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帰国研修員フォローアップチーム報告書

— 建設機械整備Ⅱ —

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国際協力事業団

東京国際研修センター

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建設機械整備Ⅱ

平成11年6月

国際協力事業団

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## 序 文

本報告書は、国際協力事業団が実施している集団研修「建設機械整備コース II」に参加した帰国研修員に対するフォローアップ事業の一環として、帰国研修員の所属機関等を訪問し、現地での諸問題に関する指導及び同研修に対する要望調査を行うため、平成10年11月23日より同年12月5日までの間、マラウイ及びエジプトの両国に派遣した、建設機械整備 II コース・フォローアップチームの調査結果を取りまとめたものである。

本報告書により、当該分野における各国の実情及び研修に係る要望等について、関係各位の一層の御理解を頂き、当該分野の研修コース内容の改善に資することができれば幸いである。

なお、本チームの派遣にあたり協力頂いた、在外公館、建設省、社団法人日本建設機械化協会、その他関係機関に対し改めて感謝の意を表する次第である。

平成11年6月

東京国際研修センター  
所長 橋本 明彦



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マラウイ国  
公共事業省表敬



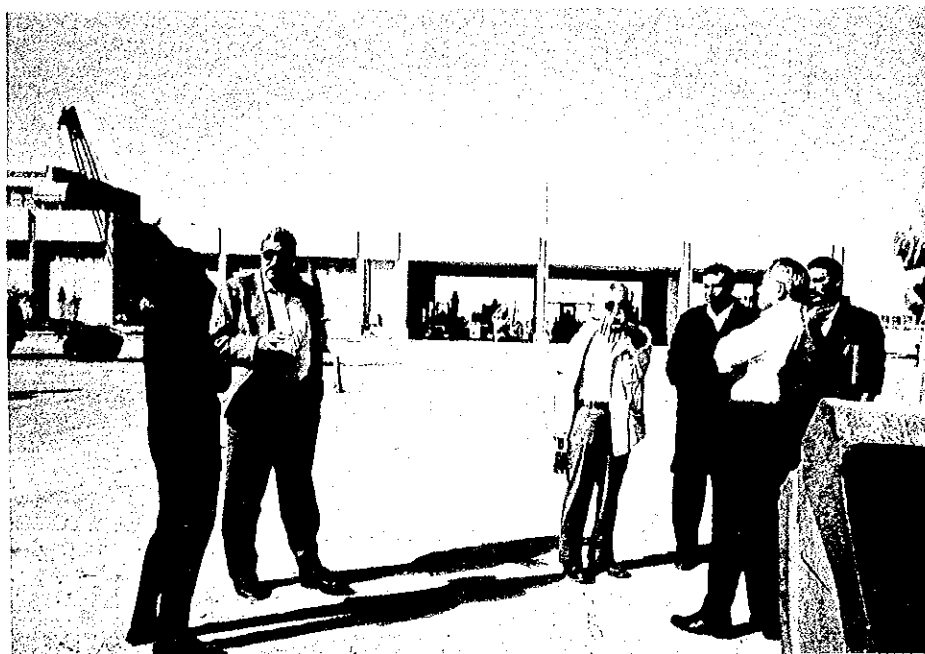
マラウイ国  
PVHO-Central  
建設機械の状況



マラウイ国における  
セミナーの状況



エジプト CETC にて  
後方に建設機械が並ぶ



CETC 建機操作実習現場



HMTC で研修を受けて  
いる 14 歳の少年達





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## 1. 派遣の目的

本建設機械整備コースにこれまで参加した、マラウイ及びエジプト両国の帰国研修員と面談、帰国研修員所属先や関係機関への訪問により、訪問国での当該分野の状況を把握し、また、研修成果の活用状況の確認を行い、さらにはこれらを踏まえて今後の研修コース改善策の検討を行い、もって研修員受入事業の向上・改善に資することを目的とする。併せて、簡易セミナーを通じて帰国研修員に最近の技術情報を提供する。

## 2. チーム構成及び担当業務

- ・後藤 勇 (社) 日本建設機械化協会 建設機械化研究所 副所長  
(総轄及び調査)
- ・友部 秀器 国際協力事業団 東京国際研修センター 研修2課 課長  
(研修計画)
- ・成田 秀志 建設省 建設経済局 建設機械課 課長補佐  
(技術管理)
- ・室岡 直道 国際協力事業団 東京国際研修センター 研修2課 職員  
(業務調整)

## 3. 調査・指導内容

- (1) 我が国で実施した研修の成果を測定する。すなわち、調査票(クエスチョネア)を事前に帰国研修員に配布し、訪問時に回収の上、取りまとめる。
- (2) 本研修分野に係る訪問国の問題点及びニーズを把握する。そのために、現地にて建設省等の機関を訪問の上、聞き取り、意見交換を行う。
- (3) 訪問国にて、簡易セミナーを開催し技術指導を行う。

## 4. コースの研修内容

### (1) 研修員

G.Iに記載の主な資格要件を以下に示す。

- 1) 大学の機械工学科卒業または同等のもので、3年以上の実務経験を有する者。
- 2) 現在または近い将来、建設機械の分野で計画・管理業務に携わる者。

### (2) 研修到達目標

各国政府・公社等あるいは民間会社等において、建設機械の運営・管理を行う部門の幹部職員を研修員の対象とする。その職務遂行に必要な知識及び技術を拾得させることが本コースの目的であり、目安として日本の建設省地方建設局機械課長補佐、又は技術事務所・工事事務所の機械課長のレベルに達することとする。

### (3) 主な講義科目

建設機械概論、建設機械の運営・管理、建設機械施行計画及び施行能力の算定、建設機械の所有経費、建設機械整備概論、建設機械整備工場の運営・管理、部品管理、建設機械材料、建設機械部品の検査、溶

接、燃料・潤滑油、電装品、建設機械用メカトロニクス（入門）、建設機械情報管理、等。

#### (4) 主な実習科目

本コースではテーマとする分野の特徴から、実物の機械に触れての実習が重要な研修方法となっている。実習は主要コンポーネント整備基礎実習、機種別整備・運転実習の2つの部分に分けられる。

##### (4) -1 主要コンポーネント整備基礎実習

研修員は様々な建設機械に共通する主要コンポーネントについて、構造・機能を学習した上で分解・組立て、及び調整することにより、基礎的な整備技術を学ぶ。取り上げる主要コンポーネントはつぎの6つである。

1) エンジン 2) 動力伝達装置 3) ブレーキ 4) 操向装置 5) 油圧機器 6) クローラ式足廻り

##### (4) -2 機種別整備・運転実習

主要コンポーネントの整備技術について学んだあとは、代表的な建設機械を機種別にとりあげ、各機種に特徴的な整備技術、故障発見法及びその運転技術の修得を目的に実習を行う。取り上げる機種は次の8種類である。

1) ブルドーザ 2) エキスカバータ 3) ホイールローダ 4) ダンプトラック 5) クレーン 6) モータグレーダ 7) 締固め機械

##### (4) -3 見学

研修員の理解を深めるために、講義・実習の他に数カ所の見学を実施する。見学箇所は次の通りである。

1) 建設工事機械施行現場 2) 建設機械製造工場 3) 建設機械整備工場 4) 関連研究所

#### 5. 本コースに関する実績

##### (1) コース実施回数

26回

##### (2) 受入研修員総数

43カ国 260名

##### (3) フォローアップチーム派遣実績

1981年度にケニア及びタイ、1988年度にタンザニア及びエジプトに派遣

#### 6. 関係省庁及び国内研修機関

(1) 建設省（建設経済局建設機械課）

(2) 社団法人建設機械化協会（委託先）

(3) コマツ

(4) 日立建機

(5) 新キャタピラー三菱

(6) マルマテクニカ

(7) 酒井重工業

(8) 東洋運搬機

7. フォローアップチームの行程

日	時	内 容
11月22日	14:40	羽田ANA57カウンター集合
	15:40	大阪へ出発(NH145)
	16:55	大阪着(JALsカウンター集合)
	19:25	ヨハネスバーグへ向け出発(JL447)、バンコク経由
11月23日	6:50	ヨハネスバーグ着
	11:00	ヨハネスバーグ発(SA170)
	13:20	リロングウエ着
	14:30	キャピタルホテルチェックイン
	15:30	打ち合わせ (ホテル内)
11月24日	9:00	JICA事務所にて打ち合わせ
	10:00	大統領府人材管理育成局表敬・協議
	11:00	公共事業省表敬
	14:00	建機車輛貸貸局リロングウエ事務所にてワークショップ視察
	15:00	帰国研修員と面談
11月25日	8:00	ブランタイヤへ移動
	14:00	建機車輛貸貸局本部表敬・ワークショップ視察、協議
	15:00	全帰国研修員との合同インタビュー
	19:00	「マ」側関係者との打ち合わせ
11月26日	9:00	民間企業(Barlows Lid)W/S視察
	10:30	住宅供給公社W/S
	13:00	リロングウエへ移動
11月27日	9:00	大統領府人材管理育成局へ報告
	10:00	JICA 事務所へ報告
11月28日	13:30	キャピタルホテル・チェックアウト
	15:35	リロングウエ発(KQ442)
	19:00	ナイロビ着
	20:30	ナイロビ発(KQ322)、Khartoum経由
11月29日	1:50	カイロ着
	11:00	JICA事務所にて打ち合わせ
	12:00	外務省訪問
	13:00	Ministry of Housing Utilities, TOMOHAR訪問
11月30日	9:30	10th of Ramadan city に向け出発
	11:00	建設機械訓練センター(CETC)訪問 帰国研修員と面談
		カイロ着
	19:00	帰国研修員とDinner Party (竹内事務所長同席)
12月1日	9:30	6th of October に向け出発
	11:00	Heavy Machinery Training Center訪問 帰国研修員面談
		カイロ着
12月2日	10:00	JICA 事務所へ報告
	11:30	日本大使館へ報告
12月3日	7:45	ロンドンに向け出発(BA154)
	12:15	ロンドン着
12月4日	19:00	ロンドン発(JL402)
12月5日	15:40	成田着

## 8. 簡易セミナーについて

本調査団は、マラウイ・エジプト両国において、日本での建設機械分野における最新情報を提供すべく、簡単なセミナーを実施した。

### (1) セミナー実施の状況

#### マラウイ国

日 時：平成10年11月25日 ブランタイヤ市内ホテルにて

出席者：PVHO 関係者、JICA マラウイ事務所関係職員他

#### セミナー実施：

開会の辞 室岡直道 JICATIC 研修2課職員

講義及びVTR

後藤勇 建設機械化研究所副所長（団長）

日本における建設機械の自動化について

質疑応答

#### セミナー実施に関するコメント：

- ・本セミナーにおけるマラウイ側の反応は良好であった。この分野でのセミナーは極めてまれであり、そういった意味でも意義深いものであった。
- ・セミナーの目的が日本における最新のトレンドを紹介することであったため、内容そのものは現地の状況に即応性のあるものではなかった。しかしながら、建設機械操作の自動化の実態を紹介するビデオ映像には、「マ」国関係者も大変興味を示していた。

#### エジプト国

日 時：平成10年11月30日 CETC 講義室にて

出席者：CETC 帰国研修員及び関係者、JICA エジプト事務所マイ職員他

#### セミナー実施：

開会の辞 室岡直道 JICATIC 研修2課職員

講義及びVTR

後藤勇 建設機械化研究所副所長（団長）

日本における建設機械の自動化について

質疑応答

#### セミナー実施に関するコメント：

- ・エジプトに団長及び団員の荷物が届かないといったハプニングがあり、OHP シート等がない中、黒板を使っての講義となった。
- ・幸いにもビデオはあったため、時間の許す限りビデオを上映した。
- ・本セミナーにおけるエジプト側の反応は、マラウイと同様に良好であった。エジプトの建設機械の整備状況およびその整備環境等は極めて良好であり、使用している建設機械の中には最新機種のものもあった。にもかかわらず、同分野における最新の技術的な情報等の入手は難しいとのことであり、意義深いものとなった。

## 9. 帰国研修員クエスチョネア（結果）

クエスチョネア回収率は以下の通りである。

国名	帰国研修員総数（人）	調査対象者（人）	所属先定着率（％）	有効解答数（人）	有効解答率（％）
マラウイ	8	6	7.5	6	100
エジプト	27	17	6.5	13	76

### まとめ

#### (1) マラウイ

- ・帰国研修員のすべてから、有益なコースであったと評価された。
- ・修理についての実習を多く取り入れてほしいとの意見が多かった。理由として、最近の日本という「修理」は、具合が悪くなった部品を新しい部品に取り替える、ということであるが、スペアパーツ不足のマラウイではそういった日本的な「修理」はありえないから、とのことであった。
- ・マルマテクニカにおける研修は特に評判が良かった。理由として、途上国でいう「修理」を実際に行っているから、とのことであった。
- ・コース内で、建設機械の施工能力についての講義は必要無い、といった意見が散見された。これについては当方から「建設機械の適切な使用方法を知ること、建設機械に無理を強いることなく使用するための知識であり、結果として機械を長期に渡って使用できることにつながり、管理者にとっては重要である」ことを説明したところ、すべての研修員が納得したようだった。

#### (2) エジプト

- ・ほとんどの帰国研修員から、有益なコースであったと評価されている。
- ・それほど有益ではなかったとする理由には、研修内容が広範囲に渡っているため、それぞれの項目を浅いレベルで紹介するに留まっているから、とのことであった。
- ・マネージャークラスを対象としているが、マネジメントについての研修が少なすぎるとの指摘があった。
- ・メカトロニクス、エレクトロニクス、ハイドロリクス等の研修が少なすぎるとの指定があった。
- ・ドイツ GTZ でも同分野に対する研修を実施している。しかしその方法は、エジプト1カ国を対象に、1つの分野に対して集中的に、かつ同分野に携わる人を10数人単位であつめて研修を行うというものであった。
- ・様々な国の人と出会い、お互いの国の状況について意見交換ができたことは有益であったようだ。
- ・帰国研修員の殆どは、本邦研修で得た知識を、帰国後のレポートや自分が担当している研修を通して、周囲に広める努力をしていた。

## 10. 調査対象国における建設機械分野の現状と問題点

### (1) マラウイ

- ・ 建設機械を正しい使用方法で使われていないことが多々あり、結果として建設機械の寿命を早めている。
- ・ 保守、修理をするにもスペアパーツ不足は深刻で、PVHO 敷地内には修理待ちの建設機械が数多く認められた。
- ・ 建設機械のディーラーがマラウイ内にない場合が多く、スペアパーツが手元に届くのに 2 年かかることもある。
- ・ 修理待ちの建設機械の部品が、他の修理が必要となった建設機械のスペアパーツ供給源となってしまう。
- ・ PVHO の主要クライアントである公共事業省のリース料支払いが滞っており、結果として PHVO の経営を圧迫している。
- ・ 現在 PVHO が保持している建設機械の多くが、入手後 10 年以上経っており、前述のメンテナンス状況も手伝って、ランニングコストが非常に割高な状態にある。
- ・ 建設機械のオペレーター、及び修理に係るトレーニングはほとんど OJT で実施しており、同組織内での研修部門はほとんど機能していない状態にある。
- ・ 民間企業の整備技術、作業効率、整備用設備等は政府関係組織を上回っている。
- ・ PVHO のワークショップは設備不十分のため、環境不良の場所で建設機械の整備が行われている。
- ・ 一般的に勤労意欲が低く、問題意識にかけているように思われる。

