Cairo Air Improvement Project

Vehicle Emissions Testing Component

Technical Specification and System Requirements for a Test System Known as Idle Emissions and Opacity Test and Vehicle Safety Inspection

Chemonics International, Inc.
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GOE TEST SYSTEM SPECIFICATION

1.0 INTRODUCTION

This document will provide the Government Of Egypt (GOE) with a description of the vehicle testing system features being employed to provide periodic testing for vehicles registered in greater Cairo. This document also serves as the "blueprint" for the systems developers to ensure a final product that will be responsive to the program needs and as such will:

- require formal acceptance by GOE, and
- specify the design criteria and performance by which the engineering product will be measured.

Modifications to this document may only be made with the joint concurrence of the approval signatory parties.

1.1 General

The Cairo Air Improvement Project (CAIP) has developed a Vehicle Emissions Testing (VET) program in order to provide periodic emissions testing of the motor vehicle fleet operating in the Greater Cairo area. Working with agencies of the Government of Egypt (GOE), the program will annually measure exhaust emissions on passenger cars, trucks and motorcycles. In addition, a vehicle inspection of various components, as detailed in §1.8 and §5.4, including an automated brake and sideslip alignment test will be provided. A Vehicle Emissions Report (VER) and/or a Vehicle Inspection Report (VIR) and an optional visible indicia will be provided for vehicles that pass the relevant portions of the test. The GOE will determine if and how to employ the reports in order for the vehicle owner to obtain vehicle registration. The optional indicia may be employed to allow for on-road enforcement of inspection requirements.

1.2 Program Area

The program area is made up of the Governorates of Cairo, Giza and portions of Kaliobeya. The current Traffic Authority Units now providing vehicle registration services will be the basis for a division of the area into zones. The zones may or may not coincide with Governorate boundaries such that one Governorate may employ more than a single contractor within its boundaries. A three station 'Pilot' program will be implemented first as described in §1.3.

Private sector VET service providers will be awarded the testing "franchises" for one or more zones and will perform the test and inspection certification process at test-only, high throughput facilities. All vehicles registered at the particular Traffic Unit will be required to regularly undergo testing at the appropriate franchise location(s) for that Unit.

1.3 Pilot Program Implementation

The program will be initially implemented with three pilot stations, one in each Governorate of the program area. The stations will be equipped to provide emissions and safety testing in each lane as per §3.1 and §3.2.

The stations and test data will not be interfaced to the host until the network is operational and the host communication is adequately supported through local suppliers.

At such time as the host is installed, the prior test data created at the pilot stations can be loaded to the host database for reporting and statistical analysis.

1.4 Vehicle Population

Reports from the General Traffic Authority indicate the vehicle population shown in the table below. It should be noted that the values shown for Kaliobeya are for the Shobra El Khaima unit only which is that portion of the Governorate considered part of Greater Cairo.

TABLE 1.4-1 VEHICLE POPULATION

	Passenger Cars	Taxis	All Buses	Motor-cycles	Trucks	Others	Total
Cairo	539,044	64,564	15,967	99,013	97,177	650	816,415
Giza	190,626	34,757	4,072	40,578	39,385	240	309,658
Kaliobeya	5,700	7,000	464	7,000	7,500	320	27,984
Total	735,370	106,321	20,503	146,591	144,062	1,210	1,154,057

No electronic data is available identifying vehicles other than gross counts in each Traffic Unit. No owner information will be supplied for use in the initial testing.

1.5 Types of Tested Vehicles

Gasoline and diesel powered vehicles (including motorcycles) registered in greater Cairo (Cairo, Giza and portions of Kaliobeya) will be tested for emissions. Selected vehicles will receive a check of safety-related components and/or systems.

1.6 Test Procedures

Current law defines pass/fail standards for vehicle emissions at a single idle speed as shown in §1.7 below, however the test procedure will employ a two speed idle test, measuring HC and CO concentrations at idle and 2500 RPM for gasoline powered vehicles. The idle portion of the test will determine the pass/fail result while the 2500 RPM portion will be supplied for repair analysis. Diesel vehicles will be tested for exhaust opacity during a snap-acceleration, or free acceleration test. All motorcycles will be given a two speed idle test with an additional exhaust opacity check on two-stroke powered machines. All contractors will perform the same test using the same emissions analyzers and opacity meters provided through CAIP. A yet to be determined portion of the fleet will receive a periodic safety inspection as well. This inspection will be a visual/functional inspection integrated into the emissions testing process.

1.7 Emission Standards

The standards for HC, CO and particulate/visible smoke will be based upon the statutory requirements as defined by Ministerial Decree of 1995 (article 37). An appropriate Ministerial Decree will be required to specify the test measurements for all vehicles to be included in the program, the testing mechanism, and the applicable fines for non-compliance. Currently, the decree defines two model year groups and specifies allowable emissions for each as shown in table 1.7-1.

TABLE 1.7-1 EMISSIONS STANDARDS

Model Year	HC	CO	Opacity
≤1994	1000 ppm	7%	65%
≥1995	900 ppm	4.5%	50%

Note: It is likely that a third tier of standards will be employed in the near future for newer model years and the GOE may also include alternative standards for different weight classifications when this new vehicle standard is specified. Additionally, it is likely that a separate standard to be employed for 2-stroke powered vehicles will be included in an appropriate ministerial decree before initiation of the test program. For the purpose of the test, idle shall be limited to an engine speed between 400 and 1200 rpm.

1.8 Safety Requirements

Vehicles subject to the safety inspection will receive a combined visual/functional inspection of the components and systems detailed in §5.4. A Vehicle Inspection Report form (VIR) will be printed for each safety inspection performed. Figure 1.9-2 depicts the VIR form to be used. The system software will allow for the lane inspector to select a combined emissions and safety inspection during the customer's visit to the station. This will provide the customer with a one-time drive through service meeting their registration renewal requirements.

The standards used for safety inspections are based upon the statutory requirements of traffic law number 66. An appropriate Ministerial Decree will be required to specify the test measurements for brake and side slip testing of vehicles to be included in the program. Currently, the law defines the items to be tested as shown in §5.4.

1.9 Compliance Enforcement

Vehicle licensing denial, possibly in combination with visible windshield stickers will be employed by the Traffic Departments of Greater Cairo to enforce the mandatory test requirements. The issuance of a test report at the test-only facility will allow the vehicle owner to proceed with registration at the appropriate Traffic Department office. Since some vehicles can register for multiple years, use of the windshield sticker is recommended to improve on-road enforcement and employing this tool would allow for eventual annual emissions test. In this way, on-road enforcement could still be effective during the extended periods when the owner is not required to return to the Traffic Unit. Such an emissions sticker would expire after one year. The vehicle owner would be required to undergo an annual emissions test, even though there is no vehicle registration requirement at the time of inspection. Depictions of the Vehicle Test Reports are included as figures 1.9-1 and 1.9-2. These report forms will be provided for each appropriate test.

Vehicle Emissions Test Report

(text area)

Governorate	Traffic Authority	Plate	Name

Displacement	Color	Cylinders	Vehicle Type	Chassis Number

Sticker Expiration	Registration Expiration	Year	Model	Make	Weight	Fuel

Overall Result	Opacity	Fuel Cap	Emissions	Test Date/Time/Station ID

Result	Limit	Units	Reading	
				Opacity
				HC
				CO
				CO_2

For Official Use Only – DO NOT WRITE IN THIS SPACE

Signature	Inspector Name

Figure 1.9-1 Sample Vehicle Emissions Report (VER)

Vehicle Inspection Report

(text area)

Governorate	Traffic Authority	Plate	Name

Displacement	Color	Cylinders	Vehicle Type	Chassis Number

Sticker Expiration	Registration Expiration	Year	Model	Make	Weight	Fuel

OVERALL Visual/Functional INSPECTION RESULTS	Test Date/Time/Station ID

For Official Use Only – DO NOT WRITE IN THIS SPACE

Signature	Inspector Name

Chassis Number	Motor Number

Figure 1.9-2 Sample Vehicle Inspection Report (VIR)

1.10 Test Charges

Discussions currently indicate that testing services may be provided without a direct charge to the motorist. However, the system will support a mechanism for processing some evidence of remittance since proposed test costs will be included in the evaluation of vendor responses to the tender offer along with other technical requirements. The currently proposed program recommends that once the vendor(s) are selected, the official charge for the test be adjusted to equalize the charges to the public at all sites, and potentially a portion of the funds collected would be used to support administrative costs to oversee the program. It is possible but not likely that the vehicle testing charges will be graduated in proportion to the registration fees set, for the most part, by engine displacement.

