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PLANT SELECTION REPORT

ENERGY AUDITS AND AUDIT TRAINING IN EGYPT

FOR

ORGANIZATION FOR ENERGY PLANNING (OEP)

AND

ARGONNE NATIONAL LABORATORY (ANL)

BY

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"A" Plant Questionnaires (completed)

1.0 Introduction:

This report presents the results of the plant selection effort executed by Foster Wheeler Energy Corporation with assistance from the Organization for Energy Planning (OEP), in accord with the scope defined in the contract between FWEC and ANL.

The work required in this subtask, identified in the work scope as 1A, includes:

- o review of OEP data for approximately 10 plant facilities.
- o perform a one day walk through inspection visit of each of the selected plant facilities, working with OEP personnel.
- o confer with ANL and OEP and select two distinct plant facilities for preaudit.
- o prepare and present the plant selection report for the two plants.

Recommendations, conclusions, and discussion of the logic for the overall subtask, along with supporting documentation are included herein, and capsulated with a brief summary in section 2.0.

2.0 Summary and Recommendations:

Foster Wheeler Energy Corporation, together with the Organization for Energy Planning, and in consort with Argonne National Laboratory, have completed the screening of eight industrial plants in the Cairo area.

The types of plants covered by this screening study include the basic industrial areas of textiles, steel, glass, sugar, cement, and cable production, with at least one candidate plant screened in each area.

Screening was conducted with a carefully planned and systematic technique, this permitting the development of a consistent scoring-system for the evaluation of each candidate plant.

The plants selected for audit, based on their high scores in accordance with the point rating of the scoring system, are:

A) The National Metal Industries Company, and

B) The Cairo Company for Dying and Finishing.

The advantages of conducting the preaudit and audit on these companies are as follow:

1. Both companies are representative of basic industries in the industrial sector in Egypt.
2. Both companies reflect the opportunity to save energy with no cost/low cost energy conservation measures, as well as with capital improvement energy conservation measures.
3. The current energy consumption of both companies is significant, and the resultant energy conserved when our recommendations are implemented will be adequate to demonstrate a meaningful result.

3.0 Discussion:

This section of the report will present the details of the plant screening activity, the methods of analysis, and the resulting selection of two plants for audit.

3.1 Objectives:

The objectives of the plant screening activity are multifold:

- to review those plants already pre-screened by the OEP engineering staff.
- to select two plants from the pre-screened list which will provide meaningful examples of energy conservation measures, and to recommend these plants for the full audit.
- to provide "on the job" training for OEP engineers, such that they are later able to perform this screening activity with personnel from within the OEP Organization.

3.2 Method of Approach:

In order that all results obtained are consistent, and that a uniform method of plant selection is obtained, a questionnaire was developed, to be used as a basis of decision. (example as included in section 4.0). The questionnaire permits the compilation of specific data as required to evaluate the industrial complex, and as required to summerize the results into the point scoring system. Elements covered by the questionnaire are general data, production detail, energy consumption information, equipment and process specifics, and energy conservation information.

3.2.1 Sequence of screening activities:

Each screening activity was conducted through the same set of four steps, as follow:

3.2.1.1 Prescreening plant selection:

OEP, through its staff in Cairo, contacted a wide variety of plants through the public sector, and determined which might be advantageously served by an energy audit. From this long list of plants, OEP established a "short list", based on proximity to Cairo, industrial sector, and plant management interest. Data was then accumulated for each plant on the "short list", and this data made available to the FW plant screening team.

3.2.1.2 Plant scheduling:

FW, through its plant screening personnel for this project, developed a priority list of plants to be visited, based upon broad OEP inputs, and in coordination with ANL.

Generally, the plant visit priority list presented the most likely plants first, and those least likely candidates last. Priority was assigned by apparent need for energy conservation, plant age, total energy consumption, and industrial sector.

3.2.1.3 Plant Visit(s)

The FW plant screening team, together with representatives of the OEP, visited each plant in turn, with a one day visit as set by the schedule. During each visit three action items were accomplished, namely:

a) completion of the questionnaire

b) inspection of technical data files

c) plant tour and inspection

Results, as obtained from each visit are presented by the plant questionnaires included in this report in section 4.0.

3.2.1.4 Plant Scoring

Scores for each plant were assigned after each visit in accord with a previously developed scoring system (as later described). At the completion of the plant screening activity, a review of each score level was made, and the two plants with the highest score were selected.

3.3 Scores and Description of the Scoring System:

The scoring system for the plant prescreening activity was developed to permit a mechanism which would inter-relate the various aspects of a potential plant audit candidates particular circumstances.

A series of guidelines, as displayed by table 1 below describe the weighted points to be assigned to any category, and, as mentioned earlier in the text, the complete results of each questionnaire are included in section 4.0 of this report.

Actual scores assigned for each of the plants screened are shown in table 2 below followed by a listing of the eight plants in order of decreasing score.

Table 1

Explanation of Appraisal Form for Plant Selection for Initial Two Audits

1. Type, Process Units, Equipment: Is the process and equipment of the type which is unique only to this plant or of the type which can be found commonly in most industrial plants or in other plants producing the same products. "unique" gets a low score. "common" gets a higher score.

2. Export of Domestic Products: A plant that exports some or all of its products gets a higher score than one which does not. Roughly, the score should relate to the percentage of product exported. With 5 points equal to 25% exports.

3. Age (Last Modernization): A plant that is either very old so that it is more difficult to justify an investment for add-on equipment or that is currently in the midst of a modernization would in either case get a low score. An ideal plant would be approximately 25 years old or less with little or no modernization, and would receive the highest score.

4. Existing Installed Instrumentation: The greater the amount of existing instrumentation, the higher the score, with consideration also given to its operating condition.

5. Energy Consumption: The greater the amount of energy consumed, the higher the score. As a baseline, 500 billion BTU/yr or less would be given 10 points maximum, 2,000 billion BTU/yr or less would be given 15 points maximum, and 5000 billion BTU/yr or less would be given 20 points maximum.

   Intermediate scores will allow for the type of energy used, and for other considerations which involve judgement, i.e. Alternate uses of the fuel, ease of export of the fuel, etc.

Table 1 continue

6. Availability of Technical Data: The greater the availability of Technical Data, the higher the score. This is due to the need for original design conditions, flow rates, and process arrangement for proper analysis of energy conservation opportunities.

7. Potential Energy Conservation Improvements: The score for this category is broken up into two parts, half for no or low investment items and half for items requiring an investment. The greater the potential for improvement, the higher the score.

A plant operating with first class maintenance and a process which relates well to the current state of the art would receive a maximum of 5 points in each category, while a poorly maintained plant with old, inefficient processes would receive up to 30 points.

Some Examples of No Cost/Low Cost Items are:

- steam leaks
- poor combustion efficiency
- little or no insulation
- equipment running when not needed
- better maintenance and operations
- improved scheduling

Some Examples of Investment Items are:

- recovery of waste heat from:
  - stack gases
  - process streams
  - condensate
  - blowdown
  - hot water/hot oil belts
- power factor improvement with capacitors
- variable speed motors
- cogeneration
- condensate recovery system

Table 2

Appraisal Form for Plant Selection

Plant Characteristics	Appraisal Computation %	Name:	Plant 1 Dyeing and Finishing	Plant 2 Cable Company	Plant 3 Sugar Refining	Plant 4 Delta Steel	Plant 5 National Steel
Type, Process Units, Equipment	5		3	3	1	2	3
Export of Domestic Products	5		0	1	2	0	0
Age (Last Modernization)	10		7	7	1	0	7
Existing Installed Instrumentation	10		2	8	4	5	6
Energy Consumption	20		15	8	20	15	15
Availability of Technical Data	20		10	18	10	15	18
Potential Energy Conservation Improvements	30		25	10	15	10	27
TOTAL	100		62	55	53	47	76

Plant Characteristics	Appraisal Computation %	Name:	Plant 6 Cement Company	Plant 7 Glass Plant	Plant 8 Textile Mill	Plant 9	Plant 10
Type, Process Units, Equipment	5		3	3	3		
Export of Domestic Products	5		0	0	0		
Age (Last Modernization)	10		2	0	5		
Existing Installed Instrumentation	10		5	8	3		
Energy Consumption	20		20	15	8		
Availability of Technical Data	20		15	18	2		
Potential Energy Conservation Improvements	30		11	3	12		
TOTAL	100		56	47	33		

Rank	Name	Score
1.	NATIONAL METAL INDUSTRIES COMPANY	76
2.	CAIRO COMPANY FOR DYEING AND FINISHING	62
3.	PORTLAND CEMENT COMPANY	56
4.	EGYPTIAN COMPANY FOR ELECTRIC CABLES	55
5.	EGYPTIAN SUGAR REFINING COMPANY	53
6.	DELTA COMPANY FOR STEEL INDUSTRY	47
7.	NASR COMPANY FOR GLASS AND CRYSTAL INDUSTRY	47
8.	EGYPTIAN COMPANY FOR WOOL SPINNING AND WEAVING	33

These scores then provide the basis for selection of the principle candidates for plant pre audit, and for subsequent audit.

3.4 Conclusions and Recommendations:

The scoring system has been used as a basis to select two plants for pre audit, and subsequent audit.

The plants selected for audit are:

a) The National Metal Industries Company

and b) The Cairo Company for Dyeing and Finishing

The Advantages of conducting pre audit and audit on these companies are as follows:

1. Both companies are representative of basic industries in the industrial sector in Egypt.
2. Both companies reflect the opportunity to save energy with no cost/low cost energy conservation measures, as well as with capital improvement energy conservation measures.
3. The current energy consumption of both companies is significant, and the resultant energy conserved when our recommendations are implemented will be adequate to demonstrate a meaningful result.

4.0 Plant Questionnaires:

In order to prepare an evaluation which would be consistent for each plant visited, Foster Wheeler developed a questionnaire which formed the basis of discussion with plant management and which was completed following each visit. The questionnaire specifically covered the following topics:

a) general information

b) production

c) energy consumption

d) equipment/process

e) energy conservation

The completed questionnaires for each of the eight (8) plants visited are included at the end to this section.

The following is a brief summary of our overall impression of each of the eight (8) plants which we visited:

1. Cairo Dyeing and Finishing Co. This plant shows a great deal of obvious waste in terms of leaks, uninsulated pipe, and unrecovered energy. Instrumentation is quite limited and is usually broken. Much opportunity exists both for no cost/low cost energy conservation measures and for investment in energy saving equipment. This plant is the second best candidate from among the eight (8) plants which we visited.

2. Egyptian co. for Elect. Cable: This plant is excepionally well maintained. Opprotunity for improvement in energy conservation is limited. The most important energy conservation problem which this plant has is that of a low power factor.

3. Sugar Refinery Plant: This plant is very old and very poorly maintained. Severe leaks and uninsulated pipe are visible in every

direction. There is much opportunity for no cost/low cost improvement in energy conservation. Larger opportunity for justifiable investment in energy saving equipment is very limited. The management of this plant, especially the chairman, was outstandingly cooperative with us.

4. Delta Steel Mill Co. This plant will be changing its processing scheme beginning in February of 1985 to include several new furraces and a new continuous casting machine. Because of these major changes it would not be appropriate to conduct an energy audit at this time.

5. The National Metal Industries Company: This plant has several large furnace burning mazout and overall is experiencing energy conservation problems related to high fuel usage, high water usage, low electrical power factor, steam leaks, insufficient heat recovery and insufficient insulation. Many opportunities exist both for low cost/no cost energy conservation, as well as for investment in energy recovery equipment. This plant is the best overall condidate from among the group of eight (8) industrial plants which we visited.

6. The Portland Cement Company: This plant currently has nine (9) kilns in operation with a tenth scheduled for production in March/May 1985. This new kiln and another which was put into operation in 1982 are both thoroughly modern and will account for 80 percent of the plants total production. Each of the other eight kilns can be improved to conserve less fuel. Since these eight kilns represent only 20 percent of the plant's production, this plant is considered a reasonable candidate for an audit, but not a best choice.

7. Nasr Company for Glass and Crystal Industry: This plant was built in 1972 and has recently modernized two of its three furnaces for increased production and energy efficiency. These two furnaces already meet inter-

nationally accepted levels of top energy efficiency. Plans are currently underway to modernize the third furnace sometime next year. This plant has already done so much, that there is little need for an energy audit.

8. Egyptian Co. For Wool Spinning and Weaving: This plant, which processes wool products in a dyeing and finishing operation, is smaller in capacity than plant number one. In general, the complex has energy conservation opportunities in condensate recovery, and in steam use during process operations. However, the plant appears to have fewer energy conservation opportunities than other plants screened and a much lower level of energy consumption. Equipment specifications and drawings for this plant do not exist.

Plant Number: 1 Date: December 10, 1984

Name of Plant: CAIRO DYING AND FINISHING CO.

Questions Used to Aid in Plant Selection
(Plants in the Industrial Sector)

GENERAL

1. What year was this plant built?

   Shobra factory - 1962 (cotton)
   Fiber factory - 1970 (cotton/polyester)
   Boilers - 1973

2. The design or process was developed by whom?

3. Any major expansions or modifications? When?

   A majority of the machines in the Shobra factory have been replaced due to old age

PRODUCTION

1. What products do you produce?

   Dyed and finished fabrics on bolts

2. What is the total quantity or number of units per year of these products?

   60 million meters per year: 60% in old plant,
   40% in new plant.

3. What are your starting materials?

   Gray goods (cotton or cotton/polyester or polyester)

4. Do you produce the same type and amount of products all year long or does it vary?

   Production is generally constant throughout the year

5. What records or summaries do you have of this production?

   It was said that this information could be made available

PRODUCTION (Continued)

6. May we briefly see these records?

Not available at time of visit

7. Are your products sold domestically or internationally?

Domestically only

8. What is the percent of each?

100% domestic

9. Does your plant operate around-the-clock, seven (7) days a week or if not, how many shifts per day and per week?

3 shifts a day, 6 days a week
Closed 2 or 3 weeks in July for maintenance

10. How many total days per year does it typically operate?

295 days

11. Are there any factors which cause seasonal effects and what are these?

None

12. Are products sensitive to environmental factors in storage?

No

ENERGY CONSUMPTION

1. About how much money do you spend per year for energy?

Not available at time of visit, but can be obtained from accounting office

2. Does the amount spent vary much each month?

Probably not, but not substantiated with actual data at the time of the visit

3. What are the various types of energy that you use?

Electricity
Mazout (no. 6 fuel oil)
Gasoline
Kerosene

ENERGY CONSUMPTION (Continued)

4. Do you have monthly records of consumption?

   Yes

5. May we briefly see these records?

   Not available at time of visit

EQUIPMENT/PROCESS

1. What items of equipment are your biggest individual users of energy?
   Boilers
   Various users of steam (driers, dying, etc.)
   Hot oil users

2. What items of equipment contribute adversely to your power factor and demand factor?

   Not known
   Power factor less than 0.7 overall

3. Do you have equipment specifications, manufacturer's data and/or drawings?

   Some, for new equipment only

4. Do you have an equipment list?

   No

5. In what language is the above information available?

   Unclear, at time of visit

6. May we briefly see this information?

   Not available at time of visit

7. What unit(s) or section(s) of the plant are the biggest users of energy?

   The plant built in 1962 is a bigger user

8. Do you have drawings showing the processing scheme used in the plant, including instrumentation?

   No

EQUIPMENT/PROCESS (Continued)

9. Are plotplan drawings available?

   Some limited information is available

10. May we briefly see these drawings?

    Not available

ENERGY CONSERVATION

1. Are there any major energy conservation related problems in your plant that you are currently aware of?

   Power consumption on "Kusters" electrically heated drier
   Steam to atmosphere during shift change

2. Have any steps yet been taken in your plant to try to conserve energy?

   Not yet

3. Is there presently any recovery of steam condensate?

   No (condensate from driers is often contaminated with lube oil from rollers)

4. Do you pay a penalty on your electrical bill for having a low power factor or penalty on demand factor?

   Yes, details not known

5. Does your demand for electricity fluctuate greatly or remain relatively constant?

   Constant

6. Are there any hot lines, tanks or other hot surfaces which are not presently insulated?

   Yes

7. Do you vent any steam to the atmosphere?

   Yes (see 1. above)

ENERGY CONSERVATION (Continued)

8. Do you recover any heat from the hot stack gases leaving your combustion equipment?

   Yes, on steam boilers
   No, on oil heaters

9. Is there any monitoring of the excess air in the stack gases from your combustion equipment?

   Not in operable condition on boilers
   Non-existent on oil heaters

10. Is there manual or automatic trim of the air/fuel ratio?

   Manual

Plant Number: 2 Date: December 11, 1984

Name of Plant: ELECTRO CABLE EGYPTE CO.

Questions Used to Aid in Plant Selection
(Plants in the Industrial Sector)

GENERAL

1. What year was this plant built?

   1955-56 and then expanded

2. The design or process was developed by whom?

   Equipment mainly is from France

3. Any major expansions or modifications? When?

   Evolutionary, since 1955

PRODUCTION

1. What products do you produce?

   All kinds of power cables and wires and enamel wire are made of copper and aluminium

2. What is the total quantity or number of units per year of these products?

   40,000 tons/year of product (10% increase per year)

3. What are your starting materials?

   8-9 mm coils of copper and aluminium

4. Do you produce the same type and amount of products all year long or does it vary?

   Essentially constant except for summer months of July and August

5. What records or summaries do you have of this production?

   Records are available

PRODUCTION (Continued)

6. May we briefly see these records?

   Yes (not actually seen during visit)

7. Are your products sold domestically or internationally?

   Mostly domestically

8. What is the percent of each?

   4-5% exported, approximately $5,000,000 per year

9. Does your plant operate around-the-clock, seven (7) days a week or if not, how many shifts per day and per week?

   2 shifts per day, 5 days per week
   2 weeks per year of staggered maintenance for each section of plant

10. How many total days per year does it typically operate?

    250 days for each section of the plant

11. Are there any factors which cause seasonal effects and what are these?

    Lower production in July and August

12. Are products sensitive to environmental factors in storage?

    No

ENERGY CONSUMPTION

1. About how much money do you spend per year for energy?

   _____

2. Does the amount spent vary much each month?

   Essentially constant

3. What are the various types of energy that you use?

   Mostly electricity

ENERGY CONSUMPTION (Continued)

4. Do you have monthly records of consumption?

   Yes

5. May we briefly see these records?

   Yes (not actually seen during visit)

EQUIPMENT/PROCESS

1. What items of equipment are your biggest individual users of energy?

   300 HP drawing machines, total of eight electric furnaces

2. What items of equipment contribute adversely to your power factor and demand factor?

   Induction Motors

3. Do you have equipment specifications, manufacturer's data and/or drawings?

   Yes

4. Do you have an equipment list?

   Yes

5. In what language is the above information available?

   French, English, Arabic

6. May we briefly see this information?

   Yes

7. What unit(s) or section(s) of the plant are the biggest users of energy?

   Drawing machines
   Furnaces

8. Do you have drawings showing the processing scheme used in the plant, including instrumentation?

   Yes

EQUIPMENT/PROCESS (Continued)

9. Are plotplan drawings available?

   Yes

10. May we briefly see these drawings?

    Yes

ENERGY CONSERVATION

1. Are there any major energy conservation related problems in your plant that you are currently aware of?

   Power factor
   No heat recovery on boilers

2. Have any steps yet been taken in your plant to try to conserve energy?

   Have made test runs on varying the length of run for the electric furnaces versus tensile strength

3. Is there presently any recovery of steam condensate?

   Yes, partially

4. Do you pay a penalty on your electrical bill for having a low power factor or penalty on demand factor?

   Yes, 0.6 power factor would like to bring up to 0.9

5. Does your demand for electricity fluctuate greatly or remain relatively constant?

   Constant

6. Are there any hot lines, tanks or other hot surfaces which are not presently insulated?

   No

7. Do you vent any steam to the atmosphere?

   No

ENERGY CONSERVATION (Continued)

8. Do you recover any heat from the hot stack gases leaving your combustion equipment?

   No

9. Is there any monitoring of the excess air in the stack gases from your combustion equipment?

   No

10. Is there manual or automatic trim of the air/fuel ratio?

    Manual

Plant Number: 3 Date: December 12, 1984

Name of Plant: SUGAR REFINERY PLANT

Questions Used to Aid in Plant Selection
(Plants in the Industrial Sector)

GENERAL

1. What year was this plant built?

   In 1881 the plant was first opened

2. The design or process was developed by whom?

   Various Egyptian and International Companies

3. Any major expansions or modifications? When?

   Yes, generally the average age of equipment is 30 years.

PRODUCTION

1. What products do you produce?

   Various types of refined sugar

2. What is the total quantity or number of units per year of these products?

   1,000 tons per day of raw sugar, corresponding to approximately 900-950 tons per day of refined sugar

3. What are your starting materials?

   Raw sugar delivered in bags

4. Do you produce the same type and amount of products all year long or does it vary?

   Constant throughout the year except for December shutdown and 2/3 capacity operation on Fridays

5. What records or summaries do you have of this production?

   Daily, monthly and yearly records are available

PRODUCTION (Continued)

6. May we briefly see these records?

   Yes (not shown at time of visit)

7. Are your products sold domestically or internationally?

   Mostly domestically, some Internationally

8. What is the percent of each?

   20-30,000 tons per year is sold Internationally or approximately 9 percent

9. Does your plant operate around-the-clock, seven (7) days a week or if not, how many shifts per day and per week?

   7 days per week, 3 shifts per day
   Closed for maintenance during the month of December

10. How many total days per year does it typically operate?

    335

11. Are there any factors which cause seasonal effects and what are these?

    Closed during December

12. Are products sensitive to environmental factors in storage?

    No

ENERGY CONSUMPTION

1. About how much money do you spend per year for energy?

   55 Egyptian pounds per ton of refined product is total cost
   Cost for energy only can be obtained later

2. Does the amount spent vary much each month?

   No, except December

3. What are the various types of energy that you use?

   Electricity (some is produced internally from steam)
   Mazout (No. 6 fuel oil) to produce steam
   Sular (kerosene)
   Various steam users

ENERGY CONSUMPTION (Continued)

4. Do you have monthly records of consumption?

Yes

5. May we briefly see these records?

Yes (not shown at time of visit)

EQUIPMENT/PROCESS

1. What items of equipment are your biggest individual users of energy?

40 tons per hour of steam for boiling
40 tons per hour of steam for other processing
300 kw motors on Nile water pumps

2. What items of equipment contribute adversely to your power factor and demand factor?

Not known

3. Do you have equipment specifications, manufacturer's data and/or drawings?

Yes

4. Do you have an equipment list?

No, but one will be developed

5. In what language is the above information available?

Various languages

6. May we briefly see this information?

Yes (not shown at time of visit)

7. What unit(s) or section(s) of the plant are the biggest users of energy?

Steam boilers
Sugar boilers

8. Do you have drawings showing the processing scheme used in the plant, including instrumentation?

Yes

EQUIPMENT/PROCESS (Continued)

9. Are plotplan drawings available?

Yes

10. May we briefly see these drawings?

Yes (Not shown at time of visit)

ENERGY CONSERVATION

1. Are there any major energy conservation related problems in your plant that you are currently aware of?

Power factor - currently have ordered capacitors
Boilers - about to order new 100 ton/hr boiler
Economizers - currently replacing in 20 ton/hr boilers, total of 4 boilers

2. Have any steps yet been taken in your plant to try to conserve energy?

Yes, see 1. above

3. Is there presently any recovery of steam condensate?

Currently recover or use all condensate for BFW or process water

4. Do you pay a penalty on your electrical bill for having a low power factor or penalty on demand factor?

Yes, power factor 0.65 - 0.75
New capacitors have neen ordered

5. Does your demand for electricity fluctuate greatly or remain relatively constant?

Constant, except for December shutdown

6. Are there any hot lines, tanks or other hot surfaces which are not presently insulated?

The need for insulation was very apparent

7. Do you vent any steam to the atmosphere?

Vented steam and steam leakage was very apparent, eventhough almost all of the plant, with the exception of one boiler, was shut down.

ENERGY CONSERVATION (Continued)

8. Do you recover any heat from the hot stack gases leaving your combustion equipment?

   Yes, both economizers and air preheat

9. Is there any monitoring of the excess air in the stack gases from your combustion equipment?

   Manual testing

10. Is there manual or automatic trim of the air/fuel ratio?

   Manual only

Plant Number: 4 Date: December 13, 1984

Name of Plant: DELTA STEEL MILL CO.

Questions Used to Aid in Plant Selection
(Plants in the Industrial Sector)

GENERAL

1. What year was this plant built?

1947

2. The design or process was developed by whom?

Individual items of equipment have been purchased from many different countries such as England, Russia, Germany and Italy. The initial plant was purchased as used equipment from Italy.

3. Any major expansions or modifications? When?

Yes, periodically from 1947 to the present. A good deal of new equipment including several furnaces and continuous casting will be operational in 1985.

PRODUCTION

1. What products do you produce?

Reinforced concrete bars - Iron and steel castings
Different sizes of wire

2. What is the total quantity or number of units per year of these products?

Reinforced concrete bars - 70,000 tons (110,000 tons with new continuous caster)
Steel wire - 10,000 tons
Steel casting - 3,500 tons
Cast iron - 7,000 tons

3. What are your starting materials?

Scrap

4. Do you produce the same type and amount of products all year long or does it vary?

Production can vaiy weekly based on local demand

5. What records or summaries do you have of this production?

Monthly records are available

PRODUCTION (Continued)

6. May we briefly see these records?

   Yes (not seen during the time of visit)

7. Are your products sold domestically or internationally?

   Domestically only

8. What is the percent of each?

   _____

9. Does your plant operate around-the-clock, seven (7) days a week or if not, how many shifts per day and per week?

   7 days per week, 3 shifts per day

10. How many total days per year does it typically operate?

    361

11. Are there any factors which cause seasonal effects and what are these?

    No

12. Are products sensitive to environmental factors in storage?

    No

ENERGY CONSUMPTION

1. About how much money do you spend per year for energy?

   Information not currently available, but can be obtained

2. Does the amount spent vary much each month?

   Yes, in relation to varying production

3. What are the various types of energy that you use?

   Electricity is used mostly
   Also used are mazout (no. 6 fuel oil)
   And sular (kerosene)

ENERGY CONSUMPTION (Continued)

4. Do you have monthly records of consumption?

Yes

5. May we briefly see these records?

Yes (not seen at time of visit)

EQUIPMENT/PROCESS

1. What items of equipment are your biggest individual users of energy?

Electric arc furnaces
Large 1500 HP and 1000 motors

2. What items of equipment contribute adversely to your power factor and demand factor?

Motors and arc furnaces

3. Do you have equipment specifications, manufacturer's data and/or drawings?

Yes

4. Do you have an equipment list?

Yes

5. In what language is the above information available?

Various languages

6. May we briefly see this information?

Yes

7. What unit(s) or section(s) of the plant are the biggest users of energy?

See 1. above

8. Do you have drawings showing the processing scheme used in the plant, including instrumentation?

No

EQUIPMENT/PROCESS (Continued)

9. Are plotplan drawings available?

Yes

10. May we briefly see these drawings?

Yes

ENERGY CONSERVATION

1. Are there any major energy conservation related problems in your plant that you are currently aware of?

No, because energy is still so cheap

2. Have any steps yet been taken in your plant to try to conserve energy?

No

3. Is there presently any recovery of steam condensate?

No, steam is not used in any large quantities

4. Do you pay a penalty on your electrical bill for having a low power factor or penalty on demand factor?

Yes, believe that power factor is 0.7

5. Does your demand for electricity fluctuate greatly or remain relatively constant?

Fluctuates

6. Are there any hot lines, tanks or other hot surfaces which are not presently insulated?

No

7. Do you vent any steam to the atmosphere?

No

ENERGY CONSERVATION (Continued)

8. Do you recover any heat from the hot stack gases leaving your combustion equipment?

   Only on some of the newly ordered equipment

9. Is there any monitoring of the excess air in the stack gases from your combustion equipment?

   No

10. Is there manual or automatic trim of the air/fuel ratio?

    No

Plant Number: 5 Date: December, 16, 1984

Name of Plant: THE NATIONAL METAL INDUSTRIES COMPANY

Questions Used to Aid in Plant Selection
(Plants in the Industrial Sector)

GENERAL

1. What year was this plant built?

   Old plant in 1946 purchased second hand from France (orig. equip. 1924)
   New plant in 1976

2. The design or process was developed by whom?

   France, Germany, Belgium

3. Any major expansions or modifications? When?

   New plant in 1976, expansion to new arc furnaces and three strand continuous caster planned for 1986. This will produce an additional 160,000 tons per year of billets.

PRODUCTION

1. What products do you produce?

   Reinforcing bars of various sizes.

2. What is the total quantity or number of units per year of these products?

   Approximately 160 tons/yr

3. What are your starting materials?

   Scrap processed in old plant and blooms and billets purchased from others.

4. Do you produce the same type and amount of products all year long or does it vary?

   Essentially the same all year. somewhat less in the summer

5. What records or summaries do you have of this production?

   Monthly records are available

PRODUCTION (Continued)

6. May we briefly see these records?

   Yes (not seen at time of visit)

7. Are your products sold domestically or internationally?

   Domestically only

8. What is the percent of each?

   _____

9. Does your plant operate around-the-clock, seven (7) days a week or if not, how many shifts per day and per week?

   7 days per week, 3 shifts per day

10. How many total days per year does it typically operate?

    365 (some maintenance is done on Fridays)
    Martin furnace is shut for 40 days for maintenance, rolling mill for 10 days.

11. Are there any factors which cause seasonal effects and what are these?

    Some decrease in production during the summer

12. Are products sensitive to environmental factors in storage?

    No

ENERGY CONSUMPTION

1. About how much money do you spend per year for energy?

   Information is available, but not known at this time

2. Does the amount spent vary much each month?

   No

3. What are the various types of energy that you use?

   Mazout
   Electricity
   Others in small quantity

ENERGY CONSUMPTION (Continued)

4. Do you have monthly records of consumption?

   Yes

5. May we briefly see these records?

   Yes (not seen at time of visit)

EQUIPMENT/PROCESS

1. What items of equipment are your biggest individual users of energy?

   2 open hearth furnaces (mazout)
   3 reheat furnaces (mazout)
   6 large motors (electricity)

2. What items of equipment contribute adversely to your power factor and demand factor?

   Induction motors

3. Do you have equipment specifications, manufacturer's data and/or drawings?

   Yes

4. Do you have an equipment list?

   Yes

5. In what language is the above information available?

   English, Arabic, French, German

6. May we briefly see this information?

   Yes

7. What unit(s) or section(s) of the plant are the biggest users of energy?

   See item 1. above

8. Do you have drawings showing the processing scheme used in the plant, including instrumentation?

   Yes

EQUIPMENT/PROCESS (Continued)

9. Are plotplan drawings available?

   Yes

10. May we briefly see these drawings?

    Yes

ENERGY CONSERVATION

1. Are there any major energy conservation related problems in your plant that you are currently aware of?

   Use too much fuel
   Fuel to air ratio must be improved
   Too much cooling water is used

2. Have any steps yet been taken in your plant to try to conserve energy?

   Some new insulation has been put on new reheat furnace
   Some of the refractory on new reheat furnace has been
   Replaced with more efficient electofused alumina

3. Is there presently any recovery of steam condensate?

   No

4. Do you pay a penalty on your electrical bill for having a low power factor or penalty on demand factor?

   Yes, current power factor is 0.6 to 0.7

5. Does your demand for electricity fluctuate greatly or remain relatively constant?

   Relatively constant

6. Are there any hot lines, tanks or other hot surfaces which are not presently insulated?

   Yes, several steam lines, furnace surfaces and parts of the oxygen plant.

7. Do you vent any steam to the atmosphere?

   Several leaks were visable

ENERGY CONSERVATION (Continued)

8. Do you recover any heat from the hot stack gases leaving your combustion equipment?

   Yes, from open hearth furnaces and new reheat furnace
   More, however, can be recovered from these and from the two old reheat furnaces

9. Is there any monitoring of the excess air in the stack gases from your combustion equipment?

   No

10. Is there manual or automatic trim of the air/fuel ratio?

   No

Plant Number: 6 Date: December, 17, 1984

Name of Plant: THE PORTLAND CEMENT COMPANY

Questions Used to Aid in Plant Selection
(Plants in the Industrial Sector)

GENERAL

1. What year was this plant built?

1929 (KILN #1)

2. The design or process was developed by whom?

All kilns wet or dry process by F.L. Schmidt (Denmark)

3. Any major expansions or modifications? When?

Now 3 plants

Kiln #1 (1929)
Kiln #2 (1937)
Kiln #3 (1940)
White kiln #1 1961
White kiln #2 1974

Kiln #4 (1950)
Kiln 5# (1951)
Kiln 6# (1957)
New dry process kiln 1 198
New dry process kiln 2 198
(May-March

PRODUCTION

1. What products do you produce?

Portland cement		80%
Rapid hardining	" "	10%
Slag or blended	" "	10%

2. What is the total quantity or number of units per year of these products?

About 6500 metric tons per day

3. What are your starting materials?

Lime stone (1000 TPH conveyor capacity on 1 shift)
Clay (500 TPH conveyor " " ")
1% sand, 0.2% Hemitite

4. Do you produce the same type and amount of products all year long or does it vary?

Same all year

5. What records or summaries do you have of this production?

Hourly, daily, monthly

PRODUCTION (Continued)

6. May we briefly see these records?

   Yes (not seen at time of visit)

7. Are your products sold domestically or internationally?

   Domestically only

8. What is the percent of each?

   _____

9. Does your plant operate around-the-clock, seven (7) days a week or if not, how many shifts per day and per week?

   7 days per week, 3 shifts per day

10. How many total days per year does it typically operate?

    365 days, (300 for operation, 65 for maintenance)
    (Note: That maintenance is random and not at the same time for all Plants)

11. Are there any factors which cause seasonal effects and what are these?

    None.

12. Are products sensitive to environmental factors in storage?

    Yes, water, but normally directly shipped out

ENERGY CONSUMPTION

1. About how much money do you spend per year for energy?

   Information is available

2. Does the amount spent vary much each month?

   No

3. What are the various types of energy that you use?

   Mazout
   Electricity
   Natural Gas

ENERGY CONSUMPTION (Continued)

4. Do you have monthly records of consumption?

   Yes

5. May we briefly see these records?

   Yes

EQUIPMENT/PROCESS

1. What items of equipment are your biggest individual users of energy?

   Kilns
   Big electric motors

2. What items of equipment contribute adversely to your power factor and demand factor?

   Power factor is no problem, currently about 0.8

3. Do you have equipment specifications, manufacturer's data and/or drawings?

   Yes, except for proprietary data and drawings

4. Do you have an equipment list?

   Yes

5. In what language is the above information available?

   English

6. May we briefly see this information?

   Yes (not seen at time of visit)

7. What unit(s) or section(s) of the plant are the biggest users of energy?

   See 1. above

8. Do you have drawings showing the processing scheme used in the plant, including instrumentation?

   Yes

EQUIPMENT/PROCESS (Continued)

9. Are plotplan drawings available?

Yes

10. May we briefly see these drawings?

Yes (not seen at time of visit)

ENERGY CONSERVATION

1. Are there any major energy conservation related problems in your plant that you are currently aware of?

Need reliable instruments to control the air to fuel ratio on each of the kilns. Would like to add chemicals to wet processing to reduce the amount of water from 38 to 25%

2. Have any steps yet been taken in your plant to try to conserve energy?

No

3. Is there presently any recovery of steam condensate?

Yes, the steam condensed in the turbines is returned to the boilers

4. Do you pay a penalty on your electrical bill for having a low power factor or penalty on demand factor?

No

5. Does your demand for electricity fluctuate greatly or remain relatively constant?

Relatively constant

6. Are there any hot lines, tanks or other hot surfaces which are not presently insulated?

Kiln outside surfaces are 150° to 300°C.
If outside were insulated, one could not tell when the inside refractory is damaged and the outside matal of the kiln could melt

7. Do you vent any steam to the atmosphere?

No

ENERGY CONSERVATION (Continued)

8. Do you recover any heat from the hot stack gases leaving your combustion equipment?

   Yes, heat from new dry process kiln No. 1 heats the cold charge

9. Is there any monitoring of the excess air in the stack gases from your combustion equipment?

   This was installed on each kiln approximately 8 years ago, but could not be maintained and is currently not operational on any of the kiln.

10. Is there manual or automatic trim of the air/fuel ratio?

    Only on the new dry porcess

Plant Number: 7 Date: December 18, 1984

Name of Plant: EL NASR GLASS AND CRYSTAL CO.

Questions Used to Aid in Plant Selection
(Plants in the Industrial Sector)

GENERAL

1. What year was this plant built?

   1972

2. The design or process was developed by whom?

   Furnaces from Germany, machines from Sweden, feeders from England

3. Any major expansions or modifications? When?

   Yes, ongoing through 1983 when the #1 furnace was upgraded from 10,000 tons per year to 15,000 tons per year.

PRODUCTION

1. What products do you produce?

   Bottles for soft drinks and pharmaceutical containers (medical ampules)

2. What is the total quantity or number of units per year of these products?

   Furnace #1 15,000 tons per year (molten product)
   " #2 15,000 " " "
   " #3 30,000 " " "

3. What are your starting materials?

   Mainly sand also: Limestone, Dolomite, soda
   (sand is local supply by truck)

4. Do you produce the same type and amount of products all year long or does it vary?

   Approximately constant, with some variation due to seasonal variation of demand, for example soft drink consumption in summer

5. What records or summaries do you have of this production?

   Daily, by shift
   Summerized as 10 day and monthly levels
   (utility comsumption records monthly)

PRODUCTION (Continued)

6. May we briefly see these records?

Yes

7. Are your products sold domestically or internationally?

Currently, mostly domestic from this plant

8. What is the percent of each?

Almost 100% domestic
Attempting to develop exports market

9. Does your plant operate around-the-clock, seven (7) days a week or if not, how many shifts per day and per week?

7 days per week, 3 shifts per day, about 24 hours per batch

10. How many total days per year does it typically operate?

365 days per year, effectively 320 working days when maintenance is included

11. Are there any factors which cause seasonal effects and what are these?

See 4. above

12. Are products sensitive to environmental factors in storage?

No

ENERGY CONSUMPTION

1. About how much money do you spend per year for energy?

Electricity	- 35,000	LE./mo
Mazout	- 10,000	"
Sular	- 9,500	"
Butagas	- 8,000	"

2. Does the amount spent vary much each month?

No

3. What are the various types of energy that you use?

Mazout (#6 fuel oil)
Light fuel oil (sular)
Electricity
Butagas

ENERGY CONSUMPTION (Continued)

4. Do you have monthly records of consumption?

Yes

5. May we briefly see these records?

Yes

EQUIPMENT/PROCESS

1. What items of equipment are your biggest individual users of energy?

Furnaces
1000 kw air compressor motors (1 on line, 2 on standby),
blower for forming (400 kw)

2. What items of equipment contribute adversely to your power factor and demand factor?

Power factor is currently very high.
Capacitors have been installed to achieve a power factor of 0.99

3. Do you have equipment specifications, manufacturer's data and/or drawings?

Yes

4. Do you have an equipment list?

Yes

5. In what language is the above information available?

English, Arabic

6. May we briefly see this information?

Yes

7. What unit(s) or section(s) of the plant are the biggest users of energy?

The 3 furnaces

8. Do you have drawings showing the processing scheme used in the plant, including instrumentation?

Yes

EQUIPMENT/PROCESS (Continued)

9. Are plotplan drawings available?

Yes

10. May we briefly see these drawings?

Yes

ENERGY CONSERVATION

1. Are there any major energy conservation related problems in your plant that you are currently aware of?

Incomimg power failures. (2 to 4 times per month. The no. 2 furnace is currently very inefficient, but this will be fixed next year.

2. Have any steps yet been taken in your plant to try to conserve energy?

Development of heat recovery on furnaces #1 and #3. On these two furnaces the international standard of 160 kg fuel per ton of product is currently achieved.

3. Is there presently any recovery of steam condensate?

No, except for use of about 10% of condensate as distilled water in cooling loop for electrodes.

4. Do you pay a penalty on your electrical bill for having a low power factor or penalty on demand factor?

No, power factor is .99

5. Does your demand for electricity fluctuate greatly or remain relatively constant

Relatively constant

6. Are there any hot lines, tanks or other hot surfaces which are not presently insulated?

The furnace surface temperature on furnaces No. 1 and No. 3 is close to ambient.

7. Do you vent any steam to the atmosphere?

No

ENERGY CONSERVATION (Continued)

8. Do you recover any heat from the hot stack gases leaving your combustion equipment?

   Yes, on furnaces #1 and #3, used to preheat air.

9. Is there any monitoring of the excess air in the stack gases from your combustion equipment?

   Yes

10. Is there manual or automatic trim of the air/fuel ratio?

    Yes, automatic trim on furnaces #1 and 3
    Nothing on the boilers.

Plant Number: 8 Date: December 19, 1984

Name of Plant: Wooltex

Questions Used to Aid in Plant Selection
(Plants in the Industrial Sector)

GENERAL

1. What year was this plant built?

   1940

2. The design or process was developed by whom?

   Primarily Italian, Swedish, other European origin(s)

3. Any major expansions or modifications? When?

   New machinery for washing, drying in 1984

PRODUCTION

1. What products do you produce?

   Main production (80%) worsted, semiworsted, blended
   (15%) blankets (blended)

2. What is the total quantity or number of units per year of these products?

   Fabrics 3,600,000 meters/yr of fabric
   45,000 blankets

3. What are your starting materials?

   Tops of wool and synthetic material (in grey)
   (i.e. fibre in balls)

4. Do you produce the same type and amount of products all year long or does it vary?

   Capacity essentially constant, although weight of fabric varies from summer to winter

5. What records or summaries do you have of this production?

   Yes

PRODUCTION (Continued)

6. May we briefly see these records?

   Yes

7. Are your products sold domestically or internationally?

   Domestically only

8. What is the percent of each?

   _____

9. Does your plant operate around-the-clock, seven (7) days a week or if not, how many shifts per day and per week?

   5 days dyeing/finishing (Thur, Fri closed)
   6 days weaving

10. How many total days per year does it typically operate?

    260 days/yr

11. Are there any factors which cause seasonal effects and what are these?

    Some seasonal effects (produce winter and summer fabrics)

12. Are products sensitive to environmental factors in storage?

ENERGY CONSUMPTION

1. About how much money do you spend per year for energy?

   Available, but not available as meeting

2. Does the amount spent vary much each month?

   Not significantly

3. What are the various types of energy that you use?

   Mazout
   Electricity

ENERGY CONSUMPTION (Continued)

4. Do you have monthly records of consumption?

   Yes

5. May we briefly see these records?

   Yes

EQUIPMENT/PROCESS

1. What items of equipment are your biggest individual users of energy?

   Fuel for boilers
   Some dryers and finishers use electric power

2. What items of equipment contribute adversely to your power factor and demand factor?

   Power factor is 0.8 to 0.85

3. Do you have equipment specifications, manufacturer's data and/or drawings?

   No

4. Do you have an equipment list?

   No

5. In what language is the above information available?

   Not available

6. May we briefly see this information?

   Not available

7. What unit(s) or section(s) of the plant are the biggest users of energy?

   Boilers and drying

8. Do you have drawings showing the processing scheme used in the plant, including instrumentation?

   No

EQUIPMENT/PROCESS (Continued)

9. Are plotplan drawings available?

No

10. May we briefly see these drawings?

Not available

ENERGY CONSERVATION

1. Are there any major energy conservation related problems in your plant that you are currently aware of?

Recovery of steam condensate

2. Have any steps yet been taken in your plant to try to conserve energy?

Preliminary planning for recovery of steam condensate

3. Is there presently any recovery of steam condensate?

No condensate recovered

4. Do you pay a penalty on your electrical bill for having a low power factor or penalty on demand factor?

Probably not, power factor 0.8 to 0.85

5. Does your demand for electricity fluctuate greatly or remain relatively constant?

Relatively constant.

6. Are there any hot lines, tanks or other hot surfaces which are not presently insulated?

Some lines (2-5%) carrying steam were seen not be insulated

7. Do you vent any steam to the atmosphere?

Visible losses from dye atmospheric becks

ENERGY CONSERVATION (Continued)

8. Do you recover any heat from the hot stack gases leaving your combustion equipment?

   No

9. Is there any monitoring of the excess air in the stack gases from your combustion equipment?

   No

10. Is there manual or automatic trim of the air/fuel ratio?

    No

APPENDIX
3.8.1-18

AUDIT REPORTS
UNDER SEPARATE
COVER

FOSTER WHEELER ENERGY CORPORATION

110 SOUTH ORANGE AVENUE · LIVINGSTON, NEW JERSEY 07039 · PHONE 201-533-1100

March 7, 1985
Letter #2.1-33
File 2.1

Technical Representative
Argonne National Laboratories
Argonne, Il 60439

Attn: Mr. Monarch

FWEC Contract 11-35625
Argonne National Laboratories
Energy Audits & Audit Training
in Egypt
Deliverable #9

Gentlemen:

This letter serves to document and to formally transmit the "Preaudit final report" for both plants, as completed and made available for reproduction, on 3/6/85. This delivery completes the requirements for transmittal #9.

As a convenience to yours records, we include herewith, as an attachment, the updated summary of deliverables for the project.

In the event that further discussion or clarification is required, please contact the undersigned.

Very truly yours,

FOSTER WHEELER ENERGY CORPORATION

C.E. Kastner, Jr.

CEK/ba

cc: H. Feintuch
T. Wolsko (ANL)
R. Houghton (ANL)

1/22/85
1/24/85 #19
1/27/85 #20
1/31/85 #28
(2/24/85)
3/7/85 #33

EGYPTIAN ENERGY AUDIT PROGRAM

SUMMARY OF DELIVERABLE ITEM SCHEDULE

SUB TASK	DELIVERABLE	TITLE	TIME (END OF WEEK)
1A	1	~~Plant Selection Report (2)~~ 12/20/84, 1/27/85 (w/comments)	2
1B	2	~~Pre Audit Course Instruction Pkg~~ 12/5/84	1
1B	3	~~Pre Audit Course Mtl for Trainees~~ 12/5/84	1
1B	4	~~Pre Audit Course Test Results~~ 1/22/85	5
~~1B~~	~~5~~	~~Pre Audit Course Evaluation Report~~ 1/31/85	~~5~~
1C	6	~~Pre Audit Data Analysis Package~~ 12/5/84	2
1C	7	~~Pre Audit Draft Report (2) & Presentation (ANL OEP)~~ 1/21/85	4/5
1C	8	~~Pre Audit Report (2) & Presentation (PLT Mgmt)~~ 1/24/84	5
1C	9	~~Pre Audit Final Report~~ 3/7/85 #33	6
1D	10	~~Audit Course Instruction Pkg~~ 1/12/85	3
1D	11	~~Audit Course Mtl for Trainees~~ 1/16/85	4
1D	12	Audit Course Test Results	~~8~~ 12
1D	13	Audit Course Evaluation Report	~~8~~ 12
1E	14	~~Audit Data Analysis Package~~ 1/12/85	5
1E	15	Audit Draft Report/Presentation (ANL OEP)	9/10
1E	16	Audit Report/Presentation (PLT Mgmt)	10/11
1E	17	Audit Final Report	12

End of Week	1	2	3	4	5	6	7	~~8~~ 12	9
Deliverable(s)	(2,3)	(1,6)	(10)	(11,7)	(4 5,8)	(9)	( )	(12,13)	(15)

10	11	12
(15,16)	(16)	(17)

5

APPENDIX
3.8.1-19

AUDIT REPORTS
UNDER SEPARATE
COVER

FOSTER WHEELER ENERGY CORPORATION

110 SOUTH ORANGE AVENUE · LIVINGSTON, NEW JERSEY 07039 · PHONE 201-533-1100

April 4, 1985
Letter #2.1-44
File 2.1, 1.2

Technical Representative
Argonne National Laboratories
Argonne, IL 60439

Attn: M. Monarch

FWEC Contract 11-35625
Argonne National Laboratories
Energy Audits and Audit Training
in Egypt
Deliverable #17

Gentlemen:

This letter serves to transmit our audit final report for each of the two selected plants for the subject project. Deliverable number seventeen is satisfied by this transmittal, which is the final deliverable required by the work order.

Please note that the text includes all comments as received verbally or in writing from ANL, OEP, and both plants (plant comments were received verbally during inplant meetings held 3/31/85).

As a convenience to your records, we include herewith, an attachment, the final summary of deliverables for the project.

Foster Wheeler Energy Corporation would like to take this opportunity to thank you for the opportunity to work with ANL and with OEP on this important and challenging activity. We expect that the results will be of value to OEP, to the plants, and to Egypt at large, and look forward to working with you on the implementation of these attractive energy conservation opportunities.

In the event that further discussion or clarifications is required, please contact the undersigned.

Very truly yours,

FOSTER WHEELER ENERGY CORPORATION

C.E. Kastner, Jr.
Project Manager

CEK/ba

cc: H. Feintuch
T. Wolsko (ANL)
R. Houghton (ANL)

CABLE ADDRESS: REWOP LIVINGSTONNEWJERSEY

55

1/22/85
1/24/85 #19
1/27/85 #20
1/31/85 #28
(2/24/85)
3/7/85 #33
3/26/85 #38

EGYPTIAN ENERGY AUDIT PROGRAM

SUMMARY OF DELIVERABLE ITEM SCHEDULE

3/26/85 #35
3/28/85 #37
3/28/85 #42

SUB TASK	DELIVERABLE	TITLE	TIME (END OF WEEK)
1A	1	~~Plant Selection Report (2)~~ 12/20/84, 1/27/85 (w/comments)	2
1B	2	~~Pre Audit Course Instruction Pkg~~ 12/5/84	1
1B	3	~~Pre Audit Course Mtl for Trainees~~ 12/5/84	1
1B	4	~~Pre Audit Course Test Results~~ 1/22/85	5
~~1B~~	~~5~~	~~Pre Audit Course Evaluation Report~~ 1/31/85	~~5~~
1C	6	~~Pre Audit Data Analysis Package~~ 12/5/84	2
1C	7	~~Pre Audit Draft Report (2) & Presentation (ANL OEP)~~ 1/21/85	4/5
1C	8	~~Pre Audit Report (2) & Presentation (PLT Mgmt)~~ 1/24/84	5
1C	9	~~Pre Audit Final Report~~ 3/7/85 #33	6
1D	10	~~Audit Course Instruction Pkg~~ 1/12/85	3
1D	11	~~Audit Course Mtl for Trainees~~ 1/16/85	4
1D	12	~~Audit Course Test Results~~ 3/26/85 #38	~~8~~ 12
1D	13	~~Audit Course Evaluation Report~~ 3/28/85 #37	~~8~~ 12
1E	14	~~Audit Data Analysis Package~~ 1/12/85	5
1E	15	~~Audit Draft Report/Presentation (ANL OEP)~~ 3/26/85 #35	9/10
1E	16	~~Audit Report/Presentation (PLT Mgmt)~~ 4/1/85	10/11
1E	17	~~Audit Final Report~~ 4/4/85 LTR #44	12

End of Week	1	2	3	4	5	6	7	~~8~~ 12	9
Deliverable(s)	(2,3)	(1,6)	(10)	(11,7)	(4 5,8)	(9)	( )	(12,13)	(15)

10	11	12
(15,16)	(16)	(17)

4/4/85 FINAL LTR 2.1-44

FOSTER WHEELER ENERGY CORPORATION
110 SOUTH ORANGE AVENUE · LIVINGSTON, NEW JERSEY 07039 · PHONE 201-533-1100

February 28, 1985
Letter #2.1-31
File 2.1, 8.1

Technical Representative
Argonne National Laboratories
Argonne, Il 60439

Attn: Mr. Monarch

FWEC Contract 11-35625
Argonne National Laboratories
Energy Audits & Audit Training
in Egypt
Basic Engineering Data

Gentlemen:

This letter serves to document and to formally transmit the revised "Basic Engineering Data", to be used for the audit task.

Three major revisions are to be noted, namely:

(1) The increase in the cost of fuels on the world market,

(2) The increase in the cost of electricity, generated in Cairo, using world market oil prices.

(3) The revision to the billing basis for electricity.

Data for the increase in cost of fuels, paragraph (1) above, was received in USD, FOB Italy, with delivery in February, 1985. (See Request for information from OEP #001).

Data for the development of cost for the cost of electricity, paragraph #2 above, was based on pricing obtained from OEP, during a meeting with OEP on 21 Feb., 1985. The end price of 0.092 LE is based on an oil price (mazout) of 242 LE/mt, and a return on capital of 10%.

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Data for the "width of spike" on the electric bill, paragraph #3 above (spike width of zero, grace of 5%) was obtained in response to the request for information from OEP #003.

In the event that further discussion or clarification is required, please contact the undersigned.

Very truy yours,

FOSTER WHEELER ENERGY CORPORATION

C.E. Kastner, Jr.

CEK/ba

cc: H. Feintuch
T. Wolsko (ANL)
✓ R. Houghton (ANL)

3.7 Basic Engineering Data:

The Basic Engineering Data (B.E.D. Sheets) which will be used during the audit and subsequent design of the various ECO'S is given in the pages which follow:

The source of the data listed below is as follows:

Utility Cost (Paragraph 3.0)

Fuels - Per Egyptian General Petroleum Corp.

Electric Power - from Organization for Energy Planning (OEP)

Steam - Developed by FWEC from data furnished by Chemical Process Economics Center for Stanford Research Institute.

Water - Developed by FWEC from data furnished by Chemical Process Economics Center for Stanford Research Institute.

Meteorological Data (Paragraph 4.0)

As developed from data provided by Egyptian Meteorological Authority for a five year period (1978 through 1982).

Minimum Dry Bulb Temp. is average of mean minimum temperatures.

Design Dry Bulb Temp. is average of mean maximum temperatures.

Design wet Bulb Temp. is determined from Psychrometric Chart using an average relative humidity of 64 percent.

Utility Information (Paragraph 5.0)

Fuel oil specifications - Per Egyptian General Petroleum Corporation.

Sular specifications - Per Egyptian General Petroleum Corporation.

Rules from Electric Billing

Specified by contract between the plants and the Electric Authority.

Organization for Energy Planning

REF. Energy Conservation
DATE Jan., 1985
PAGE 1
Revised Feb. 28, 1985

ENERGY CONSERVATION PROJECTS

BASIC ENGINEERING DATA

PLANT NATIONAL METAL INDUSTRIES CO. ABOU ZAABAL

1.0 General:

This form defines the basic engineering data which will provide the technical and economic basis for the evaluation of energy conservation opportunities (Eco's) for the above named industrial complex.

2.0 Economic Guidelines:

2.1 Operating Time:

2.1.1. Number of operating days per year 365
2.1.2 Number of shifts per day 3
2.1.3 Normalized number of operating hours per year 8,760

2.2 Economic Evaluation Basis:

2.2.1 Payback priority list, simple basis YES
2.2.2 Discounted cash flow NO
Taxes
Inflation
Interest
Required R.O.I. (if known)

3.0 Utility Cost:

Utility	Units	Public Sector Domestic Price (LE)	World (1) Price (LE)
Fuels			
Mazout (#6)	LE/met. ton	7.500	241.8
	LE/imp. gal	0.029	0.935
Sular	LE/met. ton	36.000	325.000
Electric Power (3)	LE/kwh	0.010	0.092
Steam (2)			
(4) High Pressure	LE/met. ton	0.516	16.632
(4) Medium Pressure	LE/met. ton	0.454	14.636
(4) Low Pressure	LE/met. ton	0.384	12.308
Water			
Raw	LE/imp. gal	.001	.008
Cooling	LE/imp. gal	0.007	.067

Notes
(1) Based on value FOB Italy (Feb. 21, 1985) with a conversion of 1.3 LE to 1 USD
(2) Note HP. 500 PSIG or more
MP. 150 to 500 PSIG
LP. 5 to 150 PSIG
(3) High voltage (11,000 volts)
(4) The price of condensate or boiler feed water is 10 percent of the steam price.

4.0 Meteorological Data:

4.1 Meteorological Data: (Cairo Area)

Temperatures:

Minimum Dry Bulb	6 °C
Design Dry Bulb	34 °C
Design Wet Bulb	28 °C

Note: For insulation calculations use dry bulb temperature. at 20 °C.

Wind Velocity and Direction: 0 -15 km/hr Random Direction.

Winterization Area Classification: None.

Allowance for Earthquake Forces: None.

Rainfall: Less than 10 cm/yr.

Design Humidity (relative) = 64% (34 °C/28 °C)

5.0 Utility Information:

5.1 Fuel Oil (mazout #6):

Temperature (pour point), °F	100.0
Specific Gravity @ 15/4°C	0.990
Viscosity, R I @ 100°C	2000.0
Sulfur, % by wt.	2.5
Heating Value, HHV, BTU/Imp gal	184,000

5.2 Sular:

Specific Gravity @ 15/4°C	.840
Viscosity, R I @ 100°C	60.0 max
Sulfur, % by wt.	2.0
Heating Value, HHV, BTU/metric ton	42,340,000
Flash Point PM. closed, °C	65.0

6.0 Rules for Electric Billing

The following rules for electric billing (or application of rates) will apply to economic analysis of ECO'S which relate in depth to the cost of power. These rules assume a consumption at more than 625 KVA (500 kw), at a voltage level of 380 volts, for industrial uses other than limited lighting.

6.1 Demand Factor

The demand factor envisions a base load for this complex, which is _____ kw, and allows excursions beyond the base load for a period not to exceed zero minutes per excursion. If this excursion limit is exceeded, the electric bill is calculated on the basis of this maximum load condition for the entire billing year (5% grace is allowed).

6.2 Power Factor

The target power factor for all users is 1.0. Two price variations exist, however, based on an acceptable power factor of 0.8. These are respectively, an incentive, and a penalty, as well as a shutdown clause.

6.2.1. Power Factor Incentive:

An incentive of a discount on the electric bill is offered, at a rate of 0.5% discount (factor of 0.005) on each percent of power factor greater than 0.8 (i.e. a maximum of 20 steps at 1% to achieve a P.F. = 1.0).

6.2.2. Power Factor Penalty:

A penalty of an increase on the electric bill is mandated, at a rate of 0.5% increase (factor of 0.005) on each percent of power factor less than 0.8 (i.e. a penalty of 10 x 0.5% or 5% for a PF equal to 0.7).

Additionally, if the power factor is 0.6 or less, a second 0.5% increase per 1% of P.F. is additive, for a total penalty of 1% of P.F. below 0.6.

6.2.3. Shutdown for Power Factor

The billing system provides a clause to shutdown any user who has a power factor of less than 0.6, who does not correct this adverse power factor within 3 months.

6.3 Billing Rates:

The following rates are based upon a yearly billing basis, and normally apply to a fiscal year from July to June.

The bill is based upon the sum of several elements, which consist of three major categories, thereafter ratioed up or down by the power factor rate adjustment.

The three major elements are:

a) constant annual charge, based on the maximum stated demand, and priced at 7.756 LE/year for each kw.

b) a cost per KWH consumed, on a sliding scale, in accord with table #1.

c) taxes, which are the sum of:

- o broadcast tax, @ 0.001 LE per KWH for lighting*.
- o consumption tax, @ 0.005 LE per KWH for lighting*.
- o power tax, @ 0.0001 LE per KWH for 90% of KWH.

See Table #1 on next page.

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* assumed to be 10% of total.

Organization for Energy Planning

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KWH Rate Table #1

Range	1 Time (hours)	2 Maximum Rate (KW)	3 Total Power (measured) (KWH)/year	4 Total Power (calculated) (KWH)	5 Power Remaining (KWH)	6 Rate (LE)	7 Cost (LE)
1	1000	(..)	( )	_____	_____	0.013942	
2	500	"	----------	_____	_____	0.013114	
3	1000	"	----------	_____	_____	0.011458	
4	1000	"	----------	_____	_____	0.009802	
5	1500	"	----------	_____	_____	0.007456	
6	*	--------	----------	----------	_____	0.006352	

Notes:

1. column 1 represents hours at the stated demand rate, i.e. first 1000 hours, next 500 hours, etc. Range 6 does not have an entry, since the power at rate range 6 is found by difference.

2. column 2 is the maximum rate, as determined from short term maximum during the year (not applicable to range 6).

3. column 3 is measured power at the meter, in KWH, for the billing year (enter at range 1 position only).

4. column 4 is total power calculated, as the product of column 1 & 2.

5. column 5 is remaining power, as column 3 - column 4 for range 1, and thereafter the entry for the previous range minus the entry in column 4 for the current range, i.e. power in KWH not yet accounted for.

   The calculation is repeated by range until the power remaining is less than the power calculated.

6. column 7 is the product of columns 4 & 6, until such time as the power remaining is less than the power calculated. When this occurs, column 7 is the product of the power remaining (column 5) and column 6. Note that this occurs always at range 6, if not before.

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* (Maximum hours which could exist in column one would be: 365 x 24 - 5,000 = 3,760 hours).

APPENDIX

3.8.1-21

INVENTORY OF AUDIT MONITORING EQUIPMENT
SUBMITTED TO AND RETAINED BY OEP

- FWEC Letter #2.1-43 Instrument Delivery (Signatures indicate delivery of instruments from FWEC to OEP as witnessed by ANL).

- FWEC Letter #2.1-52 Backup Documentation and Pricing for Individual Instrument Items.

FOSTER WHEELER ENERGY CORPORATION

110 SOUTH ORANGE AVENUE · LIVINGSTON, NEW JERSEY 07039 · PHONE 201-533-1100

April 3, 1985
Letter #2.1-43
File 1.2, 9.2

Technical Representative
Argonne National Laboratories
Argonne, IL 60439

Attn: M. Monarch

FWEC Contract 11-35625
Argonne National Laboratories
Energy Audits & Audit Training in Egypt
Instrument Delivery

Gentlemen:

This letter serves to transmit the portable instruments used by OEP and FWEC in the audit work to date. These instruments and supporting materials as defined by the attached list, are an unnumbered deliverable item as described in the project work order #1, amendment #2.

In the event that further discussion or clarification is required, please contact the undersigned.

Very truly yours,

FOSTER WHEELER ENERGY CORPORATION

C.E. Kastner, Jr.

CEK/ba

cc: H. Feintuch
T. Wolsko (ANL)
R. Houghton (ANL)

CABLE ADDRESS: REWOP LIVINGSTONNEWJERSEY

66

Attachment to Ltr. 2.1-43

LIST OF PORTABLE INSTRUMENTS *

REF. #	MANUFACTURERS NAME INSTRUMENT TYPE	SERIAL NO.	QUANTITY	PART NO.	BRIEF DESCRIPTION
	Thermo Electric ** Temperature Indicator	110984-1-11	1	351153 000000	Digital temperature device,w/accessories
2	Transcat Thermometer 0/220F	None	1	PT1/220	Temperature Indicator
3	" " -40/160F	None	1	PJ1/160	"
4	" " Glass Tube	None	1	6907T/300	Mercury Thermometer
5	MC Products Infrared Temperature	011270	1	LT-10C	Hand held digital temperature measuring device
6	Bacharach Boiler Test Kit	10-8001	1	10-8001	Kit of materials to test boiler efficienc
7	Bacharach Sample Test Cooler	None	1	11-7046	Accessory to Boiler Test Kit
8	MC Products Combustion Analyzer	10500	1	M-50	Digital Combustion Gas Analyzer
9	Davis Instrument Anemometer	508788	1	A/2-4"	Propeller Driven Air Flow Indicator
10	Dwyer Instrument Air Velocity Meter	S449	1	400-10	Red Oil manometer and accessories
11	Taylor Instrument Sling Psychrometer	1330	1	TA 16301	Device to measure relative humidity
12	Sonic Instrument Stethoscope	407620	1	Sonic 3000	Ultrasonic Device to locate/measure sound levels with accessories
13	Cole-Palmer Stopwatch	None	1	R-8672-20	Measuring device to measure seconds
14	YEW Tachometer	03012M	1	3632-00	Optical device with digital readout to measure rotational speed

REF.#	MANUFACTURERS NAME INSTRUMENT TYPE	SERIAL NO.	QUANTITY	PART NO.	BRIEF DESCRIPTION
15	General Electric Lightmeter	154	1	21[illegible]	Device to measure light output
16	Epic Inc. Power Factor Meter	45172	1	CO[illegible] 051	Meter to indicate power factor
17	Epic Inc. KW Meter	45172A	1	KW 480Z	Meter to indicate power in kilowatts
18	Transcat Ammeter	140903	1	7405-E50	Meter to indicate line current in amperes
19	Fluke Multitest Meter	3500087	1	8021B	Meter for various electrical measurement
20	Transcat *** Recording Ammeter	36535AE 36536AE 36532AE 36534AE	4	7816E	Recording meter to indicate current consumption in amperes with accessories

* With record cards and list of vendors.

** Includes loose thermocouples and accessories

2 EA type J, 36" long thermocouple
1 EA type K, 4" long thermocouple
1 EA type K surface contact thermocouple
1 Charger, 220 V AC
1 Armored extension handle
1 extraset rechargeable batteries

*** Includes extra chart paper

Additionally, for reference, the initial list of suppliers and their US addresses is included.

Received
Marshall R. Monarch, ANL 4/4/85

FOSTER WHEELER ENERGY CORPORATION

REF.
DATE November 6, 1984
PAGE 1 of 1

List of Instrument Vendors

Dwyer Instrument, Inc.
P.O. Box 100
Hightstown, N.J.
08520
(609)448-9200

Davis Instrument
513 E. 36 Street
Baltimore, M.D.
21218
(800)368-2516

Bacharach Distributor
Interstate Electric (Danny)
(516)887-7979

M-C Products
7720 E Redfield Road
S-2
Scottsdale, Ariz.
85260
(800)227-7701
(602)998-9577

Thermal Electric Co.
109 Fifth Street
Saddle Brook, N.J. 07662
(201)843-5800

Transcat
Box D-1
Rochester, N.Y. 14606
(800)828-1470

Westinghouse Electric Corporation
Lamp Divisions
Bloomfield, N.J. 07003
Call Michelle Harris
(201)429-3000

EPIC, Inc.
150 Nassau Street
New York, N.Y. 10038
(212)349-2470

Cole Palmer Inst. Co.
7425N Oak Park Avenue
Chicago, Ill., 60648
1-800-323-4340

FOSTER WHEELER ENERGY CORPORATION
110 SOUTH ORANGE AVENUE · LIVINGSTON, NEW JERSEY 07039 · PHONE 201-533-1100

May 9, 1985
Letter No.: 2.1-52
File No. 2.1,

Technical Representative
Argonne National Laboratories
Argonne, IL 40639

Attention: Mr. M. Monarch

SUBJECT: FWEC Contract 11-35625
Argonne National Laboratories
Energy Audits & Audit Training
in Egypt
BACKUP DOCUMENTATION AND PRICING
FOR INDIVIDUAL INSTRUMENT ITEMS

Dear Mr. Monarch:

This letter serves to transmit backup documentation with unit pricing for the instruments which we furnished to you in accord with the requirements of the work order, Amendment 2. This documentation is essentially identical to that which has been used in support of the invoices for the instrumentation. For your convenience, we also include herein, a copy of our Letter No. 2.1-43 which defines the instrumentation as actually turned over to ANL in Cairo.

We trust that this information is adequate for your accounting purposes.

Very truly yours,

FOSTER WHEELER ENERGY CORPORATION

C.E. Kastner, Jr.
Project Manager

CEK:cmp
attach.

cc: S. DiLauri w/att
H. Feintuch w/att
T. Wolsko (ANL) w/att
R. Houghton (ANL) w/att

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PURCHASE ORDER

ER WHEELER ENERGY CORPORATION
SO. ORANGE AVE.
NGSTON, N.J. 07039

Vendor No.	Order Date	ORDER NUMBER	Page 1
15062	27FEB85	PS 943	Date Promised

Thermo Electric
Boomar Place
Elmwood Park, N.J. 07407
Attn: Mr. M. Federici

INSTRUCTIONS TO SUPPLIER:
Show complete Order No., Part No., Item No., on all invoices, containers, shipping papers, and packing lists.
Invoicing: Send 3 copies of each invoice, B/L, and shipping papers to 110 South Orange Ave., Livingston, New Jersey 07039, c/o Accounting.
Packing: Include packing list with all shipments bearing Order No. Part No., Item No., Contents, Quantity Sent.
Mail shipping notice to Purchasing Department, c/o Buyer, listed below on the day shipment is made.
Shipping: Material shipped in error, rejected, or overshipments may be returned at seller's expense.
Freight: Freight charges must be supported with original receipted freight bill.
Pricing: All prices, unless otherwise, indicated, are firm.
Terms: Subject to terms and conditions printed on the back as well as the face and to specifications, drawings, and additional terms and conditions referred to herein and/or attached hereto.
FOR RESALE (unless otherwise specified)

Description	Total Order Value	Currency	Payment Terms	Retention	Escalation
nstruments	1088.80	US	(I)Net 30 Days	No	No

Wanted	Shipping Point	Ship. Terms	Frt. Incl.	Insur. Incl.	Duty. Incl.	V.A.T. Incl.	Insp.
	Saddle Brook	FOBSP/FA	Yes	No	No	No	No

NTRACT NO.	TAG/PART	QTY.	REQ'N. NO.	LTR.	REV.	REQ'N. ITEM	LOT	CTRY. OF ORGN.	PROM. DATE	UNIT PRICE	AMOUNT
625			1619	C	1						1088.80

his purchase order confirms order of 11 February 1985 to Mr. M. Federici.

rices contained in this purchase order are in accordance with Thermo Electric uotation 850013EPS dated 20 February 1985.

aterials have been shipped and received at FW USA, Livingston, N.J.

aterials furnished in accordance with the following:

Micromite Plus Part # 3115300000 Price Each Net	845.00	845.00
Handle - Part Number HN28483 Special with 6' armored lead and CO-28656 Micromite Connector Price Each Net	70.00	70.00
TC/PR28520-1 Surface Tip Price Each Net	30.00	30.00
T/XPR28553-1 General Purpose Tip Price Each Net	15.00	15.00

R.B. Heglaughlin

GENERAL FILE COPY

71

FOSTER WHEELER ENERGY CORPORATION

Order Date	ORDER NUMBER	
27FEB85	PS	943

NTRACT NO.	TAG/PART	QTY.	REQ'N. NO.	LTR.	REV.	REQ'N. ITEM	LOT	CTRY. OF ORIGN.	PROM. DATE	UNIT PRICE	AMOUNT
	A9344 - Extra Battery Pak Price Each Net									27.50	27.50
	A9380 Recharge Adaptor 220 VAC Price Each Net									25.00	25.00
	JJ18G-304-36"-48"-2A Price Net Each									38.15	76.30
	Total										$ 1088.80

72

GENERAL FILE COPY

Quick–Quote

THERMO ELECTRIC
Boumar Place
Elmwood Park, N.J. 07407
Tel: (201) 791-9683
791-9684

D FOSTER WHEELER
110 SOUTH ORANGE AVE
LIVINGSTON, N.J. 07039
TENTION: MR. ROBERT MEGLAUGHLIN

DATE 2/20/85 (Firm for 30 days)
Cust. Ref. No. PS 943
Quotation No. 850013EPS
Terms - Net 30 Days
F.O.B. Our Plant

TEM	QUANTITY	DESCRIPTION	UNIT PRICE	TOTAL
1	1	MICROMITE PLUS PART# 3115300000 PRICE EACH NET	$ 845.00	
2	1	HANDLE - PART NUMBER HN28483 SPECIAL WITH 6' ARMORED LEAD AND CO-28656 MICROMITE CONNECTOR PRICE EACH NET	$ 70.00	
3	1	TC/PR28520-1 SURFACE TIP PRICE EACH NET	$ 30.00	
4	1	T/CPR28558-1 GENERAL PURPOSE TIP PRICE EACH NET	$ 15.00	
5	1	A9344 - EXTRA BATTERY PAK PRICE EACH NET	$ 27.50	
6	1	A9380 RECHARGE ADAPTER 220 VAC PRICE EACH NET	$ 25.00	
7	2	JJ18G-304-36"-48"-2A PRICE EACH NET	$ 38.15	

QUOTED BY MARK FEDERICI
THERMO ELECTRIC CO., INC.

plicable Provisions: The price(s), shipping date(s) and quantities set forth are predicated on the visions on this and the reverse side of this quotation. Orders will be accepted only on these terms and nditions. Modifications, deletions or additions to these provisions without prior written authorization m Thermo Electric, shall be of no effect and at our option will void this quotation and any agreement the goods referenced here in.

s quotation shall remain in effect for 30 days from the date shown above, unless sooner withdrawn in iting by Thermo Electric. All orders are subject to Thermo Electric approval and acceptance.

LIVERY: ____ Weeks after receipt of formal order and approved specifications

NDLY REFERENCE OUR QUOTATION NUMBER WHEN PLACING YOUR ORDER.

73

MILLEPS COMPANY, INC.

Vendor Number

Remit To Bank

NY (212)736-4990
TELEX 135446

P 45805

INVOICE

EQUIPMENT AND ENGINEERING SERVICE TO THE PROCESS INDUSTRY

236 GREEN STREET • P.O. BOX 2008 • SOUTH HACKENSACK, NEW JERSEY 07606

CUSTOMER'S ORDER NO	DATE ENTERED	DATE SHIPPED	SHIP VIA	INVOICE DATE
934	12/5/84	2 06 85	UPS	2 06

SHIP TO: (SAME AS "SOLD TO" UNLESS SHOWN)

SOLD TO:

29250 09

Foster Wheeler
110 So. Orange Ave.
Livingston, N.J. 07039

Attn: Mr. Ro. B. Neglaughlin

TERMS: NET 30 DAYS

QUANTITY ORDERED	QTY BACK-ORDERED	QUANTITY SHIPPED	DESCRIPTION	UNIT PRICE	AMOUNT
			B/O Invoice P 45806 DIRECT SHIPMENT		
		12	Chart Paper	6.00 ea.	72.0
			SUBTOTAL		72.0
			TAX 6%		4.3
			FRT		3.0
			TOTAL		79.3

NOTE - TAX TO BE CREDITED OUT ON INVOICE TO ANL.

REGISTE
FEB 21 1985
INVOICE AUDIT

TO INVOICE AUDIT CLERK
FEB 22 1985
FILE ROOM

NO CLAIMS ALLOWED AFTER 30 DAYS

74

NJ (201)488-3008
NY (212)736-4990
TELEX. 135446

P 45474

INVOICE

P 45568

PHILLIPS COMPANY, INC.

EQUIPMENT AND ENGINEERING SERVICE TO THE PROCESS INDUSTRY

236 GREEN STREET • P.O. BOX 2008 • SOUTH HACKENSACK, NEW JERSEY 07606

CUST'S ORDER NO	DATE ENTERED	DATE SHIPPED	SHIP VIA	INVOICE DATE
934	12/5/84	1 14 85	UPS	1 14 85

SOLD TO:
XXXX 12 9250 09
Foster Wheeler
110 So. Orange Ave.
Livingston, N.J. 07039

Attn: Mr. Ro. B. Meglaughlin

(2)

SHIP TO: (SAME AS "SOLD TO" UNLESS SHOWN)

Vendor Number
13273
Remit To Suffix

TERMS: NET 30 DAYS

85LC2 390

QTY ORDERED	QTY BACK-ORDERED	QUANTITY SHIPPED	DESCRIPTION	UNIT PRICE	AMOUNT
			B/O Invoice P 45474 Direct Shipment		
		1	Bacharach Sample Cooler 11-7046	67.60	67.60
1			Transcat Rotational Speed Tachometer	546.00	
1			Westinghouse Footcandle Meter #214	93.00	
1			Transcat Ammeter #7405E-50	233.00	
4			Transcat AC volt/AMP Recorder # 7816 E	432.00	
12			Chart Paper	6.00	
			SUBTOTAL		67.60
			TAX 6%		4.05
			FRT		1.25
			TOTAL		72.90

Rec'd Rec @ Lvo
14 JAN 85 BM 1/16/85

APPROVED
TAX DEPT.