### (2) エジプト

- ・ 建設機械は概ね良好な整備状況にあった。
- ・ エジプト国内での旺盛な開発ブームも手伝って、両機関における研修に対するニーズは極めて高く、CETC、HMTC の運営は共に好調である。第三国研修実施に耐え得る体制が整っていると思われる。
- ・ 短期的にはスペアパーツ不足の心配はない。しかしながら、CETC では日本に対して引続きスペアパーツを援助してほしい、といった姿勢が見受けられ、HMTC と比較すると経営面で自立心に欠ける印象を与えた。
- ・ 周辺アラブ諸国と比べて、賃金格差が大きく、労働力の流出が懸念されている。



## II. 建設機械全般の援助及び研修コースへの提言

### (1) マラウイ

社会経済的な状況が、帰国研修員が本邦における研修成果を発揮できない環境をつくり出しており、この状況は短期的には改善されることが予想される。政府の財政環境も厳しく、例年100人程度確保されていた国費留学生スキームを今後当面見合わせることを確認された（大統領府人材管理育成局報告）。こうした中で、JICA 研修の重要度は増しており、脆弱な産業の育成、国内インフラの整備を、長期にわたり、間接的にでも支え続ける本コースの意義は大きいと言える。

日本とマラウイ国の経済状況の違いが要因となって、建設機械修理・整備の方法に著しい差が確認される。現在の日本の環境において、マラウイの状況にあわせた研修を実施することは困難であり、マラウイ側帰国研修員もそれを望んではいない。しかしながら、日本において「建設機械の修理」の意味することは、すなわち「都合の悪い部品を新品に取り替えること」といった傾向が増々強まっている中、本研修において扱っている「部品の修理」について、今後拡充していくことを検討する必要がある。

### (2) エジプト

建設機械整備の状況、メンテナンス現場の環境といった観点からだけで日本と比較をした場合、その優劣は簡単につけることができないくらい良好な状況である。しかしながら、建設機械は日進月歩進化しており、それにともなって、修理、整備に必要な知識は日々更新される必要がある。残念ながらエジプト国内では、そういった新知識、技術修得の機会は限られており、同機会を提供する JICA 研修の意義は大きい。

本コースに対する研修員の評価は概して良好なものが多かった。そんな中でも、「各国政府・公社等あるいは民間会社等において、建設機械の運営・管理を行う部門の幹部職員」を研修対象者としているには、機械の運営管理についてのコマが不足しているとの指摘があった。

これをうけて、今後、1) 研修対象者が適切であるか、2) 対象者に対して適切な研修プログラム内容、講義配分であるかについて、本邦関係者で協議し、適宜見直していく必要がある。



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## 1. 帰国研修員リスト

### (1) マラウイ帰国研修員リスト

Participant's name	Present position	Year
Mr. Davis Daiton Mila	Mechanical Supervisor, Technical, Plant & Vehicle Hire Organization, Lilongwe	1998
Mr. E. D.R. Chiyembekeza	Regional Mechanical Engineer (North), Plant & Vehicle Hire Organization, Mzuzu	1997
Mr. James Smith Umande	Mechanical Supervisor, Repair and Maintenance (Engine Bay), Plant & Vehicle Hire Organization, Blantyre	1995
Mr. Sacques G. T. Manon'ga	Acting Regional Mechanical Engineer, Regional Mechanical Engineer (Centre), Plant & Vehicle Hire Organization, Lilongwe	1995
Mr. Brnet O'brien Mkandawire	Mechanical Engineer (HQ), Management/Technical Plant & Vehicle Hire Organization, Blantyre	1993
Mr. Euison Paul Mwanga Katambo	Mechanical Engineer Standards and Inspections, Technical Division ,(Maintenance), Plant & Vehicle Hire Organization, Blantyre	1986

(2) エジプト帰国研修員リスト

COURSE TITLE	PARTICIPANT'S NAME	YEAR
MAINTENANCE OF CONSTRUCTION MACHINERY	ENG. MOHAMED ABD ALLAH SAAD EL KANSE Engineer, responsible for the complete overhauling of Earth movers, Central Work Shop, Behera Sharing Company	1986
	ENG. MOHAMED KAMAL AHMED SAYED AHMED EL NAHAS Engineer at Transportation and Maintenance of Vehicles & Construction Equipment TOMO HAR	1987
	ENG. SAFWAT ABD EL HALIM EL SAYED Engineer at Transportation and Maintenance of Vehicles & Construction Equipment - TOMO HAR	1988
	ENG. GAMAL ABD EL REHEIM EL SAYED Engineer at Transportation and Maintenance of Vehicles & Construction Equipment - TOMO HAR	1988
	ENG. HASSAN MOSAID MOHAMED HABATA Mechanical Engineer, General Organization of Developing New Urban Communities	1989
	ENG. MONIR ATTIA ABD EL SALAM Head of Transportation Section, TOMO HAR	1990
	ENG. ABD EL MEGUID MOHAMED ABD EL MEGUID EL GOWHARY Chief Engineer, Maintenance & Operation of Construction Machinery, Rental Equipment Department, Arab Contractors Company	1991

COURSE TITLE	PARTICIPANT'S NAME	YEAR
MAINTENANCE OF CONSTRUCTION MACHINERY	ENG. EL SAID ABD EL SADEK EL SAYED ABDOU Instructor of Maintenance & Management Course - TOMOHAR UNPAID LEAVE - SAUDI ARABIA	1992
	ENG. MOHAMED MOHAMED SALEH ALI Chief Trainer for Maintenance and Operation Section - DIRECTOR OF (H.M.T.C.) - TOMOHAR	1993
	ENG. MAGDY AHMED EL SAYED EL SHARABASSY Maintenance Instructor at Heavy Machinery Training Center (H.M.T.C.) TOMOHAR	1994
	ENG. GAMAL ABD EL HADY HAMED GHONAMY Instructor in Operation Course, CETC, TOMOHAR	1995
	ENG. ADEL EL GOHARY EL KOTB EL GOHARY Training Chief, Training Engineer, Heavy Machinery Training Center, (H.M.T.C.) TOMOHAR UNPAID LEAVE - KUWAIT	1996
	ENG. REDA AHMED MOHAMED NADEEM Training Engineer, CETC, TOMOHAR	1997
	ENG. MOHAMED KAMAL AHMED SAYED AHMED EL NAHAS Maintenance Chief, CETC, TOMOHAR	1998

COUNTERPARTS NAMES LIST  
CETC PROJECT 1988 / 1993

COURSE TITLE	PARTICIPANT'S NAME	YEAR
HEAVY MACHINERY OPERATION AND MAINTENANCE <u>MAY 12 ~ August 8, 88</u>	ENG. YOUSSEF ABBAS YOUSSEF Mechanical Engineer for Maintenance and Repair, TOMOHAR UNPAID LEAVE	1988
	ENG. GAMAL ZAKI ALY OSMAN Mechanical Engineer for Maintenance and Repair, TOMOHAR UNPAID LEAVE	1988
	ENG. AYMAN MAHMOUD IBRAHIM KAMAL HELMY Mechanical Engineer for Maintenance and Repair, TOMOHAR RESIGN	1988
MAINTENANCE OF CONSTRUCTION MACHINERY (GROUP TRAINING COURSE)	ENG. SALAH EL DIN MAHMOUD AHMED WERWER Mechanical Engineer, Heavy Equipment Training Center, TOMOHAR RESIGN	1989
HEAVY CONSTRUCTION EQUIPMENT (C/P) <u>NOV. 23 ~ DEC. 12, 89</u>	ENG. MOHAMED AHAMED BADARY Director, Construction Equipment Training Centre, TOMOHAR RESIGN	1989
MAINTENANCE OF CONSTRUCTION MACHINERY (GROUP TRAINING COURSE)	ENG. MOSTAFA HASSAN IBRAHIM HASSAN Mechanical Engineer, Maintenance Instructor - TOMOHAR UNPAID LEAVE	1990
	ENG. MOHAMED MAHMOUD SAID AHMED HASHEM Operation Instructor, CETC - TOMOHAR C/P - CETC A/C IN JAPAN	1990
	ENG. HANAN EL SAYED SHABAAN HASSAN Management Instructor, CETC-TOMOHAR	1990



COURSE TITLE	PARTICIPANT'S NAME	YEAR
MAINTENANCE OF CONSTRUCTION MACHINERY (GROUP TRAINING COURSE)	ENG. RABIE YOUNIS KHALIL Maintenance Instructor, CETC-TOMO HAR CANADA	1991
	ENG. AHMED ABD EL MORDY ABD EL ATY OMARA Management Instructor, CETC-TOMO HAR C/P - CETC A/C IN JAPAN	1991
	ENG. ALY SHAWKY ALY RABIE Operation Instructor, CETC-TOMO HAR	1991
TRAINING CENTER MANAGEMENT (C/P) OCT. 20 ~ NOV. 3, 91	ENG. MOSTAFA HAMOUDA MOHAMED HEGAZY Director, Construction Equipment Training Center, TOMO HAR	1991
MAINTENANCE OF CONSTRUCTION MACHINERY (GROUP TRAINING COURSE)	ENG. MOHAMED ABD EL AZIZ EL SAYED SAKR Operation Instructor, CETC - TOMO HAR	1992
	ENG. EL SAYED FATHY ABD EL SAMEAH Maintenance Instructor, CETC-TOMO HAR	1992
	ENG. WAGIEH MOHAMED ABD EL LATIF EL ASWAD Operation Instructor, CETC-TOMO HAR	1992
CENTER MANAGEMENT (C/P) OCT. 25 ~ NOV. 7, 92	ENG. EL SAYED ABDALLA MOHAMED General Manager, TOMO HAR RETIRED	1992
MAINTENANCE OF CONSTRUCTION MACHINERY (GROUP TRAINING COURSE)	ENG. EZZAT MOHAMED MAMOUN Maintenance Instructor, CETC-TOMO HAR	1993
	ENG. SAAD ABDEL SAMIA ABDEL RAHMAN Management Instructor, CETC-TOMO HAR	1993
	ENG. EL NASR SALAH EL DEEN EL HALWAGY Operation Instructor, CETC-TOMO HAR UNPAID LEAVE	1993

## 2. 各訪問先での議事要旨

### 2. 各訪問先での議事要旨 (マラウイ)

日時	場所	出席者	議事要旨
11/24 10:00-10:40	大統領府 人材管理育成局	マラウイ側 Mrs. MARIHA AVIS CHIVNGYA Deputy director Mrs. RACHEL SILUNAWA Senior officer 日本側 調査団4名 JICA マラウイ事務所関係職員	マラウイ側より ・「マ」国には人材育成計画があるが「建設機械整備」のみを対象としたものではなく全ての分野に関するものである。 ・人材育成に関するビジョンは「2020ドキュメント」(巻末資料参照)に記載されている。 ・各分野担当省庁より、トレーニングリクエストを提出させることになっており、現在回答待ちである。 日本側より ・TICADII で日本は今後いっそうアフリカ援助に力を入れていくことを強調した。 ・来日研修員の健康診断に力を入れてほしい。 ・第3回国研修の利用を勧める。
11/24 11:00-12:00	公共事業省	マラウイ側 Mr. F.B.CHINSINGA Deputy Secretary Mr. J. M.CHIRWA Deputy Secretary(Technical) 日本側 調査団4名 JICA マラウイ事務所関係職員	マラウイ側より ・帰国研修員の本研修コースに対する評価は総じて良好である。 ・しかしながら、我国の環境は、彼らが日本で得た知識を活かせるものではない。 ・スペアパーツ不足、スペアパーツを注文してもなかなか届かないので適切なメンテナンスが行われたいためである。 ・しかしながら、今後とも本コースへの参加を続けていきたい。 ・公共事業省は4局(道路局、PVHO、Landscape、他)で始まった。現在では主要幹線道路建設は民間に委託しており、小規模道路は我々が建設している。 ・省自身(PVHOを除く)も建機を保持している。 ・PVHOの建機を借りたら我々も料金を払っている。 ・PVHOの「民営化」については、むしろ「商業化」の方向で準備しているものの定かではない。 ・帰国研修員の研修効果を高めるために「リピーター研修」を希望する。 ・JOCVよりPVHOに毎年1~2人來ている。 ・PVHOはボランティアに大きなワークショップがあり、根本的な修理はそこで行っている。 ・帰国研修員の Mr. カファ氏は PVHO を辞めてしまったが、技術士の認定試験を開始した。我々は損失とは思っていない。 ・土木分野でも研修ニーズがある。
11/24 14:00-15:00	PVHO-Central	マラウイ側 Mr. J.G.MANONGA Regional Mechanical Engineer Mr. D.D.MILA Mechanical Supervisor 日本側 調査団4名	マラウイ側より ・PVHOの役目は①建機の賃貸②修理・維持・管理である。主な顧客は公共事業省、民間であり、建機の修理については民間は受け付けていない。 ・公共事業省は賃料を滞納している。 ・PVHOの得た収入は一度本部に集められ地域毎に再分配される。 ・雨季と乾季で需要に差があり、雨季明けの3月に一番大きな需要がある。 ・PVHOに研修担当部署はあるが機能しておらずOJTに頼っている。 ・Balows/W/Sで唯一研修らしきものを受けることができる。 ・当エリアでは現在23の建機があり、そのうち12台は動くが11台は修理を受けているか待っている状態である。 ・当エリアには他に6地区にW/Sがあり、45人が働いている。そのうち1人はProfessional Eng.であり、3人がDiploma holder、2人がTechnical Cert. holderである。 ・直面している最大の問題は工具不足で、特に検査のための機械がなく各人の経験に頼っている。 ・工具は具体的にはメジャリングゲージ等である。
11/25 14:00-14:30	PVHO	Mr. S.K. MWANZA Controller Mr. P.B.NAMWAWA Principal Mechanical Eng. Mr. P.A. MPHANDE Training officer	表敬。 ・研修担当部署はある。 ・研修、人材育成については別添資料。

2. 各訪問先での議事要旨 (エジプト)

11/29 12:00-12:30	外務省	エジプト側 Mrs. Nagla EL-Hussainy Deputy Assistant for Minister Mrs. Amal Abbas Third Researcher 日本側 調査団4名 JICA エジプト事務所 坂本職員、Mai 職員	エジプト側 ・人材育成計画は JICA エジプト事務所に7月提出済み。 ・帰国研修員にはレポート提出を義務付けている。 ・研修員の選考は各担当省が行う。 ・エジプト自ら「エジプシャン・アフリカンファンド (財源外務省) を設立して、アフリカ各国から研修員を受け入れている。
11/29 13:00-13:30	TOMOIHAR	エジプト側 Mr. Mob. Metwali Vice President Mr. IBRAHIM ELAWADI General Supervisor 日本側 調査団4名 JICA エジプト事務所 Mai 職員	エジプト側 ・帰国研修員の75%は TOMOIHAR に留まっている。残りはやめて沿岸諸国や北部エジプトに出稼ぎに行っている。 ・帰国後のレポートは義務付けられている。 ・日本での研修全般について CETC と HMTC の間で議論をしたことがある。 ・TOMOIHAR の提供している研修は、入社してすぐの基礎的なものと、数年後のリフレッシュメント用の2つあり、研修方針は顧客によって異なる。省が実際のところ決定しており TOMOIHAR は実施機関である。 ・主要ドナーは UK, Sweden, German, Italy, France 等であり、中でも German は大きい。 ・TOMOIHAR は68の研修施設があり、そのうち15が可動式である。扱う研修は、建機、カーペット等インテリア、銅管工事等がある。 ・ドイツの HMTC と日本の CETC は様々な面で異なっている。HMTC は1984年5人の技術者によりセンター設立以前から準備を始め、少しずつ段階を踏んで環境を整えていった。CETC の場合は最初から施設、機材の全てを備えてから始めた。HMTC には Job Side Training がある。
11/30 13:30-13:45	建設省	Mr. Magd El Din Ibrahim Eng. 日本側 調査団4名 JICA エジプト事務所 Mai 職員	先方の都合により表敬のみ。
12/1 11:00-12:00	CETC	Mr. EL-Sayed Rabie Director Mr. ELAWADI General Supervisor of CETC and HMTC	エジプト側より ・日本での研修には満足している。 ・外国人向けの研修も行っている (第三国研修)。 ・長期的にはスペアパーツ不足が予想される。
12/2 11:00-12:00	HMTC	Mr. ELAWADI General Supervisor of CETC and HMTC Mr. Saleh HMTC Director Mr. Mohamed Chief Eng. Mr. Magdy Elsharabassy Chief Eng.	エジプト側より ・日本での研修には満足している。 ・HMTC で実施する研修は1年先まで予約で一杯である。

3. マラウイ国大統領府人材管理育成局あて調査団報告書

To: Mr Roger T.E. Kamanga  
Controller of Training  
Department of Human Resource  
Management & Development

CC: The controller of Plant & Vehicles  
PVHO

CC: The Resident Representative  
JICA (Mw) Office

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Since November 24, 1998, the JICA follow-up team for the Group Training Course "Maintenance of Construction Machinery" has been carrying out a series of discussions with ex-participants in the course and authorities concerned and observation of workshops where the ex-participants are working and other related organisations.