Local conditions warrant either pre-payment of the testing charge at a financial institution separate from the test-only facility (now available for the vehicle registration fee payment) or use of a kiosk at the station entrance at which the charges will be collected immediately before testing. The latter will require a stand-alone payment processing system that can be linked to the inspection test records for audit purposes (see §7.2). In either case, the system will support functions needed to acknowledge and record information from the motorist who will present a paid receipt at the first lane position in order to obtain the test(s). The lane inspectors will handle no money.

1.11 Quality Control

As described in the appropriate sections that follow, test equipment will contain internal audit and testing accuracy checks. Initially, all emissions testing equipment, data collection and analysis equipment will be supplied by CAIP to each private sector testing facility in the network. Additionally, automated data processing equipment to compile and analyze test results will be provided by CAIP at the EEAA Technical Center for use in program evaluation by EEAA and to maximize enforcement efforts of the Traffic Authorities.

Current Traffic Authority practices will remain in place to provide quality control with respect to vehicle safety inspections. Additionally, the automated data collection system features employed in the testing program will enhance these capabilities through the use of standard and ad-hoc report generation available to oversight personnel (see section §1.12).

1.12 Quality Assurance

Training will be developed under CAIP to provide EEAA and the Traffic Authorities information on minimizing fraud, waste and abuse in the system. The data processing system will be designed to provide oversight capabilities and adequate system access to GOE personnel and will include a host computer system, located at the EEAA Technical Center, on which data from individual vehicle tests and other station operational information will reside. All host computer system inquiries relating to program performance will be confined to PCs at the Technical Center. See §6.4 and §6.5 for further information regarding host computer system access and program performance monitoring.

2.0 OPERATIONAL DESCRIPTION

2.1 Overview

The proposed emissions test lanes are designed to test all vehicle types operating on gasoline, diesel fuel, or a gasoline-oil mixture. All of the equipment specified in §3.1.1 will be included in all test lanes in the final network, however some portions of the system will not be used, or will be used in a different manner based on the vehicle being tested. Testing scenarios for gasoline-powered, diesel-powered vehicles and motorcycles are described in §5.0. Note that pilot facilities may be configured differently as well, for example, not all lanes may include extended range analyzers used in the testing of two-stroke powered vehicles.

For gasoline-powered vehicles the test will include an automated measurement of the exhaust gas for CO and HC content. In addition, a visual pre-test observation for excessive smoke may warrant initial opacity testing which could fail the gasoline-powered vehicle before exhaust gases are measured. For diesel-powered vehicles the test will include an automated measurement of the exhaust opacity. For 4-stroke powered motorcycles, the test will include an automated measurement of the exhaust gas for CO and HC content. For 2-stroke powered motorcycles, opacity check at idle will be included as well as a check of exhaust gas content using extended range testers. The visual check for smoke from the 4-stroke powered motorcycles, similar to that applied before exhaust gas measurement of other gasoline-powered vehicles will again be used at the lane inspector's discretion. A visual check of the fuel filler-cap mating will be performed on all vehicles.

The system will prompt the lane inspectors throughout the entire test procedure, including credential issuance (vehicle emissions report (VER) and vehicle inspection report (VIR) and windshield sticker if it used).

Vehicle identification information will be manually entered from standard owner credentials issued by the Traffic Authorities. No vehicle or owner data will be available prior to the initial test on the system. No vehicle or owner or prior test data will be available until the host communications with the station have been established. The vehicle, owner and test information will be stored on the lane and station computers for later transfer to the host computer system. Once the host system is operational and the station and host systems are electronically connected via data lines, information on previous tests will be available from the host system for subsequent tests (see §6). Since the Traffic Authorities have indicated that they will not be replacing their inspection form with the system VER and VIR, only minimal vehicle and owner identification information will be entered.

A vehicle safety inspection will be performed on subject vehicles consisting of a visual/functional inspection of the items detailed in section §5.4. The results for these items will be recorded based upon operator entries at either position one or three.

2.2 Lane Configuration

Figure 2.2-1, Shows the configuration of a single test lane. Each lane consists of three sequentially operated positions. These positions are:

- Position 1 – vehicle data entry, elements of the vehicle safety inspection
- Position 2 – emissions measurement (tailpipe and filler cap)

- Position 3 – remaining elements of vehicle safety inspection, brake test, side slip test, data storage, VER and VIR print-out and sticker issuance (if utilized).

The lane configuration is based on a design using commercially available PCs specifically tailored to meet the testing requirements of its assigned operating position within the test lane. These computers are linked to specialized test equipment used in performing all portions of the test sequence.

The position one lane inspector will enter vehicle and any payment receipt information via the keyboard/display at position one. The selection of test type(s), *emissions-only, safety-only* or *emissions and safety* will be made by the inspector. The vehicle/fuel-type selection by the lane inspector at position one will automatically result in the system identifying the proper test for the vehicle at position two. Manual entry of all required data is required for a vehicle appearing at any test station for the first time. Subsequent appearances of the vehicle within the test station may use data made available by the host computer system when the host computer system becomes operational and is electronically linked to the stations (see §6). Prompting messages and results will appear on the display screen.

For lanes configured as both emissions and safety inspection lanes, the ability to enter the vehicle safety inspection results for the items listed in section §5.4 are available to the operator. The inspector at position one has the option to inspect as many of the items as time allows. The remaining items not inspected at position one, along with the brake and sideslip tests will be entered at position three.

All prompts during the data entry function will be in Arabic. Multiple choice menus will be provided where appropriate to aid in data entry. A hierarchical search utility may be used to quickly identify such things as vehicle make and model. All information will undergo data type, format and validity checks. In addition, a bar code scanner will be made available should items such as the payment receipt, windshield sticker, or "owner's card" include bar coded information if available in the future.

A preliminary pre-inspection check will be performed at position one. The lane inspector will visually check for leaking fluids, presence of a fuel filler cap, excessive engine noises or smoke and will verify the integrity of the exhaust system, checking for audible leaks. If there are safety concerns over these issues, a vehicle may be rejected from testing.

At position two, the lane inspector will be prompted to perform the appropriate test based on the vehicle/fuel type. For gasoline-powered vehicles, the lane inspector will be given the opportunity to manually select a pre-screening for opacity should excessive smoke be visible from the vehicle exhaust at the expected engine operating speeds (idle and 2500 rpm). Failure of this test will automatically reject the vehicle before exhaust gases are measured. For diesel-powered vehicles, the lane inspector and vehicle operator will be provided with the required prompts to perform the snap-acceleration test. The visual gas cap inspection may be performed while the tailpipe exhaust measurement takes place. Lane inspector and any required vehicle operator prompts will be in Arabic.

