plating tank (Item 9). The chrome plating solution is operated at about 110° F and the piece is plated at about 3/4 to 1 Amp per square inch (100-150 Amps per square foot) for 1 to 2 minutes. Assuming that the base copper and nickel plates are bright, the chrome plate will have a high lustrous decorative finish.

Of course, the work must get a final rinse-off in tank No. 10.

Theoretically, plating solutions have a continuous life and will plate thousands of parts because the equivalent of the metal plated onto the parts is replaced in the solution by electrochemical action on the anodes.

Solution level in the tank will recede due to evaporation, but this evaporation loss is water only and can be overcome by the addition of water to maintain the proper operating level.

Conversely, a certain amount of the active chemicals in the solution is lost when parts are removed and minute amounts of solution are washed down the rinse. It does become necessary to periodically replenish these losses by additions of fresh chemicals. Actual amount of replacement needed cannot be estimated due to the variations in number and configuration of parts processed. Irregularly recessed parts will entrap and carry over more solution than flat parts.

The above is true of solutions that utilize anodes of the same metal as the plating bath, i.e. copper anodes for copper plating, nickel anodes for nickel plating, etc.

However, there are some plating processes that are operated with insoluble anodes that do not electrochemically dissolve in the plating bath; as in chrome plating where insoluble lead anodes must be used. In this process the metal content of the chrome solution is being depleted from the bath in direct proportion to the number of parts plated and thickness of deposit.

It is recommended that, with your order, a reasonable amount of replenishment chemicals be ordered so that when the plated finish shows signs of low metal content, additions to the bath will be readily available. Here, also, quantities must be consistent with the volume of work run through your tanks.

A suggested amount of 5 gallons of solution chemicals for each 20 gallon tank unit should be on hand, for chrome at least 10 gallons for each 20 gallon tank.

Electrocleaner and acid etch solutions will lose their potency in a matter of weeks, so we have included a double amount of concentrate according to gallons needed.

SECTION IV

LIST OF EQUIPMENT AND SUPPLIES

We are basing our list of equipment and supplies on small tanks. Larger equipment would be necessary for larger parts or increased production.

Item 1 - Electrocleaner tank

A. One 30 gallon steel drum.

B. One copper anode rod 1/2" diameter x 24" long.

C. Two insulating mounts of plastic to support the anode rod.

D. Screw clamps or spring clamps to connect the D.C. lines from the rectifier to the anode rod and to the tank wall.

E. One 30 gallon drum of Placo cleaner No. CP40.

Item 2 - Rinse tank

Vinyl waste basket with overflow outlet hole cut in the side about 2" below rim.

Item 3 - Acid dip tank

Vinyl waste basket.

Item 4 - Rinse tank

Same as Item 2.

Item 5 - Copper plating tank

A. 5, 10 or 30 gallon steel can or drum.

B. Two copper anode rods 1/2" diameter x 24" long.

C. One copper cathode rod 1/2" x 24" long.

D. Four plastic insulating mounts to support the two anode rods

E. Agitator motor with two plastic rollers or slides.

F. Connecting clamps same as Item 1 (D).

G. Two copper anodes 3" x 18" with hangers

H. 10, 20, 30 gallons of Placo bright copper plating chemicals BC701.

I. Ring type gas burner.

Item 6. Rinse tank

Same as Item 2.

Item 7. Nickel plating tank

A. Wood tank 20" x 20" x 24" deep made of 1/2" marine type plywood and coated with polyurethane type varnish.

B. Flexible vinyl liner, Type 1, size 20" x 20" x 30" deep.

C. Two copper anode rods 1/2" diameter x 24" long.

Item 7 (cont'd):

D. One copper cathode rod 1/2" diameter x 24" long.

E. Four plastic insulating mounts.

F. Agitator motor with two plastic rollers or slides.

G. Connecting clamps as Item 1 (D).

H. Four nickel anodes 3"x18" with hangers and anode bags.

I. 40 gallons Placo bright nickel plating chemicals BN711.

J. One quartz immersion heater, 1000 watts at 115 volts.

K. One thermostat No. H-4.

Item 8 - Rinse tank

Same as Item 2.

Item 9 - Chrome plating tank

A. Wood tank 20"x20"x24" deep made of 1/2" marine type plywood and coated with polyurethane type varnish.

B. Flexible vinyl liner same as Item 7 (B).

C. Two copper anode rods 1/2" diameter x 24" long.

E. Six plastic insulating mounts.

F. Connecting clamps as Item 1 (d)

G. Four lead anodes 3"x18" with hangers.

H. 40 gallons Placo chrome plating chemicals BC721.

I. One quartz immersion heater, 1000 Watts at 115 Volts.

J. One thermostat No. H-4.

Item 10- Rinse tank

Same as Item 2.

Item 11- D.C. Power Supply

A. One Placo D.C. power supply 100 Amps, 0-6 Volts D.C. 115 Volts, or 230 Volts (customer to specify) single phase A.C.

B. Sufficient insulated copper wire, size 2, to connect the outlets to the various tanks.

In order to assist any interested customer to obtain equipment, we are listing three Copper-Nickel-Chrome Plating Systems with prices. The 10 and 20 gallon size tanks are entirely self-supporting. However, if the 30 gallon tanks are to be used we strongly recommend that a supporting frame structure be made. This frame may be made of wood or, if the capability is available, a welded steel supporting frame is very satisfactory. Platers Supply Company can furnish such supporting steel frames at $90.00 each. A schematic sketch of a wood frame support is shown in Drawing No. 3.

RECOMMENDED INITIAL PURCHASES FOR THREE DIFFERENT
COPPER-NICKEL-CHROME PLATING SYSTEMS

TYPE OF EQUIPMENT	10 GAL SYSTEM	20 GAL SYSTEM	30 GAL SYSTEM
I. BUFFING EQUIPMENT			
1. One 3/4 H.P. buffing lathe, Placo No. BM75	$ 75.00	$ 75.00	$ 75.00
2. Six 8" sewed buffs @1.80 ea.	10.80	10.80	10.80
3. Six 8" loose buffs @ 1.75 ea.	10.50	10.50	10.50
4. Two 8" Tampico brushes No. BTB @ 5.00 ea.	10.00	10.00	10.00
5. Two tubes Lea Compound No. M240 @ 3.50 ea.	7.00	7.00	7.00
6. Two bars Tripoli Compound No. T-200 @ 3.75 ea.	7.50	7.50	7.50
7. Two bars White Diamond Compound No. WD210 @ 3.75 ea.	7.50	7.50	7.50
8. Two bars Color Buffing Compound No. AW230 @ 3.75 ea.	7.50	7.50	7.50
II. PLATING EQUIPMENT			
1. Steel cleaner tank 18"x14"x12" deep	40.00		
Steel cleaner tank 23"x15"x18" deep		50.00	
Steel cleaner tank 23"x18"x24" deep			60.00
2. One copper anode rod	3.00	4.00	4.00
3. Two plastic insulating mounts @ 3.50 ea.	7.00	7.00	7.00
4. Two spring clamp connectors @ 0.75 or 2.00 ea.	1.50	1.50	4.00
5. One 1-KW stainless steel electric immersion heater	47.00	47.00	
One 2-KW stainless steel electric immersion heater			64.00
6. Thermostat	27.00	27.00	27.00
7. 10 Gals. No. GP40 Cleaner Chemicals	12.50		
20 Gals. No. GP40 Cleaner Chemicals		25.00	
30 Gals. No. GP40 Cleaner Chemicals			37.50
8. Plastic rinse tank 18"x14"x12" deep with overflow	48.00		
Plastic rinse tank 23"x15"x18" deep with overflow		78.00	
Plastic rinse tank 23"x18"x24" deep with overflow			97.00
9. Plastic acid dip tank 18"x14"x12" deep with drain	42.00		
Plastic acid dip tank 23"x15"x18" deep with drain		72.00	
Plastic acid dip tank 23"x18"x24" deep with drain			91.00
10. Plastic rinse tank 18"x14"x12" deep with overflow	48.00		
Plastic rinse tank 23"x15"x18" deep with overflow		78.00	
Plastic rinse tank 23"x18"x24" deep with overflow			97.00
11. Copper plating tank 18"x14"x12" deep	30.00		
Copper plating tank 23"x15"x18" deep		60.00	
Copper plating tank 23"x18"x24" deep			79.00
12. Two copper anode rods and one copper cathode rod	9.00	12.00	12.00
13. Two plastic rollers or slides @ 4.00 ea.	8.00	8.00	8.00
14. Cathode rod agitator	37.00	37.00	37.00
15. Five spring clamp connectors @ 0.75 or 2.00 ea.	3.75	3.75	10.00
16. One 1-KW stainless steel immersion heater	47.00	47.00	
One 2-KW stainless steel immersion heater			64.00
17. Thermostat	27.00	27.00	27.00
18. Four copper anodes No. BC101, 3"x9" @ 8.50 ea.	34.00		
Four copper anodes No. BC101, 3"x12" @ 11.50 ea.		46.00	
Four copper anodes No. BC101, 3"x18" @ 17.00 ea.			68.00
19. 10 Gals. bright copper chemicals No. BC701	90.00		
20 Gals. bright copper chemicals No. BC701		180.00	
30 Gals. bright copper chemicals No. BC701			270.00
20. Plastic rinse tank 18"x14"x12" deep with overflow	48.00		
Plastic rinse tank 23"x15"x18" deep with overflow		78.00	
Plastic rinse tank 23"x18"x24" deep with overflow			97.00