It is my great honour to make a brief report on the result of the above. I really wish what I report here will contribute to further development of the Maintenance and Management system of Construction Machinery in Malawi and also to the future implementation of the training course in Japan.

At the same time I would like to express my sincere gratitude to all the ex-participants and authorities concerned for their kind cooperation to the JICA follow-up team.

1. All the ex-participants are satisfied with the course curriculum and mention that the course met their needs. At the same time they are making comments on the course as follows:
  - Additional on the job training in the workshops is effective after the present training curriculum.
  - Sharing experiences and exchanging views and information with other participants from different countries is very effective and useful for all the participants.
2. Among the training curriculum in the course, some of the ex-participant pick up the subject "Earthwork Planning and Estimation of working capacity of construction Machinery can be cause of their breakdown.

3. There are a few participants who have never had an opportunity to diffuse their knowledge and technology they acquired in the course by a seminar, a lecture nor report submission the authorised system to give them the chance to share what they learned in the course should be established.
4. Although the ex-participants are satisfied with the course, they cannot make use of the knowledge and technology they learned in the course. The reasons are described in a problem like which express a relation of each problem in the form of cause and effect.

For A-3 in this problem tree, the ex-participants in the course can be good instructors. It is reconsiderable to assign them as instructors in the training of their respective workshops.

E means that what the ex-participants learned in Japan is not always appropriate and suitable for Malawi. For example in Japan repair means changing the broken component of construction machinery in many cases, but in Malawi they try to repair itself because of difficulty to acquire new component. Because of the problem B,C,D, almost half of the construction machinery in Lilongwe and Blantyre are getting out of order and wait for repair.

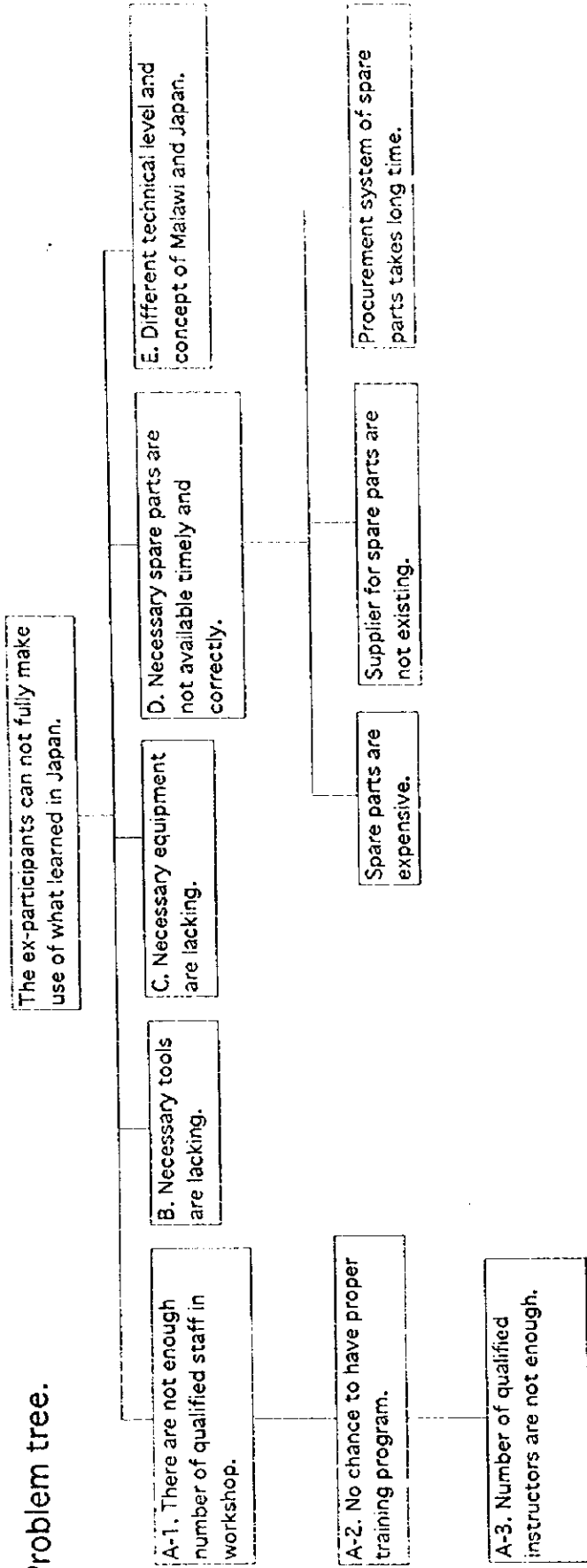
To keep the construction machinery in good condition to use them when necessity arises, they have to be reminded of the importance of 2 factors, such as the Human Resource development that is to have enough number of qualified staff and the proper system of maintenance and management to provide with spare parts and took timely and correctly.

As for Human Resource development, their technical level is the same as would standard or above, so further development of maintenance and management system enable them to improve the present situation very rapidly. Continuous efforts for it is important.

後藤 勇

Mr Isamu GOTO  
Team Leader  
JICA F/U Team

# Problem tree.



#### 4. エジプト国建設省 TOMOHAR あて調査団報告書

Since November 29, 1998, the JICA follow-up team for the group training course "Maintenance of Construction Machinery" (the Team) has been carrying out a series of discussions with ex-participants in the course and authorities concerned and visits to Construction Equipment Training Center (CETC) and Heavy Machinery Training Center (HMTC) where most of the ex-participants are working.

Although a very short stay in Egypt, the team make a brief report on the result of the above. The team really wish what is reported here will contribute to more effective implementation of the course in Japan.

At the same time the team would like to express their sincere gratitude to all the ex-participants and the authorities concerned for their kind cooperation to the Team.

##### 1. Main points of the discussion with the ex-participants

- Most of the ex-participants are satisfied with the curriculum of the course and mention that the course met their needs. As they are working for CETC and HMTC as the chief engineers or instructors, diffusion of knowledge and technology which they acquired in the course is being carried out very effectively.
- Some of the ex-participants mention that the training period especially on mechatronics and electronics for trouble shooting of new construction machinery should be extended, because the chief engineers and instructors are required to know everything on construction machinery including such subjects.
- The Team answers that as the target people of the Course are management engineers in planning and administration work of construction machinery, who should be workshop managers in many cases, the curriculum of the Course is formulated to cover all the necessary knowledge and technology widely within the limited time.
- In response to the above answer, the ex-participants mention that the title of the Course and requirement for application described in General Information (G.I.) are not appropriate for workshop managers, the target people of the Course, and time allocation to the essential subjects for workshop managers such as maintenance plan of construction machinery and management of spare parts should be intensified in the Course.
- The Team promise to convey their comments to Japan's authorities concerned and take these comments into consideration for the next implementation of the Course.

##### 2. Main points of the observation and discussion with CETC and HMTC

- In both centers, they operate and maintain their construction machinery for the training use very well.
- In HMTC, a dual education system is being implemented very effectively and their training courses are fully booked by Egyptian applicants. They have no extra capacity to carry out a training course for overseas participants from African countries.
- On the other hand, in CETC they have been implementing the special training program for Palestinian people in cooperation with JICA successfully, and they intend to organize another training program for the participants from African countries. The Team really appreciates their contributions and recognizes their ability to organize it. The Team conveys the request from the authorities concerned of Malawi that is to send participants in the training program in CETC.

5. マラウイ国人材育成方針 (大統領府人材管理育成局)

THE GOVERNMENT OF

**MALAWI**



MALAWI GOVERNMENT NATIONAL TRAINING POLICY

JANUARY, 1996

DEPARTMENT OF HUMAN RESOURCE MANAGEMENT AND DEVELOPMENT  
P.O. BOX 30227  
CAPITAL CITY  
LILONGWE 3  
MALAWI



1.0.

PREAMBLE

1.1. The strategic role of human resources in every facet of development cannot be over-emphasized. The process of human resources planning, training and utilisation is indispensable to the effective mobilisation and development of all national resources. Hence, since Independence in 1964, the unique place of our human resources in national and organisational development has been stated and emphasized on many occasions.

1.2. As the question of development entails a dynamic process at all times, the aims and objectives of the Malawi Government have necessarily changed in response to new, urgent and often critical issues. Inevitably, these issues have required the reappraisal of resources at national and organisational levels. In the process, any reallocation of resources, irrespective of size or complexity, has an immediate and long term impact on human resources of the nation. In this respect, as the Malawi Government responds with flexibility to the pressures and demands of the future, changes in the range and types of human resources become necessary. The quality of these responses and changes depends on many factors, but the most important include the strength of both public and private institutions, the capability of the work force and the formulation of clear guidelines on resources for training and development.

INTRODUCTION

- 2.1. The strategy for Malawi's development is set out in the STATEMENT OF DEVELOPMENT POLICIES (DEVPOL) document. It provides guidance on Government policies and framework for long-term development planning. As a statement of intent, DEVPOL is however, supplemented by a flexible three year rolling public sector investment programme which is revised annually to take into account changing circumstances and any other policy interventions adopted from time to time by government.
- 2.2. To further the principles and development objectives in DEVPOL, the Government of Malawi has set out in this document a training policy which covers both public and private sectors within the context of prevailing political and socio-economic order. The purpose is to spell out a training mission statement and provide individual organisations, in all sectors, with broad guidelines and strategies as well as the necessary institutional framework for coordination and implementation of the training responsibility.
- 2.3. Since training of human resources provides opportunity for organisational and individual growth, it is Government's intention to periodically monitor and review the training policy in order to accommodate changing realities and influence suitable training programmes and learning interventions.

3.0. MISSION STATEMENT OF TRAINING POLICY

The National Training Policy shall ensure the timely training of adequate and appropriate human resources in the public and private sectors in the changing social and economic environment, consistent with the fundamental principles and objectives contained in the Statement of Development Policies and any other policy interventions existing from time to time.

4.0. GOAL

The Government of Malawi is fully committed to training as a key factor in achieving sustainable human resources self-sufficiency in quantitative and qualitative terms. The aim being to optimise the performance of both the public and private sectors at political, legislative, organisational, managerial and individual levels.

This will be pursued in full awareness of the importance and urgency of reaching and maintaining the optimum level of development and utilisation of human resources so that social and economic development is sustained.

5.0. OBJECTIVES FOR TRAINING

5.1. The following are the broad objectives for training:

5.1.1. To reflect and support the priorities outlined in the Statement of Development Policies and any other policy interventions at the time;

- 5.1.2. To respond positively to the national training needs especially for the marginalised groups (women, rural and urban poor, persons with disabilities, etc) so that they contribute to the development of the country.
- 5.1.3. To accelerate localisation of human resources in both the public and private sectors as appropriate.
- 5.1.4. To promote the development and growth of Malawian entrepreneurs.
- 5.1.5. To accelerate and support the implementation of any structural changes that might take place from time to time e.g. science and technology policy and decentralisation policy.
- 5.1.6. To promote the maintenance of high academic standards in all educational and training institutions.

## 6.0. TRAINING PRIORITIES

- 6.1. The demand for training tend to exceed the capacity and resources available to undertake such training. It is, therefore, essential that training priorities be determined from time to time and be made known to all concerned to ensure that the implications and objectives of the policy are fully understood. In this regard, the training

priorities are as follows:

- 6.1.1. Training in fields where qualified personnel is currently scarce;
- 6.1.2. Providing management development programmes at all levels;
- 6.1.3. Promoting the empowerment of marginalised groups (women, rural and urban poor, person with disabilities etc).
- 6.1.4. Acquiring and upgrading of technical, commercial and entrepreneurial skills;
- 6.1.5. Promoting and preserving cultural skills;

## 7.0. STRATEGIES

7.1. The Department of Human Resource Management and Development in the Office of the President and Cabinet is the central organ for implementing this policy in liaison with other key institutions. The goal and objectives of human resources development will be pursued by;

- 7.1.1. Strengthening the relevant Divisions of Department of Human Resource Management and Development and other key institutions that are responsible for the policy;
- 7.1.2. Determining sectoral training needs and developing human resources development plan;

- 7.1.3. Strengthening existing training institutions and where necessary, creating new ones, to offer in-country training including post graduate programmes;
- 7.1.4. Monitoring and assessing the relevance and achievement of training programmes annually;
- 7.1.5. Facilitating the strengthening of training capacity in both the public and private sectors, in particular the training of trainers;
- 7.1.6. Removing the impediments in training, recruitment and utilisation of marginalised groups;
- 7.1.7. Expediting counterpart training in all positions requiring localisation by seeking cooperation of the Malawi Chamber of Commerce and Industry (MCCI), the Employers Consultative Association of Malawi (ECAM), the Department of Immigration, Ministry of Labour and Manpower Development and any other relevant organisation;
- 7.1.8. Undertaking periodic comparative reviews of all educational and training standards within and outside the country;
- 7.1.9. Identifying and utilising non-governmental training institutions or

facilities relevant to the training of public servants and private sector employees;

7.1.10. Mobilising financial and human resources for effective utilisation of training programmes;

7.1.11. Initiating and formulating policies and incentives to foster the development of public and private sectors;

7.1.12. Preparing and disseminating information on training to both the public and private sectors;

7.1.13. Providing guidance and advice on the identification of training needs and preparation of training plans for institutions in the public and private sectors;

7.1.14. Coordinating regional and national institutional training matters and programmes;

## 8.0. OPERATIONAL STRATEGIES

8.1. The Department of Human Resource Management and Development will, in partnership with institutions in both the public and private sectors as well as assistance from foreign organisations, undertake the following operational strategies to put in action policy objectives and strategies for human resource development:

- 8.1.1. Ensure that in strengthening the relevant divisions of Department of Human Resource Management and Development it will:
- 8.1.1.1. recruit and develop appropriate personnel;
  - 8.1.1.2. coordinate a professional staff common service so that movement of staff is controlled by the Secretary for Human Resource Management and Development;
  - 8.1.1.3. design an Induction programme for new recruits and training programmes for all staff dealing with human resource planning and development;
  - 8.1.1.4. establish electronic information system for planning and training purposes;
  - 8.1.1.5. improve coordination and liaison with relevant organisations;
  - 8.1.1.6. continue to manage the Malawi Government Scholarships Fund to facilitate internal and external training in critical priority areas;
  - 8.1.1.7. solicit funds from external and internal sources;



- 8.1.1.8. Involve the private sector in the collection of data for planning and training purposes; and
  - 8.1.1.9. develop operational guidelines or manuals to ensure uniformity in the implementation of the policy.
- 8.1.2. Ensure that all employers have a human resource training programme and succession plans and that they are monitored;
- 8.1.3. Ensure that the issuance of Temporary Employment Permit (TEP) is based on availability of counterpart training plan that will be closely monitored in collaboration with the Ministry of Labour and Manpower Development and the Department of Immigration;
- 8.1.4. Collaborate with the Ministry of Labour and Manpower Development and other organisations so that favourable conditions of employment are created in order to encourage retention of trained human resources;
- 8.1.5. Encourage the establishment of special training and educational institutions in addition to existing ones to assist marginalised groups;

- 8.1.6. Increase and upgrade educational and vocational training facilities in the rural areas in accordance with Ministry of Education and Ministry of Labour and Manpower Development guidelines;
- 8.1.7. Improve and Increase Institutions that provide skills for entrepreneurship programmes in the rural and urban communities;
- 8.1.8. Rationalise and Improve the recruitment process to ensure that a systematic Induction programme is devised and implemented and that entrants are placed in posts for which their qualifications, expertise and experience are relevant and that they are remunerated appropriately;
- 8.1.9. Promote and encourage gender sensitive training programmes and recruitment practices;
- 8.1.10. Promote and facilitate the implementation of non-discriminatory principles in training institutions;
- 8.1.11. Strengthen the monitoring and up-dating of sectoral skills inventory.