At position three, the emissions test results will be calculated and the VER will be automatically completed on a pre-printed VER form. The remaining safety items detailed in section §5.4, but not addressed at position one will be inspected and the

results entered, including the brake and sideslip test results. The safety inspection results will be calculated and the VIR will be automatically completed on a pre-printed VIR form. All results printed on the forms will be in Arabic. If the vehicle passes and the GOE elects to employ windshield stickers to enhance on-road enforcement, the system will assign an appropriate expiration for the windshield sticker. The system will prompt the position three lane inspector to apply the sticker, automatically tracking the lane sticker inventory at that time. Vehicle information and test results will be stored. The sticker may contain a bar code to be used in the inventory control (using a bar code scanner at position three) which could be used to speed data entry for testing in subsequent years through the bar code scanner at position one.

The vehicle owner/operator will remain in the vehicle and will be directed to move the vehicle by the lane inspector(s) based upon system prompts. If the lane is configured as a safety-testing lane the inspector will drive the vehicle from position two to position three to perform the brake and sideslip tests. Only a trained lane inspector driving the vehicle will perform the brake and sideslip tests.

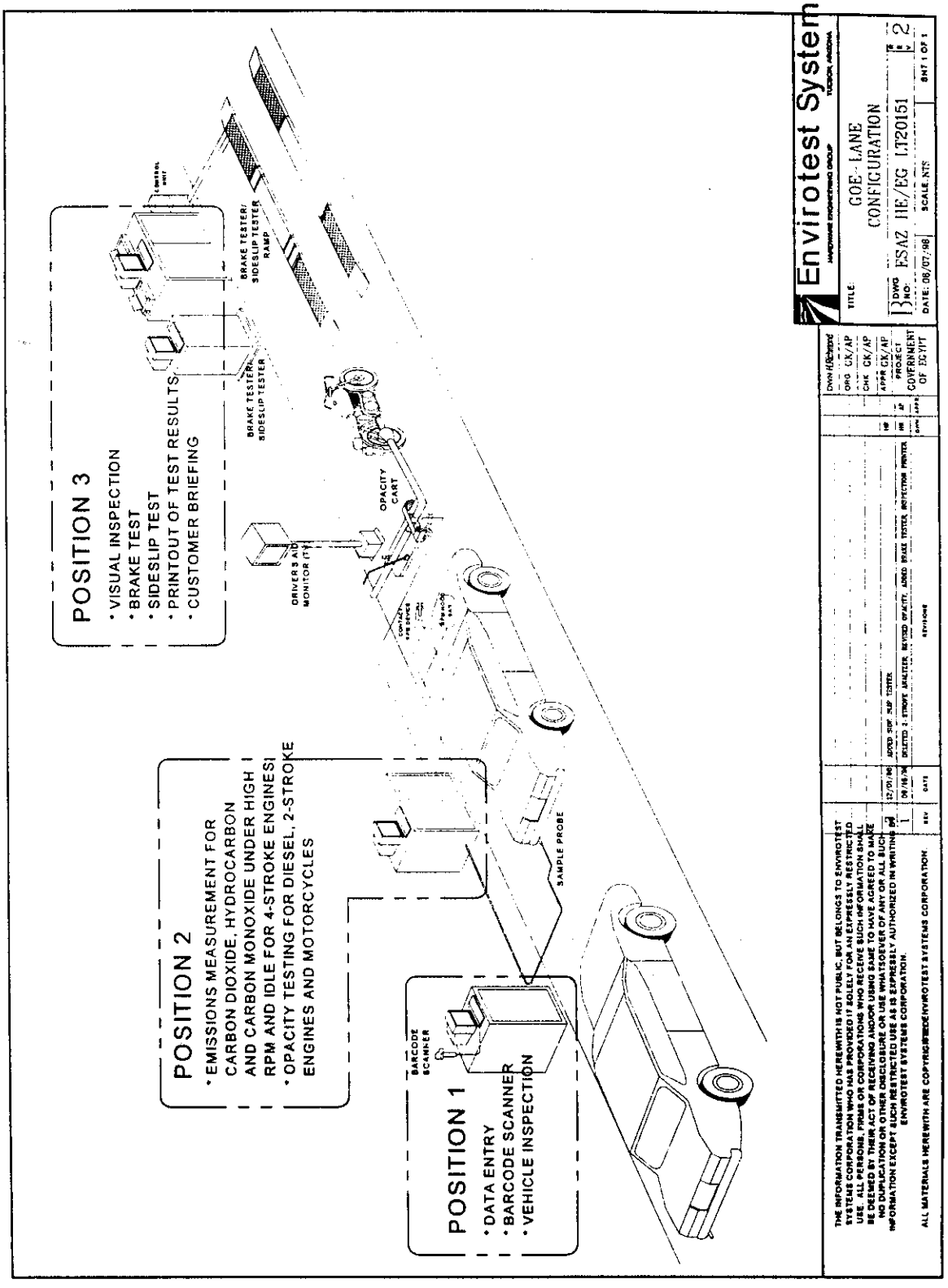
POSITION 3
• VISUAL INSPECTION
• BRAKE TEST
• SIDESLIP TEST
• PRINTOUT OF TEST RESULTS
• CUSTOMER BRIEFING
POSITION 2
• EMISSIONS MEASUREMENT FOR CARBON DIOXIDE, HYDROCARBON AND CARBON MONOXIDE UNDER HIGH RPM AND IDLE FOR 4-STROKE ENGINES
• OPACITY TESTING FOR DIESEL, 2-STROKE ENGINES AND MOTORCYCLES
POSITION 1
• DATA ENTRY
• BARCODE SCANNER
• VEHICLE INSPECTION
BRAKE TESTER/ SIDESLIP TESTER RAMP
BRAKE TESTER/ SIDESLIP TESTER
OPACITY CART
SAMPLE PROBE
BARCODE SCANNER
Envirotest Systems
GOE - LANE CONFIGURATION
DWG NO: ESAZ HE/EG LT20151
DATE: 06/07/98
SCALE: NTS
GOVERNMENT OF DC/TT

Figure 2.2-1

2.3 Lane Operations

There are three phases in the emissions test and vehicle inspection sequence for each vehicle:

- Vehicle data entry, preliminary pre-inspection check, vehicle safety inspection entries
- Emissions measurement
- Vehicle safety inspection entries, brake test, data storage, VER and VIR printout and sticker issuance (when appropriate)

In addition, troubleshooter, calibration and manager functions are provided at each PC workstations for quality assurance and maintenance of the system. These functions are provided in English only.

2.3.1 Vehicle Data Entry

The following data for each vehicle is entered into the system via the keyboard/display, bar code scanner, or system determined at position one:

Table 2.3.1-1 Vehicle Identification Information

Data Element	Field Size	Field Type	Coded Value
Governorate	15 characters	Alpha only	2 numeric
Traffic Authority	15 characters	Alpha only	3 numeric
Plate Type	≤ 6 characters	Alpha-numeric	same
License Plate Number	≤ 6 characters	Numeric only	same
Owner Name	30 characters	Alpha only	same
Registration Expiration Date	Dd/mm/yyyy	Numeric only	dd/mm/yy
Vehicle Make	≤ 10 characters	Alpha only	3 numeric
Vehicle Model	≤ 10 characters	Alpha-numeric	4 numeric
Model Year	4 characters	Numeric only	2 numeric
Chassis Number	≤ 21 characters	Alpha-numeric	same
Vehicle Type	≤ 8 characters	Alpha only	3 numeric
Engine Displacement	≤ 4 characters	Numeric only	4 numeric
Number of Cylinders	2 characters	Numeric only	2 numeric
Vehicle Weight (trucks only)	≤ 5 characters	Numeric only	same
Fuel Type	9 characters	Alpha only	1 numeric

All of the vehicle specific information is available on a single document, the "owner's card" issued by the Traffic Units and required to be carried by the driver. The data entry screen will replicate the order of the information as presented on the card (decoded values – shown as "field size" and "field type" above) to the extent practical and will use the same field sizes and edits employed by the Traffic Units, wherever possible. Where the Traffic Authority is able to identify a limited range of acceptable values employed, these will be provided in a pull down menu wherever possible so that the lane inspector will be able to enter the proper value quickly.

