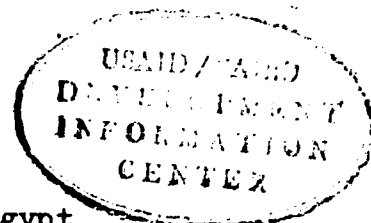


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A Report Prepared For USAID/Egypt  
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The Academy For Educational Development  
Washington, D.C.

RECOMMENDATIONS FOR UPGRADING CAIRO BUS MAINTENANCE  
CENTERS

An Addendum To

A STUDY TO DETERMINE THE FEASIBILITY OF ESTABLISHING  
A VOCATIONAL TRAINING CENTER IN CAIRO FOR  
SKILLED BUS AND TRUCK MAINTENANCE WORKERS  
AS PROPOSED BY  
THE GENERAL SYNDICATE FOR LAND TRANSPORT

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### ADDENDUM PURPOSE

The original feasibility study identified on the cover sheet contained a recommendation on page 16 item 2, Support For Bus Maintenance Garages relating to the condition of the bus maintenance garages. Since the basic study did recommend major support for the Vocational Training Center including appropriate equipment, it seemed logical to insure that graduates of the Center would have the same equipment available in the service centers to maintain the buses. Considering the deplorable conditions and lack of equipment at the present maintenance facilities we recommended that AID consider a program to re-equip each of the 4 Cairo Bus Company maintenance garages with the appropriate tools and equipment. This conclusion evolved in a discussion with Mr. DeButts.

The addendum was developed to assist AID/C in identifying the equipment and cost involved to provide the needed support. Consultations should be made with appropriate Egyptians to secure their input. AID support of an overall assistance program including the VTC and the maintenance garages would make a significant current and long range impact on the Cairo bus system. This approach would provide reasonable assurance that the 1600 plus buses already supplied by AID would be effectively maintained to meet Cairo's burgeoning transport needs.

### Service Centers

It is proposed that each bus service center would be composed of two units; Unit One serving as a maintenance segment wherein the cleaning, refueling, lubrication and service check items could be handled on regularly scheduled and pass-through basis, and Unit Two where all the major repair could take place, from engine overhaul to body work. The attached plans indicate the general

layout of each facility and the location of each type of service to be performed, with six buses being serviced simultaneously in Unit One, and fourteen in the four areas of Unit Two. The design is such that a greater demand for a specific service could be easily accomplished in an adjoining bay if that service were needed. Demand is then balanced against jobs requiring greater down-time.

Mechanics in a facility of this type could develop specialty skills, and yet with a background in general training provided by the VTC could function effectively in two or more areas, depending on the individual. Unit One could be an area of employment/service for those less skilled, and Unit Two for those employees who show a high level of proficiency and dedication.

Those trainees who complete the course of study at the Vocational Training Center would be familiar with the tools and equipment planned for these Service Centers and so the transition from training to the world of work would be relatively simple. Some skilled activities would necessarily be learned on the job. However, much of the theory would have a direct carry-over, being applicable immediately.

#### Equipment and Tools

Listed below are the suggested basic equipment and tool items required for each service center. The estimated cost is as follows:

Equipment and tools for each center:	\$115,698
25% Shipping charges:	\$ 28,925
Total Cost per Center:	\$144,623
Total Cost for 4 Centers:	\$578,492

**Floor Plans**

The enclosed floor plan can provide a basis for the expansion and or reorganization of existing garages. The development of both the equipment list and the floor plan reflects Consultant visits to the Niagara Frontier Transit Authority maintenance garage and discussions with the manager.

SUPPLY SOURCES FOR TOOLS AND EQUIPMENT

McMaster-Carr Supply Co.  
(Macarco)  
P.O. Box 4355  
Chicago, Illinois 60680

McKilligan Industrial Supply Co.  
435 Main Street  
Johnson City, N.Y. 13790

Graves-Humphreys, Inc. (G-H)  
1948 Franklin Road  
P.O. Box 13407  
Roanoke, Va. 24033