9.0. ROLE OF MALAWI GOVERNMENT IN TRAINING

9.1. The Malawi Government will be responsible for providing opportunities for training and development for members of the public and private sectors. The Government is committed to creating conditions for making training effective and will allocate not less than 2.0% of the budget to support training consistent with overall priorities.

9.2. The Government will provide opportunities for training and development for its employees in accordance with the demands of the task assigned to them in the course of their careers. It recognises that training is not a one-time activity but rather a continuous process to be offered at interval throughout one's career.

9.3. The Malawi Government and individual organisations shall ensure that the bonding policy applicable at the time is applied to people who have benefited from organisational training.

10.0. ROLE OF INDIVIDUAL MINISTRIES/DEPARTMENTS/  
PARASTATALS IN TRAINING

10.1. Each Ministry/Department/Parastatal shall be responsible for:

- 10.1.1. Undertaking induction courses and specialist, technical and professional training of its employees with assistance, where appropriate, of the Department of Human Resource Management and Development, the University of Malawi and other training institutions;
- 10.1.2. Placing its employees in appropriate posts after training;
- 10.1.3. Submitting to the Department of Human Resource Management and Development proposals for the expansion of existing specialists technical/professional training facilities within the Ministry/Department/Parastatal and for the creation of new facilities;
- 10.1.4. Undertaking training needs assessment, preparing training plans and submitting annually detailed plans and requirements for specialists technical/professional and management training for the following year to the Department of Human Resource Management and Development;

10.1.5. Providing a comprehensive report to the Department of Human Resource Management and Development at the end of each financial year detailing significant aspects of training programmes undertaken and their impact on the Ministries' Departments'/Parastatals' performance;

10.1.6. Liaising with the Department of Human Resource Management and Development in the implementation of all training policies/strategies and programmes.

#### 11.0. ROLE OF PRIVATE SECTOR IN TRAINING

11.1. The Government will collaborate with the Private Sector in the development and utilisation of human resources, in the awareness of the fact that efficiency and effectiveness as well as profitability can be improved by considering employees as an important asset and their training as inherent to the success of organisational development programmes. This policy statement, therefore, underscores the Government's recognition of the role of the private sector as a partner in human resources development and utilisation as follows:

11.1.1. To develop all levels of personnel to their highest potential within the framework of the specified organisational objectives and the National Training Policy;

- 11.1.2. To contribute financially towards the Malawi Government Scholarship Fund administered by the Department of Human Resource Management and Development;
- 11.1.3. To Inform the Department of Human Resource Management and Development annually of its short and long-term policies on human resources development and utilisation through the Ministry of Labour and Manpower Development;
- 11.1.4. To provide performance feedback and seek advice on any aspect of human resources development from the Department of Human Resource Management and Development;
- 11.1.5. To liaise with Department of Human Resource Management and Development on all individuals proceeding on training outside Malawi.

12.0. INSTITUTIONAL FRAMEWORK FOR LOCAL TRAINING

12.1. Training will be provided through a network of training institutions or training centres whose programmes will be coordinated and monitored by the Department of Human Resource Management and Development in liaison with the University of Malawi and Ministry of Education for setting directions and standards. These institutions or centres may be categorised as follows:

- 12.1.1. Specialised or technical training under ministries and departments;
- 12.1.2. Institutions or centres directly managed by the Department of Human Resource Management and Development
- 12.1.3. Autonomous and semi-autonomous Institutions and;
- 12.1.4. Privately owned training institutions

12.2. Organisations intending to establish training institutions shall obtain registration approval from the Department of Human Resource Management and Development while essential educational institutions shall continue to obtain registration and approval by the Ministry of Education in liaison with the Credentials Evaluation Committee.

12.3. In undertaking external training programmes, consideration shall first be made in regard to the capacity of local training institutions and centres.

### 13.0. ADMINISTRATIVE MACHINERY FOR COORDINATION OF TRAINING

13.1. The Coordination of training in Malawi is the responsibility of the Department of Human Resource Management and Development in liaison with sectoral agencies. A number of administrative mechanisms will be used to facilitate this coordination.

13.2. The National Training Advisory Board (NTAB) will monitor and advise on matters relating to training.

training policy, training needs and plans. The Chairman and members of the Board will be appointed by the Office of the President and Cabinet. The Secretariat will be provided by the Department of Human Resource Management and Development.

13.3.Organisational based Training Committees will be responsible for overseeing the organisation's or Department's training functions.



6. マラウイ国 Plant Position in P.V.H.O

TITLE : MAINTENANCE OF PLANT AND EQUIPMENT :  
PITFALLS AND PROBLEMS

PRESENTER : MR. S. K. MWANZA - DIP. ENG. (MLW) BENG  
(HONS) MECH. UK

PLANT POSITION IN P.V.H.O.

MAINTENANCE OF PLANT AND EQUIPMENT

Types of Plant and Equipment

PVHO has the following types of plant and equipment that can be of any help in the Construction Industry in Malawi.

- |     |                             |   |             |
|-----|-----------------------------|---|-------------|
| 1.  | MOTOR GRADERS               | - | CATERPILLAR |
|     | 140G                        | - | MITSUBISHI  |
|     | 14G                         | - | KOMATSU     |
| 2.  | DOZERS (D4 <del>0</del> D8) | - | CATERPILLAR |
|     | D4, D6, D7 + D8             | - | KOMATSU     |
| 3.  | FRONT END LOADERS           | - | CATERPILLAR |
|     | 910 + 925                   | - | KOMATSU     |
| 4.  | CRANES                      |   |             |
| 5.  | ROLLERS TOWED AND MOTOR     |   |             |
| 6.  | SHEEPFOOT ROLLERS           |   |             |
| 7.  | WATER BOWSERS               |   |             |
| 8.  | SCRAPERS                    |   |             |
| 9.  | TIPPERS                     | - | NISSAN      |
|     |                             | - | TATA        |
|     |                             | - | ISUZU       |
| 10. | LORRIES                     |   |             |
| 11. | WHEELED TRACTOR             |   |             |
| 12. | LOW LOADER                  |   |             |

**PRESENT FLEET STRENGTH**

<u>ITEM</u>	<u>SERVICEABLE</u>	<u>UNSERVICEABLE</u>	<u>TOTAL</u>
Motor Graders	9	16	25
Dozers	8	7	15
Front End Loaders	10	12	22
Rollers Towed	5	2	7
Motor	3	15	18
Sheepfoot Rollers	0	2	2
Scrappers	1	0	1
Tippers	14	22	36
Water Bowsers	4	17	21
Lorries	36	48	84
Low Loader	1	3	4
Wheeled Tractor	1	13	14
Cranes	2	4	3
Stone Crusher	1	0	1
Generator Set	5	3	8

3/.....

## MAINTENANCE

Maintenance of these Plant and Equipment is mainly done by P.V.H.O. itself. The Organisation has in place well trained Plant Engineers, Supervisors and Mechanics on all the machines. The Organisation has all the necessary tools and equipment which now has deteriorated due to the period that they have been in use. When the tools and equipment that are required are not available we sub contract the work to the dealers to carry out the specialised work.

## DEALERS

The Franchised dealers for our Plant are/were as follows:-

Maltraco	- Caterpillar Mitsubishi	until a few years ago until two months ago
Barlows	- Caterpillar	since a few years ago
Arthur Garden	- Komatsu	(could handle other machines as well)
Fargo/MST	- Any machine	

## SPARE PARTS

There used to be a very good system of spare parts procurement when both parties had faith in each other. The dealers used to have interest in all the machines which used to be purchased through them. They even developed service and repair schedules for the Organisations machines. They used to provide workshops on repairs and maintenance of machines at no cost.

From the Organisation side too everything was running smoothly and indeed honouring all the bills timely.

Things started not to move smoothly in the mid ninties (1994-95). This was due to the Cash Budget system. The dealers wanted cash up from which the Organisation could not have all the time because the biggest Customer of the Organisation was the Government and in terms of Plant and Equipment was Ministry of works and Supplies which happens to be the parent Ministry of the Organisation. The Government started to default in paying the hire charges hence the Organisation's coffers became empty and are empty up to now because the debts are still outstanding.

4/.....

As you are aware the maintenance costs of plant are usually very high, it has been very difficult for the Organisation to keep all its plant fleet running especially that no replacement of plant has been done for the past 7 years or so.

### **SERVICE AND REPAIR COSTS**

Preventive maintenance is the backbone of long life for a machine and this is also true for Plant.

This is fulfilled by carrying out right and timely servicing of the machines. This is a very expensive exercise to carry out by Malawian standards. This is supposed to be done at the site.

Some of the scheduled services costs per service:

CATERPILLAR D6H	MK 18,254.00
CATERPILLAR 140B GRADER	16,395.00
CATERPILLAR D8L	28,888.00
CATERPILLAR 910 FEL	21,239.00

Usually a minimum of three services are carried out in a year.

Repair costs on plant are very expensive. Usually when these machines come to the workshops for repairs the costs are in the range of Half a Million Kwacha. Orders for the spare parts also take time to come and may make the machine be in the workshops for more than Three months.

### **CARE FOR THE MACHINES**

This is also very important to enhance the life span of plant and equipment. These machines require well trained operators that will follow and adhere to instructions for operating the machines. These machines are not supposed to be driven long distances at high speed. That is why the services of a Low loader is required to transport these machines between long distances. When broken down or run out of fuel they are not supposed to be towed as this may damage the transmission.

5/....

## 7. マラウイ国 Aims and Objectives of P.V.H.O

### MINUTES OF THE MEETING HELD IN CONFERENCE CENTRE ON 14/04/98 ON THE RE-ALLOCATION OF P.V.H.O VEHICLES TO POLICE

PRESENT:-- Mr B E Gowelo (chairman)  
Mr E P M Katambo (member)  
Mr F R Bwalamba (member)  
Mr F F Kaponya (member)  
Mr P A Mpande (member)  
Mr P B Namwawa (member)

### AIMS AND OBJECTIVES OF P.V.H.O.

On 1st April, 1971, P.V.H.O. was officially designated as a Treasury Fund Order No. 38/1971 (Section 17) of the Finance and Audit Act (Laws of Malawi Cap. 37.01).

The Principal objectives were:-

1. To provide ministries and departments with plant and vehicles additional to what was available as an Excluded Vehicle Fund.
2. To provide a maintenance and repair services for all the acquired plant and vehicles at most economic cost consistent with the quality of services required.
3. To do the foregoing on a commercial basis.
  - (a) Equitable hire rates for the provision and operation of plant and vehicles.
  - (b) Equitable charges for maintenance and repair of services against the user ministries and departments.
  - (c) Equitable charges on maintenance and service of plant and vehicles for external institutions be the private or parastatal companies.

4. The day to day operations of the organisation were divided into 3 divisions which are mutually exclusive but co-ordinated to achieve a whole service and these are:-
  - (a) The Hiring Division
  - (b) The Engineering Division
  - (c) The Accounting and Administration Division.
  
5. As a commercial organisation, P.V.H.O. must run efficiently, the plant and vehicles hire services for government and be self - financing without government subvention.
  
6. P.V.H.O. does not limit its services to ministries and departments only, but also extends these services to statutory bodies, private companies/organisations and even individuals. It is because of this diversity in PVHO business operations that the organisation is able to stand on its own feet and compete in the open market and make some reasonable profit.
  
7. P.V.H.O. respects all the vehicle and plant franchise dealers in Malawi and on many occasions has referred maintenance cases above routine to the appropriate dealer. Conforming to technological changes, PVHO has adopted the policy of dealers offering training to PVHO technicians each time more than 5 units are bought. This facilitates self reliance on maintenance of items bought, reduction of down time and improved customer care. The motive here is none other than the desire to upgrade our standards and inspectorate section of PVHO. The organisation must have the capability to inspect any vehicle in use by government before sending it to the dealer and after it has been serviced or repaired by the dealer.

8. Additionally, P.V.H.O. also does the following:-

- (a) Maintains Central Vehicle registry for all government plant and vehicles.
- (b) P.V.H.O. registers and commissions all plant and vehicles belonging to Ministries and departments.
- (c) Maintains drivers/operators Central Registry for all Ministries/Departments.
- (d) Ensures that all plant and vehicles are insured as is required by law and co-ordinates this function with Insurance Companies for compensations as and when required.
- (e) Ensures that the standardisation policy is enforced by checking that new vehicle purchases are in line with the list recommended by PVHO Advisory Board.
- (f) Maintains a register of and processes accident reports for all the government fleet.
- (g) Ensures that requisitions for repair and maintenance of the government fleet are routed through it in order for it to be able to certify quality of repairs and maintenance.
- (h) Conducts board of survey on government plant and vehicles when requested and
- (i) Recommends to government the most suitable ways of disposal of all motorised equipment.

9 In order to carry out the above tasks, P.V.H.O. has the following divisions:-

- (a) TECHNICAL DIVISION : Whose main task is to provide maintenance and service to both PVHO fleet and that of the ministries/departments. There are three main workshops in the regions and a number of smaller workshops in other districts where appropriate to undertake these duties.

Regional Workshops are:-

Blantyre, Lilongwe and Mzuzu

On the South the district workshops are as follows

Mangochi

Zomba

Mulanje

Ngabu with sub-workshops at Chikwawa and Nsanje.

On the Central Region the District workshops are as follows:

Nkhota-kota

Kasungu

Mchinji

LIA

Salima

Dedza

In the Northern Region the district workshops are as follows:-

Chitipa

Karonga

Rumphi

Chintheche

Mzimba



- (b) HIRING DIVISION: Facilitating provision of vehicles to ministries/departments and private sector at pre-determined rates. There are three main Hire Centres - Mzuzu, Lilongwe and Blantyre with a sub-hire centre in Mangochi.

They also provide driver/operator service to other ministries/departments and private sector as and when required at cost. Also Hiring Divisions investigate and report on accidents within the regions.

- (c) ACCOUNTS DIVISION: For billing and processing of invoices and maintenance of accounts.

- (d) ADMINISTRATION DIVISION: For all administration matters. The overall responsible officer is the Controller of P.V.H.O. who is answerable to the Secretary for Works and Supplies.