FEB 15 1985

TO CASHIER'S DEPT
FEB 05 1985
INVOICE AUDIT DEPT

REGISTERED
JAN 21 1985
INVOICE AUDIT

TO INVOICE AUDIT-CLERK
JAN 21 1985
FILE ROOM

NO CLAIMS ALLOWED AFTER 30 DAYS

75

PHILLIPS COMPANY, INC.
NJ (201)483-3008
NY (212)736-4990
TELEX 135446

P 45805

INVOICE

EQUIPMENT AND ENGINEERING SERVICE TO THE PROCESS INDUSTRY

236 GREEN STREET • P.O. BOX 2008 • SOUTH HACKENSACK, NEW JERSEY 07606

MER'S ORDER NO.	DATE ENTERED	DATE SHIPPED	SHIP VIA	INVOICE DATE
934	12/5/84	1 14 85	DIRECT SHIPMENT FROM FACTORY	1 14

SHIP TO: (SAME AS "SOLD TO" UNLESS SHOWN)

129250 09

SOLD TO:

Foster Wheeler
110 So. Orange Ave.
Livingston, N.J. 07039

Attn: Mr. Ro. B. Neglaughlin

(C)

Manager
13273
Remit To Suffix

TERMS: NET 30 DAYS

SHIPPED	BACK-ORDERED	QUANTITY SHIPPED	DESCRIPTION	UNIT PRICE	AMOUNT
			B/O Invoice P 45568 DIRECT SHIPMETN		
		1	Transcat Rotational Speed Tachometer	546.00	546.0
		1	Westinghouse Footcandle Meter #214	93.00	93.00
		1	Transcat Ammeter #7405E-50	233.00	233.0
		4	Transcat AC volt/AMP Recorder #7816 E	432.00	1,728.00
	12		Chart Paper	6.00	
			SUBTOTAL		2,600.0
			TAX 6%		156.0
			TOTAL		2,756.0

Received per attached

FEB 15 1985

FRT CHARGE TO FOLLOW

REGISTERED
JAN 18 1985
INVOICE AUDIT

TO INVOICE AUDIT
JAN

TO CASHIERS DEPT.
FEB 05 1985
INVOICE AUDIT DEPT.

NO CLAIMS ALLOWED AFTER 30 DAYS

76

PHILLIPS COMPANY, INC.

NJ (201)488-3008
NY (212)736-4990
TELEX. 135446

P 45474

INVOICE

EQUIPMENT AND ENGINEERING SERVICE TO THE PROCESS INDUSTRY

236 GREEN STREET • P.O. BOX 2008 • SOUTH HACKENSACK, NEW JERSEY 07606

ER'S ORDER NO	DATE ENTERED	DATE SHIPPED	SHIP VIA	INVOICE DATE
934	12/5/84	1. 02.84	OUR DELIVERY	1 02 5

12 9250 09

Foster Wheeler
110 So. Orange Ave.
Livingston, N.J. 07039

Attn: Mr. R. B. Meglaughlin

(B)

SHIP TO: (SAME AS "SOLD TO" UNLESS SHOWN)

INVOICE NUMBER 13273

TERMS: NET 30 DAYS

85101

ITY ED	QTY BACK-ORDERED	QUANTITY SHIPPED	DESCRIPTION	UNIT PRICE	AMOUNT
			B/O Invoice P 45602		
	1		Bacharach Sample Cooler 11-7046	67.60	
	1		Transcat Rotational Speed Tachometer #7275 FST	546.00	
	1		Westinghouse Footcandle Meter #214	93.00	
		1	Epic Kilowatt Meter (KUA only) #KW4802	527.00 ✓	527.00
		1	Case for above	52.00 ✓	52.00
	1		Transcat Ammeter #7405E-50	233.00	
		1	Case for Transcat Multitest Test Meter #7960E	13.00 ✓	13.00
	4		Transcat AC volt/AMP Recorder #7816E	432.00	
			SUBTOTAL		592.00
			TAX		~~35.50~~
			TOTAL		627.50

partial/conf 1/10/85 R. Meglaughlin material personally received by him. LR 1/10/85

APPROVED TAX DEPT.

JAN 21 1985

REGISTERED
JAN 10 1985
INVOICE AUDIT

TO INVOICE AUDIT CLERK JAN 10 1985 FILE ROOM

TO CASHIER'S DEPT. JAN 18 1985 INVOICE AUDIT DEPT.

NO CLAIMS ALLOWED AFTER 30 DAYS

71

TELEX. 135446

INVOICE

EQUIPMENT AND ENGINEERING SERVICE TO THE PROCESS INDUSTRY

236 GREEN STREET • P.O. BOX 2008 • SOUTH HACKENSACK, NEW JERSEY 07606

CUSTOMER ORDER NO.	DATE ENTERED	DATE SHIPPED	SHIP VIA	INVOICE D
S 934	12/5/84	2 20 84	CUR DELIVERY	12 2

SOLD TO:
129250 09
Foster Wheeler
110 S. Orange Ave.
Livingston, NJ 07039

Attn: Mr. R. B. Meglaughlin

SHIP TO: (SAME AS "SOLD TO" UNLESS SHOWN)

TERMS: NET 30 DAYS

QUANTITY ORDERED	QTY. BACK-ORDERED	QUANTITY SHIPPED	DESCRIPTION	UNIT PRICE	AMOUNT
1		1	Transcat Thermometer PT 1/220 0-200°F	15.60	15.6
1		1	Ditto but PT 1/160 -40 to +160°F	15.60	15.
1		1	Ditto but 6907T 0-300°F	11.70	11.7
1		1	MC Products Infrared Thermometer #IT-101	1593.00	1,593.
1		1	Bacharach Boiler Test Kit 10-8001	680.65	680.
1	1		Bacharach Sample Cooler 11-7046	67.60	
1		1	MC Products Digital Efficiency Analyser #M-50	1060.00	1,060.
1		1	Davis Instrument Anemometer #Cat DI 10102	390.00	390.0
1		1	Case for above DI 10201	35.00	35.
1		1	Dwyer Air Velocity Meter #400-10	260.70	260.7
1		1	Davis Sling Psychrometer #ta 16301	140.00	140.
1		1	Davis Stethoscope #AC 27601	1964.00	1,964.
1		1	Cole-Palmer Stopwatch #H-8672-20	55.00	55.
1	1		Transcat Rotational Speed Tachometer #7275FST	546.00	
1	1		Westinghouse Footcandle Meter #214	93.00	

CONTINUED NEXT PAGE

78

PHILLIPS COMPANY, INC.

PAGE TWO (2) of TWO (2)

NJ (201)488-3008
NY (212)736-4990
TELEX. 135446

P 45534

INVOICE

EQUIPMENT AND ENGINEERING SERVICE TO THE PROCESS INDUSTRY

236 GREEN STREET • P.O. BOX 2008 • SOUTH HACKENSACK, NEW JERSEY 07606

R'S ORDER NO.	DATE ENTERED	DATE SHIPPED	SHIP VIA	INVOICE DATE
934	12/5/84			

Foster Wheeler
110 S. Orange Ave.
Fivingston, NJ 07039

Attn: Mr. R. B. Meglaughlin

(A)

SHIP TO: (SAME AS "SOLD TO" UNLESS SHOWN)

Vendor Number
13273

TERMS: NET 30 DAYS

35101 1420

QTY ORDERED	QTY BACK-ORDERED	QUANTITY SHIPPED	DESCRIPTION	UNIT PRICE	AMOUNT
		1	Epic Power Factor Meter w/2" Jaw # CS5512	527.00	527.00
1			Epic Kilowatt Meter (KUA ONLY) #KW4802	527.00	
1			Case for Above	52.00	
1			Transcat Ammeter #7405E-50	233.00	
		1	Transcat Multitest Test Meter #7960E	207.00	207.00
1			Case for above	13.00	
4			Transcat AC Volt/AMP Recorder #7816E	432.00	

Rec'd/con 1/10/85
R. Meglaughlin
matl. personally
received by him
L.R. 1/10/85

APPROVED
TAX DEPT.
JAN 21 1985

SUBTOTAL		6,955.2
TAX	6%	~~417.3~~
TOTAL		7,372.5

LR REGISTERED
JAN 10 1985
INVOICE AUDIT

TO INVOICE AUDIT CLERK
JAN 10 1985
FILE NO. 1

TO CASHIER'S DEPT.
CASHIER'S DEPT.
JAN 18 1985
INVOICE AUDIT DEPT.

NO CLAIMS ALLOWED AFTER 30 DAYS

VEHICLE FOR INDUSTRIAL ENERGY AUDITS IN EGYPT

prepared by

Center for International Energy Development
Energy and Environmental Systems Division
Argonne National Laboratory

August 1984

1.0 BASIC VEHICLE SPECIFICATIONS

1.1 OVERALL BODY DIMENSIONS AND COLOR

The following dimensions are approximate. Adjustments can be made if a standard size vehicle can be provided at a cost savings.

1.1.1 Length: approximately 20-25 feet (240-300 inches)

1.1.2 Width: approximately 8 feet or 96 inches

1.1.3 Height (with roof mount air conditioner): approximately 10 feet or 120 inches

1.1.4 Coach Headroom: approximately 6 ft 3 inches or 75 inches

1.1.5 Outside color: beige

1.2 CHASSIS AND BODY CONSTRUCTION

As above, the following specifications can be adjusted to achieve cost savings.

1.2.1 Wheelbase: approximately 13 feet or 156 inches

1.2.2 Gross Vehicle Weight (GVW): approximately 10,000 lbs

1.2.3 Chassis: Heavy Duty Commercial Van or Light Duty Truck

1.2.4 Coach Frame Construction: Heavy Duty Welded Tubular Steel or Equivalent

1.2.5 Coach Wall Insulation: approximately 1 1/2 inch foam slab

1.2.6 Coach roof reinforced for two roof mounted air conditioning units and one powered ventilation unit.

1.2.7 Four tire rear axle

1.2.8 Heavy Duty Suspension; Equivalent of spring-assisted front shock absorbers

1.3 ENGINE AND POWER TRAIN WITH ACCESSORIES

Note that the vehicle will be used exclusively outside of the U.S. It will be certified for export to meet EPA and other requirements.

1.3.1 Engine Displacement: approximately 350-450CID V8 using leaded regular (89 ROM) gasoline

1.3.2 Transmission: 4-5 speed manual

1.3.3 Engine Cooling: Heavy duty water pump; transmission and oil cooling circuits or equivalent design for optimum engine performance under load in desert-type conditions.

1.3.4 Steering and Brakes: Power Assisted

1.3.5 Fuel Tank: Single or dual, approximately 80 gallon total capacity

1.3.6 Heavy duty dual battery system with emergency start

1.3.7 Heavy duty, high output alternator

1.3.8 Cab heater and air conditioning unit operated from engine.

1.3.9 Horns: Dual trumpet

VEHICLE FOR INDUSTRIAL ENERGY AUDITS IN EGYPT

The vehicle described in the following specifications is designed to be used to conduct industrial energy audits in Egypt. The vehicle will be outfitted in the U.S. and shipped to Egypt.

The vehicle will be equipped with computer equipment (not included in these specifications). It will be driven to industrial facilities in Egypt. It will be used to provide a comfortable work space where plant managers can discuss various energy-saving alternatives. It will we used as the on-site computer facility to support the team of technicians making in-plant measurements. It will be used to transport measurement equipment to the plant site.

The vehicle will be operated under conditions of high heat and dust loads. It must be able to provide on-board electric power to operate the computer equipment and air conditioners. It must also be able to accept power from the industrial plant (220V, 50HZ AC) and convert it to 110V for on-board use.

The specifications included here are subject to change if a supplier can provide an alternative design and/or equipment that can achieve the same basic requirements at a lower cost.

Attachment 1 is a series of photographs of a similar vehicle used in Canada. This is for information purposes only.

2 SPECIAL ELECTRIC ACCESSORIES AND WIRING

2.1 BASIC WIRING FOR 110 VOLT 30 AMP SERVICE

The coach electric load requires 110 volt, 30 amp, 50-60 HZ AC service. Electric supply will be from two sources: (1) on-board electric generator; and (2) an outside 220 volt single phase 50 HZ source. The outside source will be converted to 110 volts through an on-board, air-cooled transformer. Figure 1 illustrates the basic wiring for the coach electric service in a simplified block diagram format. Table 1 is an accounting of coach electric load requirements. Figure 1 indicates that a relay/timer circuit is employed to perform the following functions:

- Prevent the load from drawing current from both the generator and outside electric source, and
- Automatically turn the generator on when service is lost from the 220 volt source after a predetermined, adjustable (1/2-3 min) time interval.

The timer (adjustable from 1/2-3 min) is necessary because the 220 volt outside source is prone to short power interrupts that may cause the generator to cycle on and off unnecessarily.

Figure 1 also indicates that the generator can be used to charge the engine batteries, if necessary, through a converter that adjusts the 110 volt a.c. current to the appropriate lower voltage D.C. charging current.

2.2 ON-BOARD ELECTRIC GENERATOR

The on-board electrical generator must be designed to operate the full load of electrical equipment on Table 1. Additional requirements are:

2.2.1 Gasoline driven, with same fuel specifications as vehicle engine.

2.2.2 Either separate fuel tank (with outside fill port) capable of 12 hours continuous operation or engine fuel tank used in which case engine fuel tank(s) must be adequately sized for both vehicle and generator use.

2.2.3 Electronic solid-state ignition with backup starter pull cord.

2.2.4 Shock mounted to reduce vibrational noise.

2.2.5 Automatic engine stop when oil drops to unsafe level to prevent seizure preferable.

2.2.6 Full set of controls and gauges wired at coach work station or at driver instrument display console. Controls include switch, timer, pilot light, and circuit breaker. Gauges include fuel gauge if separate fuel tank is used (if engine fuel tank is used - engine fuel gauge should turn on when generator is turned on), oil level gauge, voltmeter and ammeter.

2.2.7 Oil filter with easy service design.

2.2.8 Installed in rear of coach (see Figure 2 Vehicle Layout-Top View) for easy service access from outside

2.2.9 The generator should be rated to deliver 6.5 kW at 110 volt full load and be wired with a 30 amp (full-load) circuit breaker (see Table 1 for load analysis).

2.3 ROOF-MOUNTED AIR CONDITIONING UNITS

The coach body should be fitted with two roof mounted, energy efficient rotary compressor drive air conditioning units. Each unit should have its own controls located on the unit so that the units can be operated independently of each other. Each unit should generally conform to the specifications indicated below:

2.3.1 The Energy Efficiency Rating (EER)

The Energy Efficiency Rating (EER) of each unit should be no less than 8 (if less than 8, the adequacy of the generator load service will have to be evaluated as was done in Table 1).

2.3.2 Independent Controls

Independent controls at each unit for fan speed and cooling such that the unit can be operated as a ventilation unit only.

2.3.3 Easy-Access Circuit Breaker Protection

Circuit breakers should be located for ease of service.

2.3.4 Reliable Continuous Operation

Each unit should have a maximum reliable 12 hr/day operation of 13,500 Btu/hr heat removed and for an EER of 8 would be rated at approximately 15 amps.

2.3.5 Special Air Fillers to Reduce Dust Infiltration

The coach air conditioning vents should be filled with washable or replaceable air filters to prevent dust infiltration during ventilation and air conditioning service.

2.4 ROOF MOUNTED FAN-EXHAUST AIR UNIT

In addition to the two air conditioning units, the vehicle should be equipped with a powered exhaust fan. The specifications are:

2.4.1 Location

Unit should be mounted in the middle of the coach roof section.

2.4.2 Electrical Wiring

Exhaust fan should be two-speed and wired for 110 volt and 12 volt service (for operation from the vehicle engine power supply).

2.4.3 Seals

Vent unit should have tight fitting closure that can be operated from inside the coach.

2.5 STEP-DOWN TRANSFORMER

Since outside electric service hook-up will be single-phase 220 volt, 50 HZ, an on-board step-down transformer will be required (see Figure 4) to provide 110 volt service. (It is recognized that 50 HZ service instead of 60 HZ will reduce slightly the performance of fans and compressors that are rated for 60 HZ.) The specifications are:

2.5.1 Rating

The transformer should be rated to carry the same full load that can be supplied by the on-board generator. If full generator service is 6.5 kW, then at 220 volts the load would be approximately 30 amps. As a safety factor the transformer should be rated at 25-30% more than full load or approximately 40 amp.

2.5.2 Electric Wiring and Controls

The transformer should be wired with a circuit breaker on the 220 volt side rated at approximately 30 amps. A switch and service pilot light should also be wired on the 220 volt side and positioned along with the circuit breaker inside the coach at a convenient location.

2.5.3 Location

The transformer should be located under a seat cushion on the right side of the coach adjacent to the shore power cable reel (see Figures 2 and 3). Alternative locations taking advantage of modified interior configuration will be considered.

2.5.4 Transformer Cooling

The transformer compartment should have a powered exhaust fan and housing vents (see Figure 4) on the coach side and exterior to permit drawing of coach air over the transformer to cool it and exhausting to the outside. The exhaust fan should be wired to the 220 volt transformer switch so that the fan is always on when the transformer is used. The exterior vent should have a tight seal closure that will prevent dust and water infiltration while the transformer is not being used. A suggested design for the closure is illustrated in Figure 4. The vent should be wired with a normally closed momentary contact switch and pilot light such that the light goes on when 220 volt service is at the transformer and the outside vent lid is closed. This arrangement will allow the operator to easily determine if the vent lid is closed. The pilot light should therefore be place in a convenient location for observation within the coach.

2.6 REFRIGERATOR

The refrigerator should have a 3-4 cubic foot capacity and be operated from the 110 volt service line. It is not necessary for the refrigerator to be operational without

110 volt service. The location of the refrigerator is illustrated in Figures 2 and 3. The heat exchanger coils of the refrigerator should be vented to the outside in such a manner as to prevent dust infiltration in the vehicle interior.

2.7 CAB LIGHTS AND RECEPTABLES

2.7.1 110 Volt Service

The coach should be wired with two (2) roof mount and three (3) under cabinet mount 20 watt circular rapid start fluorescent lights operating on 110 volt service. Each light should have its own switch and the bank of lights should be protected by a circuit breaker (see Figures 3 and 4).

2.7.2 12 Volt Service

The coach should be wired with three 12 volt roof mount lights operated from the vehicle engine alternator/battery system (see Figure 3).

2.7.3 Electric Service Outlets

Electric service outlets (grounded) are required for both 110 volt and 220 volt service. Each bank of outlets (i.e., 110 volt and 220 volt) should be protected by a 15 amp circuit breaker located in a convenient, easily-accessible location inside the coach. The outlets should be wired such that both 110 volt and 220 volt is available at the same location and be placed as follows:

- Four (4) double socket outlets on the wall over work-station benches - two (2) for 110 volt service and two (2) for 220 volt service (see Figure 4).
- Four double socket outlets over work benches; two (2) for 110 volt service and two (2) for 220 volt service (see Figure 5).

2.8 VACUUM CLEANER SYSTEM

A vacuum cleaner system should be built into the coach compartment at a convenient location and wired to 110 volt service. The system should have an appropriate length of vacuum hose for complete cleaning of the vehicle interior with appropriate attachments. The unit should provide for easy changing of the cleaning bags and be provided with a full complement of cleaning nozzles and brushes.

3 INTERIOR CUSTOM APPOINTMENTS

3.1 CAB(DRIVER) COMPARTMENT

- Front seats (2) - high back, cloth covered swivel type reclinable bucket with arm rest
- Interior rear view mirror with night bright light control (i.e., if cab has rear door with window)
- Crash dash with full complement of gauges (i.e., instead of only warning lights) instruments for battery amps/volts, fuel, water temperature, oil pressure, trip odometer and clock
- Interior decor - light blue
- Low pile floor carpeting
- Front seat floor mats

3.2 COACH COMPARTMENT (see Figures 3, 4, and 5

The layout described here is a desired configuration. Alternative configurations that can improve the utility of the coach or that can reduce cost through the use of standard production designs will be considered.

- Interior decor - light blue
- Low pile floor carpeting
- Cabinets, storage bins - easy clean surface, movable shelving, doors with heavy duty latches. The two storage bins and two of the cabinets fitted with key locks.
- Bench seats - easy clean vinyl surface padded and hinged to provide access to under seat storage. Fitted with retractable seat belts.
- Foldable work table of sturdy construction. Work table should fold flush against cabinet while not in use

- Cabinets under folding table should be fitted with "Lazy Susan" rotating trays for each access of stored materials while table is in upright position.

4 EXTERIOR CUSTOM APPOINTMENTS

4.1 CAB

- Heavy duty independently powered 2-speed windshield wipers with individual washers
- Camper-type stainless steel exterior mirrors left and right
- Manual control spotlight on drivers side
- Front heavy-duty chrome bumper
- Cab flared to reduce wind drag
- Halogen bright headlights
- Door on drivers side, door on passengers side if part of basic design or if coach door is located at rear of coach
- Wrap around heavy tinted windshields

4.2 COACH

The coach body is preferred without side windows and with a single rear door with window. If side windows are part of the standard body design they should have heavy duty seals to prevent dust infiltration and be fitted with light-blocking shades or curtains. If side door is part of standard design it should be a single hinged door not a sliding door. Entry door should be fitted with an interior screen door and have a heavy duty key lock. The coach body should also have the following:

- Rear heavy duty shock absorbent bumper. If door at rear of coach, bumper should be step-up.
- Rear access panel for on-board electric generator for easy service from outside. Accoustical treatment of generator compartment to reduce noise level in coach compartment
- Rain gutters all around

- Roof running lights
- Weather proof side access port for 220 volt grounded cable
- Side exhaust vents for step-down transformer and refrigerator
- Bracket adjacent to 220 volt access port for mounting shore power cable reel (i.e., reel of 100 foot, 220 volt 30 amp/weather proof cable)
- Rear reflectors and lights; side reflectors

5 ACCESSORIES

5.1 SHOP MANUALS

Shop Manuals (complete) to allow for out-of-country servicing as follows:

- Engine, power-train, chassis, steering, suspension, brakes, and other vehicle components.
- Air conditioning units inclusive of freon charging instructions
- Generator unit

5.2 MISCELLANEOUS

- Two (2) fire extinguishers mounted front and aft in coach
- Two (2) shore power cable reels with 100 feet of weather-proof grounded cable suitable for 220 volt 30 amp service
- Two (2) steel belted spare tire, tire changing tools and hydraulic jack stored or mounted in vehicle in an appropriate manner
- Emergency road service kit, flares, reflectors, first aid, etc. Portable electric air compressor suitable for tire inflation

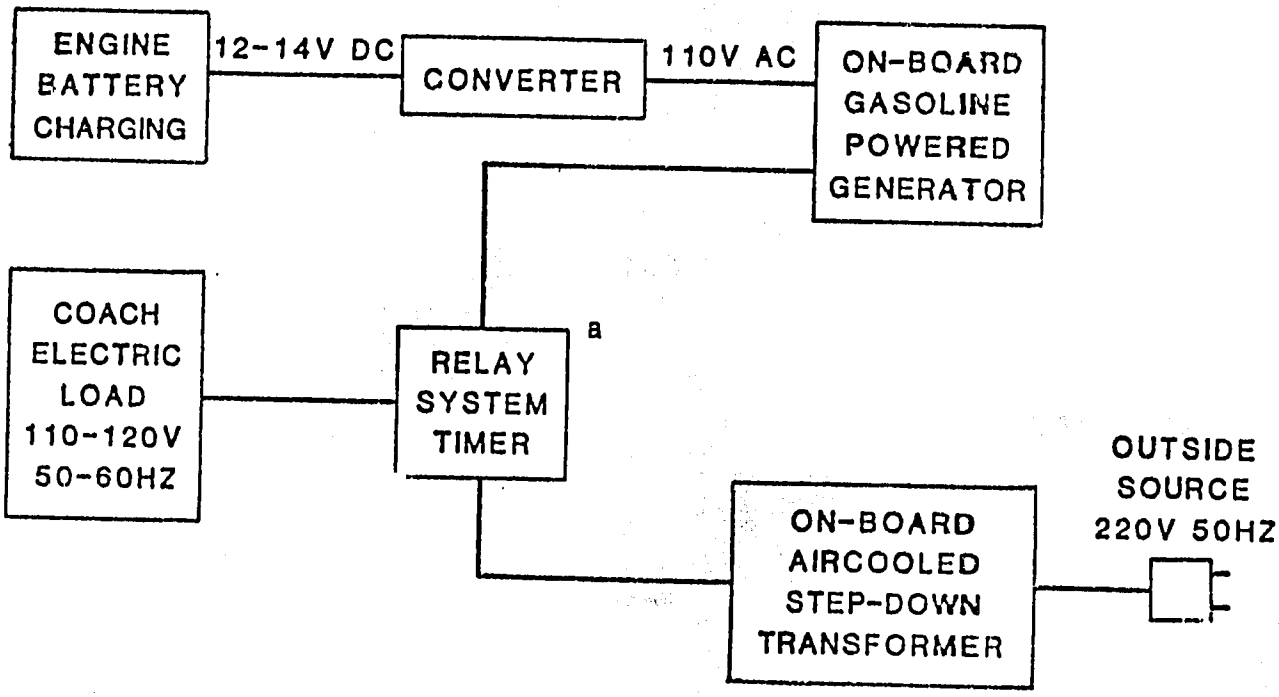
5.3 ROUTINE MAINTENANCE PARTS FOR VEHICLE ENGINE, GENERATOR

- (8) Oil filters
- (8) Gasoline filters
- (8) Sets of V belts for each service (e.g., air conditioner, alternator)
- (4) Engine Cooling System Thermostats
- (8) Air filters
- (4) Headlight sets high and low beam
- (4) Taillight and misc. bulb sets

- (8) Tune-up kits: plugs, points, condensers high-tension spark plug cables, distributor cap and rotor
- (3) Complete sets of engine cooling system rubber hoses
- Other parts recommended for replacement to protect warranty and/or service for 5 year period

TABLE 1 Estimate of Coach Electric Load-110 Volt Service

	Service	Approximate Load Demand (Watt)
(2)	Air conditioner, roof mount 13,500 Btu/hr; 15 amp	3400
(1)	Refrigerator 4 cuft with ice cube freezer; 1.4 amp	160
(1)	PC Computer with 2 disk drive	200
(1)	Printer	100
(1)	Monitor	40
(4)	Fluorescent Coach Lights @ 20 watt each	80
(1)	Vacuum cleaner system	200
(1)	Fan for Transformer Compartment	100
	Total	4180
	Generator requirements	6500
	Allowance for additional load	2320



a The relay system automatically turns off generator when 220 volt source is on and will turn generator on when power is lost for more than 1-3 minutes on the 220 volt source.

FIGURE 1 Block Diagram for Coach Electric Service

98

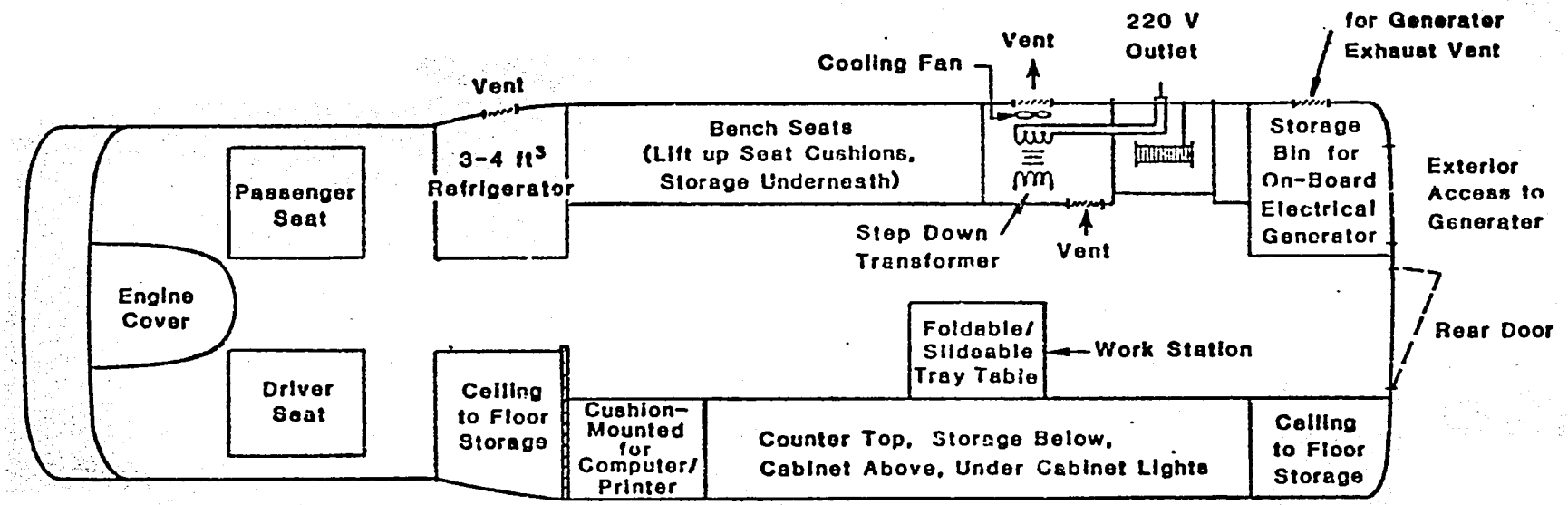


Figure 2 Vehicle Layout - Top View

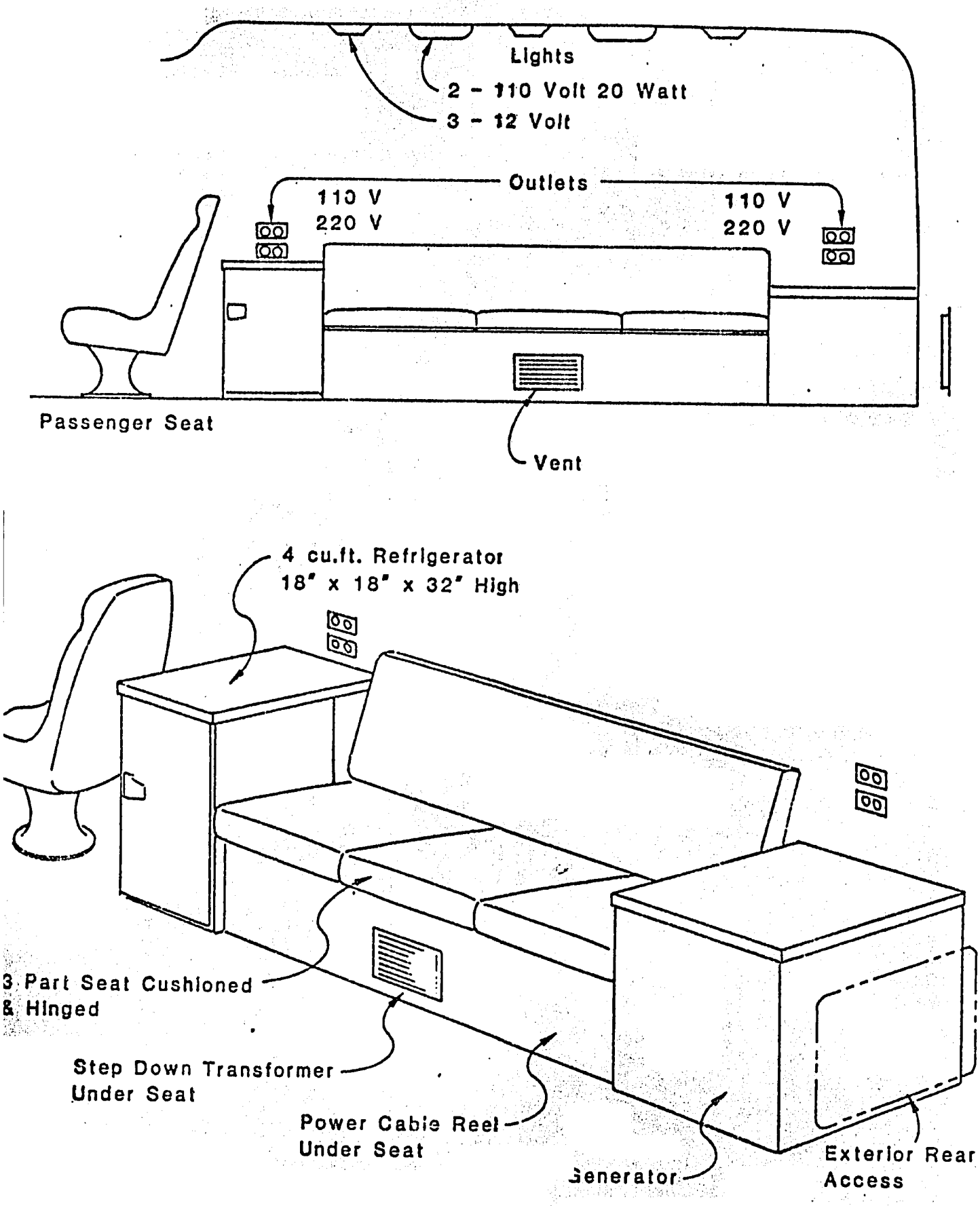


Figure 3 Layout of Right Side - Interior

100

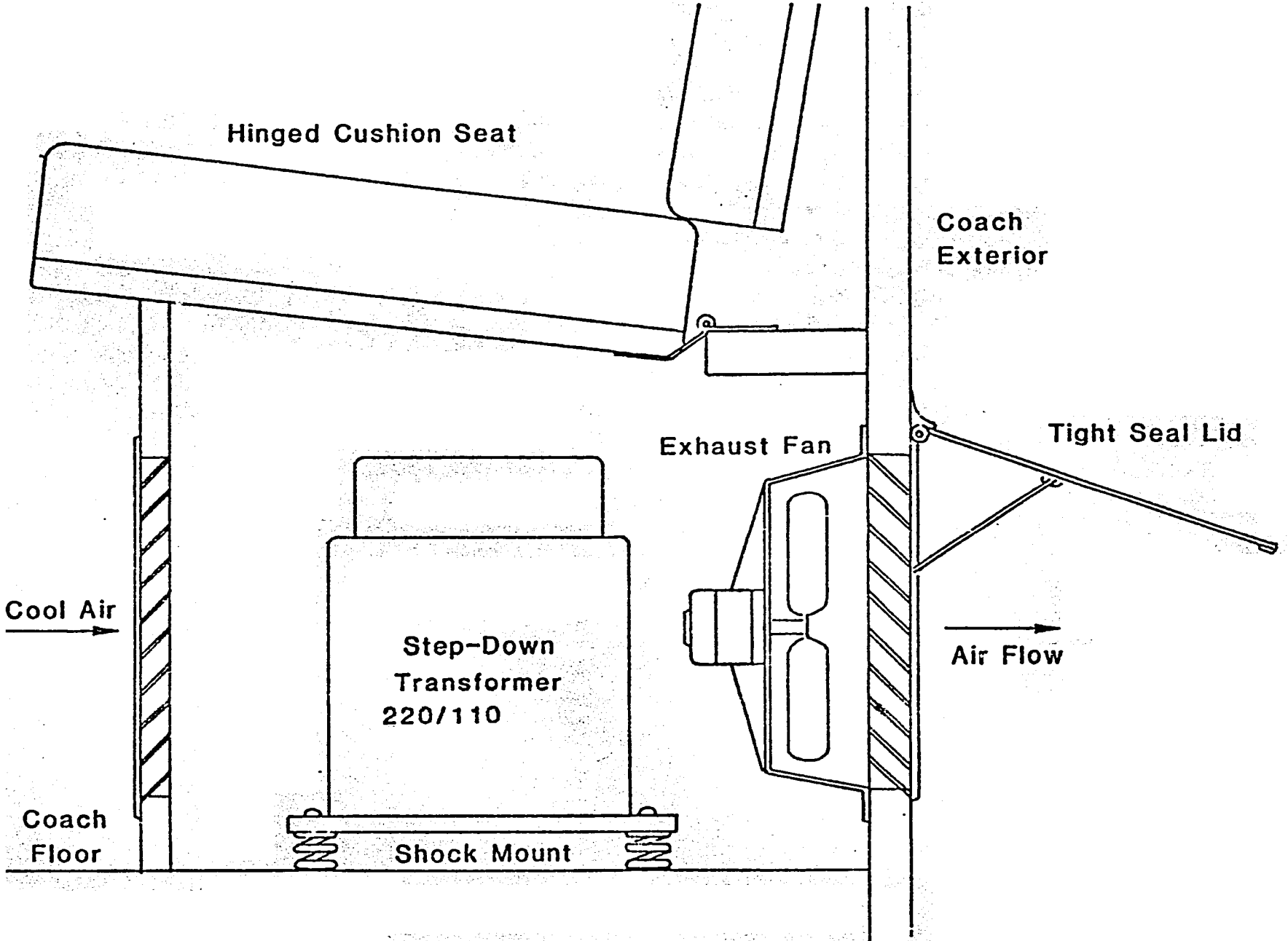
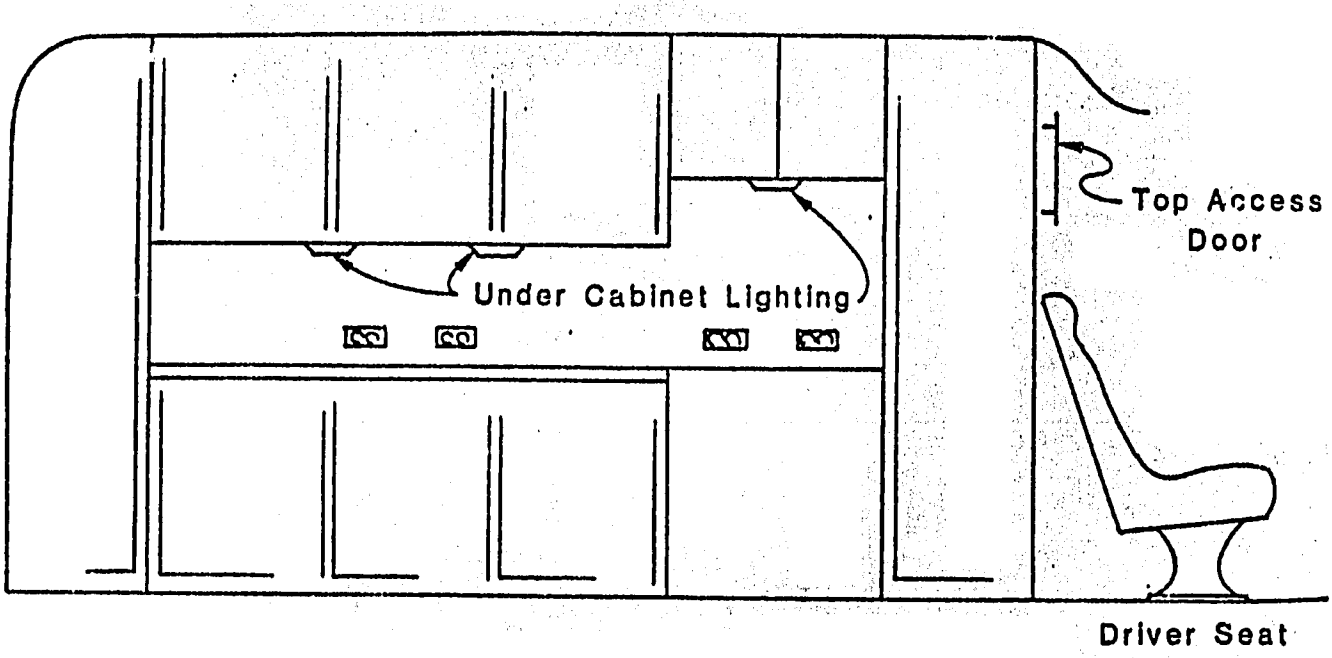


Figure 4 Transformer Compartment Layout



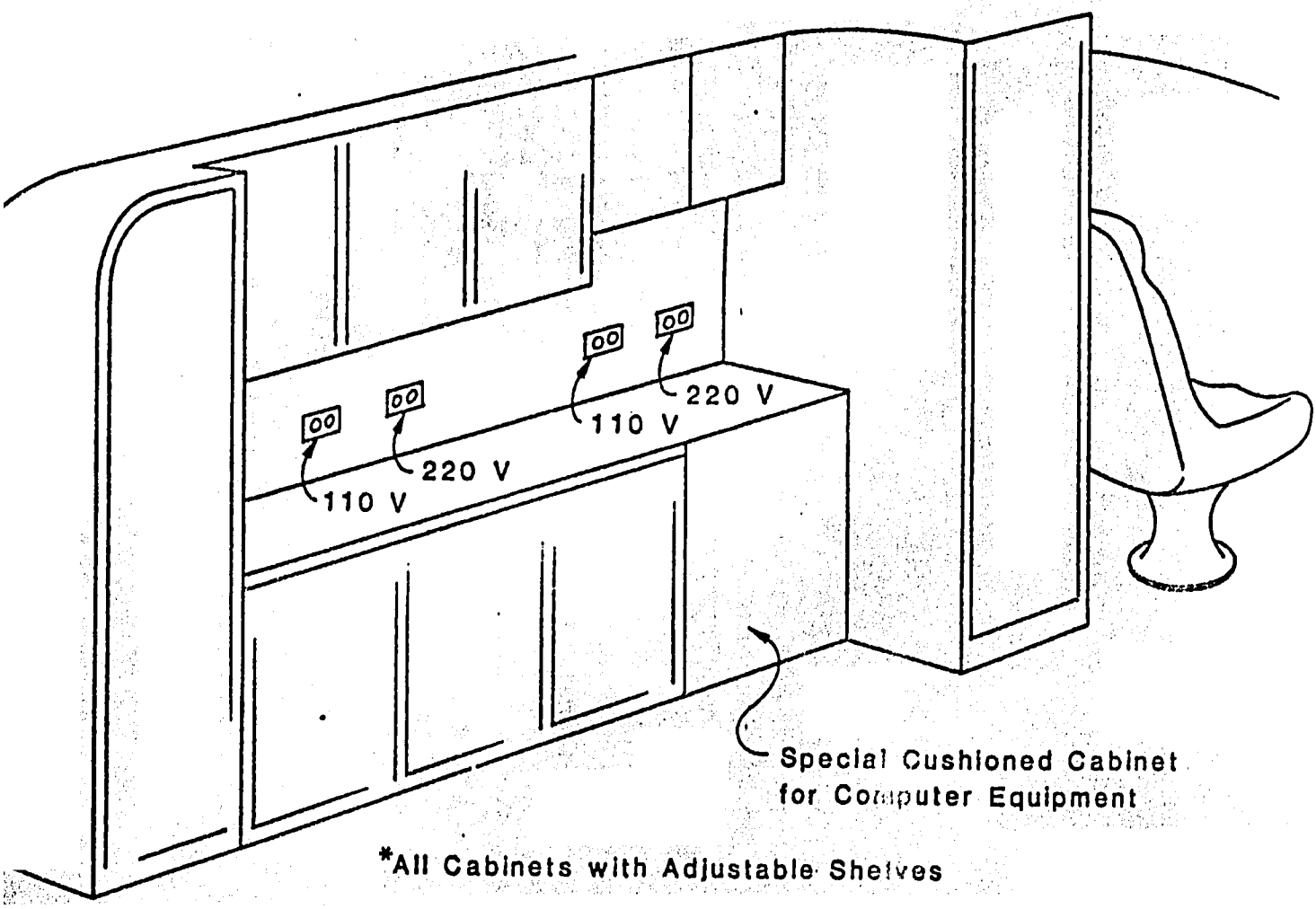
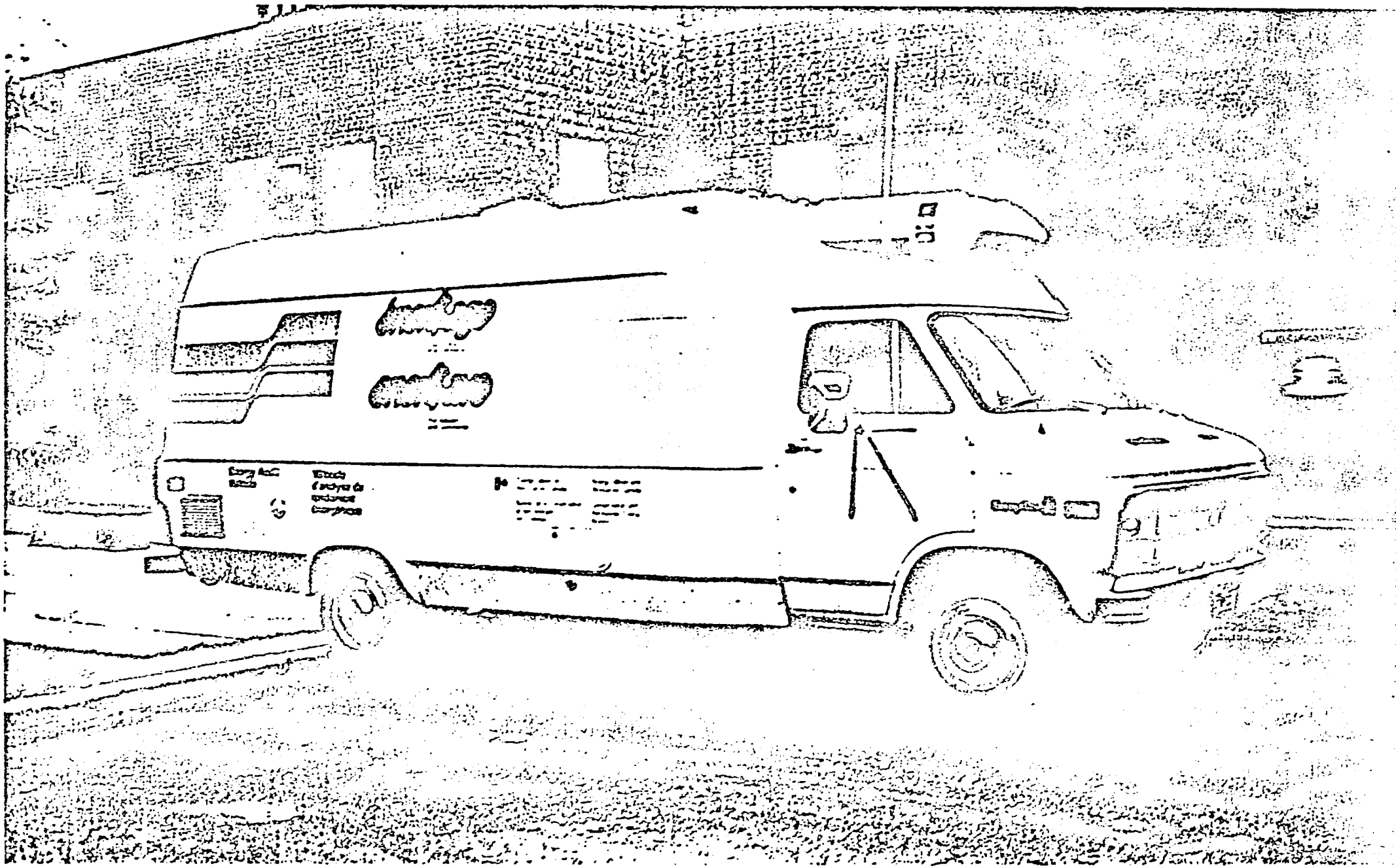
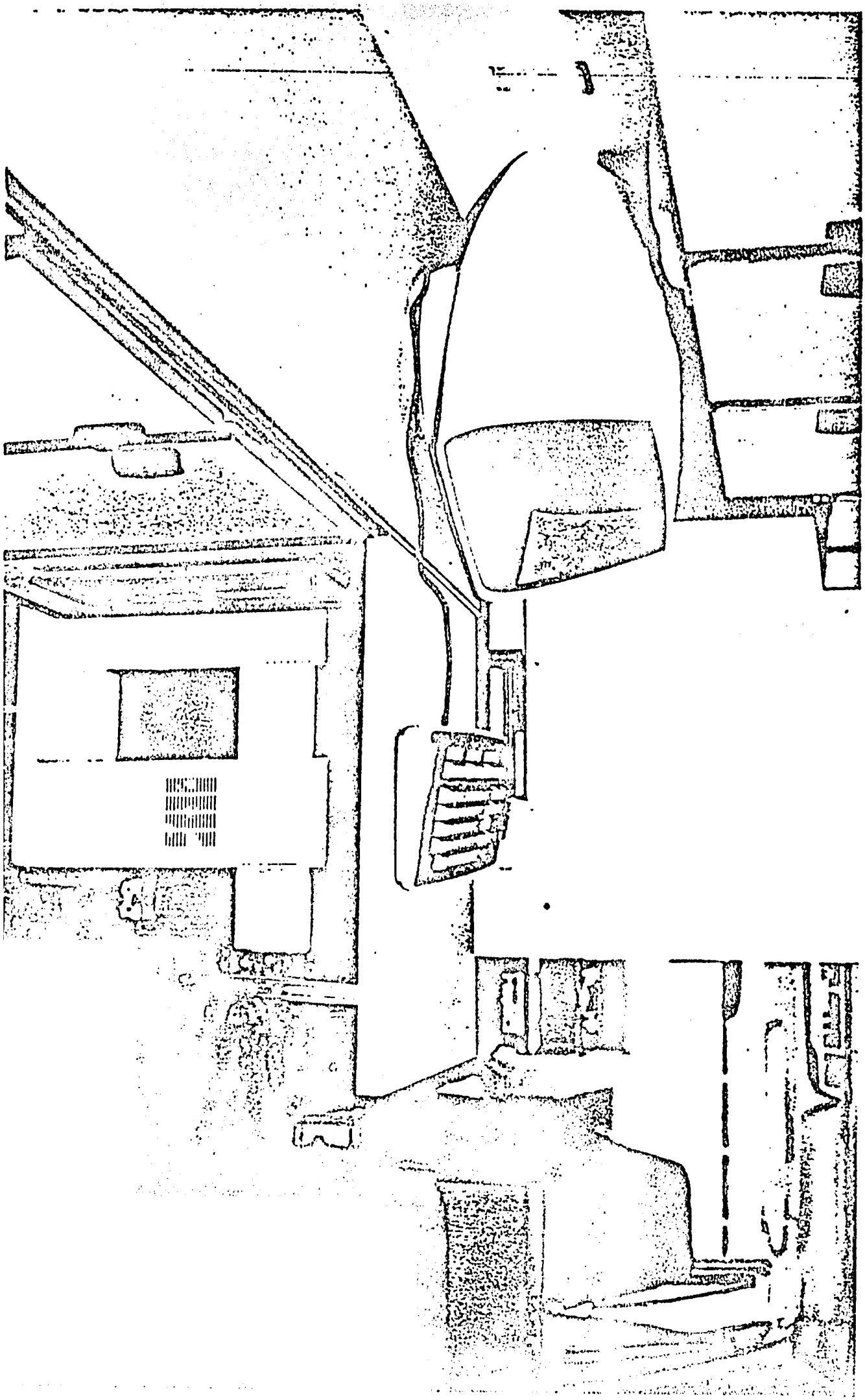
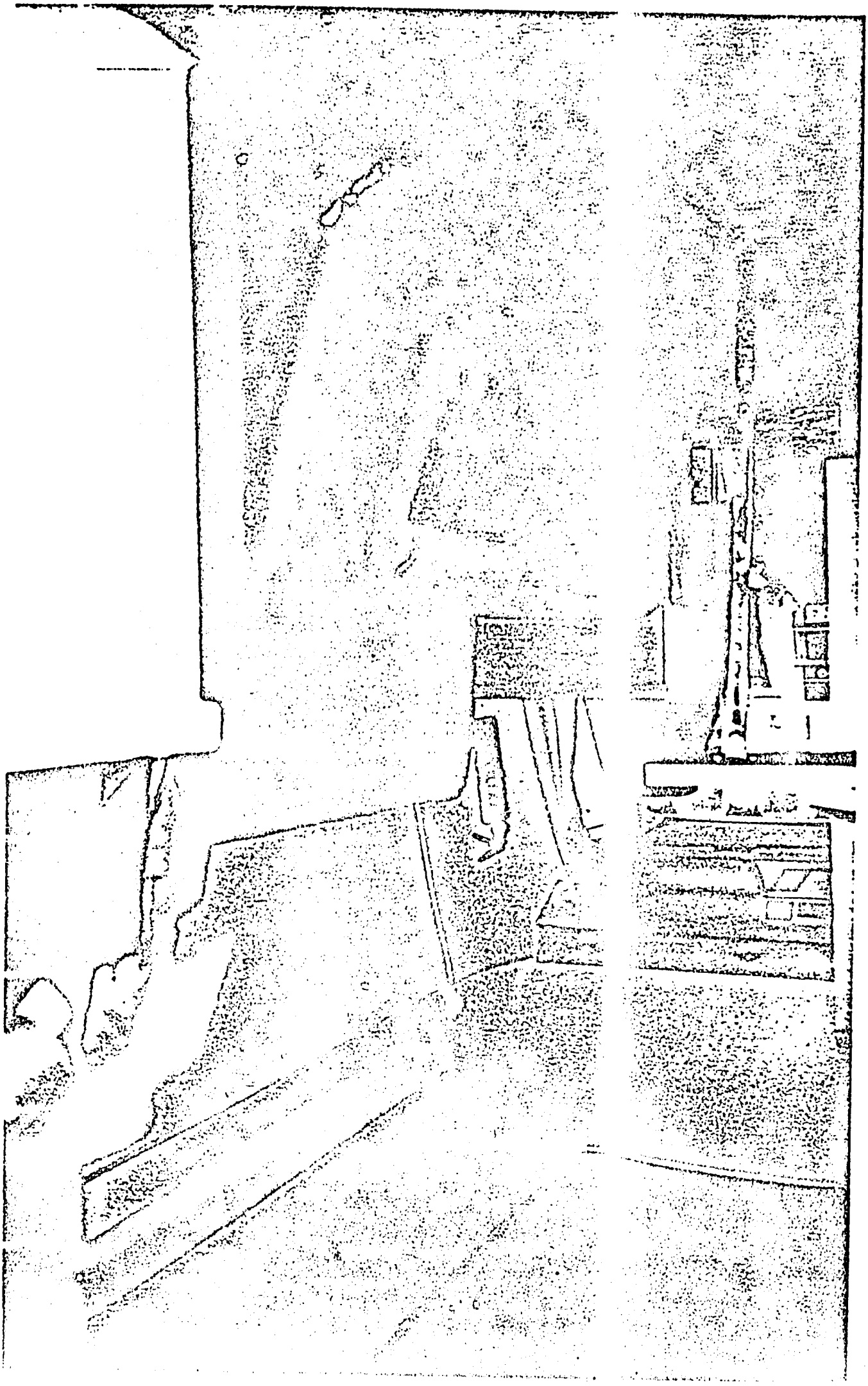
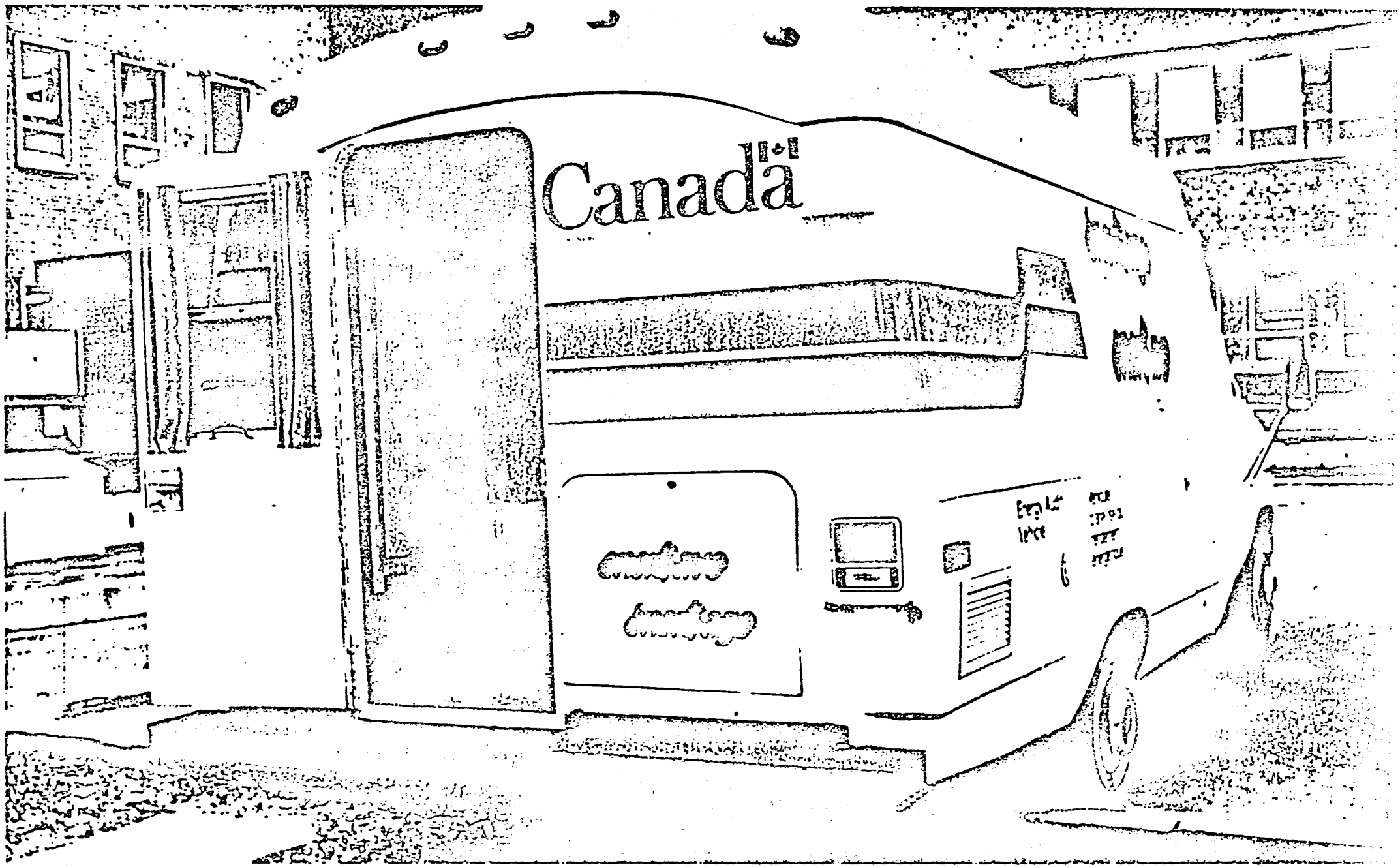


Figure 5 Layout of Left Side - Interior








Canada

APPENDIX

3.8.1-23

PRIVATE SECTOR RESPONSE TO ANL
AUDIT VEHICLE SPECIFICATIONS

- McGraw Commercial Equipment Co., Inc.

- Barth Inc.

McGraw Commercial Equipment Company, Inc.

October 2, 1984

Argonne National Laboratory
9700 Cass Ave.
Argonne, IL 60439

Attention R.M. Stachelski

Subject: Your Inquiry No. 931615

Dear Ms. Stachelski:

Please find enclosed our quotation to your specifications for "Egyptian Energy Audit Vehicle."

Also enclosed is a brochure showing some of the products we manufacture. The brochure does not show any lab equipment, so please note the photographs of an environmental test trailer we built for General Motors Research Labs last year.

The base vehicle we have proposed to you will be manufactured by Champion on a Chevrolet chassis. We will mount the cabinets and electrical components at our facility in Sterling Heights, Michigan. Twenty thousand square feet of facility is dedicated to mobile laboratory manufacturing.

We invite you and your staff to tour our facility to assure yourselves of our ability to build what you want on a timely basis at a competitive price.

Please contact me if you have any questions regarding our quotation or to arrange a meeting at our facility.

Regards,

Bruce J. Burton
Director of Engineering

BJB:ms

Enclosures (Quotation #12964 and Brochure)

7200 E. Fifteen Mile Road Sterling Heights, Michigan 48077 313 977-0400
Telex: 23-1140 MCGRAWCO STGH Cable Code: MCGRAWCO

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McGraw Commercial Equipment Company, Inc.

7200 E. Fifteen Mile Rd. Sterling Heights, MI 48077 (313) 977-0400
Telex: 23-1140 MCGRAWCO STGH Cable Code: MCGRAWCO

Quotation and Purchase Agreement

McGraw quote number 12964

Date: October 2, 1984

Customer Ref: Inquiry 931615

Attention of: R.M. Stachelski

TO: Argonne National Lab
9700 S. Cass Ave.
Argonne, IL 60439

Weight: 10,500 lbs.

OL behind cab: 27 ft.

Width: 96 inches

~~Height above frame~~ 135 in. OAH

The following is our proposal to furnish equipment and material at the prices indicated.

Item	Quantity	Description	Price
1	1	Egyptian Energy Audit vehicle, as described below:	

CHASSIS
- Champion 27 ft. motor home, exterior color beige, Chevrolet chassis
- 454 cubic in. V-8 gasoline (regular) engine
- 77 in. interior height
- 158 in. wheelbase
- 12,300 lb. GVWR
- 1/2 in. to 1 in. insulation
- Two roof mounted 13.5 thousand BTU a/c units (EER=8)
- Dual rear wheels
- Heavy duty suspension
- 105 amp alternator
- Heavy duty shock absorbers
- Automatic transmission
- Heavy duty cooling
- Oil cooler
- Power steering
- Power brakes
- 65 gallon fuel tank
- Cab heater
- Cab air conditioner
- Two spare tires on brackets at rear

CAB
As specified in paragraph 3.1 pg. 11 of inquiry 931615

All prices F.O.B. _____

Federal Excise Tax included/excluded in above price.

Terms _____ Days

Railroad loading _____

By _____

Price firm for _____ days after bid opening or quote date provided confirming P.O. is received within _____ days. If bid opening date is extended, we reserve the right to revise our prices.

Delivery _____ days after receipt of chassis or _____ days after receipt of order.

110

McGraw Commercial Equipment Company, Inc.

7200 E. Fifteen Mile Rd. Sterling Heights, MI 48077 (313) 977-0400
Telex: 23-1140 MCGRAWCO STGH Cable Code: MCGRAWCO

Quotation and Purchase Agreement

McGraw quote number 12964 continued

Date: October 2, 1984

Customer Ref: Inquiry 931615

Attention of: R.M. Stachelski

TO: Argonne National Lab

Weight:

OL behind cab:

Width:

Height above frame:

The following is our proposal to furnish equipment and material at the prices indicated.

Item	Quantity	Description	Price

BODY AND EQUIPMENT
- 7.5 KW Kohler generator (58 amps @ 110V)
- Remote generator panel
- Generator on vibration isolators
- 7.5 KW dry type transformer, cabinet enclosure with panel light per specifications, exterior door
- 4 ft.^{3} refrigerator, 110V a/c operation
- Side door located on curbside in lieu of door at rear, screen door included
- Two 110V ceiling lights
- Three 12V dome lights
- Natural "earth tone" (beige or wheat) interior color
- No windows

CABINETS (CURBSIDE)

The curbside wall shall be constructed with the refrigerator forward and generator compartment aft. The space between these components shall have a full length bench seat with backrest and storage below. The transformer shall be located in a separate compartment with an intake louver towards the interior. The transformer compartment shall have an exhuast fan and interlock as specified in inquiry 931615. Receptacles shall be located above the refrigerator and generator compartment as shown in figure three of 931615. The curbside door will be in front of the refrigerator.

ROADSIDE

The roadside wall shall have full height storage cabinets at the extreme front and rear. The area between shall have cabinets and countertop as shown in figure 5 of 931615.

All prices F.O.B.

Federal Excise Tax included/excluded in above price.

Terms Days

Railroad loading

By

Price firm for days after bid opening or quote date provided confirming P.O. is received within days. If bid opening date is extended, we reserve the right to revise our prices.

Delivery days after receipt of chassis or days after receipt of order.

111

McGraw Commercial Equipment Company, Inc.

7200 E. Fifteen Mile Rd. Sterling Heights, MI 48077 (313) 977-0400
Telex: 23-1140 MCGRAWCO STGH Cable Code: MCGRAWCO

Quotation and Purchase Agreement

McGraw quote number 12964

Date: October 2, 1984

Customer Ref: Inquiry 931615

Attention of: R.M. Stachelski

TO: Argonne National Lab

Weight:

OL behind cab:

Width:

Height above frame:

The following is our proposal to furnish equipment and material at the prices indicated.

Item	Quantity	Description	Price
		ACCESSORY EQUIPMENT The following equipment shall be included in the base unit price: - (8) engine oil filters - (8) engine gasoline filters - (8) sets of engine belts - (4) engine thermostats - (8) replacement air cleaners - (4) sets of headlamps - (4) sets of replacement tail lamp bulbs - (8) tune up kits - (3) hose sets	
		TOTAL PRICE-unit complete-delivered to Argonne, Illinois	$55,829.80 each

All prices F.O.B. Argonne, Illinois

Federal Excise Tax included/excluded in above price. n/a

Terms Net 30 days Days

Railroad loading --

By

Price firm for 90 days after bid opening or quote date provided confirming P.O. is received within 30 days. If bid opening date is extended, we reserve the right to revise our prices.

Delivery 180 days after receipt of chassis or _____ days after receipt of order.

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SEP 17 RECD

B.C.W

THE UNIVERSITY OF CHICAGO
OPERATOR OF
ARGONNE NATIONAL LABORATORY
9700 S. CASS AVE., ARGONNE, ILL. 60439 312/972-2000
(CONTRACT NO. W-31-109-ENG-38)

REQUEST FOR QUOTATION

THIS IS NOT AN ORDER

NOTICE:
1. The right is reserved to accept or reject quotations on each item separately unless your quotation states otherwise.
2. The right is reserved to accept minor deviations from specifications herein listed or referenced.
3. Firm prices are requested. If other than firm prices are quoted, conditions of escalation are to be stated.
4. If material is packaged in returnable containers the amount of deposit, if any, is to be stated together with instructions for returning.
5. Terms and Conditions referenced below will apply to any resulting Purchase Order.

MARK BODY
50625 RICHARD W.BLVD.
MT. CLEMENS, MI 48046

Date 9-13-84 Inquiry No. 931615 Address Reply To R.M. STACHELSKI Buyer
Quotation must be received by 10-3-84

QUANTITY	DESCRIPTION	UNIT PRICE	TOTAL
	ANL Form 70A, Representations and Certifications, is included as part of this request and must be completed, signed and returned with your quotation.		
1	SUBMIT A QUOTATION TO FURNISH A CUSTOM VEHICLE, VAN TYPE IN ACCORDANCE WITH INSTRUCTION TO BIDDERS AND AS DESCRIBED IN ANL SPECIFICATION ENTITLED "VEHICLE FOR INDUSTRIAL ENERGY AUDITS IN EGYPT" DATED AUGUST, 1984, PAGES 1 THROUGH 22 INCLUSIVE AND ATTACHMENT NUMBER ONE "ILLUSTRATION OF CANADIAN AUDIT VEHICLE" ALL ATTACHED HERETO AND MADE A PART HEREOF.		
	NOTE: CONTRACTORS ARE ADVISED THAT ATTACHMENT NUMBER ONE IS A SERIES OF PHOTOGRAPHS OF A SIMILIAR VEHICLE USED IN CANADA TO BE USED FOR INFORMATION PURPOSES ONLY. THE VEHICLE FURNISHED IS TO ADHERE TO THE ANL SPECIFICATION AS DEFINED HEREIN.		
	PRICE EACH		$55,829.80
	Any resulting Purchase Order will be subject to the Terms and Conditions (ANL Form ~~460~~ 71T dated 4-84) attached hereto and made a part hereof and will be exempt from Illinois Occupation and Use Taxes and from Manufactures and Retailers Federal Excise Taxes.		

PRIORITY RATING DO-E, CERTIFIED UNDER D.M.S. REGULATION #, WILL BE APPLIED TO ANY PURCHASE ORDERS ISSUED AS A RESULT OF THIS QUOTATION

We quote you F.O.B. DESTINATION Shipment can be made in 180 days from receipt of order.

Terms Net 30 days Will Ship Via our delivery Date

AUTHORIZED SIGNATURE

ANL-70 (8-81)

COMPLETE AND RETURN THIS COPY ONLY

PLEASE MARK "NO BID" IF YOU CANNOT QUOTE

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REPRESENTATIONS AND CERTIFICATIONS
(Other Than Construction Contracts)

THE OFFEROR/BIDDER REPRESENTS AND CERTIFIES THAT: *(check or complete all applicable sections)*

1. TYPE OF BUSINESS ORGANIZATION

He operates as ( ) an individual, ( ) a partnership, ( ) a non-profit organization, XX a corporation, incorporated under the law of the State of Michigan.

2. PARENT COMPANY & EMPLOYER IDENTIFICATION NUMBER

a. He ( ) is, XX is not, owned or controlled by a parent company. *(For the purpose of this offer/bid, a parent company is defined as one which either owns or controls the activities and basic business policies of the offeror/bidder. To own another company means the parent company must own at least a majority [more than 50%] of the voting rights in that company. To control another company, such ownership is not required; if another company is able to formulate, determine or veto basic business policy decisions of the offeror/bidder, such other company is considered the parent company of the offeror/bidder. This control may be exercised through the use of dominant minority voting rights, use of proxy voting, contractual arrangements, or otherwise.)*

b. If he is owned or controlled by a parent company, enter below the name and main office address of the parent company:

Name of Parent Company	Main Office Address *(Include Zip Code)*

c. Employer's Identification Number *(Federal Social Security Number used on Employer's Quarterly Tax Return, U.S. Treasury Department Form 941).*

E.I. No. of Offeror/Bidder 38-2072040

E.I. No. of Parent Company *(if any)* _____

3. SMALL BUSINESS

a. He (X) is, ( ) is not, a small business concern. *(A small business concern for the purpose of Government Procurement is a concern, including its affiliates, which is independently owned and operated, is not dominant in the field of operation in which it is submitting offers or bidding on Government contracts and can further qualify under the criteria concerning number of employees, average annual receipts, or other criteria, as prescribed by the Small Business Administration. See Code of Federal Regulations, Title 13, Part 121, as amended, which contains detailed industry definitions and related procedures.)*

b. If he is a small business concern and is not the manufacturer of the supplies offered or bid, he also represents that the supplies to be furnished hereunder (X) will, ( ) will not, be manufactured or produced in the United States, its territories, its possessions, or the Commonwealth of Puerto Rico by a small business concern.

4. CONTINGENT FEE *(applicable to contracts of $2,500 or more)*

a. He ( ) has, (X) has not, employed or retained any company or person *(other than a full-time bona fide employee working solely for him)* to solicit or secure this contract.

b. He ( ) has, XX has not, paid or agreed to pay any company or person *(other than a full-time bona fide employee working solely for him)* any fee, commission, percentage or brokerage fee contingent upon or resulting from the award of this contract; and agrees to furnish information relating to a. and b. above as requested by Argonne National Laboratory. *(For interpretation of the representation, including the term "bona fide employee" see Code of Federal Regulations, Title 41, Subpart 1-1.5.)*

5. BUY AMERICAN ACT

Each end product, except the end products listed below, is a domestic source end product *(as defined in the clause entitled "Buy American Act")* and that components of unknown origin have been considered to have been mined, produced or manufactured outside the United States.

Excluded End Products	Country of Origin

6. EQUAL OPPORTUNITY *(applicable to contracts of more than $10,000)*

a. He (X) has, ( ) has not, participated in a previous contract or subcontract subject to the Equal Opportunity clause herein, or the clause originally contained in section 301 of Executive Order No. 10925, or the clause contained in section 201 of Executive Order No. 11114; that he (X) has, ( ) has not, filed all required compliance reports; and that representations indicating submission of required compliance reports, signed by proposed subcontractors, will be obtained prior to subcontract awards. *(The above representation need not be submitted in connection with contracts or subcontracts which are exempt from the clause.)*

b. AFFIRMATIVE ACTION PROGRAM

(1) He ( ), has, (X) has not, developed an affirmative action compliance program for each of his establishments. *(See 41 CFR 60-1.40 and 60-2.)*

(2) He ( ) does,* (X) does not, employ more than fifty employees and ( ),* has not, been awarded a contract subject to Executive Order No. 11246 in the amount of $50,000 or more since July 1, 1968. If such a contract has been awarded since July 1, 1968 give the date of such a contract, but do not list contracts awarded within the last 120 days prior to the date of this representation.

*If both answers are affirmative, please indicate name and address of Compliance Agency (if known).

c. STANDARD FORM 100 (EEO-1) FILING

If he has 100 or more employees he ( ) will, ( ) has file(d) SF-100 with the Joint Reporting Committee. *(If not filed within the last 12 months, SF-100 must be filed within 30 days after award.)*

d. NOTICE OF REQUIREMENT FOR CERTIFICATION OF NONSEGREGATED FACILITIES

By signing these representations and certifications, the offeror or bidder will be deemed to have signed and agreed to the provisions of the "Certification of Nonsegregated Facilities" which follows. The certification provides that the offeror or bidder does not maintain or provide for his employees facilities which are segregated on a basis of race, color, religion or national origin, whether such facilities are segregated by directive or on a de facto basis. The certification also provides that he will not maintain such segregated facilities. Failure of offeror or bidder to agree to the Certification on Nonsegregated Facilities will render his offer or bid nonresponsive to the terms of solicitations involving awards of contracts exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity Clause.

CERTIFICATION ON NONSEGREGATED FACILITIES

He does not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. He certifies further that he will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he will not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The vendor agrees that a breach of this certification is a violation of the Equal Opportunity clause in any purchase order or contract that may result from the enclosed quotation. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, rest rooms and washrooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, creed, color or national origin, because of habit, local custom, or otherwise. He further agrees that (except where he has obtained identical certifications from proposed subcontractors for specific time periods) he will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity clause; that he will retain such certifications in his files; and that he will forward the following notice to such proposed subcontractors:

NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENT FOR CERTIFICATIONS OF NONSEGREGATED FACILITIES

A certification of Nonsegregated Facilities must be submitted prior to the award of a subcontract exceeding $10,000 which is not exempt from the provisions of the Equal Opportunity clause. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e., quarterly, semiannually or annually).

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

7. MINORITY BUSINESS ENTERPRISE

He ( ) is, (X) is not, a minority business enterprise. A minority business enterprise is defined as a "business, at least 50 percent of which is owned by minority group members or, in case of publicly owned businesses, at least 51 percent of the stock of which is owned by minority group members." For the purpose of this definition, minority group members are Negroes, Spanish-speaking American persons, American-Orientals, American-Indians, American Eskimos, and American Aleuts.

* * * * *

BY SUBSCRIBING HERETO, THE OFFEROR/BIDDER AGREES THAT THE FOREGOING REPRESENTATIONS AND CERTIFICATIONS ARE TRUE AND CORRECT.

Name of Offeror/Bidder McGraw Commercial Equipment Company, Inc.