Brodhead-Garrett (B-G)  
4560 East 71st Street  
Cleveland, Ohio 44105

Snap-On Tools Corporation  
2801 - 80th Street  
Kenosha, Wis. 53140

Hein-Werner  
1200 National Ave.  
Waukesha, Wis. 53186

Ruger Equipment Co.  
617 W. Fourth St.  
Uhrichsville, Ohio 44683

Ammco Tools Inc.  
2128 Commonwealth Ave.  
N. Chicago, Ill. 60064

GMC Truck Division  
Detroit, Michigan

APPENDIX B

<u>Item No.</u>	<u>Quantity</u>	<u>Description</u>	<u>Part No.</u>	<u>Unit Price</u>	<u>Amount</u>
1	1	Hydraulic Press, 40 ton, with accessory pkg, I-H40-71D	B-G No. 189344	2400	2400
2	6	Safety Jack Stand 7-ton	Hein-Werner CS-7-20	170 pr	510
3	6	Safety Jack Stand	Hein-Werner CS-10-18	250 pr	750
4	6	Truck Jacks, 12 ton,	Macarco 2909T4	85	510
5	1	Hydraulic Floor Jack, transmission	Macarco 2906T14	450	450
6	2	Hydraulic Service & Positioning Jack, 10 ton	Macarco 2908Y2	950	1900
7	2	Bench grinder, 7" H.D.	B-G 115762	370	740
8	1	Buffer-grinder, combo.	B-G 134824	550	550
9	1	Drill Press, 1/2", 20" variable speed, tilting table	B-G 112815	1000	1000
10	2	Drill, Electric, hand, 1/4"	B-G 138869	150	300
11	2	Drill, Electric, hand, 1/2" reversing	B-G 486318	150	300
12	1	Ratchet lever hoist, 1-1/2 ton cap.	G-H 4510020	170	170
13	1	Ratchet lever hoist, 3 ton cap.	G-H 4510019	215	215
14	1	Brake deliner and riveter, w/tools	Macarco 6658A12	250	250
15	1	Brake drum refinishing machine Bus-Truck cap.	AMMCO 4100	12400	12400
16	2	Brake hand-tool kit	AMMCO 2650	75	150

Item No.	Quantity	Description	Part No.	Unit Price	Amount
17	1	Brake cylinder Hone	AMMCO 3750	25	25
18	1	Disco Brake Caliper Hone	AMMCO 9575	50	50
19	1	Brake Bleeder	AMMCO 7400	415	415
20	2	Dual Wheel Dolly	Hein-Werner No. 80	400	800
21	4	Creeper Seat, Model 273	G-H 7430015	25	100
22	1	Tire changer, H.D. Truck-bus		5000	5000
23	1	Brake & Tubing Tools, Panel 1-SP	B-G 193198	200	200
24	2	Portable Tire Tool Service Board Set	Macarco 6691A2	250	500
25	1	Portable Gasoline Engine A.C. with Accessory Kit	B-G 161507	525 25	550
26	2	Oxy-Acetylene Welding-Cutting Outfit	Macarco 7781A2	370	740
27	2	Welding cylinder trucks	Macarco 2625T14	120	240
28	1	Portable spot welder	Macarco 8013A3	275	275
29	1	AC/DC Arc Welder, Dial arc 250 w/Accessory Kit (158744) & w/Wheel Unit (158755)	B-G 158733	475 80 80	635
30	1	Multiple battery charger w/10 battery jumpers (7318K14)	Macarco 7318K12	300	300
31	1	Alternator-Generator Regulator-Battery tester (AVR)	Snap-On MT-539C	550	550
32	1	Armature Lathe Motorized Undercutter, w/motor(188045)	B-G 188056	300	300
33	1	Metalcutting bandsaw, Wilton 1/3 HP, Model 3002	B-G 427875	400	400

Item No.	Quantity	Description	Part No.	Unit Price	Amount
34	10	Bandsaw blades 1/2 x 64-1/2, 6 T	B-G 117187	3.50	35
35	10	Bandsaw blades 1/2 x 64-1/2, 10 T	B-G 117165	3.50	35
36	10	Bandsaw blades 1/2 x 64-1/2, 14 T	B-G 117176	3.50	35
37	2	Portable Grinder, Electric	Macarco 4425A18	200	400
38	1 ea.	Diesel Test & Calibration Equipment, 10 H.P.	B-G 205724		9500
	1	Master Mounting Kit	122654		390
	1	P.T. Injectors for Detroit Diesel w/accessories	205446		100 90
	1	Portable nozzle tester	18626		260
	1	Injector Tester Set Detroit Diesel	186284		500
	1	General Purpose Nozzle Service Kit	186408		130
	1	Injector Service Kit, Detroit Diesel	186380		320
39	1	Tow Truck-Wrecker, Heavy Duty GMC Diesel, 1979 model (or equal) with the following:			
		a. Conventional cab			
		b. Holmes Model 600 wrecker & body, 92" wide w/twin 110" boom tubes			
		c. Power unit: twin worm rapid-reverse			
		d. Two outboard legs			
		e. Two 1/2" x 200" load cables			
		f. Two snatch blocks			
		g. One hand crank			
		h. P.T.O. with all drive components			