8. マラウイ 国 Training in P.V.H.O

TS/IRZ

PLANT AND VEHICLE HIRE ORGANISATION (PVHO)  
EXTERNAL TRAINING NEEDS SUBMISSION 1996-1998

3 YEARS PROGRAMME

PVHO CODE	COURSE TITLE	YEAR AND NO. OF CANDIDATES			GRADE/POST	DURATION	PROPOSED DONOR/COUNTRY	OBJECTIVES
		1996	1997	1998				
PV01	FLEET MANAGEMENT	1	2	1	HIRING MANAGER AND OFFICERS	3 MONTHS		ACQUIRE FLEET MANAGEMENT SKILLS.
PV02	AUTOMOBILE REPAIRS - SPECIALISING IN ELECTRONIC CONTROL SYSTEMS	2	2	1	TRAINER/MECHANICAL SUPERVISOR	9 MONTHS	JAPAN	IMPROVE KNOWLEDGE AND PRACTICAL SKILLS IN AUTO MOBILE ELECTRONIC CONTROL SYSTEMS ON JAPANESE CARS.
PV03	ENGINE CRANKSHAFT REGRINDING	1	-	1	TECHNICIAN	3 MONTHS	GERMAN/JAPAN	IMPROVE SKILLS IN CRANKSHAFT REGRINDING.
PV04	PERFORMANCE APPRAISAL FOR PRODUCTIVITY IMPROVEMENT	2	1	1	REGIONAL MECHANICAL ENGINEERS	2 WEEKS	ESAMI	IMPROVE MANAGERIAL SKILLS IN THE RUNNING OF WORKSHOPS.
PV05	FUEL INJECTION PUMPS OVERHAUL AND TESTING	1	-	1	TECHNICIANS	3 MONTHS	JAPAN/UNITED KINGDOM	IMPROVE KNOWLEDGE AND PRACTICAL SKILLS IN THE REPAIR OF JAPANESE FUEL INJECTION PUMPS.
PV06	MAINTENANCE OF CONSTRUCTION MACHINERY	1	1	1	MECHANICAL ENGINEER/TECHNICIAN	3 MONTHS	JAPAN	IMPROVE PRACTICAL SKILLS IN THE MAINTENANCE OF CONSTRUCTION MACHINERY.

PV07	MANAGING THE RESTRUCTURING AND PRIVATISATION PROCESS	1	1	-	CONTROLLER/ DEPUTY CONTROLLER	4 WEEKS	ESAMI	ACQUIRE KNOWLEDGE AND SKILL IN THE RESTRUCTURING OF AN ORGANISATION TOWARDS PRIVATISATION.
PV08	DESIGN AND MANUFACTURE OF SPARE PARTS FOR MACHINERY REPAIR AND MAINTENANCE	1	1	1	MECHANICAL ENGINEERS	3 MONTHS	JICA/EGYPTIAN TECHNICAL COOPERATION FUND	AQUIRE KNOWLEDGE AND SKILL IN THE MANUFACTURE OF SCAR SPARE PARTS AND REDUCE COS
PV09	WELDING TECHNOLOGY FOR ENGINEERS	1	1	1	MECHANICAL ENGINEERS	6 WEEKS	JICA/EGYPTIAN TECHNICAL COOPERATION	ACQUIRE THEORETICAL AND PRACTICAL KNOWLEDGE OF WELDING METALLURGY, WELDING PROCESSES AND NONDESTRUCTIVE TESTS.
PV10	DIPLOMA IN TRAINING MANAGEMENT	1	-	1	TRAINER	8 WEEKS	UNITED KINGDOM	UPGRADE SKILLS OF TRAINERS TO ENABLE THEM MANAGE A TRAINING FUNCTION.
PV11	WEAR DEBRIS AND VIBRATION ANALYSIS	1	1	-	MECHANICAL ENGINEERS	3 MONTHS	JAPAN/UNITED KINGDOM	ENGAGE IN ANALYSING OILS IN ORDER TO DETERMINE FAILURE OF EQUIPMENT.
PV12	MAINTENANCE AND REPAIR OF MERCEDES BENZ CARS	1	1	1	TRAINER/ TECHNICIAN	6 MONTHS	GERMANY	ACQUIRE KNOWLEDGE AND SKILL IN MERCEDES BENZ CARS MAINTENANCE AND REPAIR.

\* TRAINING BACKGROUND INFORMATION ATTACHED \*

PLANT AND VEHICLE HIRE ORGANISATION (PVHO)  
EXTERNAL TRAINING BACKGROUND INFORMATION  
 ( SUBMITTED MAY 1996 )

PVHO CODE	COURSE TITLE	BACKGROUND INFORMATION
PV01	FLEET MANAGEMENT	Personnel managing the PVHO fleet has not been exposed to any training in Fleet Management. The organisation requires well trained personnel in Fleet Management in order to improve its fleet operations.
PV02	AUTOMOBILE REPAIRS - SPECIALISING IN ELECTRONIC CONTROL SYSTEMS	Technicians are not conversant with Electronic Control Systems now installed on the modern cars. There is urgent need to train two trainers who would impart skills to artisans. A Fully trained Trainer <sup>left</sup> a few years ago.
PV03	ENGINE CRANK-SHAFT REGRINDING	Most of the work is subcontracted due to lack of skills. A well skilled technician left a few years ago.
PV04	PERFORMANCE APPRAISAL FOR PRODUCTIVITY IMPROVEMENT	Controlling officers require performance appraisal skills and Regional Mechanical Engineers have not been exposed to this type training before.
PV05	FUEL INJECTION PUMPS OVERHAUL AND TESTING	Technicians in this field are only skilled in conventional type of pumps and old type of testing equipment. Japanese type of pumps are mostly sub-contracted to the private sector due to lack of expertise.
PV06	MAINTENANCE OF CONSTRUCTION MACHINERY	Several officers who have received training in this field have since left the organisation. PVHO maintains a large fleet of construction machinery ranging from Farm Tractors to Scrapers. There is great need to improve the maintenance and repairs skills of the technicians in order to obtain an extended service life of the machines.
PV07	MANAGING THE RESTRUCTURING AND PRIVATISATION PROCESS	The organisation is likely to be restructured and may be privatised. There is great need to train senior officers in this process.

PVHO CODE	COURSE TITLE	BACKGROUND INFORMATION
PV08	DESIGN AND MANUFACTURE OF SPARE PARTS FOR MACHINERY REPAIR AND MAINTENANCE	PVHO has no registered engineers at present making it difficult to fill senior vacant key posts in the organisation. The proposed course is intended to provide the engineers with practical skills in design and manufacturing. They will undertake a practical project which will enable them obtain registration with the Malawi Board of Engineers.
PV09	WELDING TECHNOLOGY FOR ENGINEERS	A few have received this type of training and the organisation has benefited a lot from their input, unfortunately most of them have left the organisation.
PV10	DIPLOMA IN TRAINING MANAGEMENT	The officer managing training at present has not received training in the management of a Training Function. Exposure to areas such as Manpower Planning; Managing a Training Department; Recruitment, Selection and Placement; Managing Training Strategies are essential in managing a Training function.
PV11	WEAR DEBRIS AND VIBRATION ANALYSIS	Meanwhile PVHO has no expert in this field. Analysis of oils assists in determining premature failure in earthmoving machines thereby reducing excessive downtime and costs.
PV12	MAINTENANCE AND REPAIR OF MERCEDES BENZ CARS	All Mercedes Benz cars are meanwhile subcontracted to Automotive Products and it is the intention of the organisation to undertake most of the repairs in its workshops in order to reduce costs.

9. マラウイ国 Application for Japanese Grant aid Assistance

Ref. No. 1004 (73)

6<sup>th</sup> August, 1998

FROM : THE ACTING CONTROLLER OF P.V.H.O., PRIVATE BAG 32,  
BLANTYRE

TO : THE SECRETARY FOR TREASURY , P. O. BOX 30049, LILONGWE 3

Through : The Secretary for Works and Supplies, Private Bag 316, Lilongwe 3

*Forwarded  
M*

Dear Sir,

**RE : APPLICATION FOR JAPANESE GRANT AID ASSISTANCE**

In recent years, the state of Malawi's road network has begun to deteriorate rapidly. In an attempt to prevent further degradation, the Government of Malawi has been promoting road construction and maintenance projects throughout the country. The result has been an increased pressure for plant and vehicle maintenance.

The Plant and Vehicle Hire Organization (PVHO) is charged with the maintenance and upkeep of all Government vehicles and plant equipment. Due to the lack of finances, the workshops and equipment needed to perform such maintenance have become very run down. This has led to a reduced efficiency and quality of vehicle maintenance. Consequently the standard of the Government's fleet has fallen and both vehicles and plants have a much shortened life span.

P.V.H.O. requests that it be allowed to perform the duties to which it was assigned, by being given the necessary financial support. It will be greatly appreciated if this is expedited.

We approach the Ministry of Finance in hope that you will forward our request to the Embassy of Japan for their consideration and approval.

Thank you in advance for your most needed support.

Yours faithfully,

*S.K. Mwanza*  
S.K. Mwanza

**ACTING CONTROLLER OF PLANT AND VEHICLES**

APPLICATION FORM FOR JAPAN'S GRANT AID  
GENERAL AND FISHERIES

1. Date of entry: month JULY year 1998
2. Applicant : The Government of THE REPUBLIC OF MALAWI
3. Project title: IMPROVEMENT OF MAINTENACE WORKSHOPS FOR CONSTRUCTION MACHINERY
4. Sector : INFRASTRUCTURE SECTOR
5. Project type :

1. Equipment supply.
2. facilities construction.

6. Target site: (province/county name) : MALAWI  
(city/town/village name): BLANTYRE, LILONGWE AND MZUZU  
(from the metropolis) : about hours' ride/flight.

(Attach a map indicating the site location to reach from the metropolis and a site map covering the intended project site area.)

7. Requested amount: JP YEN 600,000,000 (APPROX. MK113,400,000)
8. Desired fiscal year of implementation:
- Survey : FY 1998
- Implementation: FY 1999

9. Implementing agency:
- Ministry/Agency of PLANT AND VEHICLE HIRE ORGANISATION (PVHO)
- Person in charge: (full name) MR. S.K. MWANZA  
(affiliation) CONTROLLER OF PLANT AND VEHICLE HIRE ORGANISATION
- Address: PRIVATE BAG 32, BLANTYRE, MALAWI
- Telephone No.: (265) 634650 (DIRECT) 633644

10. Outlines of the implementing agency.

Describe in detail the position in the government, authorities, data on principal projects, annual budget, staff members, etc., and attach its organizational chart in a separate sheet.

Plant and Vehicle Hire Organisation (PVHO)

(i) Please refer to annex 1 for the Organisation CHART

(ii) Authorities and Duties of the Agency:-

- (a) To repair and service Government Construction Machinery (Plant and Vehicles).
- (b) To provide construction machinery (Plant) and vehicles hire services to Government Ministries and Departments and to the Public (in support of socio-economic development).

Annual budget and staff members of responsible department or section for the past three years and future prospects.

Name of the department/section:		<u>PLANT AND VEHICLE HIRE ORGANISATION</u>			
Year		<u>96/97</u>	<u>97/98</u>	<u>98/99</u>	
Annual budget	Revenue:	62.7	86.2	89.5	
	Expenditure:	<u>55.7</u>	<u>62.7</u>	<u>83.9</u>	
	(Millions MK)				
	Number of staff members	<u>1015</u>	<u>962</u>	<u>963</u>	

11. Background of the request.

Provide detailed information on the importance, necessity, and urgency of the requester project in terms of the current situations of and problems found in the target sector, the current situations of and problems found in intended sites of the requested project, etc. by referring to related statistics and data.

(See overleaf for the background)



## **11. BACKGROUND OF THE REQUEST**

1. The Government of Malawi consider improvement and enhancement of social infrastructure which leads to the solution of regional differences and the general development throughout the country. To achieve this aim, Plant and Vehicle Hire Organization (P.V.H.O) under Ministry of Works and Supplies is complementing the road maintenance, restoration and improvement efforts by supplying maintaining and repairing construction machinery which forms the most important base in infrastructure development.

2 The total length of paved roads in Malawi has reached 2880Km about 18% of which is deteriorated due to the insufficiency of maintenance, and the necessity of the road restoration work is highly required. Therefore PVHO is supporting the road restoration work by providing construction machinery and vehicles, part of which was supplied under the Japanese Grant Aid.

3. The existing workshop, which PVHO owns, has only simple hand tools and very old equipment and machinery, and does not have minimum facilities required at the workshop for repair . Therefore, the workshop is facing the difficulty in the repairing and commissioning work for engine and hydraulic system which is the most important element, and also the checking and detecting of the trouble of equipment and machinery. The equipment and machinery shall be used for daily maintenance of the road, thus the improvement of the workshop which maintains and repairs the equipment and machinery is urgently required.

4 Currently, the roads in Malawi could be divided into two different categories; primary and secondary levels. The former category includes main roads linking center of the regions and those linking Malawi with neighboring countries. The latter includes roads linking districts with each region.

5. P.V.H.O. is responsible for providing construction machinery required for maintenance and serving about 90% of the road networks within the National Road Maintenance Plan, which is aiming at enhancing the economy and increasing the welfare of the road users. P.V.H.O. should execute the machinery maintenance works to improve equipment availability to the construction industry in the country as a whole.

6. The road traffic on the road network is increasing annually at a high rate, particularly heavy vehicles, which have a great effect on enhancing damage to pavement life, and condition. Furthermore, traffic volumes in some of the roads have almost reached its capacity, and various road upgrading projects to meet demands have been proposed towards the end of the century, in which maintenance is a prerequisite.

7. Deterioration of road condition causes accidents and enhances wearing out of vehicles, which, in the medium and long term, is uneconomical.

8. P.V.H.O. has 3 central workshops in Blantyre, Lilongwe and Mzuzu and each workshop has a depot equipped with road maintenance equipment and workshop equipment. However, workshop equipment, necessary for maintenance and repair of construction machinery and vehicles is not sufficient.

9. Therefore the improvement and restoration of the workshop is indispensable for supporting the rehabilitation and repairing of the machinery and vehicles which are necessary for implementation of road maintenance and repairing works.

10. Furthermore, P.V.H.O. throws away approximately 10 units of construction machines and or vehicles annually, because maintenance is unable to be performed due to the lack of budget and equipment.

11. As mentioned on the other pages, our technical persons studied Japan's effective reconstruction and maintenance, but they have not been able to utilize their skills due to the lack of maintenance equipment. Therefore, we are afraid that they may forget their important knowledge.

12. P.V.H.O. plans to transfer the technique and knowledge of the technical persons who studied in Japan to the other P.V.H.O. technical staff to improve total maintenance ability.

13. The technical persons who studied in Japan realized that a lot of worn and damaged parts have been wasted in Malawi, even though these parts are still able to be utilized again if they are rebuilt, as done in Japan.

14. Recently, the construction machines are composed of hydraulic and electronics systems, and therefore, it is very difficult to locate the cause of the trouble without proper testing equipment.

15. Often, even though the maintenance problem of the construction machine is light, the heavy machine must be brought back to the distant workshop, causing excessive down time and expenses, because there are no mobile type of maintenance equipment to go to the job site.

12. Relation with the government's development plan and other factors.

(1) Relation with the government's national development plan.

National Road Maintenance Plan (Initiative) under the  
Name of the plan: National Road Maintenance Authority.

Period : from 1997 to 2020

The position occupied by the requested project/sector in the above-mentioned plan.

The requested sector is considered as the backbone in the infrastructure development such as roads and bridges etc.

(2) Relation with the sector comprehensive/overall program.