TYPE OF EQUIPMENT		10 GAL SYSTEM	20 GAL SYSTEM	30 GAL SYSTEM
21.	Nickel plating tank 18"x14"x12" deep	30.00		
	Nickel plating tank 23"x15"x18" deep		60.00	
	Nickel plating tank 23"x18"x24" deep			79.00
22.	Two copper anode rods and one copper cathode rod	9.00	12.00	12.00
23.	Two plastic rollers or slides @ 4.00 ea.	8.00	8.00	8.00
24.	Cathode rod agitator	37.00	37.00	37.00
25.	Five spring clamp connectors @ 0.75 or 2.00 ea.	3.75	3.75	10.00
26.	One 1-KW quartz immersion heater	51.00	51.00	
	One 2-KW quartz immersion heater			72.00
27.	Thermostat	27.00	27.00	27.00
28.	Four nickel anodes No. BN103, 3"x9" @ 14.00 ea.	56.00		
	Four nickel anodes No. BN103, 3"x12" @ 20.00 ea.		80.00	
	Four nickel anodes No. BN103, 3"x18" @ 28.00 ea.			112.00
29.	10 Gals. bright nickel chemicals No. BN711	110.00		
	20 Gals. bright nickel chemicals No. BN711		220.00	
	30 Gals. bright nickel chemicals No. BN711			330.00
30.	Plastic rinse tank 18"x14"x12" deep with overflow	48.00		
	Plastic rinse tank 23"x15"x18" deep with overflow		78.00	
	Plastic rinse tank 23"x18"x24" deep with overflow			97.00
31.	Chrome plating tank 18"x14"x12" deep	30.00		
	Chrome plating tank 23"x15"x18" deep		60.00	
	Chrome plating tank 23"x18"x24" deep			79.00
32.	Two copper anode rods and one copper cathode rod	9.00	12.00	12.00
33.	Five spring clamp connectors @ 0.75 or 2.00 ea.	3.75	3.75	10.00
34.	One 1-KW quartz immersion heater	51.00	51.00	
	One 2-KW quartz immersion heater			72.00
35.	Thermostat	27.00	27.00	27.00
36.	Four lead anodes No. BC104, 3"x9" @ 8.00 ea.	32.00		
	Four lead anodes No. BC104, 3"x12" @ 10.50 ea.		42.00	
	Four lead anodes No. BC104, 3"x18" @ 16.00 ea.			64.00
37.	10 Gals. bright chrome chemicals No. BC721	110.00		
	20 Gals. bright chrome chemicals No. BC721		220.00	
	30 Gals. bright chrome chemicals No. BC721			330.00
38.	Plastic rinse tank 18"x14"x12" deep with overflow	48.00		
	Plastic rinse tank 23"x15"x18" deep with overflow		78.00	
	Plastic rinse tank 23"x18"x24" deep with overflow			97.00
39.	D.C. Power supply 50 Amp, 0-6 Volt D.C.	250.00		
	D.C. Power supply 100 Amp. 0-6 Volt D.C.		345.00	
	D.C. Power supply 150 Amp, 0-6 Volt D.C.			435.00
III.	GENERAL PLATING SUPPLIES			
1.	One 10 lb. spool copper wire No. 22	40.00	40.00	40.00
2.	One platers thermometer	6.00	6.00	6.00
3.	One hydrometer (for testing chrome solution)	5.00	5.00	5.00
4.	One box pH papers (for copper solution)	7.00	7.00	7.00
5.	One box pH papers (for nickel solution)	7.00	7.00	7.00
6.	One pair rubber gloves (acid resistant)	4.50	4.50	4.50

All Prices are F.O.B. Los Angeles, California

Cleaning and Plating Solutions are shipped as dry chemicals.

COMPLETE ACCESSORY LIST
INCLUDING SOLUTIONS AND ANODES FOR YOUR HOME WORK SHOP PLATING SYSTEM

Item I : BUFFING EQUIPMENT AND SUPPLIES

One 3/4 H.P. buffing lathe Placo No. BM75, 110 volt or 220 volt single phase motor.	$ 59.50
Six 8" sewed buffs at $1.00 each	6.00
Six 8" loose buffs at .95 each	5.70
Two 8" Tampico brush wheels No. 8TB at $4.00 each	8.00
Two tubes Lea Compound No. M240 at 2.75 each	5.50
Two bars Tripoli Compound No. T-200 at 3.00 each	6.00
Two bars White Diamond Compound No. WD210 at 3.00 each	6.00
Two bars Color Buffing Compound No. AW230 at 3.00 each	6.00
Total for Item I	$ 102.70

Item II: **PLATING EQUIPMENT AND SUPPLIES

We have based this list of equipment for Item II on cleaner and copper plating tanks approximately 18" diameter x 18" deep, rinse tanks and acid dip tank approximately 15" diameter x 18" deep and nickel and chrome plating tanks approximately 18" x 18" x 18" deep. Other size tanks will require other sizes in heaters, anode and cathode rods, rectifier and different quantities of prepared cleaning and plating solutions. In all cases, when ordering the items listed herein, PLACO must know tank dimensions in order to ship the proper sizes and quantitites.

A. Accessories for Electro Cleaner Tank 18" diameter x 18" deep.

One stainless steel electric heater - 1-KW	$ 40.00
One thermostat	27.00
One anode rod 1/2" diameter x 24" long	3.00
Two lucite insulating mounts	5.00
One 1 lb. roll copper wire	2.50
Two alligator type connectors	1.20
Twenty (20) gals. PLACO Cleaner No. GP40 at .60 gal.	12.00
Total for Cleaner Tank	$ 90.70

Item II: Continued

B. Accessories for Copper Plating Tank - 18" diameter x 18" deep.

One stainless steel electric heater - 1-KW	$ 40.00
One thermostat	27.00
Two anode rods 1/2" diameter x 24" long	6.00
One cathode rod 1/2" diameter x 24" long	3.00
Four lucite insulating mounts	10.00
Two plastic rollers or slides	5.00
One cathode rod agitator (110 volt)	33.00
Three alligator type connectors	1.80
Two copper anodes No. BC101, 3" x 12" at $7.50 each	15.00
Twenty (20) gals. PLACO Bright Copper Chemicals BC701 at $7.00 per gal.	140.00
Total for Copper Plating Tank	$ 280.80

C. Accessories for Nickel Plating Tank - 18" x 18" x 18" deep.

One flexible PVC liner for above tank	$ 10.20
One quartz electric heater - 1-KW	44.00
One thermostat	27.00
Two anode rods 1/2" diameter x 24" long	6.00
One cathode rod 1/2" diameter x 24" long	3.00
Four lucite insulating mounts	10.00
Two plastic rollers or slides	5.00
One cathode rod agitator	33.00
Three alligator type connectors	1.80
Two nickel anodes No. BN103, 3" x 12" at $12.00 each	24.00
Twenty (20) gals. PLACO Bright Nickel Chemicals BN711 at $8.00 per gal.	160.00
Total for Nickel Plating Tank	$ 324.00

D. Accessories for Chrome Plating Tank-18" x 18" x 18" deep

One flexible PVC liner for above tank	$ 10.20
One quartz electric heater - 1-KW	44.00
One thermostat	27.00
Two anode rods 1/2" diameter x 24" long	6.00
One cathode rod 1/2" diameter x 24" long	3.00
Six insulating mounts	15.00
Three alligator type connectors	1.80

PART III

Brass, Cadmium, Zinc, Silver, Gold and Hard Chrome Plating

Platers Service Company, 1511 Esperanza St., Los Angeles, CA 90023

BRASS PLATING

The same preparation of the base metal, the cleaning, rinsing and acid dipping prior to plating that we have described under copper-nickel-chrome plating also applies to these plating operations. Furthermore, all these plating processes except hard chrome have similar characteristics. They are alkaline cyanide type plating solutions and are relatively simple to operate.

1. Equipment:

One plain steel tank or drum the same as suggested for copper plating in SECTION IV-1.

Two copper anode rods with insulation mounts.

One copper cathode rod with plastic rollers or slides for cathode agitation.

One cathode rod agitator.

One gas burner to heat the tank or drum to about 110° F. Stainless steel immersion heaters may be used to heat this solution if preferred.

Two or more brass anodes.

Sufficient alkaline brass plating solution to fill the plating tank and enough extra solution to maintain the bath for about one month should be purchased.

One D.C. power source.

One cold running rinse tank. This may be a common vinyl waste basket or equivalent and must be large enough to completely immerse the work being plated. An overflow outlet should be provided to maintain the flow of this running rinse.

Very frequently a bright brass plate is achieved by plating first with bright nickel as described under copper-nickel-chrome plating and then plating a thin brass plate over this bright nickel. If this double-plate process is used, additional tanks, accessory equipment and chemicals are needed to perform the bright nickel plating.

2. Brass Plating Procedure:

The part to be plated is suspended in the brass plating solution and connected to the cathode rod as previously described for plating procedures. The brass solution is operated at about 110° F. at a cathode density of 5 to 20 Amps per square foot (A.S.F) about 35 minutes, using a cathode current density of 10 Amps per square foot (A.S.F). Of course, it is not necessary to build up the brass plate to .0005" if the brass is over a base plate of bright nickel as mentioned above. In

this case, the brass is plated only long enough to give the desired brightness and color. The thin brass plate should be coated with clear lacquer to preserve the plate.

CADMIUM PLATING

Cadmium is plated on steel parts such as bolts, screws, etc. to prevent corrosion. Because of the high price of cadmium it is generally deposited on small parts only. Cadmium is a by-product from zinc smelting operations and because of its short supply it is much more expensive than zinc. Also cadmium has more superior corrosion protection properties than zinc. The cadmium plate has a white "matte" or frosty appearance which can be dipped in chemical solutions after plating to achieve various effects such as color, luster and corrosion properties. These chemical dips, however, are outside the scope of this discussion.

1. Equipment:

   One plain steel tank or drum the same as suggested for copper plating in SECTION IV-1.

   Two copper anode rods with insulation mounts.

   One copper cathode rod with plastic rollers or slides for cathode agitation.

   One cathode rod agitator.

   Two or more cadmium anodes.

   Sufficient alkaline cadmium plating solution to fill the plating tank and enough extra solution to maintain the bath for about one month should be purchased.

   One D.C. power source.

   One running cold rinse tank same as described under SECTION VI-1.

2. Cadmiun Plating Procedure

   Cadmium plating is one of the easiest plating baths to operate since it will plate satisfactorily over a wide range of conditions as to concentration and current density. No heating of the solution is necessary. Cathode current density is about 30 Amps per square foot (A.S.F.) and .0005" thickness will deposit in about 12 minutes at this current density. Usually 8 to 12 minutes is sufficient plating time.

ZINC PLATING

Zinc is closely related to cadmium in its properties except that it is less expensive and not so high in corrosion resistance. Zinc deposit is light grayish in appearance and, as with cadmium, there are chemical dips that improve the appearance or resistance to corrosion.

1. Equipment:

   One plain steel tank or drum same as the copper plating tank in SECTION IV-1.

   Two copper anode rods with insulation mounts.

   One copper cathode rod with plastic rollers or slides for cathode agitation.

   One cathode rod agitator

   Two or more zinc anodes.

   Sufficient alkaline zinc plating solution to fill the plating tank and enough extra solution to maintain the bath for about one month should be purchased.

   One D.C. power source.

   One cold running rinse tank the same as described in bronze plating.

2. Zinc Plating Procedure:

   Zinc plating, like cadmium plating, is easy to operate. The parts are plated at about 30 Amps per square foot (A.S.F.). A thickness of .0005" will deposit in about 15 minutes at this current density.

SILVER PLATING

A silver deposit has a white matte finish in the "as-deposited" condition. This must be color buffed to produce a shiny decorative finish. Using a bright silver solution will result in a bright lustrous finish which may or may not need any subsequent buffing. The purpose of silver plating is mostly decorative but much industrial silver plating is also done because of the solderability of silver or because of its high electrical conductivity.

1. Equipment:

   One PVC lined tank or molded plastic tank of suitable size to accomodate the parts being plated.

   Two copper anode rods with insulation mounts.

   One copper cathode rod with two plastic rollers or slides for cathode agitation.