The column above in table 2.3.1-1, indicating "coded value" represents the current depiction of the element on the Traffic Authority automated database record. These

same coded values will be used on the database created for the VET system, wherever possible, for ease of future information transfer. For example, a vehicle make of *Mazda* may show as such on the owner's card, but is coded "MAZD" in the vehicle record. Every effort will be made to similarly code the Traffic Authority information to the Environmental Systems Products Inc., system data. If the Traffic Authorities supply this information, it will be included in Appendix A of this document. Should no information be forthcoming, industry standard codes will be employed wherever possible at the discretion of ESP.

If there is a direct charge to motorists associated with the test/inspection service, it may be possible to capture certain portions of the vehicle identification information when the payment is made depending upon the process employed. However the information gathered will be minimized to avoid delays at the payment kiosk if such a device is employed. See §7.2 for further information.

It is the intent of the system design that once this information is entered, it would ultimately be available for subsequent tests via system recall from the host computer system (when the host computer system becomes operational and is electronically linked to the stations), keyed off of the chassis number, the bar-coded windshield sticker or some other unique vehicle identifier, if this is employed. The recalled information would require verification only by the lane inspector. Logic and field size edits will be performed on the vehicle and owner information entered at position one. In addition, an edit to ensure that the vehicle is qualified to be tested at the particular location based upon the Traffic Unit assignment will be performed (see §1.2).

A vehicle inspection of safety related components will be performed. The entry of the pass/fail visual/functional inspection can be made at positions one or three. Initially when the vehicle is presented at position one, the inspector will be given a display containing all of the safety-related components that are to be inspected. If there is sufficient time to perform the entire inspection at position one, with the exception of the brake and sideslip tests, the results will be entered. If there is not sufficient time to inspect any or some of the components, the vehicle will be moved to position two for emissions testing and then position three where the remaining safety related component will be checked by that lane inspector, completing the safety inspection.

Note that the identical display given at position one will be again displayed at position three with the results that have already been entered. A confirmation that all items have been inspected, is required at position three before the inspection will be considered complete and the system finalize the test.

After the vehicle data has been entered, edited and accepted, the lane inspector is cued to direct the operator to move the vehicle to position two.

2.3.2 Emissions Measurement

The emissions test is an idle mode, HC, CO, and CO_2 test for gasoline-powered vehicles and those operating on a gasoline-oil mixture (two-stroke). Vehicles emitting visible smoke may be subjected to an opacity check prior to exhaust gas measurement if the position one lane inspector selects this option. Excessive smoke would fail the vehicle before any exhaust gas measurements are taken. All two-stroke powered vehicles will receive an opacity check and diesel powered vehicles will receive a snap-acceleration opacity check. All vehicles will also receive a visual fuel-filler cap/filler neck mating check to ensure for the safety of vehicles operating in the inspection

facility. The appropriate tests and pass/fail standards will be automatically selected for the vehicle based upon the vehicle information entered at position one. All emissions tests will take place at position two based upon the system prompts.

The system will include edits and reading validation checks (sample dilution, engine rpm, etc.) to assure proper testing. If the readings are not valid, the lane inspector will be prompted that an invalid condition exists and will be given the opportunity to RESTART, CANCEL or ABORT the test after examination of the cause of the fault and/or correction of the problem.

> The ABORT command allows the entire current vehicle test to be terminated. The incomplete test record is stored, but not included in the test count. No test forms are printed.
>
> The CANCEL command immediately terminates the in-process test only. The lane inspector then has the option of either repeating the emissions test, or terminating the entire current vehicle test, through the abort command, if it is determined that the test cannot be performed for the vehicle. Anytime that an entire vehicle test is terminated, by an abort, the test data up to that point is saved. Test data that is canceled (is not saved).
>
> The RESTART command allows the inspector to restart the entire current vehicle test from the beginning at position one.

2.3.3 Data Storage, VER and VIR Printout and Sticker Issuance

Upon completion of the emissions tests, the lane inspector at position two is prompted to direct the vehicle operator to move the vehicle to position three. Information on the vehicle and test results is transferred to position three. In the case of safety inspections utilizing the platform brake tester, the lane inspector will move the vehicle to position three and onto the platform brake tester. The vehicle safety inspection will be completed for any components not verified at position one. In addition, the brake and sideslip tests will be completed as a part of the safety inspection.

The VER is printed for the emissions test and a VIR is printed for the vehicle safety inspection to provide a written record of the vehicle data test and inspection results. The system also saves the results of the test along with the vehicle data on the lane and station computers (see §2.4). Provisions for transfer of the data to the host computer system (potentially using data lines, but initially via manual disk transfer) are included in the system.

The position three lane inspector delivers the VER and VIR to the vehicle operator. The system automatically assigns the proper sticker (expiration date and type) for vehicles that pass the test from an inventory maintained at position three if stickers are employed by the GOE. The lane inspector will be appropriately prompted to select and apply the sticker(s) to the vehicle, after passing the tests.

2.3.4 Troubleshooter

The Troubleshooter function of the automated lane system provides a means of dynamically displaying the values of all analog signals (both volts and engineering

units) and discrete signals. Access to this function on the lane system is password protected via employee number and PIN entries and accessible to appropriate maintenance personnel only. This functionality is provided in English only.

2.3.5 Calibration

The Calibration function provides a means of calibrating the analytical system using known concentrations of bottled gas in the case of the exhaust gas analyzer. Filters or electronic means will be employed to perform opacity measurement device calibration as well. A record of all the calibration procedures performed each day will be stored in the lane. Periodic transfers of the calibration information to the host computer system will be performed by station management. This functionality is provided in English only.

2.4 Station Operations

Independent of the number of lanes, each station shall be equipped with a station computer and a station manager PC.

The station computer will act as a secondary data storage device and compile information for use in station management. Additionally, this computer will be connected to the host computer system via the wide area network (WAN) if and when such communications become established. At present, it is not known if the local telephone services will support electronic data communications with the host computer system from all test locations. As such, the station computer will allow for the manual transfer of all lane data via standard diskette until the WAN can be established. In either case, the system will provide for this manual data collection/transfer, should communications fail.

The station manager PC will serve as general purpose PC with limited reporting capability related to test station operations.

It is important to note that at the lane level, the calibration records will be saved for the current calibration status of the lane equipment only. No historical listing of calibration records is available at the lane level. The current record over writes the prior record. The lane activity will be restricted or even eliminated if the calibration records for that particular lane record a status of fail for any of the required calibrations. This ensures credibility for the status of the lane equipment.

3.0 SYSTEM EQUIPMENT

Figure 3.0-1 Illustrates the equipment included in a typical test facility, including the linkages between test equipment and computers. Individual lanes operate independently and can be shut down for repairs without impacting the remaining station and operations.