Item No.	Quantity	Description	Part No.	Unit Price	Amount
39 (Continued)					
		i. Nylon bushed dual controls			
		j. Dual rear tires, 10:00 x 20, Front 10:00 x 20, plus one spare wheel and tire			
		k. Gross cargo wt. 42,000			
		l. Two front tow hooks	GMC		
		m. Four speed transm.	Detroit	20000	20000
40	1	Air Compressor, 2 stage, tank mounted, 3 H.P. with Magnetic Starter	Macarco 4364K34 4364N33	1400 110	1400 110
41	1	Air compressor, Gasoline driven, 2 H.P., Portable	Macarco 439K31	340	340
42	3	Air hose assemblies, 50' w/ chuck, 1/4"	Macarco 531K12	30	90
43	2	Snubber hose assemblies, 1/4"	Macarco 5366K51	5	10
44	2	Inflator guages, dual head chuck	Macarco 5440K2	20	40
45	2	Blowgun w/6" extension nozzle	Macarco 5450K14	11	22
46	1	Steam Cleaner/Pressure washer, on wheels. Using No. 1 fuel oil or kerosene	Macarco 3156K18	1000	1000
47	1	Parts and Equipment Cleaner, 42 gal.	Macarco	710	710
48	1	Blacksmith Forge w/water tank	Macarco 2465D2	1000	1000
49	1	Swentsch Wrench	No. 1	550	550
50	3	Machinist vise, 5", Swivel base	B-G 224267	185	550
51	3	Machinist vise, 5", Fixed base	B-G 224194	150	450

Item No.	Quantity	Description	Part No.	Unit Price	Amount
52	1	Warehouse Stock Truck,	Macarco 2451Y13	60	60
53	2	Platform Truck, 30 x 60, all- steel, rubber-tired wheels	Macarco 2539Y26	320	640
54	1	Transmission Bench, 10059, all-steel	B-G 455824	240	240
55	3	Service Work Bench, 9190, 24" x 60" x 33"	B-G 455868	365	1095
56	3	Work Bench, steel, standard 1316, 30" x 8'	B-G 456319	120	360
57	1	Metal Bench SM-60-S, 40" x 60"	B-G 457589	290	290
58	1	Welding Table, WT 2337, 23" x 37"	B-G 499272	95	95
59	3	Soldering Bench, 6123 TRD, 30" x 6'	B-G 457143	165	495
60	2	Maintenance Tool Set, 5252 A-G-S tools/KFA 1368 Combo	Snap-On 5252 A-G-S BA	2200	4400
61	2	Body Repair Set, Tools plus KRA 58C Tool Chest	Snap-On 2183-A-BR- R	700	1400
62	3	Detroit/GMC Diesel Tool Set	Snap-On 2020A-DS	100	300
63	3	Compressor Gauge	Snap-On M-3526	40	120
64	2	Special Cylinder head wrench	Snap-On M-3504	8	16
65	2	Fuel Injection Timing Gauge	Snap-On M-3527	5	10
66	2	Special Fuel & Water Pump wrench	Snap-On M-3516	5	10
67	2	Head Bolt Socket	Snap-On M-3519	3.50	7

Item No.	Quantity	Description	Part No.	Unit Price	Amount
68	2	Universal Engine Stand	B-G 187 192-151	325	650
69	1	Differential Repair Stand	B-G 187 221-153	360	360
70	1	Engine Test Stand, w/casters	McKilligan No. 608GWG MI-104C	405	405
71	1	Portable Hoist, Model 67574 Hydraulic - 1 Ton	G-N 452-0042	725	725
72	1	Paint Spraying Outfit, portable	Macarco 7848-T4	530	530
73	1	Air operated Grease Gun, for 120 pound drum	Macarco 1357N12	320	320
74	1	High Pressure System Gun	Macarco 1306N11	60	60
75	1	Loxocket Set, 6 and 12 point Standard Set, 1" drive	Snap-On 521A-EHD-B	590	590
76	2	Impact Wrench, 1" square Drive with the following sockets 3/4" - 3-1/8" 5550 A 710, 720, 730, 740, 270, 280, 290, 310, 320, 330, 340, 350, 360, 370, 380, 390, 410, 420, 430, 770, 780, 460, 470, 480, 490, 510, 520, 530, 540, 790, 810, 820, 830, 840, 550, 560, 630, 640	Macarco 7185A11	300	600
				1000	1000
77	1	Torque Wrench, Snap-On	TE 12 A	50	50
78	1	Torque Wrench, Snap-On	TE 175	50	50
79	1	Torque Wrench, Snap-On	TE 602	175	175
80	1	Hydraulic Lift Truck	Macarco 9912Y18	5000	5000