   One cathode rod agitator.

One stainless steel immersion heater with thermostatic control.

Two or more silver anodes.

Sufficient alkaline silver plating solution to fill the plating tank and enough extra solution to maintain the bath for about one month should be purchased.

One D.C. power source.

One cold running rinse tank the same as described in bronze plating.

2. Silver Plating Procedures:

The silver solution is heated to about 85° or 90° F. for plating operations and at a cathode current density of about 20 Amps per square foot (A.S.F.). Silver has excellent "throwing power." Throwing power is defined as the ability of the plate to build up in recesses in the part being plated. For example, if we are plating silver on a metal cup the throwing power of the solution would be a measure of the ability to plate the inside of the cup completely. At a cathode current density of 20 Amps per square foot (A.S.F.) a thickness of .0005" will require about 12 to 15 minutes.

GOLD PLATING

The beauty, color and permanence of gold are too well known to need repeating. Gold plating for decorative purposes is usually done by plating a thin flash of gold over a bright nickel base plate the same described in the section on brass plating. The yellow gold plating solution offered for decorative work is a 22 karat gold. The gold plating system is generally smaller than other plating operations. Because of the price of the gold solution it is limited to small items such as jewelry, etc.

1. Equipment:

A small plastic tank, glass jar or in larger systems, a PVC lined steel tank is satisfactory. For decorative gold plating of jewelry a tank of 1/2 gallon to 5 gallons would be suggested.

Two stainless steel anode rods with insulating mounts.

One stainless steel cathode rod with insulating mounts.

One stainless steel immersion heater with thermostatic control.

Two or more stainless steel anodes.

Sufficient alkaline gold plating solution to fill the plating tank and enough extra solution to maintain the bath for about one month should be purchased.

One D.C. power source.

One reclaim rinse tank consisting of a plastic, or glass, or lined steel tank the same size as the plating tank. This reclaim rinse tank is filled with water and the gold plated parts are first rinsed here after gold plating. The thin film of gold solution adhering to the plated part is "reclaimed" by using this rinse to make additions back into the plating tank. Of course, this reclaim solution is not as concentrated in dissolved gold as the plating solution but a major part of the gold dragged out with the work is saved in this tank.

One cold rinse tank as described above for the reclaim rinse except that this is a running rinse and hence must have an overflow outlet.

2. Gold Plating Procedures:

The gold solution is operated at 140°-160° F. and at a cathode current density of 2 to 5 Amps per square foot (A.S.F.). At a cathode current density of 3 Amps per square foot (A.S.F.) a gold deposit of .00005" (50 millionths of an inch) will be deposited in about 5 minutes.

Agitation of the work will produce a bright uniform color. Although a cathode rod agitation is avilable it could not be used on tanks smaller than 5 gallons and hence it was not listed above in the equipment. In the case of small gold plating systems such as 1 or 2 gallons simply tapping the rack or wires on the cathode rod for a few seconds would be satisfactory.

Since we are using stainless steel anodes, then all the gold plated will come out of the solution with no replacement from the anodes. This means that frequent additions of fresh gold solution are needed to bring the solution up to proper strength. This may be done by establishing a schedule of additions according to the amount of surface plated over a given period of time. In larger shops an ampere-hour meter is included with the D.C. rectifier. Simple calculations will tell how much gold has been plated out as a function of the number of ampere-hours.

HARD (INDUSTRIAL) CHROME PLATING

Contrary to decorative chrome plating, this type of chrome plating is performed for reclaiming worn machine parts or for putting a hard wear-resistant surface on machine tools. Hard chrome plating is much thicker than the decorative chrome deposits and the plating bath is operated under different conditions.

1. Equipment:

   One plastic or PVC lined tank the same as suggested for chrome plating.

   Two copper anode rods with insultation mounts.

   One copper cathode rod with insulation mounts.

   One quartz immersion heater with thermostatic control.

   Two or more lead anodes.

   Sufficient hard chrome plating solution to fill the plating tank and enough extra solution to maintain the bath for about one months should be purchased.

   One D.C. power source.

   One cold running rinse tank the same as described for bronze plating.

2. Hard Chrome Plating Procedure:

   Besides using a hard chrome plating solution which differs in composition from the decorative chrome plating solution, the hard or industrial chrome solution operates at about 125° to 130° F. at a cathode current density of about 250 to 400 Amps per square foot (A.S.F.). At a current density of 250 Amps per square foot a thickness of .001" will build up in about 31 minutes. Sometimes a thickness of 1/8" will be deposited to build up wear on engine shafts and the deposit is then ground down to give a perfect circle within the limits of the specified diameter.

   Because of the high currents used in hard chrome plating it is often necessary to cool the solution down during plating operations. This may be done by means of plastic acid-resistant cooling coil with cold water running through the coil or by setting the plating tank in a larger tank with cold water in the outer tank. Such additional equipment would be needed if the volume of solution is small compared to the amperes used in the plating operation and no rule can be given before actual plating has been performed.

PART IV

Non-Metallic Plating

PLATING NON-METALLICS, PLASTER, PLASTICS AND STEP-BY-STEP PROCESS FOR ELECTROPLATING BABY SHOES

Preserving baby shoes by electroplating is a relatively simple procedure and requires only a modest investment in equipment and supplies. Although this section specifically describes plating on baby shoes the same equipment and method is also applicable to the plating of other non-metallic items.

Equipment:

1. Spray outfit for spraying lacquer and conductive coating.
2. Electroplating Tank. This tank must be made of acid resistant materials. The wood tank with a flexible plastic liner as previously described can be used for this purpose. Platers Service Company can supply a fully assembled plating tank with anode and cathode rods included (see price list).
3. D.C. Power Supply
4. Rinse Tank. This must be made of acid resistant materials. A common vinyl waste basket such as described under the Copper-Nickel-Chrome Plating System is satisfactory.
5. Two anode rods with insulating mounts.
6. One cathode rod with plastic rollers.
7. Two or more copper anodes.
8. One pound spool of bare copper wire, size 20, 22 or 24.
9. Sufficient acid copper plating solution to fill the plating tank.
10. Rinsing and neutralizing tank. A plain steel, stainless steel or plastic tank may be used.

Procedure:

Step No. 1 -- Remove the laces from the two top holes, tie in a neat bow and cement in place with a good grade of cellulose cement. Pull the tongue up and shape it. Cement the tongue in place on the two sides where it touches the shoe. Do not use excessive amounts of cement. Allow the shoe to dry thoroughly.

Step No. 2 -- Dip the shoe in melted platers wax which has a melting point of about 120° F. Heat the wax to 135° F. but do not exceed 155° F. Allow the shoes to remain in the wax until the leather is thoroughly impregnated (approximately 5 minutes). Remove the shoe, drain off the excess wax and proceed immediately to shape the shoe while the wax is still soft. When cold remove the excess wax with a fine wire brush in preparation for the shellac operation in Step No. 3.

Step No. 3 -- Puncture a hole in the heel of the shoe and insert a piece of #20, 22 or 24 bare copper wire to suspend the shoe for spraying and for processing through the following steps. Spray or dip the inside and outside of the shoe with two coats of white shellac being certain not to miss any spots. Allow to dry for two hours. A fan will help speed up the drying.

Step No. 4 -- Mix copper conductive coating according to the following formula:

3/4 pint (12 fluid ounces) of lacquer thinner

1/2 teaspoonful of cellulose lacquer

1 heaping teaspoonful of superfine copper powder.

Hold the shoe by the wire suspension (as in Step No. 3) and spray on two coats of copper conductor solution being sure to coat inside and outside. Dry with electric fan before plating.

Step No. 5 -- The actual plating operation is accomplished in the plating tank containing an acid copper solution and copper anodes. The tank must be equipped with a minimum of three rods. Two of these rods are connected together for suspending the anodes, whereas, the single center rod is for suspending the baby shoes. The center rod (cathode rod) should ride on plastic insulating rollers and be connected to a slow-speed, geared motor that will move the rod in a reciprocal motion at approximately 12-18 strokes per minute. For larger production, 5 rods may be installed on the plating tank, with anodes suspended on three rods and baby shoes on two rods. (See illustration of arrangement with 3 and 5 rods.)

The D.C. power supply should be adjustable from 0 to 3 or 4 volts. The current output of the D.C. power supply is entirely dependent on the number of baby shoes or the actual area to be plated. As an example, to plate four size 0 baby shoes at the optimum voltage of 1 volt would require at least 10 amperes. If the number of shoes is doubled to 8 small shoes the amperes would also double, i.e. 20 amperes. Of course, if the shoes are larger and have twice the area to be plated, then the D.C. amperes would also be doubled.

PLACO low voltage D.C. power supplies rated 0-4 volts are specifically designed for this process. D.C. power supplies are shown in the illustrations with the positive (+) outlet connection to the anode rods and the negative (-) connection to the cathode rod. Size of wire used for connections is determined by the current rating of the D.C. power

supply. For example, B14 rated at 15 amps would require #14 wire while the B104 rated at 150 amps will require #1-0 wire. The wire connected to the moving cathode rod must be of the flexible type so that no undue strain is put on the agitation motor.

After the shoe has been properly coated with the copper conductive coating they should be hung on the cathode rod as illustrated with the D.C. power supply switch in the "On" position and the voltmeter set at 1 to 2 volts.

After plating the shoe for about 2 hours remove the shoe and touch up any unplated spots with conductor solution, return the shoe to the plating tank and plate for 8 to 24 hours depending on the thickness desired. Most processors plate about 12 hours. A load weight such as a large fishing sinker may be used to submerge the shoe in the plating solution. The plating solution would be Platers Service Company's #BA702 acid copper concentrate.

Step No. 6 -- When the shoe is completely plated soak it in clean water containing about one teaspoonful of bicarbonate of soda (sodium carbonate) to each gallon of water to neutralize the acid. Rinse thoroughly in running water, dry and prepare for polishing.

Step No. 7 -- Polish on a sewed buff wheel using a #120 mesh Lea Compound and finish on a loose buff wheel using a 300 to 400 mesh Lea Compound. Remove the buffing compound by cleaning in a solution of sodium cyanide made up of 2 to 4 ounces/gallon. After removing the residues of buffing compound, rinse the soda solution as in Step No. 6.