Signature Bruce J. Burton

Title Director of Engineering

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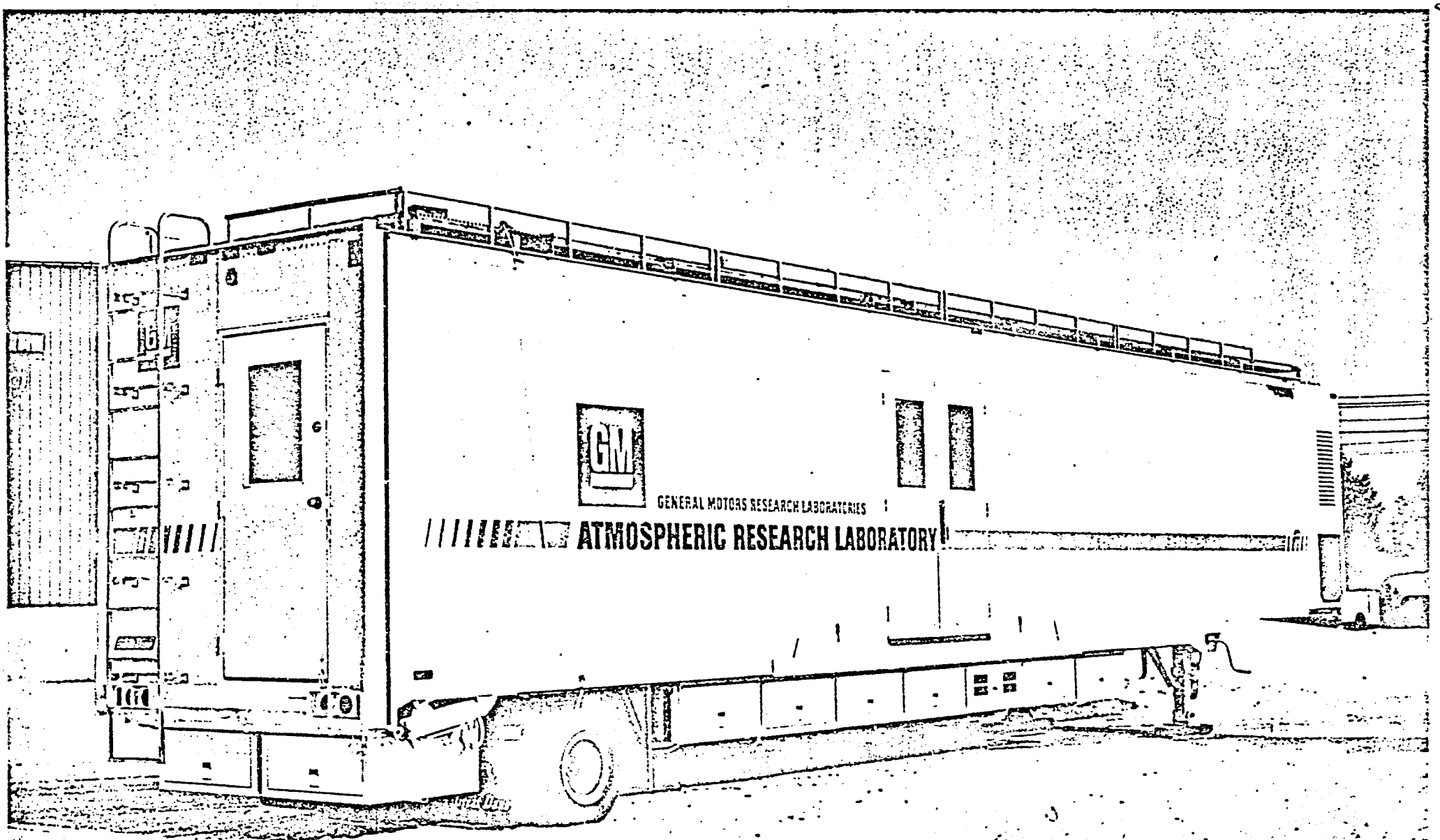
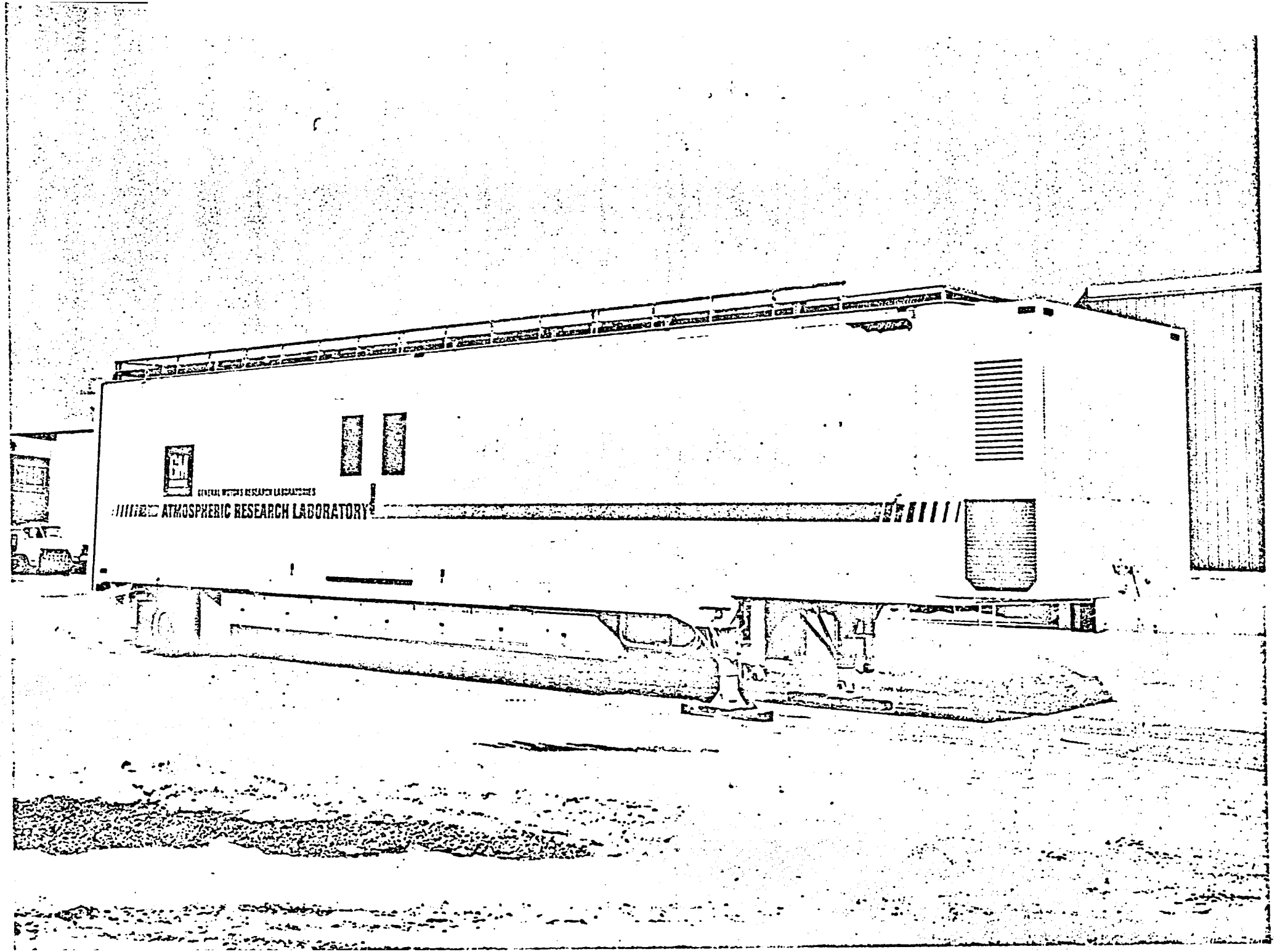

GM
GENERAL MOTORS RESEARCH LABORATORIES
ATMOSPHERIC RESEARCH LABORATORY



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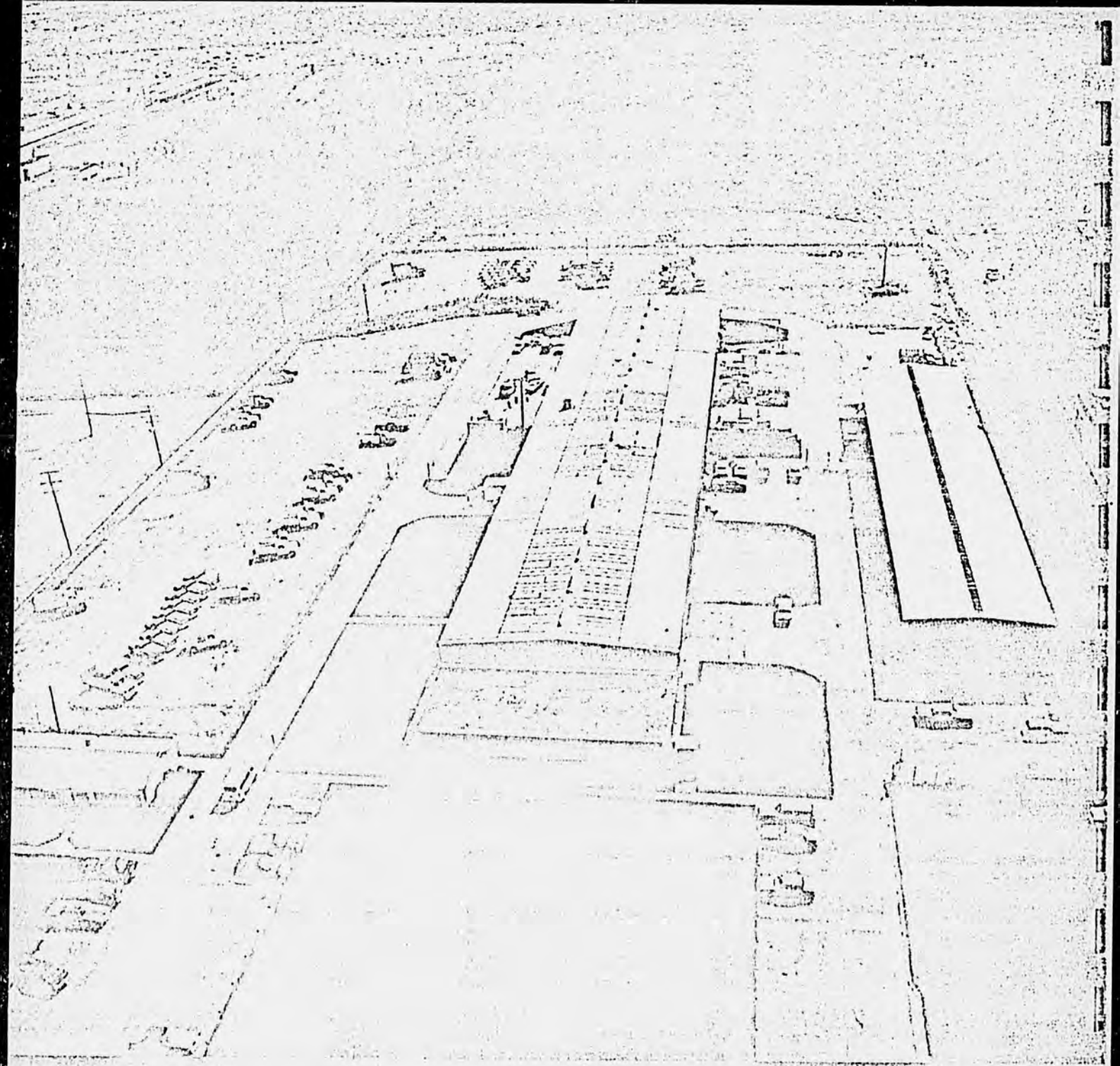
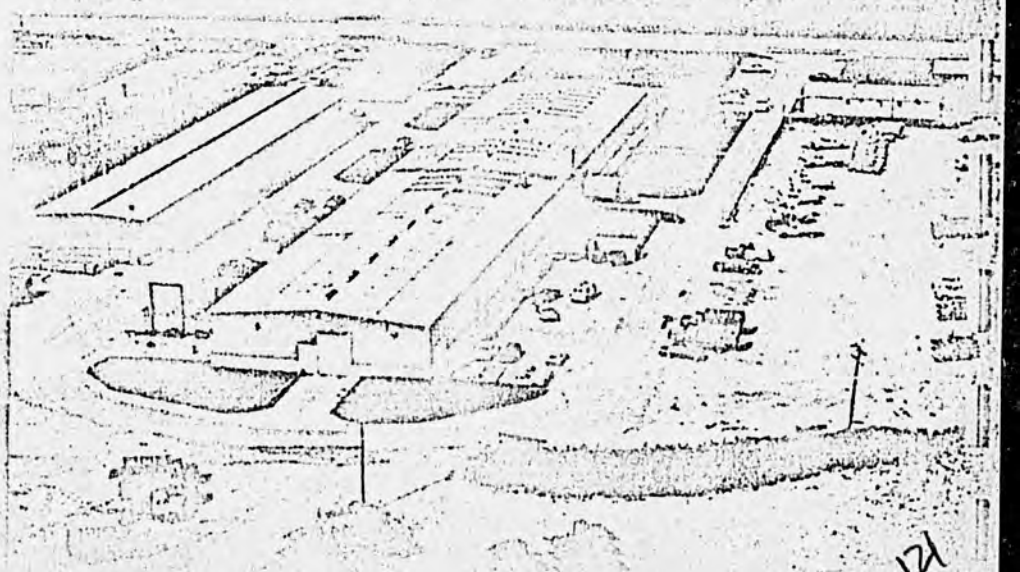
McGRAW



IcGraw Commercial Equipment Co., Inc.
200 E. Fifteen Mile Road
terling Heights, Michigan 48077
313) 977-0100
Telex: 23-1140 MCGRAWCO STGH
Cable Code: MCGRAWCO



THANK YOU FOR YOUR INTEREST IN McGRAW COMMERCIAL EQUIPMENT COMPANY. . .

McGraw Commercial Equipment Company is a leading OEM manufacturer/installer of truck bodies and equipment for commercial and military tactical use.

Our principal business is as a sub-contractor/supplier to the major U.S. truck manufacturers. These clients sell their products to U.S. military and civilian agencies which use vehicles and related ground support in their operations.

McGraw's experience and expertise as a principal supplier of truck bodies, truck equipment and special products allows us to competitively service the needs of major U.S. automotive companies as well as those of U.S. military and civilian agencies. Moreover, our knowledge of government operations makes us highly effective in securing business for our suppliers and supporting the marketing efforts of our corporate customers.

At the international level, McGraw is a major supplier of truck bodies and equipment to foreign government agencies and foreign automotive distributor dealers. Currently, we sell and supply our services to 50 countries throughout the world. This includes several major contracts which we have negotiated with foreign and Defense Ministries in the Middle East, Asia and South America.

A Diversity of Functions

McGraw Commercial Equipment Company functions in several ways:

1. Exclusive sales representatives to the U.S. Government for certain manufacturers.
The companies we represent include The Heil Company, Mark Body Division, E. R. Buske Manufacturing Company, IMC Corporation, Monroe-Patterson Company, The Truck Engineering Company, and many other outstanding firms.

2. Installer and fabricator of equipment.
We process more than 4,000 vehicles annually at our modern complex in Sterling Heights, Michigan. Situated on 16½ acres, our main plant has 36,000 square feet; our auxiliary building contains 10,000 square feet and our Design Engineering Center has 1,500 square feet.

3. OEM supplier of equipment.
We furnish and install dump and wrecker bodies for a major U.S. automotive company. These bodies are installed on the client's chassis and the completed vehicle is sold to the client's dealer organization as a factory-supplied truck.

4. Supplier of custom bodies and equipment.
When a specific requirement necessitates special engineering and equipment adaptation, McGraw can accommodate the need. We handle automotive armoring, work shop bodies, police car packages and police car engine conversions, front axle conversion, and many other custom jobs.

In fact, our knowledge of police and ambulance vehicles has made us the principal supplier of ambulance bodies for the U.S. military (M886 and CUCV). We also are a major supplier of police vehicles to overseas markets.

5. Sales representatives to government and defense agencies for energy and vehicle-oriented products.
Always seeking additional ways to service our customers, McGraw offers diagnostic equipment, electroluminous lamps, vehicle diagnostic systems, and thermoelectric generators. These products require a technical expertise that McGraw Commercial Equipment Company can provide to meet the most exacting needs of U.S. and foreign government agencies.

Special Know-How Gets The Job Done

McGraw offers quality products from more than 50 truck and automotive suppliers who have confidence in our ability to effectively secure OEM and government business.

With many years' service in corporate and governmental positions, our highly qualified staff of sales and engineering personnel have a thorough knowledge of military specifications.

Moreover, our ability to obtain data on what is required to service the needs of the government and our understanding of its procurement procedures have contributed to the growth of our suppliers and customers.

Care to engineering detail is part of every McGraw project, assuring the specifications are rigidly held and the workmanship is of the highest quality. In addition, our experience, know-how, and skill allow us to complete projects on time and at a competitive price.

We'd Like To Do Business With You

The brief descriptions in this catalog are merely an introduction to our products and service. For more complete information on any particular item or a discussion of your specific requirements, please call or write us.

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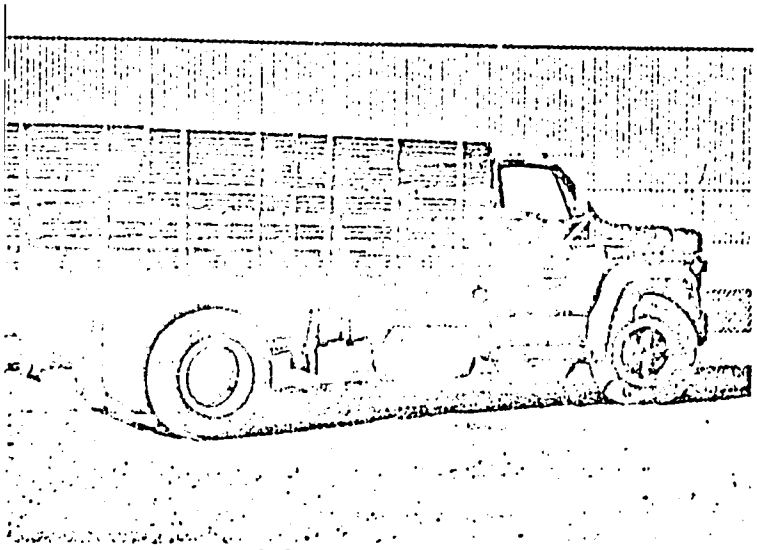
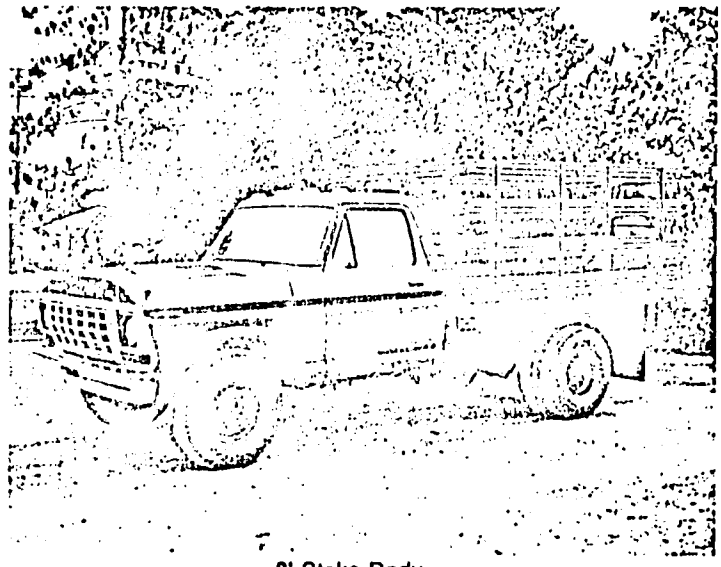
23 Wrecker Bodies
25 Special Bodies
29 Lowboy/Flatbed/Van Trailers
30 Police Vehicles
31 Tactical Vehicles

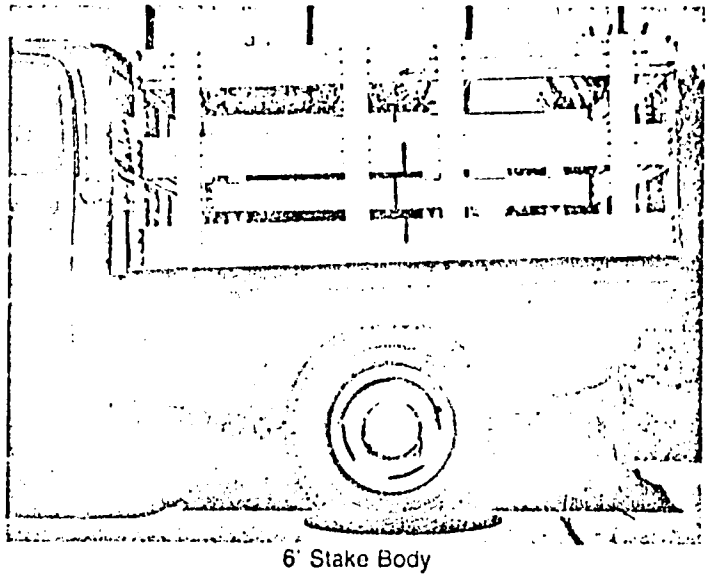
STAKE BODIES



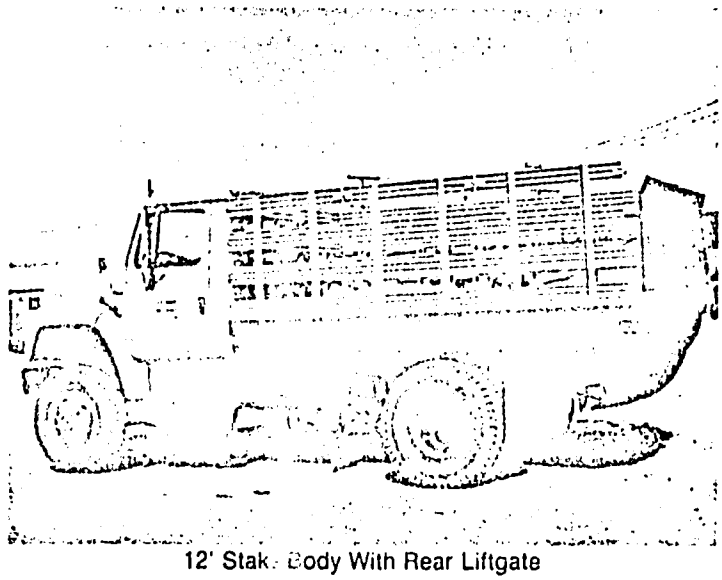
16' Stake Body



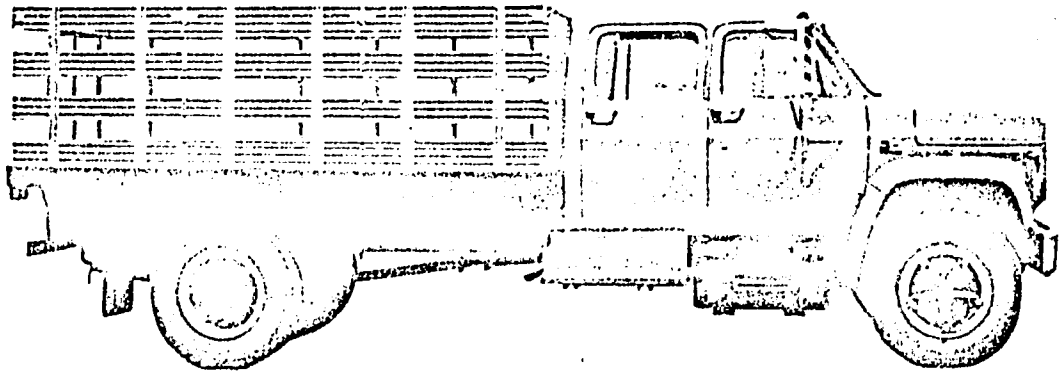
8' Stake Body



6' Stake Body



12' Stake Body With Rear Liftgate



12' Stake Body With Crew Cab Chassis

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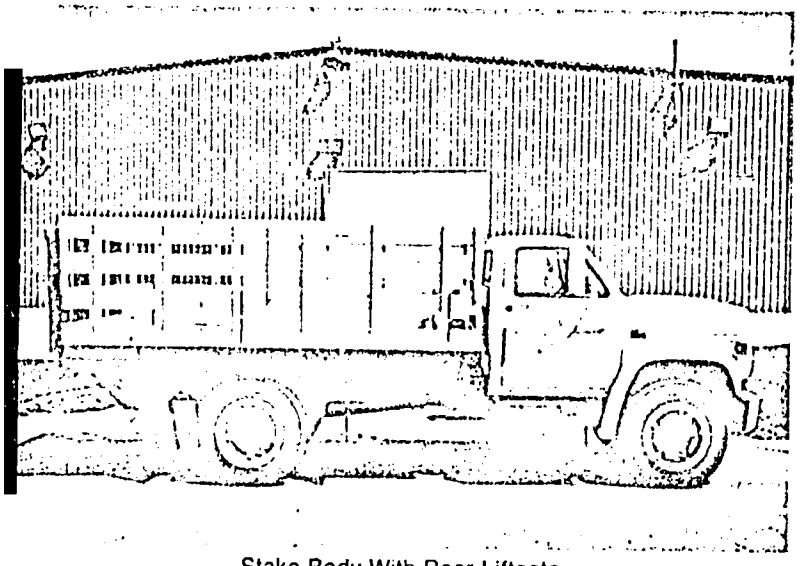
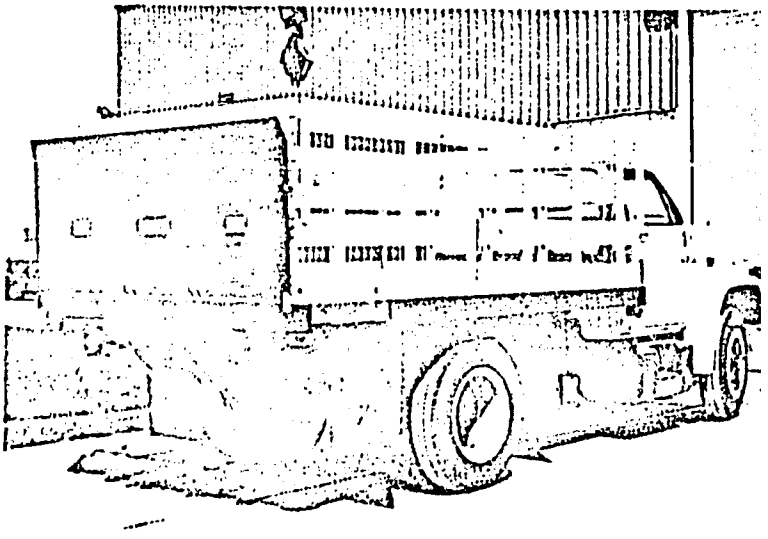
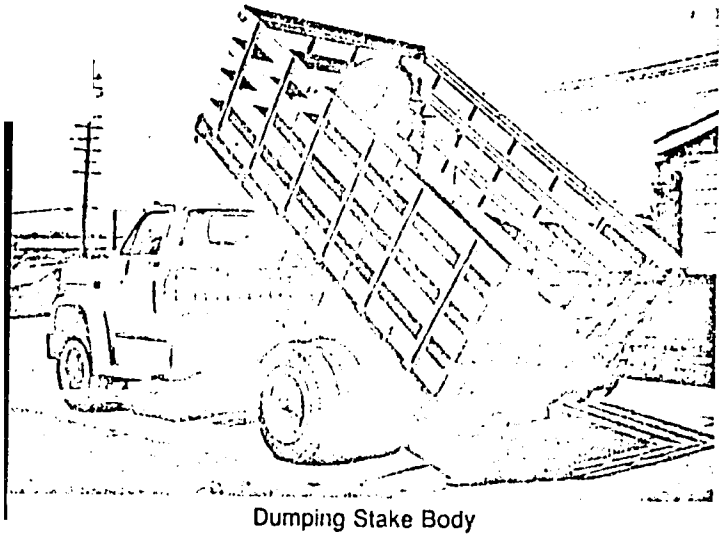
STAKE BODIES



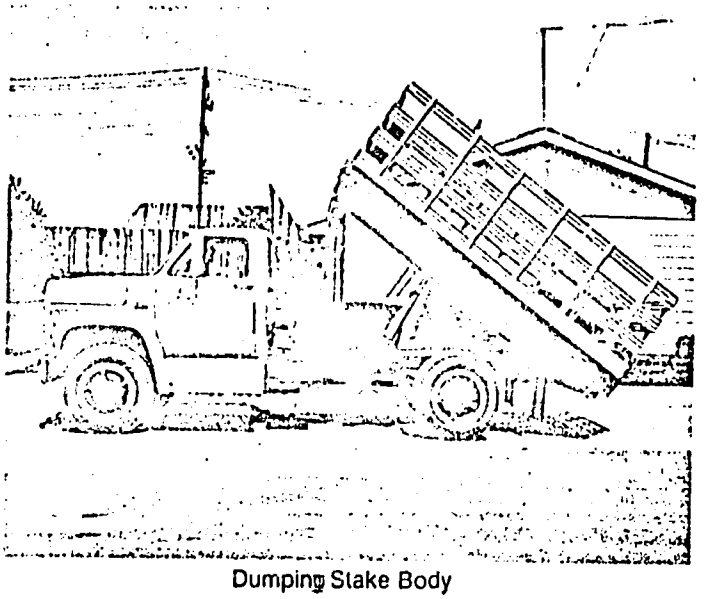
Stake Body With Rear Liftgate



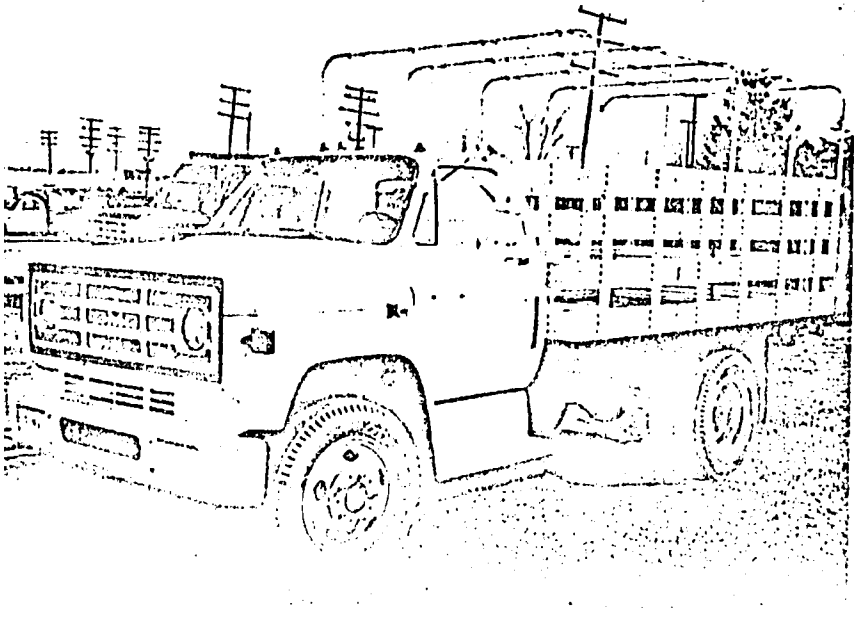
Stake Body With Rear Liftgate



Dumping Stake Body

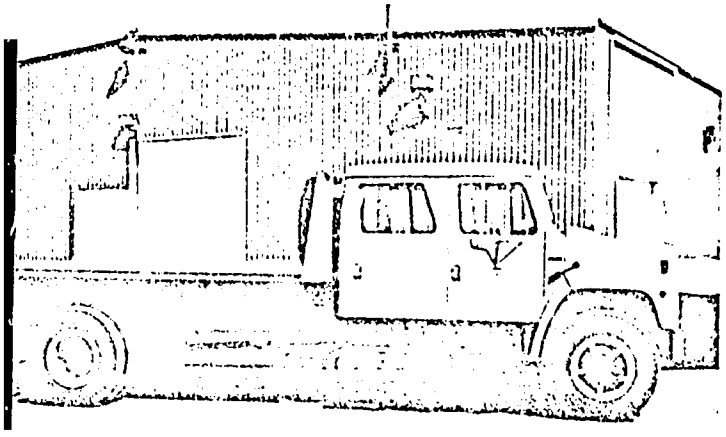


Dumping Stake Body

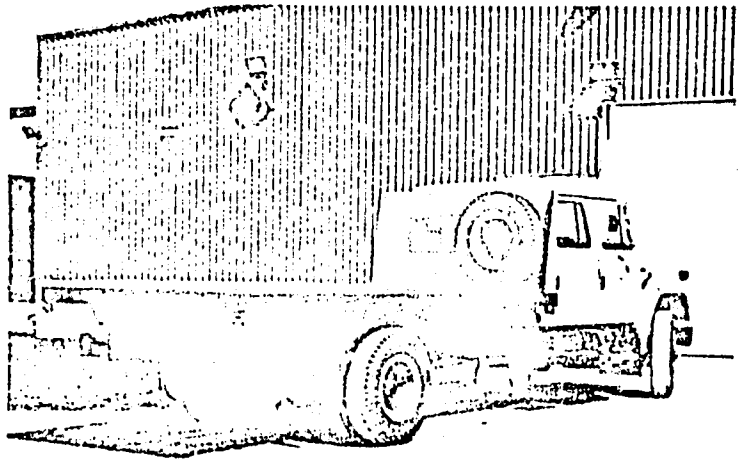


14' Stake Body With Bows

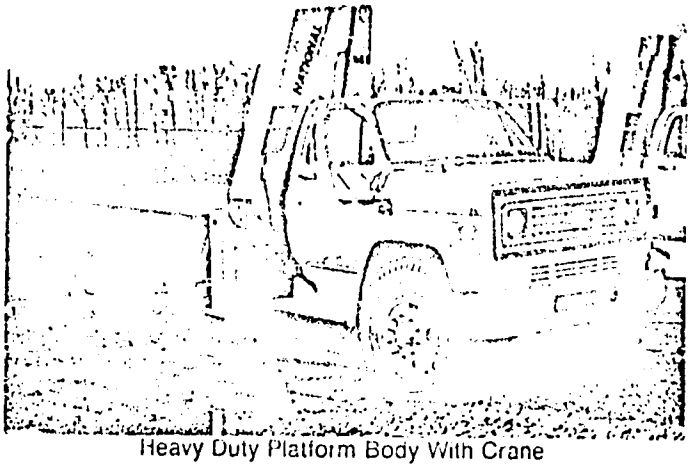
PLATFORM BODIES



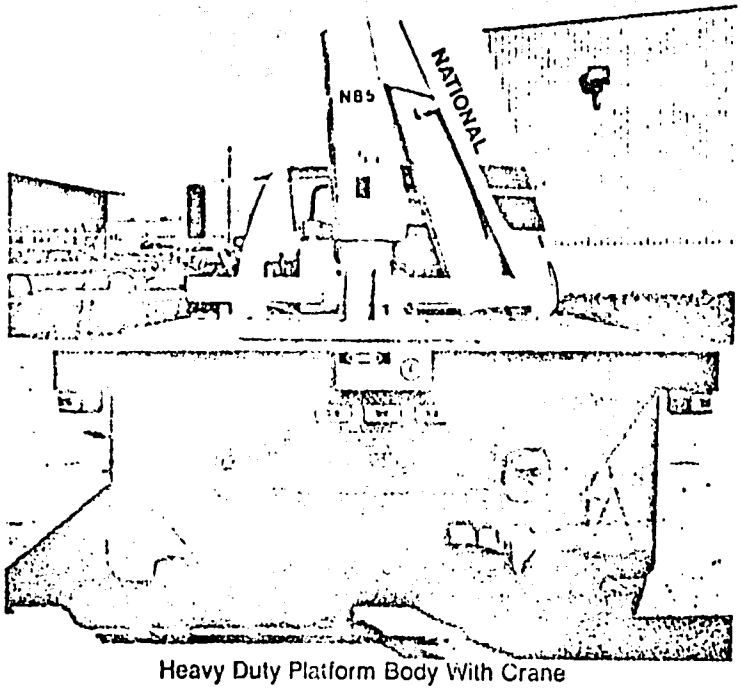
Heavy Duty Platform Body With Bulkhead



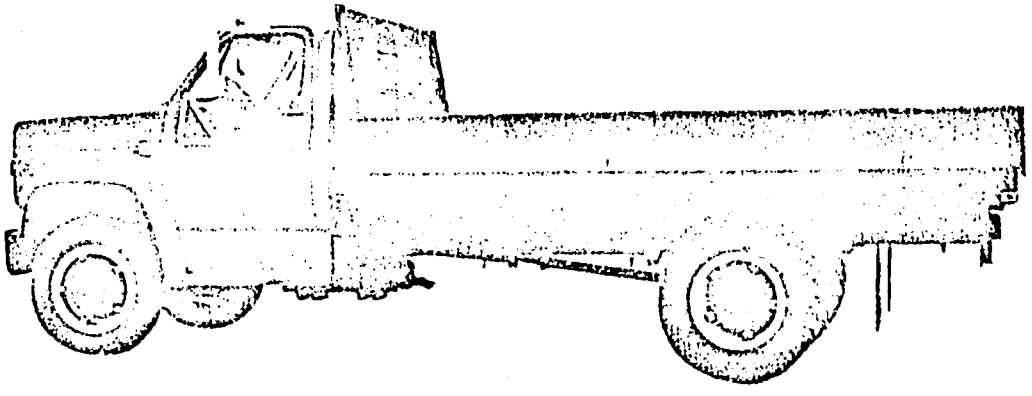
Heavy Duty Platform Body With Bulkhead



Heavy Duty Platform Body With Crane

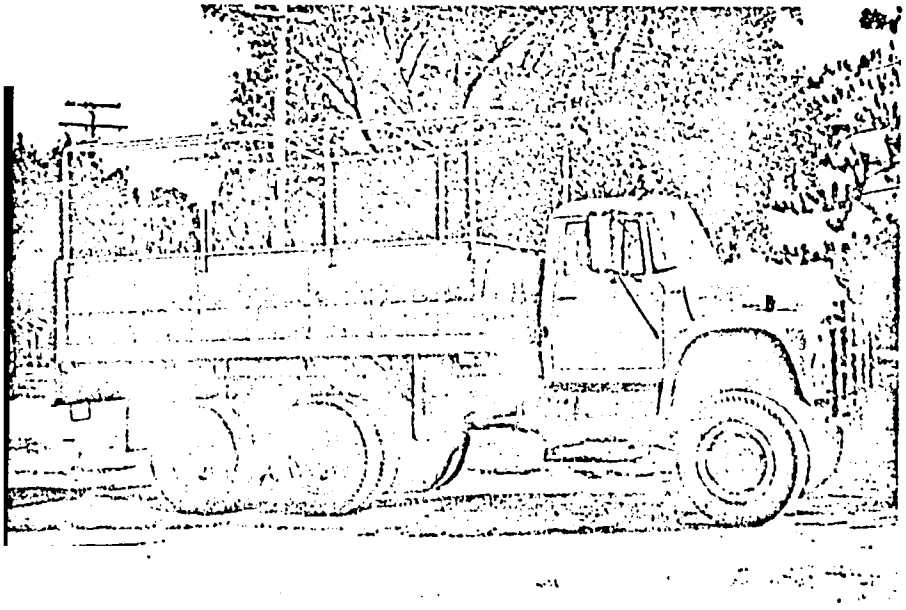


Heavy Duty Platform Body With Crane

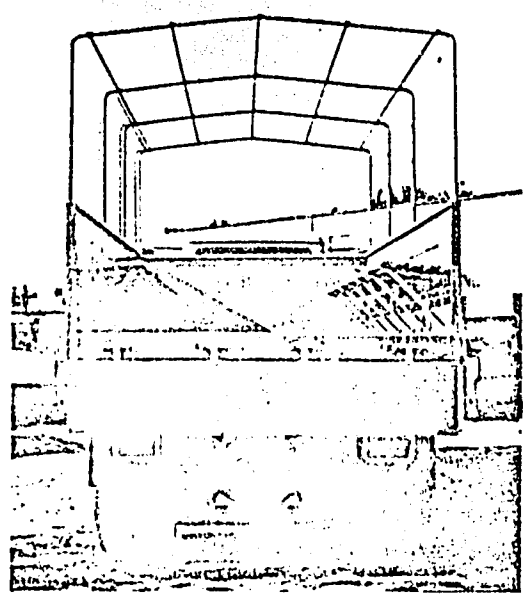


16' Contractor Body

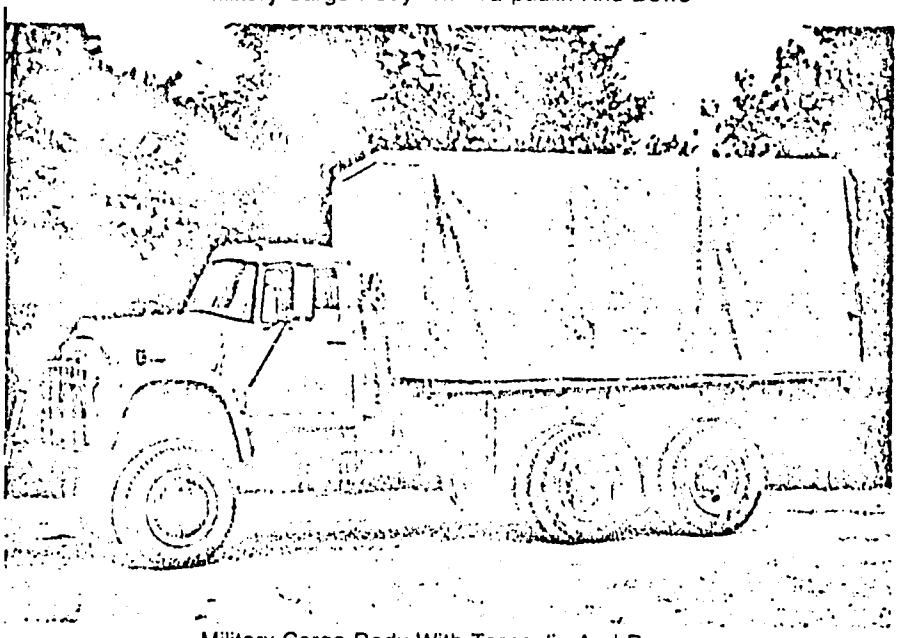
CARGO BODIES



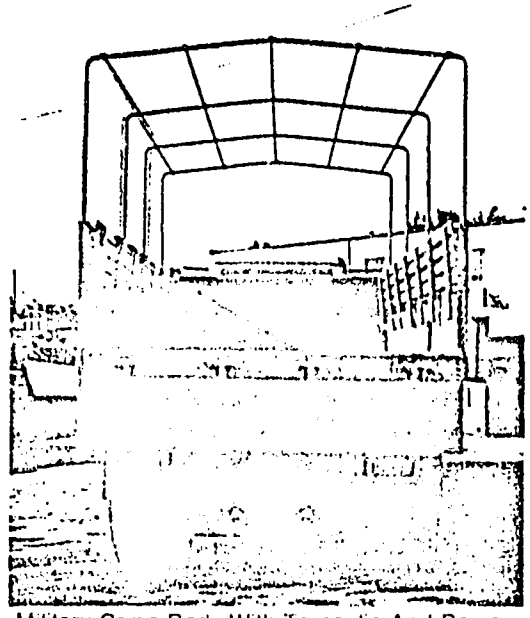
Military Cargo Body With Tarpaulin And Bows



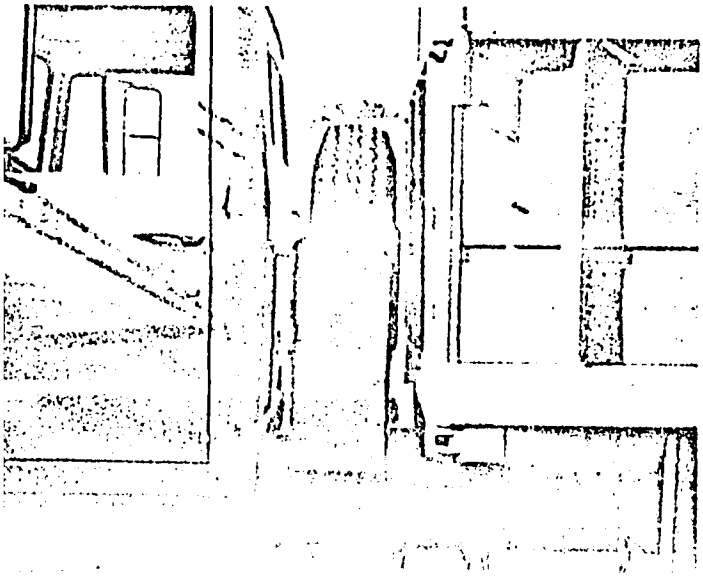
Military Cargo Body With Tarpaulin And Bows



Military Cargo Body With Tarpaulin And Bows



Military Cargo Body With Tarpaulin And Bows



Military Cargo Body With Tarpaulin And Bows

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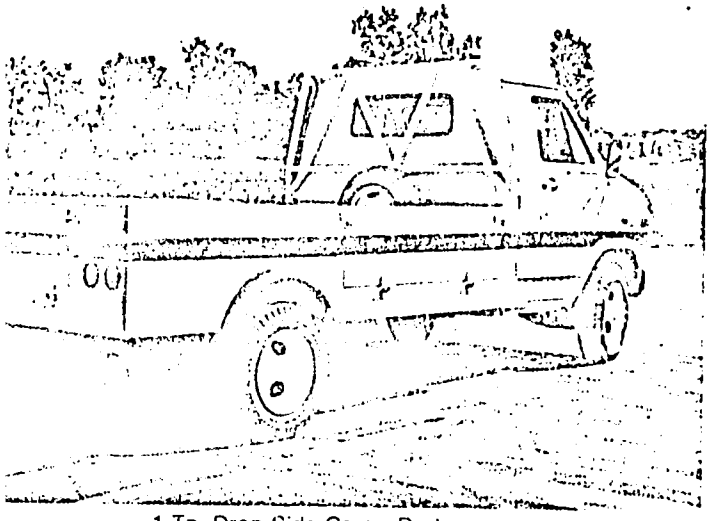
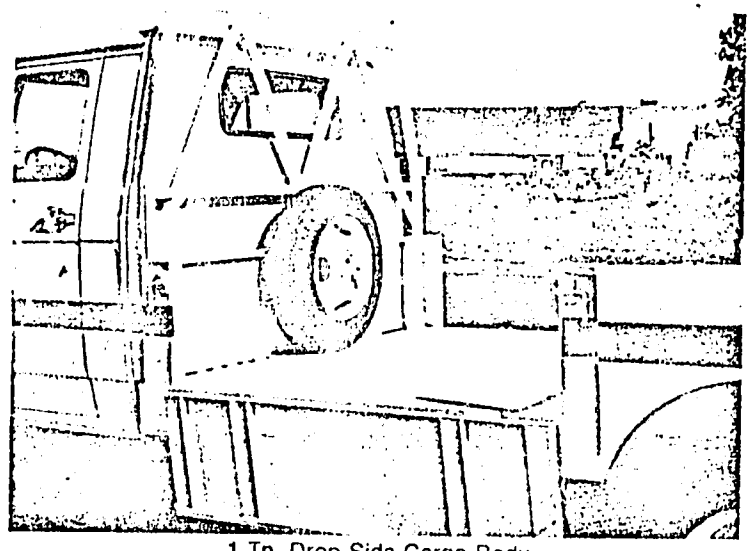
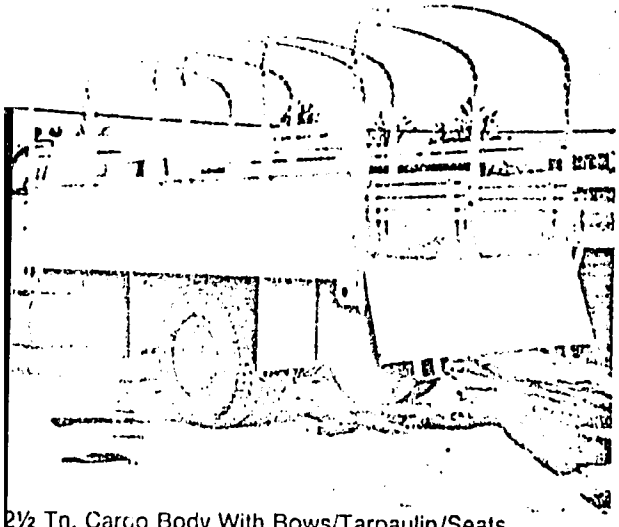
CARGO BODIES



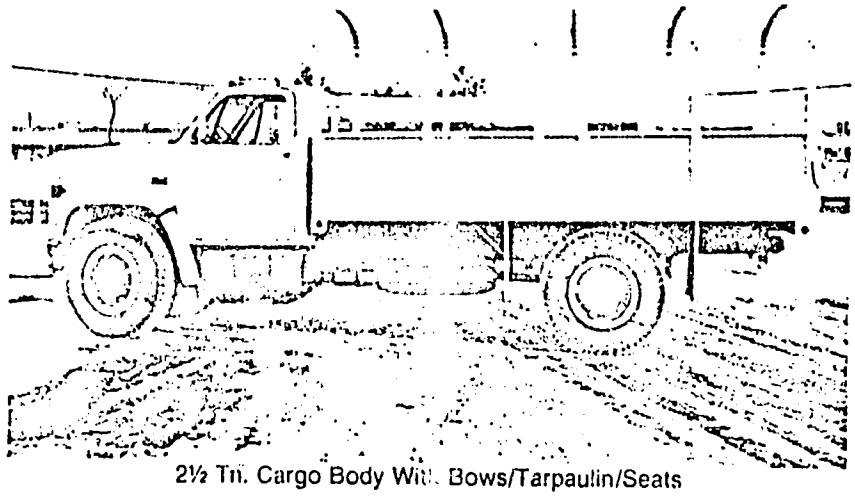
1 Tn. Drop Side Cargo Body



1 Tn. Drop Side Cargo Body

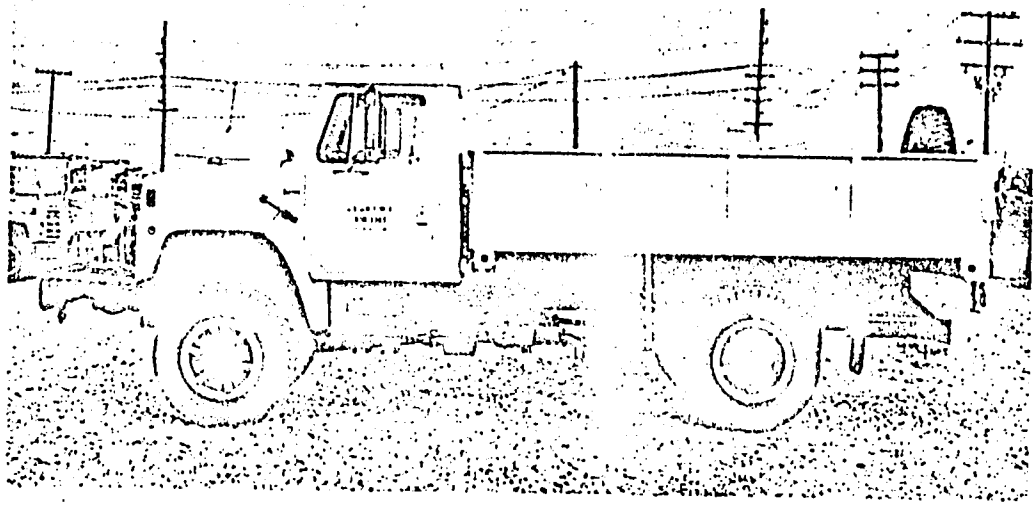


2½ Tn. Cargo Body With Bows/Tarpaulin/Seats



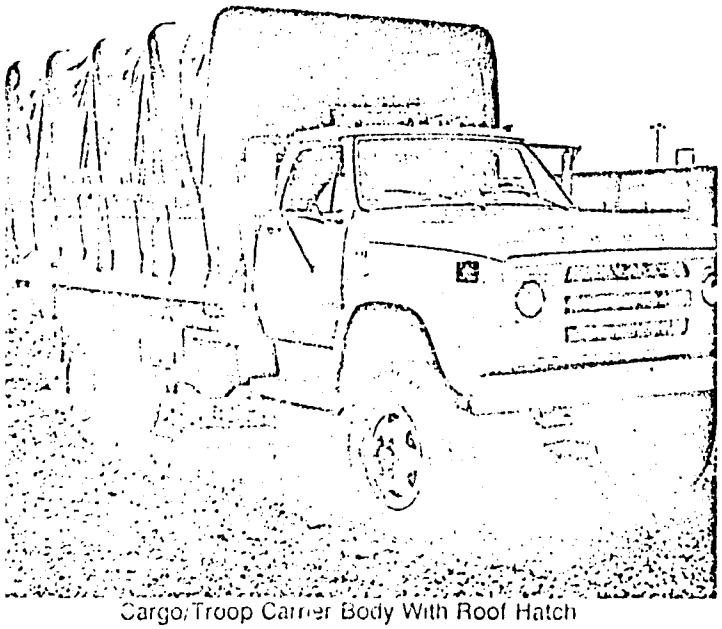
2½ Tn. Cargo Body With Bows/Tarpaulin/Seats

12' Cargo Body

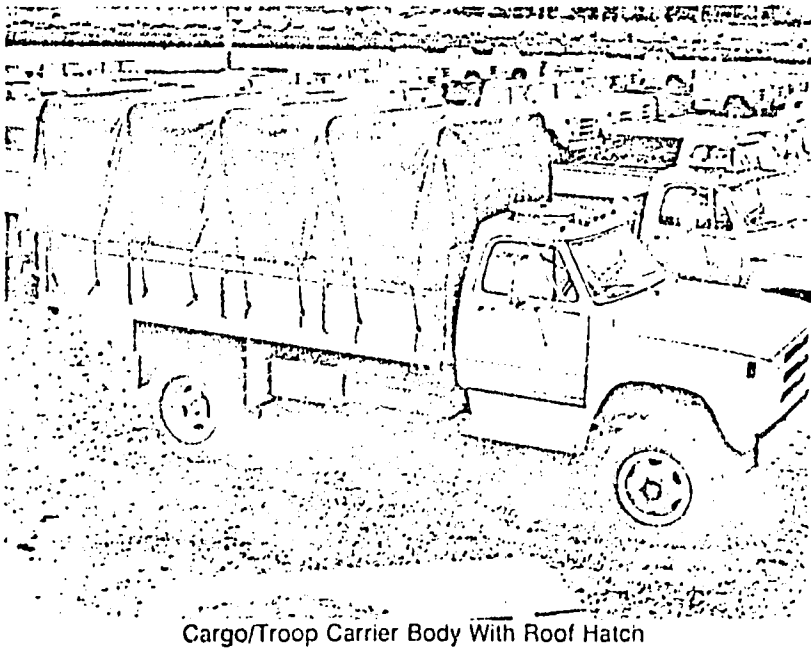


127

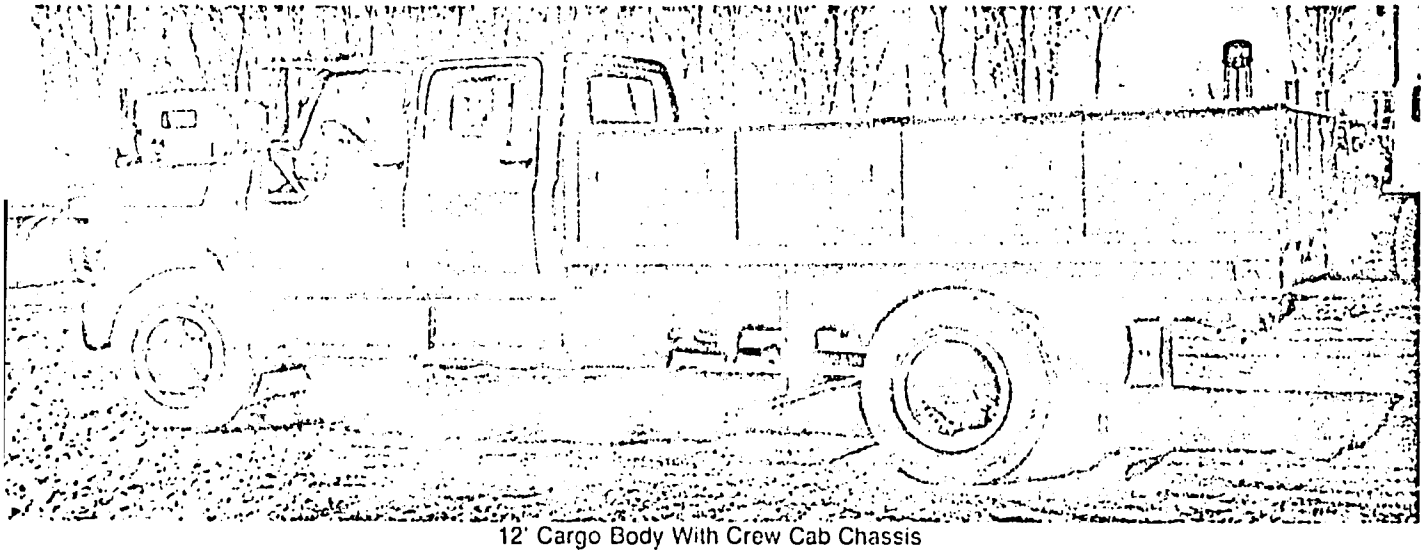
CARGO BODIES



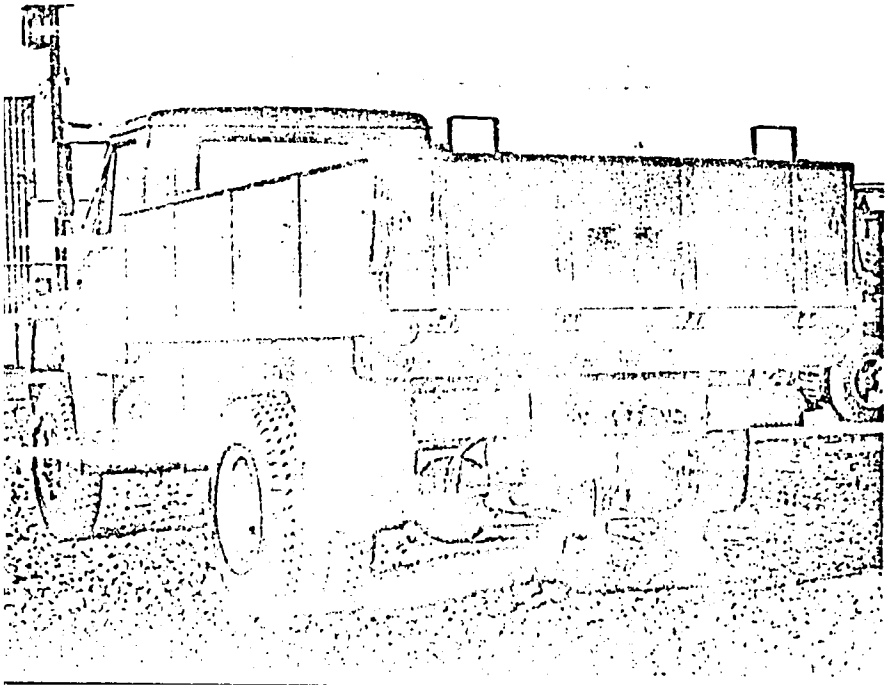
Cargo/Troop Carrier Body With Roof Hatch



Cargo/Troop Carrier Body With Roof Hatch

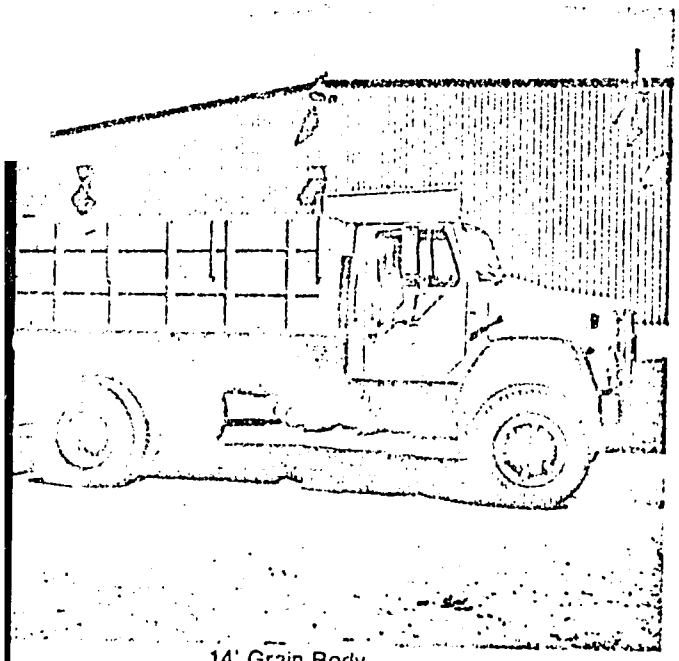


12' Cargo Body With Crew Cab Chassis

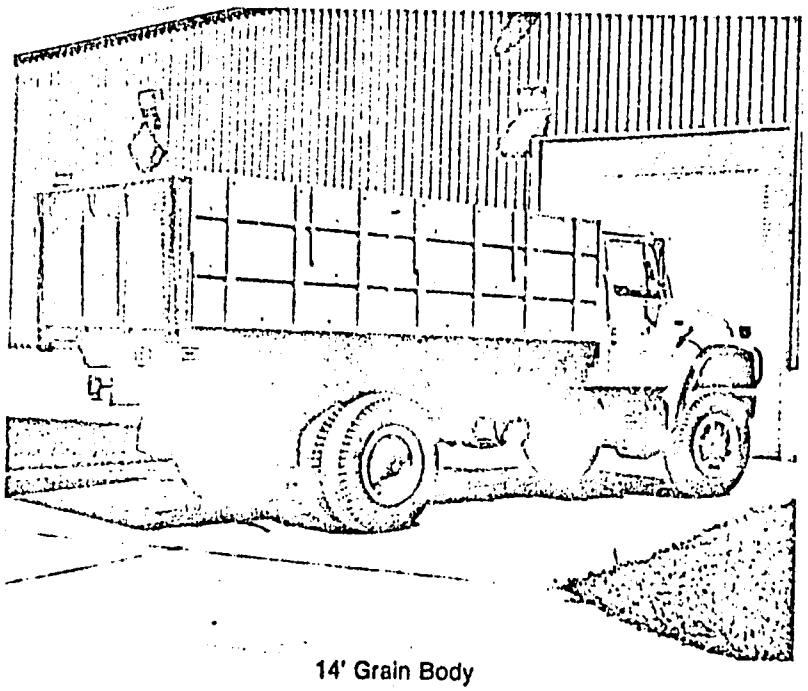


12' Military Cargo Body With Drop Tailgate

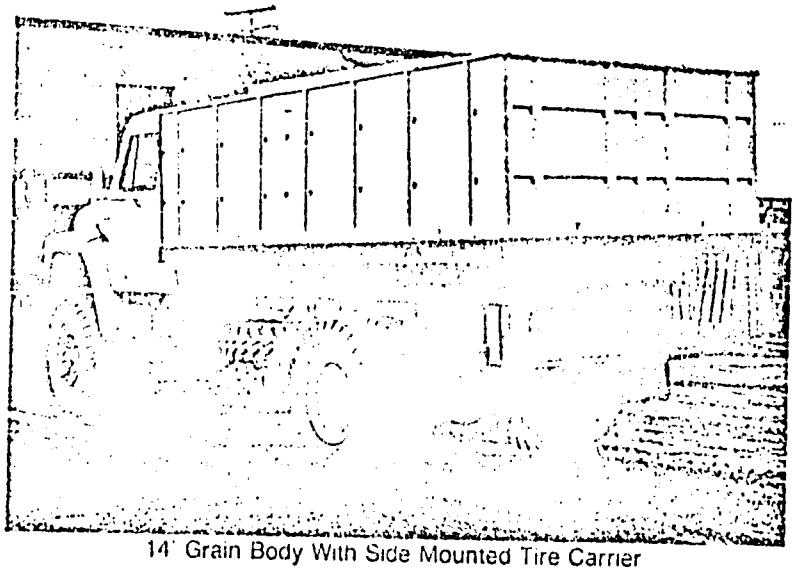
GRAIN BODIES



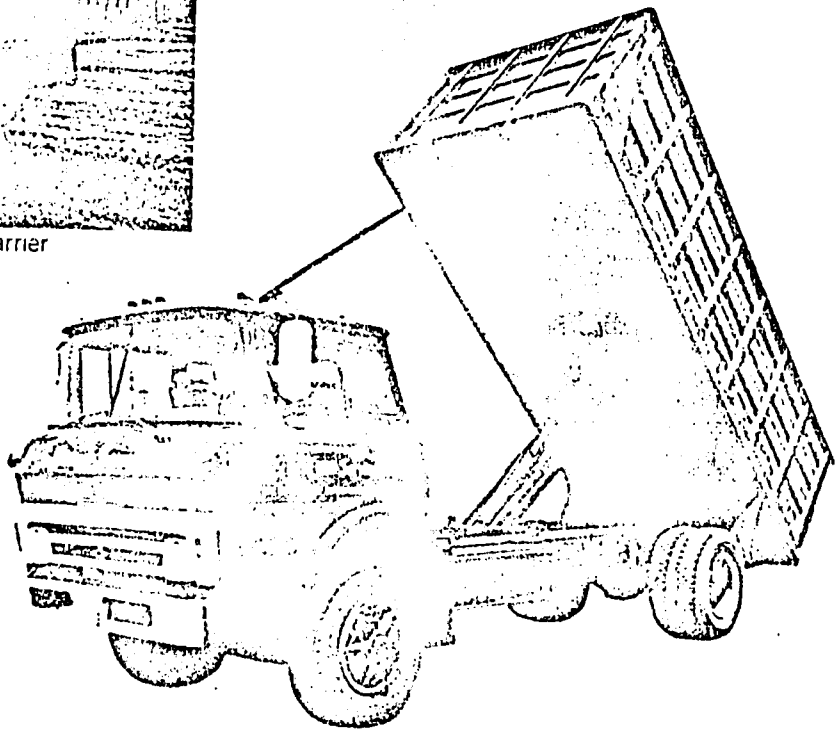
14' Grain Body



14' Grain Body

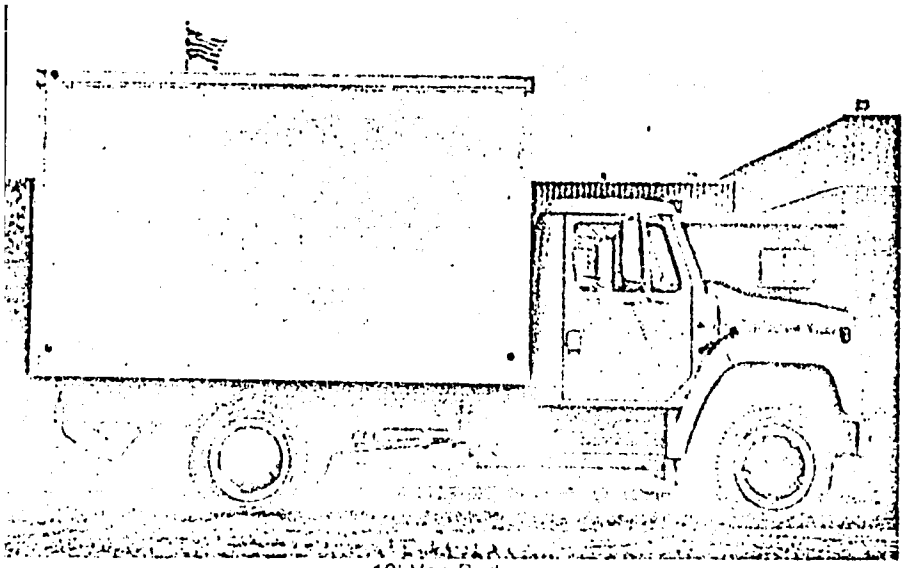


14' Grain Body With Side Mounted Tire Carrier

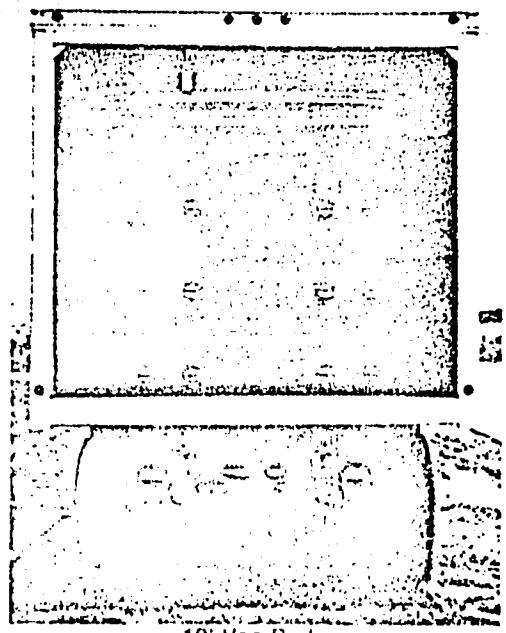


16' Dumping Grain Body

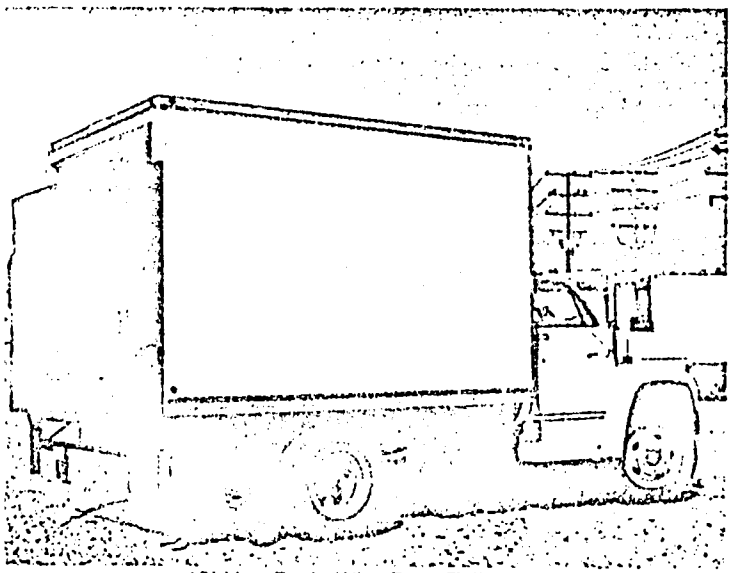
VAN BODIES



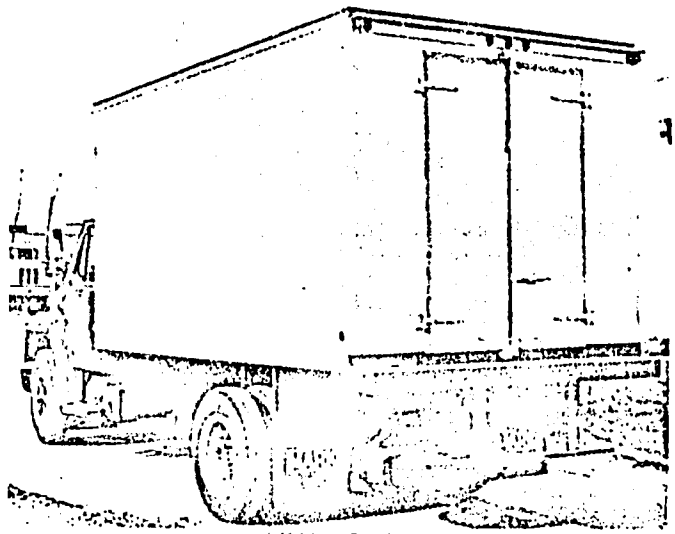
12' Van Body



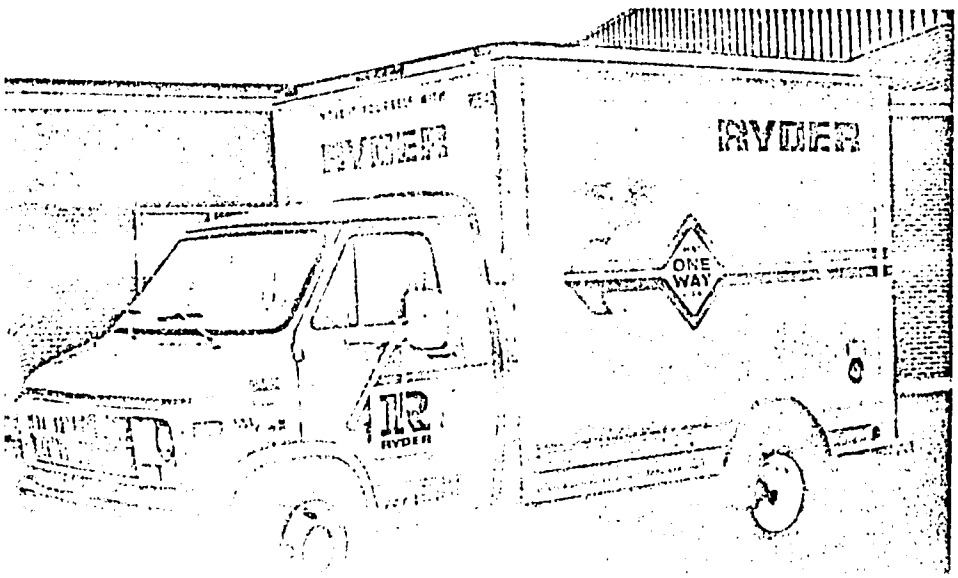
12' Van Body



12' Van Body With Rear Tailgate

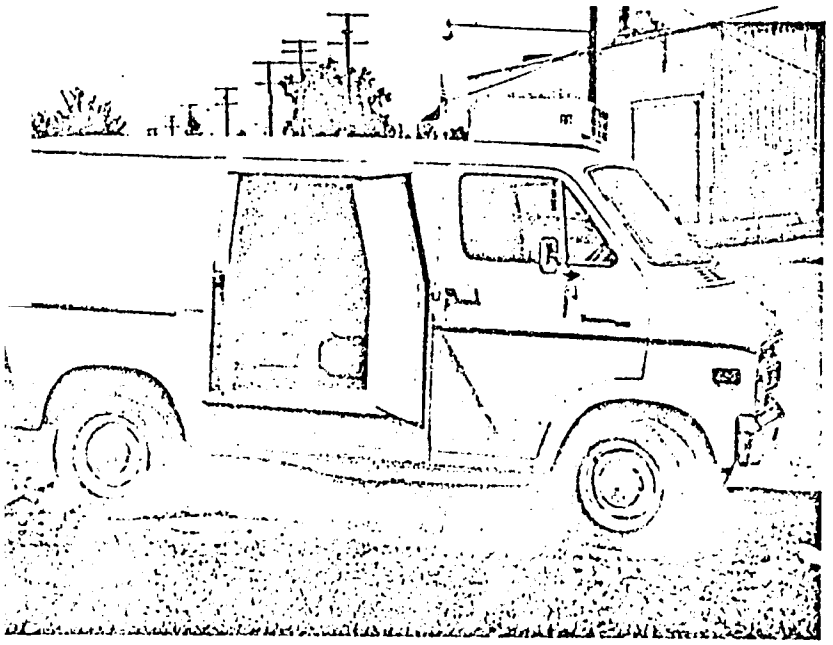


14' Van Body

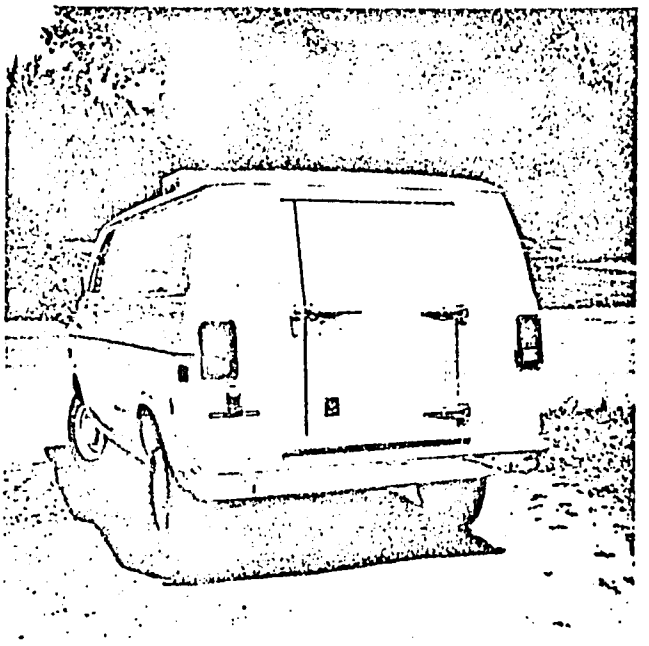


Hi-Cube Van Body

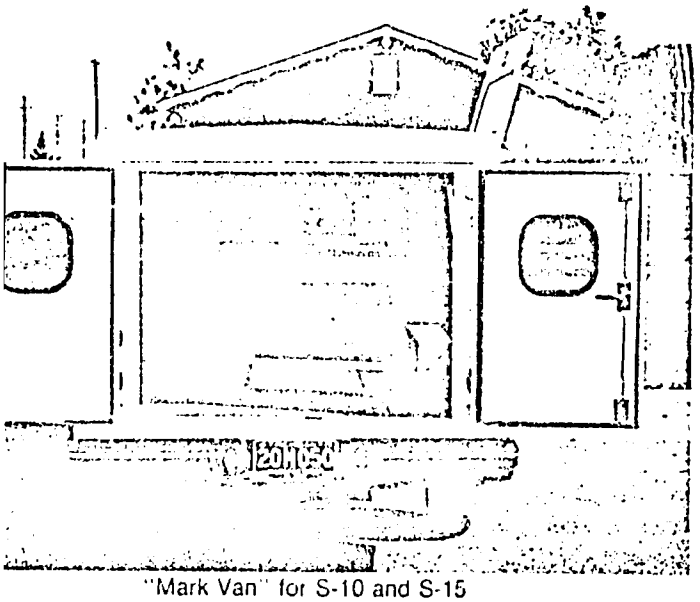
VAN BODIES



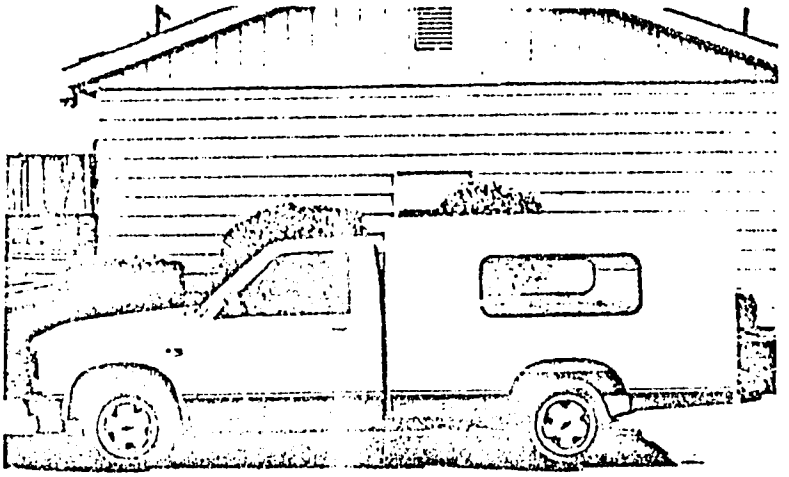
Refrigerated Van Conversion



Refrigerated Van Conversion

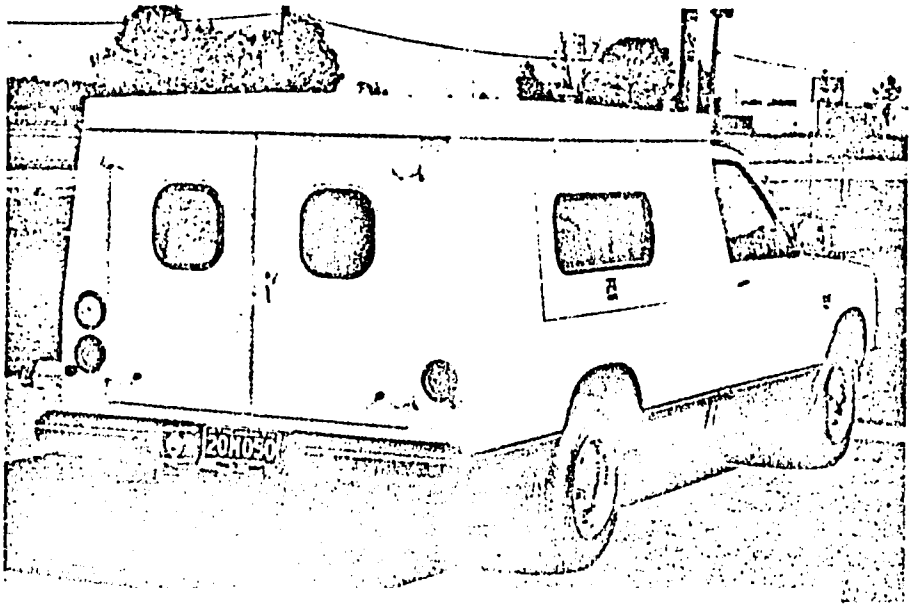


"Mark Van" for S-10 and S-15

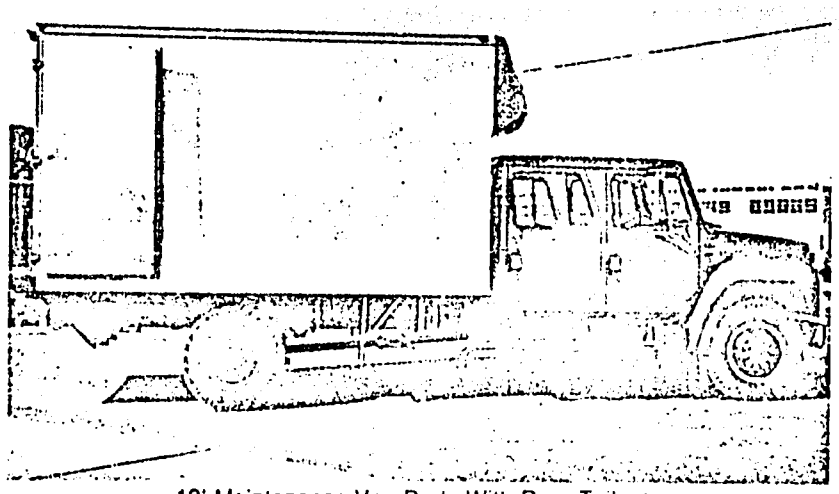


"Mark Van" for S-10 and S-15

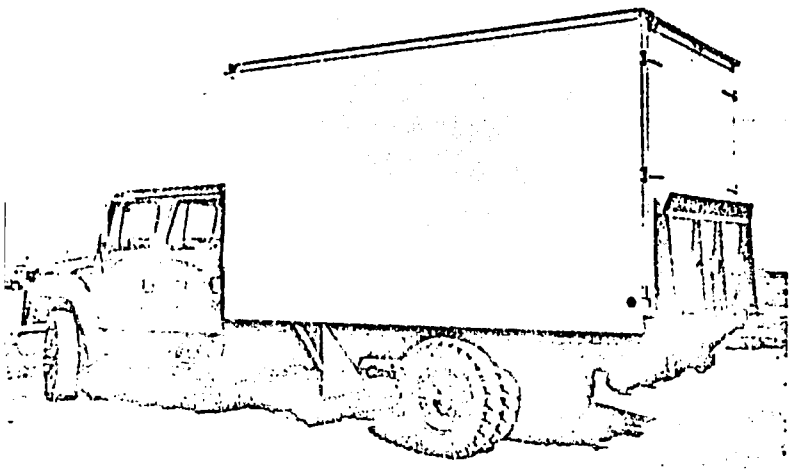
"Mark Van" for S-10 and S-15



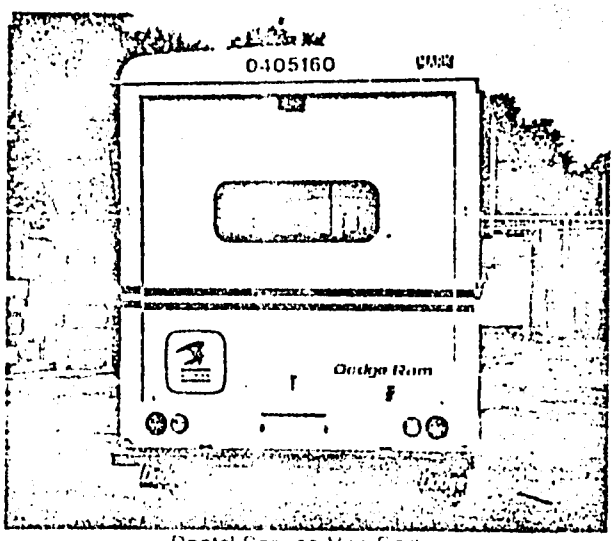
VAN BODIES



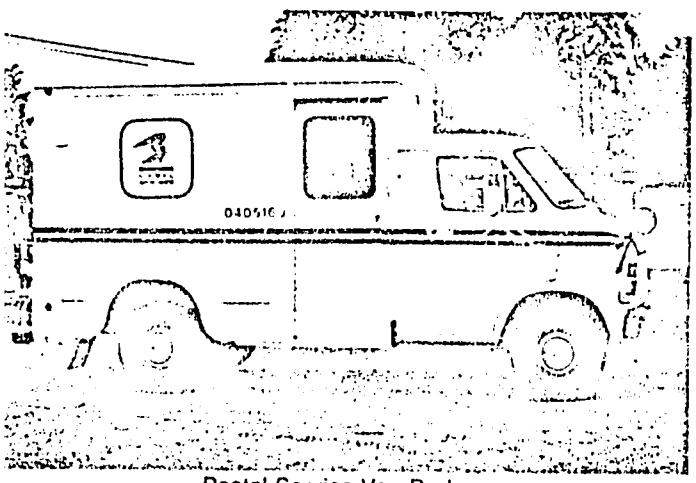
12' Maintenance Van Body With Rear Tailgate