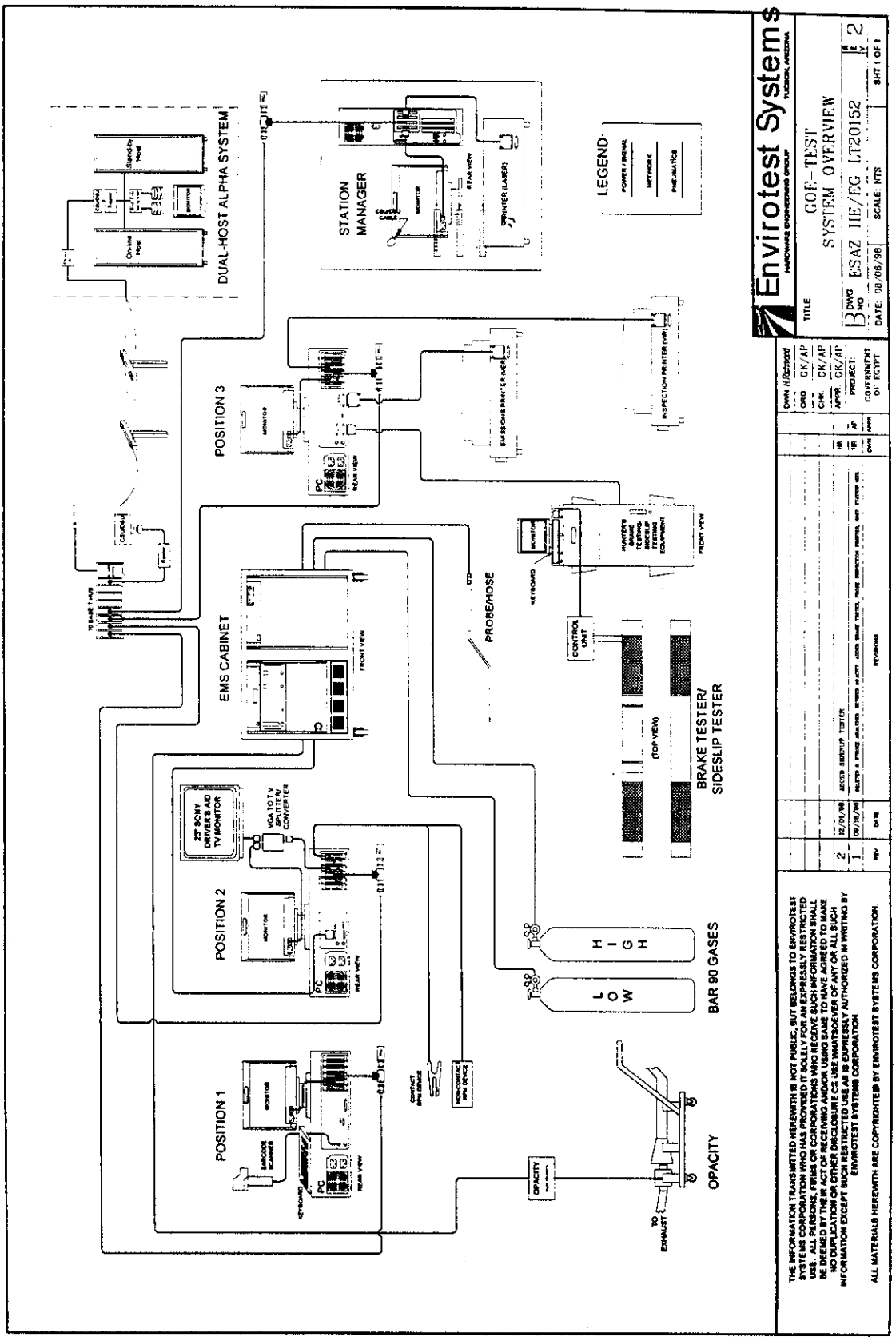
DUAL-HOST ALPHA SYSTEM
STATION MANAGER
LEGEND
POSITION 3
POSITION 2
POSITION 1
EMS CABINET
PROBE/HOSE
BRAKE TESTER/ SIDESLIP TESTER
BAR 90 GASES
OPACITY
HIGH
LOW
Envirotest Systems
GOF-TEST SYSTEM OVERVIEW
ESAZ IIE/EG LT20152
DATE: 08/06/98
SCALE: NTS
COVERNMENT OF EGYPT
PROJECT

Figure 3.0-1

3.1 Lane Equipment and Documentation

3.1.1 Lane Equipment

Each lane will be supplied with the following equipment or equivalent:

Position 1

- Lane PC: Pentium PC (166MHz minimum) with 32MB memory, 1GB hard disk (minimum), 1.44MB floppy, WIN95 (Arabic), Ethernet network interface card (NIC)
- 14" VGA color monitor
- English/Arabic keyboard
- Bar code scanner

Position 2

- Lane PC: Pentium PC (166MHz minimum) with 32MB memory, 1GB hard disk (minimum), 1.44MB floppy, WIN95 (Arabic), Ethernet network interface card (NIC)
- 14" VGA color monitor
- English/Arabic keyboard
- Emissions Measurement Systems Cabinet
  Exhaust Gas Analyzer System (may include extended range devices for use with two-stroke powered vehicles)
- Opacity Measurement System (to be used only when lane inspector observes excessive exhaust smoke or for two-stroke motorcycles and diesel fueled vehicles)

Position 3

- Lane PC: Pentium PC (166MHz minimum) with 32MB memory, 1GB hard disk (minimum), 1.44MB floppy, WIN95 (Arabic), Ethernet network interface card (NIC)
- 14" VGA color monitor
- English/Arabic keyboard
- Bar code scanner
- Brake test unit
- Side slip test unit
- VER printer
- VIR printer

This position contains the brake and sideslip testing equipment. The brake and sideslip tests may be a stand alone, non-integrated system. In this case, the overall pass/fail result of the brake test will be manually entered into the system test record at position three, as part of the Vehicle Inspection. If the brake tester used is compatible with the interface at position three, an integrated transfer of data will be employed, eliminating the need for an operator entry of the brake test data.

The brake test equipment features include:

- System to test service brake, parking brake and measure static weight
- Plate system allowing vehicle to simply drive and stop. Microprocessor-based electronics employed to identify brake balance problems that can't be detected by wheel-off inspection.
- Capacity to test vehicles with an axle weight up to 7000 pounds or 3175 Kg and wheel base up to 188 inches or 4.76 m.
- Plates will have hot-dipped galvanized finish to resist rust and corrosion.
- Plates shall be less than three inches high and bolt to the flat floor. No pits will be required.
- Brake tester console will employ a PC with multimedia processor. Windows 95 based software will be included with features for brake testing and ability to connect / communicate with other software programs.

The Sideslip equipment includes:

- Tests for alignment
- Plate system that will allow vehicle to simply drive over. Microprocessor-based electronics will identify the amount of misalignment.
- Capacity to test vehicles with an axle weight up to 7000 pounds
- Plates that are less than three inches high and bolt to the flat floor. No pits will be required.

3.1.2 Documentation

The following documents as detailed in sections 3.1.2.1 and 3.1.2.2 and 3.2.6 will be provided with the system.

3.1.2.1 Inspector's Manual

The inspector's manual will be provided as an operational guide to the lane operator's functions. The manual will cover such items as;

1. Position one data entry including pre-test eligibility, test charge processing (if required) and test types, vehicle safety inspection results.
2. Position two test sequencing, test types, proper test methods and data entry.
3. Position three data entry, fuel cap test, brake test, vehicle safety inspection results, VER and VIR data and customer information.
4. Proper use of the 'Abort', 'Cancel', 'Re-print' and 'Re-start' functions.

The manual is intended as a reference guide and teaching tool for proper lane operations. It is imperative that the procedures be followed to ensure safe, accurate and proper testing practices.

3.1.2.2 Maintenance Manual

A system maintenance manual will be provided that will cover the overall general system maintenance and calibration routines.

The purpose of the manual is to explain the proper calibration and maintenance procedures for the test equipment located in each test lane and position within the test facility. It provides information and procedures for routine maintenance and servicing, and in some cases it will provide diagnostic and repair methodologies. It is intended that the information be used as a reference manual and teaching tool.

It is imperative that the practices be followed to ensure that the systems perform accurately, safely and as specified.