Step No. 8 -- To oxidize the copper plated shoe it is immersed in a liver-of-sulfur solution made as follows:

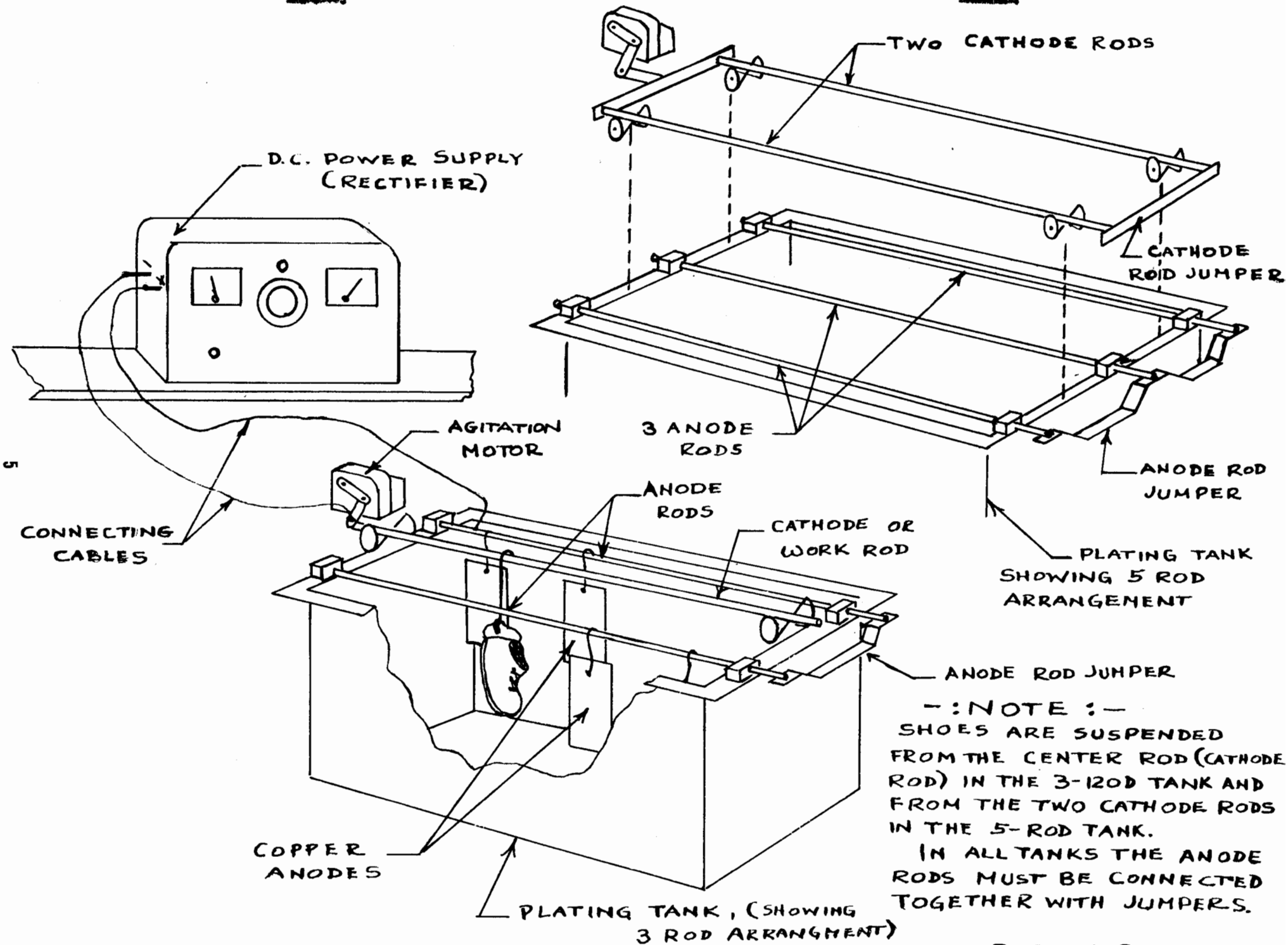
1 teaspoonful of liver-of-sulfur

1 gallon of water

Dip the shoe in the above solution for a few seconds until the desired color is obtained. Remove and rinse thoroughly. The shoe is now dried thoroughly, scratch brushed and buffed for high-lighting. Spray with clear lacquer to prevent oxidation to the finish.

PRICE LIST OF MATERIALS FOR PLATING BABY SHOES AND NON-METALLIC ITEMS

QUANTITY		DESCRIPTION	PRICE
		EQUIPMENT - 10 GAL PLATING SYSTEM	
1		3/4 HP Buffer, 110/115 volts, single phase	75.00
1		Spray Outfit for lacquer and conductive coating	75.00
1		Plating Tank 18"x14"x12" Deep including 2 anode rods, one cathode rod, one cathode rod agitator	120.00
1		D.C. Power Supply #B14, 15 amps, 0-4 volts, D.C. output, 115 volts, single phase A.C.	145.00
1		Polyethylene Rinse Tank 18"x14"x12" Deep with overflow outlet	48.00
1		Polyethylene Neutralizing Tank 18"x14"x12" Deep	30.00
		EQUIPMENT - 25 GAL PLATING SYSTEM	
1		3/4 HP Buffer, 110/115 volts, single phase	75.00
1		Spray Outfit for lacquer and conductive coating	75.00
1		Plating Tank 23"x15"x18" Deep including 2 anode rods, one cathode rod, one cathode rod agitator	155.00
1		D.C. Power Supply #B34, 30 amps, 0-4 volts, D.C. output, 115 volts, single phase A.C.	180.00
1		Polyethylene Rinse Tank 23"x15"x18" Deep with overflow outlet	78.00
1		Polyethylene Neutralizing Tank 23"x15"x18" Deep	60.00
		CHEMICALS AND SUPPLIES	
10	lbs.	Regular Wax	8.50
2½	lbs.	Special Wax (mix with regular wax 4-1 for best results)	3.00
1	gal.	Shellac	9.00
1	gal.	Shellac Thinner	5.00
5	lbs.	Super Fine Copper (for conductive coating)	18.75
1	gal.	Clear Lacquer	7.50
1	gal.	Lacquer Thinner	5.00
10	gals.	Acid Copper Chemicals #BA702 for 10 and 25 gallon set-up	60.00
4		Copper Anodes 3"x9" with Hooks	34.00
3		Tubes Lea Compound	10.50
6		6" Sewed Buffs	10.20
4		6" Loose Buffs	6.40
1		Roll Copper Wire	4.00
1	qt.	Liver-of-Sulfur	2.75
1	pr.	Platers Rubber Gloves	4.50



-: NOTE :-

SHOES ARE SUSPENDED FROM THE CENTER ROD (CATHODE ROD) IN THE 3-120D TANK AND FROM THE TWO CATHODE RODS IN THE 5-ROD TANK.

IN ALL TANKS THE ANODE RODS MUST BE CONNECTED TOGETHER WITH JUMPERS.

PLATERS SERVICE CO.

PART V

Complete Chrome Plating Setups

Platers Service Company, 1511 Esperanza St., Los Angeles, CA 90023

MODEL 25
DECORATIVE CHROME PLATING SYSTEM

The Model 25 Copper-Nickel-Chrome Plating System is designed for decorative plating with a minimum of equipment and floor space. The system allows considerable flexibility in arrangement of equipment items as well as purchase options (see price list below).

We have divided this integrated plating system with support stands into two sections. Tanks 1 through 4 are mounted in one stand and Tanks 5 through 9 are mounted in a second stand. The D.C. pwer unit is mounted on its own separate support stand which raises this unit above the tank level for easy accessibility. All accessory items are included with the system and these are partially assembled at out factory as far as is practical for shipping purposes. Seven of the tanks are made of molded inert polyethylene and hence shipping weight has been held to a minimum. Two tanks are constructed of steel and the three support stands are also of steel construction.

If the entire system such as listed below is purchased, all the equipment and accessories are included to perform decorative chrome plating. It is only necessary for the customer to furnish the required area to install the equipment and to connect water supply, waste water drain and electric connections to start plating operations.

When the equipment is arranged as an in-line system such as shown in our drawing entitled "Model 25 Decorative Chrome Plating System" the floor space occupied is approximately 14 feet long x 4 feet deep. Of course, other rearrangements of the three stands allows a right-angle arrangement or double parallel arrangement of the tanks and their stands.

These tanks will accomodate parts up to a maximum of 20" long x 5" wide x 12" deep or any multiple number of smaller parts that will fit within that area. Somewhat wider parts up to about 9" wide can be plated by lifting out the cathode rod (center rod) lowering the work into the solution and replacing the cathode rod.

The plating cycle is outlined on the drawing included with these instructions and is detailed as follows:

1. Electroclean in Tank No. 1. Cleaner consists of prepared cleaner chemical GP40 and is operated at 160°-180° F. The current density will be 30-50 Amps per square foot and the cleaning time will depend on how dirty the parts are, usually 1 to 4 minutes is sufficient.
2. Rinse in Tank No. 2 in cold running water for 15 to 30 seconds.
3. Acid dip in Tank No. 3 which consists of 25 to 50% muriatic acid.

3. (continued)

   For 20 gallons of finished acid dip solution add 5 to 10 gallons of acid to the proper amount of water to make up 20 gallons total.

4. Rinse in Tank No. 4 same as Step 2.
5. Copper plate in Tank No. 5. Use prepared bright copper plating conicals No. BC701. The solution is operated at about 140° F. using a cathode current density of about 20 Amps per square foot. Plating time is 10 to 15 minutes.
6. Rinse in Tank No. 6 same as Step 3.
7. Acid dip in Tank No. 3 same as Step 3.
8. Rinse in Tank No. 4 same as Step 2.
9. Nickel plate in Tank No. 7. Use prepared bright nickel plating chemicals No. BN711. The solution is operated at 140° F. using a cathode current density of about 40 Amps per square foot. Plating time is 10 to 15 minutes.
10. Rinse in Tank No. 8 same as Step 2.
11. Chrome plate in Tank No. 9. Use prepared bright chrome plating chemicals No. BC721. The solution is operated at about 105° F. using a cathode current density of about 140 Amps per square foot. Plating time is 1 to 2 minutes.
12. Rinse in Tank No. 8 same as Step 2.

PURCHASE OPTION NO. 1

The Model 25 Plating System including the nine tanks, two support stands, D.C. power unit, all tank accessories, necessary chemicals to make up one tank load of each solution and necessary anodes is priced at $2900.00 F.O.B. Los Angeles, California.

PURCHASE OPTION NO. 2

The Model 25 Plating System including all equipment items listed above but not including chemicals or anodes is priced at $2300.00 F.O.B. Los Angeles, California.

PURCHASE OPTION NO. 3

The Model 25 Plating System including nine tanks, D.C. power unit, and all tank accessories but not including support stands, chemicals or anodes is priced at $1985.00 F.O.B. Los Angeles, California

It is considered advisable to purchase additional chemicals in order to make additions to the solutions as called for to replace losses due to drag-out. Of course, the cleaner solution in Tank No. 1 and the acid solution in Tank No. 3 must be completely drained occasionally and made up fresh. Hence, it would be well to buy double quantities of these two items. The plating solutions are not discarded and hence an additional 5 gallons of each of these concentrates should be purchased to maintain the plating solutions up to strength.