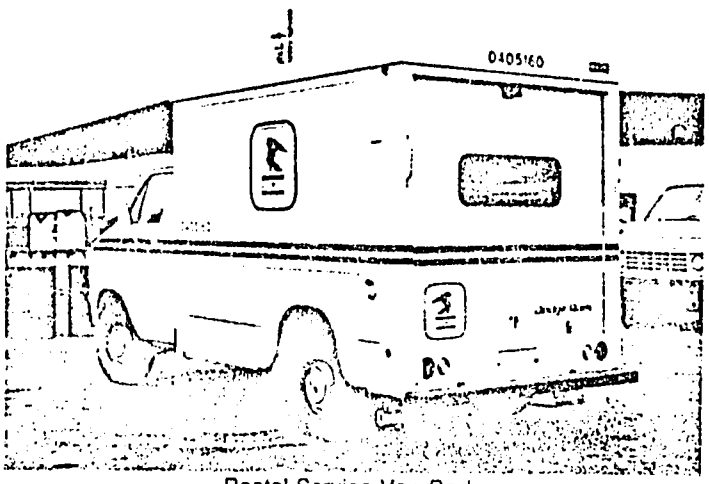
12' Maintenance Van Body With Rear Tailgate



Postal Service Van Body



Postal Service Van Body



Postal Service Van Body

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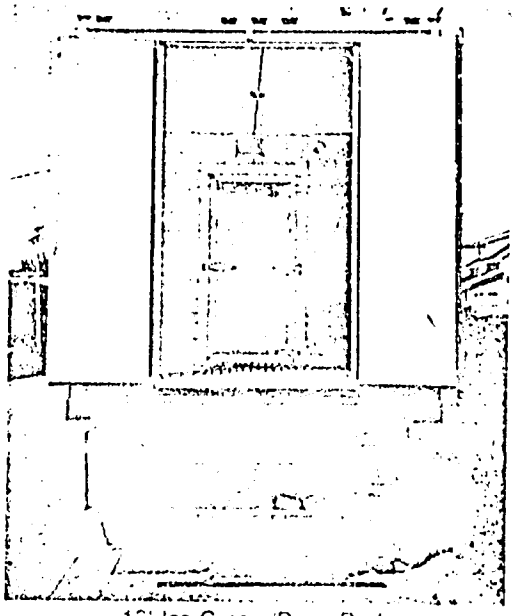
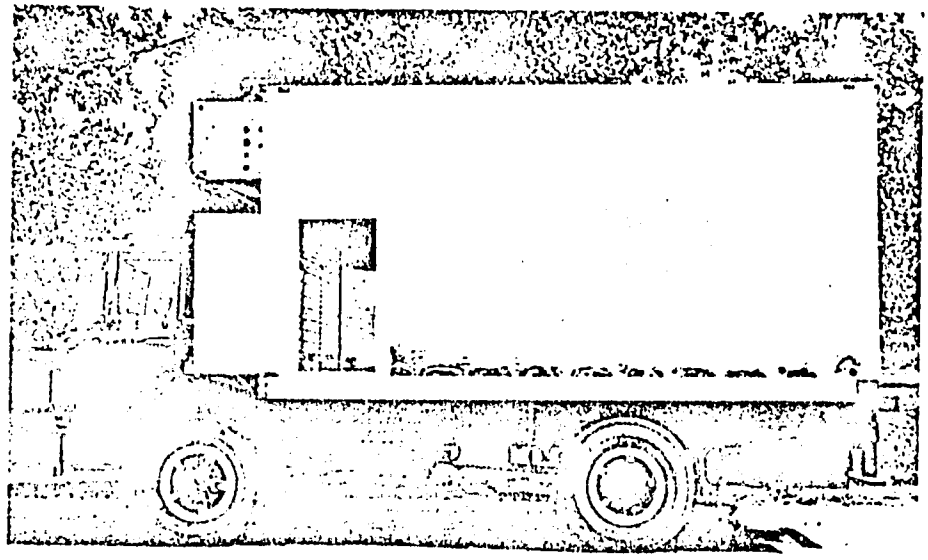
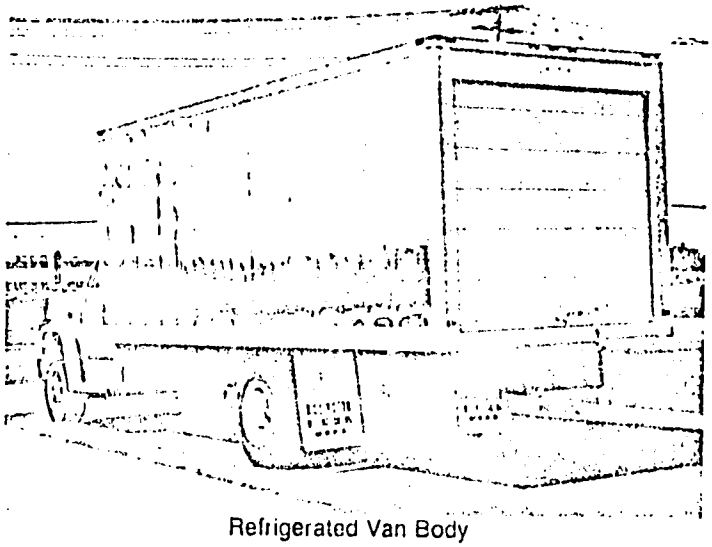
VAN BODIES



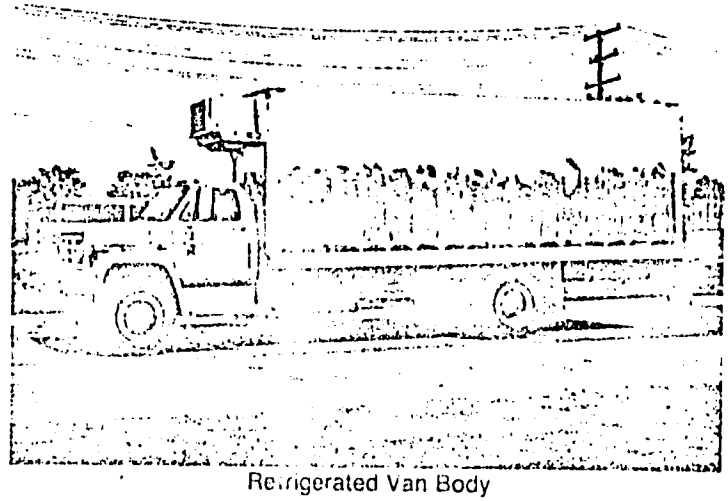
16' Ice Cream/Dairy Body



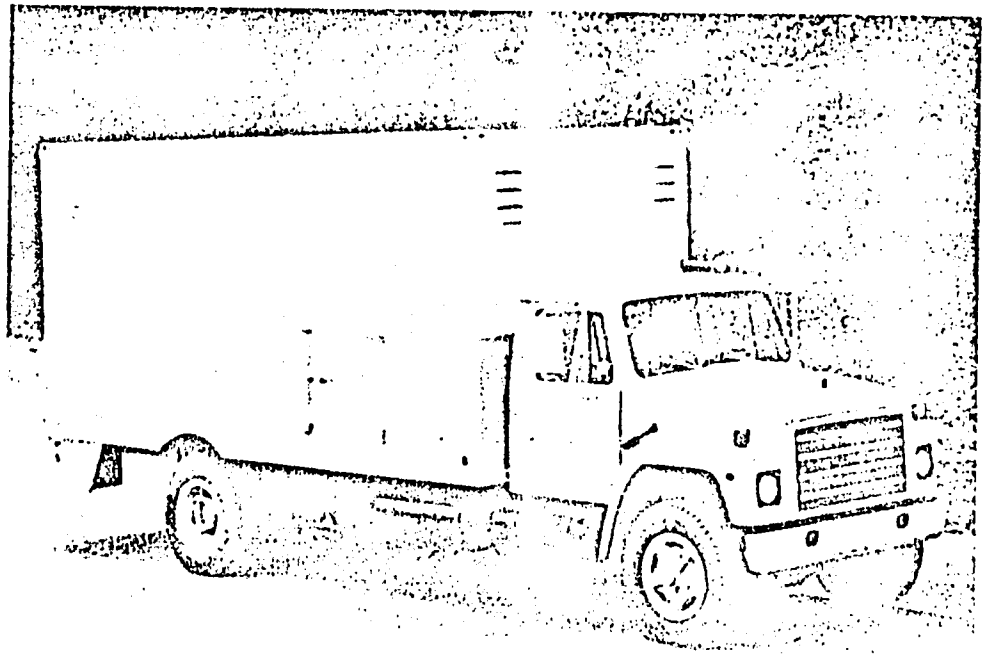
16' Ice Cream/Dairy Body



Refrigerated Van Body

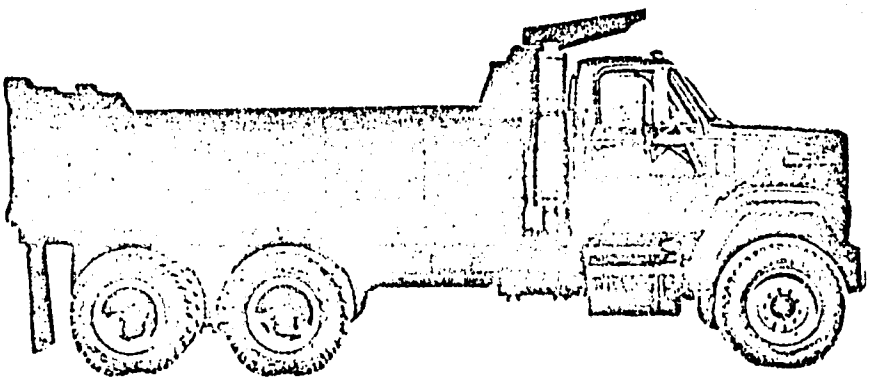


Refrigerated Van Body

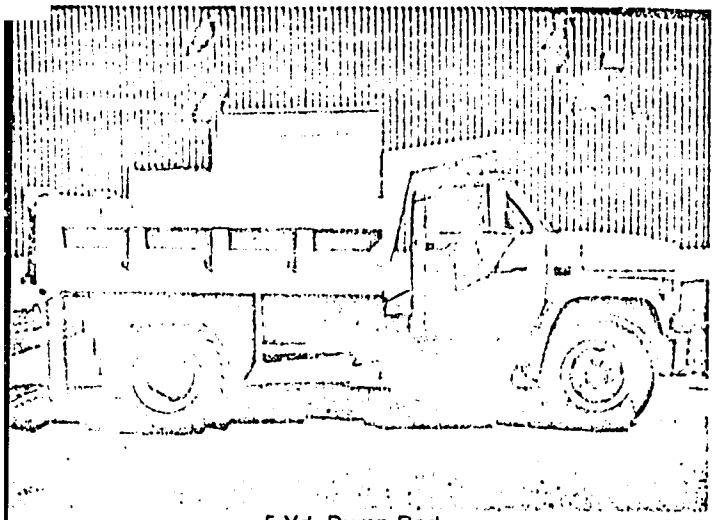


Poultry Transport Body

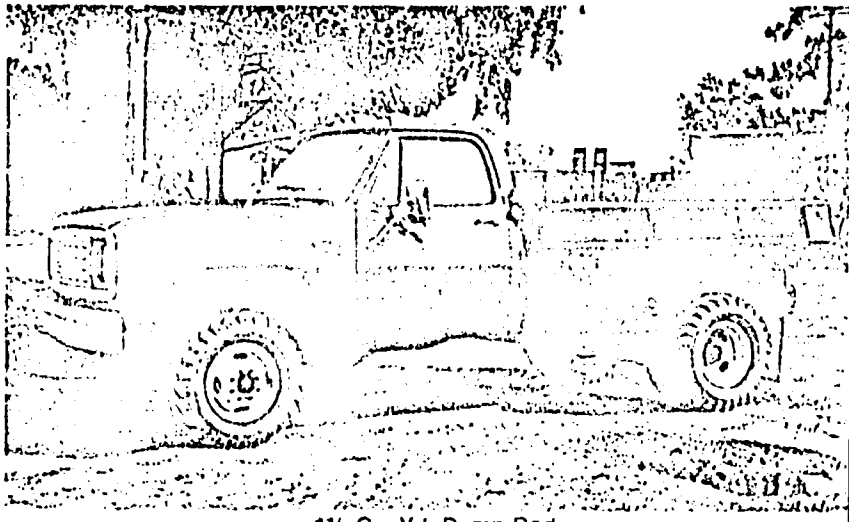
DUMP BODIES



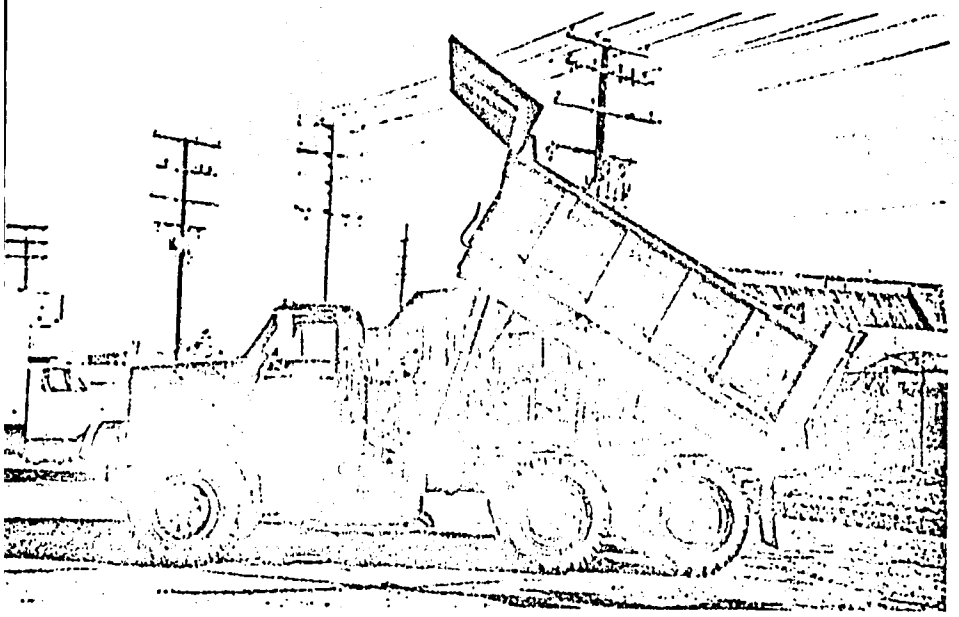
10 Yd. Dump Body



5 Yd. Dump Body



1½ Cu. Yd. Dump Body



6 Cu. Yd. Dump Body

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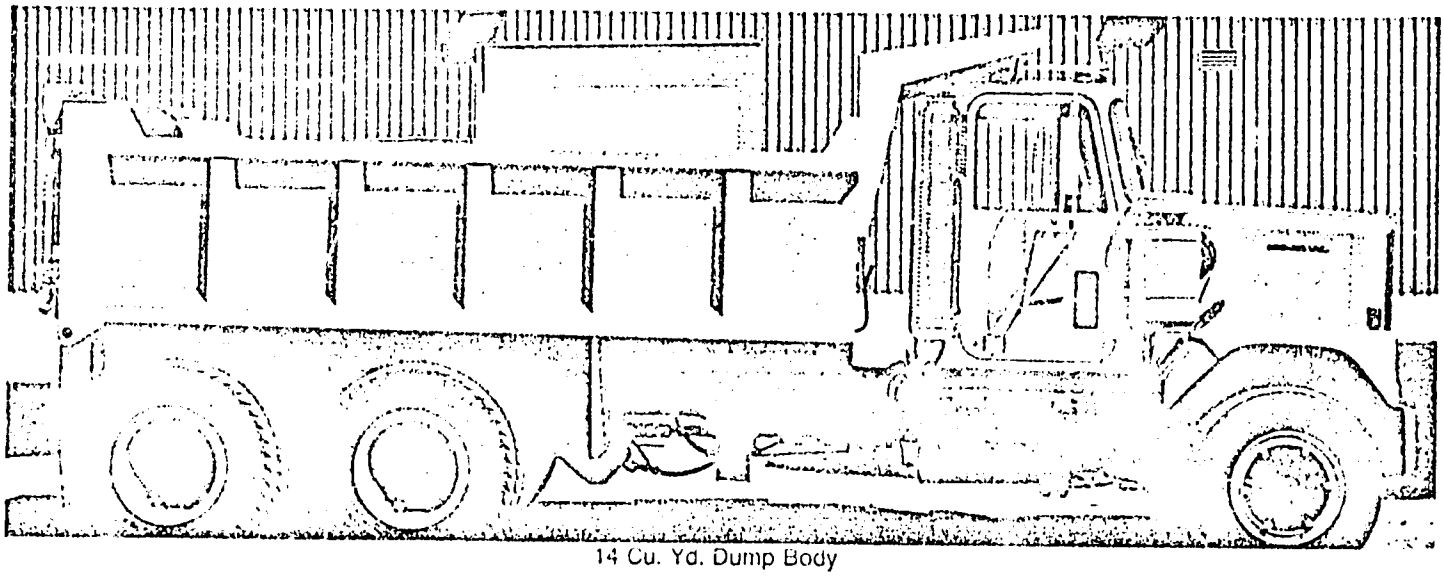
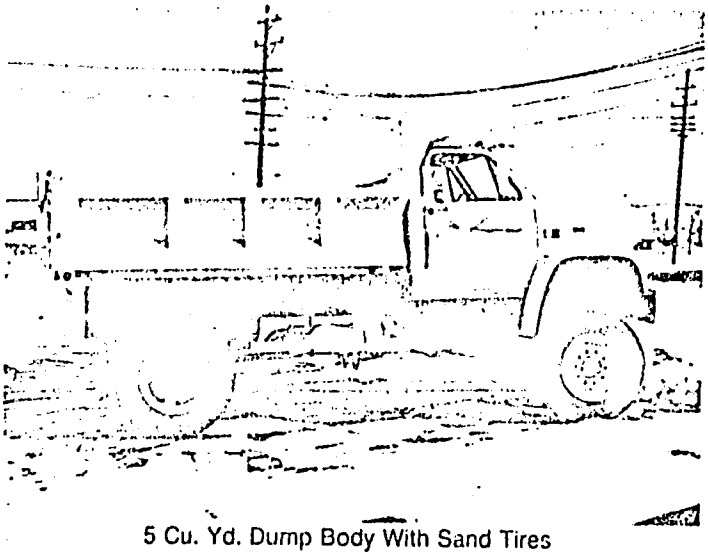
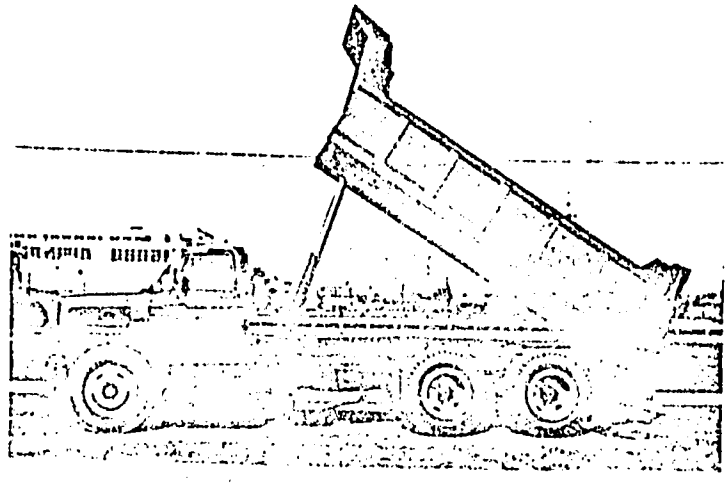
DUMP BODIES



14 Cu. Yd. Dump Body

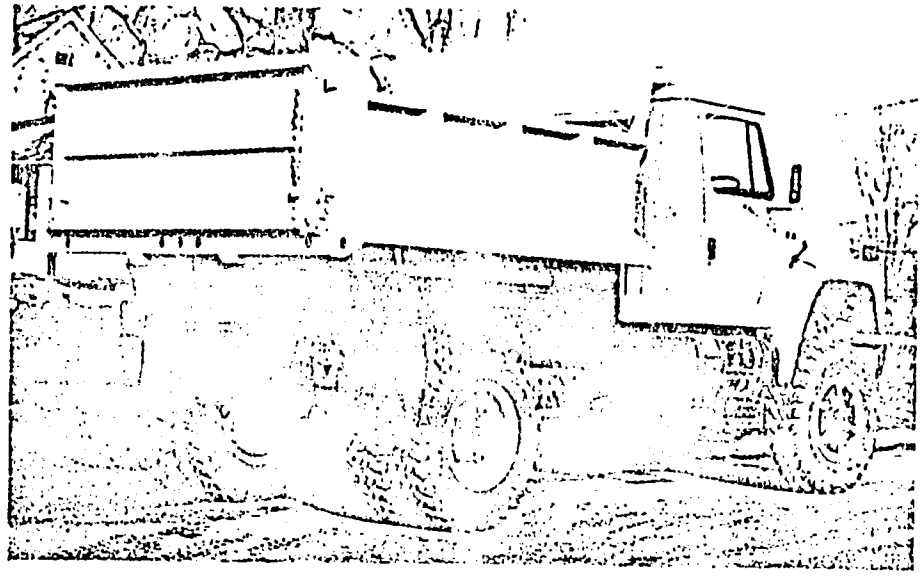


5 Cu. Yd. Dump Body With Sand Tires



8 Cu. Yd. Dump Body

5 Cu. Yd. Dump Body



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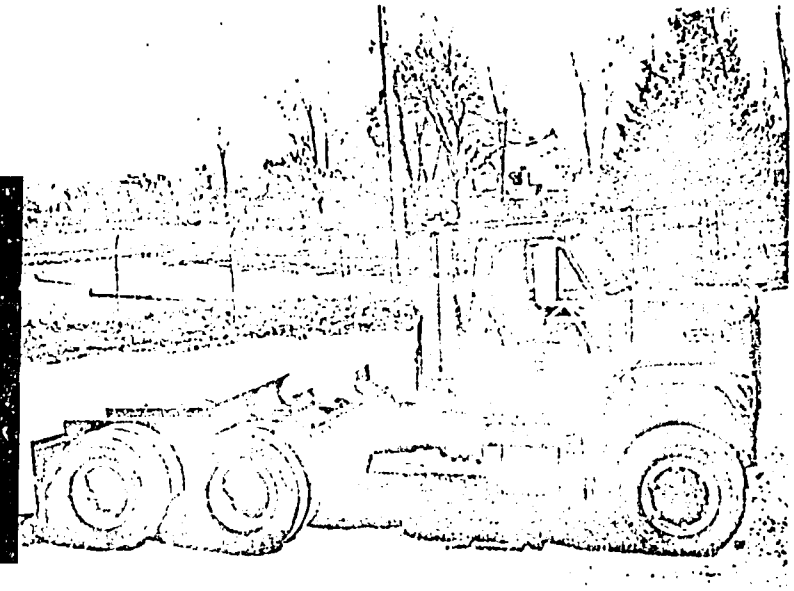
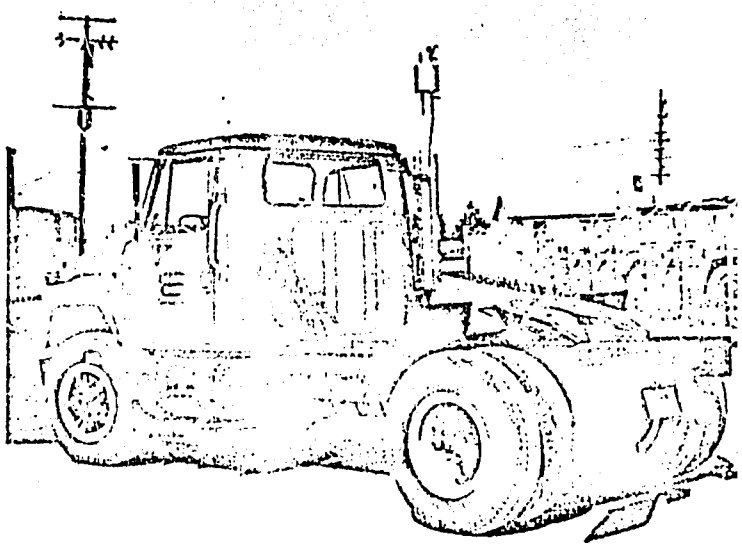
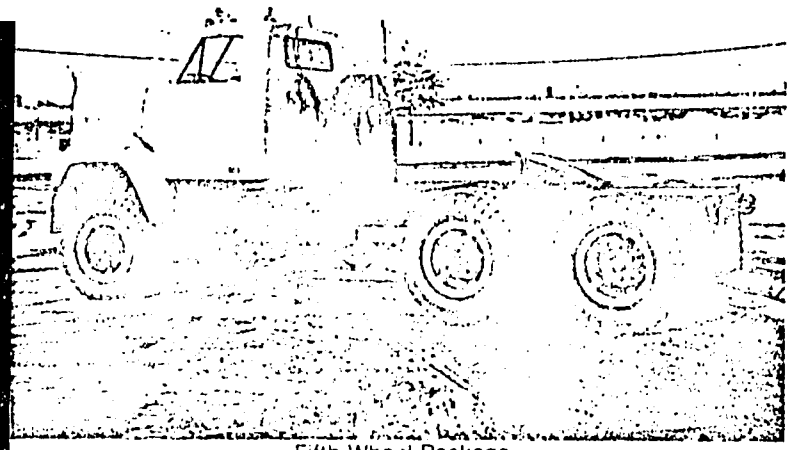
FIFTH WHEELS



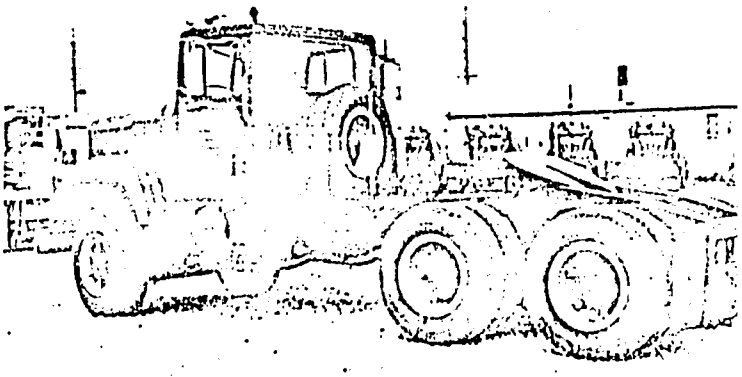
Fifth Wheel Package



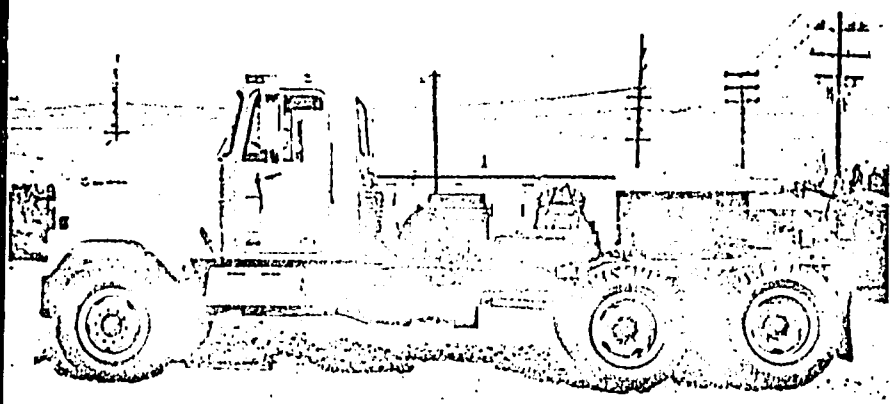
Fifth Wheel Package



Fifth Wheel Package



Fifth Wheel Package



Fifth Wheel Package With 60,000 Lb. Rear Winch

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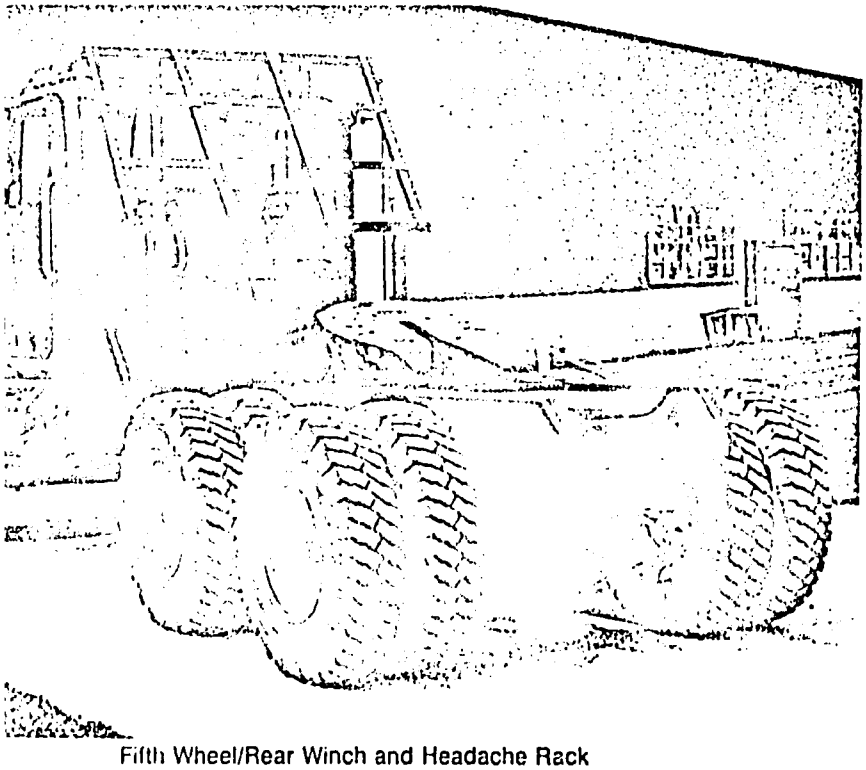
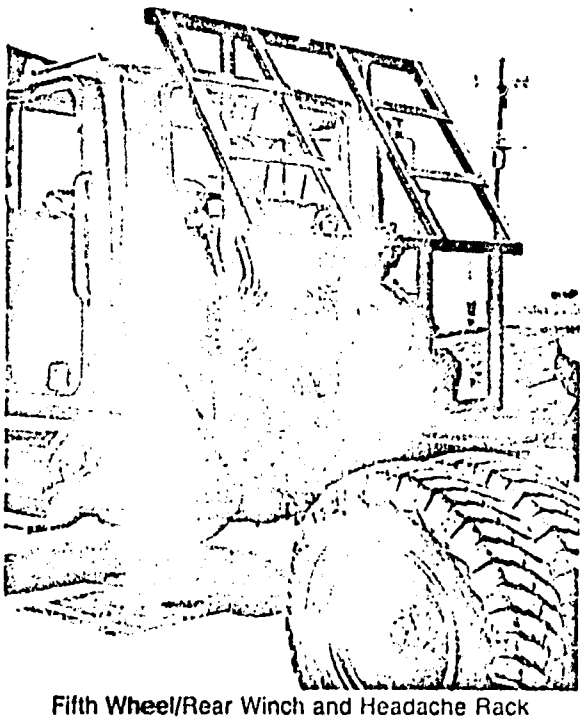
FIFTH WHEELS

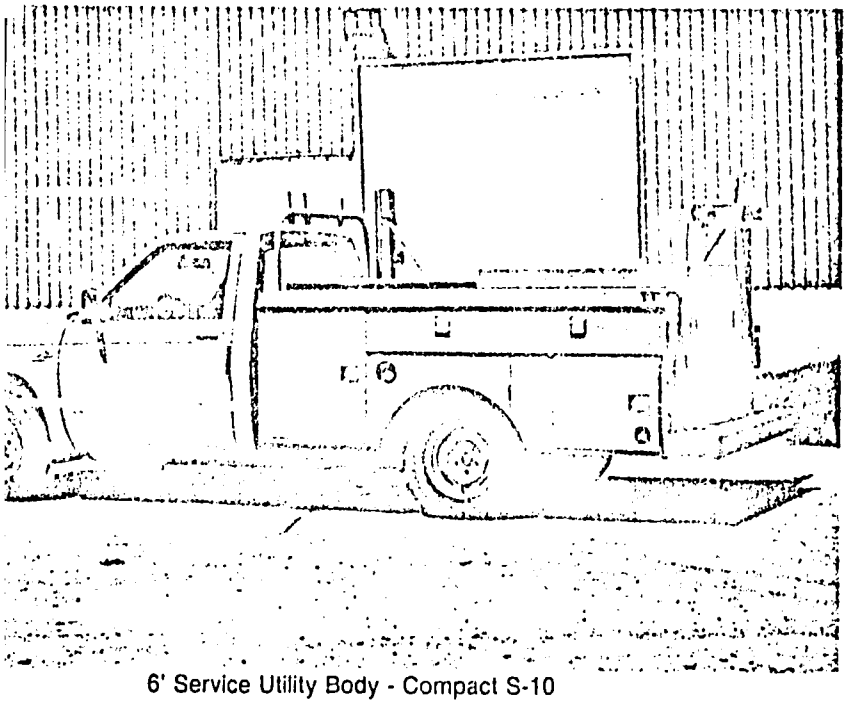


Fifth Wheel/Rear Winch and Headache Rack

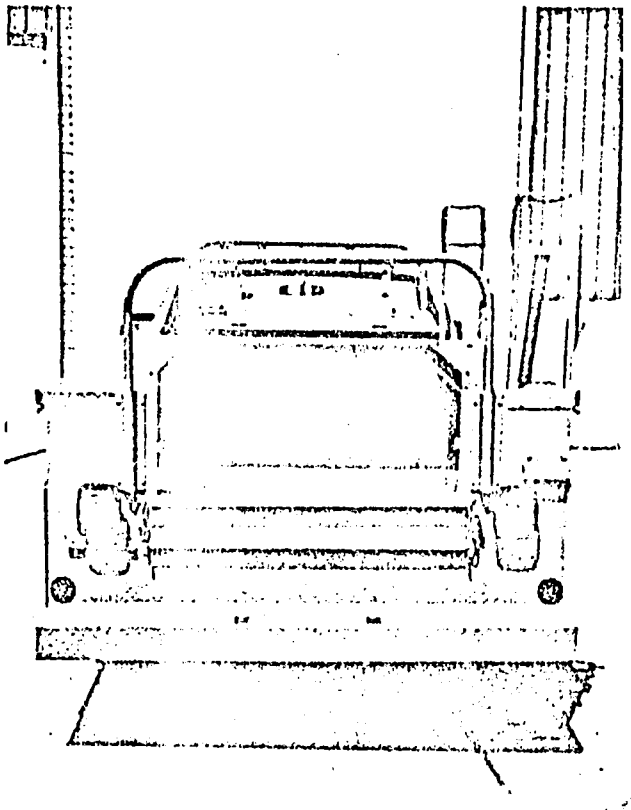


Fifth Wheel/Rear Winch and Headache Rack

SERVICE UTILITY BODIES

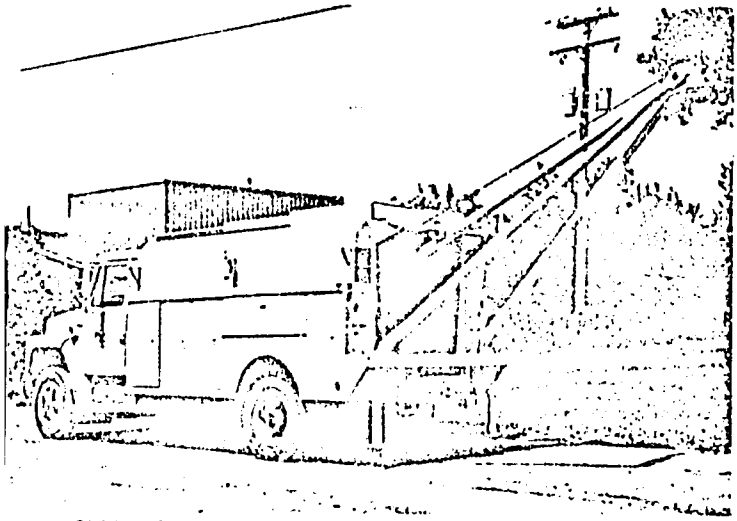


6' Service Utility Body - Compact S-10

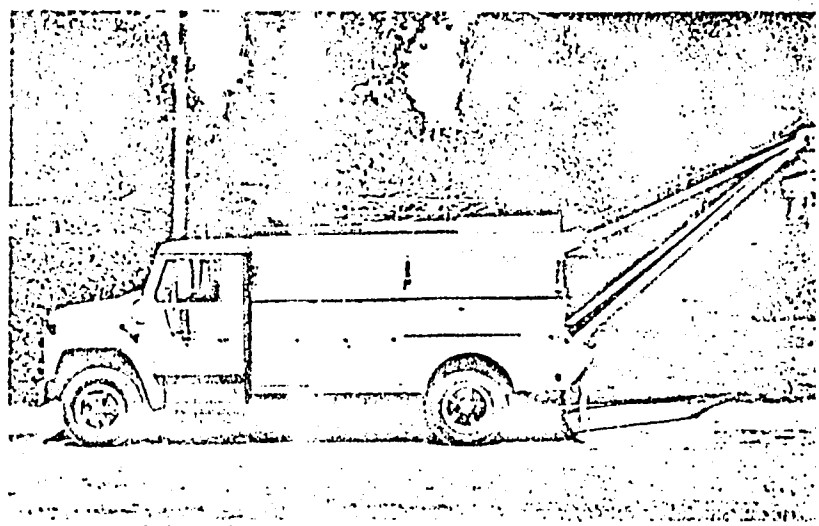


6' Service Utility Body - Compact S-10

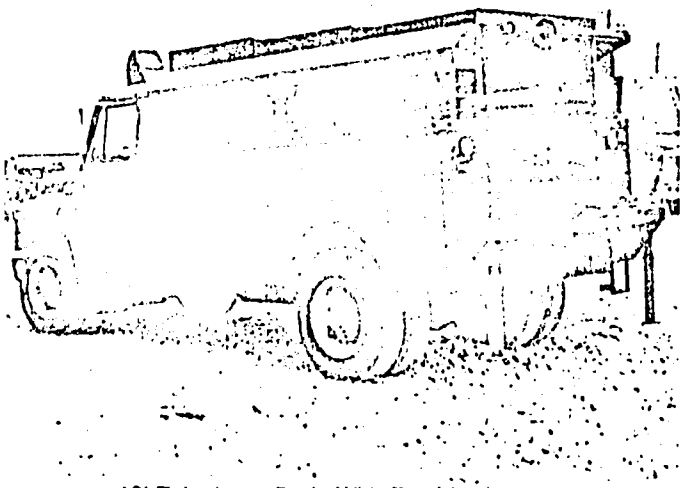
SERVICE UTILITY BODIES



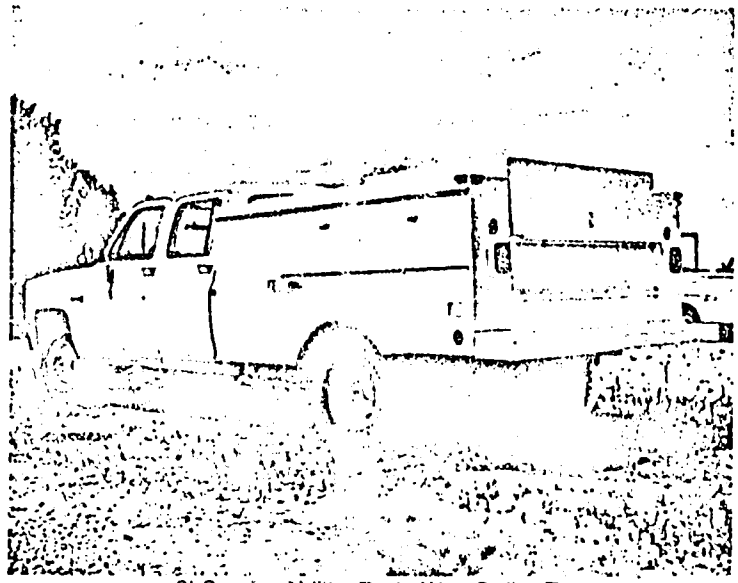
12' Line Construction Body With Derrick Poles and Winch



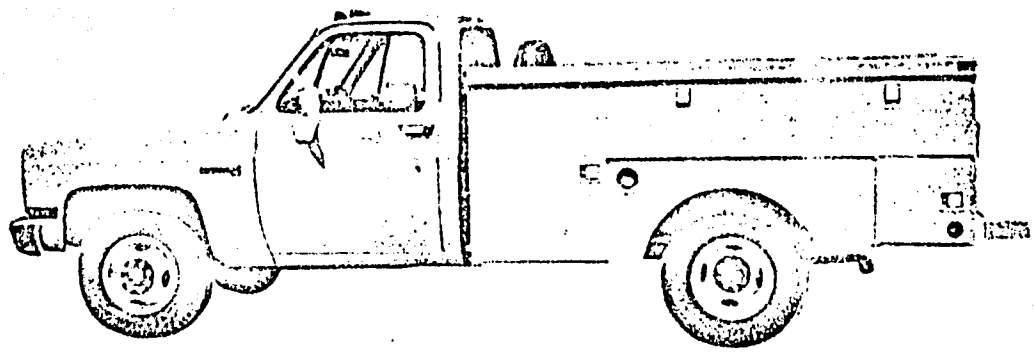
12' Line Construction Body With Derrick Poles and Winch



12' Telephone Body With Roof Periscope



8' Service Utility Body With Roller Top



8' Service Utility Body

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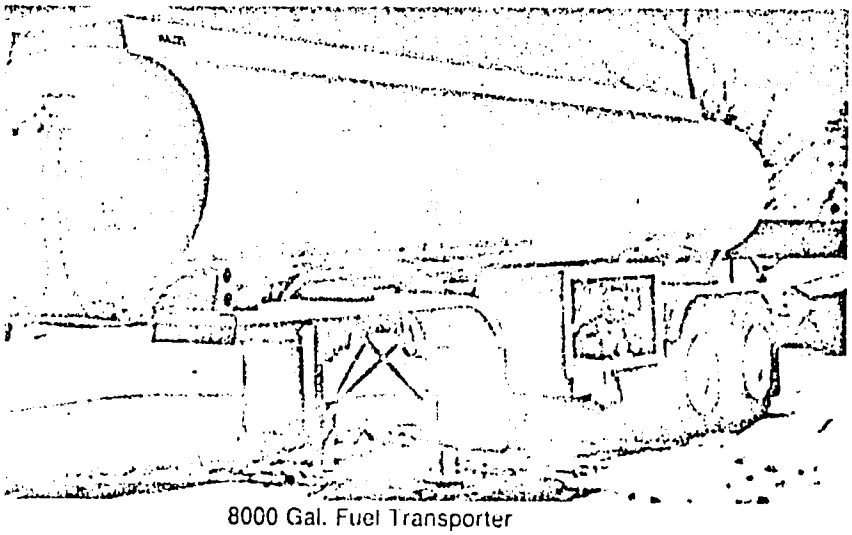
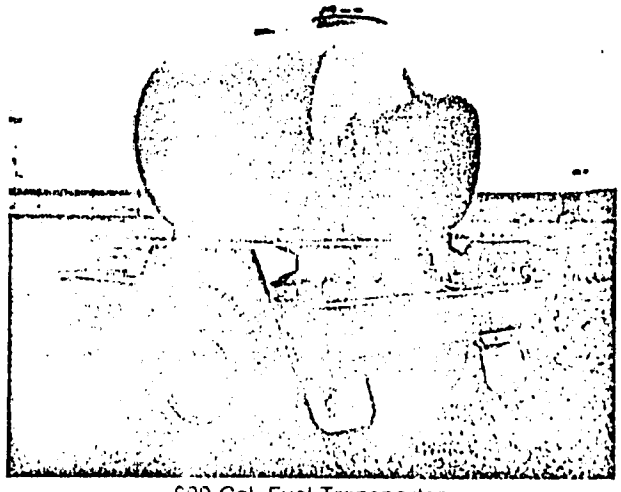
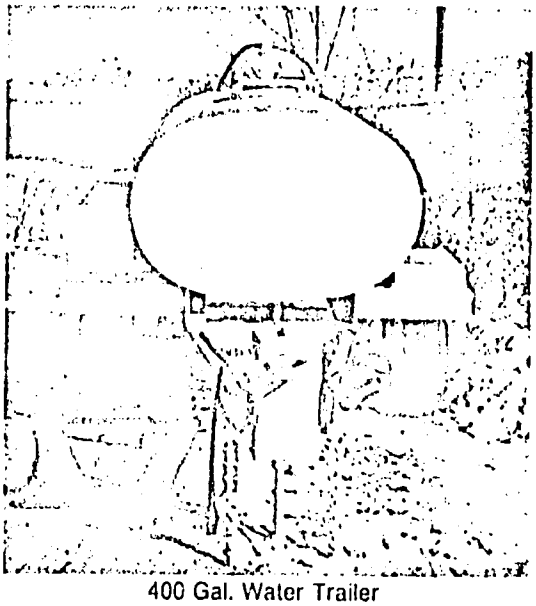
FUEL/WATER TANKS



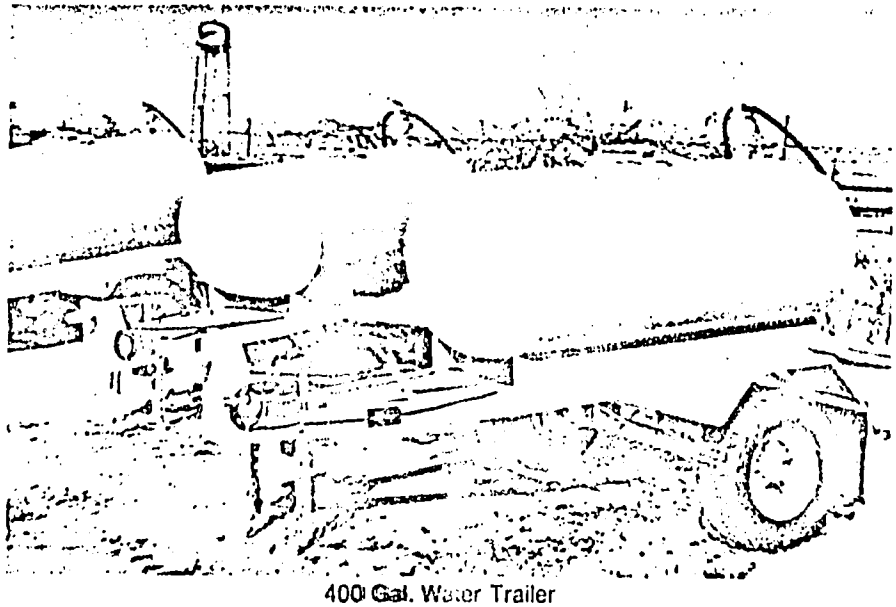
8000 Gal. Fuel Transporter



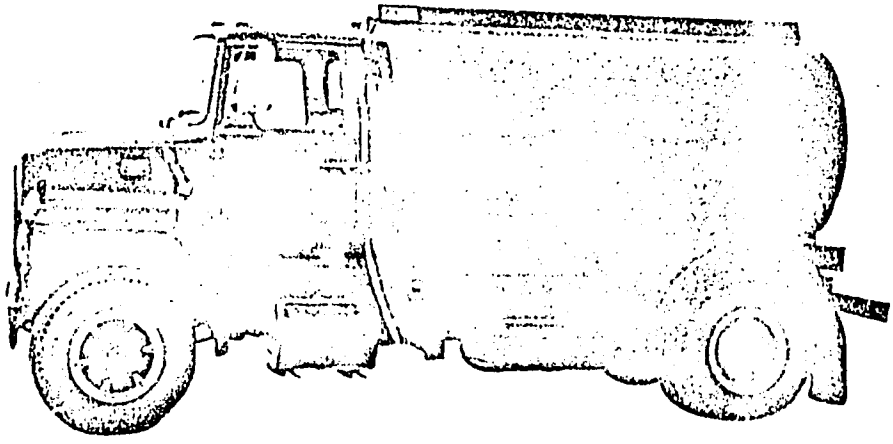
600 Gal. Fuel Transporter



400 Gal. Water Trailer



400 Gal. Water Trailer



1600 Gal. Water Tank

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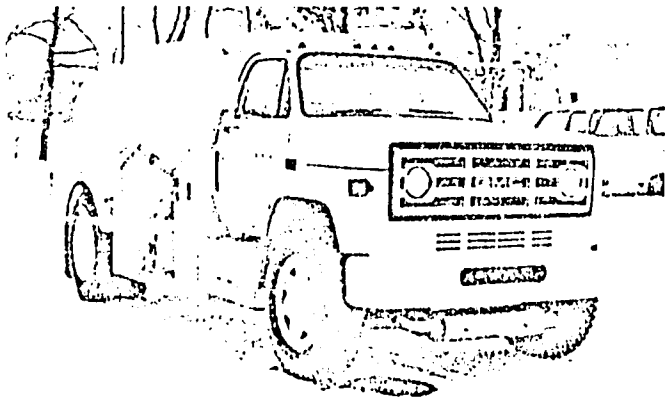
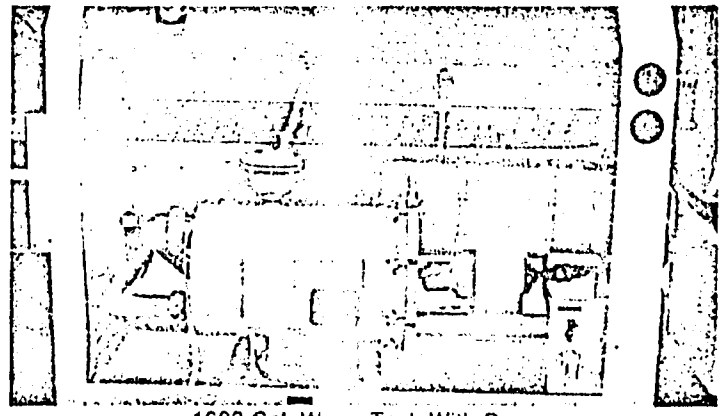
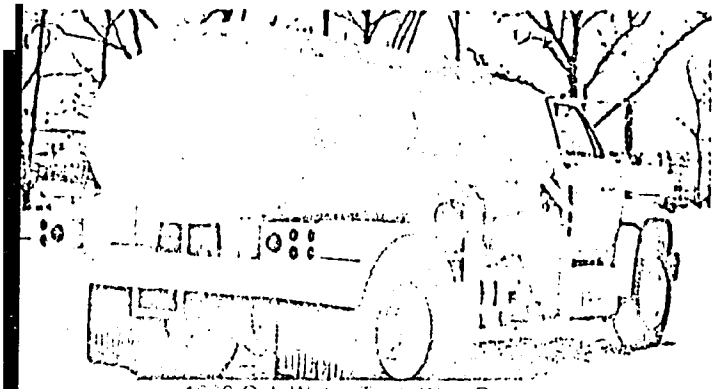
FUEL/WATER TANKS



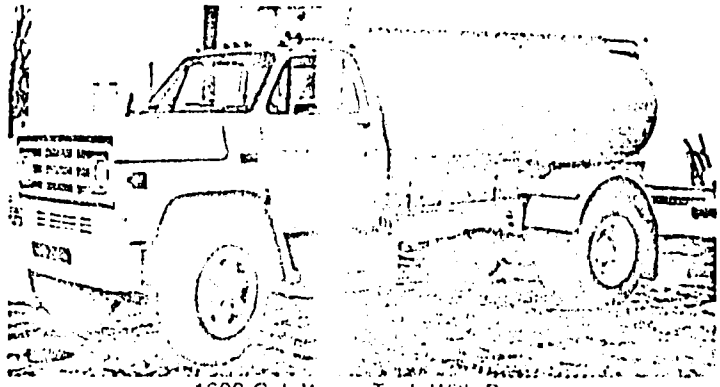
1600 Gal. Water Tank With Pump



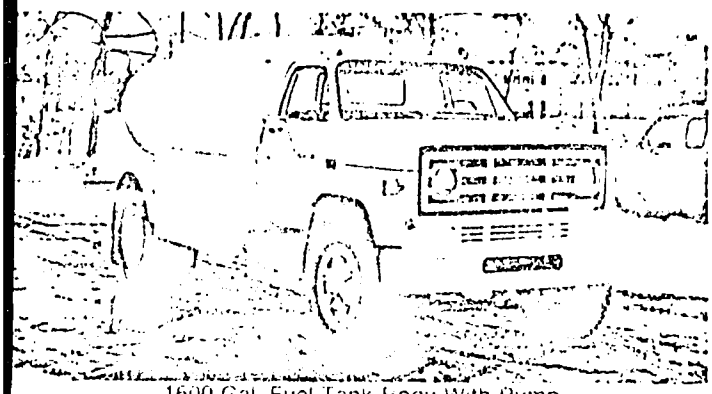
1600 Gal. W. er Tank With Pump



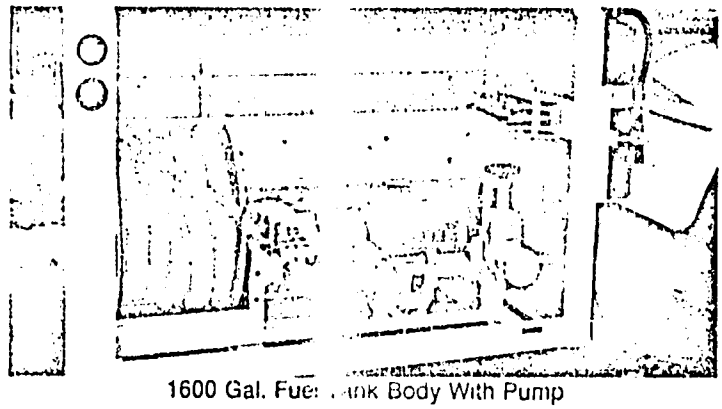
1600 Gal. Water Tank With Pump



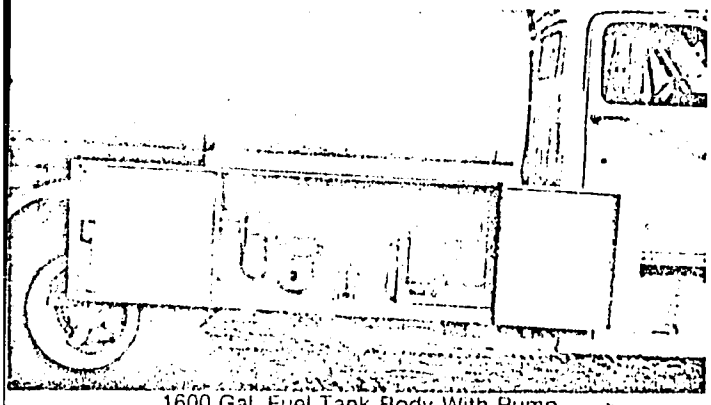
1600 Gal. W er Tank With Pump



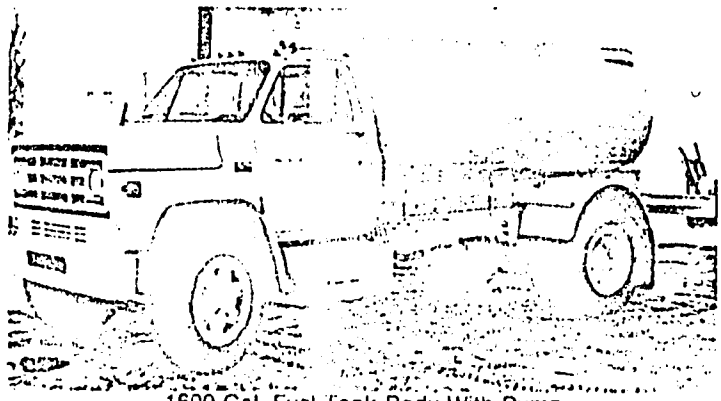
1600 Gal. Fuel Tank Body With Pump



1600 Gal. Fue ank Body With Pump



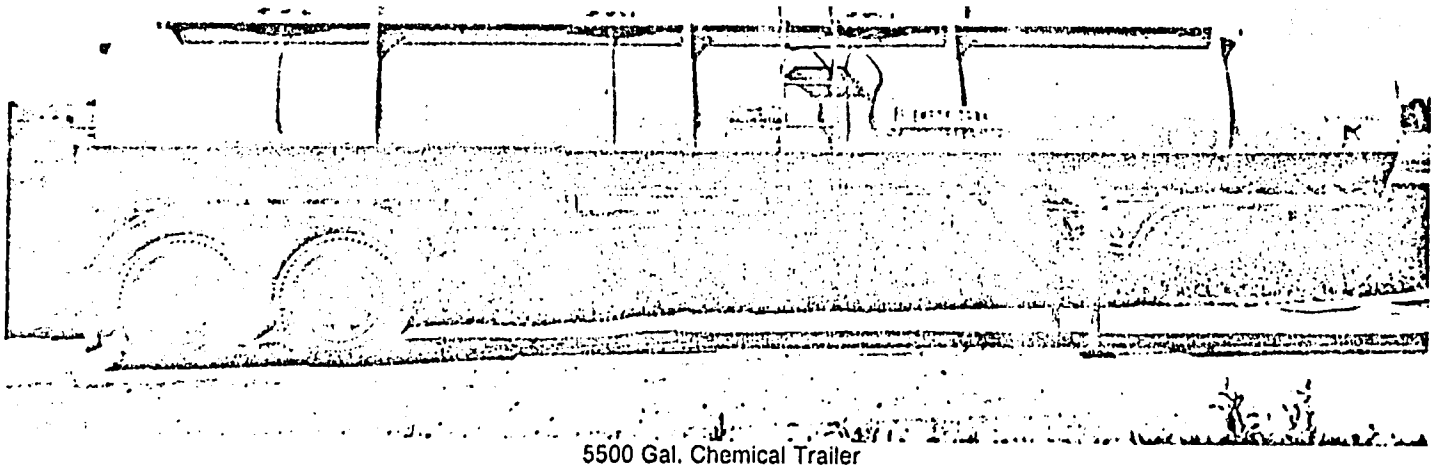
1600 Gal. Fuel Tank Body With Pump



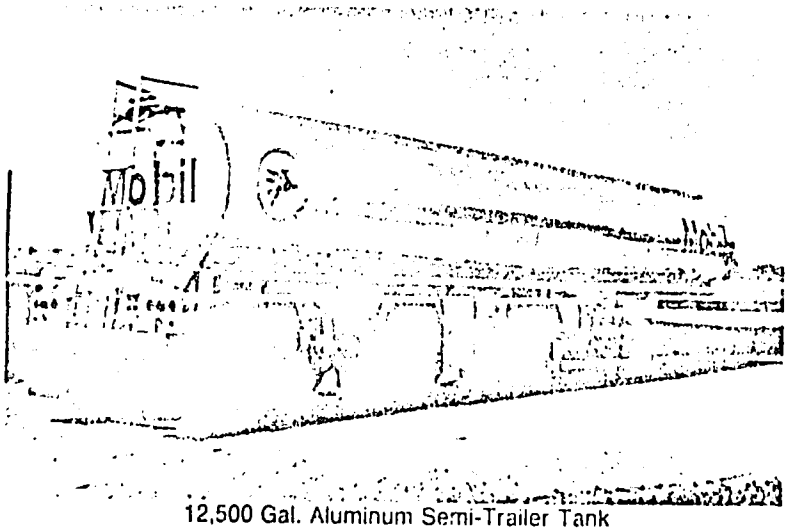
1600 Gal. Fuel Tank Body With Pump

140

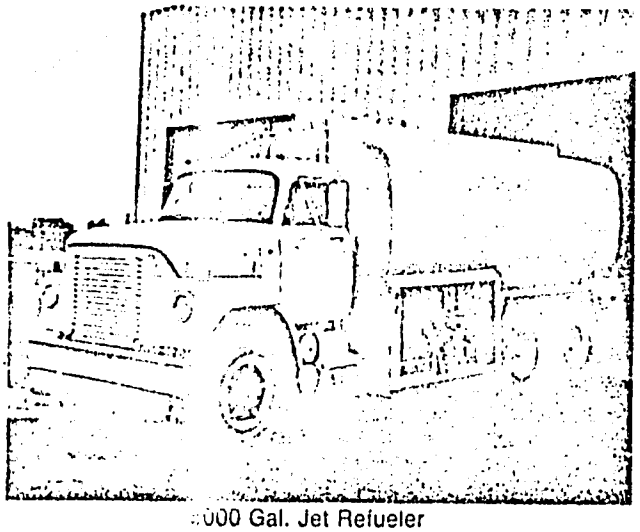
FUEL/WATER TANKS



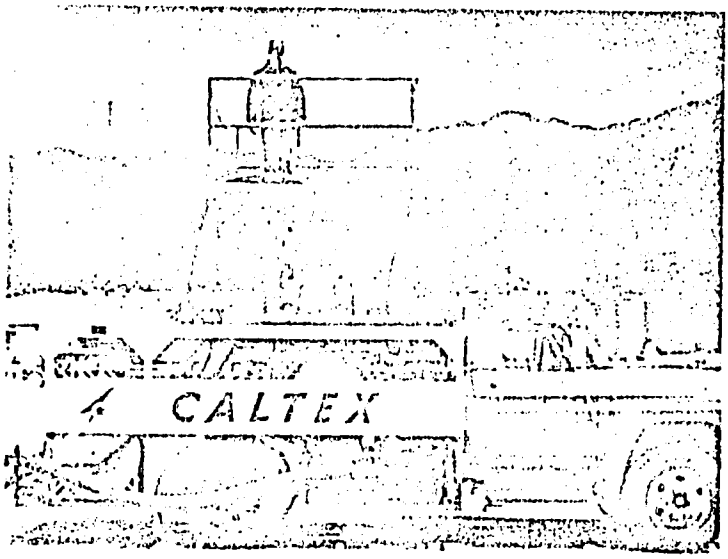
5500 Gal. Chemical Trailer



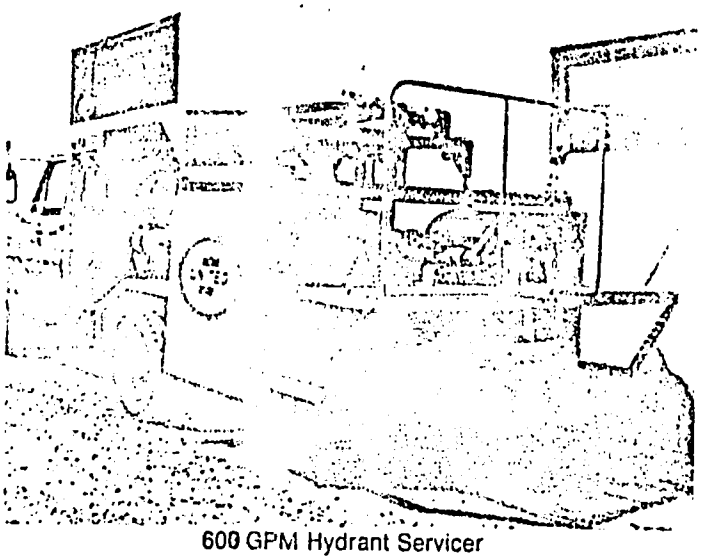
12,500 Gal. Aluminum Semi-Trailer Tank



000 Gal. Jet Refueler

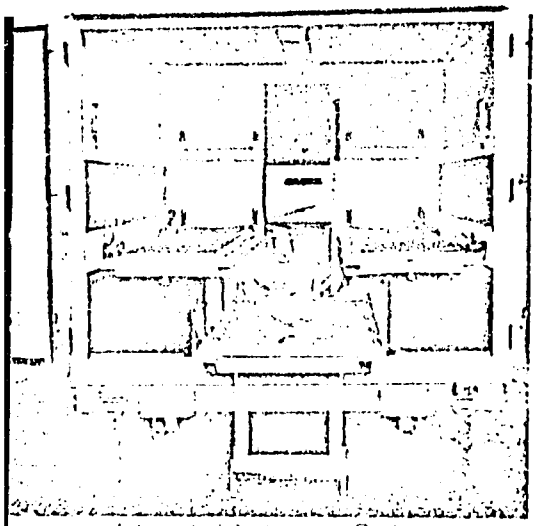


1000 GPM Hydrant Servicer

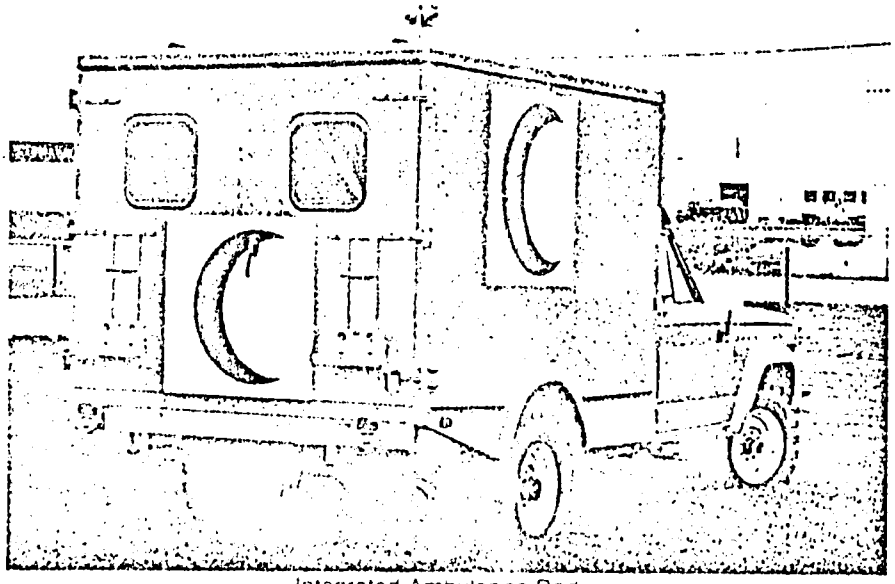


600 GPM Hydrant Servicer

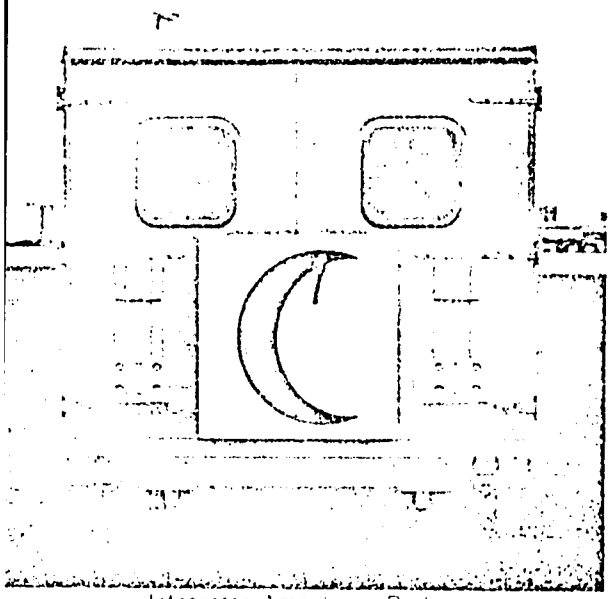
AMBULANCE BODIES



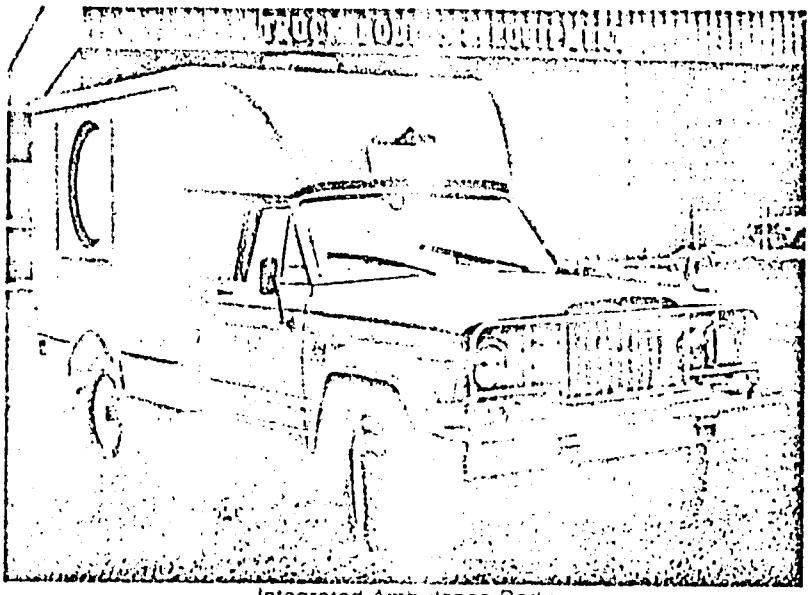
Integrated Ambulance Body



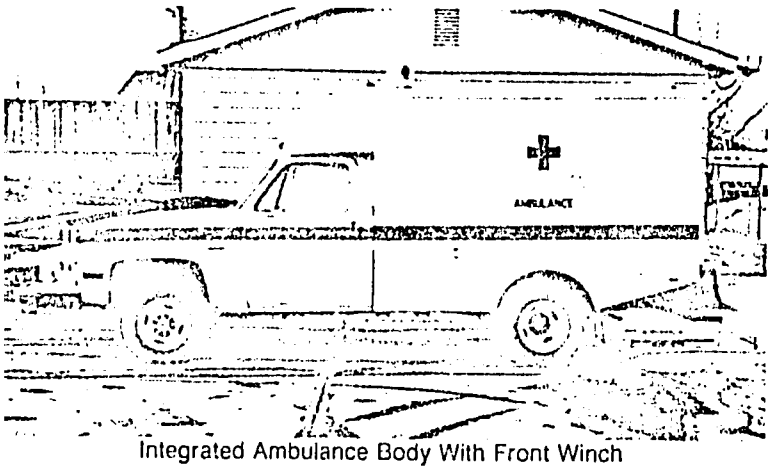
Integrated Ambulance Body



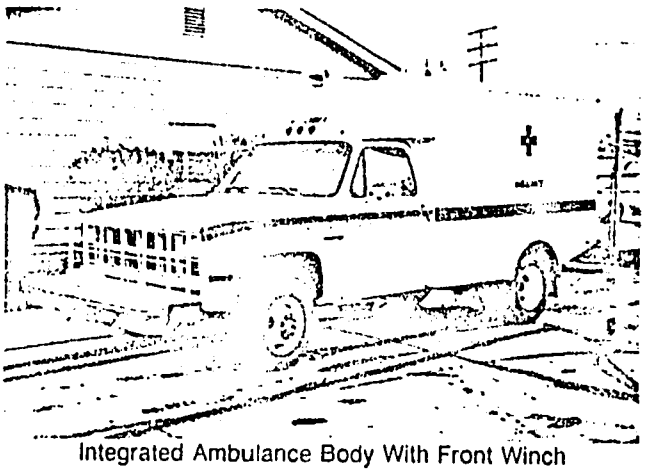
Integrated Ambulance Body



Integrated Ambulance Body



Integrated Ambulance Body With Front Winch



Integrated Ambulance Body With Front Winch

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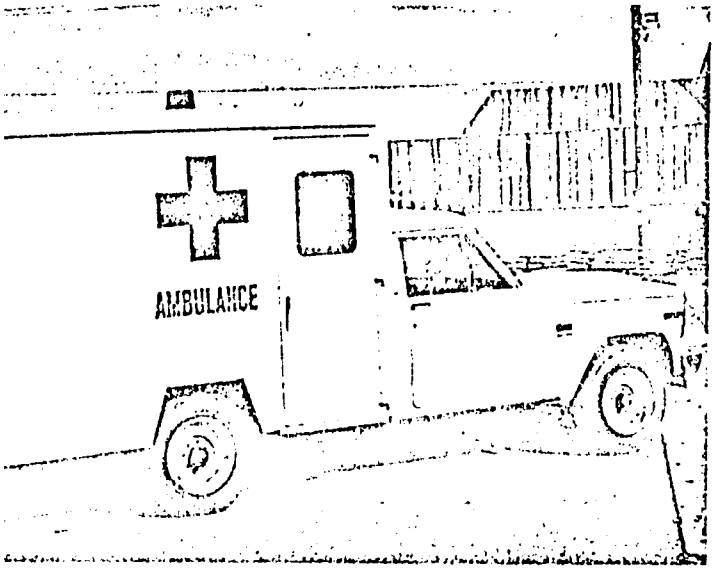
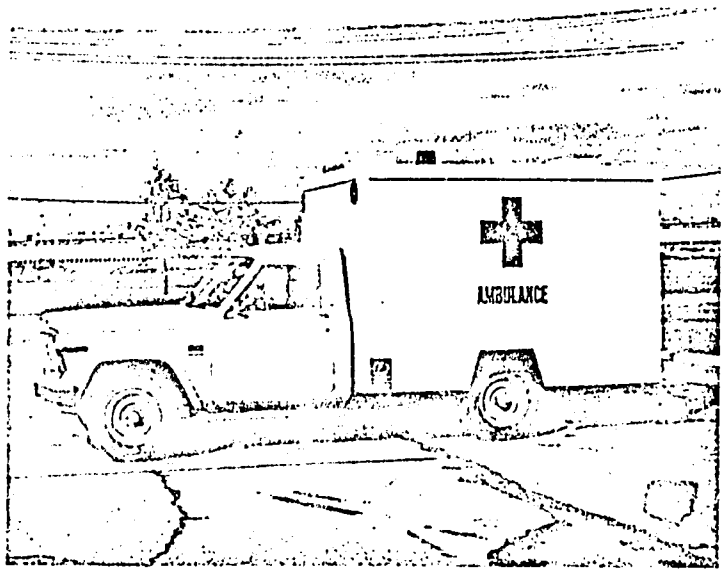
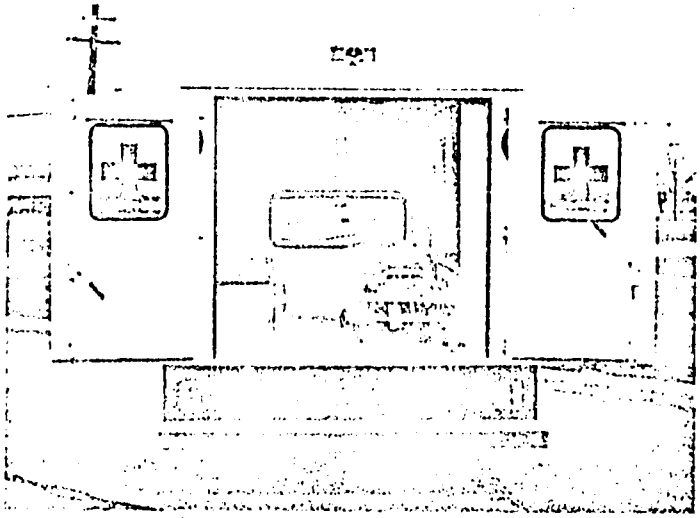
AMBULANCE BODIES