3.2 Station Equipment and Documentation

Each Station will be supplied with the following equipment or equivalent:

3.2.1 Station Computer (and peripherals)

- Station PC: Pentium PC (266 MHz minimum) with 128 MB memory, 4.3 GB hard disk (minimum), 1.44MB floppy, WIN95 (Arabic), MS Access, Ethernet network interface card (NIC)
- 16X CDROM
- 100MB Zip Drive or equivalent
- 14" VGA color monitor and keyboard

3.2.2 Station Manager PC (and peripherals)

- Station Manager PC: Pentium PC (266 MHz minimum) with 128 MB memory, 4.3 GB hard disk (minimum), 1.44MB floppy, WIN95 (Arabic), MS Office PRO (Arabic), Ethernet network interface card (NIC)
- 16X CDROM
- 100MB Zip Drive or equivalent
- 14" VGA color monitor and keyboard
- 33.6K data modem
- Bar code scanner
- Laser printer

3.2.3 Ethernet LAN Interconnection Hub

Each station will contain a multi-port Ethernet LAN (local area network) interconnection hub. The hub is used to interconnect the lane and station PCs into a single LAN. The hub will be located in the station manager's office. The hub will also be used to

connect the LAN to the WAN (wide area network) via a WAN router and CSU/DSU (see §6.0 for more details).

3.2.4 WAN Router

Each station will contain a WAN router to connect the station LAN to the WAN. The WAN consists of all the telephone data circuits that connect each testing station to the centralized site where the host computer system is located. The WAN router will be located in the station manager's office (see §6.0 for more details).

3.2.5 CSU/DSU (Customer service unit/Data service unit)

Each station will contain a CSU/DSU to connect the station WAN router to the physical data circuit provided by the telephone company. The CSU/DSU will be located in the station manager's office (see §6.0 for more details).

3.2.6 Operations Manual

With the system delivery, an Operations manual will be included for the host operator functions. The manual will cover such items as;

Reports Generation
System data maintenance
Archiving data
Ad-hoc report formulation
Lane - Host communications support

3.2.7 Station Calibration Gases

The following gases will need to be provided at each station.

Low Span Calibration Gas:
300 PPM Propane (C3)
1.00% CO
6.0% CO2
Balance Nitrogen
Analytical Accuracy ± 2%

High Span Calibration Gas:
1200 PPM Propane
4.0 % CO
12.0 % CO2
Balance Nitrogen
Analyzer Accuracy ± 2%

3.2.8 Station Calibration Equipment

The following calibration equipment needed to calibrate the analytical equipment within a station consists of the following:

3.3 Equipment at the Technical Support Center

- RPM calibration system:
  - RPM Simulator
  - Digital Voltmeter
  - Oscilloscope (optional)
- Manual 10 Point Gas Divider
- Gas for the linearity adjustment calibration:
  - 12 % CO2
  - 8% CO
  - 1.4 % (14000 PPM) HC (Propane)
  - +/- 1% accuracy
- Brake Tester calibration system (optional)
- Teflon tubing and quick connect fittings

3.4 Equipment at Each Station

- Opacity calibration filters if required
- Tailpipe simulator
- Leak check cap for probes

4.0 Test Equipment Specifications

4.1 Position One

4.1.1 Data Entry Computer – PC, Monitor and Keyboard

Each lane will be supplied with the following equipment or equivalent at position one:

- Lane PC: Pentium PC (166MHz minimum) with 32MB memory, 1GB hard disk (minimum), 1.44MB floppy, WIN95 (Arabic),
- Ethernet network interface card (NIC)
- 14" VGA color monitor
- English/Arabic keyboard
- Bar code scanner

4.1.2 Barcode Reader

The specifications for the position One barcode reader are as follows:

Scan Pattern -
Start Time: 0.065 sec to 75% of steady state horizontal amplitude
0.50 sec to 90% of steady state vertical amplitude
Pattern Size: At 9.5 inches from the nose of the scanner, the pattern is 7.2 inches horizontally and 2.6 inches vertically.
Scan rate: 560 scans / sec 280 Hz +/- 15 Hz Horizontal
Frame rate: 25 frames / sec, 12.5 Hz +/- 1 Hz Vertical
Humidity range: 5-95% (non-condensing)
Operating temperature: -20 ° C to 40 ° C (-4 ° F to 104 ° F)
Power Requirements: + 5 Vdc, 400 mA Typical

Symbol Technologies Model LS4800 scanners meet these requirements.

4.1.3 Other

Single Bay Cabinet
220 V to 110 V Transformer, capacity 8 Amps
UPS

4.2 Position Two

4.2.1 Emissions Measurement Computer – PC, Monitor and Keyboard

Each lane will be supplied with the following equipment or equivalent at position two:

- Lane PC: Pentium PC (166MHz minimum) with 32MB memory, 1GB hard disk (minimum), 1.44MB floppy, WIN95 (Arabic),
- Ethernet network interface card (NIC)
- 14" VGA color monitor
- English/Arabic keyboard
- Emissions Measurement Systems Cabinet
- Exhaust Gas Analyzer System

- Opacity Measurement System (to be used only when lane inspector observes excessive exhaust smoke)

4.2.2 4-Stroke Exhaust Gas Analyzer

Measuring gas ranges: CO: 0 to 10% volume
CO2: 0 to 20% volume
HC: 0 to 10000 PPM (HC as Hexane)

Range and Accuracy:

Gas	Range	Accuracy, % of point	Accuracy absolute
HC	0-2000 ppmh	± 3%	4 ppmh
	2001-5000 ppmh	± 5%	-
	5001-9999 ppmh	± 10%	-
CO	0-10.00%	± 3%	0.02% CO
	10.01-14.00%	± 5%	-
CO2	0-16%	± 3%	0.3 % CO2
	16.1-18%	± 5%	-

Signal Interface: RS 232C Serial Interface, 9600 Baud, 3 Wires (Rx, Tx, Gnd)

Sample Flow: 2.0 LPM to 3.0 LPM

Environmental Conditions:
Temperature Range: 10 ° C to 50 ° C
Relative Humidity: 0 % to 90%
Altitude: -300 m to 2500 m

The Horiba BE-140AD Three Gas Exhaust Analyzer meets these requirements.

A limited number of extended range analyzers may be employed in order to test two-stroke powered vehicles. These may not be available in all lanes, depending upon final network determinations by the GOE. These devices will include special sampling systems and analyzers to measure HC to 20,000 ppm.

4.2.4 Portable Opacity Meter

Power Requirement: 220 VAC, 50 HZ to 12 V DC Power Adapter
Range: 0-100% Opacity
Accuracy: ± 2%
Operating Temperature: 0 – 50 ° C (32 – 120 ° F)
Zero Drift: Less than 1% in 10 minutes

Interface: 0 – 1 V DC analog signal or RS232C Serial

4.2.5 Engine RPM Measurement (Tachometer)

Tachboard:
Standard IBM PC/XT/AT full length card
Two identical DB-9 connectors for sensors

Power Requirements: +5V @50mA, +12V @ 290mA, -12V @80mA.
Measurement Accuracy: +/- 30 RPM
Operating Temperature: 0 to +60 deg. C
Storage Temperature: -40 to +75 deg. C
Relative Humidity: 5 – 95%

Non-Contact Sensor:

Cylindrical PVC housing, 4.5" long, 2" diameter
Two pin Amphenol connector, weatherproof
Two conductor shielded cable, 24 to 20 AWG
Mounted inside a foam lined soft cover, leather bag.

4.2.6 Other

Double Bay Cabinet
220 V to 110 V Transformer, capacity 25 Amps
UPS

4.3 Position Three

4.3.1 VER and VIR Printer Computer – PC, Monitor and Keyboard

Each lane will be supplied with the following equipment or equivalent at position three:

- Lane PC: Pentium PC (166MHz minimum) with 32MB memory, 1GB hard disk (minimum), 1.44MB floppy, WIN95 (Arabic), Ethernet network interface card (NIC)
- 14" VGA color monitor
- English/Arabic keyboard
- Bar code scanner
- VER printer
- VIR printer
- Brake test unit
- Side slip test unit

4.3.2 Other

Double Bay Cabinet
220 V to 110 V Transformer, capacity 8 Amps
UPS

5.0 VEHICLE TESTING SCENARIOS

5.1 Gasoline-powered Vehicles

The proposed emissions inspection lanes are designed to inspect all vehicle types operating on gasoline or a mixture of gasoline and oil. Testing of four- or two-stroke powered vehicles will include an automated measurement of the exhaust gas for CO and HC content. A visual pre-test observation for excessive smoke may warrant initial opacity testing which could fail the gasoline-powered vehicle before exhaust gases are measured. Additionally, a visual check of the fuel filler-cap mating will be performed on all vehicles in order to assure safe working conditions within the confines of the inspection facility. Two-stroke powered vehicles will always receive an exhaust opacity check.