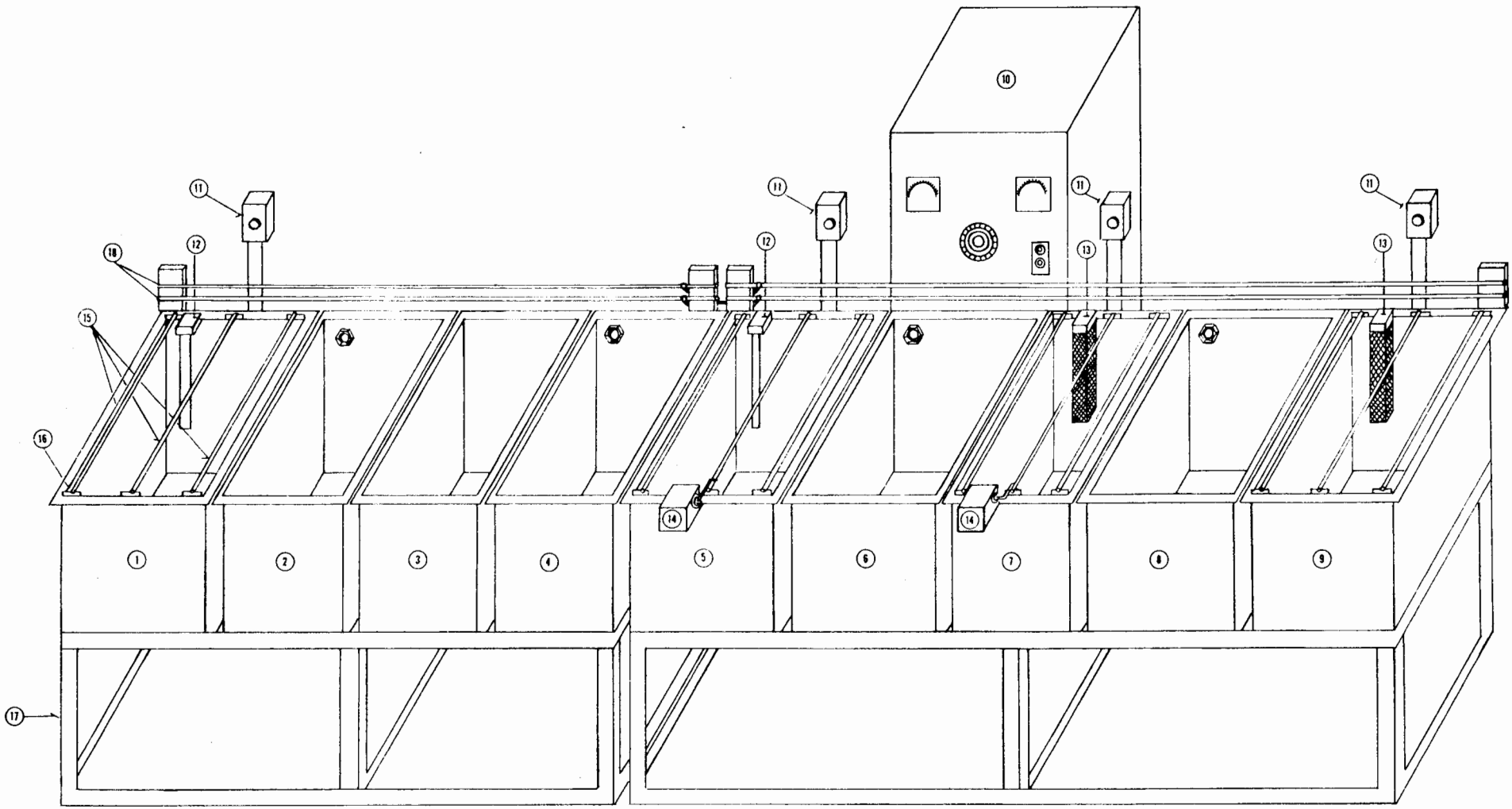
INDUSTRIAL COPPER-NICKEL-CHROME PLATING SYSTEM

Decorative chrome plating large parts or to meet larger production requirements necessitates tank systems in six to ten foot sizes. Such systems should be individually engineered and are only briefly discussed here. If auto bumpers are to be plated, nine or ten foot tanks must be available. Large production requirements or smaller parts may be done in six foot tanks. Such items as space available, type of heating to be used, A.C. electric power and other considerations all contribute to the final answer.

The schematic drawing of a typical copper-nickel-chrome system enclosed will indicate some of the equipment needed. We have shown thirteen tanks, four rectifiers and two buffing lathes. If the exhaust ventilation system is required by the local air pollution authorities a fume washing apparatus will be required. This item is usually mounted on the roof or outdoors adjacent to the plating area.

A plating system with tanks 6' x 3' x 3' deep such as illustrated will cost $25,000.00 to $35,000.00 and a similar plating system with 10' x 3' x 3' deep tanks will cost $45,000 to $55,000.00. These estimated costs do not include chemicals, plating solutions or anodes. Market prices on chemicals and metals are subject to market fluctuations and these items, in the event of an order, will be priced at prevailing market prices and shipped from the closest distribution point.

It will be apparent, from the foregoing brief mention, that these larger decorative plating system will involve many questions and Platers Service Company should be contacted for firm proposals covering these systems.



PLATING PROCEDURE				
TANK No	PROCESS	TEMP.	A.S.F	TIME
1	ELECTRO CLEAN	160°-180°	30-50	1-4 MIN.
2	RINSE	ROOM		15-30 SEC.
3	ACID DIP	ROOM		15-30 SEC.
4	RINSE	ROOM		15-30 SEC.
5	COPPER PLATE	140°-160°	20-40	10-15 MIN.
6	RINSE	ROOM		15-30 SEC.
3	ACID DIP	ROOM		15-30 SEC.
4	RINSE	ROOM		15-30 SEC.
7	NICKEL PLATE	135°-145°	30-50	10-15 MIN
8	RINSE	ROOM		15-30 SEC.
9	CHROME PLATE	105°-110°	100-150	1-2 MIN.
8	RINSE	ROOM		15-30 SEC.

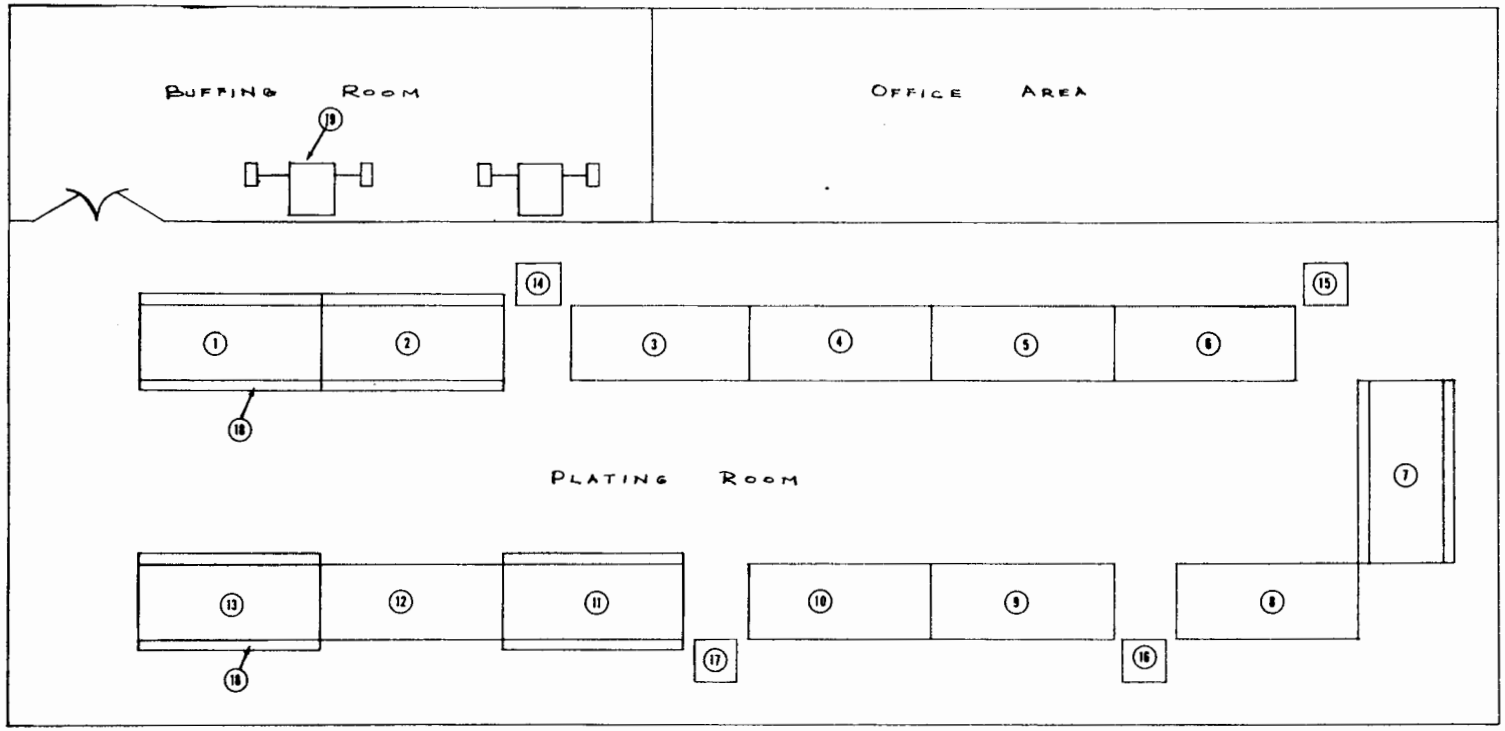
EQUIPMENT DESCRIPTION			
ITEM	SIZE	ITEM	SIZE
1	TANK 24"X18"X18"	13	QUARTZ HEATER
2	TANK 23"X15"X18"	14	ROD AGITATOR
3	TANK 23"X15"X18"	15	ANODE & CATHODE RODS
4	TANK 23" X15"X18"	16	PLASTIC INSULATORS
5	TANK 24"X18"X18"	17	SUPPORT STAND
6	TANK 23"X15"X18"	18	BUSS BARS
7	TANK 23"X15"X18"		
8	TANK 23"X15"X18"		
9	TANK 23"X15"X18"		
10	D.C. POWER SUPPLY - 300 AMPS, 2-6 VOLTS		
11	THERMOSTAT		
12	S.S. HEATER		

MODEL NO 25 DECORATIVE CHROME PLATING SYSTEM

SCALE	APPROVED BY	DRAWN BY
DATE		REVISED

PLATERS SERVICE COMPANY

DRAWING NUMBER



ITEM	DESCRIPTION	OPERATING TEMP.	ACCESSORIES REQUIRED
1	SOAK CLEAN TANK	160 - 180°F	HEATER, THERMOSTAT, EXHAUST HOODS
2	ELECTROCLEAN TANK	160 - 180°F	CATHODE & ANODE RODS, HEATER, THERMOSTAT, EXHAUST HOODS
3	RINSE TANK	ROOM	——
4	ACID DIP TANK	ROOM	——
5	RINSE TANK	ROOM	——
6	CYANIDE DIP TANK	ROOM	——
7	COPPER PLTG TANK	120-150°	CATHODE & ANODE RODS, HEATER, THERMOSTAT, EXHAUST HOODS
8	RINSE TANK	ROOM	——
9	NICKEL PLTG TANK	135°-145°	CATHODE & ANODE RODS, HEATER, THERMOSTAT
10	RINSE TANK	ROOM	——
11	CHROME PLTG TANK	105°-110°F	CATHODE & ANODE RODS, HEATER, THERMOSTAT, EXHAUST HOODS
12	RINSE TANK	ROOM	——
13	HOT RINSE TANK	160°-180°	HEATER, THERMOSTAT, EXHAUST HOODS
14	ELECTROCLEAN RECTIFIER	——	——
15	COPPER PLTG RECTIFIER	——	——
16	NICKEL PLTG RECTIFIER	——	——
17	CHROME PLTG RECTIFIER	——	——
18	EXHAUST HOODS	——	——
19	BUFFING LATHES	——	——

SCHEMATIC LARGE INDUSTRIAL COPPER-NICKEL-CHROME PLATING SYSTEM

SCALE NONE	APPROVED BY	DRAWN BY
DATE		REVISED

PLATERS SERVICE CO.