Item No.	Quantity	Description	Part No.	Unit Price	Amount
81	1	Volt-Ohmmeter	B-G 167800	80	80
82	1	Photo Tachometer, Model 410	B-G 128310	205	205
83	1	Injector Flow comparator for Detroit injectors	B-G 186251	2780	2780
84	1	Flow Test Panel for Fuel	B-G 434895	1450	1450
85	1	Pressure Tester No. 64-7001, with accessories	B-G 186302	260	260
86	1	Rockwell 14" Metal Lathe, wired for 200 V.	B-G 116246	6000	6000
87	1	Lathe accessory package for 14" lathe, D-40	B-G 011722	1000	1000
88	1	Index Milling Machine, Model 847, R-8 spindle, 200 V.	B-G 118972	6000	6000
89	1	Milling machine tooling package, R-8 spindle	B-G 489115	1050	1050
90	1	Milling machine step clamp set, No. 10625 CK	B-G 485210	100	100
91	1	Screw Extractor Set, Style "D"	B-G 218770	25	25
92	1	Rethreading Tool Set, No. 5815	B-G 218725	5	5
93	1	Rethreading Tool Set, No. 5861	B-G 218736	5	5
94	3	High speed drill set, S-29 1/16" - 1/2"	B-G 218430	60	180
95	3	High speed drill set, S-60 No. 1-60	B-G 218451	40	120
96	2	High speed drill set, S-80 No. 61-80	B-G 218462	20	40
97	2	High speed drill set, S-26 No. A-Z	B-G 218473	60	120
98	2	Tap and die set, No. 99614	B-G 219008	225	550

Item No.	Quantity	Description	Part No.	Unit Price	Amount
99	1	Rod Straightening Press, hydraulic	G-H UV-45	1100	1100
100	1	Anvil and Rocker Kit, Large: for Rod Press	G-H A-G	150	150
101	1	Wheel and Gear Puller, two jaw	G-H 4530033	40	40
102	1	Wheel and Gear Puller, three jaw	G-H 4530041	50	50
103	4	Creeper, "Smash-Proof", No. 18-222	B-G 192436	20	80
104	1	Radiator Pressure Tester, 4 to 17 lbs.	Snap-On ST-255A	30	30
105	1	Pressure Tester Adaptor Kit, large diameter	Snap-On A-450	11	11
106	1	Pressure Tester Adaptor Kit, Threaded	Snap-On TA-15	12	12
107	1	Universal Folder and Brake, w/stand (197915)	B-G 197904	1500	1500
108	1	Dial Comparator, Series 653	B-G 191210	140	140
109	1	Dial Bore Gage, No. 82C	B-G 183622	275	275
110	1	Universal Heavy Duty Dial Test Indicator, 645 A	B-G 182283	65	65
111	2	Micrometer, 0-1	B-G 213403	25	50
112	2	Micrometer, 1-2	B-G 213414	30	60
113	2	Micrometer, 2-3	B-G 213425	30	60
114	1	Micrometer, 3-4	B-G 213436	35	35
115	1	Micrometer, 4-5	B-G 213447	40	40
116	1	Micrometer, 5-6	B-G 213458	45	45
117	1	Micrometer, Inside Caliper	B-G 213586	55	55

<u>Item No.</u>	<u>Quantity</u>	<u>Description</u>	<u>Part No.</u>	<u>Unit Price</u>	<u>Amount</u>
118	1	Micrometer, Depth Gage 440-3RL	B-G 160917	45	45
119	1	Telescopic Gages, Set of Three, S229F	B-G 213871	25	25
120	1	Telescopic Gage 229D	B-G 213850	10	10
121	1	Telescopic Gage 229E	B-G 213860	10	10
122	1	Thickness Gage, No. 66	B-G 183706	15	15
123	1	Small Hole Gage Set, S829E	B-G 214450	30	30