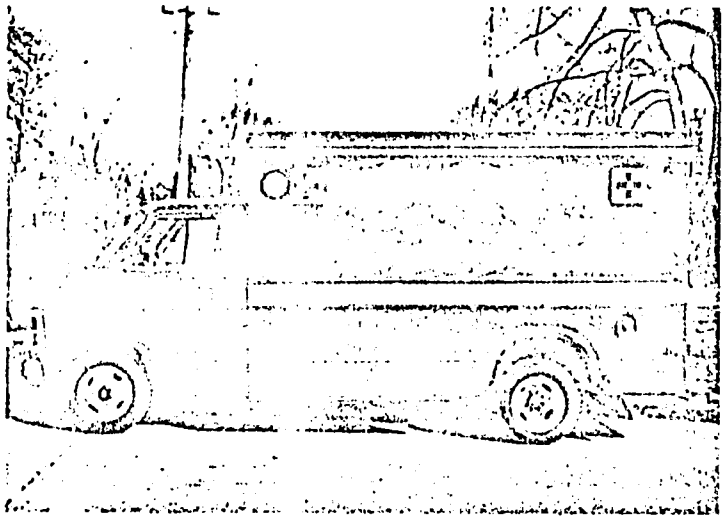
Modular Ambulance - 1 Tn. Truck



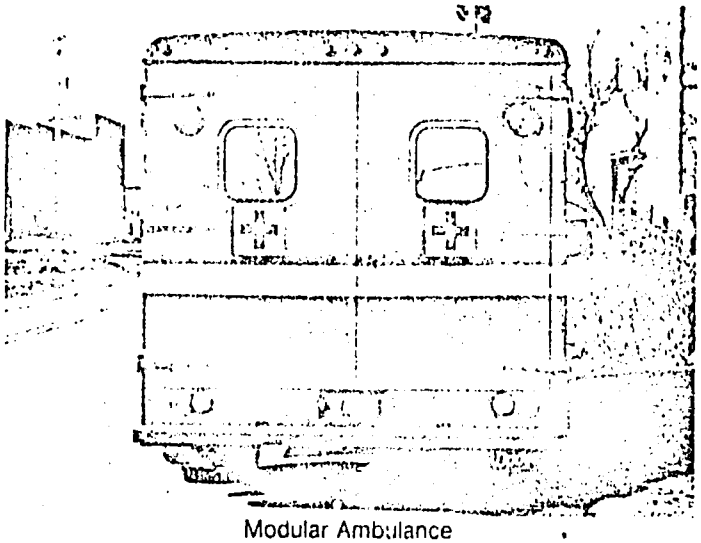
Modular Ambulance - 1 Tn. Truck



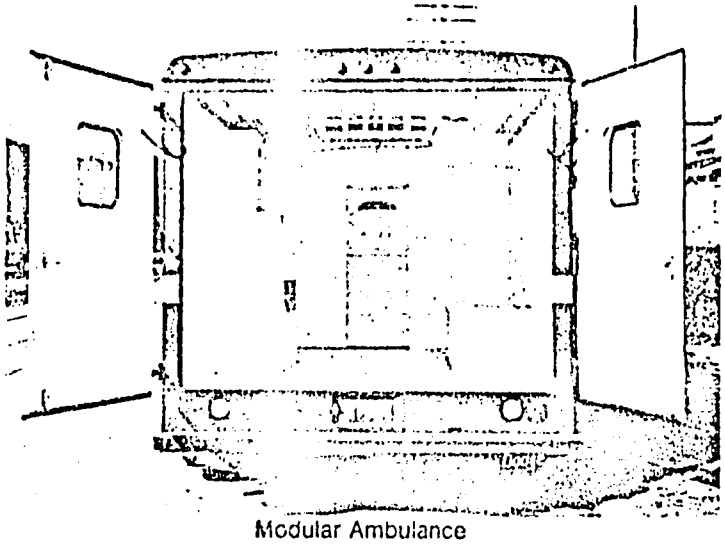
Modular Ambulance - 1 Tn. Truck



Modular Ambulance



Modular Ambulance



Modular Ambulance

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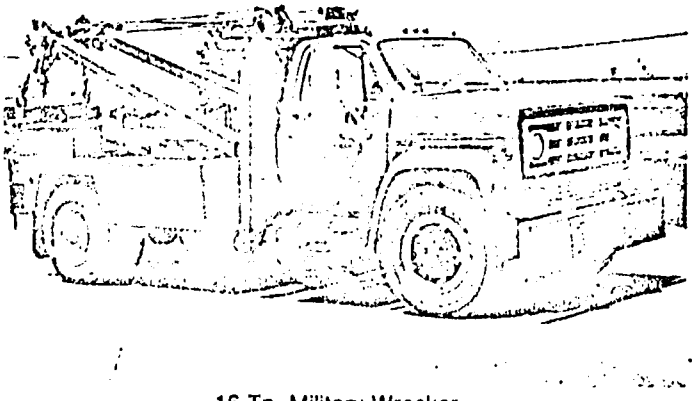
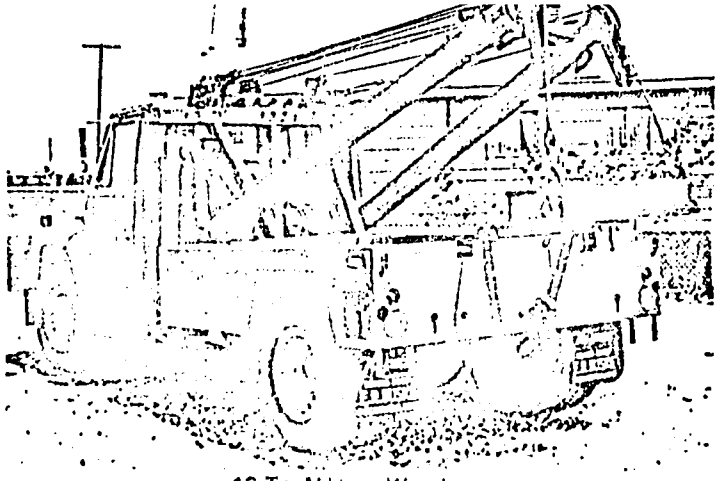
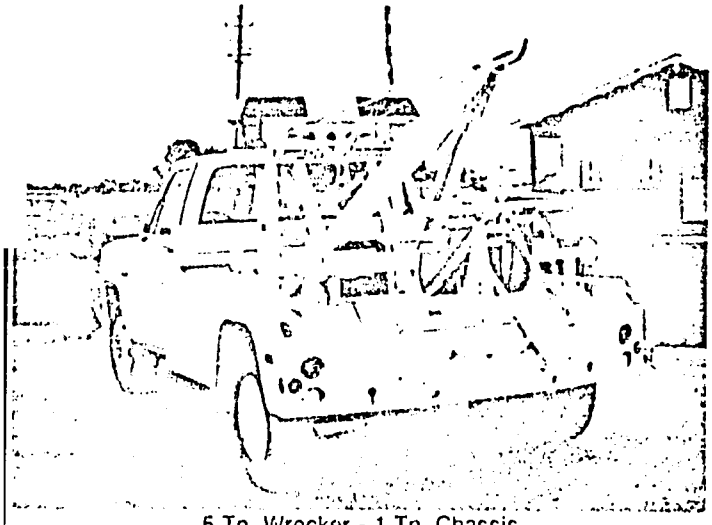
WRECKER BODIES



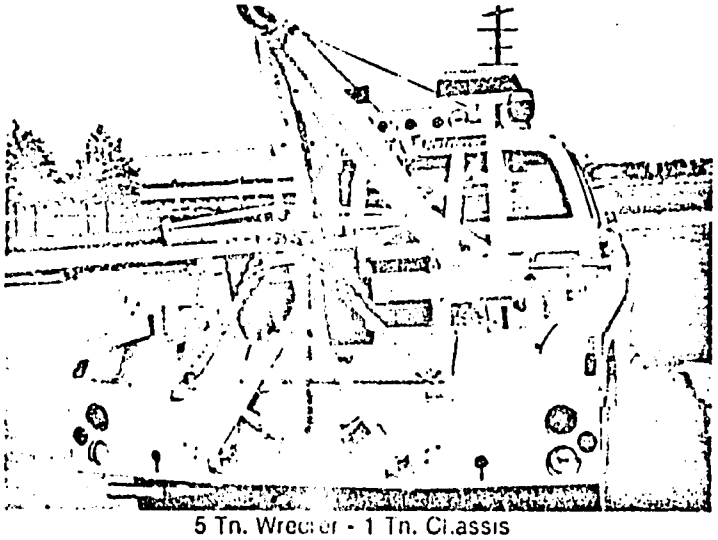
16 Tn. Military Wrecker



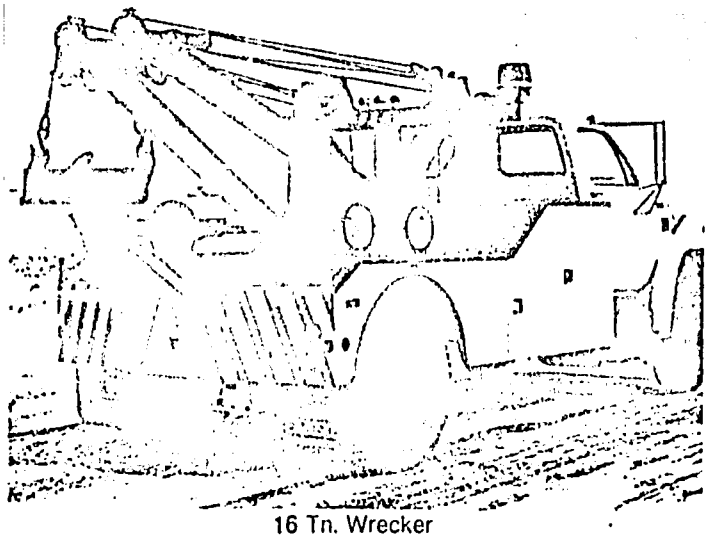
16 Tn. Military Wrecker



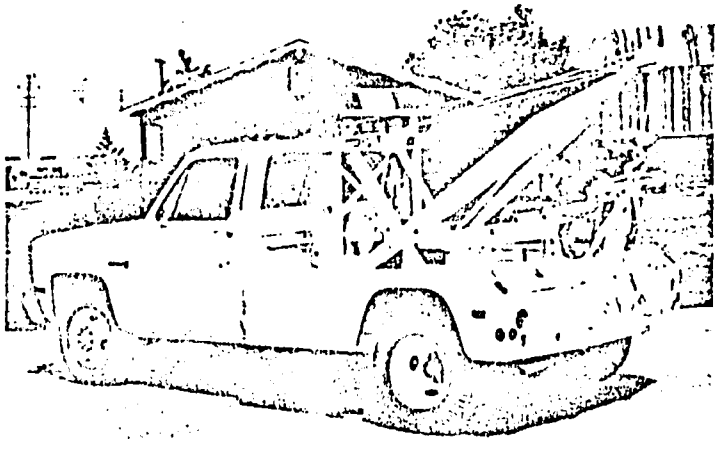
5 Tn. Wrecker - 1 Tn. Chassis



5 Tn. Wrecker - 1 Tn. Chassis



16 Tn. Wrecker



5 Tn. Wrecker - 1 Tn. Chassis

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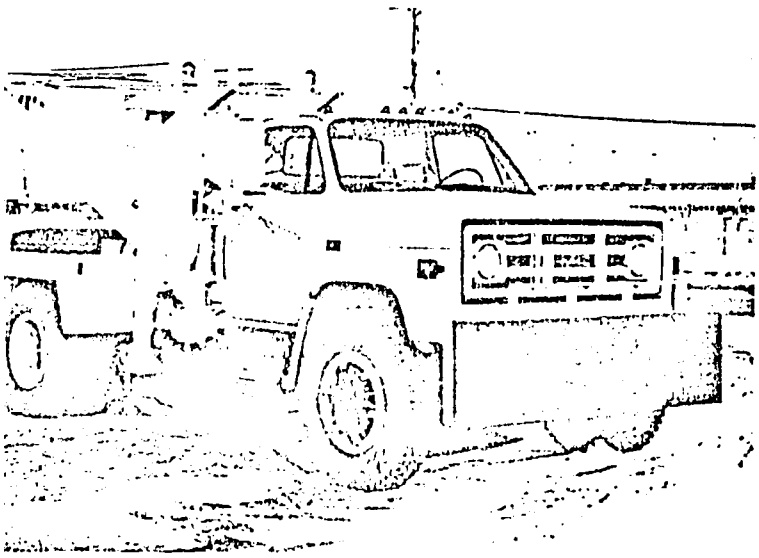
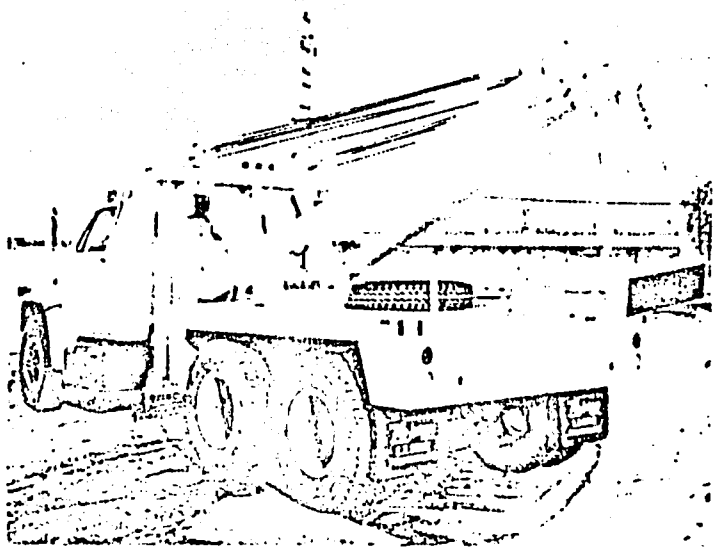
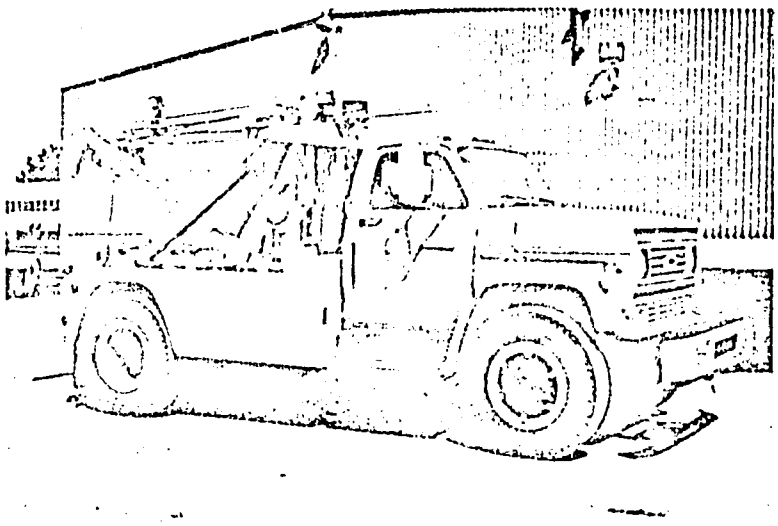
WRECKER BODIES



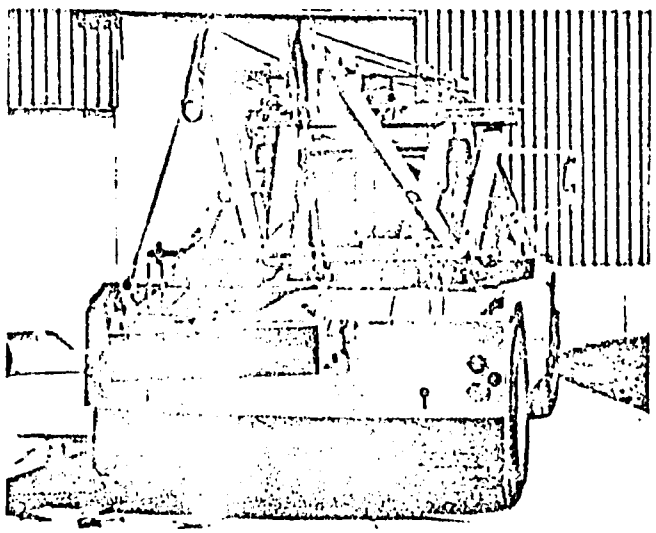
24 Tn. Wrecker



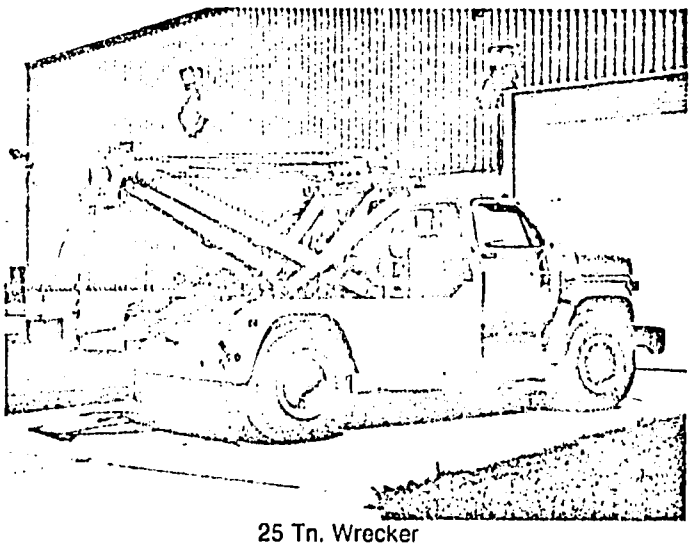
24 Tn. Wrecker



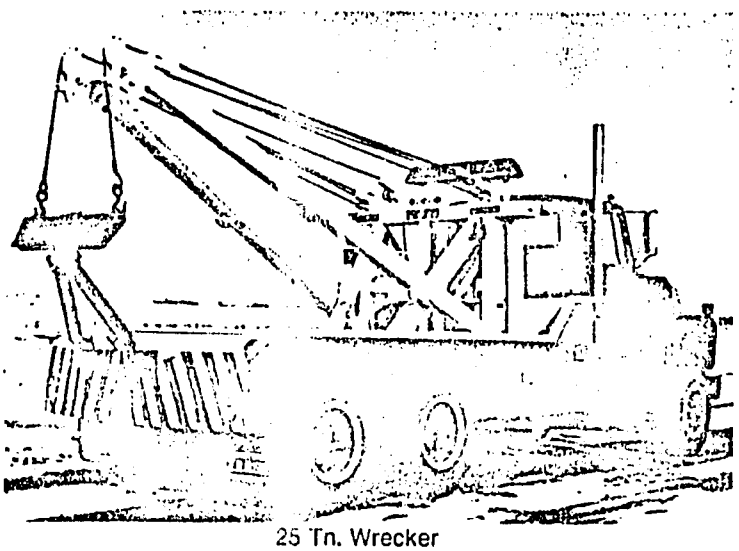
25 Tn. Wrecker



25 Tn. Wrecker

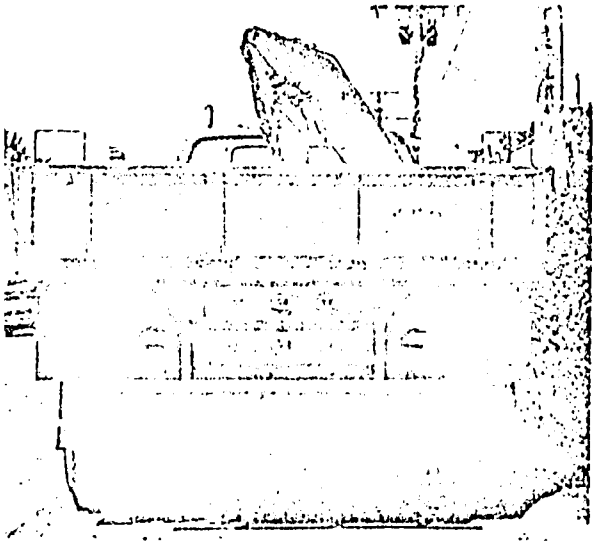


25 Tn. Wrecker

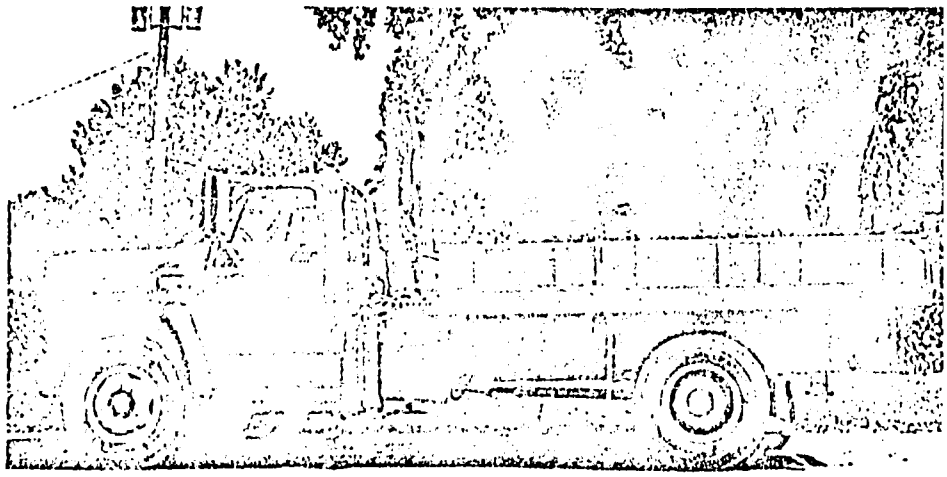


25 Tn. Wrecker

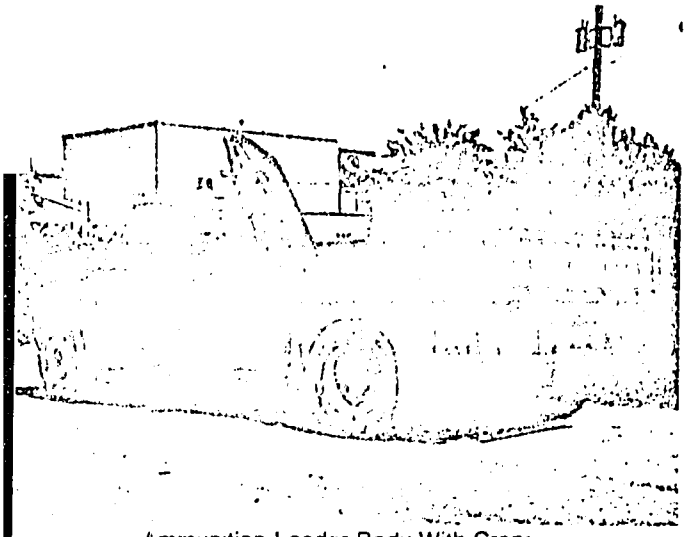
SPECIAL BODIES



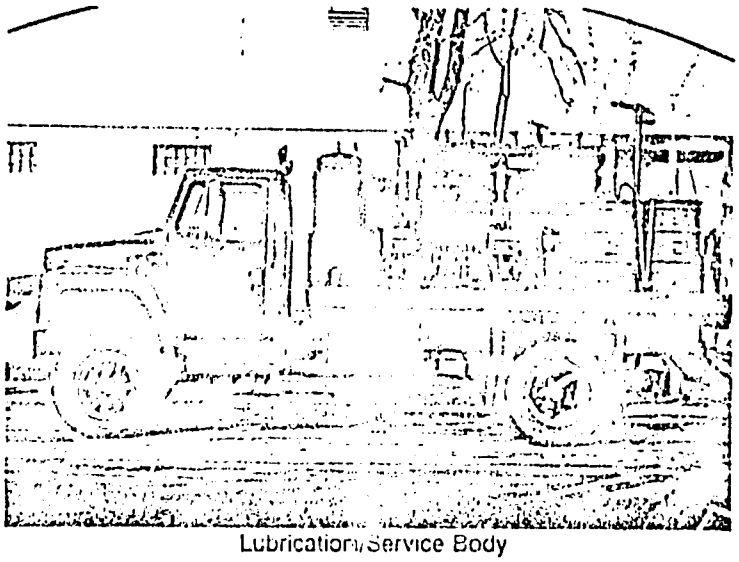
Ammunition Loader Body With Crane



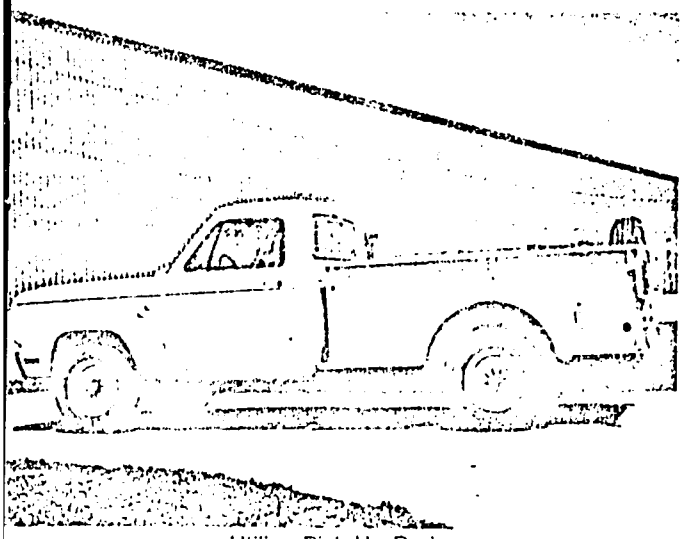
Ammunition Loader Body With Crane



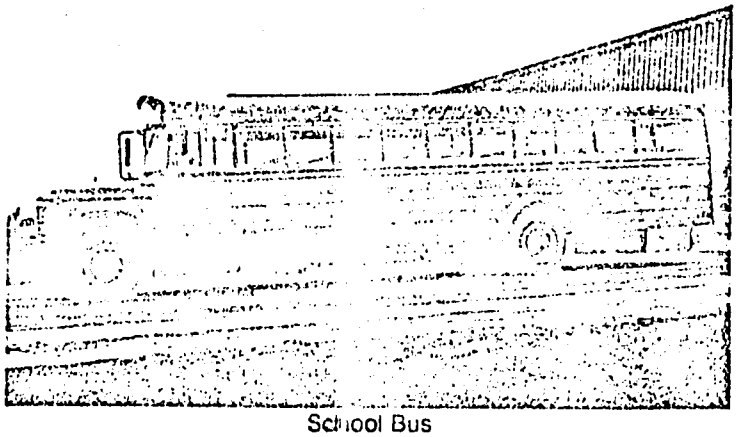
Ammunition Loader Body With Crane



Lubrication/Service Body

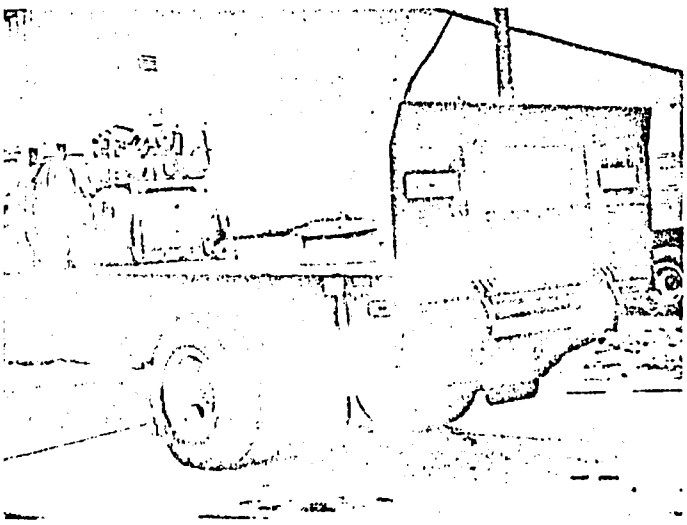


Utiline Pick Up Body

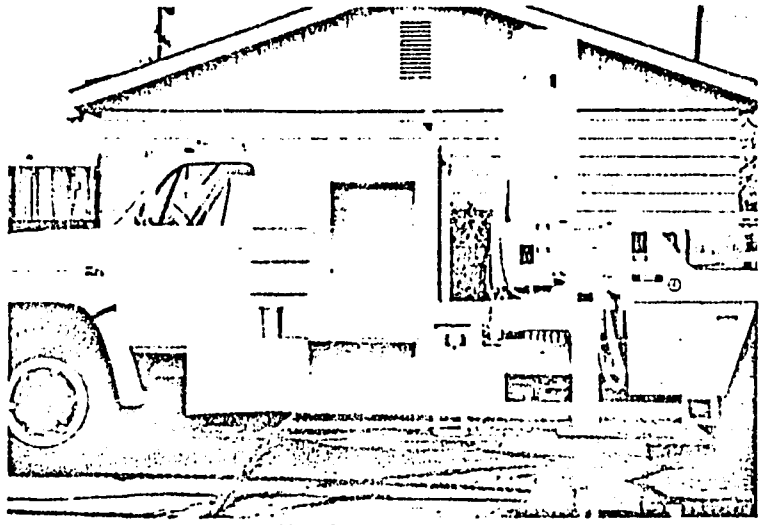


School Bus

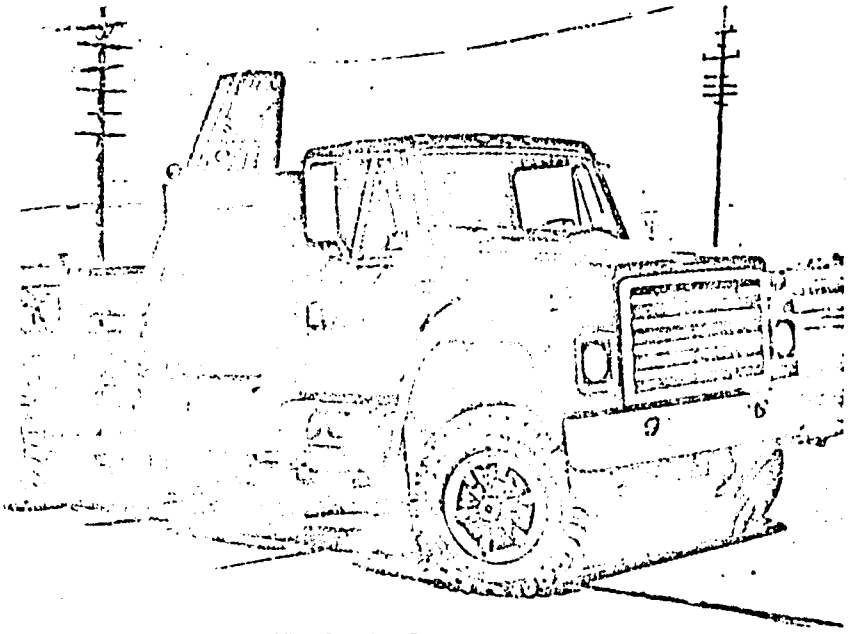
SPECIAL BODIES



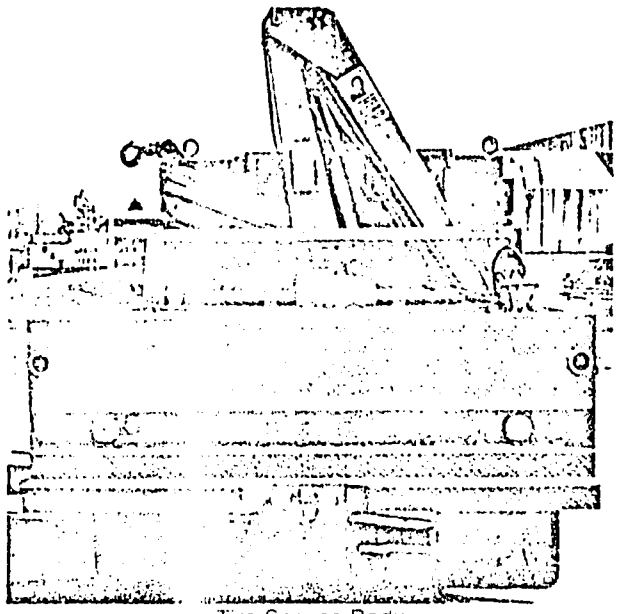
16' Tire Service Body



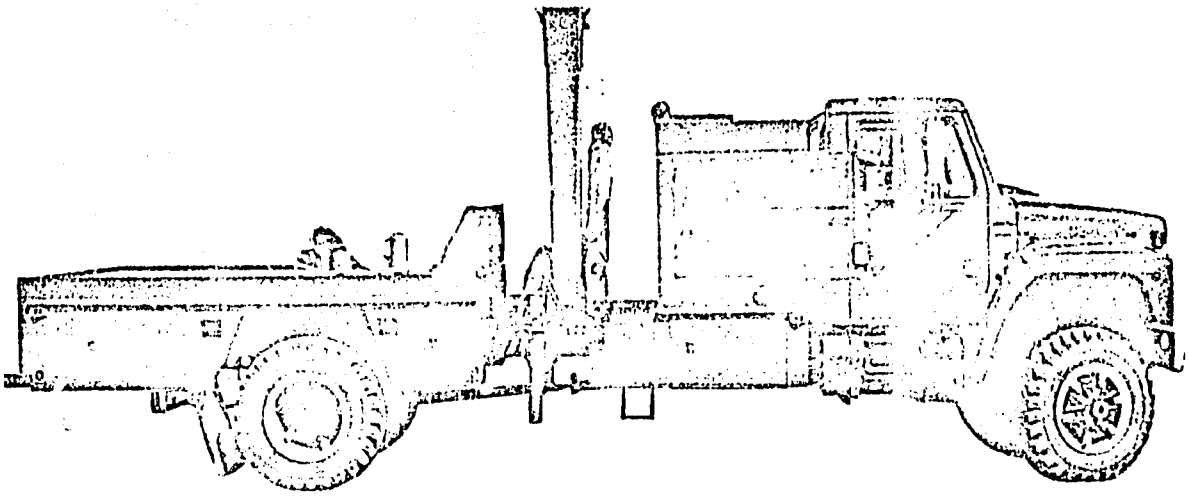
Tire Service Body



Tire Service Body

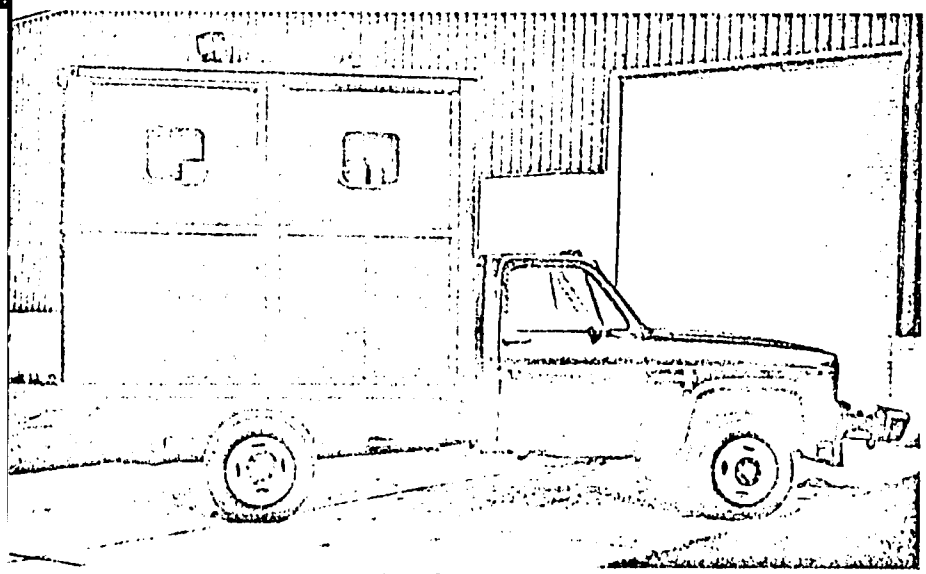


Tire Service Body

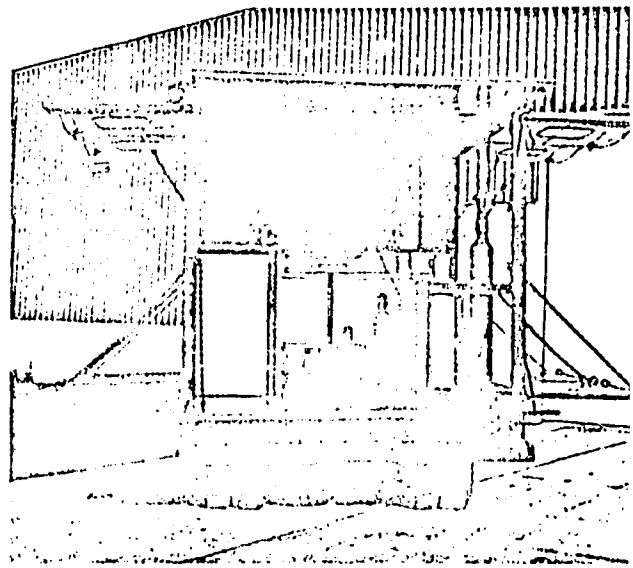


Tire Service Body

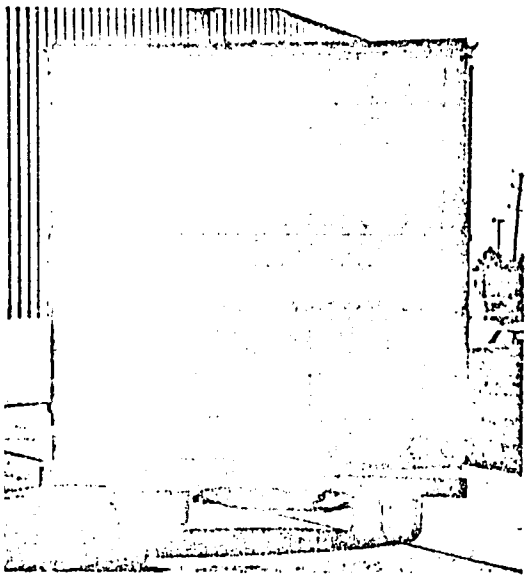
SPECIAL BODIES



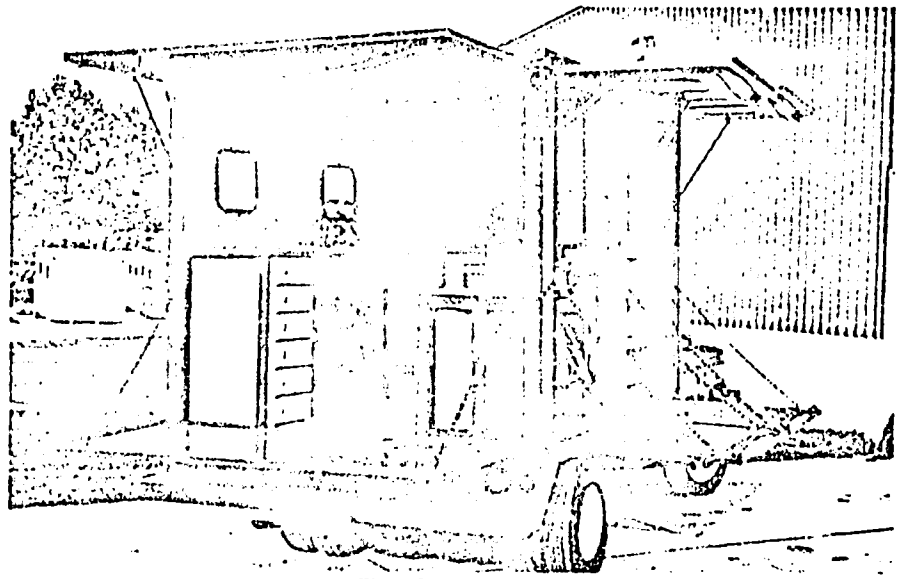
Field Service Van



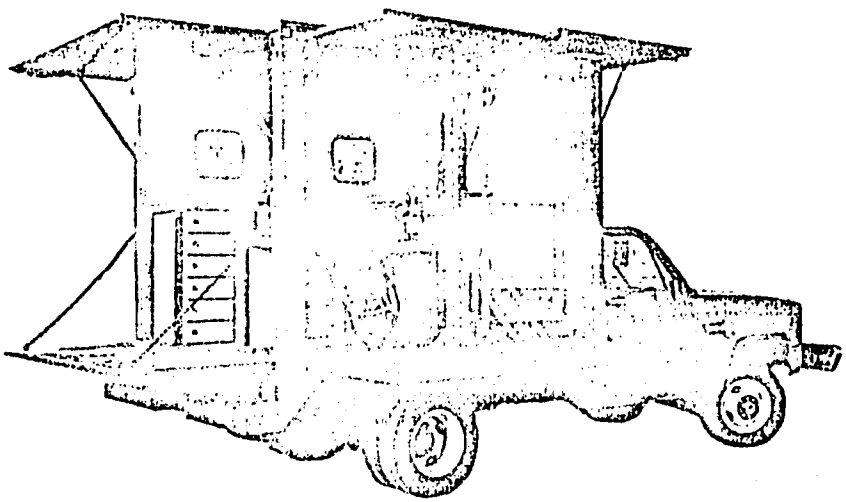
Field Service Van



Field Service Van

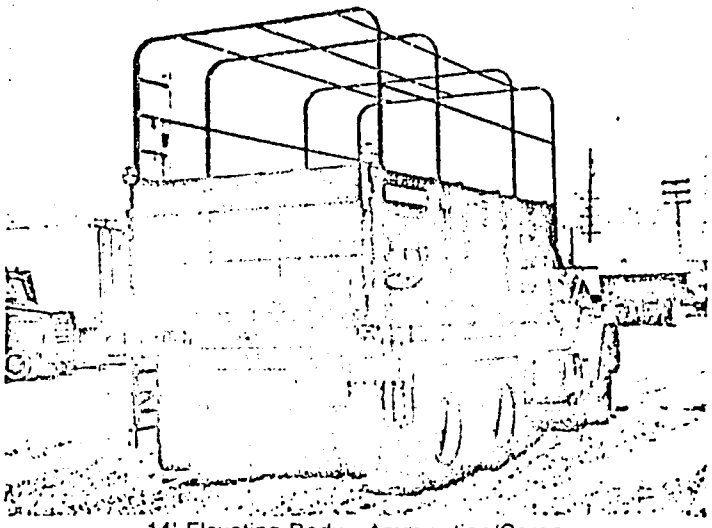


Field Service Van

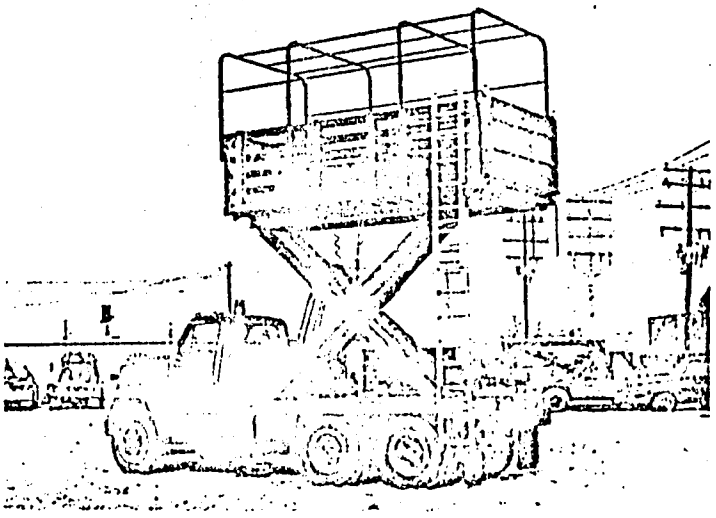


Field Service Van

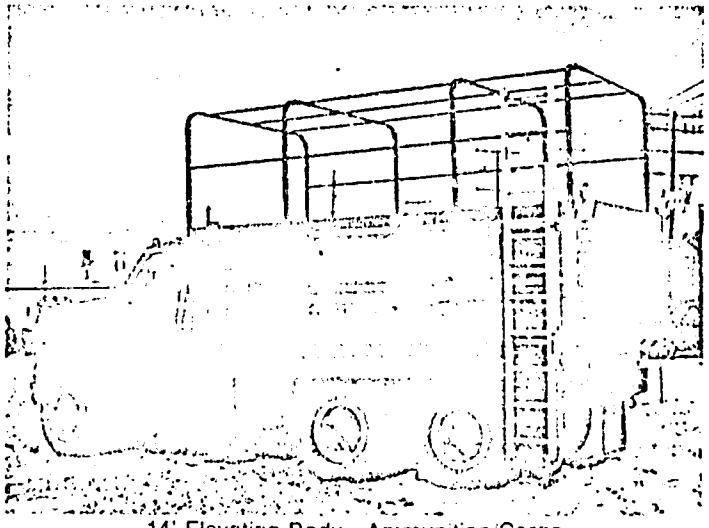
SPECIAL BODIES



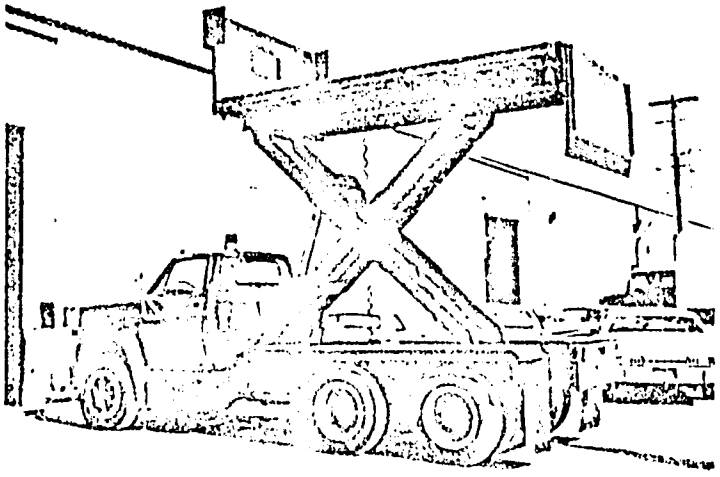
14' Elevating Body - Ammunition/Cargo



14' Elevating Body - Ammunition/Cargo

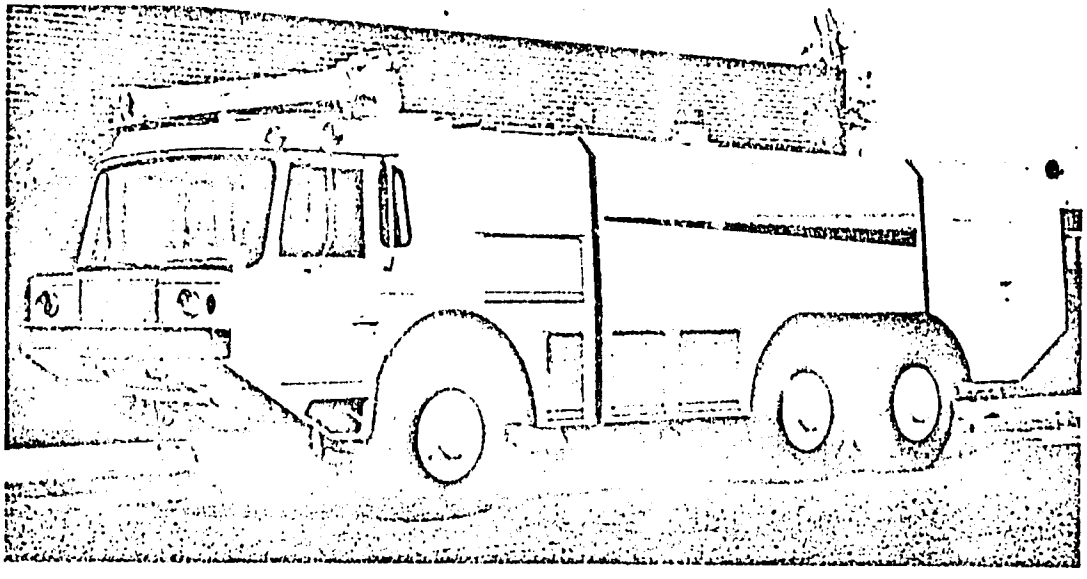


14' Elevating Body - Ammunition/Cargo

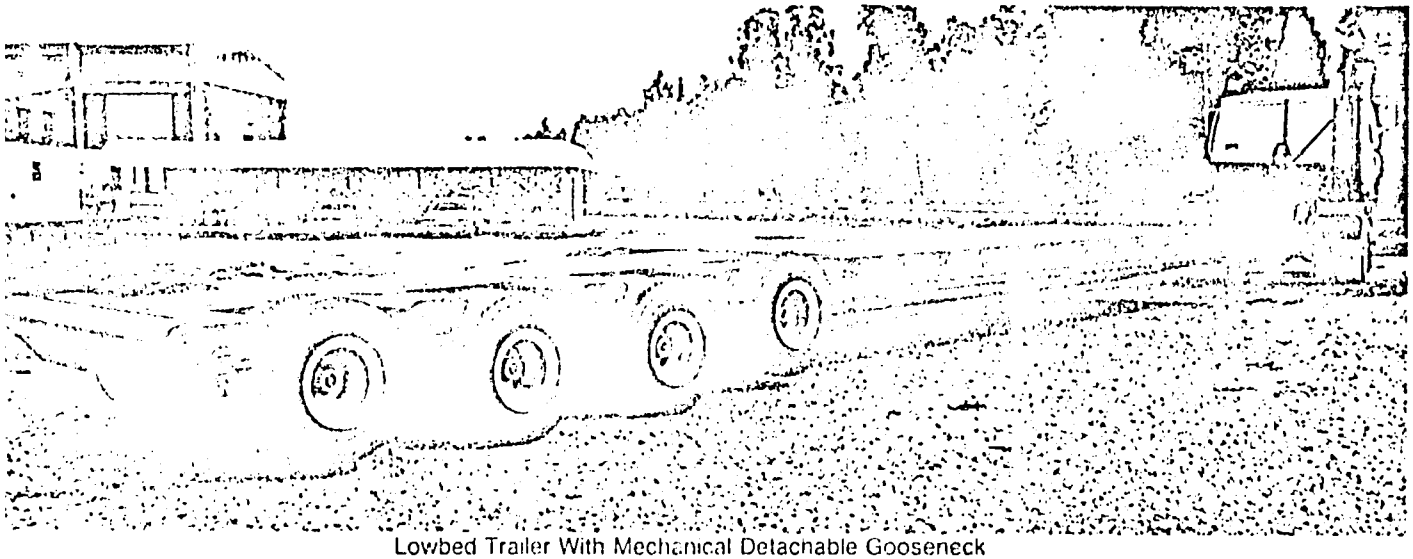


14' Elevating Body - Ammunition/Cargo

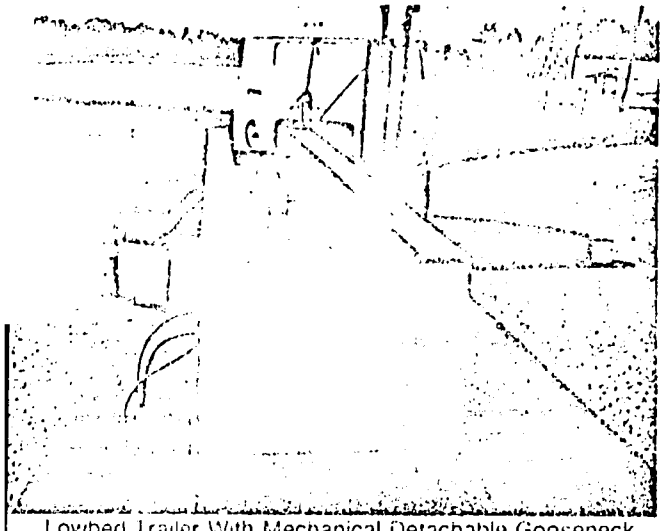
Airport Fire Truck



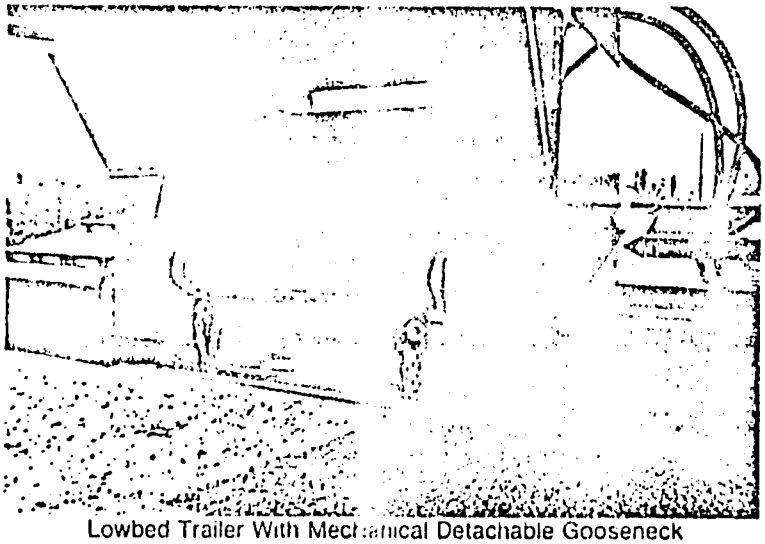
LOWBOY/FLATBED/ VAN TRAILERS



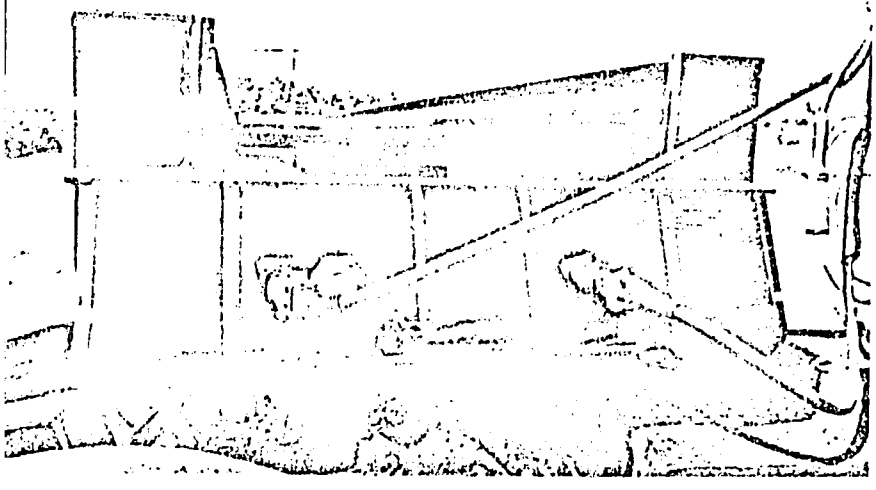
Lowbed Trailer With Mechanical Detachable Gooseneck



Lowbed Trailer With Mechanical Detachable Gooseneck

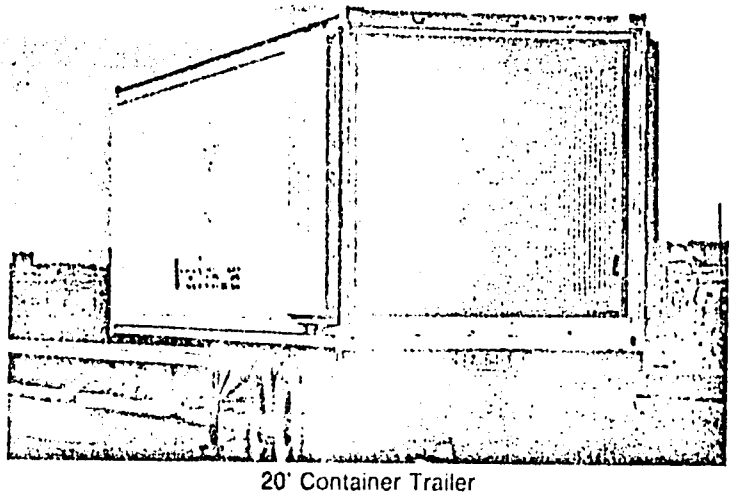


Lowbed Trailer With Mechanical Detachable Gooseneck

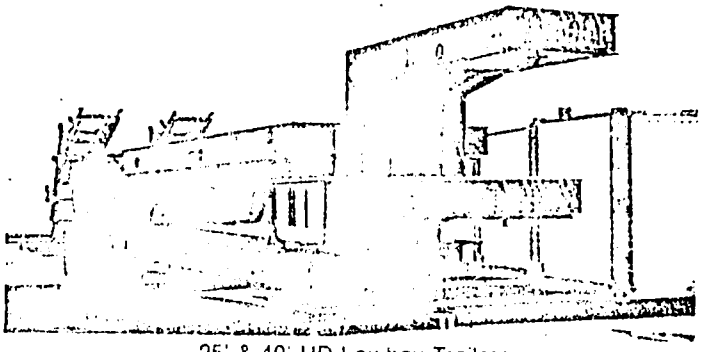


Lowbed Trailer With Mechanical Detachable Gooseneck

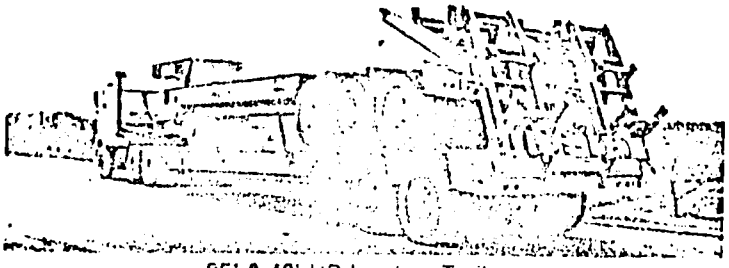
LOWBOY/ FLATBED/ VAN TRAILERS



20' Container Trailer

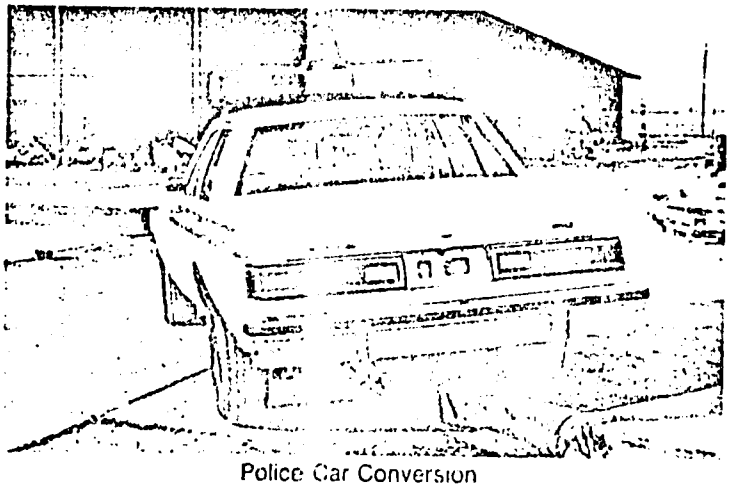


25' & 40' HD Lowboy Trailers

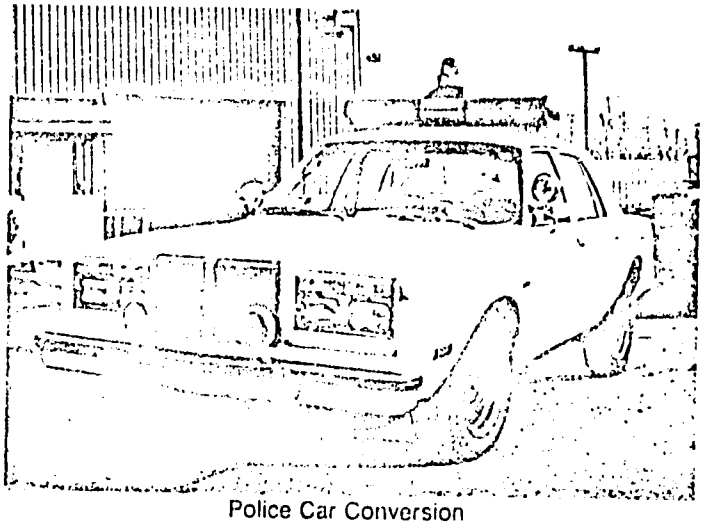


25' & 40' HD Lowboy Trailers

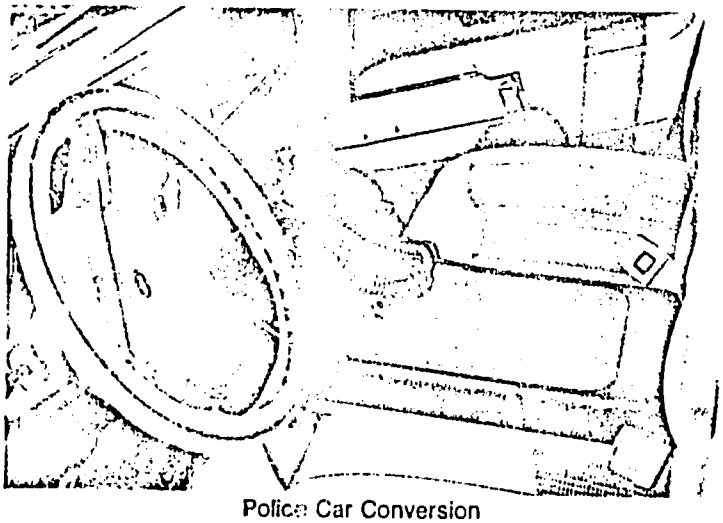
POLICE VEHICLES



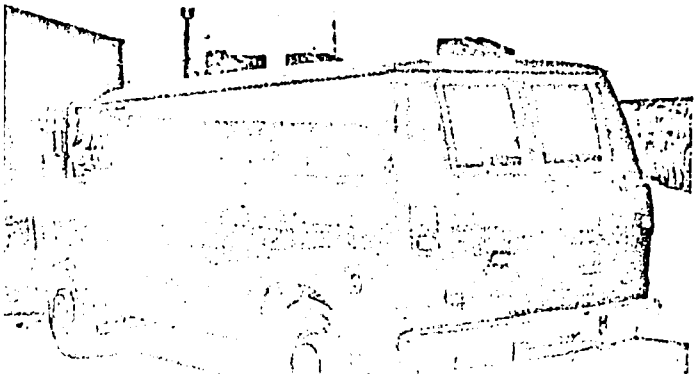
Police Car Conversion



Police Car Conversion

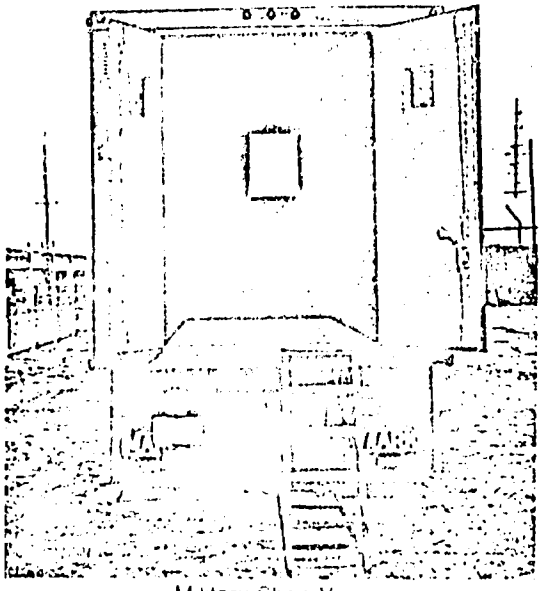


Police Car Conversion

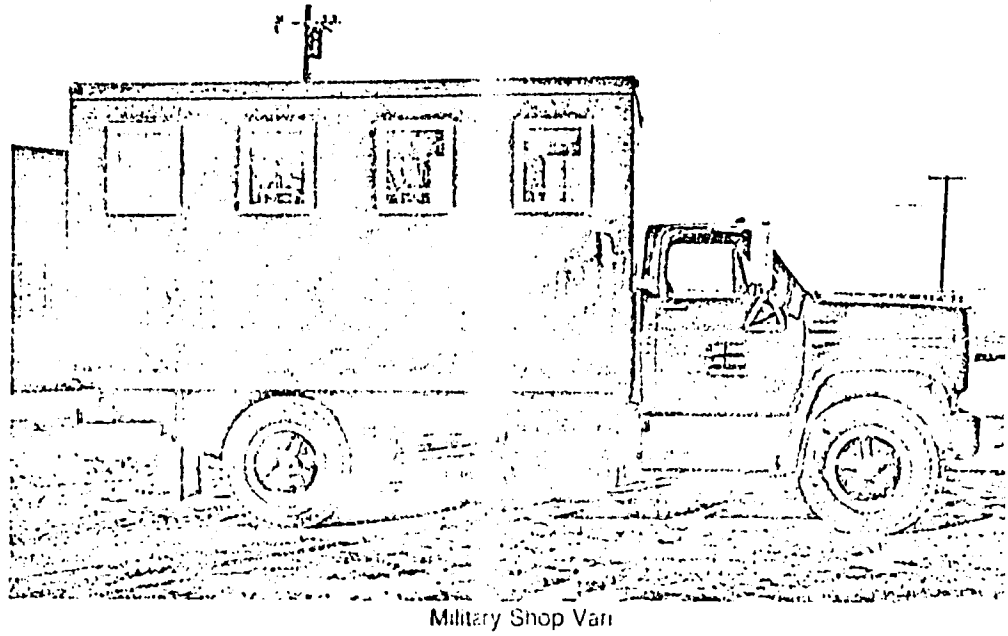


Police Patrol Van Conversion

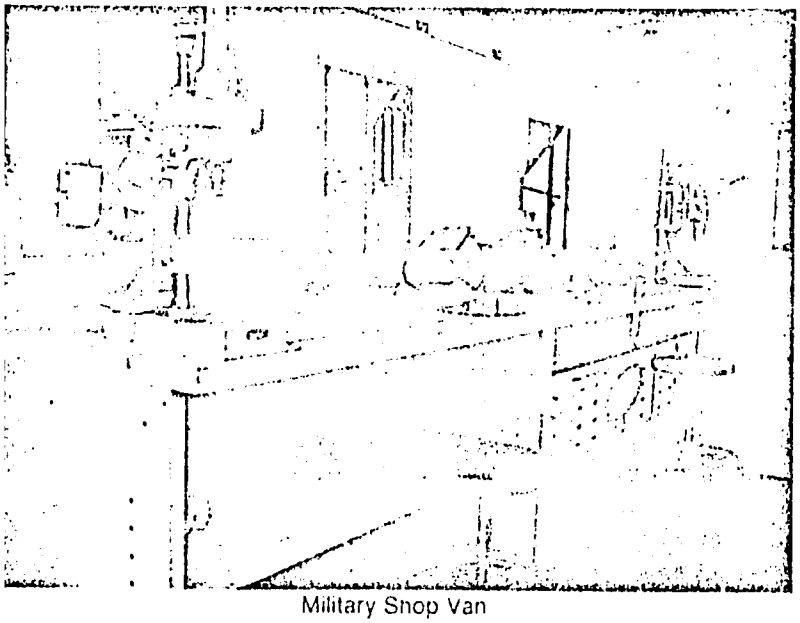
TACTICAL VEHICLES



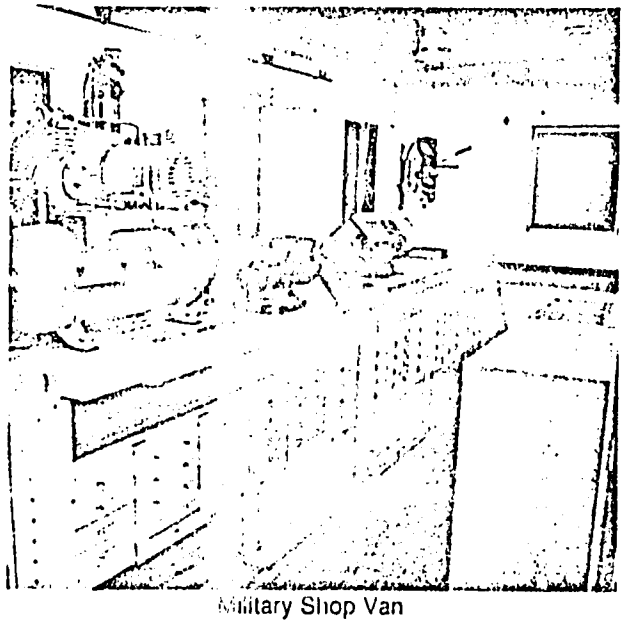
Military Shop Van



Military Shop Van



Military Shop Van



Military Shop Van

Military Shop Van

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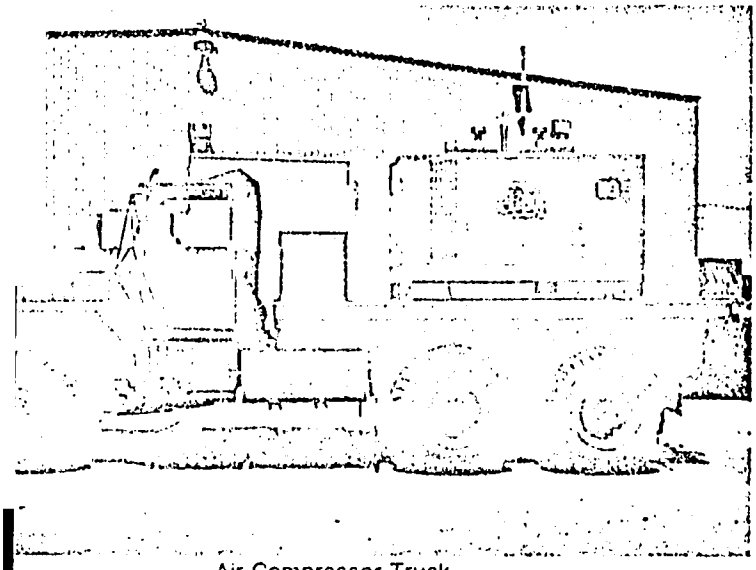
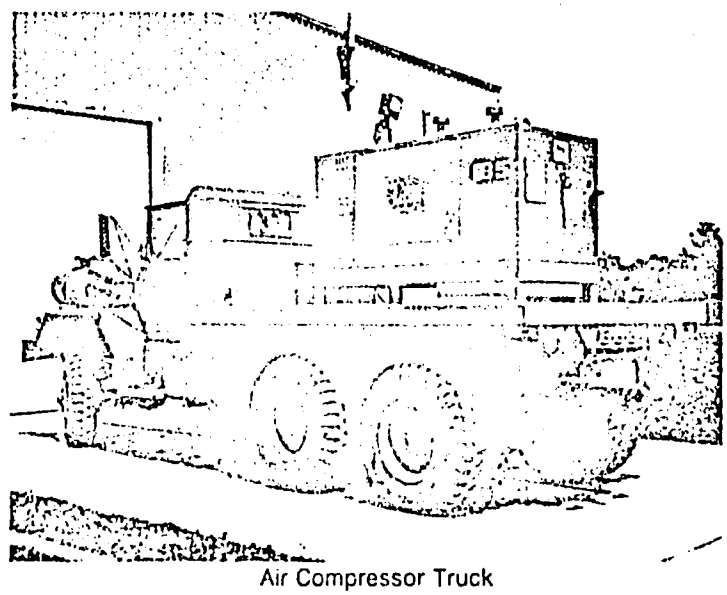
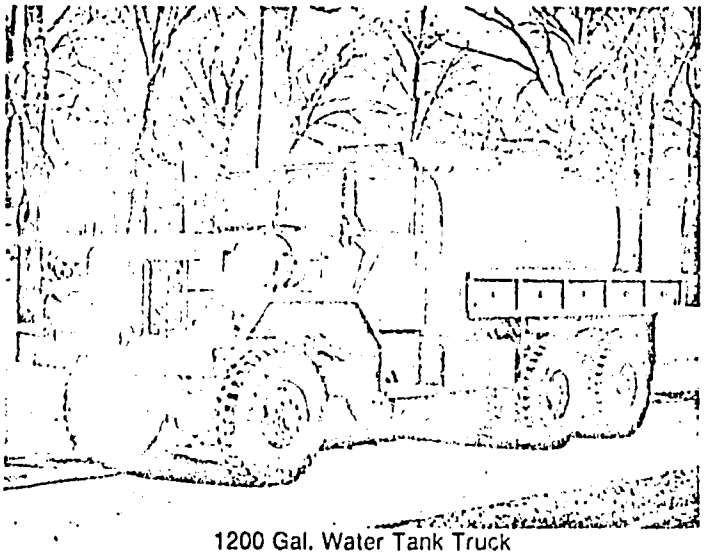
TACTICAL VEHICLES