DRAWING NUMBER

Glossary of Plating Terms

Platers Service Company, 1511 Esperanza St., Los Angeles, CA 90023

GLOSSARY OF TERMS

ACID - A chemical which liberates hydrogen ions in water solution and which neutralizes alkalies to form salts.

ALKALI - A chemical which liberates hydroxyl ions in water solution and which neutralizes acids to form salts.

AMPERE - A unit of electricity. That quantity of electricity which will pass through a resistance of one OHM under a force of one volt.

ANION - A negatively charged ion which migrates to the anode under the influence of a direct electric current through the solution.

ANODE - A positive electrode at which oxidation occurs.

ANODIC COATING - A coating of film, usually an oxide which forms on the anode by electrolytic oxidation.

ATOM - A minute particle which is part of a molecule.

BASE - Same as alkali.

BASE METAL - The metal on which an electroplate is deposited.

BRIGHT DIP - An acid or other chemical solution into which artcles are immersed to obtain a clean bright surface.

BRIGHTENER - An addition agent to an electroplating solution to give a bright, lustrous deposited plate.

BUFF - A polishing or buffing wheel usually made of a large number of muslin discs sewed together.

BUTLER FINISH - A satin type finish produced by very fine grit polishing wheels or brushes.

CATHODE - A negative electrode at which reduction occurs.

CATION - A positively charged ion which migrates to the cathode under the influence of a direct electric current through the solution.

CAUSTIC POTASH - The common alkali, potassium hydroxide.

CAUSTIC SODA - The common alkali, sodium hydroxide.

CONDUCTIVITY - Ability of a substance (metal or solution) to conduct electricity.

CONVERSION COATING - A thin coating on the surface of a metal which is produced by chemical reaction on the metal.

CURRENT DENSITY - The amount of current per unit area, usually expressed in amperes per square foot (A.S.F.).

DRAG-IN - Impurities introduced into a solution as a carry-over from preceding treatments.

DRAG-OUT - Solution lost or carried out of the bath by work pieces withdrawn from it.

DUMMYING - The process of removing undesirable metallic impurities from a plating solution by electroplating at low current density.

ELECTROFORMING - Making or reproducing parts by electroplating methods.

ELECTROLESS PLATING - See immersion plating.

ELECTROLYTE - A solution of a chemical substance or mixture containing ions which migrate to the anode or cathode.

ELECTROCLEANING - Removing grease, dirt and other foreign matter from metal surfaces by making the part an electrode in a suitable solution.

ETCH - To chemically remove part of the surface producing a rough finish.

FLASH PLATE - A very thin electroplated deposit, usually less than .00001 inch.

FOGGING - Loss of surface luster caused by a film of corrosion products on the surface.

GALVANIZING - The process of coating iron or steel with zinc from a molten bath.

HARD WATER - Water containing dissolved salts of calcium and magnesium.

HYDROCHLORIC ACID - Commonly known as muriatic acid.

HYDROFLUORIC ACID - Also known as hydrogen fluoride. This is a very dangerous and corrosive acid.

IMMERSION PLATING - Plating from a solution by chemical reduction of a metal from its salt rather than by electrolytic means.

INHIBITOR - A chemical substance which decreases corrosion when introduced into an acid solution.

INSOLUBLE ANODE - An anode that does not go into solution during the electroplating process.

ION - An electrically charged atom or group of atoms.

LEVELING ACTION - The ability of a plating solution to plate out as a smoother surface than that of the base metal.

MATTE FINISH - A frosty appearing surface finish with low reflectivity.

MURIATIC ACID - See hydrochloric acid.

NEUTRALIZE - To counteract the properties or affect of a chemical as the neutralization of an acid and a base.

NITRIC ACID - A strongly corrosive colorless or yellowish fuming acid.

OXIDATION - Loss of electrons by a constituent in a chemical or electro-chemical reaction.

PEELING - Separation or non-adherence of an electrodeposit from the base metal.

pH - A term which is used as an index of the acidity or alkalinity of a solution. a pH of 0 to 7 is acidic while a pH of 7 to 14 is alkaline. The pH of exactly 7 is considered neutral.

PHOSPHORIC ACID - A colorless syrupy acid used in certain chemical coating and electropolishing processes. Very limited application in plating procedures.

PICKLE - An acid treatment used to remove scale and tarnish from metal surfaces.

PITTING - A term used to designate the tiny holes in an electroplated surface.

PLATING RANGE - The range of electric current (or current densities) over which a satisfactory plate is deposited.

POTASSIUM HYDROXIDE - See caustic potash.

REDUCTION - The process which takes place at the cathode in plating processes.

RINSING - The immersion or spray operation in clean running water following chemical or electrochemical processes in a plating cycle.

SCOURING - Cleaning metal surfaces mechanically using abrasive materials and a liquid.

SELECTIVE PLATING - By shielding or stopping off certain areas the remaining "selected" areas only are plated.

SODIUM HYDROXIDE - See caustic soda.

SOLUBILITY - The amount of substance capable of being dissolved in a given volume of solvent.

STRIKE - A low metal content bath used to improve the adherence of the subsequent plate.

STRIPPING - Removal of defective or undesirable plate either chemically or electrochemically.

SULFURIC ACID - A strong inorganic acid also known as oil of vitriol.

TARNISH - A stain or oxidation that tends to dull or lessen the luster of the surface.

THROWING-POWER - The ability of a solution to electroplate uniformly on irregular or recessed shaped articles.

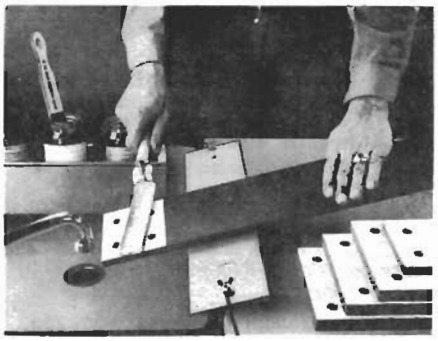
TRIPOLI - An abrasive used in buffing compounds for copper, brass, aluminum and other non-ferrous metals.

VAPOR DEGREASING - Removal of oil or grease by solvent vapors.

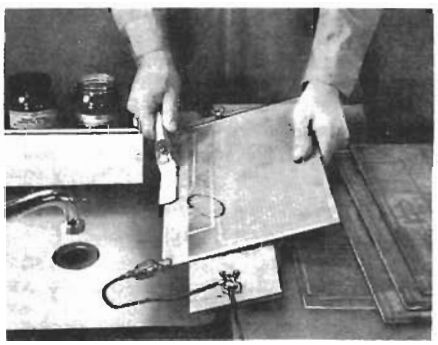
VOLT - The electric potential necessary to force one ampere through a resistance of one OHM.

PRICE LIST NO. 138C

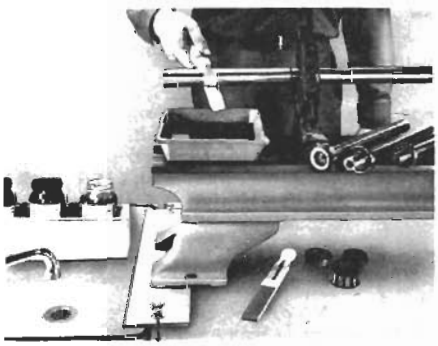
Prices effective May 15, 1974



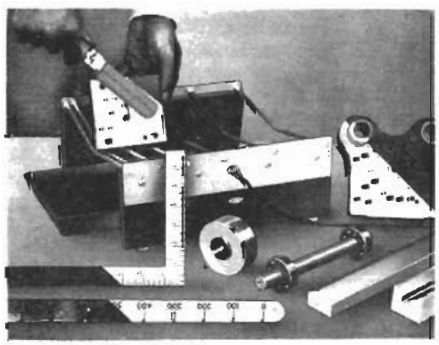
RAPID SILVER PLATING—unequaled for electrical contact surfaces of any kind or size. Prevents power losses reduces or eliminates fire and explosion hazards, even under overloads, etc.



RAPID GOLD PLATING—Self-indicating. For contacts on printed circuit boards etc. Can be plated directly on copper or over an underplating of Rapid Bright Nickel. Safe for all types of work. No free cyanide or acids used. Patents pending.



RAPID NICKEL PLATING—for hard surfacing specific areas building up shafting up to .010" or more (in minutes) for ball bearings, gears etc.—no turning or grinding—no cold flow even in severest service.



RAPID TIN PLATING—is ideal for rust resisting platings on punches, dies, fixtures etc. Makes numbers and graduations more visible on rules, beams of scales, machinery, tools etc. Only a polishing with a fine, sharp abrasive cloth is needed to prepare the work. Meets all requirements for repair and maintenance of tin plating on dairy and other food handling equipment.

THE HIGH SPEED

RAPID PORTABLE PLATERS

FOR SHOP, FIELD, PRODUCTION

Fastest known portable plating method

- **Completely portable, (tankless) can be used anywhere by anyone**
- **Meet all electrical and other specifications**
- **More than 100 times faster than brushplating** (which we also make)
- **No corrosive acids** ● **No hydrogen embrittlement**
- **Apply light or heavy plating — on practically any metal including aluminum, stainless steel, carbon, powdered metal parts, etc.**

Easy to use

PREPARATION of the work is simple and no corrosive acids are used. The largest copper bus bar can be prepared with Activator #4 in 15 seconds or less per contact area; aluminum bus bar of equal size about 30 seconds with Activator #5. No water rinse required. Iron and steel can even be prepared with emery or other sharp abrasive and perfect adhesion of the plating obtained.