PVHO - Improvement of Construction Machinery  
Name of the program: Maintenance Workshops

Period : from 1997 to 2005

The position occupied by the requested project in the program.

It is very important in optimising construction machinery thereby improving availability to construction industry.

13. Objectives (Itemize as concretely as possible.)

(1) Objectives/purpose of the project.

To improve the existing workshop facilities and tools necessary for implementation of repair and preventive maintenance of the machinery and equipment used for road construction and maintenance to maximise availability of construction machinery and vehicles.

(2) Overall goal/medium and long-term objectives.

By supplying necessary equipment for the maintenance service of PVHO road serviceability and dependability would increase, and could optimise the economical aspects of road maintenance, which will contribute to the employment in the sector of transportation, construction, commerce, agriculture etc. Thus helping also the development of the regional small cities and towns in the country.

14. Outline of the project and request (Itemize as concretely as possible).

(1) a) In the case of facilities construction project

Outlines of requested facilities (such as the name and address of the project site, site-selecting criteria, supporting photographs, design drawings with dimensions and area, number of requested facilities, and desired materials to be used).

b) Please refer to annex 4 for outline of requested facilities and equipment.

c) Method to operate, manage and maintain the facilities and equipment:

The P.V.H.O. is staffed with sufficient engineers technicians and operators with rich experience Mr. Tayamanja (MVM) already attended a ten months training in Japan, and Mr. D.D. Mila (Mechanical Supervisor) and the following Engineers : Mr. B.O. Mkandawire, Mr. J.G. Manonng'a, Mr. E.D.R. Chiyembekeza attended training courses in maintenance of Construction Machinery in Japan. Also Mr. E.P. Katambo was trained in Japan.

d) Financial sources for management and maintenance after completion of the requested project: Fully Borne by the Government.

In the case of equipment supply project.

List of requested equipment (such as the name and address of the site to install the equipment, equipment selecting criteria, name. Specifications, quantity, unit price, total amount, etc. of the equipment).

(2) Breakdown of total amount of the facilities and equipment and supporting data

Total project cost is approximately JP Yen. 600,000,000.

The project cost is roughly estimated at as follows.

K113,400,000 which is constituted by the equipment and facilities outlined in annex 4.

(3) Additional information

a. Existing facilities:

Please refer to the attached sheet (Annex 5)

b. List of existing equipment covering the name, quantity, year purchased, country of origin of the equipment, together with the manufacturer's name and operating conditions.

please refer attached sheet (Annex - ??)

c. Project site preparation(including expropriation)

Land: Already acquired

Name of the land owner : Plant and Vehicle Hiring Organisation(PVHO)

1) Blantyre Workshop -

Area : 35,000m2

Address of the site : Private 32, Blantyre

2) Lilongwe Workshop -

Area : 23,600m2

Address of site : Private Bag 21, Lilongwe.

3) Mzuzu Workshop -

Area : 18,000m2

- Current situation of the project site, such as leveling, drainage, availability of power, water supply, telephone etc.

The project will be implemented within the PVHO premises, so primary utilities are available in the project areas..

- Data on natural conditions.

All the necessary information and data are available at any time.

- Security situation

No problem at this moment.

(4) Related grant aid cooperation in the past

FY : 1989

Title : Road Maintenance & Construction Machinery Project

Amount : JPY571 million

Target area : Infrastructure development

Assessment on level of utilization of the project

- a. Good
- b. Passable
- c. Bad
- d. Not utilized

15. Benefit and effects of the project.

(1) Area that will benefit from the project(specify the total area if possible):

In accordance with the objectives of the project, the implementation of the project will contribute to the development in whole of the country, which will benefit directly and indirectly.

(2) Population that will benefit (directly and indirectly):

Approximately 10 million people estimated to be living in all the regions of the country will benefit directly and indirectly from the proje

(3) Expected social and economic effects

Supplying of workshop equipment would make it possible for PVHO to almost double their service capacity, which would then contribute to economic stability, of the country and maintenance of social security.

Sector improvement is an economic investment with prospective returns, in the short and long terms. For example, with the improvement of Road construction, living standard of rural people who have more difficult access to social infrastructure such as hospitals, school etc, will be much improved by providing them access.

This would be undertaken through a developed policy for maintaining and upgrading the roads and providing them with all the required facilities leading to the traffic safety and easiness which would enhance the economical activities as a whole.

16. Relation with technical cooperation, etc.

(1) Feasibility study (Survey )

Already effected/being effected. - Through Mr. Wakabayashi JOCV staff.

From month JULY year 1995 to month JULY year 1996

Conducted by : JICA  
 other agency:

Not yet effected.

(2) Technical cooperation

Which of the following forms of assistance do you require?

- a. Project - type technical cooperation
- b. Long - term experts : \_\_\_\_\_ persons
- c. Short term experts :  1  persons
- d. JOCV :  2  persons
- e. Acceptance of trainees :  3  persons
- f. Not needed

When the technical cooperation is underway

Title : Diagnostic, skill & Maintenance of Construction Machinery

Period : from month May year 1999 to month Oct year 1999

- a. Project - type technical cooperation
- b. Long - term experts : \_\_\_\_\_ persons
- c. Short - term experts :  2  persons
- d. JOCV :  1  persons
- e. Acceptance of trainees :  3  persons

17. Request to other donors for same project.

N/A

18. Aid by third countries or international organizations in the same or related fields.

Name of Donor	Period	Type (Grant or Loan)	Amount	Outline (concretely)	Relationship with the present request



ANNEX

- ANNEX 1 ORGANIZATION, CHART OF PLANT AND VEHICLES  
HIRE ORGANIZATION (P.V.H.O)
- ANNEX 2 MAP OF MALAWI SHOWING P.V.H.O. REGIONAL  
CENTRES
- ANNEX 3 WORKSHOP LAYOUT DIAGRAMS (A) BLANTYRE  
(B) LILONGWE AND (C) MZUZU
- ANNEX 4 OUTLINE (LIST) OF REQUESTED FACILITIES AND  
EQUIPMENT
- ANNEX 5 OUTLINE OF EQUIPMENT EXISTING IN THE P.V.H.O.  
(A) BLANTYRE WORKSHOP  
(B) LILONGWE WORKSHOP  
(C) MZUZU WORKSHOP