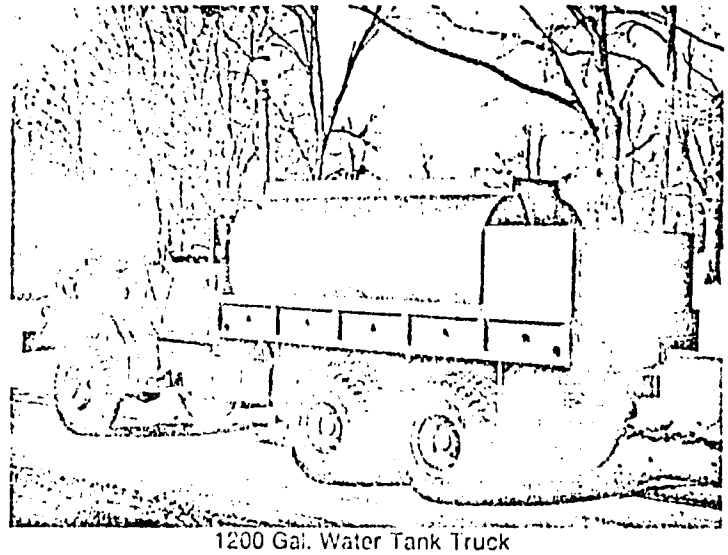
Air Compressor Truck



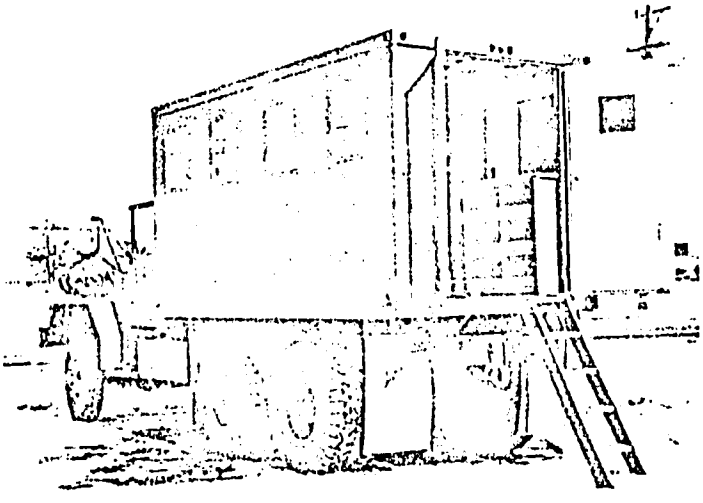
Air Compressor Truck



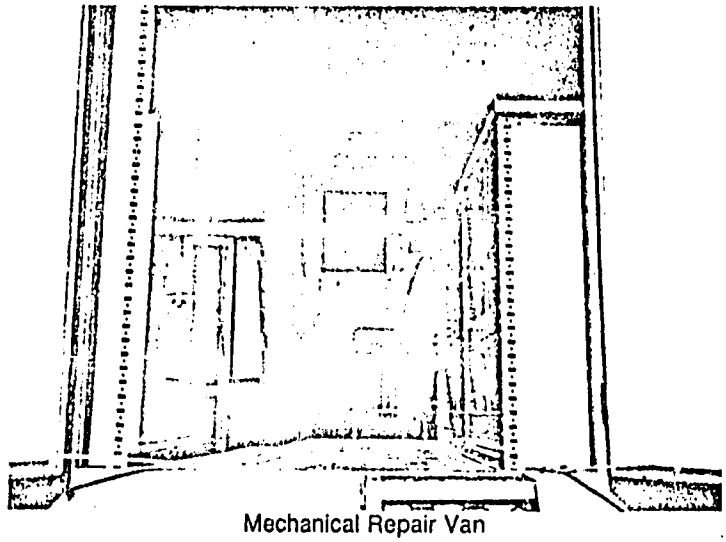
1200 Gal. Water Tank Truck



1200 Gal. Water Tank Truck



Mechanical Repair Van



Mechanical Repair Van

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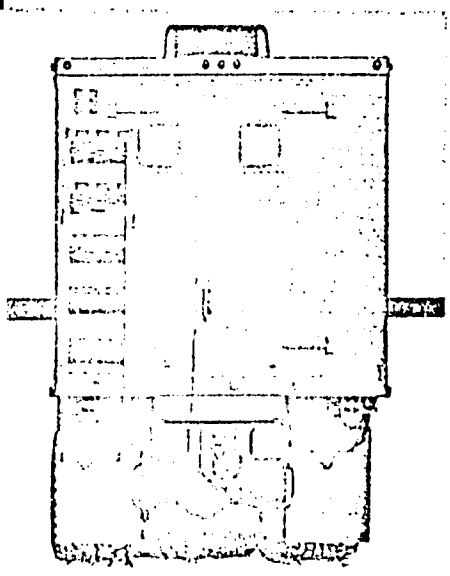
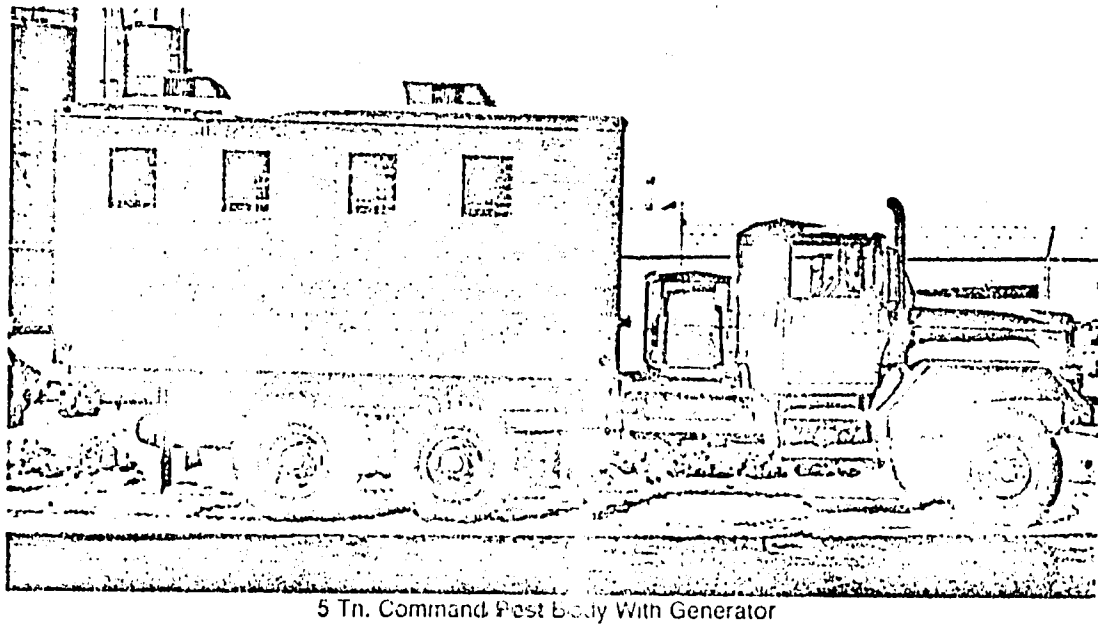
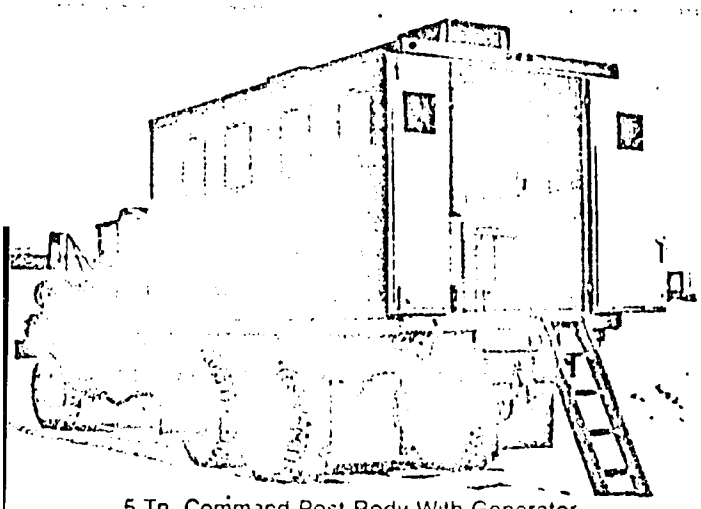
TACTICAL VEHICLES



Tn. Command Post Body With Generator



5 Tn. Command Post Body With Generator



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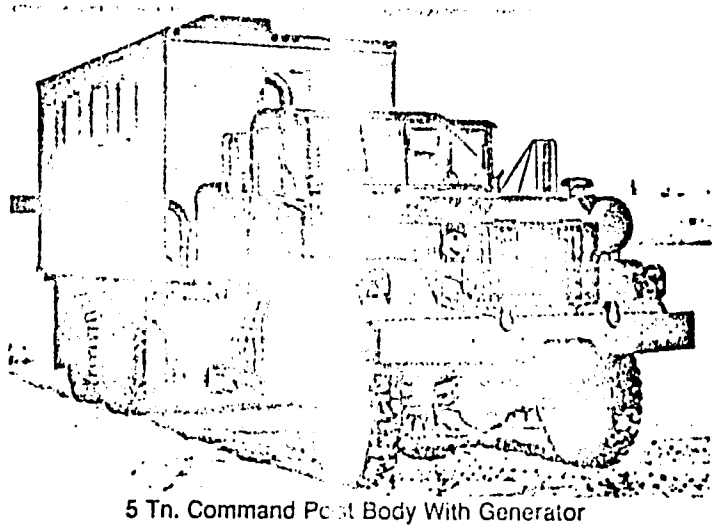

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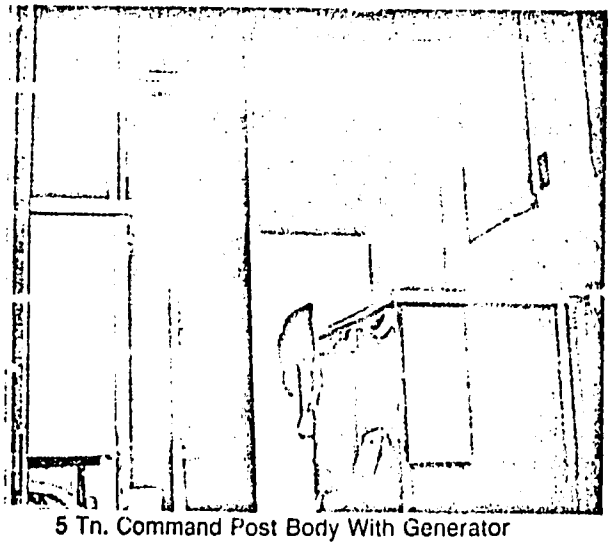
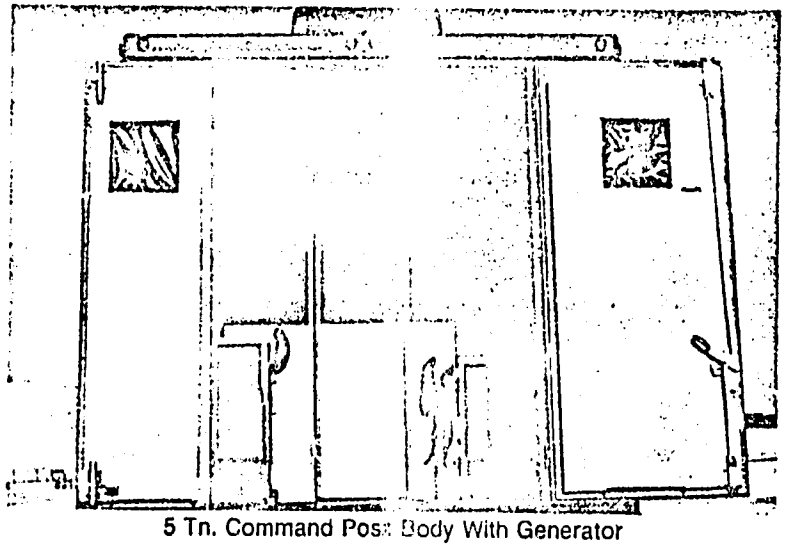


5 Tn. Command Post Body With Generator



5 Tn. Command Post Body With Generator

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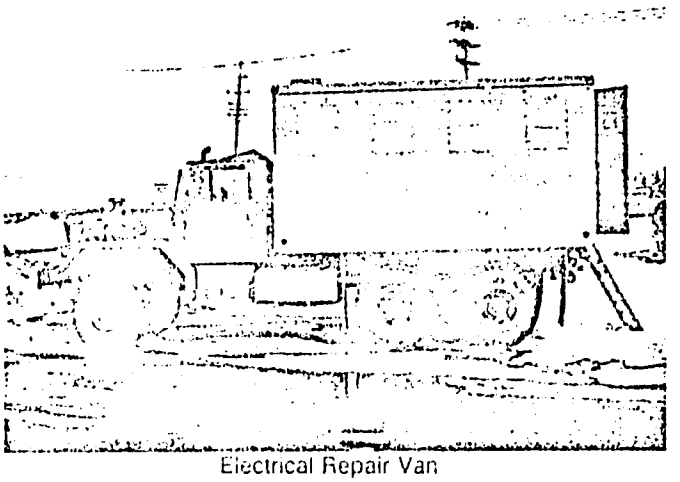
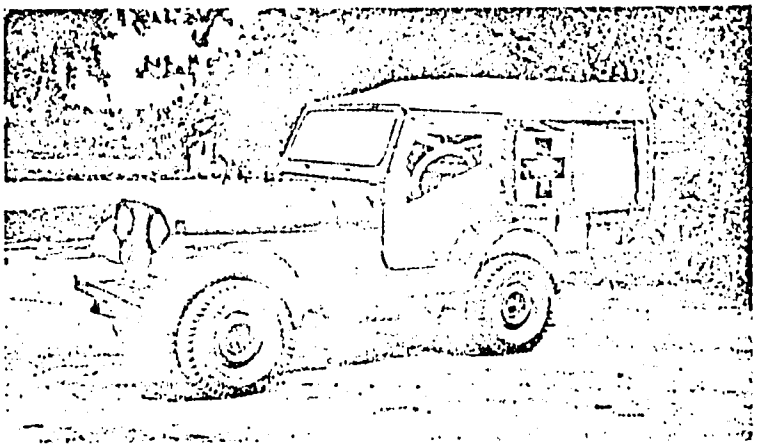
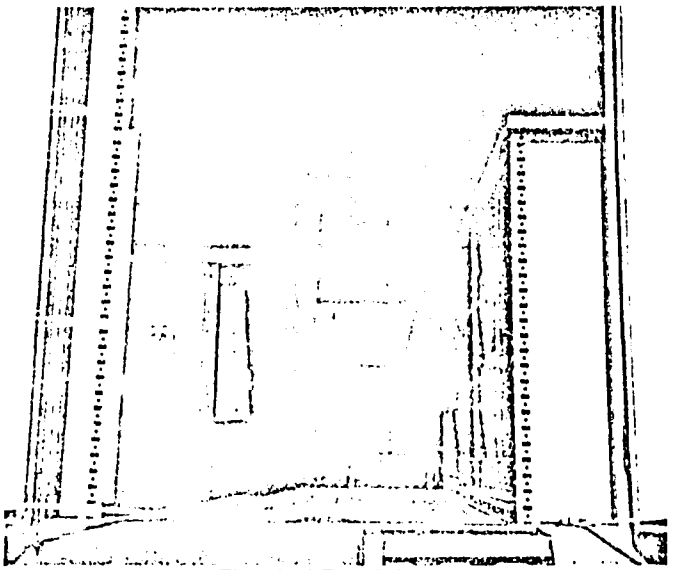
TACTICAL VEHICLES



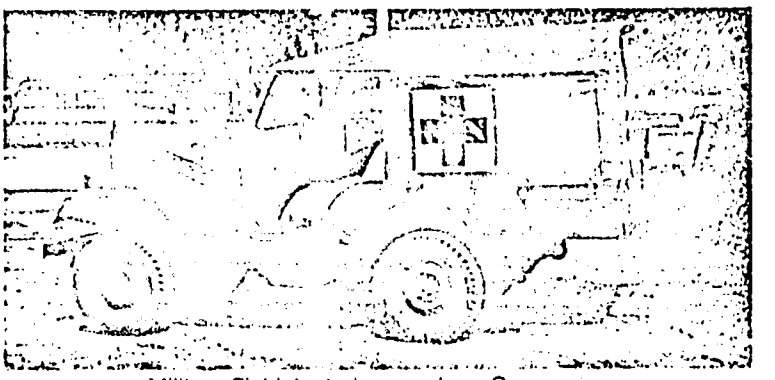
Electrical Repair Van



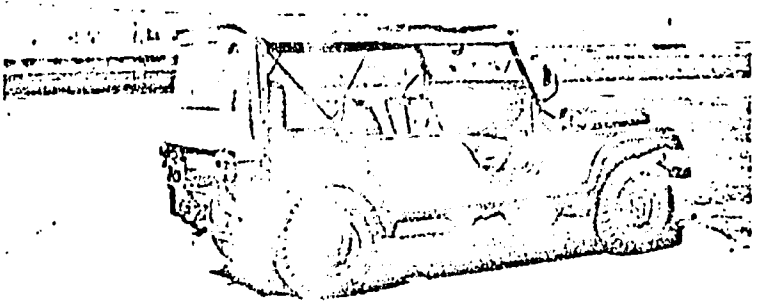
Military Field Ambulance - Jeep Conversion



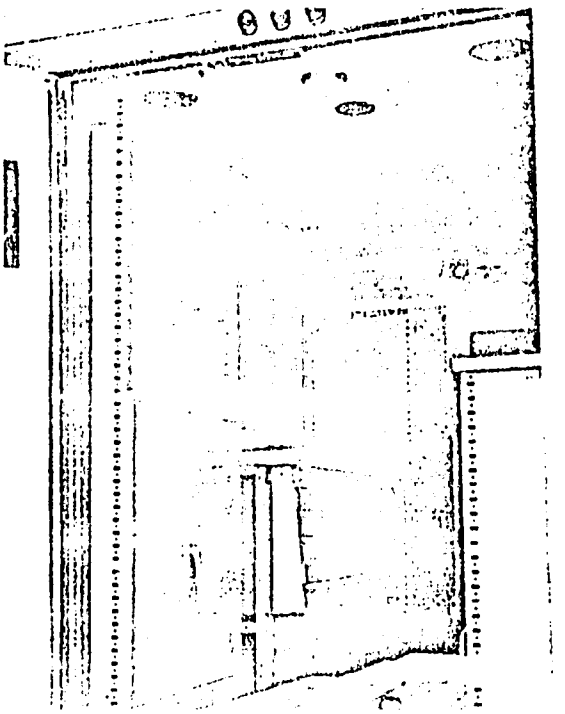
Electrical Repair Van

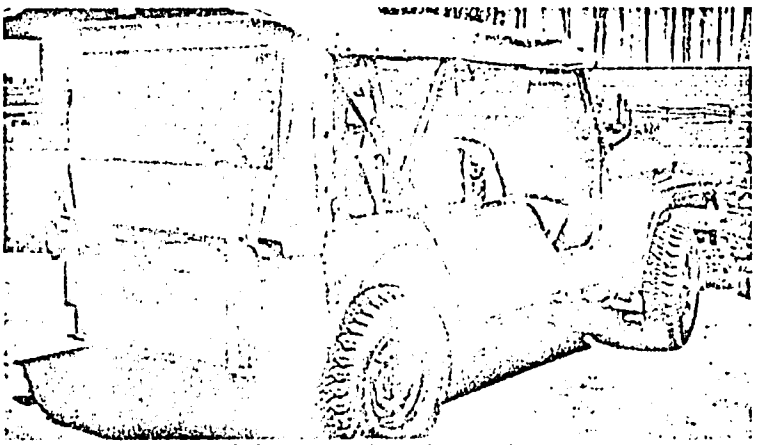


Military Field Ambulance - Jeep Conversion



CJ7 Military Jeep Conversion





CJ7 Military Jeep Conversion

Electrical Repair Van

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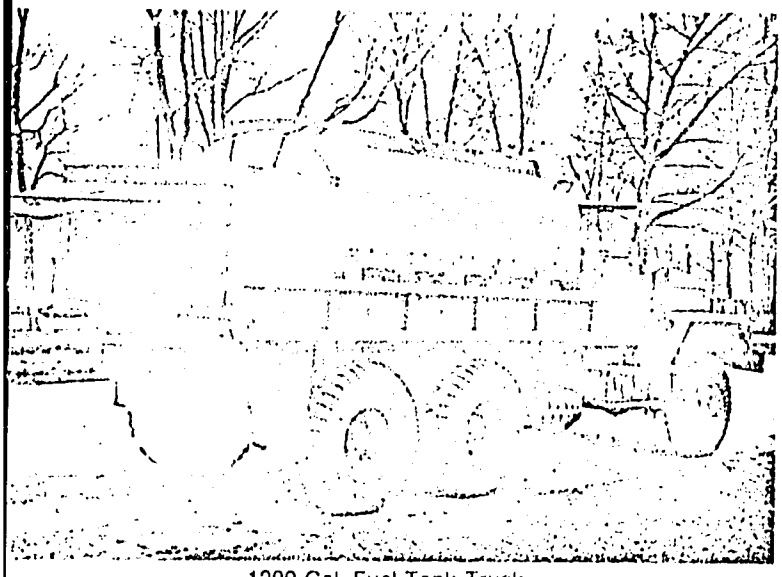
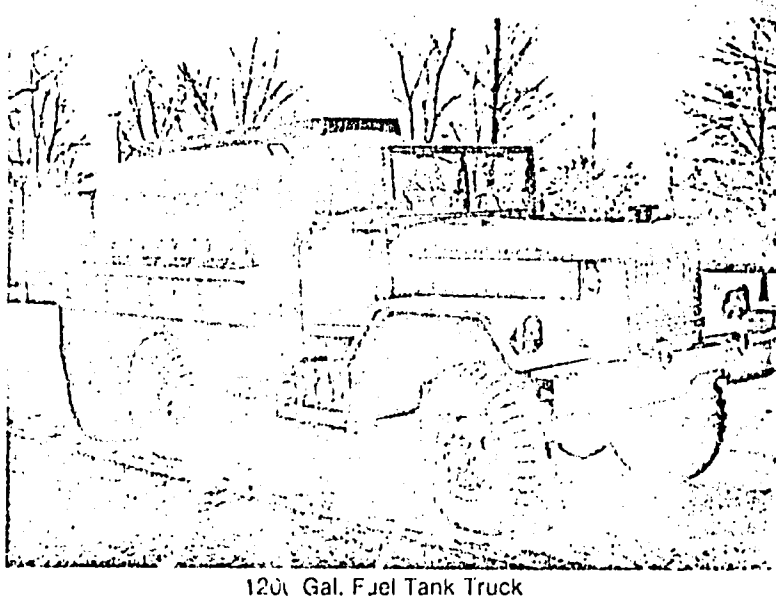
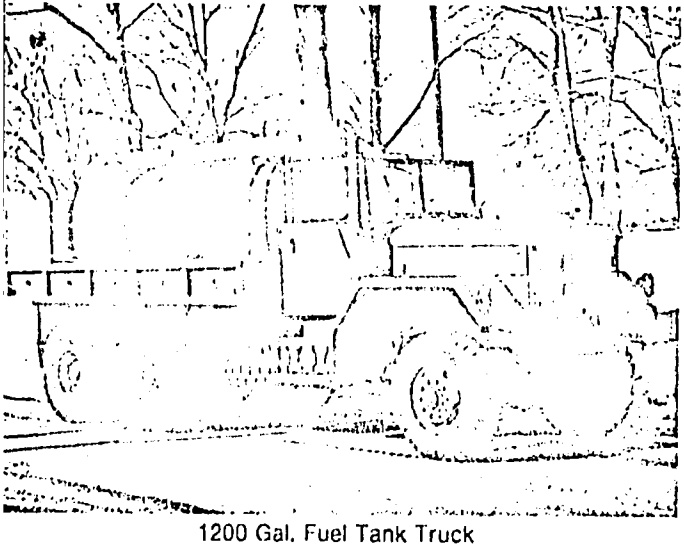
TACTICAL VEHICLES



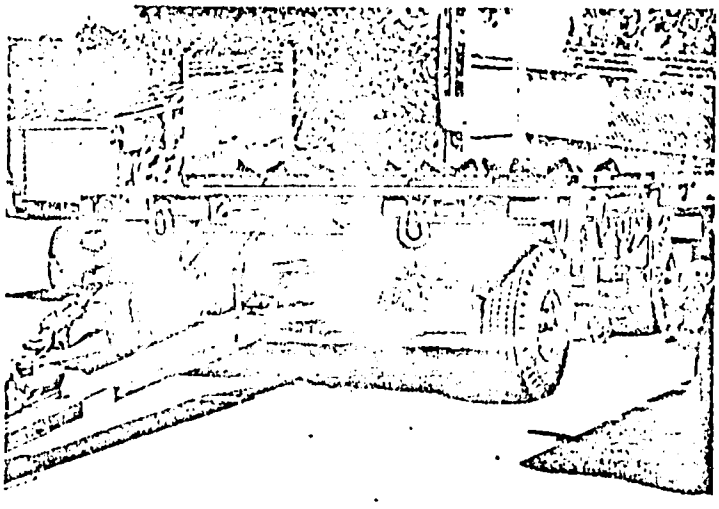
1200 Gal. Fuel Tank Truck



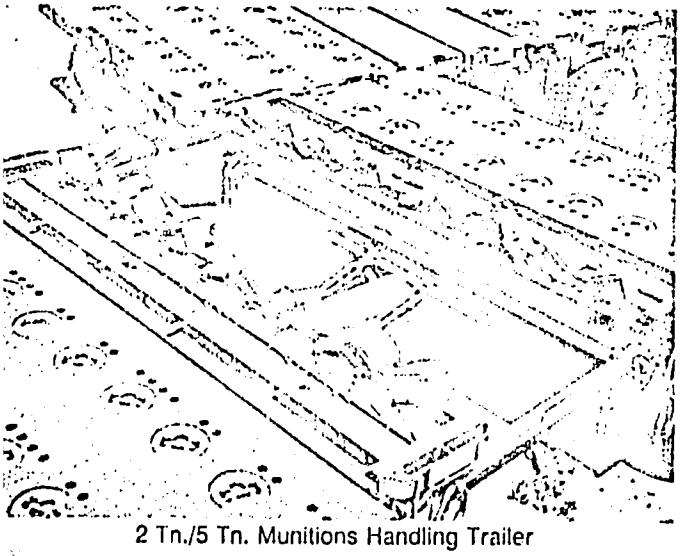
1200 Gal. Fuel Tank Truck



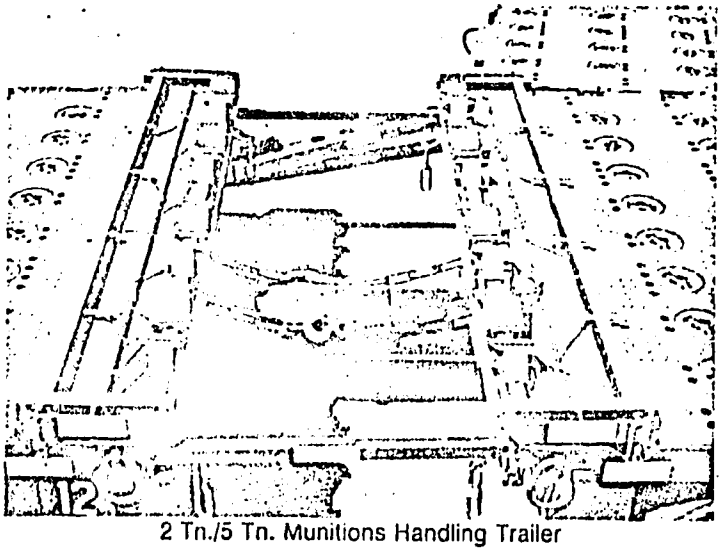
1200 Gal. Fuel Tank Truck



2 Tn./5 Tn. Munitions Handling Trailer



2 Tn./5 Tn. Munitions Handling Trailer



2 Tn./5 Tn. Munitions Handling Trailer

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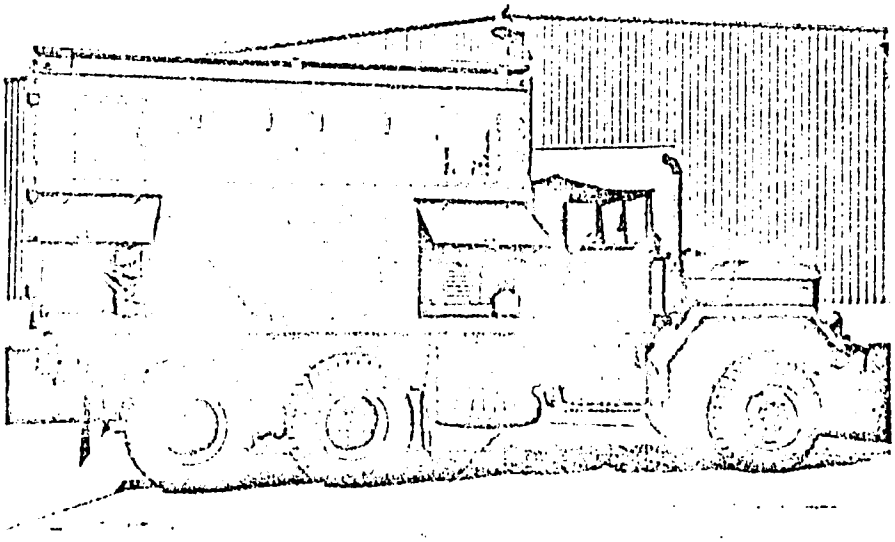
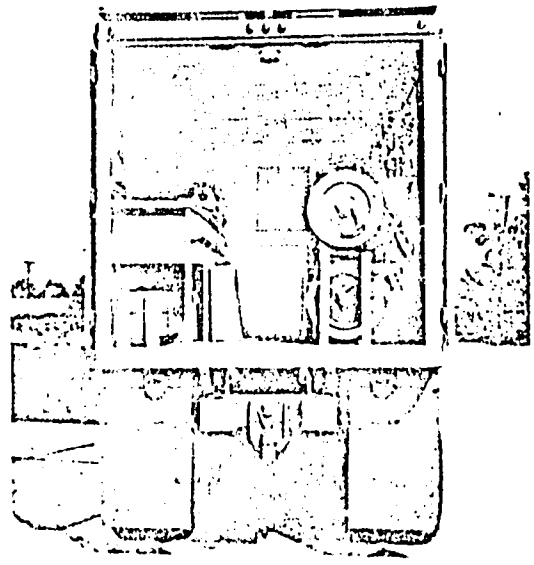
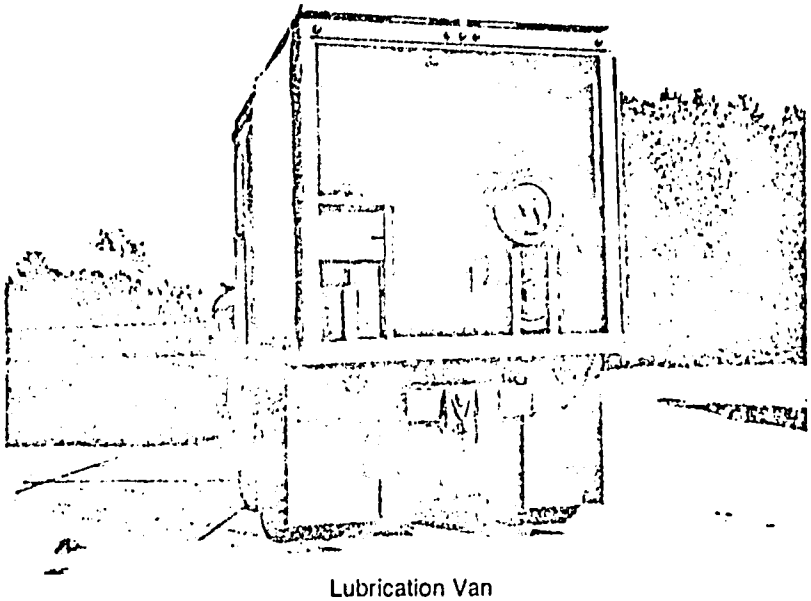
TACTICAL VEHICLES



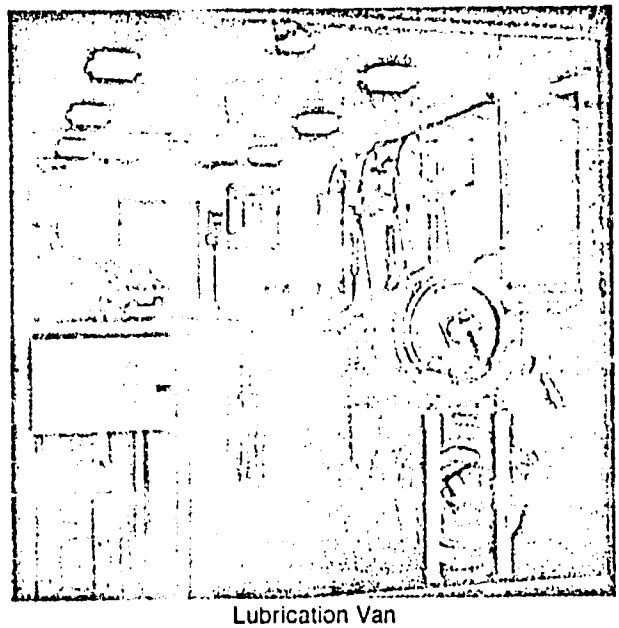
Lubrication Van



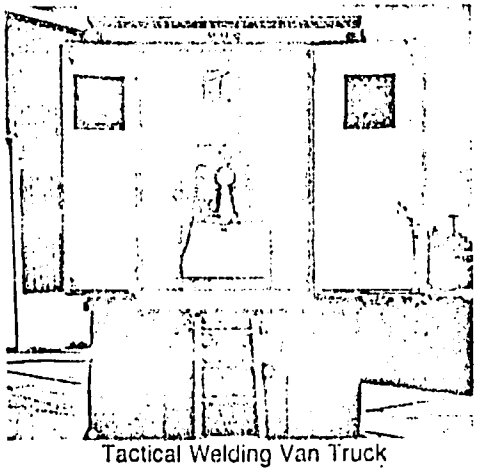
Lubrication Van



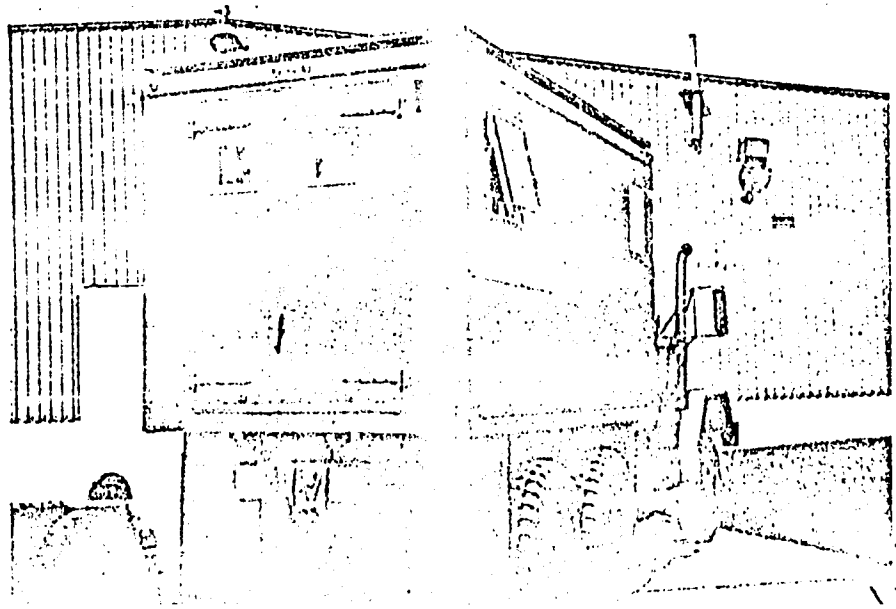
Lubrication Van



Lubrication Van

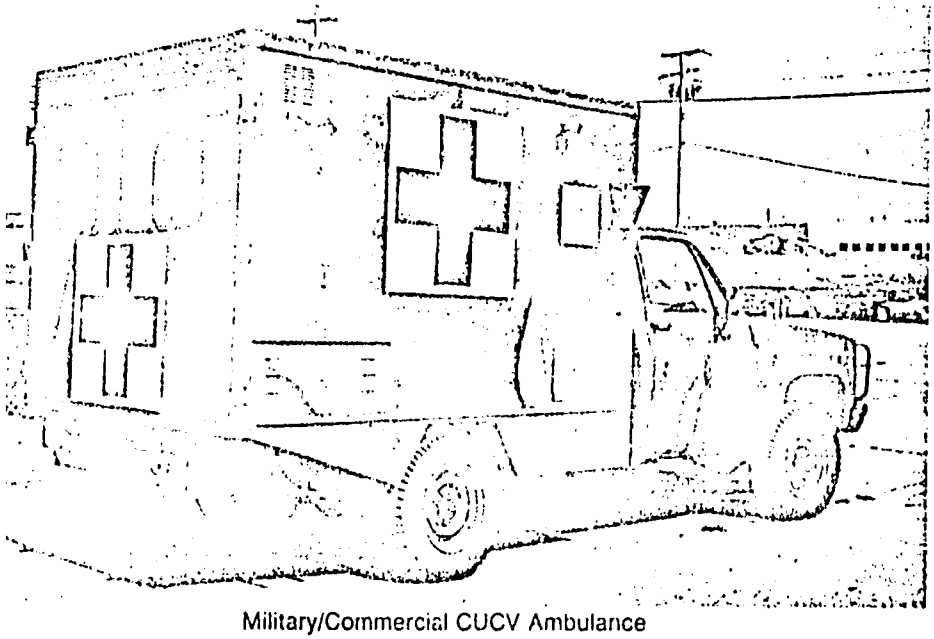


Tactical Welding Van Truck

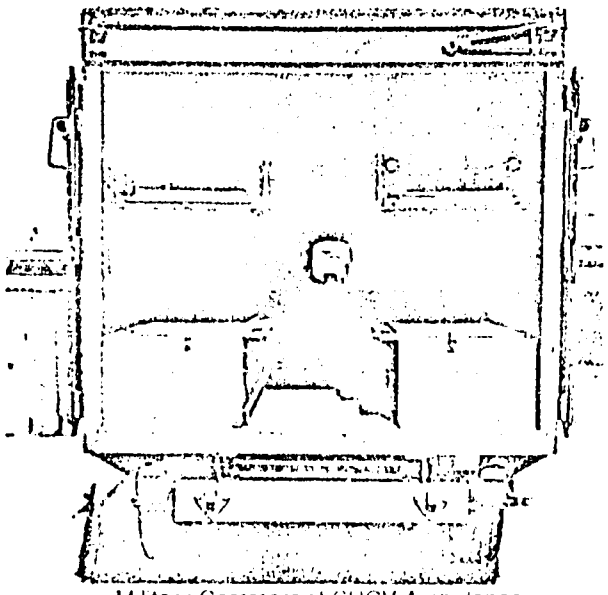


Tactical Welding Van Truck

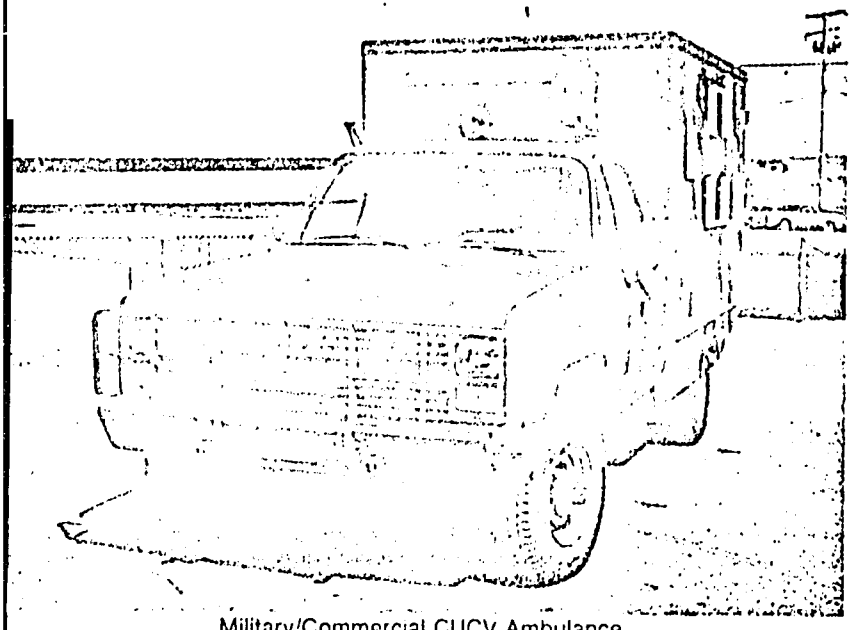
TACTICAL VEHICLES



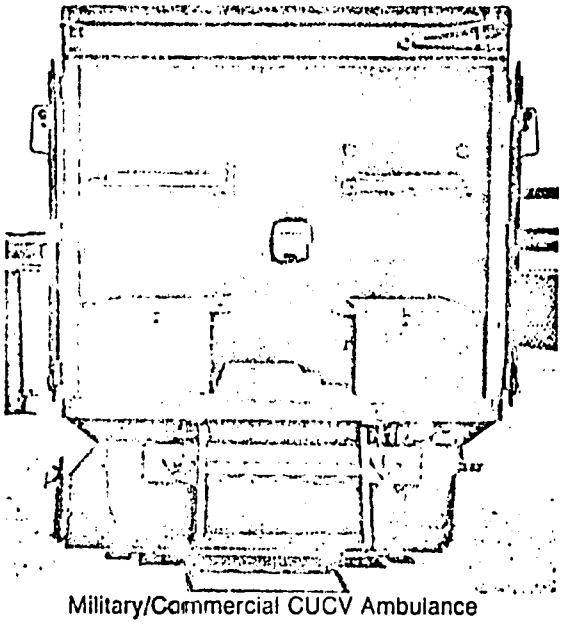
Military/Commercial CUCV Ambulance



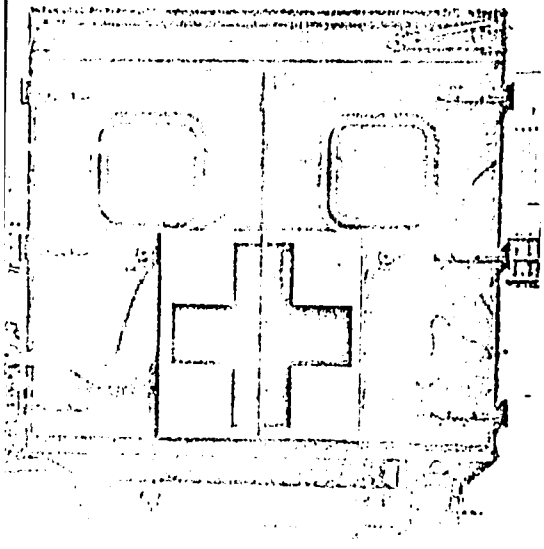
Military/Commercial CUCV Ambulance



Military/Commercial CUCV Ambulance

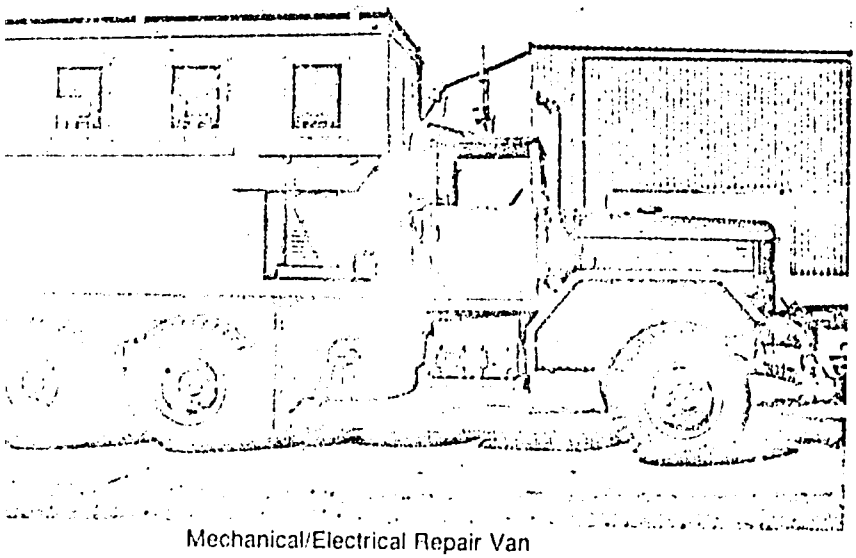


Military/Commercial CUCV Ambulance

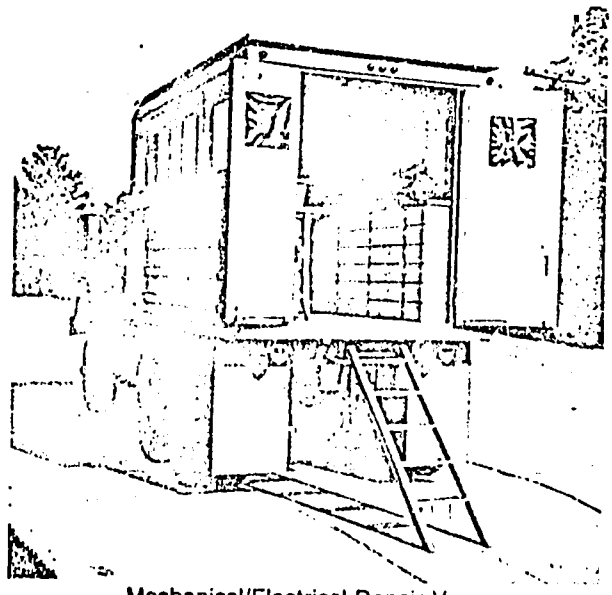


Military/Commercial CUCV Ambulance

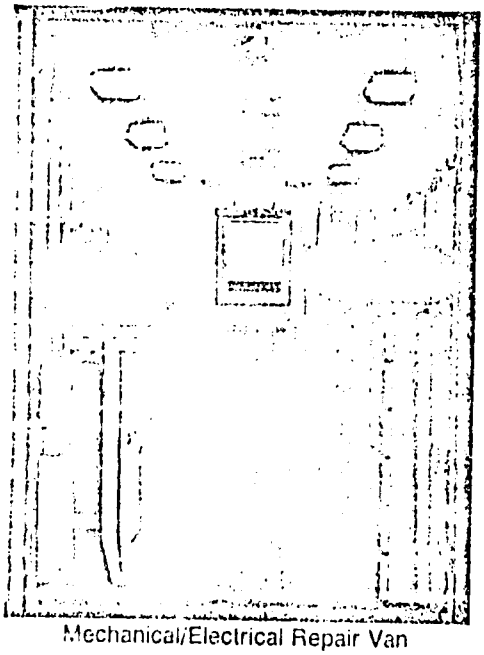
TACTICAL VEHICLES



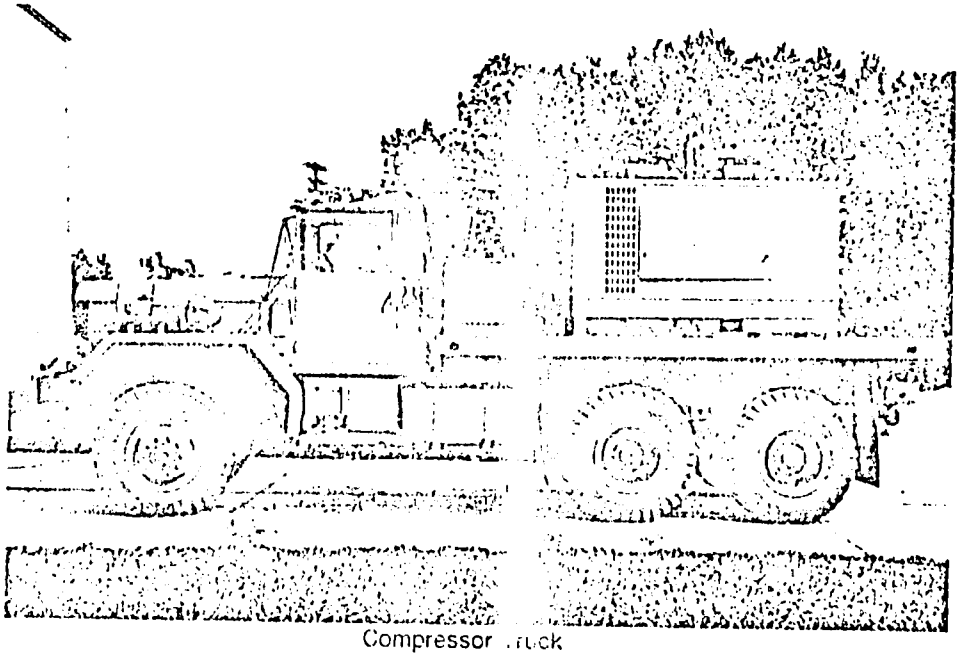
Mechanical/Electrical Repair Van



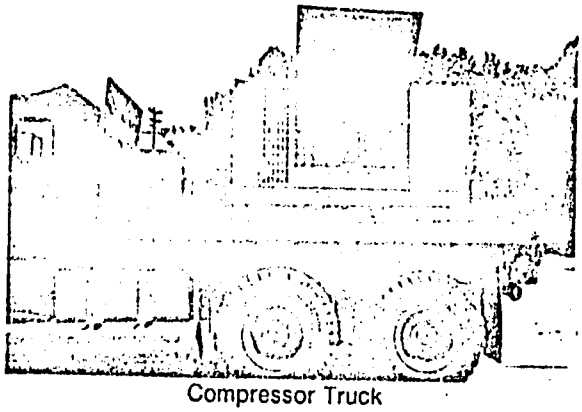
Mechanical/Electrical Repair Van



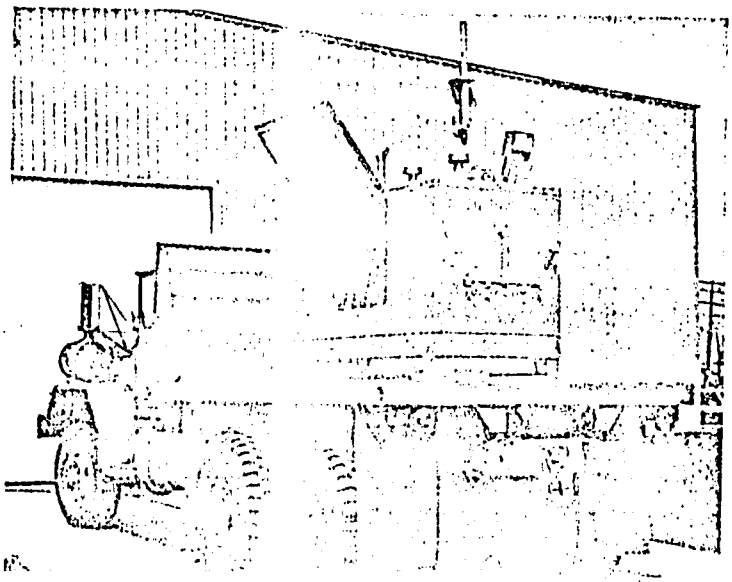
Mechanical/Electrical Repair Van



Compressor Truck

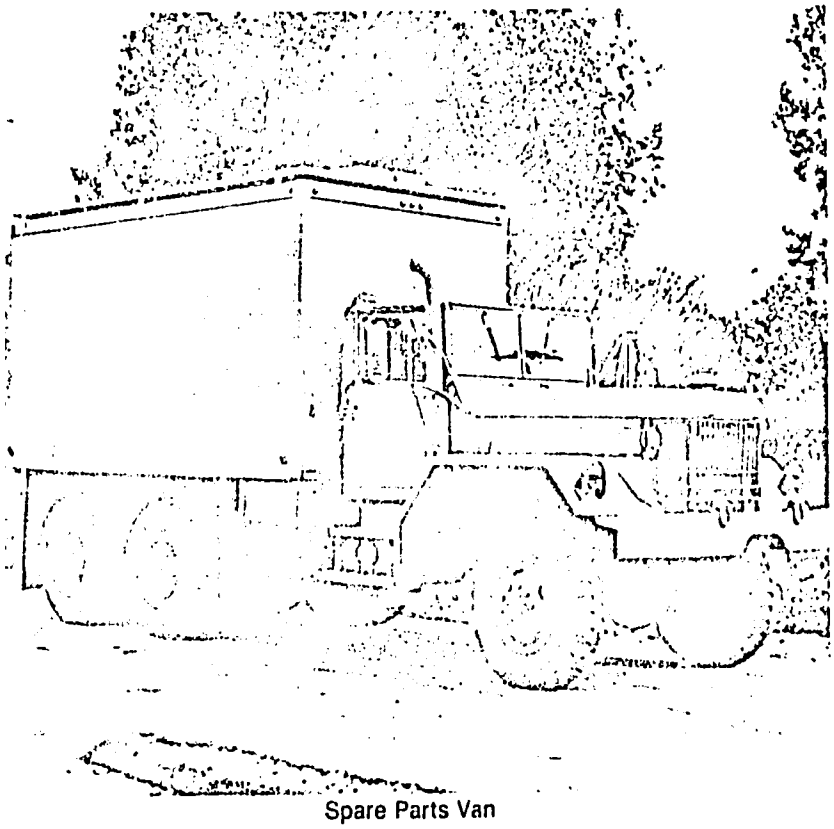


Compressor Truck

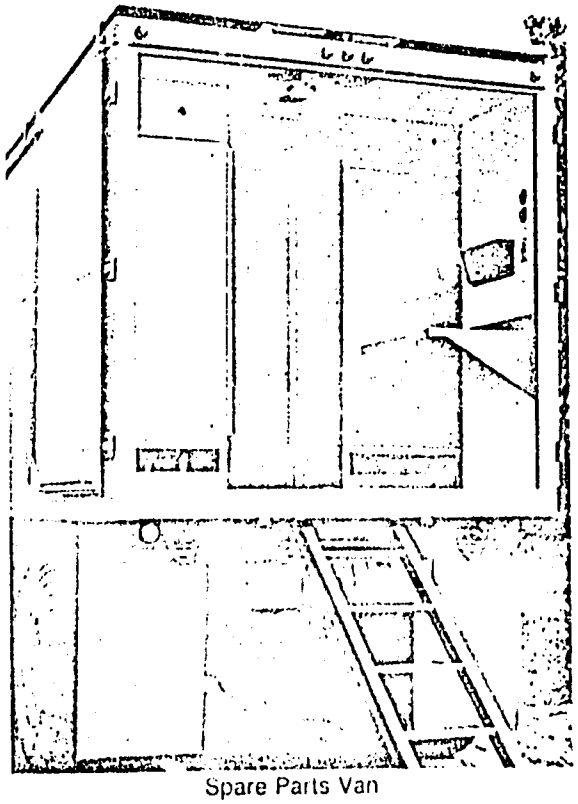


Compressor Truck

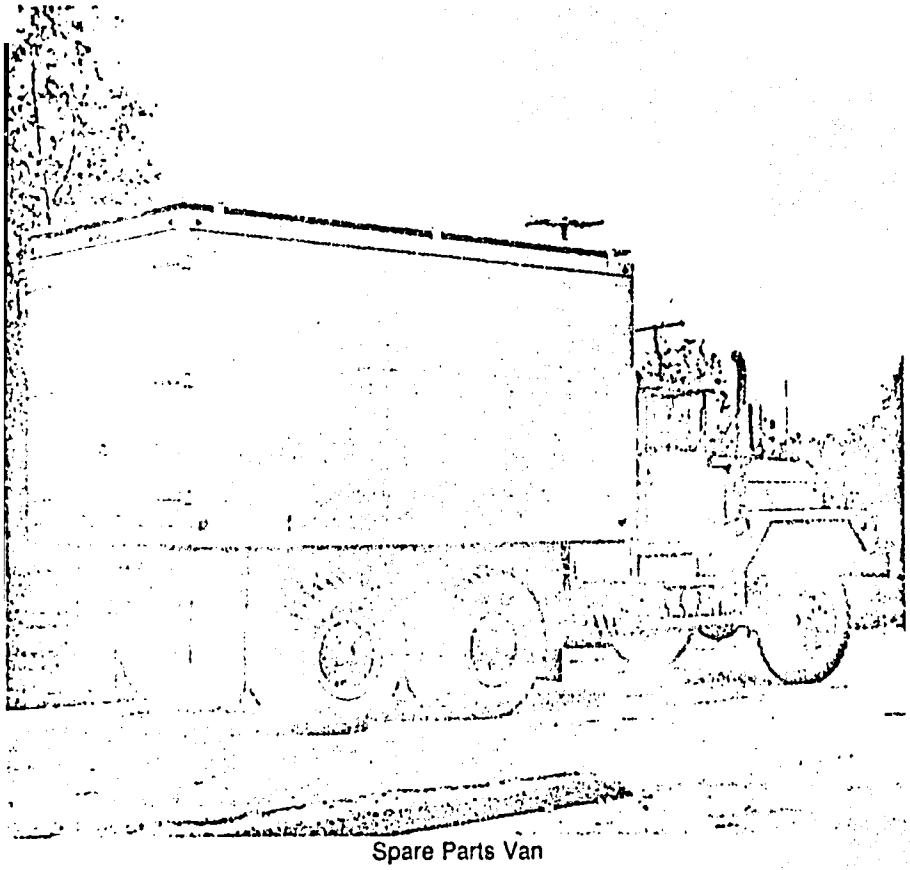
TACTICAL VEHICLES



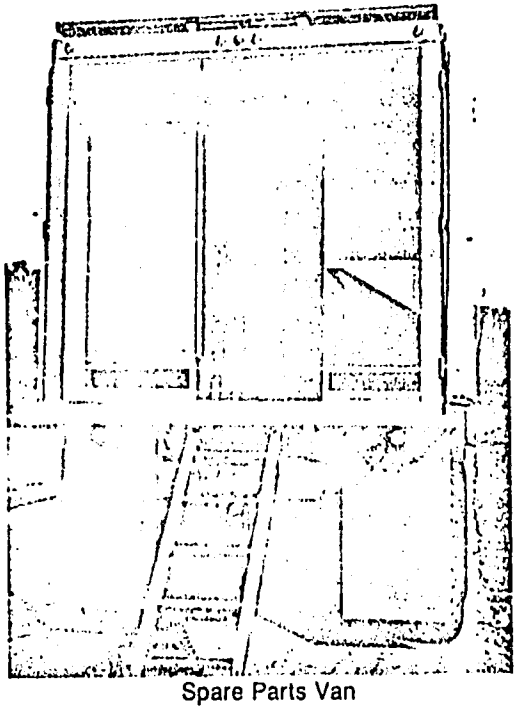
Spare Parts Van



Spare Parts Van



Spare Parts Van



Spare Parts Van

160

PRODUCTS

ODIES (GENERAL)

- craft Service Bodies
- r Carrier
- rgo (Military & Commercial; Standard & Drop Side)
- mp (1½ cu. yd. up to 24 cu. yd.)
- vating Platform Bodies
- ain/Livestock
- avy Duty Platform with Crane
- be/Service
- Field
- k Up (8 ft. & 9 ft. Utiline Style)
- tform (Standard and Heavy Duty)
- frigeration Van
- fuse
- ll-A-Ramp (10°)
- (Roll Back Body)
- ake
- ake with Liftgate
- lephone Line Construction
- e Service
- ility - Telephone Maintenance
- and Service
- ns: Audio/Visual
  - Dry Bulk
  - Furniture
  - Medical/Dental
  - Poultry
  - Shop and Field Service
- recker

PECIAL BODIES

- erial Lift
- nbulances (Modular-Integrated and Panel)
- MMO Loader/Cargo/Crane Bodies
- hipper Body
- xplosive Vans
- fth Wheel Packages and Wet Line Kits
- re Apparatus and Bodies
- ary Vans
- obile Field Hospital
- olice Car Packages
- olice Patrol Vans
- /ork Shops on Wheels

TRAILERS

- ¼ Tn., ½ Tn., ¾ Tn., & 1½ Tn. Commercial Type
- Container
- Custom Flat Bed
- Dump
- Fifth Wheel
- 600 Gal. Fuel Trailer (Commercial Type)
- Low Boy Trailers
- Special Heavy Hauler Trailers - Caterpillar Tractors; etc.
- Tank Transporters (Fuel; Water; Aviation; Ammonia; etc.)
- 400 Gal. Water/Fuel Trailers (Commercial Type)

MILITARY BODIES AND TRAILERS

- CUCV Ambulance
- M886 Ambulance
- Command Post
- Electrical/Fuel Service Repair
- Field Ambulance
- Field Bakery
- Field Kitchen
- Field Laundry
- Jeep Conversion
- Military Cargo Body Conversion
- 2 & 5 Tn. Munitions Handling Trailer
- Parts Van
- 5000 Gal. Refueler
- Shop Vans (Tactical)
- ¼ Tn., ½ Tn., ¾ Tn., and 1½ Tn. Tactical Cargo/Ammunition Trailers
- Tank and Armored Vehicle Transporters
- 400 Gal. Water and Fuel Tactical Trailers
- 1200 Gal. Water and Fuel Tanks

TANKS

- Aircraft Refueler
- Fuel Transporters (5,000/10,000 gal.)
- Gasoline
- Water

CRANES

- Hydraulic Extendable (Stiff Boom)
- Hydro-Lift (Floor and Truck)
- Knuckle Boom

HOISTS

- Dump (Single and Twin Cylinder)
- Elevating
- Scissors/Arm
- Telescopic
- Underbody

MISCELLANEOUS

- Air Power Systems for Winch and Dump Applications
- Bows/Ridge Poles and Tarpaulin
- Chelsea PTO Assemblies
- Compressors
- 4x4 Conversion (Marmon)
- Emergency Vehicle Lights
- Emergency Vehicle Package
- Front Mounted Snow Plow for 1 Tn. Truck
- Generators
- Hooks (Tow and Pintle)
- Hydraulic Components
- Hydraulic Liftgates
- Hydraulic Systems
- Insulation Packages
- 24 V. Inverter Kit
- Longitudinal Seats with Lazy Backs
- Medical Equipment and Supplies
- Pick Up Camper Top
- 500 Gal. Potable Water Tank
- Refrigeration Units
- Refrigeration Van Insulation Kits
- Retrofit
- Rustproofing (Standard and Tropical)
- Welders - Arc and Oxygen/Acetylene
- Wet Line Kits
- Winches (8000 lb. to 100,000 lb.)
- Wire Ropes for Winches
- Wood Racks for Pick Up and Cargo Bodies

McGraw Commercial Equipment Company, Inc.

October 23, 1984

R.M. Stachelski
Argonne National Lab
9700 S. Cass Ave.
Argonne, IL 60439

Subject: Inquiry 931615

Reference: McGraw Quotation 12964

Dear Ms. Stachelski:

Please find enclosed McGraw drawing no. 3001064, Sheets 1 and 2, three copies of each. These sales sketches should help clarify our proposal.

I will be available to meet with you at your facility on Friday, November 2, 1984, if you so desire.

Please let me know on or before Friday, October 26, 1984.

Regards.

Bruce J. Burton

BJB:ms

Enc.

7200 E. Fifteen Mile Road Sterling Heights, Michigan 48077 313 977-0400
Telex: 23-1140 MCGRAWCO STGH Cable Code: MCGRAWCO

162

McGraw Commercial Equipment Company, Inc.

October 26, 1984

R.M. Stachelski
Argonne National Lab
9700 S. Cass Ave.
Argonne, IL 60439

Dear Ms. Stachelski:

Please find enclosed a brochure on Champion motor homes on which your mobile laboratory will be based.

Page eight (8) shows model 9272 (27'), which we will receive from Champion without interior components. We will install interior cabinetry as shown in the previously forwarded drawings (McGraw Drawing No. 3001064 Sheet 1 & 2).

If you require additional information, please contact me.

Regards,

Bruce J. Burton

Bruce J. Burton

ms

Enc.

OCT 31 1984 2:52

7200 E. Fifteen Mile Road Sterling Heights, Michigan 48077 313 977-0400
Telex: 23-1140 MCGRAWCO STGH Cable Code: MCGRAWCO

163

Champion Motor Homes . . . Fun For All Seasons

164

Champion Motor Homes, Built Tough, Priced Right For Year-Round Fun

Your recreational dollars will stretch a long way with a Champion motor home. And for your money you'll get year-round fun. You can use your Champion in the winter to travel in comfort and warmth to ski slopes, sledding areas, skating parties or just to enjoy the scenery.

In summer, use your Champion motor home for long leisurely vacations, weekend trips to nearby recreational areas, sporting events or as an overnight guest lounge.

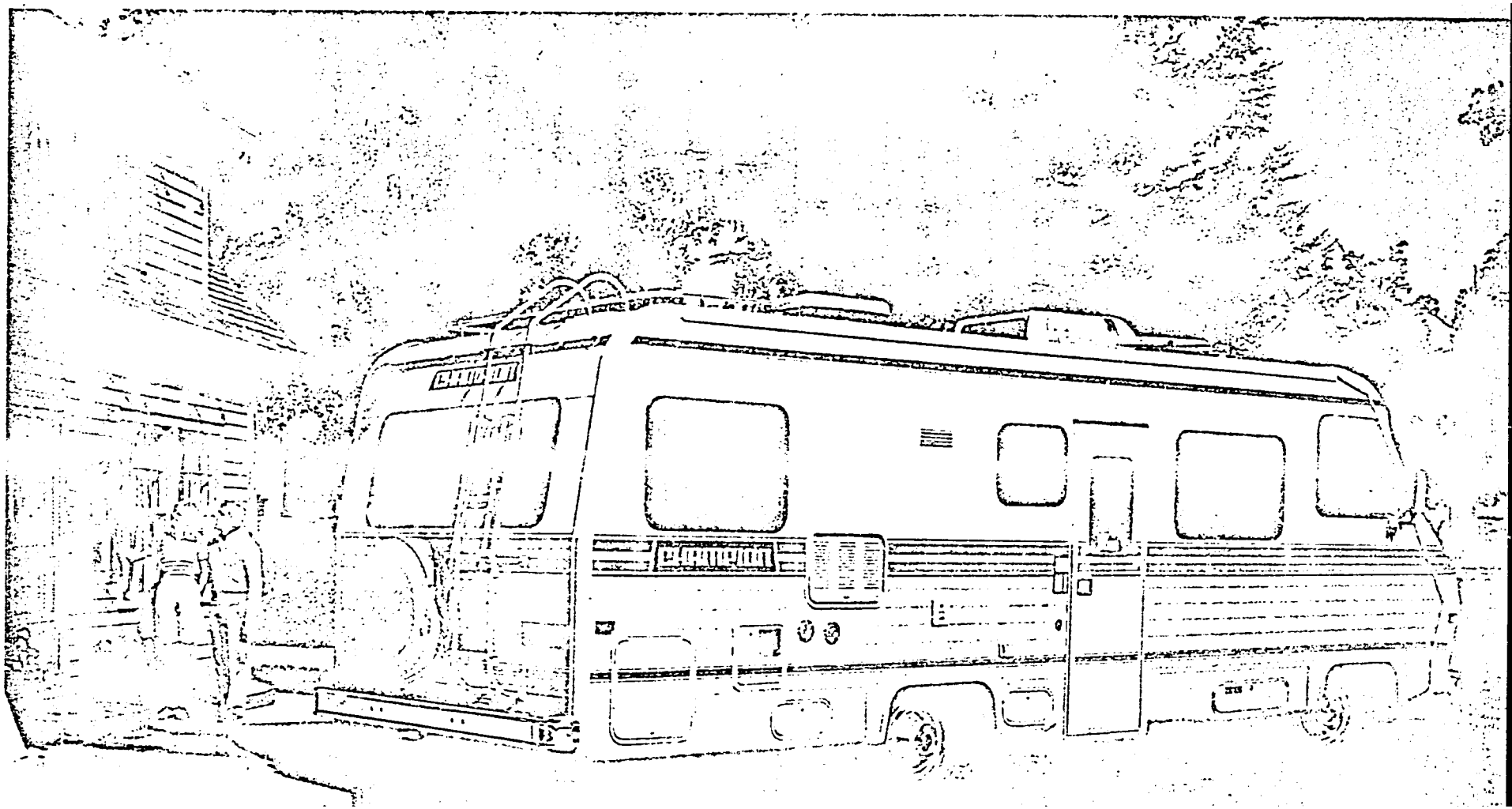
(25

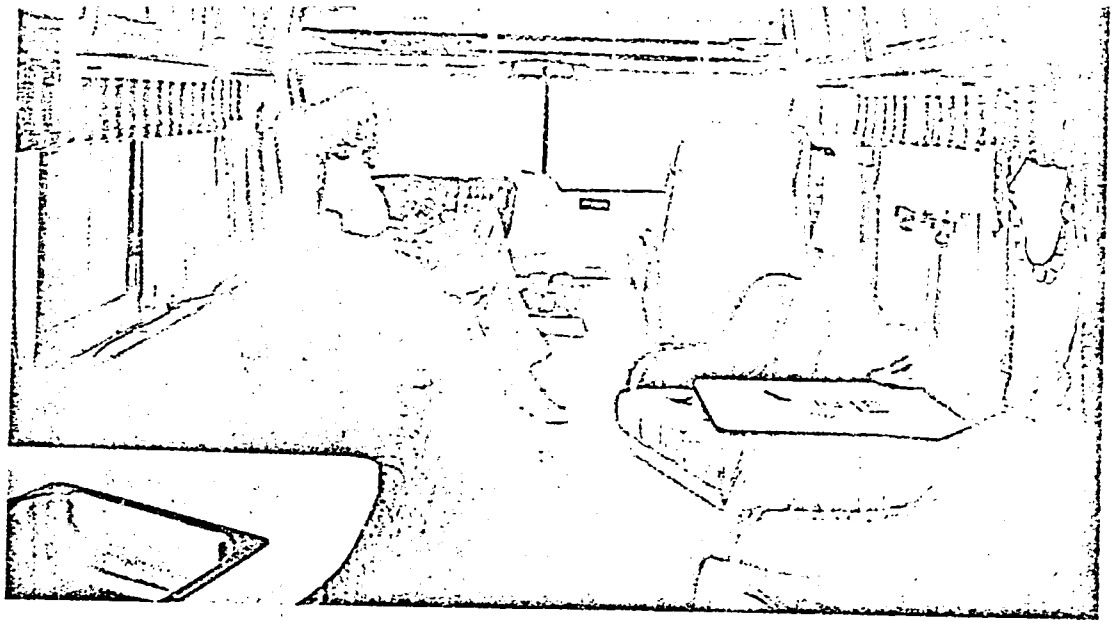
space and gives you ample storage area.

However, one of the best features of the Champion motor home is its construction. Champion gives you the benefit of a well-made motor home. For added strength, they have carbon steel braces and crossmembers to reinforce the basic chassis. And then there's the extra-strength all-steel frame, not wood or aluminum. All four sidewalls have foamed-in-place insulation for extra body unification and reduced noise and vibration.

Step into a Champion motor home, you'll find rich fabrics and beautiful velvet accents. On the exterior, you'll see aerodynamic styling and pleasing color accents.

Champion motor homes give you the maximum pleasure for your leisure/recreational dollar. They're styled for fun and care-free living. Check out a Champion motor home today!