PLATING also is simple. Make electrical connections as instructed on instrument panel of plater. Dip applicator in coatalyte and apply plating with a firm forward and backward rubbing action of the applicator. With this Rapid process, many jobs can be prepared and plated quicker than is required just to prepare the work by other methods.

16 Ounces equals a gallon or more!

Rapid plating solutions (Coatalytes) never become "spent" or "used" because no carbon, graphite or stainless steel anodes are used. With the exception of rhodium which is applied with pure platinum, Rapid plating is applied with applicators having anodes of the same metal as the coatalytes, i. e., silver is applied with pure silver anodes, tin with pure tin, etc. This gives the best and fastest known plating because of the continuous flow of metal from anode to coatalyte to work. This also makes a 16 fl. oz. jar of Rapid Coatalyte equal to a gallon or more of other solutions using insoluble type anodes.

Many uses

ELECTRICAL—Rapid Silver is unequaled by any other material or method for electrical contact surfaces of any kind or size—even on aluminum. Even a 15 second application on a 4" bus contact (for example) will ensure service under all operating conditions and the conventional petroleum jellies or compounds are not required on aluminum.

ELECTRONIC applications include gold plating directly on copper, or over and underplating of Rapid Bright Nickel, on printed circuit boards etc.; silver on power contacts, component parts, wave guides etc.

REPAIR AND MAINTENANCE of commercial platings (even hot dipped coatings) on all types of work, military aircraft, rockets, missiles, aerospace, nuclear, etc.

BUILDING UP worn or low spots on bedways w/Rapid copper or brass; building up shafting w/Rapid hard nickel to obtain required fits for ball bearings, gears etc.; close tolerance build up or shimming, ranging from a microscopic thickness and up.

ARCHITECTURAL applications include plating over soldered, brazed or welded areas to match metals, applying stripes and designs on panels, highlighting art work, etc.

TOOL AND DIE WORK—Cadmium plating critical parts of tools, dies, etc. to prevent rusting, applying anti-friction platings on sliding parts, making bearings, etc.

AND—hundreds of other uses including corrosion resistant platings on specific areas, hard surfacing copper and brass, brass plating for rubber bonding, laboratory applications, research, design, development, etc.

Standard of Industry for Over 38 Years

Used by domestic and foreign power companies, electrical equipment mfrs., electrical contractors, mfg. plants, steel plants, shipyards, navy yards, mines, radio and television mfg. and broadcasting; air forces, missile, aerospace, nuclear projects, etc.

Easy to order—no nonessentials

Rapid Portable Platers are complete with supplies needed—illustrated price list inside. Patents pending and applied for.

RAPID

REG. U.S. PAT. OFF.

Printed in U.S.A.

THE HIGH SPEED
RAPID PORTABLE PLATERS

***Completely* portable — everything in a steel case with handle — can be carried anywhere**

Rugged construction for trouble-free service in shop, field or on production lines. Operate from any 110-120 volt, 50-60 cycle A.C. (Also from 230 volt, 50-60 cycle A.C. by means of adapter-transformer listed below). Power unit delivers 0 to 12 meter, amheter, voltage control, var. transformer, f/w Se Rectifier, on-off switch, reverse switch, 8 ft. cord with third wire for ground.

Plating supplies include jar of coatalyte jar of activator, applicator with 4½" anode, one dozen woven or 6 acrylic sleeves, swab #49, set of 6 ft. flexible color coded leads, illustrated instructions—or as indicated below. In louvered steel case, 16" x 8" x 8", with hinged cover and handle, neutral gray enamel finish. Shipping weight 26 lbs.

NOTE: Only one complete plater is required. If more than one metal is wanted, just order coatalyte and applicator for the other metal(s). If nickel underplating is required for gold or rhodium plating, order Bright Nickel Coatalyte #310B and applicator #430B. Nickel and silver platings require a copper underplating on iron and steel. Any plating on aluminum requires a copper underplating; order Aluminum Activator #5, Copper Coatalyte #314 and copper applicator #454 as separate items.*

NO. 100 NICKEL PLATER, heavy plating. Building up shafting for ball pearings, gears etc. hard surfacing specific areas, etc. W 1 each #310, #314, #440, #444, #79 . . . . . **230.00**

NO. 100-B NICKEL PLATER, bright plating. Repair of bright nickel plating; special underplating; etc. W/#430B **218.00**

NO. 101 TIN PLATER w/Activator #2 . . . . . **221.00**

NO. 102 CADMIUM PLATER w/Activator #2 . . . . . **221.00**

NO. 103 ZINC PLATER w/Activator #2 . . . . . **218.00**

NO. 104 COPPER PLATER w/Activator #2 . . . . . **218.00**

NO. 105 BRASS PLATER w/Activator #2 . . . . . **220.00**

NO. 106 SILVER PLATER for misc. repairs, etc. W/Act. #4. X

NO. 106-E SILVER PLATER for electrical contact surfaces of any kind or size—even on aluminum.* Includes #436 and #456 pure silver applicators w/Activator #4 X

NO. 107 GOLD PLATER, 24K, will plate directly on copper or on nickel underplating (see note above). W/#437 applicator. X

NO. 108 LEAD PLATER, w/Activator #2 . . . . . **221.50**

NO. 109 INDIUM PLATER, w/Activator #2, #439 applicator X

NO. 120 RHODIUM PLATER, for special contacts, touching up rhodium platings. W/#43P (platinum) applicator, Act. #2. . . X

NO. 121 RAPIDMETAL PLATER—a soft, white metal alloy for quick touch up work. Easily polished by hand. W/Act. #2 . . . . . **232.00**

PLATING FIXTURE

Expedites plating of many kinds of small work. Fixture is connected to negative terminal of plater which automatically makes the work negative when it is placed on the fixture for plating. Pan under the fixture holds the coatalyte, also catches any for re-use that may run off the work. All metal parts made of high chromium stainless steel. Size 12½" x 12½" x 5½". Shipping weight 15 lbs.

NO. 70 FIXTURE W 2 pans . . **49.00**

TEST SOLUTION

For testing silver platings on electrical contact surfaces or other work where a poor silver plating might be undesirable or hazardous. Simply brush it on. If silver is too thin, or if it is 'rub-on' silver (applied without current) it will disappear like magic. A good silver plating is not affected. 95 ml bottle, with brush.

NO. 26 TEST SOLUTION **3.00**

POWER UNIT

Power unit only, same as platers but without supplies. Complete with voltmeter, ammeter, voltage control, var. transformer, f/w Se rectifier, on-off switch, reverse switch, 8 ft. cord with third wire for ground. In louvered steel case, 16" x 8" x 8", with hinged cover and handle, neutral gray enamel finish, set of 6 ft. flexible color coded leads. Ship. wt. 20 lbs.

NO. 99-P POWER UNIT **196.00**

RAPID CATHODE BAR

The Rapid Cathode Bar (Pats Applied For) for plating specific areas on small or large work. It is an EC aluminum bar that can be made fast to the end of a bench and to project over a sink or plastic tub as illustrated. Makes plating and rinsing fast and thorough. Connected to (—) terminal of plater it automatically makes the work negative when placed on bar. Ship wt. 10 lbs.

NO. 77 RAPID CATHODE BAR **8.70**

ADAPTER — TRANSFORMER

For adapting Rapid Portable Platers or Power Unit for operation from 230 volts, 50-60 cycle A.C. Plug or connect Adapter-Transformer to 230 volt line and plug plater or power unit into receptacle provided on transformer. With 8 ft. cord. Finish matches platers and power units. Shipping weight 11 lbs.

NO. 22 ADAP. TRANSFORMER **58.00**

SUPPLY CASE

For carrying extra plating supplies. Has 4 compartments for jars and a compartment for applicators, anodes, etc. Steel case, 16" x 8" x 8" with hinged cover and handle, neutral gray, baked enamel finish. Shipping weight 10 lbs.

NO. 88 SUPPLY CASE **32.40**

CHEMICAL SUPPLIES

Rapid Portable Plating chemicals are special high speed formulas (not commercial solutions). Will not deteriorate in stock and can be used to the last drop—no waste. Coatalytes plate up to 35 sq. ft/jar, depending on plating thickness. Activators #2 and #4 prepare about 35 sq. ft./jar; activators #5 and #7 about 25 sq. ft./jar. In 16 oz. (shop size) jars. Quantity packing is 12 jars to case.

NOW—in heavy duty, wide mouth, polyethylene jars. Will not break if accidentally dropped or contents frozen. Applicators and swabs can be dipped directly into the jars.

COATALYTES

		Price per jar
No. 310	Nickel, heavy plating	4.80
No. 301B	Nickel, bright plating	4.80
No. 311	Tin	4.80
No. 312	Cadmium	4.80
No. 313	Zinc	4.80
No. 314	Copper	4.60
No. 315	Brass	4.60
No. 316	Silver†	X
No. 317	Gold, 24K	X
No. 318	Lead	4.80
No. 319	Indium	X
No. 320	Rhodium (6 ft. oz. jar)	X
No. 321	Rapidmetal	8.40

ACTIVATOR NO. 2

Instantly cleans, activates, removes oxides, etc., except heavy rust and scale—from iron, steel, copper, brass, bronze. Applied with swab #49; small parts can be dipped. Acidic but not corrosive.

NO. 2 ACTIVATOR, per jar 3.20

ACTIVATOR NO. 4

For preparing copper, brass, bronze for silver and gold plating. Cleans, removes oxides and activates the work instantly. Applied with swab #49, wiped off.

NO. 4 ACTIVATOR, per jar 3.20

ACTIVATOR NO. 5

For preparing aluminum. Applied with swab #59, supplied with each jar. Simply wipe off with a cotton cloth before plating. All platings on aluminum, also soft soldering, require a copper underplating.

NO. 5 ACTIVATOR, per jar, w/swab #59 ..... 5.40

ACTIVATOR NO. 7

For preparing stainless steel. Also used for removing welding discoloration from stainless steel. Applied with special applicator #43X using current from a Rapid Plater. Apply a copper underplating before plating other metals on stainless steel.

NO. 7 ACTIVATOR, per jar 4.20

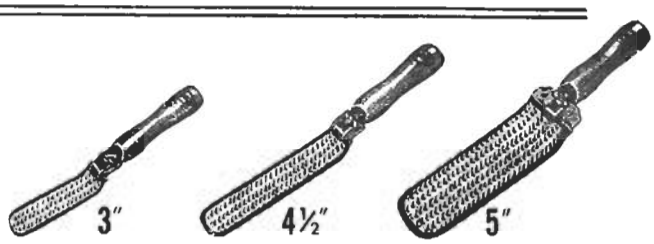
METAL POLISH

Fast cutting metal polish for hand polishing bright work. Polishing stick with each jar.