## ANNEX 1

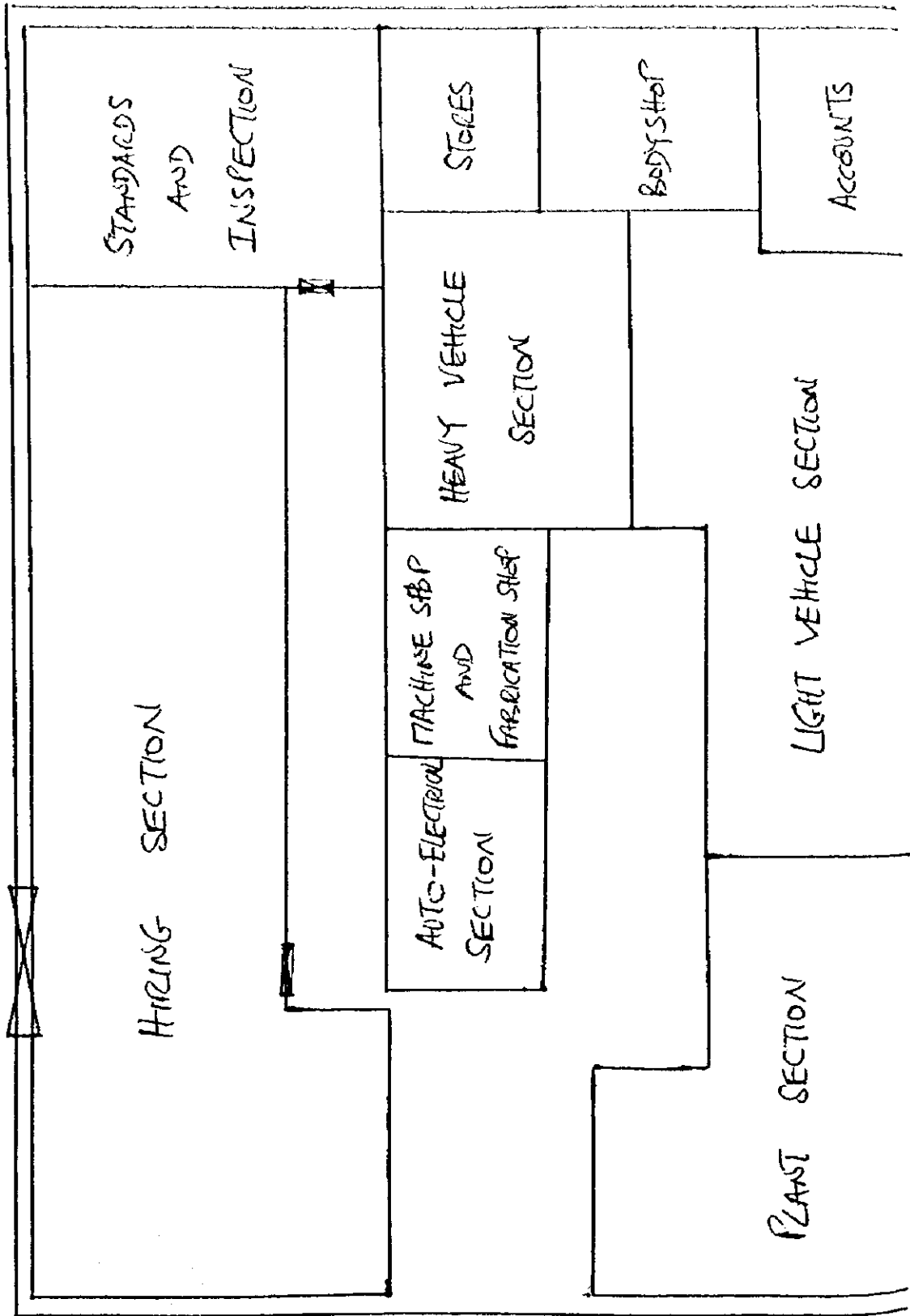


## ANNEX 2

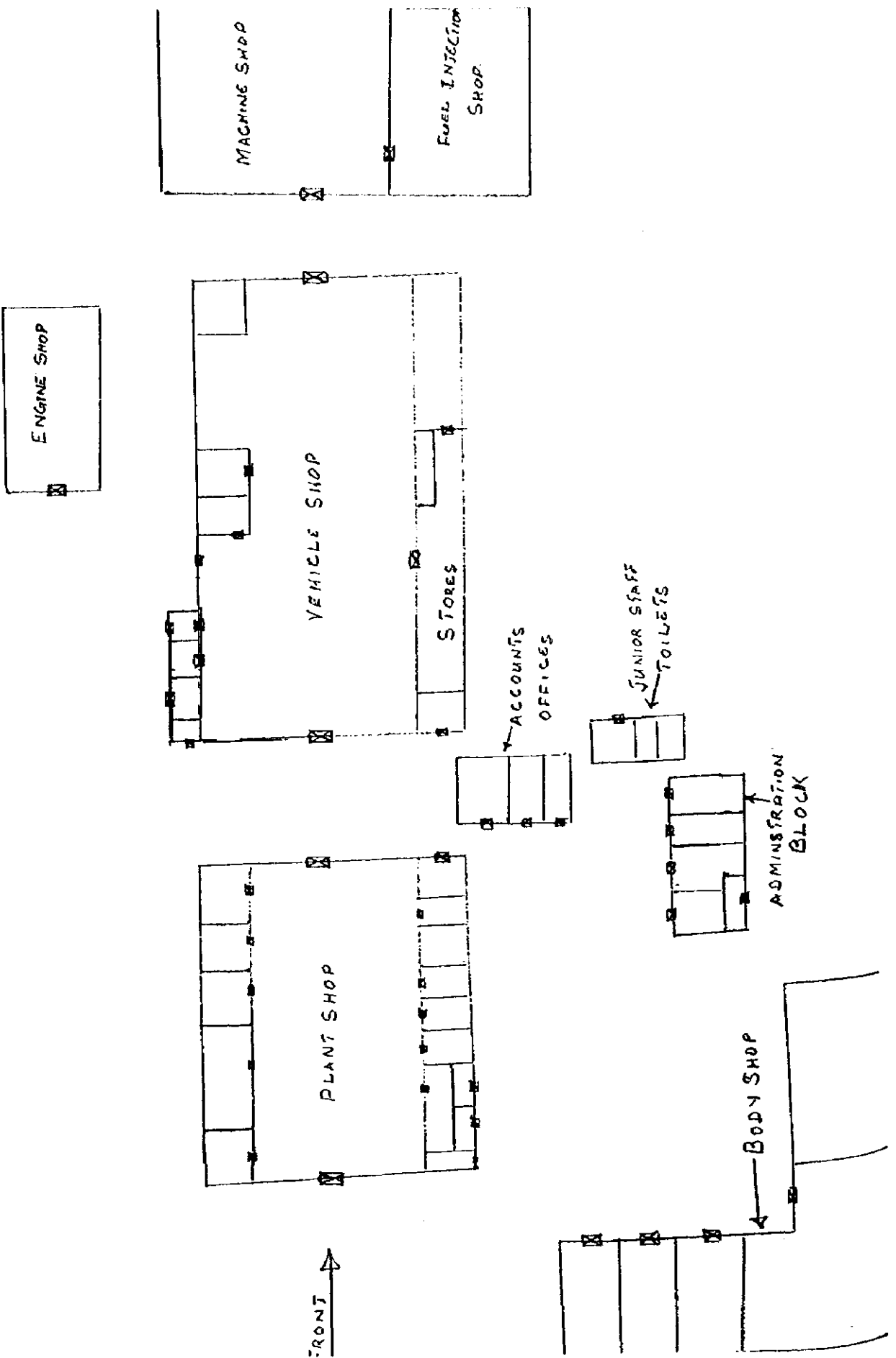


## ANNEX 3

PRE(1) WORKSHOP LAYOUT



SKETCH DIMENSIONS V.I. P.V. HD WORKSHOP LAYOUT

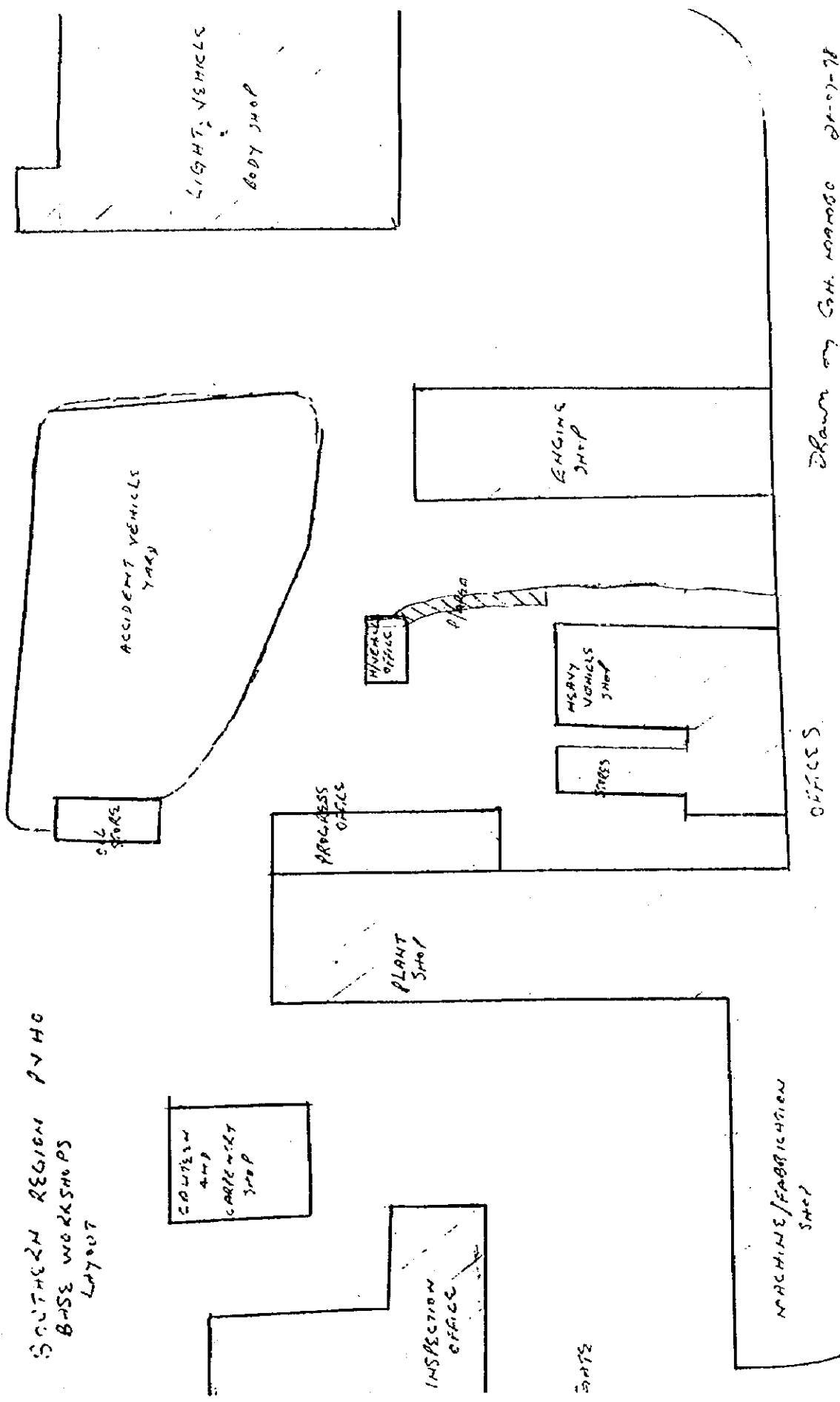




TRUCK

# SOUTHERN REGION PVHO BASE WORKSHOPS LAYOUT

FINISHED 10/4



Drawn by Sgt. MORRIS 21-57-78

## MAINTENANCE EQUIPMENT LIST

### A FOR LILONGWE WORKSHOP

---

1.	Automobil Maintaneance	
	1 Hydraulic Garage Jack	2 u
	Capacity: 2 ton	
	2 Four Post Lift	1 u
	3 Portable Hydraulic Jack	1 p
	4 Ram and Pump Set	1 s
	5 Ram and Pump Set	1 s
	6 Spray Gun, Suction Type	2 p
	Nozzle dia.: 1.5 mm	
	7 Electric Drill	4 p
	Drilling Cap. : 13mm dia.	
	8 Welding Shield	2 p
	Hood type	
	9 Air Sander	3 u
	Disc paper(dia.mm):100x16	
	10 Air hose (100m)	1 s
	11 Disc Grinder	3 p
	12 Bottle Jack ( 50 t)	3 p
	13 Body & Fender Tool Set	5 s
	14 Engineer Tool box	5 p
	15 Rotary Angle Grinder	2 p
	Wheel Size: 4x1/4'x5/8'	
	16 Rotary Angle Grinder	1 p
	Wheel Size:9'x1/4'x7/8'	
	17 Secondary Cord	1 p
	18 Machinists Vise	8 p
	(Swivel Base Type)	
	19 Dust & Mist Respirator	10 p
	20 Bench Drill Press	5 u
	21 Sawing Machine	1 u
	22 Air Compressor	2 u
	23 Compression Gauge for Gasoline	2 p
	Engine	

## MAINTENANCE EQUIPMENT LIST

24 Hydraulic Garage Jack	2 u
25 Timing Light	2 p
26 Garage Lamp(Incandescent) without Lamp	2 p
27 Radiator Cap Tester	3 s
28 Hydrolic Crane (10t)	2 u
29 Flywheel Pitot Bearing Puller	1 s
30 Flywheel Pitot Bearing Puller	1 s
31 Adjutable Reamer Set	1 s
32 Adjutable Reamer Set	1 s
33 Wheel Alignment Tester	2 u
34 Digital Multitester	2 p
35 Clamp Tester	3 p
36 Water Purifier Regeneration type	1 u
37 Silicon Quick Charger with Normal Charge	1 u
38 Silicon Quick Charger With Normal Charge	1 u
39 Telex Key Set	3 u
40 Hexagon Wrench Set 2 - 14 MM (10 pcs/set)	3 s
41 Hexagon Wrench Set	3 s
42 Diesel Smoke Meter	2 u
43 Tachometer Range: 0 - 600 mm (0.5 mm)	2 p
44 Wheel Balancer	1
45 Spark Plug Cleaner and Tester	1 p
2. <b>Contruaction Machine Maintenane</b>	
1 Hydraulic Garage Jack	1 u
2 Portable Hydraulic Jack	1 p
3 Battery Tester Applicable: 6, 12V/6-150AH	3 p
4 Screw Compressor	2 p
5 Torque Wrench, 2500-7000kgf.cm	2 p

## MAINTENANCE EQUIPMENT LIST

### A FOR LILONGWE WORKSHOP

6 Torque Wrench, 100 - 450kgf.cm Torque Pre Set Type	1 p
7 Piston Ring Compressor Capacity: 50 - 125mm	1 p
8 Hydraulic Shop Press, 55 ton with Hydraulic Hand Pump	1 s
9 Silicon quick Charger with Normal Charge	1 u
10 Electric Impact Wrench	1 p
11 Gear Puller	1 s
12 Outside Micrometer Set	1 p
13 Dial Indicator 0-50-0/0.01mm, 0-10mm	1 p
14 Portable Spot Welder	1 p
15 17-1/2 ton Capacity Hydraulic Puller Set	1 s
16 13 ton Capacity Automotive Puller Set	1 s
17 Oil Filter Wrench Max. dia: 150mm	1 s
18 Bench Electric Grinder Wheel Size: 150x16x12.7mm	1 u
19 Thermometer (Digital, Pocket Size)	1 p
20 Sun Tester	1 p.
3. Fuel, Machine and Welding Shop	
1 Shaping Machine	1 u
2 Lathe Machine	1 u
3 Crankshaft Grinder	1 u
4 Cylinder Boring (and surface-grinding) Machine	1 u
5 Hack Sawing Machine	1 u
6 Surface Grinder	1 u
7 Radial Drilling Machine	1 u
8 Fuel Test Bench	1 u
9 Injector Reconditioning Machine	1 u

## MAINTENANCE EQUIPMENT LIST

### B FOR BLANTYRE WORKSHOP

2 Track Measuring Tool Set	1 p
3 Floating Seal Tester	1 s
4 Tire Changer	1
5 Tire Service Tool Set	1 s
6 Tire Bead Breaker (Air Type)	1 p
7 Sprocket Remover	1 s
8 Sprocket Installer	1 s
9 M7-100C Cylinder	1 u
10 Hand Operated Pump	1 u
11 Shoe Rebuilder	1 u
12 Hydraulic Shoe Bolt Wrench (powerd by track press)	1 u
13 Shoe Bolt Nut wrench Set (for 5 models)	1 s
14 Track Welder	1 u
15 Track Buffer, Stand Type	1 u
16 Wire Footage Counter	1 p
17 Track Press	1 u
18 Gravity Conveyor and Chute	1 u
19 Truck Winder	1 u
20 Roller Collar Remover	1 u
21 Roller Welder	1 u
22 Vacuum Flux Recovery System for use with CE-1507	1 u
23 Portable Lubricator (Mobile Type, Air Operated)	1 u
24 Portable Spot Welder	1 u
25 Hydraulic Shop Press, 55 ton with Hydraulic Hand Pump	1 s
26 Battery and Coolant Tester	2 p
27 Transmission Jack (standard) Capacity: 1500 kg	1 u

## MAINTENANCE EQUIPMENT LIST

### B FOR BLANTYRE WORKSHOP

28	Transmission Jack (standard) Capacity: 1200 kg	1 u
29	Differential Gear Jack Capacity: 300 kg	1 u
30	Differential Gear Jack Capacity: 600 kg	1 u
31	Differential Bearing Pullers	1 p
32	Pressurized Nozzle Cleaner	1 u
33	Diesel Timing and Tacho Tester	1 p
34	Diesel Compression Gauge	1 s
35	Compression Gauge for Gasoline Engine	1 s
36	Eight Way Puller Set	1 s
37	Tool Cabinet	1 p
38	Torque Wrench, 100-450 kgf.cm Torque Pre Set Type	1 p
39	Torque Wrench, 400-1800 kgf.cm Torque Pre Set Type	1 p
3.	Lifting and Transportation	
1	Mobile Floor Crane, 2,500 kg with Electric Hydraulic Pump	3 s
2	Fork Lift Capacity: 3 ton	1 u
4.	Lifting and Transportation	
1	Mobile Workshop for Construction Machine Drive: 4x4 Hydraulic Crane: 3ton	1 u
2	Mobile Workshop for Water Supply and Drainage Drive: 4x2 Hydraulic Crane: 3ton	1 u
3	Lubrication Truck	1 u
4	Road Dispatch Truck	1 u
5	Light Mobile Workshop (4x4 service car)	1 u
6	Recovery Truck (3 ton)	1 u

## MAINTENANCE EQUIPMENT LIST

### G FOR MZUZU WORKSHOP

1.	Automobile Maintenance	
1	Hydraulic Garage Jack Capacity: 2ton	1 u
4	Rim and Pump Set	1 s
6	Spray Gun, Suction Type Nozzle dia.: 1.5mm	1 p
7	Electric Drill Drilling Cap.: 13mm dia.	2 p
9	Air Sander Disc Paper (diamm): 100x18	1 u
13	Body & Fender Tool Set	2 s
14	Engineer Tool Box	2 c
15	Rotary Angle Grinder Wheel Size: 4'x1'4'x5/8'	1 c
18	Mechinists Vise (Swivel Base Type)	4 c
19	Dust & Mist Respirator	4 p
22	Air Compressor	1 u
25	Tuning Light	1 c
27	Radiator Cap Tester	1 s
28	Hydraulic Crane (10t)	1 u
33	Wheel Alignment Tester	1 u
34	Digital Multitester	1 c
35	Clamp Tester	1 c
39	Telex Key Set	1 u
40	Hexagon Wrench Set 2 - 14mm (10 pcs/set)	1 s
41	Hexagon Wrench Set	1 s
43	Tachometer Range: 0 - 600mm (0.5mm)	1 c
1	Gasoline Engine Analyzer	2 c
4	Petrol Engine Compression Tester	2 u
5	Radiator Cap & Cooling System Tester	2 s

## MAINTENANCE EQUIPMENT LIST

### C FOR MZUZU WORKSHOP

8	Volt-Ampere Regulator Tester	2 n
8	Strong Box Puller Set	4 s
13	Garage Lamp (Incandescent) without Lamp	3 p
21	Nozzle Tester Pressure Gauge: 0-500 kg/cm <sup>2</sup>	2 c
22	Engine Positioner	4 u
26	Air Valve Lapper	2 c
33	Electric Drill Drilling Cap. : 16mm dia.	1 n
2.	<b>Construction Machine Maintenance</b>	
3	Battery Tester Applicable: 6, 12V/6-150AH	1 p
4	Screw Compressor	1 n
5	Torque Wrench, 2500 - 7000kgf.cm Torque Pre Set Type	1 n
6	Torque Wrench, 100 - 450kgf.cm Torque Pre Set Type	1 n
7	Piston Ring Compressor Capacity: 50 - 125mm	1 n
8	Hydraulic Shop Press, 55 ton with Hydraulic Hand Pump	1 s
10	Electric Impact Wrench	1 n
3	Floating Seal Tester	1 s
4	Tire Changer	1
13	Shoe Bolt Nut wrench Set (for 5 models)	1 s
24	Portable Spot Welder	1 u
27	Battery and Coolant Tester	2 n
32	Differential Bearing Pullers	1 p
34	Diesel Timing and Tacho Tester	1 n
38	Tool Cabinet	1 n
3.	<b>Lifting and Transportation</b>	



## MAINTENANCE EQUIPMENT LIST

### C FOR MZUZU WORKSHOP

1	Mobile Floor Crane, 2,500 kg with Electric Hydraulic Pump	1 u
4.	Field Service	
2	Mobile Workshop for Water Supply and Drainage Drive: 4x4	1 u
2	Mobile Workshop for Construction Machine Drive: 4x2 Hydraulic Crane: 3ton	1 u
5	Road Dispatch Truck	1 u

## ANNEX 5

## Annex 5 (a)

### OUTLINE OF EQUIPMENT EXISTING IN P.V.H.O. WORKSHOP BLANTYRE WORKSHOP

#### (a) Construction Machinery (Plant) Shop

1. Compressor (Air)
2. Battery Charger
3. Mobile truck with workshop equipment
4. Oil heater
5. Hydraulic Press
6. Parts Washer
7. 2 No Overhead Cranes
8. Portable presses (hydraulic Cylinders) with pullers

#### (b) Machine Shop

1. 2 No. Milling machines
2. 5 No. lathe machines
3. Boring machines
4. Crankshaft regrinding machine
5. Foot Cutter regrinding machine
6. Surface reginder (Universal)
7. Roller
8. 2 No. drilling machines
9. Guillotine
10. Furnace
11. Spot Welding machine (Poor condition)
12. Arc Welding set
13. Hydraulic press
14. Sheet metal bender
15. Circular saw/cutter (Portable)
16. 2 No. Power saw
17. 2 No. Portable cranes

## Annex 5(a) Continued

#### ©Engine Shop

1. Honing Machine
2. Roboring Machine
3. 2 No. Dynamometers (Poor Condition)
4. Drilling Machine
5. ydraulic Press

#### (d) Heavy vehicle shop

1. 2 No. Hydraulic Press
2. Air Compressor
3. Drilling Machine
4. Grinder
5. Overhead Crane

**(e) Light Vehicle and Unit Shop**

1. Crypton starter motor tester
2. Undercutting machine
3. Glowler
4. Distributor tester
5. Spark plug tester
6. 3 No. Hydraulic press
7. Bench grinder
8. Engine tester - motor master
9. Battery charger
10. Distiller
11. Compressor (Air)
12. Hydraulic Press
13. 2 No. Sewing Machines

**(f) Body Shop**

1. 2 No Spray guns
2. 2 No. Fans (Blowers) - Condition poor

**5 (b) LILONGWE WORKSHOP**

<b>EQUIPMENT</b>	<b>QTY</b>	<b>LOCATION</b>
Voltmeter	1	Machine Fuel Shop
Me 442 Drill Machine	1	
ME Grinding Machine	1	
ME 1235 Lathe Machine	1	
ME 436 Lathe Machine	1	
ME 433 Lathe Machine	1	
ME 599 Milling Machine	1	
ME 2619 Grinding Machine	1	
ME 4144 Lathe Machine	1	
ME 1234 Milling Machine	1	
mE 2821 Hydro Press	1	
ME 430 Drilling Machine	1	
ME2913 Shaper Machine	1	
Banch Drilling Machine	1	
Porta Pack Oxy-acetylene	1	
ME 3997 Welding Machine	1	
MGH 300 Arc Welding Machine	1	
ME2907 Arc Welding Machine	1	
ME 3438 Power Saw	1	
ME 2908 Pedestal grinder	1	