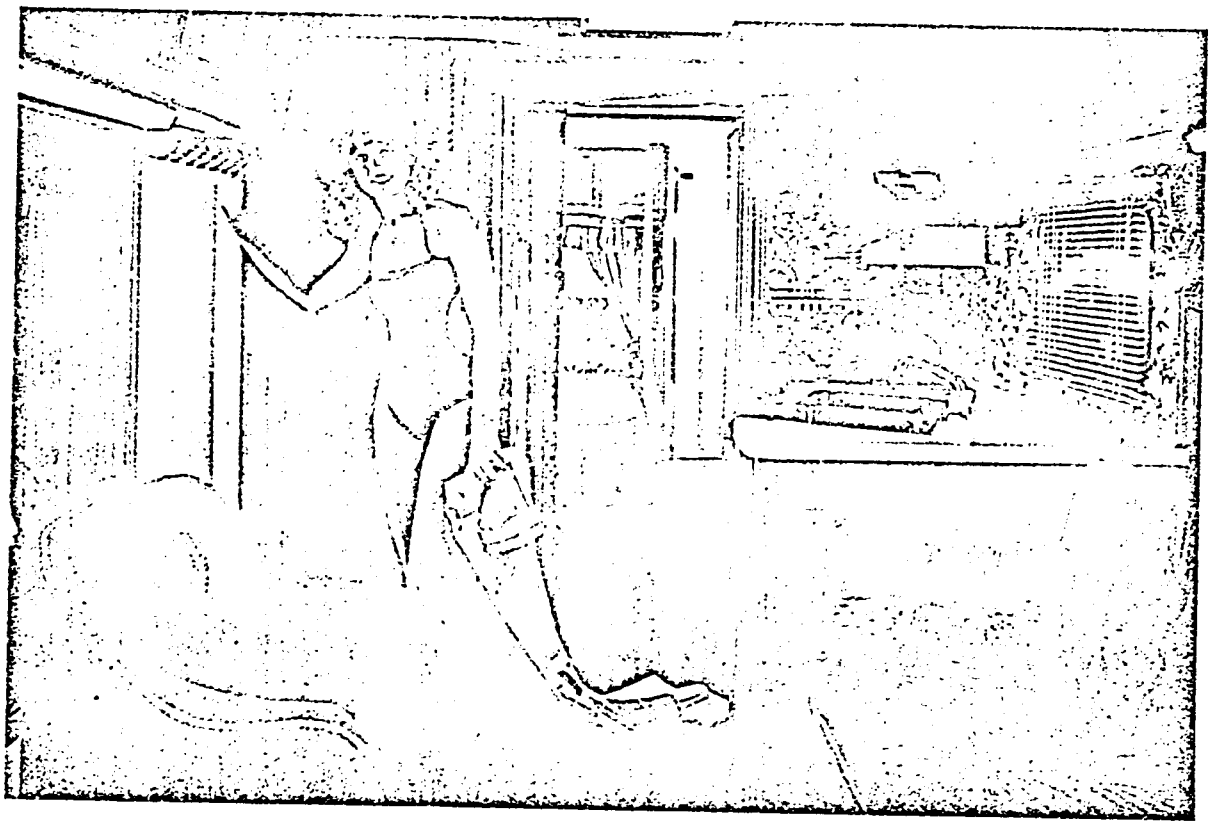


have plush carpeting and rich fabrics for well-appointed interiors. Shown here is 27' model 9273 that has a front lounge area for playing games or entertaining and a back bedroom and bath. With the driver and passenger chairs swiveled to face backwards, up to seven adults can be seated comfortably.

Free Membership In Our Owner's Club

If you're interested in meeting new people and going to new places, then our owner's club, the Champion Fleet Owners Association (CFOA), is meant for you.

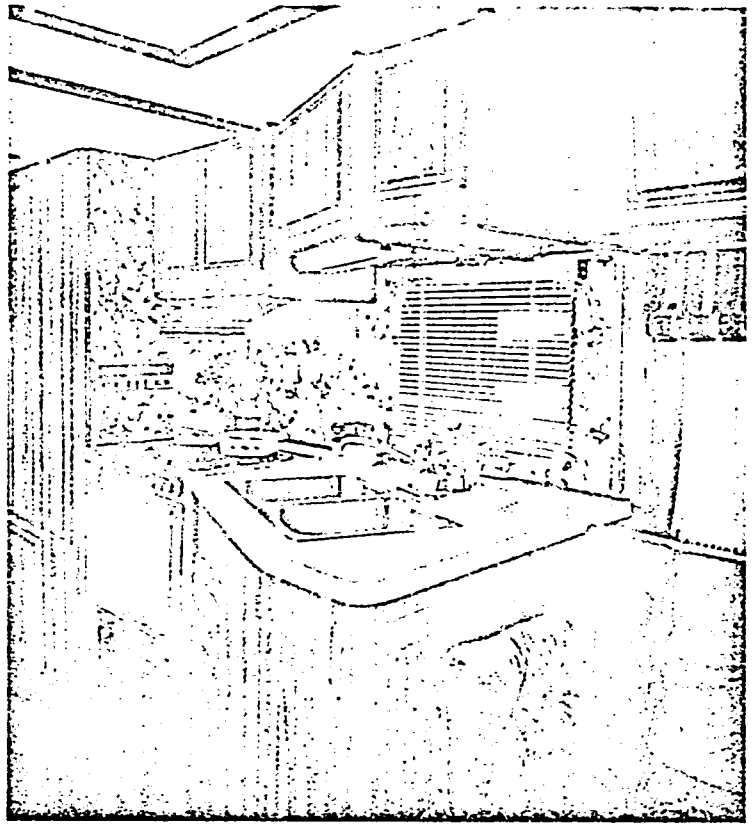
Purchase of your new recreation vehicle entitles you to a free first year membership in the club. With over 4,500 members, the CFOA organizes caravans and rallies and also provides special discounts and even a club newspaper for its members.

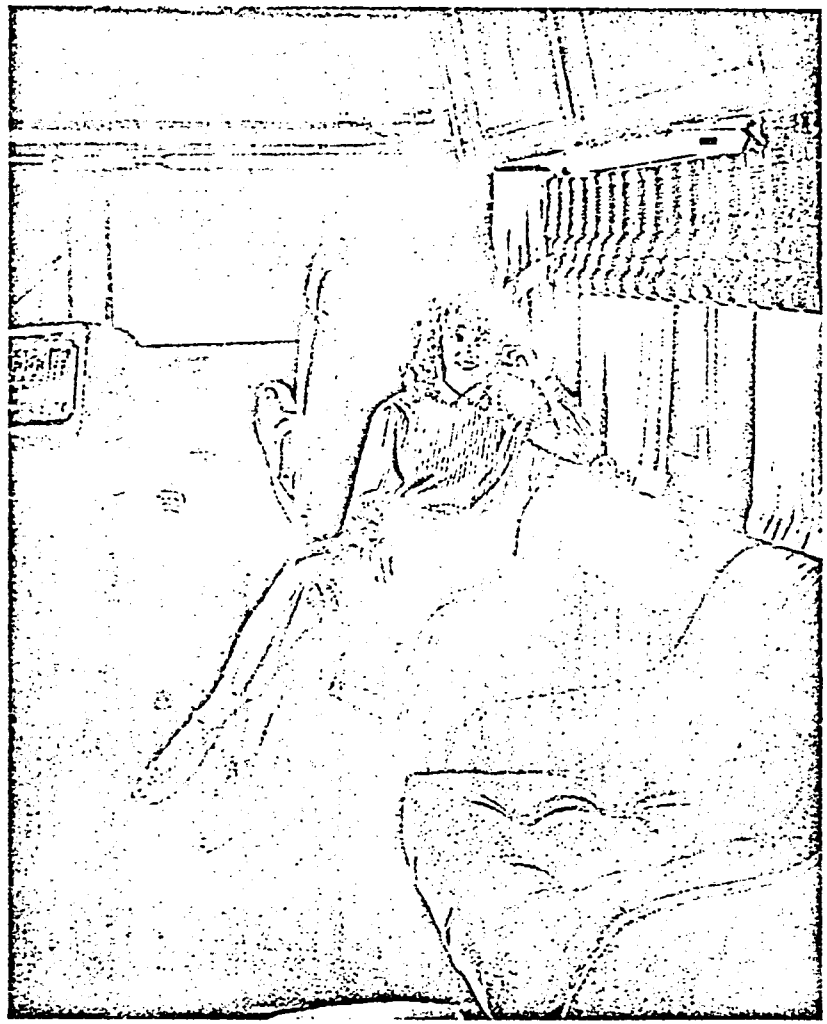


Rear view of 27' Champion Motor Home. Front cover shows front view of this model.

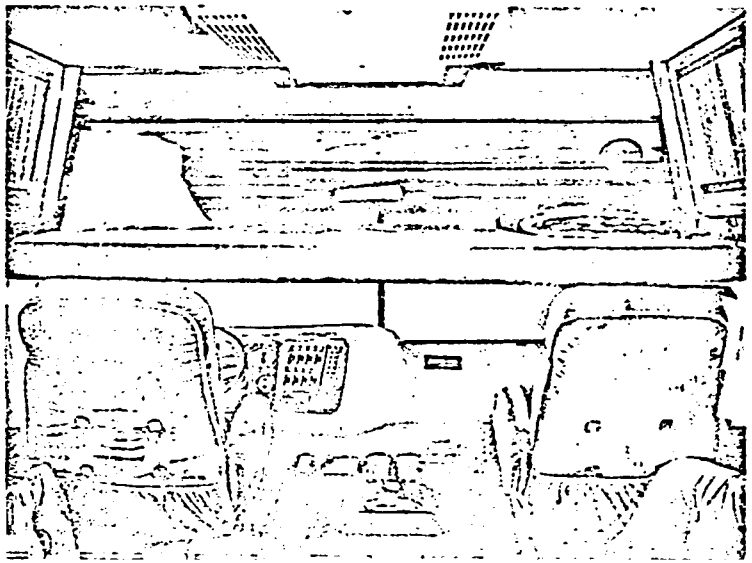
Champion's Versatile Interiors Designed For Families Trav

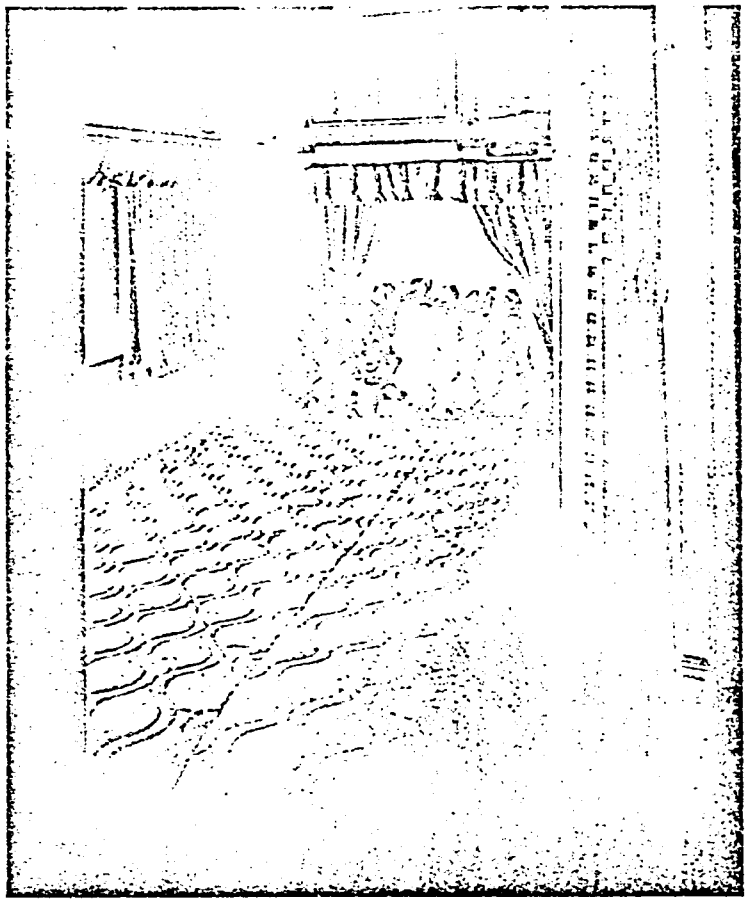
Champion's 27' model 9273 shows its interior versatility in these pictures. Note the spacious galley with its L-shaped top that gives you extra counterspace. Overhead cabinets and two closets give ample storage space in this model 9273. Also, the driver's area is well organized for comfort on the longest trips. Automotive-type air conditioning, power steering and brakes, tilt steering wheel and cruise control are all standard features.

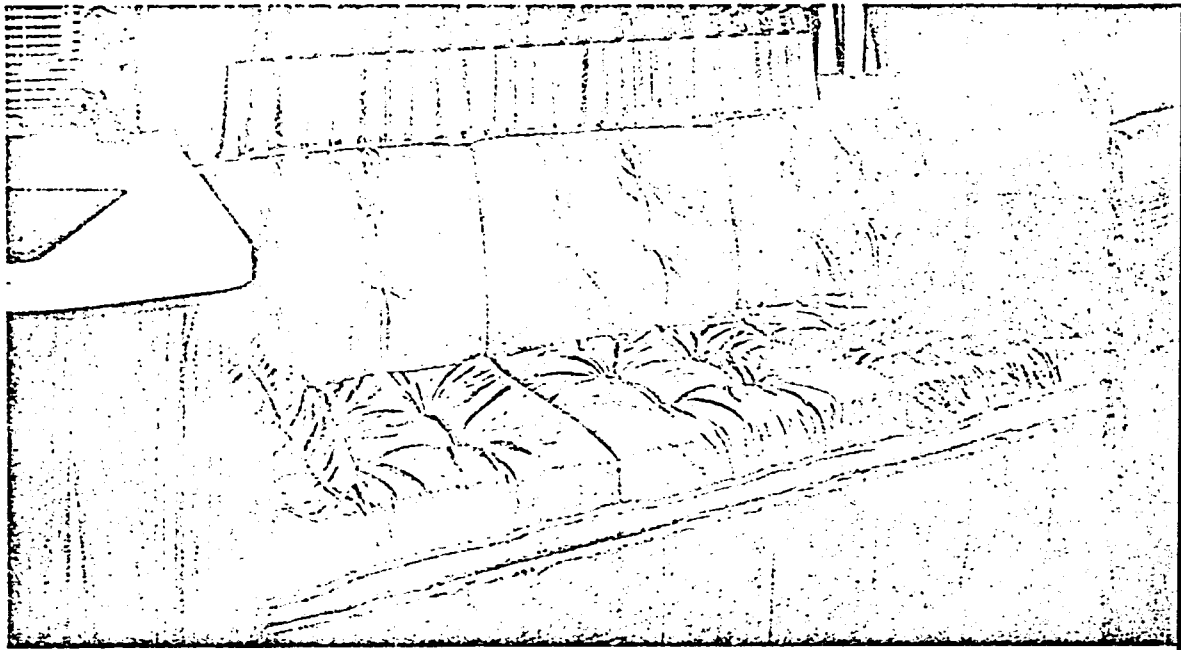


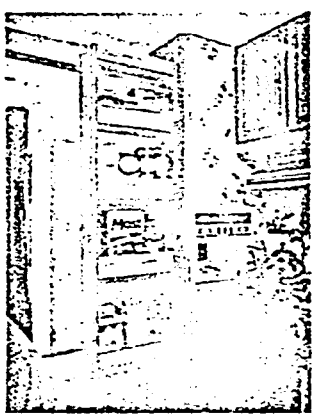


Also, there's a bed over the driver's area that can sleep up to two adults.

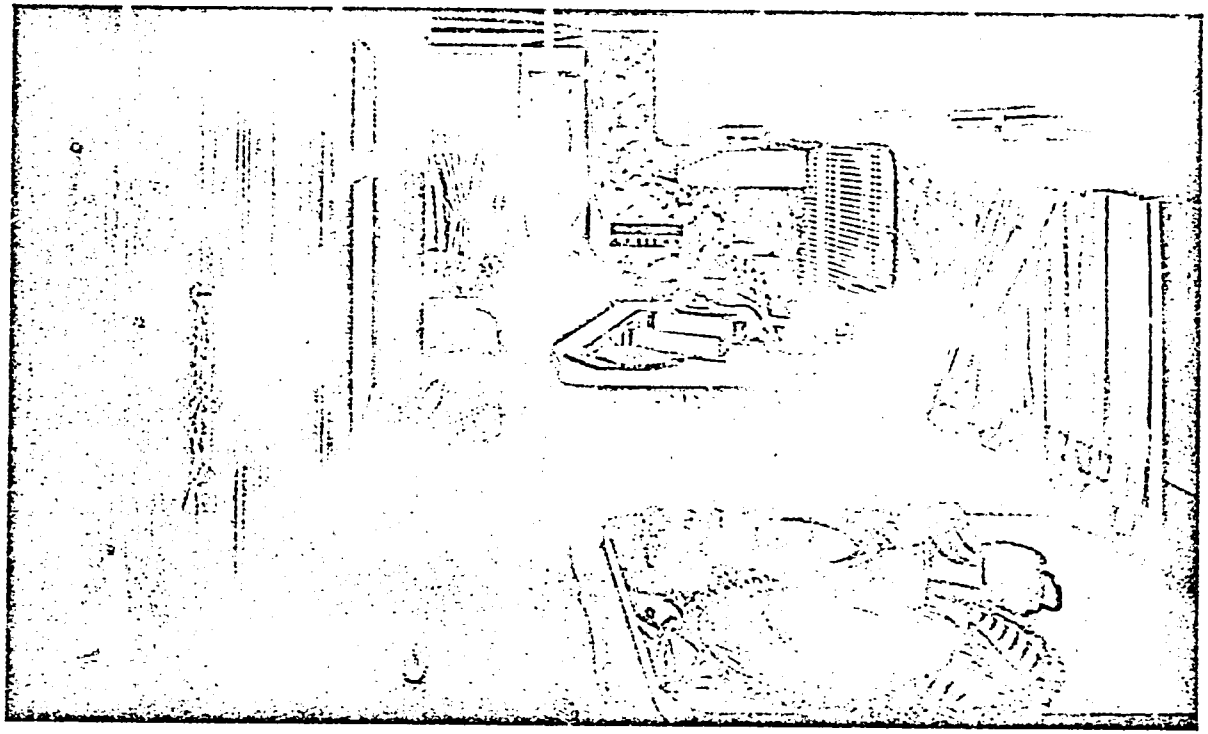






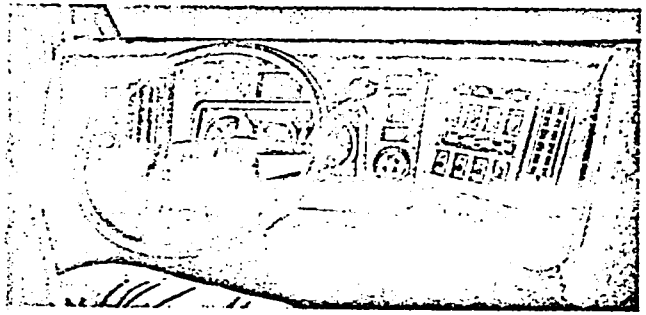


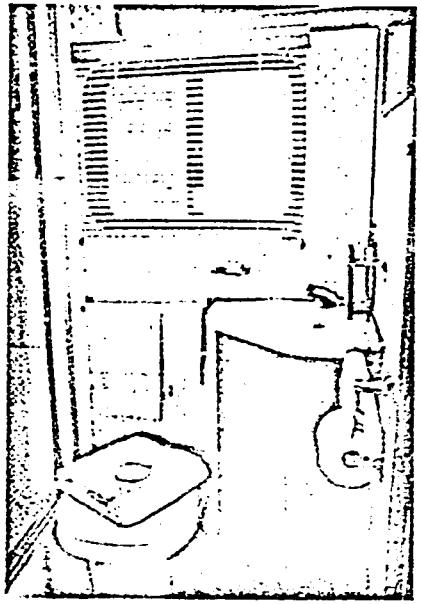
The pull-out pantry conveniently stores food for easy access.

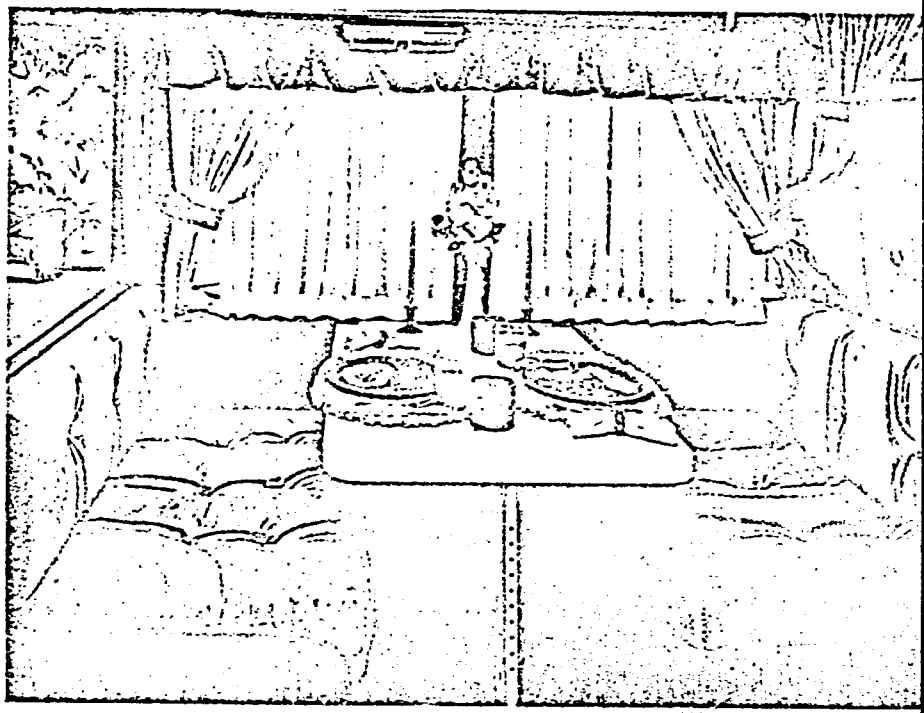


Champion's 25' model 9251 has many of the rich appointments of the larger motor homes, such as the L-shaped galley and plenty of sleeping and storage area (overhead and underneath). The dinette included in this floor plan converts into a bed that sleeps two adults.

The padded intrument panel on the Champion Motor Home has all its gauges and controls easily accessible. It has eight switches for interior lighting which saves time and effort in locating the proper controls.

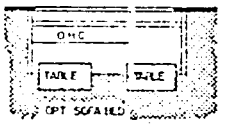


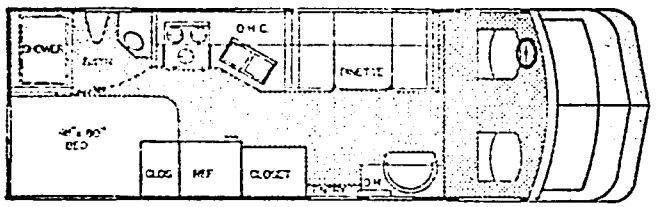




Model 9251 25 ' Features and Benefits

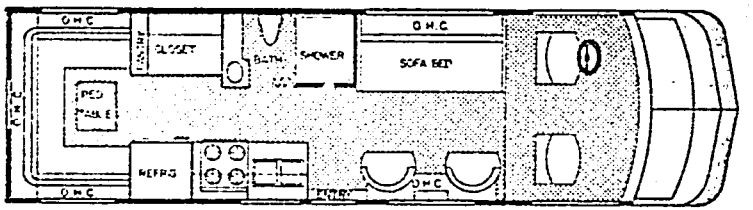
ENTERTAINMENT: Captain's chair • Dinette for games and extra seating • Driver, passenger chairs swivel to give seating for seven. GALLEY: L-shaped galley top for extra counterspace • Three burner gas range. DINING: Four person seating at dinette. BATH: Private shower stall for convenience. SLEEPING: Rear double bed with innerspring mattress comfort • Dinette converts to bed to sleep two adults. FLOOR PLAN OPTIONS: Bunk over the driver's area adds extra sleeping arrangements • Sofa bed in place of dinette can sleep two adults. STORAGE: Overhead cabinets and two closets give ample storage space. HIGHLIGHTS: Well designed smaller unit offering floor plan efficiency and privacy.





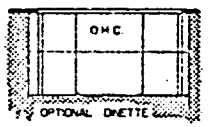
Model 9272 27 ' Features and Benefits

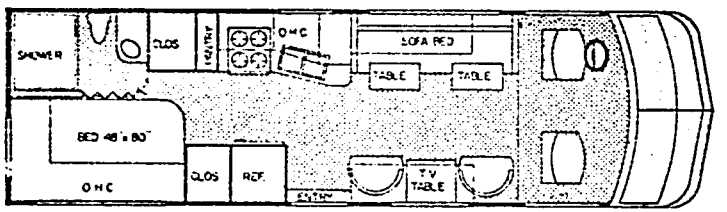
ENTERTAINMENT: Captain chairs and pull-out table for games or dining • Sofa bed and swivel driver, passenger chairs and lounge chairs give seating for up to six adults. GALLEY: Step-saving layout for ease of food preparation • Slide-out pantry allows easy access to stored food • In-line appliances for open space and convenience. DINING: Pedestal table in rear allows extra dining room. BATH: Private shower stall for convenience. SLEEPING: Front lounge area sleeps two adults • Back bedroom area sleeps two adults. FLOOR PLAN OPTIONS: Bunk over the driver's area adds extra sleeping arrangements. STORAGE: Overhead cabinets and closet give ample storage space. HIGHLIGHTS: Well-designed floor plan offers comfort and convenience.



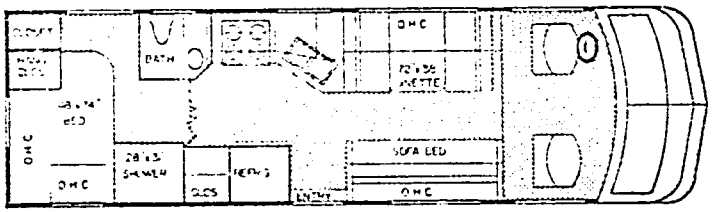
Model 9273 27 ' Features and Benefits

ENTERTAINMENT: Captain chairs, pedestal tables next to sofa bed and pull-out table offer extra room for games or dining • With swivel driver, passenger chairs, seven adults can be seated. GALLEY: L-shaped galley top gives extra counterspace • All appliances conveniently placed for efficient use and space • Slide-out pantry allows easy access to stored food. DINING: Sofa bed converts to dining area with two removable pedestal tables. BATH: Private shower stall for convenience. SLEEPING: Double bed sleeps two adults • Sofa bed sleeps two adults. FLOOR PLAN OPTIONS: Bunk over the driver's area adds extra sleeping arrangements • Facing dinette adds sleeping and dining accommodations. STORAGE: Overhead cabinets and two closets provide ample storage space. HIGHLIGHTS: Floor plan offers excellent sleeping and dining arrangements for the large or small family.



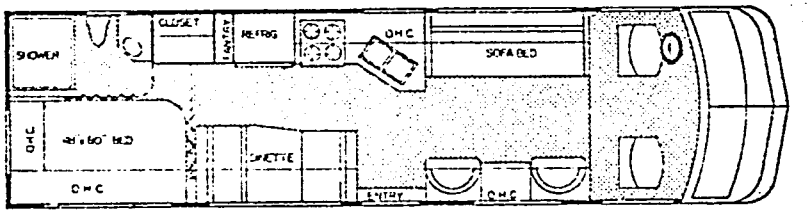


ENTERTAINMENT: Sofa area offers extra seating for dining or games • Dinette offers seating for four adults • Driver, passenger chairs swivel to face lounge area • Nine adults can seat conveniently. GALLEY: L-shaped galley top offers additional counterspace • Appliances located for maximum convenience. DINING: Front dinette offers seating for four. BATH: Private shower for convenience. SLEEPING: Front sofa accommodates two adults • Back bed and front dinette each accommodate two adults. FLOOR PLAN OPTIONS: Bunk over the driver's area adds extra sleeping arrangements. STORAGE: Three closets give excellent storage for personal affects • Overhead cabinets also give ample storage space. HIGHLIGHTS: Back bi-fold door section offs unit to make rear bedroom private • Extra seating in front allows ample space for entertaining.



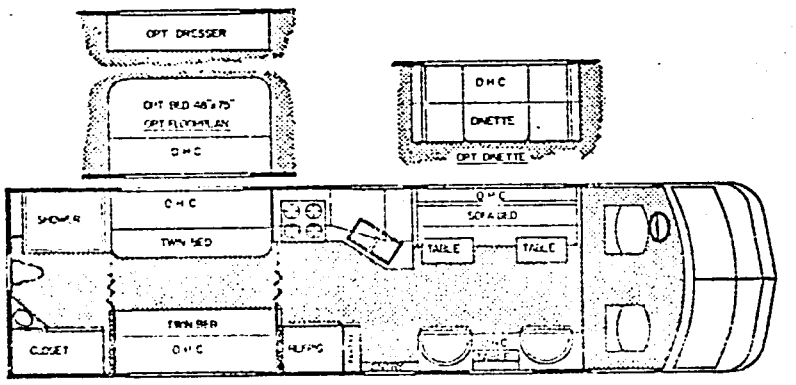
Model 9303 30' Features and Benefits

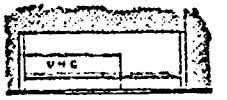
ENTERTAINMENT: Captain chairs and pull-out table offer extra room for games or dining • With swivel driver, passenger chairs, seven adults can be seated. GALLEY: L-shaped galley top gives extra counterspace • All appliances conveniently placed for efficient use and space • Slide-out pantry allows easy access to stored food. DINING: Back dinette seats up to four adults. BATH: Private shower stall for convenience. SLEEPING: Double bed sleeps two adults • Sofa bed sleeps two adults • Dinette sleeps two adults. FLOOR PLAN OPTIONS: Bunk over the driver's area adds extra sleeping arrangements. STORAGE: Overhead cabinets, closet and pantry provide ample storage space HIGHLIGHTS: Excellent floor plan for the large family and for entertaining • Back bi-fold door section offs unit for added privacy.



Model 9305 30' Features and Benefits

ENTERTAINMENT: Captain chairs, and pedestal tables next to sofa bed, and pull-out table offer extra room for games or dining • With swivel driver, passenger chairs, seven adults can be seated. GALLEY: L-shaped galley top gives extra counterspace • All appliances conveniently placed for efficient use and space • Slide-out pantry allows easy access to stored food. DINING: Sofa bed converts to dining area with two removable pedestal tables. BATH: Private shower stall for convenience • Bi-fold door for privacy. SLEEPING: Double bed sleeps two adults • Sofa bed sleeps two adults. FLOOR PLAN OPTIONS: Bunk over the driver's area adds extra sleeping arrangements [illegible] bed in front • Bed with large dresser. STORAGE: Overhead cabinets, closet and dresser provide ample storage space. HIGHLIGHTS: Versatile unit for the large family or for entertaining.

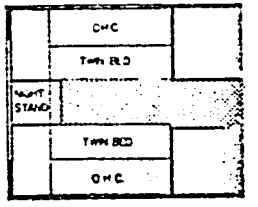


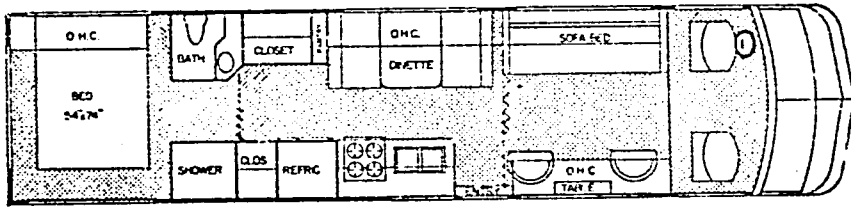


OPT SOFA BED

Model 9332 33' Features and Benefits

ENTERTAINMENT: Captain chairs and pull-out table offer extra room for games or dining • With swivel driver, passenger chairs, and dinette area, up to eleven adults can be seated. GALLEY: Spacious kitchen and step-saving layout offers ease of food preparation • Slide-out pantry for easy access to stored food • In-line appliances for open space. DINING: Sofa bed converts to dining area • Dinette offers extra seating for four adults. BATH: Private shower stall for convenience • Bi-fold door for privacy. SLEEPING: Front sofa bed sleeps two adults • Dinette area sleeps two adults • Back bed sleeps two adults. FLOOR PLAN OPTIONS: Bunk over the driver's area adds extra sleeping arrangements • With dual twin beds in back, up to eight adults can be accommodated for sleeping. STORAGE: Overhead cabinets and closets give ample storage space. HIGHLIGHTS: Large floor plan for the growing family offers maximum comfort and large area for entertaining • Bi-fold doors section off unit for extra privacy.





	MODELS			
	9251	9272 9273 9274	9303 9305	9332
Air-Conditioner; automotive	OPT	OPT	OPT	OPT
Air-Conditioner; roof mounted	OPT	OPT	OPT	OPT
Automatic Transmission	•	•	•	•
Awning	OPT	OPT	OPT	OPT
Bedspreads (where applicable)	•	•	•	•
Bucket Seats; contour w/seat belts	•	•	•	•
Bumpers; wraparound	•	•	•	•
Bunk; pull-down front or rear, with mattress	OPT	OPT	OPT	OPT
Carpet; deluxe	•	•	•	•
Ceiling liner; automotive-type	•	•	•	•
Clock; battery operated	OPT	OPT	OPT	OPT
Clock; digital	OPT	OPT	OPT	OPT
Closets; large, some w/built-in drawers	•	•	•	•
Cruise control	OPT	OPT	OPT	OPT
Curtain, windshield	OPT	OPT	OPT	OPT
Decor Package; roman shades in living area only	OPT	OPT	OPT	OPT
Dinette cushions; thick foam	•	•	•	•
Dinette tables; mar-resistant top	•	•	•	•
Door; driver's side exit	OPT	OPT	OPT	OPT
Drink tray with ashtray & glove box	OPT	OPT	OPT	OPT
Dual Battery system	OPT	OPT	OPT	OPT
Electrical Interior Outlets; 110 volt duplex on separate 110 volt system for electrical appliances	•	•	•	•
Entertainment center; area for TV set	N/A	OPT	OPT	OPT
Entrance door; with screen	•	•	•	•
Exterior Door; easy access to oil and water	•	•	•	•
Fans; dash	OPT	OPT	OPT	OPT
Fender skirts	•	•	•	•
Fire extinguisher	•	•	•	•
Fresh water tanks (see chart below for capacities)	•	•	•	•
[illegible] BTU forced-air duct	•	•	N/A	N/A
Furnace; 30,000 BTU forced-air duct	N/A	N/A	•	N/A
Furnace; 40,000 BTU forced-air duct	N/A	N/A	N/A	•
Gas detector alarm	OPT	OPT	OPT	OPT
Generator; 4,000 watt with hour meter & switch	OPT	OPT	OPT	OPT
Generator; 5,000 watt with hour meter & switch	OPT	OPT	OPT	OPT
Generator; 6,500 watt with hour meter & switch	OPT	OPT	OPT	OPT
Grab handle; recessed & lighted (N/A on model 9273 or 9274)	OPT	OPT	OPT	OPT
Heat strip; installed in roof-mounted air for 5,600 BTU output heating	OPT	OPT	OPT	OPT
Heater defroster in driver's area	•	•	•	•
Heater; 12V mounted rear	OPT	OPT	OPT	OPT
Holding tanks; dual capacity (see chart below)	•	•	•	•

	MODELS			
	9251	9272 9273 9274	9303 9305	9332
Horn; chrome electric	OPT	OPT	OPT	OPT
Horn; electric	•	•	•	•
Horn, bully air horns with aux. air hose	OPT	OPT	OPT	OPT
Insulation; foamed-in-place	•	•	•	•
Jacks; electric leveler	OPT	OPT	OPT	OPT
Jacks; hydraulic leveler	OPT	OPT	OPT	OPT
Kitchen counter; mar-resistant	•	•	•	•
Lights; 12 volt throughout interior	•	•	•	•
Light package; courtesy	OPT	OPT	OPT	OPT
Light package; deluxe (includes quartz driving lights)	OPT	OPT	OPT	OPT
L.P. Gauge in monitor panel	OPT	OPT	OPT	OPT
Luggage carrier; mounted on roof	OPT	OPT	OPT	OPT
Lumadome roof vents	•	•	•	•
Lumadome vents; extra	OPT	OPT	OPT	OPT
Lumadome vent; power in bath	OPT	OPT	OPT	OPT
Lumadome vent; power lighted in bath	OPT	OPT	OPT	OPT
Medicine cabinet	•	•	•	•
Microwave prepped (electrical receptacle & holding area)	•	•	•	•
Microwave oven	OPT	OPT	OPT	OPT
Mirror; outside rear-view w/convex and defroster	OPT	OPT	OPT	OPT
Mirror; outside rear-view w/convex	•	•	•	•
Monitor system	OPT	OPT	OPT	OPT
Mud flaps	OPT	OPT	OPT	OPT
Overhead cabinets	•	•	•	•
Pantry; slide out (except 9274)	N/A	•	•	•
Perma pub (bar)	OPT	OPT	OPT	OPT
Power brakes	•	•	•	•
Power converter; 12 volt	•	•	•	•
Power cord safety device	OPT	OPT	OPT	OPT
Power cord 30 amp; 110 volt rubberized	•	•	•	•
Power steering	•	•	•	•
Privacy curtain	OPT	OPT	OPT	OPT
Propane gas tank 65 lb; w/regulator & hose frame mounted	•	•	•	N/A
Propane gas tank 85 lb;	N/A	N/A	N/A	•
Quartz driving lights	OPT	OPT	OPT	OPT
Radio; deluxe with seek and scan features	OPT	OPT	OPT	OPT
Radio; AM-FM stereo w/push button and tape	OPT	OPT	OPT	OPT
Radio; 40 channel CB	OPT	OPT	OPT	OPT
Range; 3-burner brushed chrome	•	•	•	•
Range; deluxe 4-burner	OPT	OPT	OPT	OPT
Refrigerator 6 cu. ft. gas-electric 110 volt	•	•	•	•

•—Standard OPT—Optional at extra-cost N/A—Not available

	MODELS			
	9251	9272 9273 9274	9303 9305	9332
Refrigerator; 7 or 10 cu. ft. two door gas-electric or 110-12 volt all electric	OPT	OPT	OPT	OPT
Roof, Rack w/Ladder also w/built-in TV-FM antenna	OPT	OPT	OPT	OPT
Seat Belts; for as many as unit sleeps	•	•	•	•
Seats; recliner	OPT	OPT	OPT	OPT
Sewer hose compartment and sewer hose	•	•	•	•
Screens; aluminum on opening living area windows	•	•	•	•
Shades; Roman w/sheers (living area only)	OPT	OPT	OPT	OPT
Shower molded fiberglass; (most models)	•	•	•	•
Sink; stainless steel, double-well	•	•	•	•
Spare tire & wheel w/cover	OPT	OPT	OPT	OPT
Spot light; remote	OPT	OPT	OPT	OPT
Steel cage construction	•	•	•	•
Steering wheel; tilt	•	•	•	•
Sun visors	•	•	•	•
Tail lights, automotive designed and engineered	•	•	•	•
Toilet; recirculating	OPT	OPT	OPT	OPT
Trailer hitch	OPT	OPT	OPT	OPT
Tub enclosure	OPT	OPT	OPT	OPT
TV antenna	OPT	OPT	OPT	OPT
Vacuum, central system	OPT	OPT	OPT	OPT
Venetian blind on kitchen window	•	•	•	•
Vents; lighted	OPT	OPT	OPT	OPT
Water heater 6 gal. fast recovery	•	•	•	•
Water heater, auto lite	OPT	OPT	OPT	OPT
Water purifier	OPT	OPT	OPT	OPT
Water System 12 volt	•	•	•	•
Wheels; dual rear	•	•	•	•
Wheels; full cover	OPT	OPT	OPT	OPT
Wheels; aluminum	OPT	OPT	OPT	OPT
Windshield; tinted wrap around	•	•	•	•
Windshield wipers; electric parallel action	•	•	•	•

•—Standard OPT—Optional at extra-cost N/A—Not available

	Model 9251 Chevrolet	Models 9272 9273 9274 Chevrolet	Models 9303 9305 Chevrolet	Model 9332 Chevrolet
Wheelbase	158.5"	158.5"	178"	208" (Stretched)
Engine(s)	454 CID (Std) 6.2 Liter Diesel (Opt)	454 CID (Std) 6.2 Liter Diesel (Opt)	454 CID (Std)	454 CID (Std)
GVWR	12,300 Lbs	12,300 Lbs	14,500 Lbs	14,500 Lbs (454 CID)
Tires	7.50×16-8 Ply	7.50×16-18 Ply	8.00×19.5-8 Ply	8.00×19.5-8 Ply
Fuel Capacity*	45 Gal.-Opt on 454 CID 40 Gal.-Std on Diesel	60 Gal.-Opt on 454 CID 40 Gal.-Std on Diesel	70 Gal.-Opt on 454 CID	70 Gal.-Opt on 454 CID

*Please check with your dealer on availability of other fuel tank capacities

Body Dimensions

Exterior height*: 9'-2" (Models: 9253, 9271, 9272, 9273); 9'-4" (Models: 9301, 9302, 9332)
Interior height: 77"
Maximum exterior width: 96"
Exterior lengths: 25', 27', 30', 33'
*Add 13" for roof mounted air conditioning

MODELS	FRESH WATER TANKS*	HOLDING TANKS*
9251	48 Gal.	55 Gal.
9272	42 Gal.	47 Gal.
9273	48 Gal.	47 Gal.
9274	48 Gal.	55 Gal.
9303	48 Gal.	50 Gal.
9305	42 Gal.	47 Gal.
9332	48 Gal.	50 Gal.

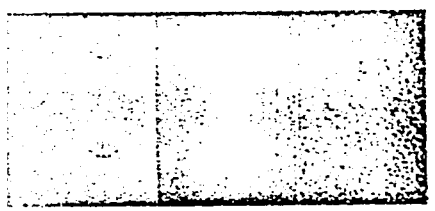
*(Approximate combined capacity)

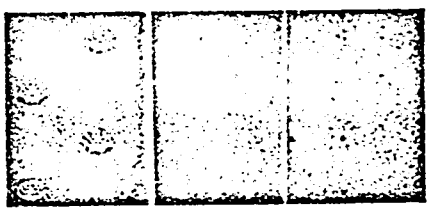
Exterior Color Choices

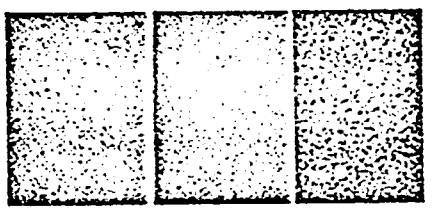
- Two Tone Clay Beige and White exterior with Cinnamon accent Stripe
- Two Tone Clay Beige and White exterior with Light Blue accent Stripe
- Two Tone Clay Beige and White exterior with Burgundy accent Stripe

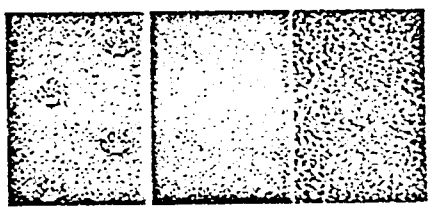
Interior Selection

The 1984 Champion is available in these four interior colors:


Cognac-Beige


Cinnamon


Taupe


Dusty-Rose

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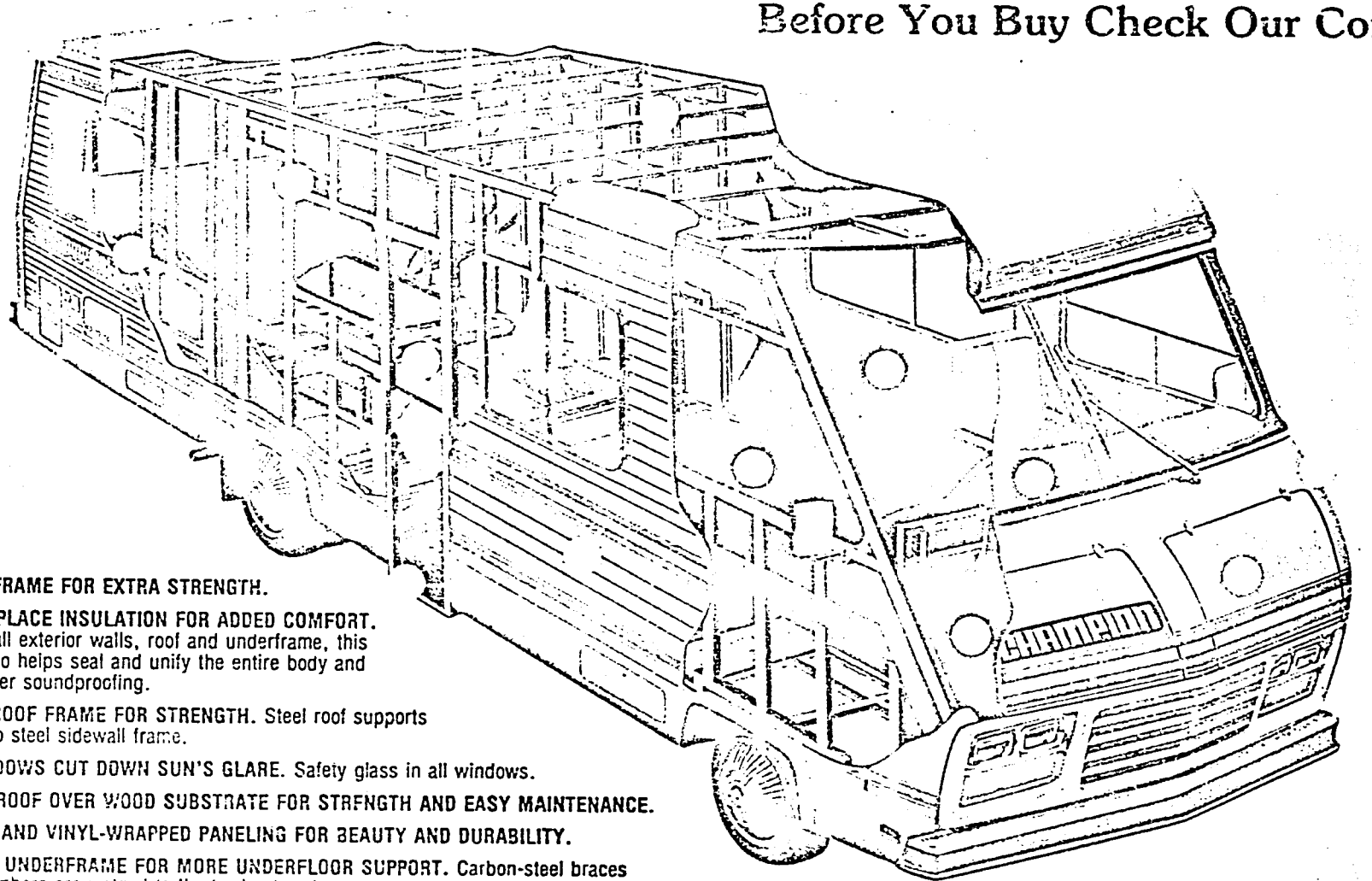
Before You Buy Check Our Construction



1. **ALL-STEEL FRAME FOR EXTRA STRENGTH.**
2. **FOAMED-IN-PLACE INSULATION FOR ADDED COMFORT.** Sprayed on all exterior walls, roof and underframe, this insulation also helps seal and unify the entire body and provides better soundproofing.
3. **ALL-STEEL ROOF FRAME FOR STRENGTH.** Steel roof supports are welded to steel sidewall frame.
4. **TINTED WINDOWS CUT DOWN SUN'S GLARE.** Safety glass in all windows.
5. **ALUMINUM ROOF OVER WOOD SUBSTRATE FOR STRENGTH AND EASY MAINTENANCE.**
6. **WOODGRAIN AND VINYL-WRAPPED PANELING FOR BEAUTY AND DURABILITY.**
7. **REINFORCED UNDERFRAME FOR MORE UNDERFLOOR SUPPORT.** Carbon-steel braces and crossmembers are welded to the basic chassis.
8. **ROUNDED RADIUS CORNERS FOR SLEEKER APPEARANCE.** No sharp corners.
9. **FULL METAL UNDERBELLY.** Provides thermal and sound resistance. Protects exposed components and helps reduce wind resistance.
10. **EASY-CARE ALUMINUM SIDING.** It's corrosion resistant.
11. **BUILT-IN EXIT-ENTRY STEP.**

LUXURIOUS CARPET FOR COMFORT. Includes padding.

CARBON-STEEL FIRE WALL.

PADDED INSTRUMENT PANEL.

ACCESS DOORS FOR EASY OIL AND WATER MAINTENANCE.

STYLISH FIBERGLASS FRONT END.

Champion
HOME BUILDERS CO.
CHAMPION MOTOR HOME DIVISION
P.O. Box 482
Highway 19 South
Elkhart, Indiana 46514
(219) 293-6581

NOTE: Champion Home Builders Co. reserves the right to make changes at any time in prices, colors, materials, equipment, specifications, and models and also to discontinue models without notice and/or obligations. Data shown is basic information for the prospective buyer effective at time of issuance of this literature. Dealer will provide complete up-to-date information on available equipment, specifications, etc. not shown here. Items referred to as options or as available are extra cost.

LOCAL DEALER

THE UNIVERSITY OF CHICAGO
OPERATOR OF
ARGONNE NATIONAL LABORATORY
9700 S. CASS AVE., ARGONNE, ILL. 60439 312/972-2000
(CONTRACT NO. W-31-109-ENG-38)

REQUEST FOR QUOTATION

THIS IS NOT AN ORDER

NOTICE:
1. The right is reserved to accept or reject quotations on each item separately unless your quotation states otherwise.
2. The right is reserved to accept minor deviations from specifications herein listed or referenced
3. Firm prices are requested. If other than firm prices are quoted, conditions of escalation are to be stated.
4. If material is packaged in returnable containers the amount of deposit, if any, is to be stated together with instructions for returning
5. Terms and Conditions referenced below will apply to any resulting Purchase Order.

BARTH, INC.
P.O. BOX 768
MILFORD, IND 46542

Date 9-13-84 Inquiry No. 931615 Address Reply To R.M. STACHELSKI Buyer
Quotation must be received by 10-3-84

QUANTITY	DESCRIPTION	UNIT PRICE	TOTAL
	ANL Form 70A, Representations and Certifications, is included as part of this request and must be completed, signed and returned with your quotation.		
	SUBMIT A QUOTATION TO FURNISH A CUSTOM VEHICLE, VAN TYPE IN ACCORDANCE WITH INSTRUCTION TO BIDDERS AND AS DESCRIBED IN ANL SPECIFICATION ENTITLED "VEHICLE FOR INDUSTRIAL ENERGY AUDITS IN EGYPT" DATED AUGUST, 1984, PAGES 1 THROUGH 22 INCLUSIVE AND ATTACHMENT NUMBER ONE "ILLUSTRATION OF CANADIAN AUDIT VEHICLE" ALL ATTACHED HERETO AND MADE A PART HEREOF.		$52,197.00
	NOTE: CONTRACTORS ARE ADVISED THAT ATTACHMENT NUMBER ONE IS A SERIES OF PHOTOGRAPHS OF A SIMILIAR VEHICLE USED IN CANADA TO BE USED FOR INFORMATION PURPOSES ONLY. THE VEHICLE FURNISHED IS TO ADHERE TO THE ANL SPECIFICATION AS DEFINED THEREIN.		
	71T		
	Any resulting Purchase Order will be subject to the Terms and Conditions (ANL Form 460, dated [illegible]) attached hereto and made a part hereof and will be exempt from Illinois Occupation and Use Taxes and from Manufactures and Retailers Federal Excise Taxes.		

PRIORITY RATING DO E , CERTIFIED UNDER D.M.S. REGULATION # , WILL BE APPLIED TO ANY PURCHASE ORDERS ISSUED AS A RESULT OF THIS QUOTATION

e quote you F.O.B. DESTINATION Shipment can be made in 120 days from receipt of order.

h Terms 25% deposit w/order Will Ship Via Vehicle will be driven to Argonne, IL Date 9-26-84
Balance on completion

J.A. Maher
AUTHORIZED SIGNATURE Director, Special Vehic

ANL-70 (8-81)

COMPLETE AND RETURN THIS COPY ONLY

PLEASE MARK "NO BID" IF YOU CANNOT QUOTE

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ARGONNE NATIONAL LABORATORY

TE: 10/5/84

M. Monach

EES-362

OM: RONETTE STACHELSKI 7045 Purchasing Building 4

BJECT: Requisition # 931615

tached for your technical evaluation are copies of bids received in sponse to our solicitation.

further action will be taken pending receipt of your comments. However, I do not receive a reply by 10/28/84 the requisition will be ncelled and returned.

- -

(Please fold along dotted lines and return)

TE:

: Purchasing Building 4

OM:

☐ Low bid is acceptable, proceed with order placement

☐ Low bid is not acceptable

Reason:

Recommendation:

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REPRESENTATIONS AND CERTIFICATIONS
(Other Than Construction Contracts)

THE OFFEROR/BIDDER REPRESENTS AND CERTIFIES THAT: *(check or complete all applicable sections)*

1. TYPE OF BUSINESS ORGANIZATION

He operates as ( ) an individual, ( ) a partnership, ( ) a non-profit organization, (X) a corporation, incorporated under the law of the State of Indiana.

2. PARENT COMPANY & EMPLOYER IDENTIFICATION NUMBER

a. He ( ) is, (X) is not, owned or controlled by a parent company. *(For the purpose of this offer/bid, a parent company is defined as one which either owns or controls the activities and basic business policies of the offeror/bidder To own another company means the parent company must own at least a majority [more than 50%] of the voting rights in that company. To control another company, such ownership is not required; if another company is able to formulate, determine or veto basic business policy decisions of the offeror/bidder, such other company is considered the parent company of the offeror/bidder. This control may be exercised through the use of dominant minority voting rights, use of proxy voting, contractual arrangements, or otherwise.)*

b. If he is owned or controlled by a parent company, enter below the name and main office address of the parent company:

Name of Parent Company	Main Office Address *(Include Zip Code)*

c. Employer's Identification Number *(Federal Social Security Number used on Employer's Quarterly Tax Return, U.S. Treasury Department Form 941).*

E.I. No. of Offeror/Bidder 35-1144115

E.I. No. of Parent Company *(if any)* _____

3. SMALL BUSINESS

a. He (X) is, ( ) is not, a small business concern. *(A small business concern for the purpose of Government Procurement is a concern, including its affiliates, which is independently owned and operated, is not dominant in the field of operation in which it is submitting offers or bidding on Government contracts and can further qualify under the criteria concerning number of employees, average annual receipts, or other criteria, as prescribed by the Small Business Administration. See Code of Federal Regulations, Title 13, Part 121, as amended, which contains detailed industry definitions and related procedures.)*

b. If he is a small business concern and is not the manufacturer of the supplies offered or bid, he also represents that the supplies to be furnished hereunder ( ) will, ( ) will not, be manufactured or produced in the United States, its territories, its possessions, or the Commonwealth of Puerto Rico by a small business concern.

4. CONTINGENT FEE *(applicable to contracts of $2,500 or more)*

a. He ( ) has, (X) has not, employed or retained any company or person *(other than a full-time bona fide employee working solely for him)* to solicit or secure this contract.

b. He ( ) has, (X) has not, paid or agreed to pay any company or person *(other than a full-time bona fide employee working solely for him)* any fee, commission, percentage or brokerage fee contingent upon or resulting from the award of this contract; and agrees to furnish information relating to a. and b. above as requested by Argonne National Laboratory. *(For interpretation of the representation, including the term "bona fide employee" see Code of Federal Regulations, Title 41, Subpart 1-1.5.)*

5. BUY AMERICAN ACT

Each end product, except the end products listed below, is a domestic source end product *(as defined in the clause entitled "Buy American Act")* and that components of unknown origin have been considered to have been mined, produced or manufactured outside the United States.

Excluded End Products	Country of Origin
None	

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6. EQUAL OPPORTUNITY *(applicable to contracts of more than $10,000)*

a. He (X) has, ( ) has not, participated in a previous contract or subcontract subject to the Equal Opportunity clause herein, or the clause originally contained in section 301 of Executive Order No. 10925, or the clause contained in section 201 of Executive Order No. 11114; that he ( ) has, ( ) has not, filed all required compliance reports; and that representations indicating submission of required compliance reports, signed by proposed subcontractors, will be obtained prior to subcontract awards. *(The above representation need not be submitted in connection with contracts or subcontracts which are exempt from the clause.)*

b. AFFIRMATIVE ACTION PROGRAM

(1) He ( ), has, (X) has not, developed an affirmative action compliance program for each of his establishments. *(See 41 CFR 60-1.40 and 60-2.)*

(2) He ( ) does,* (X) does not, employ more than fifty employees and ( ),* has not, been awarded a contract subject to Executive Order No. 11246 in the amount of $50,000 or more since July 1, 1968. If such a contract has been awarded since July 1, 1968, give the date of such a contract, but do not list contracts awarded within the last 120 days prior to the date of this representation.

*If both answers are affirmative, please indicate name and address of Compliance Agency (if known).

c. STANDARD FORM 100 (EEO-1) FILING

If he has 100 or more employees he (X) will, ( ) has filed(d) SF-100 with the Joint Reporting Committee. *(If not filed within the last 12 months, SF-100 must be filed within 30 days after award.)*

d. NOTICE OF REQUIREMENT FOR CERTIFICATION OF NONSEGREGATED FACILITIES

By signing these representations and certifications, the offeror or bidder will be deemed to have signed and agreed to the provisions of the "Certification of Nonsegregated Facilities" which follows. The certification provides that the offeror or bidder does not maintain or provide for his employees facilities which are segregated on a basis of race, color, religion or national origin, whether such facilities are segregated by directive or on a de facto basis. The certification also provides that he will not maintain such segregated facilities. Failure of offeror or bidder to agree to the Certification on Nonsegregated Facilities will render his offer or bid nonresponsive to the terms of solicitations involving awards of contracts exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity Clause.

CERTIFICATION ON NONSEGREGATED FACILITIES

He does not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. He certifies further that he will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he will not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The vendor agrees that a breach of this certification is a violation of the Equal Opportunity clause in any purchase order or contract that may result from the enclosed quotation. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, rest rooms and washrooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, creed, color or national origin, because of habit, local custom, or otherwise. He further agrees that (except where he has obtained identical certifications from proposed subcontractors for specific time periods) he will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity clause; that he will retain such certifications in his files; and that he will forward the following notice to such proposed subcontractors:

NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENT FOR CERTIFICATIONS OF NONSEGREGATED FACILITIES

A certification of Nonsegregated Facilities must be submitted prior to the award of a subcontract exceeding $10,000 which is not exempt from the provisions of the Equal Opportunity clause. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e., quarterly, semiannually or annually).

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

7. MINORITY BUSINESS ENTERPRISE

He ( ) is, (X) is not, a minority business enterprise. A minority business enterprise is defined as a "business, at least 50 percent of which is owned by minority group members or, in case of publicly owned businesses, at least 51 percent of the stock of which is owned by minority group members." For the purpose of this definition, minority group members are Negroes, Spanish-speaking American persons, American-Orientals, American-Indians, American Eskimos, and American Aleuts.

* * * * *

BY SUBSCRIBING HERETO, THE OFFEROR/BIDDER AGREES THAT THE FOREGOING REPRESENTATIONS AND CERTIFICATIONS ARE TRUE AND CORRECT.

Name of Offeror/Bidder BARTH, INC. P.O. Box 768, Milford, IN 46542

Signature J. A. Maher

Title Director, Special Vehicles Division

BARTH INC.
Recreational Vehicles
P.O. Box 768
Milford, Indiana 46542

219 / 658 - 9401

QUOTATION

Date September 25 19 84

POSED FOR ARGONNE NATIONAL LABORATORY

TERMS:
CASH F.O.B. FACTORY

QUANTITY	DESCRIPTION	AMOUNT
	MISCELLANEOUS	
	Two fire extinguishers Emergency road service kit including flares, reflectors, first aid kit Portable electric compressor for tire inflation Spare parts per specification Shop manual for automotive, A/C and generator	
	TOTAL	$ 52,197 00
	Prices do not include Federal Excise Tax where applicable, other Federal, State or local taxes, State Code Inspection fees or handling. All Special Vehicle price quotations are firm for sixty (60) days.	

BARTH INC.
Recreational Vehicles
P.O. Box 768
Milford, Indiana 46542

219 / 658 - 9401

QUOTATION

Date September 25 1984

'OSED FOR ARGONNE NATIONAL LABORATORY

TERMS:
CASH F.O.B. FACTORY

QUANTITY	DESCRIPTION	AMOUNT
	ELECTRICAL - LIGHTING - SOUND SYSTEMS	
	One 7000 watt Kohler generator on slide tray with remote start	
	Two 12V deep cycle coach batteries	
	Converter & battery charger	
	Shore power cord - 30 amp 220V, two 50' lengths on reels	
	Circuit breaker box - 50 amp	
	12V lights - Courtesy Group	
	110V outlets - four, 220 outlets; four 110V outlets	
	Fluorescents - five fixtures	
	Step down transformer in vented compartment with service light	
	Emergency start feature with timer for generator	
	HEATING AND COOLING SYSTEM	
	Two 13,500 BTU air conditioners, 110V 60HZ, roof mounted, Rotary type	
	INTERIOR - CABINETRY - COLORS	
	Floor cabinets per drawing	
	Overhead cabinets	
	Storage closets per drawing	
	Floor covering - commercial grade - Bigelow or equal	
	Tables (coach) - one	
	Motor cover table	
	Seating Bench	
	Colors - light blue	
	APPLIANCES	
	Two defroster fans	
	Refrigerator - 4 cu.ft.	
	Built-in vacuum cleaner	

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BARTH INC.
Recreational Vehicles
P.O. Box 768
Milford, Indiana 46542

219 / 658 - 9401

QUOTATION

Date September 25 1984

)SED FOR ARGONNE NATIONAL LABORATORY

TERMS:
CASH F.O.B. FACTORY

UANTITY	DESCRIPTION	AMOUNT
	BODY - CONFIGURATION Body Construction: Sub-chassis of 2" seamless box steel welded into rectangular sections with perimeter members and welded steel forward cockpit frame to and including windshield header bar. Sidewall, end and roof sections .062 aluminum extrusion framework, interlocked and hand buck riveted into unitized body framework. Sidewall, roof and end panels joined with .080 aluminum extruded "z" bar per Barth Patent 3,292,603. Sidewalls and end panels incorporate .040 aluminum skin riveted to unitized aluminum frame. Roof and sub-chassis underbelly incorporate .030 aluminum skin. Bumpers - aluminum front, step type rear Interior height - 78" Body style - R2 - Square Back Front end style - Bus type Two doors - one curbside, one rear w/window in each and screen door Exterior storage compartment in space available No extra windows - windshield and cockpit windows standard One 12V power roof vent 3/4" exterior grade plywood floor Fiberglass batts insulated - floor, walls & roof, mastic retained Paneling from standard selection Quilted white vinyl ceiling One manual curbside exterior step Two dead bolt locks Roof mounted spotlight/floodlight Exterior decor - Beige with accent stripe	

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BARTH INC.
Recreational Vehicles
P.O. Box 768
Milford, Indiana 46542

219 / 658 - 9401

QUOTATION #2582

Date September 25 19 84

POSED FOR ARGONNE NATIONAL LABORATORY
9700 South Cass Avenue
Argonne, IL 60439

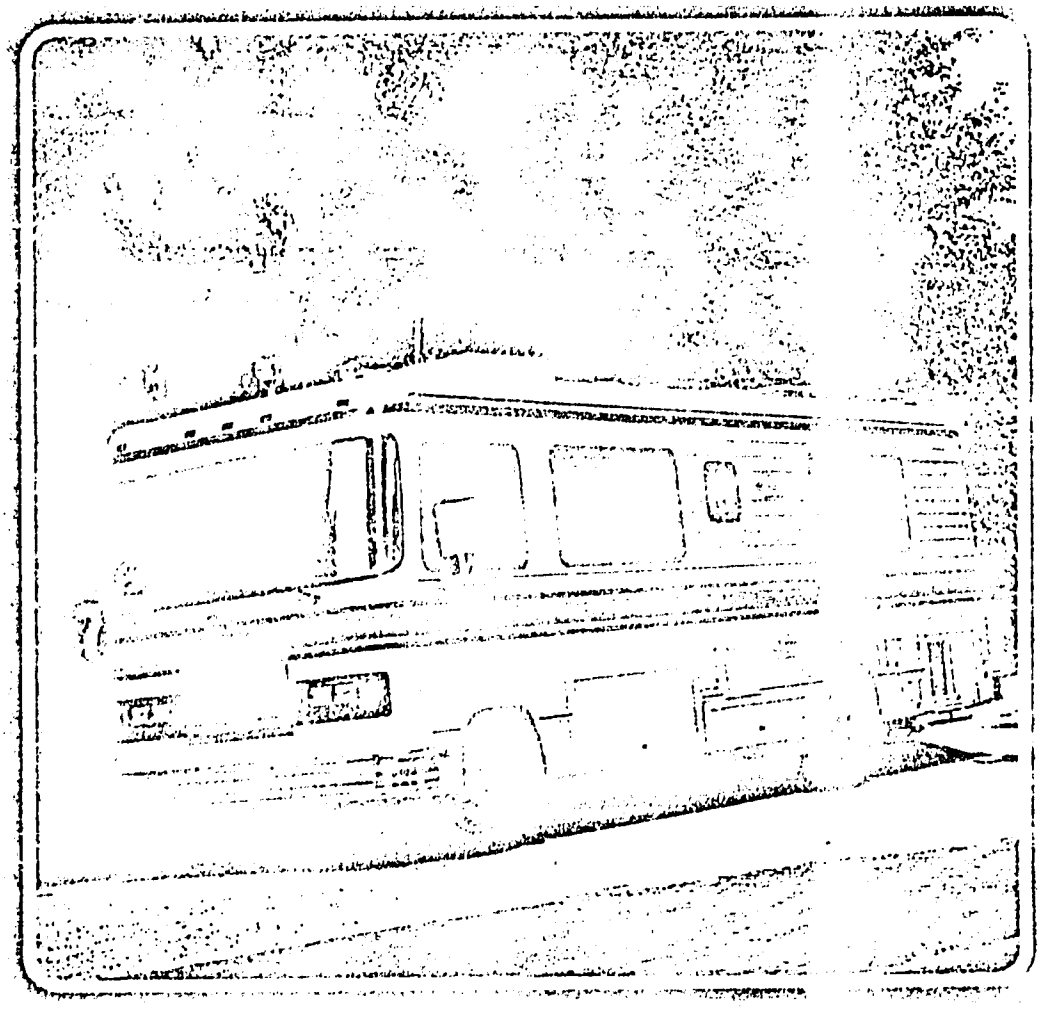
TERMS:
CASH F.O.B. FACTORY

QUANTITY	DESCRIPTION	AMOUNT
One	1985 Custom Built Barth Vehicle for Industrial Energy Audits in Egypt. Inquiry #931615, 9/13/84.	

