DESCRIPTION OF ASSEMBLY (SOP)

VII. OPERATION

The following is an outline of the eleven (11) pre-constructed assemblies required prior to activating the assembly line. All other items required on the assembly line are either produced on the line itself. come to us assembled by the manufacturer, or are complete and ready for mounting:

1. BODY

With the equipment available. it is possible to produce seventy- two (72) bodies for our automobile per day. However, our requirements are only twenty (20) cars per day, per shift. The manufacture of exterior skins. which includes, roof panels, left and right side panels. door skins, roof assembly, body pans, dash panels. corner posts, pillar members, etc., can be produced at the rate of one entire body system approximately every 20 minute. Body parts will be spread through each station according to mounting requirement.

2. DOORS

After door units are formed, they are moved from the body area to this station. where lights, door latches, interior panels, etc., are put into place.

3. INTERIOR PANELS

Interior panel are removed from the body area to this station for carpeting, trim and glasswork.
This job can easily be filled using Disabled Veteran, physically handicapped persons or by a mentally handicapped person.

4. BUMPERS

The assembly consists of only mounting bumper blocks for final assembly onto the chassis.

5. WIRING HARNESS

A myriad of colored wires are assembled into a harness for quick connection of all electrical assembly parts. including batteries. controller, accelerator, speedometer, etc.

6. TAILLIGHT ASSEMBLY

Taillight assembly includes turn indicators, back-up lights, stop light and wire assembly for rear mounting.

7. DASH

The pre-formed dash will have dash lights, control units, fuse box switches, computer, clock, radio and all digital light emitting diode (LED or other) read-outs.

8. AXLE ASSEMBLY

This assembly not only includes the axle, differential and special ears, but also motor, motor mounts, brakes, shocks, - spring, tires, and wheels.

9. FRONT WHEEL ASSEMBLY

This is an entire unit, consisting of both left and right front wheels. bearing systems, brakes, "A" arms, shock, and springs. "- The assembly goes through a preliminary alignment and moves into a holding area on the assembly line for mounting on the chassis.

10. WINDSHIELD WIPER ASSEMBLY

(Hidden portion of this assembly subject to change). The entire windshield wiper assembly, which includes, motors, pantograph wipers, blades and washers, is assembled into a removable unit which, while not in operation, lies beneath the panel at the - lower end of the windshield. By activating a cable pull inside the vehicle, this assembly moves into position, and the wipers operate at the selected speed. While not in use, the wiper assembly is hidden below the windshield, and the cover for the assembly allows a smooth flow of air in a continuous line from the bumper to the top of the car in order not to interfere - with aerodynamics, except during inclement weather.

*This Job can easily be filled using Disabled Veterans, physically handicapped persons or by a mentally handicapped person. "

11. BATTERY PREPARATION

Batteries arrive on specially designed pallets. These pallets are then arranged in such a way that the entire days' production, plus a number of replacement batteries, are brought up to charge and specific gravities checked. Any batteries not meeting the specifications are replaced.

VIII. ASSEMBLY LINE

1. STEEL

The beginning of the assembly line is a steel storage area wherein three welders (skilled) and two helpers (semi-skilled) will pull the two shape of steel required for the manufacturing of the chassis. We use 410 chrome/Alloy Steel, round and rectangular tubing. The material is marked and moved into sawing area.

2. SAW AREA

Marked steel is et into an automatic saw, which cuts to length and trims excess. After cutting, rectangular tube is moved to a the automatic welder, and round tube is moved to the tube bending area.

3. TUBE BENDING

Round tube is set into jigs, and the tube bender is used to form roll cages and undercarriage. Bent tube is then sent further up the line to the automatic welder.

4. AUTOMATIC WELDER

Rectangular tube is locked into a jig and automatically welded (all 20 chassis frames are welded) The automatic welder is then converted for the assembly of the undercarriage and roll cage. Once the units are welded, the automatic welder is once again positioned for the welding of the roll cage system to the frame.

5. WELD INSPECTION

After the completed chassis, all welds are inspected and tested. Any welds not meeting standards are repaired on the spot.
This job can easily be filled using Disabled Veterans, physically handicapped persons or by mentally handicapped person.

6 through 25 DOLLY

Once inspection is completed, the chassis is mounted onto a dolly and moved to station number 25. This process is repeated for stations 6 through 25.

> All sub-assemblies should be in position, workers re-assigned by section heads and group leaders stationed sub-groups into position for final production assembly.

27. BODY PANS

These units, which were part of the pre-assembly, are now mounted onto the chassis.

28. AXLE AND MOTOR

Rear axle is rolled 'into position. Six bolts lock on the entire assembly; ten additional bolts mount the shock absorbers. Springs are mounted and held in place by weight.

29. FRONT WHEEL ASSEMBLY

This pre-assembled unit is now rolled under the front of the chassis and bolted into place. Shock systems are mounted, springs lipped into position and held in place by weight.