A vehicle safety inspection will be performed with a separate VIR form created for the results of this inspection. For vehicles up to 7000 pounds (3175 Kg), the inspection will include a functional brake test, measuring the overall performance of the vehicle's braking system and a sideslip alignment test measuring the degree of misalignment of the vehicle's front wheels. The detailed listing of the items inspected is given in section §5.4. Heavier vehicles may receive a brake and alignment inspection similar to that currently performed by the traffic authorities, without the use of the platform brake tester in the lane.

The system will prompt the lane inspectors throughout the entire test procedure, including credential issuance (vehicle emissions report (VER) and vehicle inspection report (VIR) and windshield sticker). The system will automatically measure and record the test results based on the appropriate tests and pass/fail standards automatically selected by the system for the tested vehicle.

5.2 Diesel-Powered Vehicles

The proposed emissions inspection lanes are also designed to inspect all vehicle types operating on diesel fuel. Testing of diesel-powered vehicles will include an automated measurement of the exhaust opacity. A visual check of the fuel filler-cap mating will be performed on all diesel-powered vehicles. The emissions test is a snap-acceleration test for diesel-powered vehicles. The position two lane inspector and the vehicle operator will be prompted through the snap-acceleration pre-conditioning and test cycles.

A vehicle safety inspection will be performed with a separate VIR form created for the results of this inspection. The Vehicle Inspection will include a functional brake test, measuring the overall performance of the vehicle's braking system and a sideslip alignment test measuring the degree of misalignment of the vehicles front wheels within the limits described above in §5.1 above. The detailed listing of the items inspected is given in section §5.4.

The system will prompt the lane inspectors throughout the entire test procedure, including credential issuance (vehicle emissions report (VER) and vehicle inspection report (VIR) and windshield sticker). The system will automatically measure and record the test results based on the appropriate tests and pass/fail standards automatically selected by the system for the vehicle to be tested.

All of the equipment specified in §3.1.1 will be included in all test lanes, however some portions of the system will not be used, or will be used in a different manner. In the case of diesel testing, the Exhaust Gas Analyzer System will not be employed. However, the Opacity Measurement System used only for screening gasoline-powered vehicles emitting visible smoke will be used to test every diesel-powered vehicle.

5.3 Motorcycles

The proposed emissions inspection lanes will also provide for testing of motorcycles. Both four-stroke and two-stroke powered motorcycles will be tested. Testing of two-stroke powered vehicles will include an automated measurement of the exhaust opacity in addition to the exhaust gas analysis. A visual check of the fuel filler-cap mating will be performed on these vehicles as well.

At position two, the lane inspector will be prompted to perform the appropriate test based on the fuel type. Exhaust gases will be measured for all vehicles and two-stroke powered motorcycles will also be inspected for opacity at idle. The visual check for smoke from the four-stroke powered motorcycles, similar to that applied before exhaust gas measurement of other gasoline-powered vehicles will again be used at the lane inspector's discretion.

A vehicle safety inspection will be performed with a separate VIR form created for the results of this inspection. The vehicle inspection will include a manual functional brake test, measuring the stopping performance of the vehicle's braking system by acceleration against braking. The detailed listing of the items and test procedure is given in section §5.4.

The system will prompt the lane inspectors throughout the entire test procedure, including credential issuance (vehicle emissions report (VER) and body sticker). The system will automatically measure and record the test results based on the appropriate tests and pass/fail standards automatically selected by the system for the vehicle to be tested.

5.4 Vehicle Safety Inspection

The Vehicle Safety Inspection is a two segment inspection consisting of a visual/functional inspection of the items listed in the table 5.4.1, and an automated brake and sideslip test measuring the braking performance of the vehicle's overall brake performance and the degree of misalignment of the vehicle's front wheels. Initially, a manual entry of the results from the brake and sideslip tests will be included as an item of the vehicle inspection. The lane software will be developed to allow entry of the inspection items at lane positions one or three. A final verification for completeness at position three will be required to ensure that all components have been inspected.

Table 5.4-1 details the items to be inspected.

TABLE 5.4-1 Vehicle Inspection Items

Item	Inspection Type	Possible Results
Head Lights	Functional	Pass/Fail
Tail Lights	Functional	Pass/Fail
Front Turn Signal Indicators	Functional	Pass/Fail
Rear Turn Signal Indicators	Functional	Pass/Fail
Horn	Functional	Pass/Fail
Brake Test	Functional	Pass/Fail
Windshield Wipers	Functional	Pass/Fail
Side Rear View Mirror	Visual	Pass/Fail
Side Slip Alignment Test	Functional	Pass/Fail
Chassis Number Verification	Visual	Pass/Fail
Vehicle Body Condition Check (bumps, corrosion, etc.)	Visual	Pass/Fail
Fire Extinguisher Presence	Visual	Pass/Fail
Windshield Condition	Visual	Pass/Fail
Windshield Stickers	Visual	Pass/Fail
Interior Rear View Mirror	Visual	Pass/Fail
Tires	Visual	Pass/Fail
License Plate Numbers	Visual	Pass/Fail

Upon completion of the inspection a VIR will be automatically printed giving the results of the inspection.

6.0 HOST COMPUTER SYSTEM AND NETWORK

A host computer system, housed in the EEAA Technical Center and operated by the EEAA will provide for the consolidation of testing and other information from the testing facilities. All testing equipment and computer systems at the stations will be identical and the testing system will be designed to operate as a seamless network, without regard to the individual contractors operating the testing sites. Note: test data and network specifications must be consistent for all contractors.

The testing system network will ultimately be electronically linked directly to the host computer system, however it is possible that the data circuits provided by the local telephone company may not be available to support real-time communications when testing begins. As a result, two phases of operations are described – the first, Phase I utilizes manual transport of lane and station data to the host computer system. Phase II describes the system with all stations linked via telephone data circuits to the host computer system.

During the initial implementation of the three planned demonstration stations, the host may not be available for the functionality described in the phase I or II implementation described here, in section §6.0. It is intended that the host system be introduced during the evaluation period of the three demonstration stations. The host system will be implemented before the additional stations are put into operation.

Figure 3.0-1 Illustrates the Cairo Inspection and Certification system topology.

6.1 Benefits of the Network

In both Phase I and Phase II, the vehicle test lane information will be compiled on the host computer system for review and analysis. Statistical reports will be available to show program trends in emissions, station and operator performance. Reports can be generated by each of the vehicle variables entered to show specific results by vehicle make, year, engine size, etc. Contractor performance can also be reported and compared against others in the network or the network norms.

In Phase I, these reports will be done after the fact – that is, data on magnetic transfer media manually transported from each station will be compiled on the host computer system and the desired reports will be generated. In Phase II, EEAA operations personnel will be able to produce these same reports plus have the added advantage of continually monitoring test station performance and produce real-time reports identifying lanes or stations exhibiting selected behaviors as they take place. The manual data accumulation mechanism from Phase I will be retained after Phase II is operational, should any telecommunications difficulties be encountered in the future.

A listing of the automatic reports that will be generated by the host computer system is included in Appendix B. In addition, the host computer system will provide ad hoc report generation should additional variations on the standard reports be desired. Samples of common reports are also included in this Appendix.