Angle Grinder	1	
Bench Vices 26"	1	
Surface Plate	1	
MEB 562 Fuel Enjector Tester		
MEB 991 Nozzle Cleaner	1	
Enjector Tester	1	
Motor Grinder (Brush) (Motor)	1	
Pressor Machine		
Nipple Former	1	
Enjetomatic	1	
ME 3322 Hydraulic Crane	1	Rover Section
Bottle Jack 10T	1	
Trolley Jack	1	
Bench Vices 26"	1	Heavy/U/S/Lgoods
ME2980 Lever Press	1	
ME 3408 Drill Machine		
Preumatic Ram	1	
Trolley Jack	1	
Bench Vices 26"		
Batter Charger	1	
ME 279T Trolley Jack	1	Plant Shop Goods
ME4151 Trolley Jack	1	
MEB Welding Set	1	
ME Denyo Welding Machine	1	
Bench Grinder	1	
pressor Machine	2	
ME 91Z Premnatic Compressor	1	
Bench Vices 26"	1	
Batteery charger	1	
MEB 455 Workshop Grane	1	
MEB 1236 Drill Machine	1	
MG 858M Nissan UD	1	
ME 4028 Fuel Injection Cleaner	1	Mobil Workshop
ME 4019 Bench Grinder	1	
BE 4039 Press	1	
ME 4016 Drilling Machine	1	
ME 4013 Welding Seet		
ME 4022 Battery Charger	1	
ME 4034 Engine	1	
ME 4031 Compressor	1	
ME 4025 Generator	1	Body Shop Workshop
Angle Grinder	1	
Welding Machine	1	
Welding Machine MIG	1	
Porter Power	1	
Anvil	1	
Bolling Machine	1	
Binder Sawing Maching	2	
Pop rivet Gun	1	
Spray Gun	1	
Hand Drill Machine	1	

Microfilm	1	
Bench Vice		
G. Clamp	1	
ME 4204 Trolley Jack (ST)	1	Service Bay
Ram (Permanent structure)	1	
ME 4088 Cranking Kit	1	
Value Seat Grinding set	1	Tools Store
Toe in-out Gauge (Pair)	1	
Motor Master	1	
Hand Drill Machine	1	
Cutter	2	
Tyre Levers	2	
Battery Tester	2	
Cylinder leakage Tester	1	
Heavy duty Torque wrench	1	
Torque metter	1	
Compression gauge	1	
Puller set	2	
Ball Joint Clamper	1	
Dolleys	2	
Banner Set	10	
Ignition Stamp	3	
Number Stamp	1	
Letter Stamp	1	
Radiator Tester	1	
Compression Gauge	1	
Spring Compression	1	
ME 4095 Service Press	1	
Air Container	1	
Value Pullers	3	
Heavy duty Puller	1	

### **5 (C) MZUZU WORKSHOP**

#### **AUTO ELECTRICAL SECTION**

##### **AVAILABLE TOOLS AND EQUIPMENT**

- a) Test Bench
- b) Battery Charger
- c) Battery tester
- d) Battery terminal soldering gun
- e) Water distiller
- f) Armature tester

##### **AVAILABLE TOOLS AND EQUIPMENT**

- a) Welding generator
- b) Hand drilling machine
- c) Drilling Machine
- d) Hand press machine
- e) Lathe Machine
- f) Power hack-saw

#### **LIGHT VEHICLE SECTION**

##### **AVAILABLE TOOLS AND EQUIPMENT**

- a) Bench vice

#### **HEAVY VEHICLE SECTION**

##### **AVAILABLE TOOLS AND EQUIPMENT**

- a) Bench Vice

#### **STANDARDS AND INSPECTION**

##### **AVAILABLE TOOLS AND EQUIPMENT**

- a) Motor ram
- b) Stationery ram
- c) Oil measuring Cans

#### **BODY SHOP SECTION**

##### **AVAILABLE TOOLS AND EQUIPMENT**

- a) Spraying cans

## 10. エジプト国 Outline in C.E.T.C

Arab Republic of Egypt  
Ministry of state for new communities  
Training Organization (TOMOMHAR)  
Construction Equipment Training Center  
in Tenth of Ramadan City

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We have the honor to brief here an outline in C.E.T.C.

Outline of the project :-

Executive Agency : Ministry of Development, New Communities,  
Housing and public utilities, Training Organization ( TOMOHAR ) .  
Basic design : Japan International Cooperation Agency ( JICA ) .  
Grant Amount : Yen 1,624,000,000 = LE 31,231,000 .  
Location : Tenth of Ramadan City, the Arab Republic of Egypt .

Site Area : Approx , 500,000 m<sup>2</sup>

Building Area : 4 884 ,5 m<sup>2</sup> ( Total Floor Area : 6,157,2 m<sup>2</sup> .

New Work Shop : 800 m<sup>2</sup> .

Outline of Training Courses :

Training Courses	No of Trainees	Courses Per years	Annual out put
Management	10	3	30
Maintenance	20	3	60
Operation	40	3	120
Total	70	3	210
Intensive Courses Short time	According to Agreement		



## Target of Trainig :

**Mangement Course :** To cultivate managers who have a good understanding of the use, maintenance and storage of construction equipmant in the construction industry .

**Maintanance Course :** To cultivate mechanic in the field of enging, chassis , hydraulic system and electric system who can find cause of troubles , fix them effectively and keep equipment in good and appropriate condition for work.

**Operation Course :** To cultivate operators who are familiar with various kinds of construction equipment , and to make operators acquire safe , accurate, economical and speedy operation techniques.

## Main Equipment of the Center :

Operation	Used Work Shop	Total
30	6	36

## Number of Employees :-

Eng	Assetant	Adminst	Total
13	28	22	63

## Number of Graduates Of the center from 21/10/1989 To 30/11/1998

No / Year →	1990	1991	1992	1993	1994	1995	1996	1997	1998
Operation	46	105	28	139	137	194	181	223	230
Maintenance	23	44	31	66	51	66	40	47	44
Management	43	33	38	54	20	73	21	31	37
Intensive cou.	---	33	87	12	14	20	59	38	74
University Students	---	---	---	245	244	164	203	98	54
<b>Total</b>	<b>112</b>	<b>215</b>	<b>284</b>	<b>516</b>	<b>466</b>	<b>517</b>	<b>504</b>	<b>437</b>	<b>439</b>

\* Mobark - Khol from 13 / 4 / 1998 To 10 / 7 / 1998 ( 20 ) Trainees .

**Palestinian Courses :**

- The contract between the Government of Japan and the Government of Egypt for Training the Palestinian trainees through five courses in Management , Operation & Maintenance Course .

No of Course	Date	Number of Trainees
First	From 12/3/1995 To 8/6/1995	18
Second	From 1/10/1995 To 28/12/1995	19
Third	From 29/9/1996 To 26/12/1996	18
Fourth	From 6/7/1997 To 2/10/1997	20
Fifth	From 21/6/1998 To 17/9/1998	20
Total		95

Number of The Course	From	To	Number of The Graduates
1 St	12/10/1989	12/1/1990	37
28	6/9/1998	3/12/1998	104

Intensive Courses on Maintenance , repair and Operation Of construction Equipment its Duration ( From One Week to 3 Weeks )  
In the Fields of :-

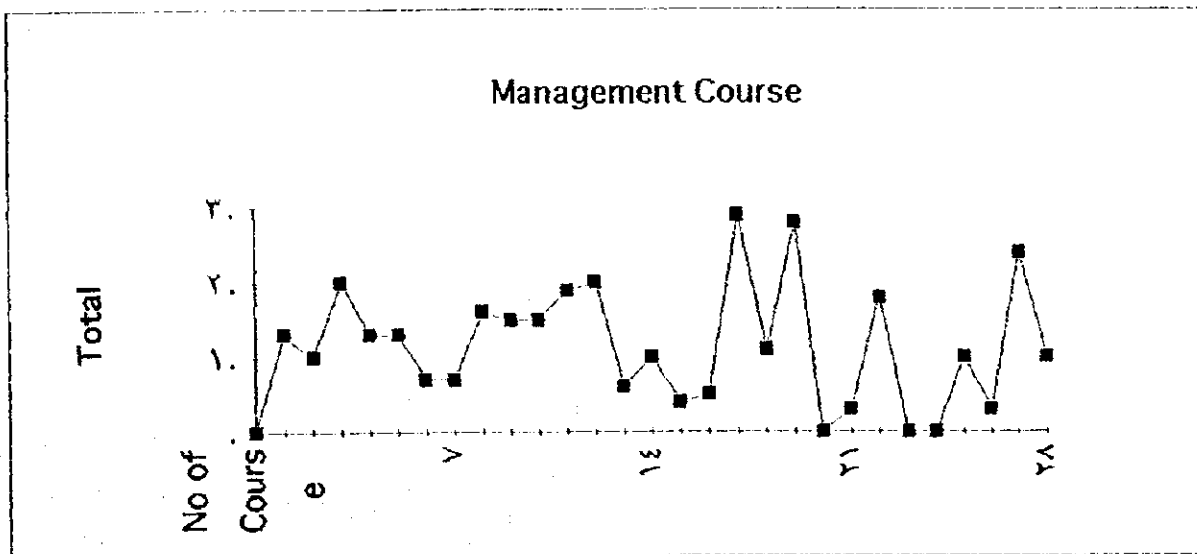
- Hydraulic
- Engine
- Transmission
- Maintenance of Equipment

Number of The Graduates From 12/10/1989 Until 30/11/1998 .

Regular	Short Time	University Students	Total
2155	337	1008	3500

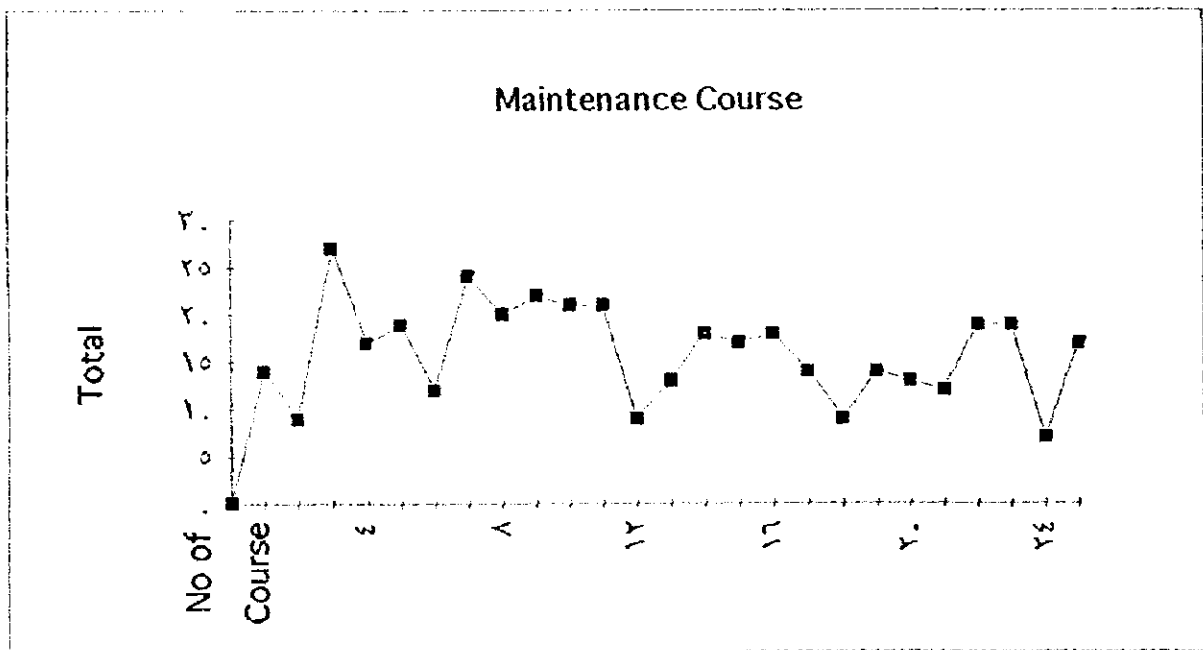
## Management Course

No of Course	Management	From	To
1	13	21/10/89	21/1/90
2	10	6/5/90	6/8/90
3	20	2/9/90	29/11/90
4	13	16/12/90	15/3/91
5	13	5/5/91	1/8/91
6	7	18/8/91	14/11/91
7	7	8/12/91	5/3/92
8	16	19/4/92	16/7/92
9	15	2/8/92	29/10/92
10	15	15/11/92	11/2/93
11	19	4/4/93	1/7/93
12	20	18/7/93	14/10/93
13	6	31/10/93	3/2/94
14	10	20/3/94	16/6/94
15	4	2/7/94	29/9/94
16	5	16/10/94	12/1/95
17	29	12/3/95	8/6/95
18	11	18/6/95	14/9/95
19	28	1/10/95	28/12/95
20	Special Co.	25/2/96	23/5/96
21	3	9/6/96	5/9/96
22	18	22/9/96	19/12/96
23	Special Co.	16/2/97	15/5/97
24	Special Co.	1/6/97	28/8/97
25	10	14/9/97	11/12/97
26	3	8/2/98	7/5/98
27	24	24/5/98	20/8/98
28	10	6/9/98	3/12/98
29		24/1/99	22/4/99
30		9/5/99	5/8/99
31		22/8/99	18/11/99



## Maintenance Course

No of Course	Maintenance	From	To
1	14	21/10/89	21/1/90
2	9	6/5/90	20/9/90
3	27	21/10/90	15/3/91
4	17	5/5/91	19/9/91
5	19	7/10/91	27/2/92
6	12	19/4/92	10/9/92
7	24	27/9/92	11/2/93
8	20	4/4/93	1/7/93
9	22	18/7/93	14/10/93
10	21	31/10/93	3/2/94
11	21	20/3/94	16/6/94
12	9	2/7/94	29/9/94
13	13	16/10/94	12/1/95
14	18	12/3/95	8/6/95
15	17	18/6/95	14/9/95
16	18	1/10/95	28/12/95
17	14	25/2/96	30/5/96
18	9	9/6/96	5/9/96
19	14	22/9/96	19/12/96
20	13	16/2/97	15/5/97
21	12	1/6/97	28/8/97
22	19	14/9/97	11/12/97
23	19	8/2/98	7/5/98
24	7	24/5/98	20/8/98
25	17	6/9/98	3/12/98
26		24/1/99	22/4/99
27		9/5/99	5/8/99
28		22/8/99	18/11/99



## Operation Course

No of Course	Operation	From	To
1	10	21/10/89	21/1/90
2	20	6/5/90	6/8/90
3	16	2/9/90	29/11/90
4	33	16/12/90	15/3/91
5	26	5/5/91	1/8/91
6	46	18/8/91	14/11/91
7	47	8/12/91	5/3/92
8	39	19/4/92	16/7/92
9	42	2/8/92	29/10/92
10	52	15/11/92	11/2/93
11	40	4/4/93	1/7/93
12	47	18/7/93	14/10/93
13	43	31/10/93	3/2/94
14	48	20/3/94	16/6/94
15	46	2/7/94	29/9/94
16	46	16/10/94	12/1/95
17	44	12/3/95	8/6/95
18	55	18/6/95	14/9/95
19	49	1/10/95	28/12/95
20	55	25/2/96	23/5/96
21	60	9/6/96	5/9/96
22	68	22/9/96	19/12/96
23	77	16/2/97	15/5/97
24	75	1/6/97	28/8/97
25	73	14/9/97	11/12/97
26	77	8/2/98	7/5/98
27	76	24/5/98	20/8/98
28	77	6/9/98	3/12/98
29		24/1/99	22/4/99
30		9/5/99	5/8/99
31		22/8/99	18/11/99