30. STEERING

Rack and pinion steering attached. Toe-in tentatively set, dolly removed and returned to starting area.

31. BATTERY AND HARNESS

Twenty-four unit mounted into proper compartments and properly wired. Charger bolted into place and wired to batteries.

32. CONTROLLER AND ACCELERATOR

These two units are bolted into place and connected. BRAKES
Dual master cylinders are attached. Pedals bolted into place. Brake lines attached to calipers and fluid added. All bleeding and preliminary settings for brakes made at this station. including switches for stop lights.

33. HEATER AND DUCT WORK

Mounting the unit to the chassis. Taking duct work into all battery compartments. Running duct guide to both rear window and front windshield and into front and rear passenger area.

34. AIR CONDITIONER

At present, we are looking at two air conditioning system, both small and lightweight. One of the systems we have seen operates on a compressed air principle and produce enough air conditioning to cool the vehicle comfortably. It is a noisy unit that must be insulated, however, it can use the same duct that the heater uses. According to the manufacturer, at 144 volts, it does not require over eight amperes an hour to operate. Since this is questionable, in the case of both manufacturers we are providing this station in our outline which may be

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Electric Vehicle Air Conditioners and Heat Pumps--Test and Evaluation of Candidate Systems

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for
Assistant Secretary for Conservation
and Renewable Resources
U.S. DEPARTMENT OF ENERGY

Table 3-1. Summary of Electric Vehicle A/C System Concepts

Component	EER (Btu/Wh)	Advantage	Disadvantage	Range Impact* (mi (%))
Shaft-Sealed Compressor and d.c. Motor with R-12 Refrigerant	5	Readily Available	Low Efficiency	-6 (-15%)
Integrated Compressor and Induction Motor with R-22 Refrigerant	11	Compressors are Commercially Available	Needs Inverter, Higher System Pressures	-3.06 (-7.7%)
Integrated Compressor and Brushless d.c. Motor with R-22 Refrigerant	14.5	High Efficiency	High Cost Motor and Complex Controller	-2.38 (-6%)

*Assume: 15-kWh battery
40-mile range without A/C
12,000-Btu/hr A/C capacity
35-mph steady speed

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which may be deleted from production.

35. AIR BAGS

The air bag for the driver is attached to the steering wheel and was previously mounted at station number 29. The passenger's a compartment air ba is mounted under the dash at this station. Sensors are placed on the chassis behind the bumpers, and jut below the windshield area, all lines attached and tested. This a item may not be necessary.

36. BODY

All outer skins, which include sun roof, are bolted into place. Rubber gaskets between parts mounted. Sun roof motor attached and wired into place and un roof aligned.

37. BUMPERS

Front and rear bumpers mounted to chassis.

38. WIRING HARNESS

All electrical wiring from bumper light, headlights. air bag senors. windshield washer and wiper. air hock pump. motor, heater and air conditioning elements, interior lights, turn indicators, etc.. with the exception of dash electrical equipment.

39. BATTERY COVERS

These covers have already had carpet mounted. Latches are proportionate into place and locked down.

40. EXTERIOR AND TAILLIGHT ASSEMBLIES

At this station, all lights are checked. Outer covers bolted or screwed into place and aligned. Turn indicators, high beam switches, back-up lights, stop lights, headlight, and parking lights are given final inspection.

41. WINDSHIELD WIPER ASSEMBLY

This assembly is bolted to the roll cage below the windshield. The acrylic fiberglass cover is mounted. Electrical circuits connected.

42. GLASSWORK

Glasswork completed. Front windshield is mounted. Windshield wipers and washers tested. Proper seal checked.

43. DASH

All instrumentation panels, radio, dash lights, sun roof witch, switches for all control within the car, fuse boxes and controls, including computer. are connected by wiring harness and a second check for all operational devices completed.

44. FLOOR CARPET

The carpet is mounted by use of Velcro.

45. HEAT ASSEMBLIES

Heat holders are pinned into position. Seat tracks are pinned to holders. Seat is slid onto holder and locked into place.

46. INTERIOR PANELS

Panels, which have previously been carpeted and prepared for mounting are placed into position and clip pressed through for attachment.

47. DOOR ASSEMBLIES

Light switch wires are brought through door housing into main frame and attached to fuse box. Hinges are adjusted and tightened into place. Doors checked for proper closure.

48. FINAL INSPECTION

Final electrical hook-up and check of all devices.

49. FRONT WHEEL ALIGNMENT AND TRACKING

Final adjustment to all rolling assemblies completed. Steering checked. Air shocks filled with standard pressure.

50. BALANCE OF GLASSWORK AND CLEAN-UP

51. FINAL TESTING AND INSPECTION

Automobile prepared for delivery and moved to parking area.