6.2 Network Overview

In Phase II, the test lanes will be connected to the host computer system using WAN routers and CSU/DSUs. The data circuit from each testing station will be connected to the host computer system via a WAN router and CSU/DSU. This network scheme will allow the host computer system to communicate with the test station via the wide area network (WAN) while test facility communications will utilize a Ethernet local area network (LAN) already in place as part of Phase I.

6.3 Host Computer System

The host computer system will be a clustered dual-configuration consisting of two separate CPU systems in a clustered configuration processor. This Digital Alpha AXP computer system will be located at the EEAA Technical Center. The AXP series is a 64-bit RISC (reduced instruction set computer) architecture offering outstanding performance, reliability and scalability. The host computer system will support OpenVMS, a multi-task operating system, RAID storage technology and a relational database. The host computer will be operated in English, only the pre-defined reports, as detailed in Appendix 'B', generated by the host will be in Arabic. The system will consist of the following:

- RAID StorageWORKS Subsystem for system/database storage
- High speed/capacity DLT (Digital Linear Tape) Archive Subsystem for backups
- High speed CDROM for on-line vendor documentation
- High speed Laser Printer for reports
- System console/printer for system monitoring/control
- UPS (Uninterruptable Power Supply)
- OpenVMS multi-user, multi-tasking operating system software
- TCP/IP network software
- RDMS (relational database management system) software
- Multiple PCs for database access

6.3.1 Key Features

- Host computer system redundancy offers a dual-host configuration that protects against a single-point CPU failure. Peripheral devices are shared between the two CPUs.
- Relational database management system includes ANSI-standard SQL database access tool
- Archival data storage system offers a high speed/capacity archival storage for off-line, long-term data retention

6.3.2 System and Data Integrity/Backup

The test lanes are designed to provide dual recording of test data to ensure no information is lost. Recording is performed at both the lane and station PCs. This is particularly important because of a number of conditions inherent locally. First, contractors with EEAA supervision will operate the stations and the feedback from the oversight group to those operating the testing facilities may be delayed. Adequate backup must be available should communications problems not be immediately rectified. Second, automatic transmission of lane data may not be available when the network begins operations and third, even when implemented, local telephone line conditions may result in less than optimal reliability from some testing locations. As a result, the lane redundancy has been designed into the system.

Further, data preservation will be assured through the use of redundant disk technology (RAID) as part of the host computer system. Removable, magnetic storage will be employed with system operation procedures that call for:

- System image backups to capture the entire state of the system (at least once per month or on major system upgrades).
- Database image backups to capture the entire state of the databases (at least once per month or on major database upgrades).
- Nightly database incremental backups to capture incremental change to the databases from the last incremental backup.

6.4 Communications

The network will be designed for initial operations using manual transport of data written to magnetic media at each station, should dedicated phone connections not be immediately available from all points in the network. As lines are available, the equipment described in §5.2.1 will be employed to connect the host computer system with each station in the network.

Once telephone lines are established for transmission of data, both hardware and software will be employed to check that the data received are equivalent to data transmitted. The network will utilize TCP/IP network standards as the basis for its design. Data will not be lost due to transmission even if temporary suspension of communications becomes unavoidable.

6.5 Performance Monitoring

One of the critical elements of the host computer system will be its use as a tool with which EEAA can monitor contractor performance. The multiple contractor-agency relationships will call for strategic allocation of the limited EEAA resources to assure uniform, high quality tests are performed throughout the network. Through the use of accumulated data from each testing station, EEAA will be able to generate routine reports to watch for trends in contractor, system and test equipment performance so that any degradation can be addressed before allowable tolerances are exceeded. Appendix B lists typical reports that will be available as soon as the host computer system is operational.

In Phase II, when stations are on-line to the EEAA host computer system, these functions can be performed real-time where appropriate. Information such as the current number of vehicles tested and Technical Center personnel performing the vehicle tests, can routinely query the time required while the system is operating. With this information, EEAA will be able to dynamically manage the oversight function and effectively magnify oversight manpower by most effectively directing the agency's resources.

6.6 Report Generation

A number of standard reports will be available regularly from the host computer system. A listing of reports, their generation frequency and selected samples are shown in Appendix B. In addition, the host computer system will support ad hoc report

generation through the use of PC-based database query/reporting software. This query/reporting software allows the user to select multiple variables in order to derive statistical reports in response to specialized requests. For example, a query to enumerate the number of failed tests for 1995 Honda 4-stroke motorcycles can be created. The canned reports generated by the host will be in the Arabic language.

Through the use of the reporting tool, EEAA will be able to monitor program progress and address changing program conditions.

7.0 FEE COLLECTION SYSTEM OPTIONS

Before the final system is implemented, a decision by the GOE is required regarding if a separate fee will be employed and if so, how it will be collected. This section assumes a fee or charge to the motorist will be instituted to 1) pay private sector service providers who contract to perform the tests and; 2) to help defray program oversight costs. Considering that a charge will be assessed, two optional methods of test fee payments have been discussed. These are expansion of the existing program whereby the vehicle owner pre-purchases forms or stamps at local post offices or other outlets selected by the VET and then submits these for the service, or use of a stand-alone fee processor at each station, separate from the test lanes, where the fee is collected and a receipt is issued. Either system requires the collection of proof of payment at lane position one in advance of the tests and eliminates any cash handling in the lanes.

7.1 Existing Financial Institutions

Currently, vehicle owners have the option of remitting their registration/licensing fees at post offices in advance of applying for their vehicle credentials. This same method could be expanded to allow for the inspection fee payment. If employed, the document issued could include a serial bar code as well as instructions for the vehicle owner regarding the test. This would improve the testing process efficiency and allow for automated collection of fee information for invoicing by the testing service contractors.

By capturing the pre-payment form information using the bar code scanner at lane position one, the system automatically records the payment information and matches it to the vehicle test record. Combining this with the information entered by the lane inspector, the station and date identifiers set by the system and the test results, a complete, easily audited record for payment of the contractor by the GOE is created. This approach will also more easily permit differential fees for different contractors and the retention of that portion of the fee designated for the Environmental Fund

7.2 Stand Alone Fee Processor

Should prepayment through the currently operating system not be made available for the emissions testing program, a separate fee collection function will have to be established at each testing facility. This is less desirable than the prepayment alternative but still removes cash handling from the inspection lanes.

Under this approach, a kiosk or similar structure will be constructed at or near the entry to the inspection facility. Motorists will be required to pay the appropriate fee upon entry to the property for testing. This system will calculate the appropriate fee based on the vehicle to be tested and a receipt will be issued.

The payment record will be established on the stand-alone system. The receipt will contain a bar code, to be read at position one. Record matching between the test and fee collection system will automatically provide the ability for financial reconciliation at the station level.

APPENDIX A – TRAFFIC AUTHORITY CODES AND ACCEPTED VALUES

To be added when available from GOE

APPENDIX B – HOST COMPUTER SYSTEM REPORTS LISTING

The following is a listing of the typical 'Canned' host reports that will be available. Typical reports are:

1. Monthly Test Results Summary Report by Vehicle Type - LDV
2. Monthly Test Results Summary Report by Vehicle Type – LDT1
3. Monthly Test Results Summary Report by Vehicle Type – LDT2
4. Monthly Test Results Summary Report by Vehicle Type – HDT
5. Monthly Test Results Summary Report by Vehicle Year
6. Annual Station Lane Summary Report
7. Monthly Station Lane Summary Report
8. Monthly Station Summary Report by Model Year
9. Annual Quality Control Report
10. Monthly Inspector Summary Report
11. Monthly Compliance Status Report
12. Annual Emissions Summary Report by Vehicle Year
13. Annual Emissions Summary Report by Vehicle Type