NO. 74 METAL POLISH, per jar 3.30

APPLICATORS

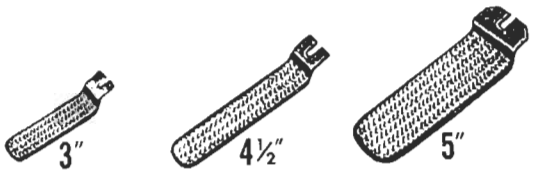
Complete with new, improved handle, jack assembly, anode and sleeve. Applicators marked * use acrylonitrile sleeves on the anode. Price each—



Nickel, heavy plating	No. 430 ... 8.80	No. 440 ... 10.30	
Nickel, bright plating*	No. 430B .. 9.20		
Tin*	No. 431 ... 9.20	No. 441 ... 11.30	
Cadmium*	No. 432 ... 9.20	No. 442 ... 11.30	No. 452 ... 14.80
Zinc	No. 433 ... 9.00	No. 443 ... 10.90	
Copper	No. 434 ... 8.70	No. 444 ... 10.30	No. 454 ... 11.80
Brass*	No. 435 ... 8.70	No. 445 ... 10.30	No. 455 ... 11.80
Silver*†	No. 436 ... X	No. 446 ... X	No. 456 ... X
Gold, 24K*	No. 437 ... X		
Lead*	No. 438 ... 9.30	No. 448 ... 11.80	
Indium*	No. 439 ... X		
Rhodium (platinum anode)*	No. 43P ... X		
Special	No. 43X ... 9.20	No. 44X ... 11.10	No. 45X ... 12.80
Rapidmetal*	No. 43R ... 13.20	No. 44R ... 18.60	

ANODES

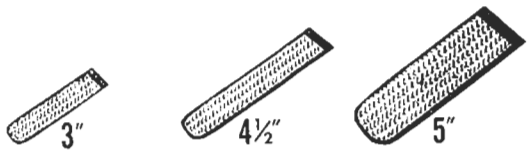
With sleeve. About one 3" anode consumed per 2 jars coatalyte, other sizes in prop.; gold, rhodium, 5-6 jars. Anodes marked * use acrylonitrile sleeves. Each-



Nickel, heavy plating	No. 530 ... 4.40	No. 540 ... 5.90	
Nickel, bright plating*	No. 530B .. 4.80		
Tin*	No. 531 ... 4.80	No. 541 ... 6.90	
Cadmium*	No. 532 ... 4.80	No. 542 ... 6.90	No. 552 ... 10.40
Zinc	No. 533 ... 4.60	No. 543 ... 6.50	
Copper	No. 534 ... 4.30	No. 544 ... 5.90	No. 554 ... 7.40
Brass*	No. 535 ... 4.30	No. 545 ... 5.90	No. 555 ... 7.40
Silver*†	No. 536 ... X	No. 546 ... X	No. 556 ... X
Gold, 24K*	No. 537 ... X		
Lead*	No. 538 ... 4.90	No. 548 ... 7.40	
Indium*	No. 539 ... X		
Rhodium (pure platinum)*	No. 53P ... X		
Special	No. 53X ... 4.80	No. 54X ... 6.70	No. 55X ... 8.40
Rapidmetal*	No. 53R ... 8.80	No. 54R ... 14.20	

SLEEVES

Sleeves on anodes are subject to wear, must be replaced occasionally.



WOVEN SLEEVES for use with hard nickel, copper, zinc, special anodes..	No. 32/doz. .1.68	No. 42/doz. .2.04	No. 52/doz. .3.00
ACRYLO. SLEEVES for bright nickel, rhodium, tin, gold, cadmium, indium, Rapidmetal, brass, lead, silver	No. 31/each. .50	No. 41/each. .70	No. 51/each. .90

HANDLES—New, improved type. Fit all Rapid anodes. Complete with jack assembly, screw, wingnut.

NO. 17 HANDLE ASSEMBLY 5.20

LEADS—Two to a set, negative and positive. Flexible, vinyl covered, 6 ft. long, with clip and plug.

NO. 66 LEADS, per set 5.20

SWABS—Much better than a brush.

NO. 49 SWAB for Act. #2 or #4, ea. 1.20

NO. 59 SWAB for Act. #5, ea. 1.20

NO. 79 ABRASIVE BOARD & refills.. 1.60

PLUGS—Replacement or for use when making special leads. Fit all Rapid Applicator handles.

NO. BP3 PLUGS, price each ..... .37

†Pure silver (not sterling) to ensure the highest known electrical conductivity. Chromium not listed because it is not suited or safe for portable plating.

SHIPPING INFORMATION—Chemicals and platers shipped by express—usually cheapest way—unless otherwise directed (not mailable).

PLEASE NOTE—Silver, Gold and Rhodium are subject to constant change because of market fluctuation of these precious metals. Please write for current prices before ordering. All prices are subject to change without notice.

X Prices at time of shipment will prevail.

THE RAPID PORTABLE PLATER

will prove a valuable addition for any department in your plant, or as a supplement to an existing plating facility. This unit will adequately handle the plating processes normally done by many of the more expensive similar types of plating equipment.

It is not necessary to purchase a complete unit. Any small DC Power Supply (even batteries) with variable voltage of 0 to 12 and amperage from 0 to 20 (approximate) will suffice.

Order the Coatalytes, Applicators (anode and sleeve are included in the price of an applicator) and Activators for the plating you may need. A set of #66 Leads with special size banana jack to fit the applicator handle is also advisable.

For as little as $25 you can have a supplemental plating facility that will save you many times its cost over and over. Minimum order is $10.

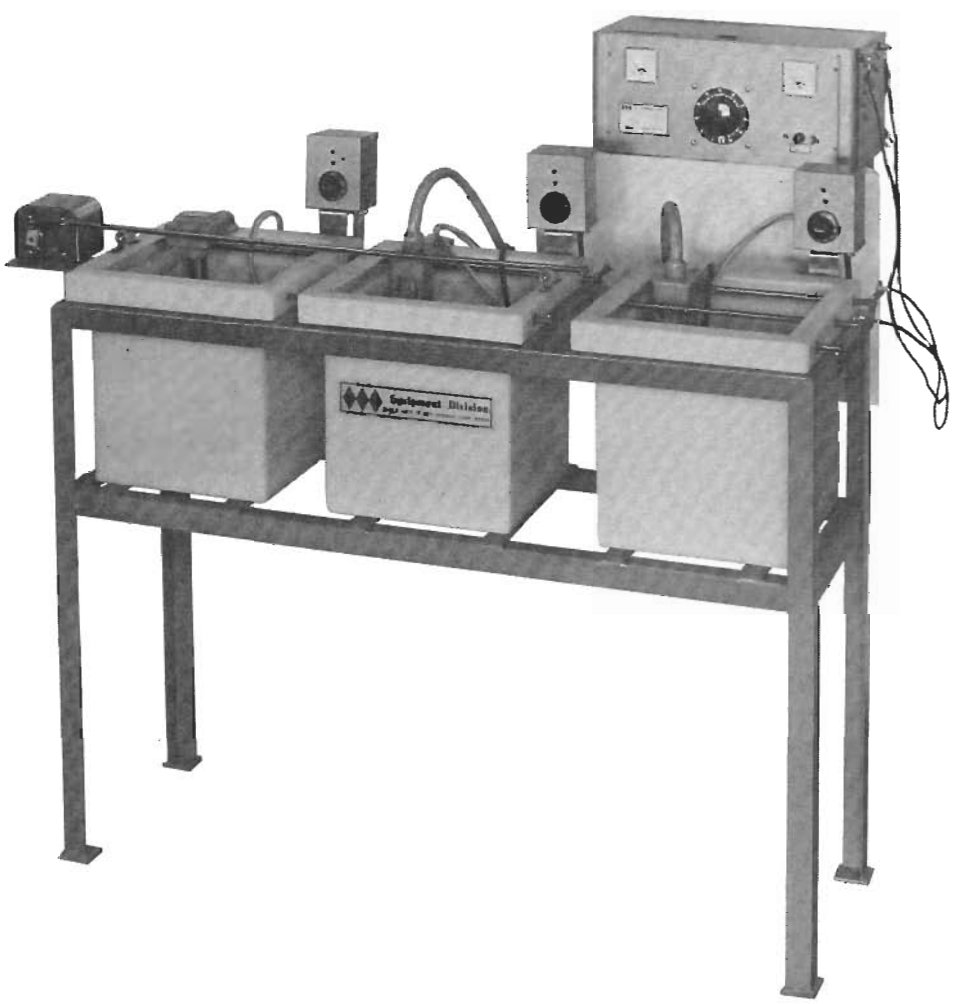
Platers Service Company

1511 ESPERANZA STREET • LOS ANGELES, CALIFORNIA 90023 • PHONE (213) 264-1880

HBS Plating Facility

MODEL CNC-50

A triple plate unit especially designed for plating or replating small parts, prototype plating, research and development plating.



This plating facility is a complete system including three plating tanks with support stand, DC power supply and chemicals.

Years of experience in engineering and developing electroplating units have resulted in this compact unit. It utilizes the most modern techniques and solution formulas and has a capacity for processing 100 square inches or more depending on configuration of the parts. The unit includes a 50-amp, 6-volt DC power supply, 3 polyethylene plating tanks 12x12x12″ deep, anode and cathode rods, electric immersion heaters, blue plastisol coated support stand, and necessary supplies and accessories for copper-nickel-chrome plating. Also included are free step-by-step simplified instructions.

FEATURES:

- 50 amp, 0-6 volt, DC Power Supply with ammeter, voltmeter, stepless voltage control, filtered for low ripple factor.
- Three molded polyethylene tanks of approximately 7 gallons each total capacity.
- All tank accessories such as anode rods, cathode rods, cathode rod agitator for copper and nickel plating tanks, electric immersion heaters with thermostat controls.
- Overall dimensions of assembly are approximately 47″ long x 16″ wide x 57″ high excluding DC Power Supply. The DC Power Supply is usually mounted on a shelf or bench within convenient reach.
- All equipment operates on 110/115 volts, AC current.
- Complete set of easy-to-follow instructions.

CHEMICALS AND ACCESSORIES:

5 gallons C295 Copper Solution
5 gallons B298 Bright Nickel Solution
5 gallons C299 Bright Chrome Solution
All necessary additional agents and brighteners.
4 Copper Anodes 3x6″
4 Nickel Anodes 3x6″
4 Lead Anodes 3x6″ for Chrome Plating Tank
1 roll Copper Wire for suspending parts
1 gallon HBS99 Degreasing Fluid
1 jar No. 1602 Activator
1 pair Plater's Rubber Gloves
1 bottle Super-Powdered "No-Chrome" Mist
Necessary cables from DC Power Supply to Tanks.
1 Plater's Thermometer
3 Plastic Stirring Rods

Complete CNC-50 Plating Assembly as Shown Above $975.00

F.O.B. Los Angeles, California

Platers Service Company

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