SPECIFICATIONS

CHASSIS - AUTOMOTIVE

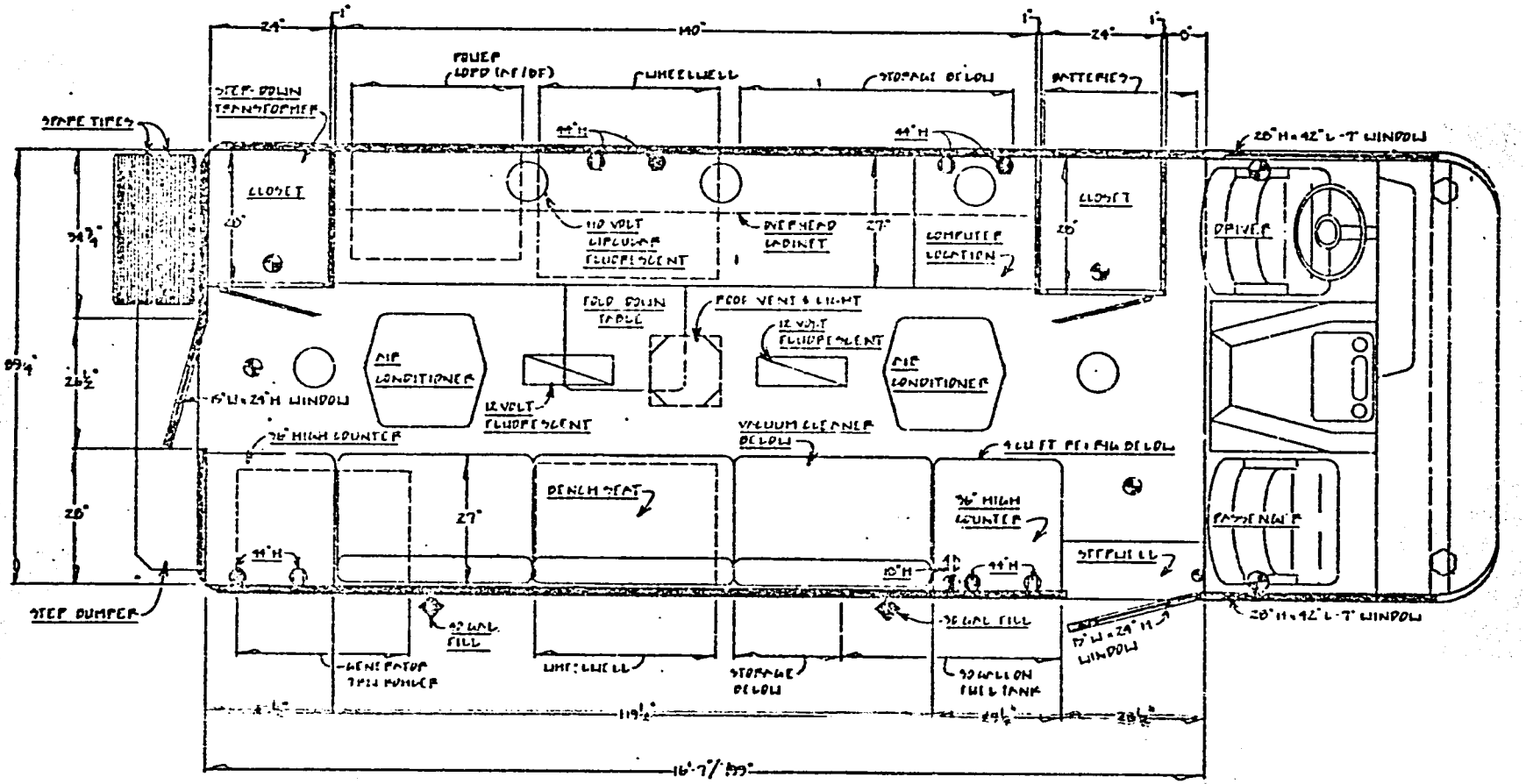
Unit length - 22'
Chevrolet chassis - CP30832
454 C.I.D. V-8 gasoline engine
Wheel base - 137"
Gross vehicle weight rating - 11,000#
Turbo hydramatic transmission with H.D. Cooler
Integral power steering with tilt wheel
Power disc brakes front & rear
Suspension - independent Positrim front with H.D. shock absorbers - H.D. rear leaf springs with H.D. shock absorbers & stabilizer bar.
Fresh air automotive heater & defroster
Tinted, heat absorbing safety glass
H.D. Windshield wipers with individual motors & individual washers
Approved exterior lighting system including back-up lights
Halogen headlights
Exterior West Coast mirrors
Interior rear view mirror
Adjustable driver & companion seats with head & arm rests, seat belts and tilt feature
Gasoline capacity - one 40 gallon tank, one 30 gallon tank
Automotive air conditioner
Special tires - steel belted radial
Spare tire, wheel & mount, two
Spare tire cover - two
Cruise control



REGAL 22

23S

177" WHEELBASE



SYMBOLS

BREAKER BOX	12 VOLT LIGHTER	220 VOLT OUTLET	
AC-DC CONVERTER	HOOD FAN 12 V	12 VOLT PUMP	
110 VOLT OUTLET	EXTRA SPEAKERS	GAS FILL	
12V REFRIG OUTLET	HEAT REGISTERS	SWITCH	
12V JACK	GRAB RAIL 12 V	CONTROL PANEL	
12 VOLT LIGHT	THERMOSTAT	12V FUSE BLOCK	
12 V BULLET LIGHT	PROPANE	MANUAL TRANSFER SWITCH	
		LP GAS DETECTOR	

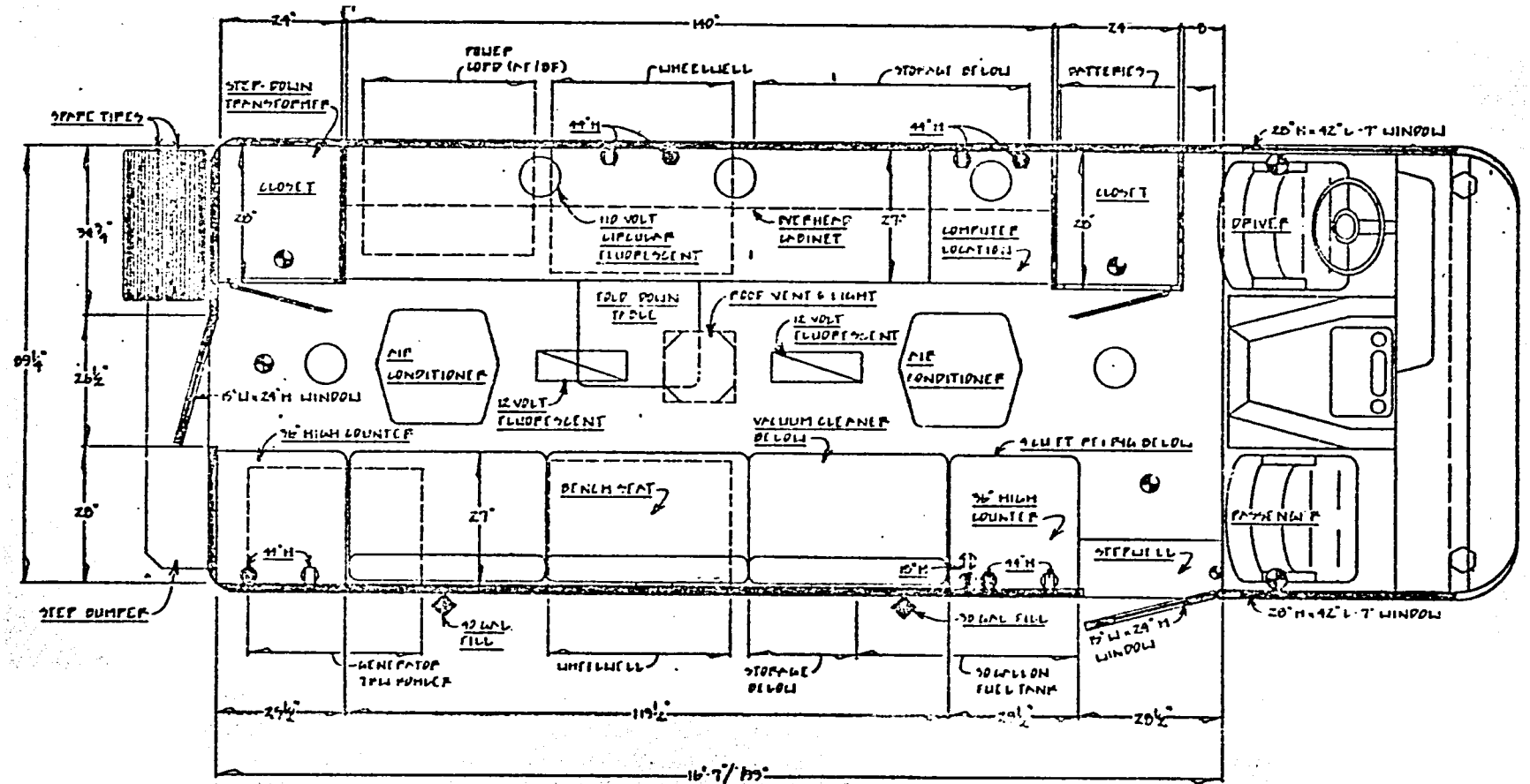
DATE	CH BY	REVISION RECORD

BARTH INC

DIVISION	SPECIALIZED VEHICLES		
MODEL	23S		
NAME	FLOOR PLAN		
DRAWN BY	STEVE PRICE	DATE	25 SEP 1984
CH'D BY		DATE	
DRWG. NO.	85V-84 9527	SCALE	3/4"=1'-0"

23S

137" WHEELBASE



SYMBOLS

	BREAKER BOX		12 VOLT LIGHTER		220 VOLT OUTLET
	AC-DC CONVERTER		HOOD FAN 12 V		12 VOLT PUMP
	110 VOLT OUTLET		EXTRA SPEAKERS		GAS FILL
	12V REFRIG OUTLET		HEAT REGISTERS		SWITCH
	TV JACK		GRAB RAIL 12 V		CONTROL PANEL
	12 VOLT LIGHT		THERMOSTAT		12V FUSE BLOCK
	12 V BULLET LIGHT		PROPANE		MANUAL-TRANSFER SWITCH
					LP GAS DETECTOR

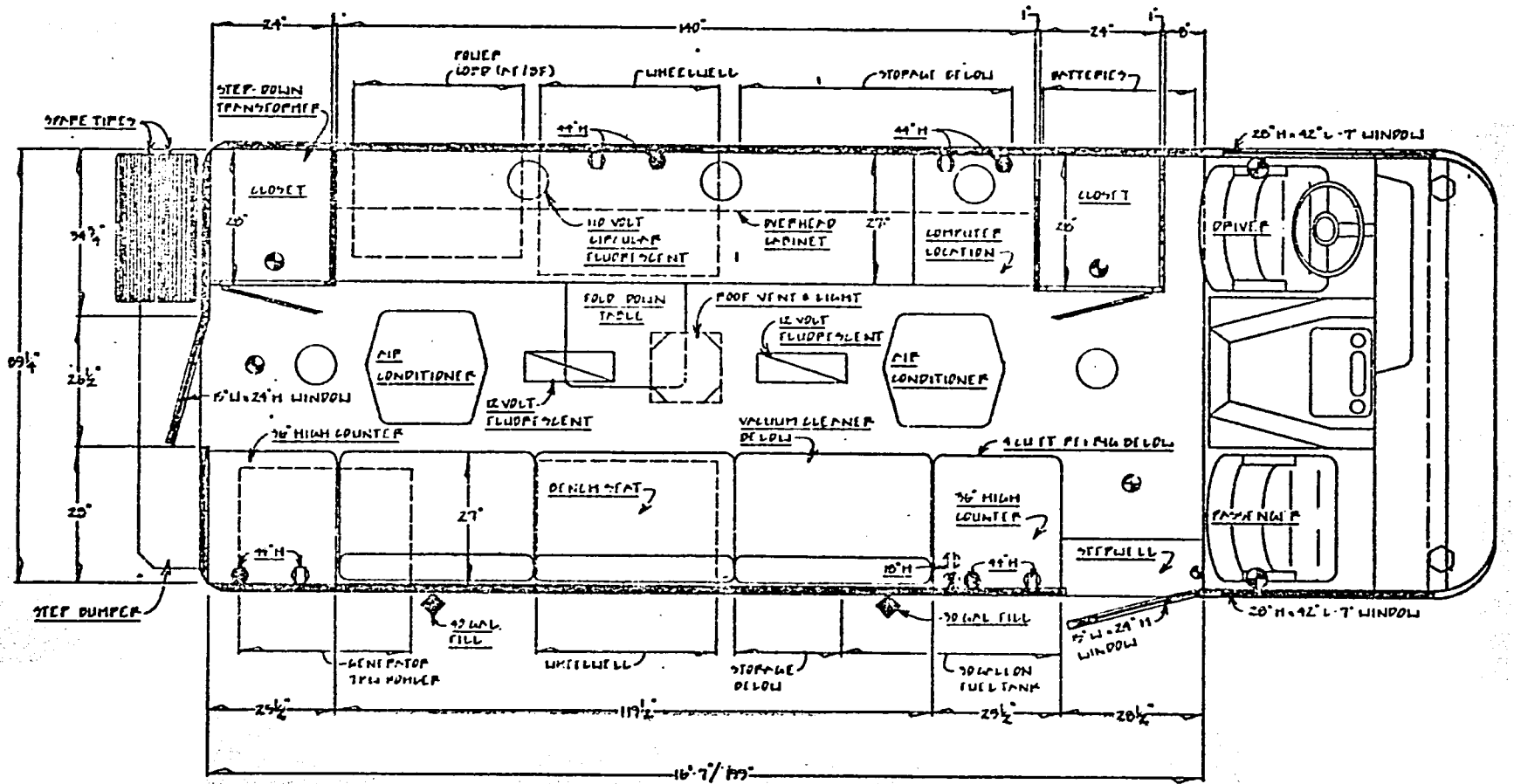
DATE	CH BY	REVISION RECORD

BARTH INC

DIVISION	SPECIALIZED VEHICLES		
MODEL	23S		
NAME	FLOOR PLAN		
DRAWN BY	STEVE PRICE	DATE	25 SEP 1984
CH'D BY		DATE	
DRWG. NO.	BW-84 9527	SCALE	3/4"=1'-0"

23S

197" WHEELBASE



SYMBOLS			
BREAKER BOX	12 VOLT LIGHTER	220 VOLT OUTLET	
AC-DC CONVERTER	HOOD FAN 12 V	12 VOLT PUMP	
110 VOLT OUTLET	EXTRA SPEAKERS	GAS FILL	
12V REFRIG. OUTLET	HEAT REGISTERS	SWITCH	
T.V. JACK	GRAB RAIL 12 V	CONTROL PANEL	
12 VOLT LIGHT	THERMOSTAT	12V FUSE BLOCK	
12V BULLET LIGHT	PROPANE	MANUAL TRANSFER SWITCH	
		LP GAS DETECTOR	

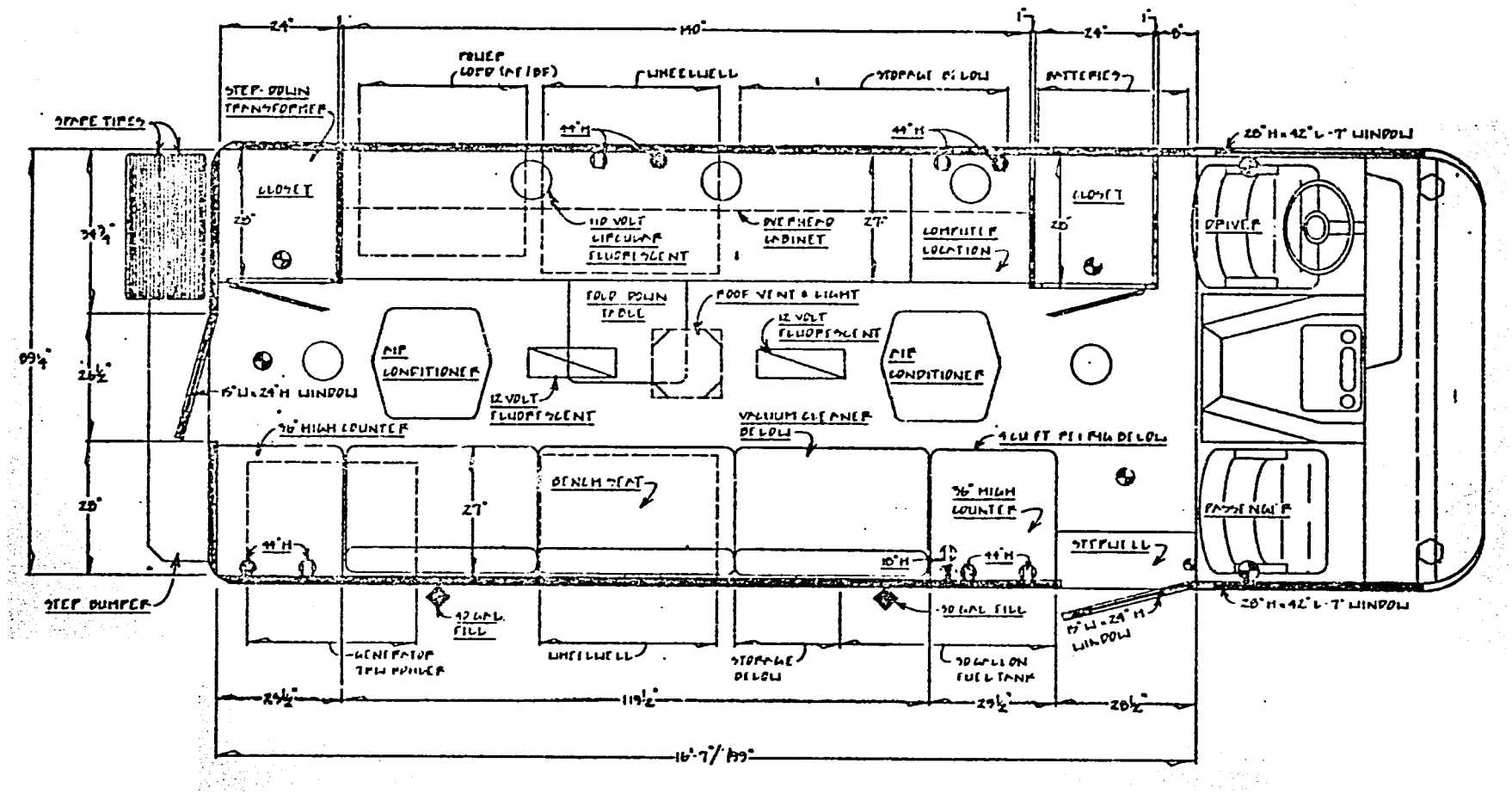
REVISION RECORD	DATE	CH BY

BARTH INC

DIVISION	SPECIALIZED VEHICLES		
MODEL	23S		
NAME	FLOOR PLAN		
DRAWN BY	STEVE PRICE	DATE	25 SEP 1984
CH'D BY		DATE	
DRWG. NO.	BW 84 9527	SCALE	3/4"=1'-0"

239

197" WHEELBASE



SYMBOLS

BREAKER BOX	12 VOLT LIGHTER	220 VOLT OUTLET	
AC-DC CONVERTER	HOOD FAN 12 V	12 VOLT PUMP	
110 VOLT OUTLET	EXTRA SPEAKERS	GAS FILL	
12V REFRIG OUTLET	HEAT REGISTERS	SWITCH	
12V JACK	GRAB RAIL 12 V	CONTROL PANEL	
12 VOLT LIGHT	THERMOSTAT	12V FUSE BLOCK	
12 V BULLET LIGHT	PROPANE	MANUAL TRANSFER SWITCH	
		LP GAS DETECTOR	

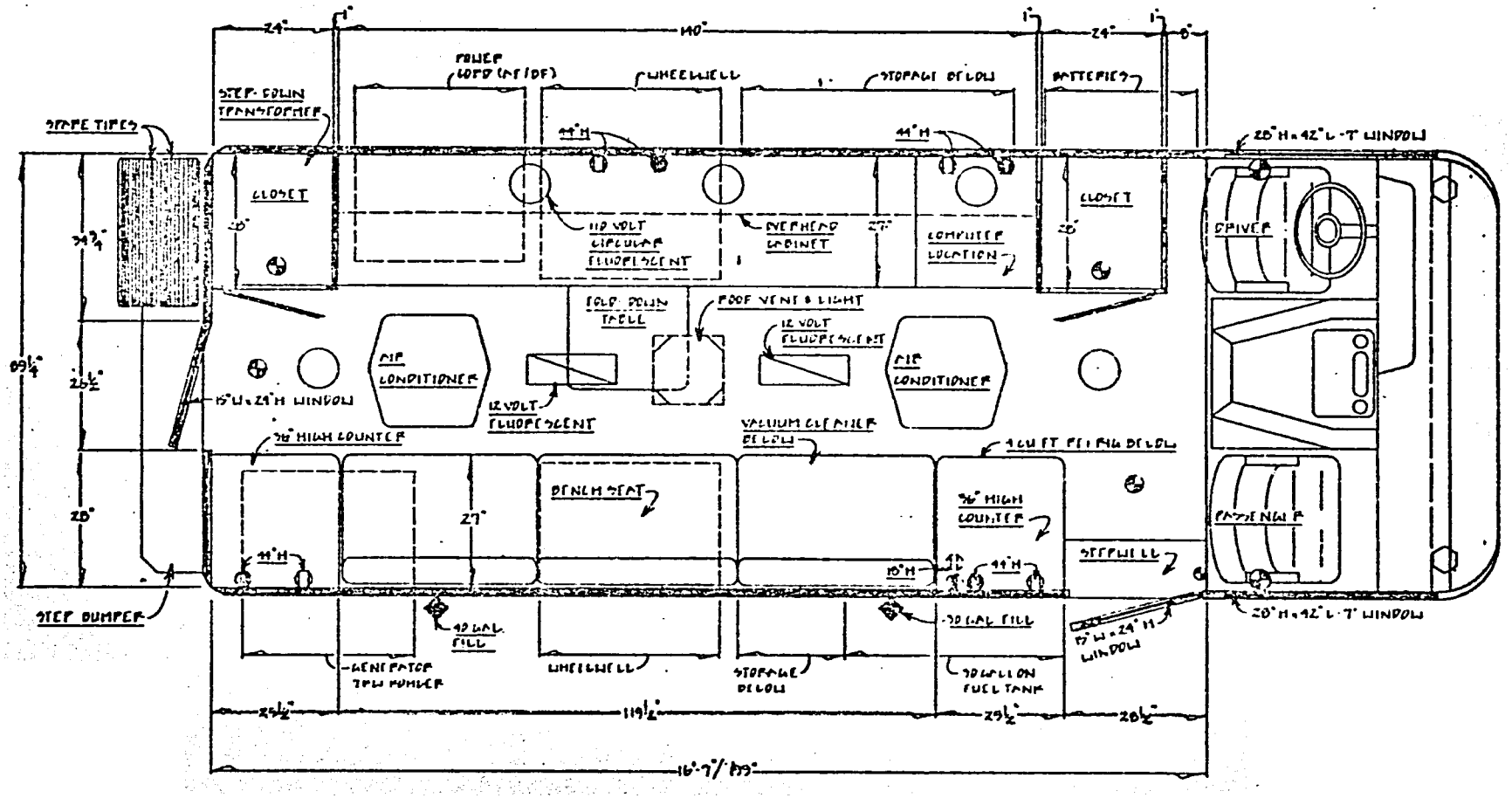
REVISION RECORD	DATE	CH BY

BARTH INC

DIVISION	SPECIALIZED VEHICLES		
MODEL	239		
NAME	FLOOR PLAN		
DRAWN BY	STEVE PRICE	DATE	29 SEP 1994
CH'D BY		DATE	
DRWG. NO.	89V-84 9527	SCALE	3/4"=1'-0"

23S

197" WHEELBASE



SYMBOLS

SPEAKER BOX	12 VOLT LIGHTER	220 VOLT OUTLET	
AC-DC CONVERTER	HOOD FAN 12 V	12 VOLT PUMP	
110 VOLT OUTLET	EXTRA SPEAKERS	GAS FILL	
12V REFRIG. OUTLET	HEAT REGISTERS	SWITCH	
TV JACK	GRAB RAIL 12 V	CONTROL PANEL	
12 VOLT LIGHT	THERMOSTAT	12 V FUSE BLOCK	
12 V BULLET LIGHT	PROPANE	MANUAL TRANSFER SWITCH	
		LP GAS DETECTOR	

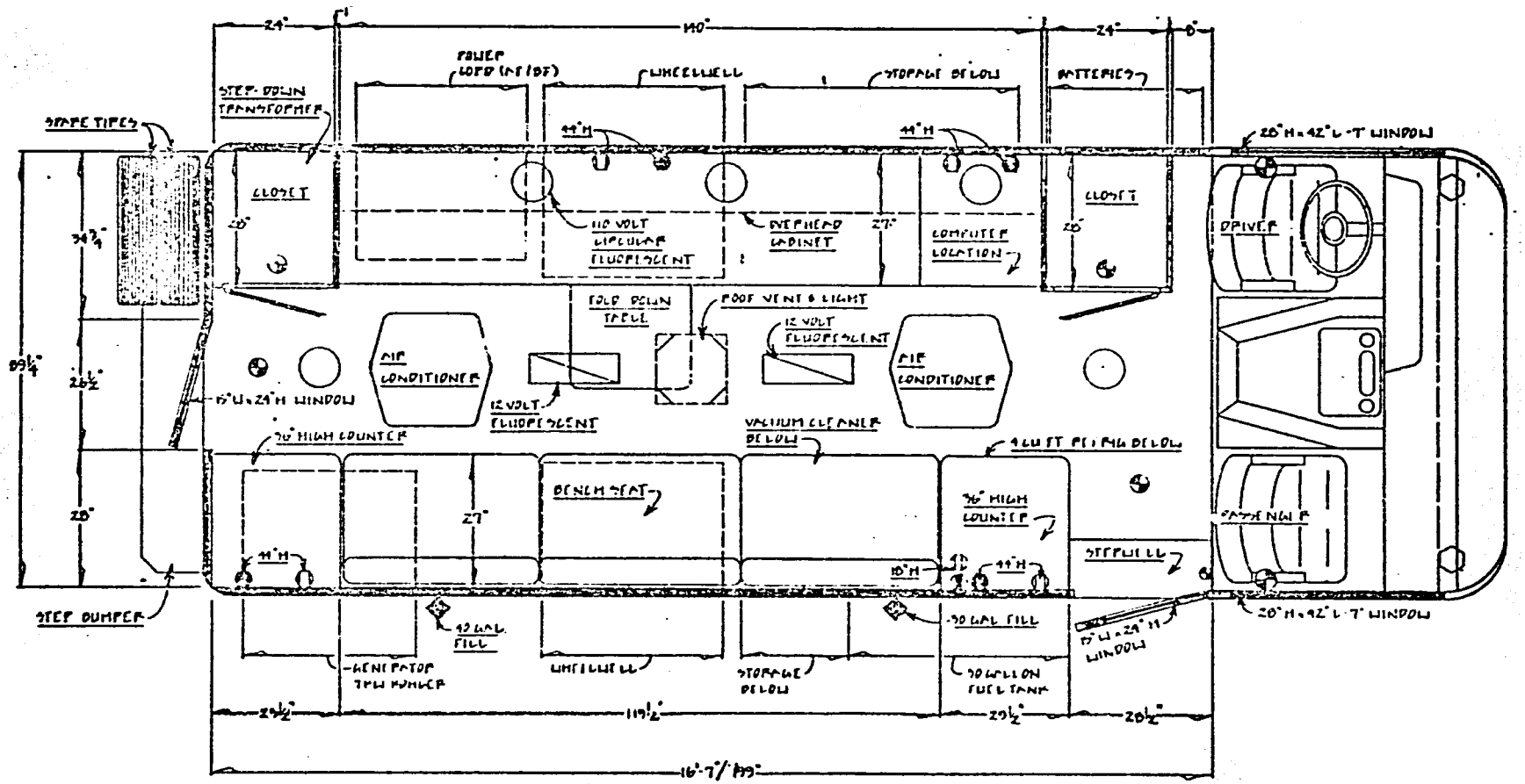
DATE	CH BY	REVISION RECORD

BARTH INC

DIVISION	SPECIALIZED VEHICLES		
MODEL	23S		
NAME	FLOOR PLAN		
DRAWN BY	STEVE PRICE	DATE	25 SEP 1984
CH'D BY		DATE	
DRWG. NO.	BSV-84-9527	SCALE	3/4"=1'-0"

23S

197" WHEELBASE



SYMBOLS

	BREAKER BOX		12 VOLT LIGHTER		220 VOLT OUTLET
	AC-DC CONVERTER		HOOD FAN 12 V		12 VOLT PUMP
	12 VOLT OUTLET		EXTRA SPEAKERS		GAS FILL
	12V REFRIG OUTLET		HEAT REGISTERS		SWITCH
	T.V. JACK		GRAB RAIL 12 V		CONTROL PANEL
	12 VOLT LIGHT		THERMOSTAT		12V FUSE BLOCK
	12 V SULLET LIGHT		PROPANE		MANUAL TRANSFER SWITCH
					LP GAS DETECTOR

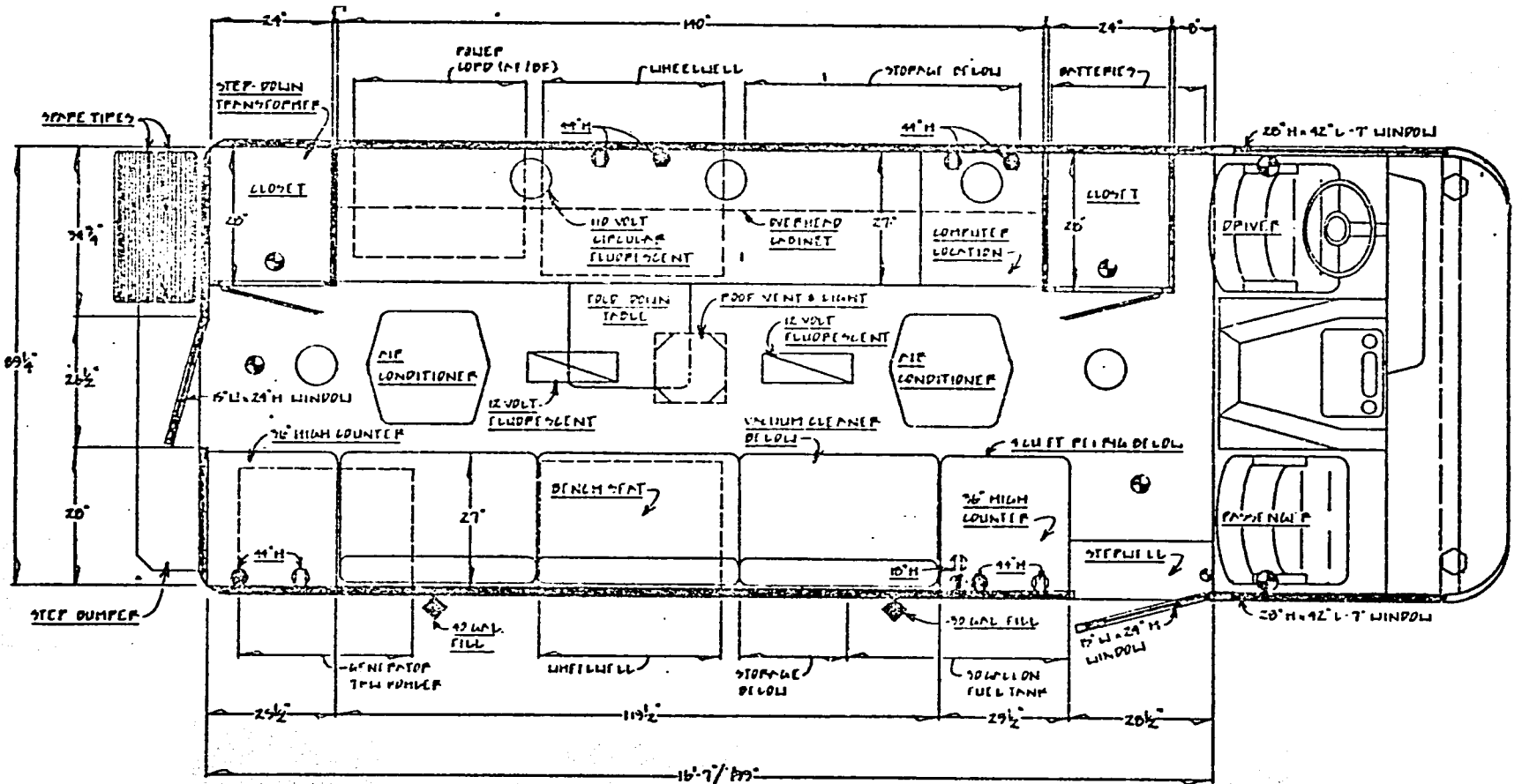
DATE	CH BY	REVISION RECORD

BARTH INC

DIVISION	SPECIALIZED VEHICLES		
MODEL	23S		
NAME	FLOOR PLAN		
DRAWN BY	STEVE PRICE	DATE	25 SEP 1984
CH'D BY		DATE	
DRWG. NO.	84V-84 9527	SCALE	3/4"=1'-0"

23S

157" WHEELBASE



SYMBOLS			
SPEAKER BOX	12 VOLT LIGHTER	220 VOLT OUTLET	
AC-DC CONVERTER	HOOD FAN 12 V	12 VOLT PUMP	
110 VOLT OUTLET	EXTRA SPEAKERS	GAS FILL	
12V REFRIG. OUTLET	HEAT REGISTERS	SWITCH	
T.V. JACK	GRAB RAIL 12 V	CONTROL PANEL	
12 VOLT LIGHT	THERMOSTAT	12 V FUSE BLOCK	
12 V BULLET LIGHT	PROPANE	WATER LEVEL SENSOR SWITCH	
		LP GAS DETECTOR	

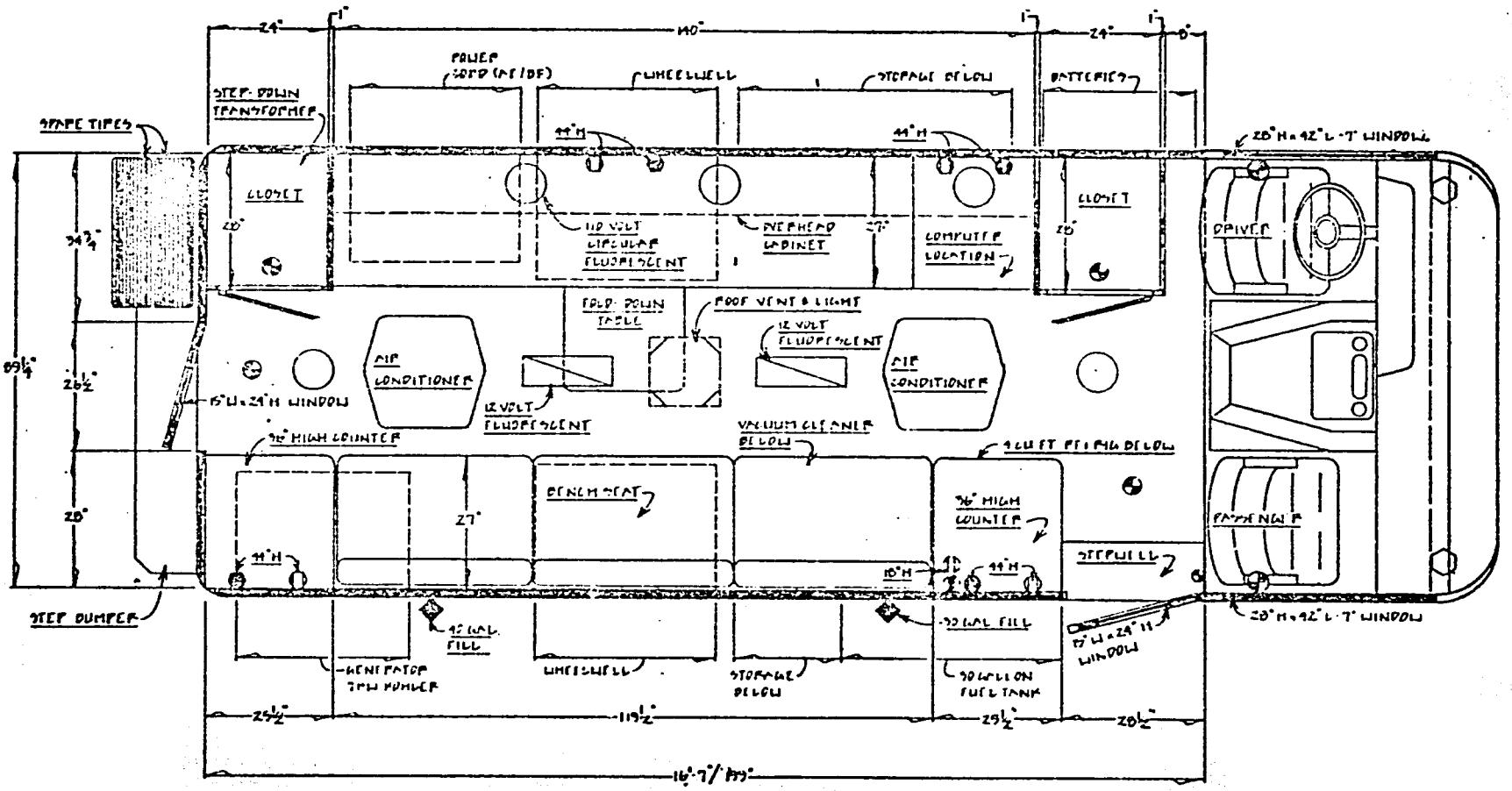
DATE	CH BY	REVISION RECORD

BARTH INC

DIVISION	SPECIALIZED VEHICLES		
MODEL	23S		
NAME	FLOOR PLAN		
DRAWN BY	STEVE PRICE	DATE	25 SEP 1984
CH'D BY		DATE	
DRWG. NO.	BW-84 9527	SCALE	3/4"=1'-0"

235

137" WHEELBASE



SYMBOLS

SPEAKER BOX	12 VOLT LIGHTER	220 VOLT OUTLET	
AC-DC CONVERTER	HOOD FAN 12 V	12 VOLT PUMP	
110 VOLT OUTLET	EXTRA SPEAKERS	GAS FILL	
12V REFRIG OUTLET	HEAT REGISTERS	SWITCH	
T.V. JACK	GRAB RAIL 12 V	CONTROL PANEL	
12 VOLT LIGHT	THERMOSTAT	12V FUSE BLOCK	
12 V BULLET LIGHT	PROPANE	DUAL-TRANSFER SWITCH	
		LP GAS DETECTOR	

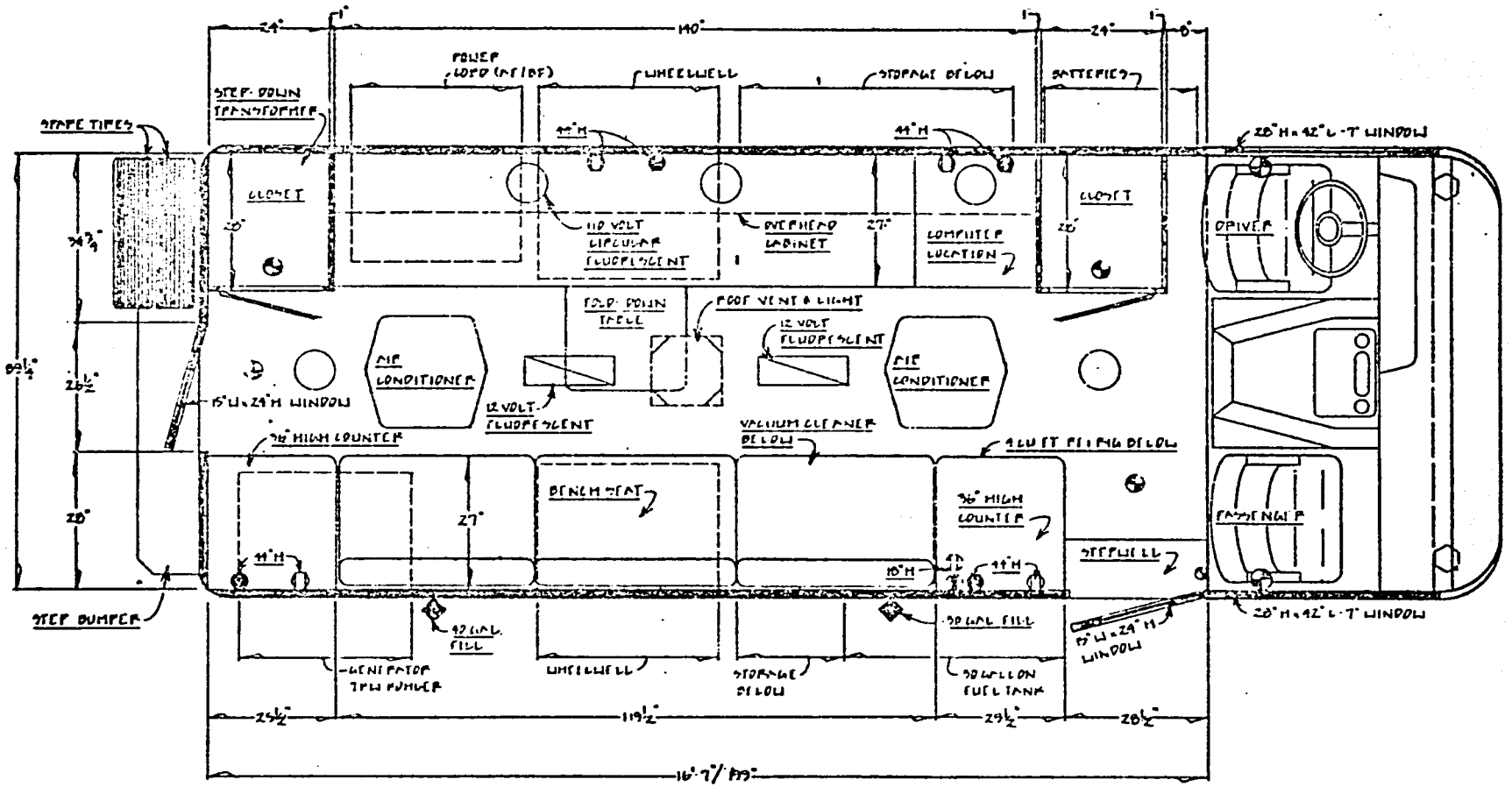
REVISION RECORD	DATE	CH BY

BARTH INC

DIVISION	SPECIALIZED VEHICLES		
MODEL	235		
NAME	FLOOR PLAN		
DRAWN BY	STEVE PRICE	DATE	25 SEP 1984
CH'D BY		DATE	
DRWG. NO.	BSV 84 9527	SCALE	3/4"=1'-0"

235

137" WHEELBASE



SYMBOLS

	BREAKER BOX		12 VOLT LIGHTER		220 VOLT OUTLET
	AC-DC CONVERTER		HOOD FAN 12 V		12 VOLT PUMP
	110 VOLT OUTLET		EXTRA SPEAKERS		GAS FILL
	12V REFRIG. OUTLET		HEAT REGISTERS		SWITCH
	T.V. JACK		GRAB RAIL 12 V		CONTROL PANEL
	12 VOLT LIGHT		THERMOSTAT		12 V FUSE BLOCK
	12 V BULLET LIGHT		PROPANE		MANUAL TRANSFER SWITCH
					LP GAS DETECTOR

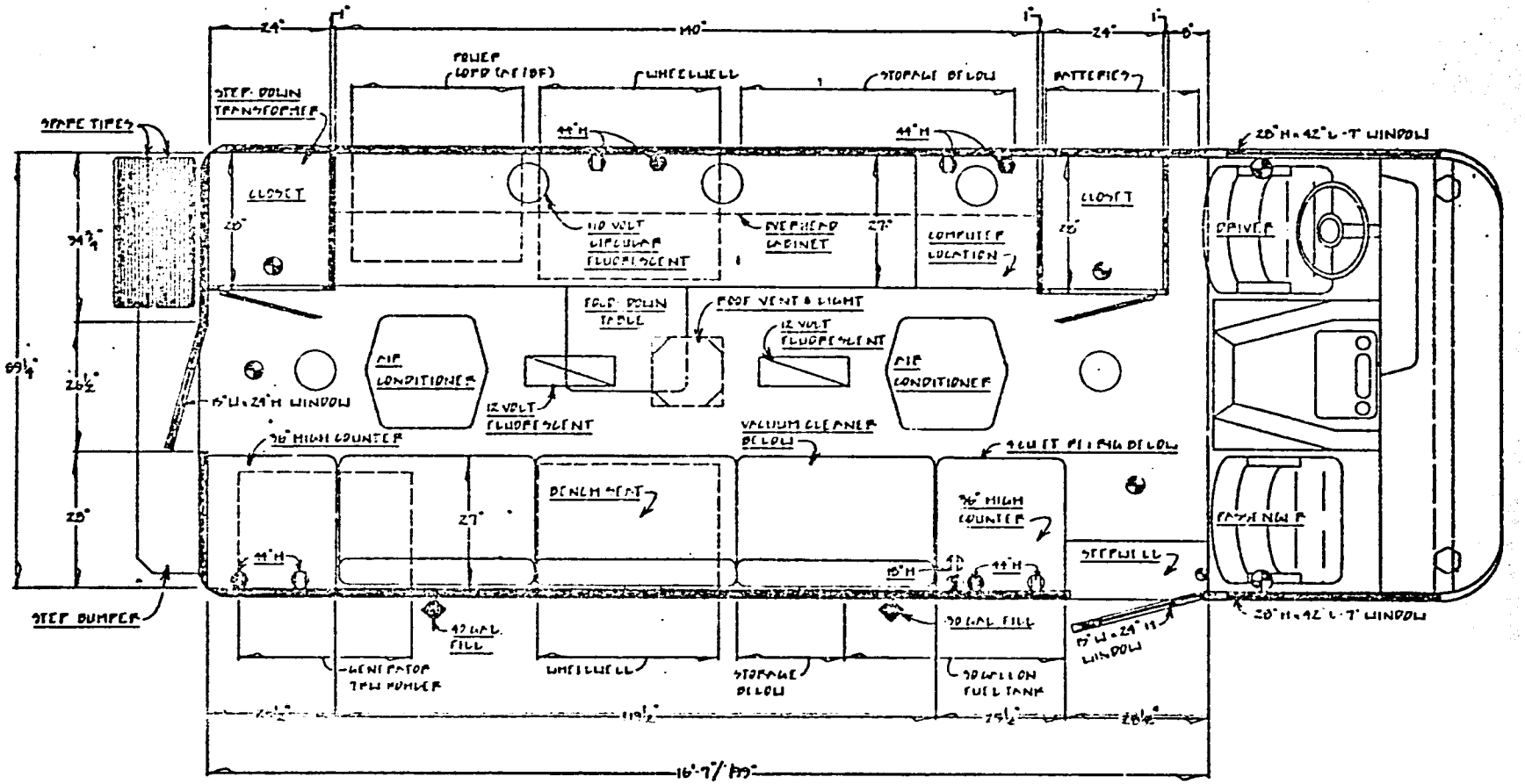
DATE	CH BY	REVISION RECORD

BARTH INC

DIVISION	SPECIALIZED VEHICLES		
MODEL	235		
NAME	FLOOR PLAN		
DRAWN BY	STEVE PRICE	DATE	25 SEP 1984
CH'D BY		DATE	
DRWG. NO.	BW 84 9527	SCALE	3/4"=1'-0"

235

137" WHEELBASE



SYMBOLS

BREAKER BOX	12 VOLT LIGHTER	220 VOLT OUTLET	
AC-DC CONVERTER	HOOD FAN 12 V	12 VOLT PUMP	
110 VOLT OUTLET	EXTRA SPEAKERS	GAS FILL	
12V REFRIG. OUTLET	HEAT REGISTERS	SWITCH	
T.V. JACK	GRAB RAIL 12 V	CONTROL PANEL	
12 VOLT LIGHT	THERMOSTAT	12V FUSE BLOCK	
12 V BULLET LIGHT	PROPANE	MANUAL TRANSFER SWITCH	
		LP GAS DETECTOR	

DATE	CH BY	REVISION RECORD

BARTH INC

DIVISION	SPECIALIZED VEHICLES		
MODEL	235		
NAME	FLOOR PLAN		
DRAWN BY	STEVE PRICE	DATE	29 SEP 1984
CH'D BY		DATE	
DRWG. NO.	BSV 84 9527	SCALE	3/4"=1'-0"

APPENDIX

3.8.1-24

RECOMMENDATIONS FOR FUTURE INDUSTRIAL ENERGY CONSERVATION ACTIVITY

ARGONNE NATIONAL LABORATORY
9700 South Cass Avenue, Argonne, Illinois 60439
Telephone 312/972-

April 3, 1985

Dr. Hussein Abdallah
Chairman and Chief Executive
Organization for Energy Planning
1 Aisha Taymouria
Garden City
Cairo, Egypt

Subject: Suggestions for Program Activity in Industrial Audits

Attached you will find six programs that I have outlined as suggestions for consideration regarding the continuing OEP industrial audit activity. I developed the outline of these programs after reviewing the Energy Conservation Opportunities (ECOs) described in the OEP/FWEC audit reports.

In the development of these suggested program outline's I have considered the following:

- Program areas that could be developed and implemented by OEP now,
- Program areas that OEP staff could take the lead based on the recent audit exercise,
- Programs that would be industry-wide and, therefore, have a far-reaching impact on Egyptian industry,
- Programs that would demonstrate to many industries the current capability of OEP energy conservation support and service, and
- Programs that would further optimize the OEP sponsored full audit activity.

There are, of course, other important aspects of the OEP audit activity, some of which ANL has addressed in the current request for PASA extension.

In order that you may better understand my thought process in the development of the program outlines, I have described each program suggestion under the following categories:

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ARGONNE NATIONAL LABORATORY
9700 South Cass Avenue, Argonne, Illinois 60439
Telephone 312/972-

- Program title
- Specific program objective
- Rationale (or justification) for implementation, and
- General guidelines for program development

I trust that you will find these suggestions useful to the continuing success of the OEP industrial audit activity.

Sincerely yours,

Marshall

Marshall R. Monarch

cc: Richard Cirillo
Thomas Wolsko

Attachments

Program 1: Determine Priority Plants for Audit in the Next Three Years.

Objective: To be in a position to commence certain critical plant data collection activities that may require a long lead time to accomplish with accuracy.

Rationale: There is certain data that is required during a preaudit that is critical to the audit evaluation but may not be currently available in the format and accuracy required. This data may require one or two months to a year to establish accurately -- a period of time well beyond the normal period of preaudit activity.

Guidelines: OEP should review its records now and establish a preliminary list of Priority Plants for possible audit in the next three years. This list of plants (e.g. the number should be kept initially small -- 10 or 15 plants) should be prioritized for data collection purposes. The prioritization should be based on the best available information currently available characterizing the desirability of a plant for audit. As time progresses, plants would be added to the list and the prioritization for audit adjusted based on new information, program policy considerations, etc.

Program 2: Develop Energy Consumption/Production Data Sets for Priority Plants

Objective: To establish accurate, defensible total plant and major equipment energy consumption/production base year data sets for Priority Plants prior to the preaudit/audit activity.

Rationale: One of the most important data sets for an energy conservation program that is built on the development and implementation of energy conservation opportunities (ECO's) is the establishment of an accurate and defensible base year data set for energy consumption by energy type (e.g., mazout, sular, electricity, etc.) for the entire plant and for significant energy consuming equipment (e.g., boilers, furnaces, etc.). The success of the implementation of an ECO is measured against this base year data set. Some plants may not have this data readily available for the entire plant and most would not have it readily available for individual large energy consuming equipment such as boilers and furnaces.

To collect this data and verify its accuracy may require a significant amount of time depending on the current plant record keeping procedure. In some instances fuel and electricity payment receipt records are not in a format that is readily verifiable by OEP. For large energy consuming equipment such as boilers and furnaces fuel metering device for mazout or sular consumption may not be in place, be inoperative or plant operators may not be in the habit of recording the data and thus monitoring accurate and current data logs.

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Therefore, in order to avoid delays and confusion, as well as the necessity for undesirable estimating during the full preaudit activity, it is desirable to plan ahead and give both OEP and the plant personnel time to develop a good, defensible base energy consumption and production data set well in advance of the preaudit activity. This will reduce stress for plant management and engineers, as well as for OEP staff. The availability of the information in advance of the preaudit activity will also provide a better basis for OEP to target subsystems for audit rather than the entire plant should this approach appear desirable from a cost-effective evaluation.

Guidelines: Once the Priority Plants have been selected, OEP should develop procedures individually with each plant for reviewing and further developing a base year energy consumption/production data base. The first step would be to evaluate the current data available, establish deficiencies and work with plant personnel to develop a cooperative program to correct the deficiencies, establishing a target date for the availability of an appropriate base year data set for preaudit evaluation. In some instances it may be desirable or necessary to develop a base year data set commencing with the current year of OEP involvement.

The development of the base year data set should proceed using the general preaudit data set procedures provided by FWEC with appropriate modifications by OEP staff to fit the particular situation. OEP would provide

the data analysis and management expertise using the FWEC computer program. The tables and graphs generated by the program would be offered to the plant management as a service to the plants where the organized data may be of assistance to the plants for their own records and evaluation. In fact, OEP could offer this service on an annual basis.

Program 3: OEP Sponsored Plant Personnel Training Program on Insulation and ECO Development

Objective: To train plant personnel to determine plant requirements for insulation to reduce energy consumption that will set the stage for a future OEP/Industry cooperative program of insulation ECO implementation.

Rationale: As indicated by the ECO's developed by FWEC, the analysis for reducing energy consumption by insulating hot surfaces (e.g. pipes, tanks, etc.) is fairly straight-forward (using available micro-computer programs[a]) and can be very cost-effective (i.e. has an attractive pay-back period).

This type of program could be implemented in plants prior to a complete preaudit activity especially for plants that would not receive a full preaudit/audit for a couple of years. In such cases, the training program and follow-up insulation ECO activity could provide an early OEP service and energy reduction for many plants that may have to wait for the full audit service.

Guidelines: OEP staff should be able to develop a training course to train plant personnel on estimating insulation requirements for their plant systems. The training would involve taking the proper in-plant measurements (e.g. pipe dimensions, surface temperature, etc.) as well as engineering analysis supported by OEP computer program capability.

OEP may want to present this program on a routine basis with several trainees at a time

(i.e. representing two plants at a time) so that instruction could be on a somewhat personal basis (especially necessary to demonstrate and instruct in computer program support analysis).

The training program could conclude in an orientation toward developing a cooperative program of Insulation ECO development and implementation. Once trained, plant personnel will return to their respective plants, take the appropriate in-plant measurements (possibly with assistance and monitoring by OEP), and return to OEP with the appropriate data set for analysis. OEP will then assist the trainees in performance of the technical and economic ECO analysis.

Once the ECO is implemented OEP would work with plant personnel to verify the energy savings. This data would be documented by OEP and aggregated for the plants involved in the program. OEP could then publish this information on a periodic basis thereby indicating the success of the industry-wide program.

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[a]Note that OEP currently has two Insulation Analysis Computer Programs -- one provided by ANL and one provided by FWEC.

Program 4: OEP Sponsored Plant Personnel Training Program for Boiler/Furnace Combustion Efficiency Improvement and ECO Development.

Objective: To train plant personnel to tune boiler/furnace combustion systems for optimum efficiency using portable instrumentation subsequent to developing a cooperative combustion tune-up program with industry.

Rationale: The FWEC audits demonstrated that it can be cost-effective to develop a boiler/furnace combusion system tune-up program within the plant. The program will require certain in-plant measurements using portable instrumentation some of which can be replaced by permanent monitoring instruments (e.g. temperature guage in stack). As an interim measure it would be worthwhile to instruct plant personnel in the use of portable instruments to tune combustion systems so that they can subsequently incorporate the procedures in their plant operations.

Once the plant personnel are trained and a plant program developed, OEP could loan needed portable measurement instruments on a temporary basis to the respective plants (making maximum use of available instruments). This procedure would ultimately be finalized by the purchase of the necessary monitoring equipment for plant use directly by the plant or OEP.

In association with the combustion system tune-up program it may be desirable to purchase fuel consumption monitoring instruments and develop a program with the plant to monitor fuel consumption associated with the tune-up

program. The monitoring of fuel consumption and collection of such data will serve to demonstrate the effectiveness of the program and maintain an incentive to keep the program in place. This data would also be furnished to OEP so that the impact of the program among participating plants can be aggregated and published as an indication of the success of the industry-wide program.

Guidelines: OEP staff should prepare an in-house training course on combustion system tune-ups based on the information, instruments and training provided by FWEC. The training group should be kept small (i.e. several from approximately 2 plants) so that personal attention can be given to the plant trainees.

OEP should pursue the formal training with on-the-job training in the individual plants and assist the plant toward the establishment of a routine combustion system tune-up program where OEP would loan the instruments to the plant on a routine basis (this way several plants could be served by one set of instruments) until the instruments could be purchased for the plant.

Program 5: OEP Sponsored Plant Personnel Training Program for Steam Leak Repair and Steam Trap Inspection/ Replacement.

Objective: To train plant personnel to develop a plant steam leak repair program and a routine steam trap inspection program.

Rationale: The results of the FWEC audits indicate that it may be cost-effective for certain industries to undertake a systematic program to repair steam leaks and inspect, on a routine basis, steam traps replacing those that are defective. Training plant personnel in developing both a program for systematic repair of steam leaks and a routine steam trap inspection program would lead to implementation of ECOs.

Guidelines: OEP staff could establish a training program to train plant personnel in the procedures presented by FWEC to identify and quantify steam leaks. Plant personnel could then apply these procedures to their respective plants and return to OEP with the data. OEP would then instruct plant personnel on the analysis of the data using the information collected by the plant trainees. OEP would then establish a cooperative program with the plant for the repair of steam leaks and monitor the progress of repair and also monitor the improved energy conservation which would be a credit to the individual plant. Aggregate data from the plants involved in the program would be published to demonstrate the success of the industry-wide program.

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OEP would also develop a training program to instruct plant personnel on how to develop a routine program to inspect steam traps using the information, training and instruments provided by FWEC. The instruments could be loaned to the plants for routine inspection until instruments could be purchased for the plant. OEP may be able to assist the plants in the purchase of new steam traps to replace those that are found to be defective. OEP will train personnel in analyzing the fuel savings by replacing defective steam traps and help the plant monitor the energy savings which will be reported to OEP and aggregated for plants subscribing to the program. This data will then be published to demonstrate the success of the industry-wide program.

Program 6: Develop Preaudit Training Program for Plant Personnel.

Objective: To train plant personnel in preaudit procedures prior to OEP/Contractor activity in the preaudit and audit and establish preaudit and audit coordination and responsibilities.

Rationale: In order to optimize the support and assistance of plant personnel during the preaudit and audit it would be appropriate to provide a formal introduction to the activity approximately one month prior. The training program will serve to train plant personnel in the data collection procedures and objectives of these procedures. As part of the training program OEP can develop a plan of coordination with plant personnel establishing respective responsibilities of both plant and OEP staff.

Guidelines: OEP should develop the training course based on the specific data collection procedures that will be employed (i.e. discuss the specific forms that will be used for data collection). If this is not possible because of unknown contractor requirements the material should be presented as the general type of information required by data collection. The objectives of the data collection must be emphasized in order that plant personnel fully understand (and thereby support) the data collection effort.

The course should also emphasize the need for accurate data and the need for conscientious, informed estimates where such data is missing. The plant personnel are the best sources of such estimates.

The course should conclude with the development of a combined OEP/Plant Audit Team. This, of course, would be a cooperative venture and at the conclusion of the course it would then be appropriate to designate certain responsibilities and details regarding the team structure.

It is recommended that the course be given to the specific plants that are scheduled to undergo preaudit/audit approximately one month before the activity will start. This is recommended because the plant personnel will have the proper orientation recognizing that they will have to apply the information discussed fairly shortly. Also the information will be fresh in their minds and the actual preaudit and audit process will be an on-the-job training continuation of the classroom effort.

FOSTER WHEELER ENERGY CORPORATION
110 SOUTH ORANGE AVENUE · LIVINGSTON, NEW JERSEY 07039 · PHONE 201-533-1100

April 1, 1985
Letter No. 2.1-48
File No. 2.1

Technical Representative
Argonne National Laboratories
Argonne, IL 40639

Attention: Mr. M. Monarch

SUBJECT: FWEC Contract 11-35625
Argonne National Laboratories
Energy Audits and Audit
Training in Egypt
Future ECO Execution

Dear Mr. Monarch,

Foster Wheeler Energy Corporation is please to provide herein some of our thoughts with regard to implementation of the favorable Energy Conservation Opportunities which have been developed by OEP, the plant staff, and FWEC.

A. Technical Steps for Implementation

Several distinct steps are necessary to implement the ECO's, and to subsequently realize their benefits. These steps vary slightly with the project execution plan, and will thus be approached separately, to present a discussion with suitable overall logic.

The broad project execution steps are as follows:

Detail Engineering
Procurement
Construction

From an overall standpoint, the definition of these terms would be essentially as follows:

Detail Engineering

Detail Engineering would entail the total definition of the work, from a technical standpoint, to begin with the contract definition, and to complete with construction drawings, equipment requisitions, and

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project specifications as required. The contract definition would be based upon an ECO, or a scope definition, with additional drawings if available.

Detail Engineering is the initial technical effort for any project. For purposes of this discussion other necessary organizational functions, such as Project Management and Project Control (cost and scheduling) begin during the Detail Engineering phase and continue throughout the life of the project.

Procurement

Procurement, as a working term, envisions the work related to the procurement of all equipment, material, and services which are required to complete the engineering contractor's work.

This work includes inquiry, buying, expediting, inspection, and traffic. Essentially, procurement begins with a written requirement (a requisition), and performs all purchasing functions until the end of service is completed or the material received.

Typically, procurement work begins shortly after Detail Engineering, with actual buying to begin 1 to 6 months after project start, depending on size, etc.

Construction

Construction essentially involves the field work, beginning with equipment/material received, and controlling either direct hire workers or subcontractors through the completion of the work.

In most cases, Project Management, Project Control, and Procurement functions are transferred to the field, to maintain intimate contact with the project through completion of construction. (Which may include testing, startup, and/or plant operation in select cases.)

B. Financing Prior to Implementation

A wide variety of commercial bases are available, and are used for the commercial terms which dictate the expenditure of project funds.

Prior to a detail plan, the source of funds must be defined, as this frequently dictates the outline of the project execution plant.

Four parallel routes exist which can be entitled:

1) Unrestricted Funds

Unrestricted funds, as from the plant operating budget, or from sources within the Egyptian Government, controlled through OEP, would permit either sole source or competitive procurement on any basis chosen by the controller of the funds.

2) World Lending Agencies

World lending agencies, such as the World Bank, Asian Development Bank, African Development Bank, and the like will normally impose restrictions on the commercial terms applied, frequently requiring different groups to each execute a portion of the work (i.e. an Architect/Engineer and a general contractor), and are normally required by their charter to use competitive bidding techniques.

These restrictions generally require a significantly higher level of documentation or formality, increase cost somewhat, and extend the period of execution.

3) Grant Funds

Grant funds, such as those supplied by USAID or other similar agencies of major nations, may be made available for specific areas of work. Restrictions vary, but would always include services and material from that country.

4) Contractor Supplied Financing (Assistance)

Procurement activities of an adequate size may be initiated with the requirements that the contractor assist the owner (borrower) in obtaining financing either from an export/import bank, a private bank, or other source.

Export/import funds, while they provide most expenditures within the lending country can be made additive by purchase from several countries. Restrictions normally include payment in the lending countries currency, use of a major portion of funds within the lending country, and little or no funds for construction labor (although construction supervision, if done by expatriates from the lending country, will frequently be covered).

C. Commercial Basis for Implementation

After definition of the source of financing, if this is a consideration, the actual commercial basis for the project must be defined.

While a large number of variations and combinations exist, there are essentially two types of commercial bases used, both of which have their own advantages.

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Frequently, the profit element of the project may be on a different basis than the cost, and the cost may be split dependent upon risk or other considerations.

Cost, in this context, includes all elements of cost to the contractor, including personnel with their payroll burdens, material and equipment purchased, services purchased, labor, and various overheads.

Profit is the remainder of the contract payment, and may be a part of a fixed price, a separate fixed amount, a percentage of cost, or some variable amount calculated around an expected cost.

Fixed price, (lump sum) contracting sets a known value on the work, but often builds into the contractor's price a series of contingencies against unknown factors.

Reimbursable contracting protects the contractor against losses, but does not necessarily assure a profit. With work that has a high risk, or which is subject to frequent changes in scope, a reimbursable cost should be lower than fixed price.

Quite probably a mix of fixed and reimbursable elements of compensation for cost are best suited to the execution of the selected ECO's from the audit.

(Note that the contract for the screening/preaudit/audit was also done in this manner, with "effort" as a fixed price, and "Travel and Living" reimbursable.)

D. Tentative Execution Plan

Assuming that OEP has flexibility in funding (i.e. funds from B 1, 3 and 4 above) FWEC would suggest the following sequence of events:

1) OEP, with the plants, and assistance from FWEC if required, would select the ECO's which should be implemented in a package, which could include any combination from both plants, and possibly others (if known).

2) FW would provide a price to execute the international engineering contractor's scope, based on the execution basis set forth in the audit report, i.e.

   - Overall control by OEP.
   - Technology transfer and technical assistance and/or front end packages by an international engineering contractor.
   - Detail Engineering (with international engineering contractor supervision) by a local engineering contractor.

- o Procurement by the international engineering contractor, and,

- o Construction by Egyptian subcontractor (with international contractor supervision).

We would expect that the most equitable commercial terms to both parties would be as follows:

- Technical assistance and front end packages, including supervision of Egyptian Engineering contractors

- Egyptian Engineering contractor

- Procurement — To be determined

- Subcontract supervision

- Subcontractor construction costs

The advantages of this course of action to OEP are several, including key points as follows:

a) The background and understanding of the plants, the ECO's, and OEP, by FWEC and its personnel will reduce bidding time, expense, and formalities, while developing a greater understanding of the overall energy conservation problem in Egypt.

b) Critical elements of the pricing can be made fixed price, while those elements which have unknowns can be made reimbursable, to minimize cost and maximize flexibility.

c) The ECO's can be implemented rapidly, with a minimum overall schedule, to display hard results at the earliest possible opportunity.

d) Standards and specifications suitable for future projects may be developed/made available to OEP.

Please advise the undersigned if the above approach is consistant with your wishes, and, if so, we should be please to proceed with a formal proposal.

Very truly yours,

FOSTER WHEELER ENERGY CORPORATION

C.E. Kastner, Jr.
Project Manager

CEK:ba

cc: H. Feintuch
R. Houghton (ANL)
T. Wolsko

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FOSTER WHEELER ENERGY CORPORATION
110 SOUTH ORANGE AVENUE · LIVINGSTON, NEW JERSEY 07039 · PHONE 201-533-1100

April 2, 1985
Letter #2.1,49
File 2.1

Technical Representative
Argonne National Laboratories
Argonne, IL 60493

Attn: M. Monarch

FWEC Contract 11-35625
Argonne National Laboratories
Energy Audits & Audit Training in Egypt
ECO Execution Scenario

Gentlemen:

Attached please find a Scenario for each plant previously audited, which describe a possible sequence of execution. These documents are essentially self standing, and require no further discussion.

If further information is required, please contact the undersigned.

Very truly yours,

FOSTER WHEELER ENERGY CORPORATION

C.E. Kastner, Jr.

CEK:ba

cc: R. Houghton (ANL) w/att.
T. Wolsko (ANL) " "
H. Feintuch

CABLE ADDRESS: REWOP LIVINGSTONNEWJERSEY

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NATIONAL METAL INDUSTRIES COMPANY

SCENARIO FOR ENERGY CONSERVATION PROGRAM IMPLEMENTATION

The preaudit report established a total of 51 ECO's which were to be reviewed for the National Metal Industries. After analyzing each ECO by evaluating the technical and economic benefits and estimating the required investment, it became evident that some were extremely attractive in both the quantity of energy saved and the rapid payout.

In order to present a practical implementaiton plan, the various ECO's were grouped into four different categories, as shown in Tables 1 through 4 and described below:

CATEGORY 1: NO COST/LOW COST AND RAPID PAYOUT (TABLE 1)

Upon initiation of the program to conserve energy, the National Metal Industries Co. should form a committee to plan and implement the ECO's as defined by ECO-A-15. The management of the plant in conjunction with this committee should then issue publicity to make the employees aware of the importance of energy conservation, as described by ECO-A-16. Several ECO's should then be put into effect all of which, including ECO's A-15 and A-16, require no investment. These are ECO's A-5 and A-21. Following these shall be the implementation of ECO's A-23, A-2 and A-12, which require an investment of LE 7,900. The annual savings of all of the above ECO's in Category 1 (Table 1) is estimated to be LE 190,200.

CATEGORY 2: INVESTMENT RECOVERED IN NOMINALLY 1 YEAR OR LESS (TABLE 2)

The next category of implementation of ECO's which should be started, even before Category 1 is completed, are those ECO's requiring a total investment of approximately LE 1,060,700 with an annual savings of approximately LE 3,671,800.

The items in Category 2 which have an attractive payout are ECO's A-13b, A-13a, B-11, B-13, B-3, A-8, A-14, B-12, B-15, A-26, A-10, A-11, A-6, B-1, B-25, A-13c, B-10c, A-9 and B-10a.

Considering all the above ECO's, combining both Category 1 and Category 2, that is starting from ECO-A-15 calling for the formation of an energy committee, to ECO-B-18 covering the review of transportation of Billets from old shear, represent a predicted total annual savings equal to almost one third the current annual energy bill for the National Metal Industries Company.

CATEGORY 3: INVESTMENT RECOVERED IN 1 TO 3 YEARS (TABLE 3)

Even before completion of all the Category 2 ECO's, the following ECO's with a payout period approximately 1 to 3 years should begin to be implemented. These are ECO's B-10b, B-7, A-1b, A-17, B-4, B-5, A-20, A-3, B-8, B-6, B-2 and B-14e. The total annual energy savings for this group of ECO's is LE 1,207,900 based on worldwide prices for a combined total investment of approximately LE 2,199,700.

There are certain ECO's whose implementation is contingent upon other ECO's having been already implemented. This means that unless ECO's A-8, A-9 and A-13b have been executed, i.e., the combustion improvement work for reheating furnaces #1 and #2 and the two open hearth furnaces has been finished, ECO's B-3, B-4 and B-5 which involve installing heat recuperators for the two reheating furnaces and a steam generating system for the open hearth furnaces, cannot be started.

Also please note that once it is decided to implement ECO-B-10 (a, b and c), ECO-A-6 is no longer valid.

CATEGORY 4: PAYOUT GREATER THAN 3 YEARS (TABLE 4)

ECO's B-24, A-1c and A-4 with their payout of over three years, should next be considered for implementation.

The ECO's in Category 4 may or may not be implemented depending upon a reevaluation of their need following completion of Categories 1, 2 and 3.

TABLE 1

CATEGORY 1: NO COST/LOW COST AND RAPID PAYOUT

ECO#	TITLE	Worldwide Cost, LE Annual Energy Savings	Investment Cost, LE	Payout, years
A-15	Form a Committee to Plan and Implement ECO's.	Extensive	0	Immediate
A-16	Publicity to Make Employees Aware of Importance of Energy Conservation	Extensive	0	Immediate
A-21	Describe a Formal Maintenance Program	Extensive	0	Immediate
A-5	De-energize Excess Electrical Transformer Capacity	37,000	0	Immediate
A-23	Investigate Measurement of Mazout unloading from Barges	87,500	3,500	0.04
A-2	Exhaust Ducting Clean-out for Reheating Furnaces #1 and 2.	20,700	1,100	0.05
A-1a	Repair all Leaks	45,000	3,300	0.07
	TOTAL	190,200	7,900	0.04

TABLE 2

CATEGORY 2: INVESTMENT PAYOUT IN NOMINALLY 1 YEAR

ECO#	TITLE	Worldwide Cost, LE Annual Energy Savings	Investment Cost, LE	Payout, years
A-13b	Improve Combustion in Open Hearth Furnaces	433,200	31,000	0.07
A-13a	Improve Boiler Combustion Efficiency	180,000	16,200	0.09
B-11	Insulate Water-Cooled Runners in all Reheat Furnaces	1,725,200	173,900	0.10
B-13	Improve Performance or Replace Steel Cranes in Steelmaking Shop	41,000	7,000	0.17
B-3	Install Recuperator in #1 Reheating Furnace in Semiautomatic Rolling Mill	197,000	44,200	0.22
A-8	Improve Combustion in Reheating Furnace #1	158,000	45,800	0.29
A-14	Install Temperature Indicators on Mazout Lines	23,900	6,900	0.29
B-12	Obtain Extra Oxygen Bottles	63,100	24,000	0.38
B-15	Install Automatic Door Controls (both doors) in Sequence with Pushers in Reheating Furnaces	25,000	12,100	0.48
A-26	Investigate Instrumentation to Quantify Air Leaks into Automatic Mill Furnace Exhaust Gases	3,600	1,800	0.5
A-10 and A-11	Install New Instruments in Mazout and Combustion Air Lines, Repair or Modify Inoperative Instruments	56,100	29,900	0.53
A-6	Repair and/or Replace Outside Bricks on Furnaces to Prevent Excessive Heat Loss	207,700	134,500	0.65

TABLE 2 (Cont'd)

ECO #	TITLE	Worldwide Cost, LE Annual Energy Savings	Investment Cost, LE	Payout, years
B-1	Automatic Air Switching for the Open Hearth Furnaces	15,400	10,100	0.66
B-25	Investigate Other Materials or Techniques for Recuperator in Automatic Mill	63,500	42,000	0.66
A-13c	Improve Combustion Efficiency in Automatic Mill Reheating Furnace	101,600	77,500	0.76
B-10c	Investigate the Replacement of Refractory in Automatic Mill Reheating Furnace	257,800	203,400	0.79
A-9	Improve Combustion in Reheating Furnace #2	44,700	36,700	0.82
B-10a	Investigate the Replacement of Refractory in Reheating Furnace #1	105,000	92,100	0.88
B-18	Review Transportation of Billets from Cold Shear to Automatic Rolling Mill Reheat Furnace	75,000	71,600	0.95
		3,671,800	1,060,700	0.29

TABLE 3

CATEGORY 3: INVESTMENT PAYOUT IN 1 TO 3 YEARS

ECO #	TITLE	Worldwide Cost, LE Annual Energy Savings	Investment Cost, LE	Payout, years
B-10b	Investigate the Replacement of Refractory in Reheating Furnace #2	39,500	50,200	1.27
B-7	Demand Controller for Reducing Electric Power Demand	57,000	73,800	1.29
A-1b	Add Insulation on Hot Bare Pipes	10,200	13,600	1.33
A-17	Blower Repair for Automatic Mill Furnace	33,000	48,400	1.47
B-4	Investigate Installing Heat Recuperator for Semiautomatic Rolling Mill #2 Reheating Furnace	53,000	79,000	1.49
B-5	Install Steam Generators in Open Hearth Furnace Exhaust Flue Gas System	520,000	898,800	1.73
A-20	Install Windshields for all Reheating Furnaces	20,000	36,200	1.81
A-3	Establish Procedures for Cooling Water Shutdown	30,100	60,800	2.02
B-8	Consider Adding Seals Around Doors of Reheating	20,000	40,900	2.05
B-6	Capacitor Installation to Improve Power Factor	404,300	847,100	2.10
B-2	Install Instrumentation in Oxygen Plant	4,900	11,900	2.43
B-14e	Automatic Air/Fuel Ratio Control in Automatic Mill Reheat Furnace	15,900	39,000	2.45
		1,207,900	2,199,700	1.82

TABLE 4

CATEGORY 4: PAYOUT GREATER THAN 3 YEARS

ECO #	TITLE	Worldwide Cost, LE Annual Energy Savings	Investment Cost, LE	Payout, years
B-24	Pump Suction	1,500	5,600	3.63
A-1c	Add Insulation to Bare Tanks	52,300	204,000	3.89
A-4	Mazout Filter Cleanout/Maintenance	2,600	17,200	6.6
		56,400	226,800	4.02

CAIRO DYEING AND FINISHING COMPANY

SCENARIO FOR ENERGY CONSERVATION PROGRAM IMPLEMENTATION

The preaudit report established a total of 34 ECO's which were to be reviewed for the Cairo Dyeing and Finishing Company. After analyzing each ECO by evaluating the technical and economic benefits and estimating the required investment, it became evident that some were extremely attractive in both the quantity of energy saved and the rapid payout.

In order to present a practical implementation plan, the various ECO's were grouped into four different categories, as shown in Tables 1 through 4 and described below:

CATEGORY 1: NO COST/LOW COST AND RAPID PAYOUT (TABLE 1)

Upon initiation of the program to conserve energy, the Cairo Dyeing and Finishing Co. should form a committee to plan and implement the ECO's as defined by ECO-A-19. The management of the plant in conjunction with this committee should then issue publicity to make the employees aware of the importance of energy conservation, as described by ECO-A-20. Several ECO's should then be put into effect all of which, including ECO's A-19 and A-20, require no investment. These are ECO's A-1, A-18, A-7, A-6 and A-14. It should be noted that ECO-B-8 should also be accomplished in conjunction with ECO-A-14. The investment for ECO-B-8 is estimated to be LE 8,800. The annual savings of all the above ECO's in Category 1 (Table 1) is in excess of LE 250,000.

CATEGORY 2: INVESTMENT RECOVERED IN NOMINALLY 1 YEAR OR LESS PLUS INSTRUMENTATION (Table 2)

The next category of implementation of ECO's, which should be started, even before Category 1 is completed, are those ECO's requiring a total investment of approximately LE 667,300 with an annual savings of approximately LE 1,459,600. With one exception the payout in this group is from nearly immediate to $1\frac{1}{4}$ years. The one exception is instrumentation ECO's A-10, 12 and 13 which although it has a somewhat less attractive payout is critically

needed in order to provide better monitoring of consumption and to provide data for the other ECO's. This instrumentation must be implemented promtly. The items in Category 2 which have an attractive payout are ECO's A-2, A-8, B-11, A-3, A-4, B-9b, A-17, B-6, B-2, B-4 and A-5. Considering all the above ECO's, and combining both Category 1 and Category 2, that is starting from ECO A-19, calling for the formation of an energy committee, to ECO A-5, covering the installation of insulation, represent a predicted total annual savings equal to approximately one half the current annual energy bill of the Cairo Dyeing and Finishing Co.

CATEGORY 3: INVESTMENT RECOVERED IN 1 TO 3 YEARS (TABLE 3)

Even before completion of all the Category 1 ECO's the following ECO's with a payout period of approximately two to three years, should begin to be implemented. These are ECO's B-5, A-15, and B-3 all of which have a combined total investment of approximately LE 144,900. The total annual savings for this group, based on worldwide prices, is about LE 66,700.

ECO-B-10a covering the power recovery turbine with a payout of 2.8 years, corresponding to an investment of LE 1,100,000 and annual savings of LE 389,000, should then be considered. This requires the operation of the steam boilers at 20 Bar pressure while ECO-A-14, initiated in the first group above, covered boiler operation at a lower pressure. Also, note that this ECO is based on the steam requirements of the turbine being those currently supplied to the Shobra and Fiber plants. If, however, the repair of steam leaks and steam traps and installation of insulation has already been implemented under ECO's A-2, A-3, A-4 and A-5 above, the lower overall steam consumption will result in the need for a smaller steam turbine generator and a corresponding lower output of generated power. This ECO should be reviewed, after implementation of ECO's A-2, A-3, A-4 and A-5 to determine the amount of power that can be generated and, how best to use this power. At this point, ECO B-10b covering a cogeneration system to supply the total electricity and steam required for

the entire plant should be carefully reviewed. The possibility of utilization of outside power on a standby basis only, should also be reviewed, at that time, with the proper authorities. Note that, as described on page 6 of ECO-CD-B-10b, the net energy savings for the cogeneration unit will be LE 1,026,000, after the steam leakage and insulation is repaired. On this basis the payout on worldwides prices is 2.5 years for the cogeneration unit.

CATEGORY 4: PAYOUT GREATER THAN 3 YEARS (TABLE 4)

ECO's A-11 and A-22 with their payout of over three years, should next be considered for implementation.

The ECO's in Category 4 may or may not be implemented depending upon a reevaluation of their need following completion of Categories 1, 2 and 3.

TABLE 1

CATEGORY 1: NO COST/LOW COST AND RAPID PAYOUT

ECO#	TITLE	Worldwide Cost, LE Annual Energy Savings	Investment Cost, LE	Payout, years
A-19	Form a Committee to Plan and Implement ECO's	Extensive	0	Immediate
A-20	Publicity to Make Employees Aware of Importance of Energy Conservation	Extensive	0	Immediate
A-1	Eliminate venting of Steam Between Shifts	200,000 (Note 1)	0	Immediate
A-18	Reduce Peak Demand of Electricity for Fiber Plant	53,500	0	Immediate
A-7	Shutdown water & steam Usage during Power Failures	4,000	0	Immediate
A-6	Study the Effect of Insulation on Heat Loss From Pipes	0	0	Immediate
A-14	Possible Operation of Boilers at a Much Lower Pressure	17,400	8,800	0.51
B-8	Eliminate Two Current Users of High Pressure Steam			
	TOTAL	274,900 (Note 1)	8,800	Immediate

NOTES: (1) This savings will be reduced by approximately 103,700 LE/year when ECO's A-10, 12, 13, A-2, A-3, A-4, A-17 and A-5, as listed in Table 2, are implemented.

TABLE 2

CATEGORY 2: INVESTMENT PAYOUT IN NOMINALLY 1 YEAR OR LESS PLUS INSTRUMENTATION

ECO#	TITLE	Worldwide Cost, LE Annual Energy Savings	Investment Cost, LE	Payout, years
A-10, 12,13	Improve/add/fix Instrumentation	78,200	228,600	2.92
A-2	Repair of Steam, etc. Leaks in Piping	368,000	13,600	0.04
A-8	Check Combustion Efficiency	40,600	4,200	0.10
B-11	Water Recovery System	307,300	50,200	0.16
A-3	Test, Repair, Replace Steam Traps	120,000	22,900	0.19
A-4	Trap Testing Program	60,000	17,000	0.28
B-9b	Power from Two Sources	120,000	72,500	0.60
A-17	Investigate Putting Covers on J Boxes and Other Equipment	36,000	22,800	0.63
B-6	Consider Use of Heat Pipes to Recover Heat from Hot Air Leaving Dryer Stacks	48,000	31,300	0.65
B-2	Condensate Collection System	99,100	84,700	0.85
B-4	Installation of Capacitors to Improve Power Factor	133,400	119,500	0.90
A-5	Add New or Repair Existing Insulation	49,000	59,600	1.22
	TOTAL	1,459,600	667,300	0.46

TABLE 3

CATEGORY 3: INVESTMENT PAYOUT IN 1 TO 3 YEARS

ECO #	TITLE	Worldwide Cost, LE Annual Energy Savings	Investment Cost, LE	Payout, years
B-5	Demand Controller for Reducing Electric Power Demand	38,500	73,800	1.92
A-15	Reduce Steam Required for Deaerator	4,700	11,100	2.36
B-3	Recovery of Heat from the Stacks of the Existing Four Oil Boilers	23,500	60,000	2.55
B-10a (Note 1)	Power Recovery Turbine	389,000	1,100,000	2.83
	TOTAL	455,700	1,244,900	2.73

NOTES: (1) After implementation of ECO's A-2, A-3, A-4 and A-5, both ECO B-10a and B-10b should be reviewed to determine whether or not it might not be better to implement ECO B-10b instead of B-10a.

TABLE 4

CATEGORY 4: PAYOUT GREATER THAN 3 YEARS

ECO #	TITLE	Worldwide Cost, LE Annual Energy Savings	Investment Cost, LE	Payout, years
A-11	Consider the Use of "Bump and Run" on Dye Using Equipment	5,500	19,500	3.54
A-22	Reduce Heat Losses in Mazout Storage System	30,600	118,100	3.86
	TOTAL	36,100	137,600	3.81