HAL COMMUNICATIONS CORP.
QUALITY ASSURANCE MANUAL

Revision: A

March 19, 1991

870-99010 HAL COMMUNICATIONS CORP. QUALITY ASSURANCE MANUAL

TABLE OF CONTENTS:

1.0 INTRODUCTION

This manual describes the HAL Communications Corp. Quality Assurance and Inspection Program. This program assures compliance with the intent of MIL-I-45208A as well as other applicable inspection system requirements.

This manual describes company policies and procedures which are followed to maintain an effective and economical quality assurance program.

1.1 The HAL Quality Assurance and Inspection System includes ordering, positive identification, tracking of parts and materials, the stocking and issuing of parts and materials, fabrication of assemblies and sub-assemblies, and product inspection and testing of these fabricated assemblies and sub-assemblies.

1.2 The HAL Quality Assurance System is designed to assure that the supplies, products, or services used, produced or performed by HAL Communications Corp. are subject to adequate quality control to insure customer satisfaction. The system is also designed to provide for early detection of discrepancies and to see that positive corrective action is taken.

1.3 Each product, service, or contract has unique requirements for inspection and test procedures. These unique requirements are detailed in separate quality assurance procedure documents that are supplemental and used in addition to this Quality Assurance Manual. The procedures are dictated by the complexity of product design, manufacturing techniques employed, and contractual requirements.

2.0 CORPORATE ORGANIZATION AND RESPONSIBILITIES

2.1 Departments and Managers

HAL Communications Corp. is organized into five major departments directly supervised by the President. Corporate Organization is diagrammed in Figure 1. The departments are:

(1) MARKETING
(2) MANUFACTURING
(3) QUALITY ASSURANCE
(4) ENGINEERING
(5) ADMINISTRATION

2.1.1 The President oversees all operations of the company and is the direct supervisor of the department heads.

2.1.2 The Marketing Department determines the marketing strategy of the company, supervises sales and shipping personnel, and is the direct link between the customer and the company. The Marketing and Sales Managers place advertising, exhibit at shows, take customer orders, interface with customers for orders and repairs, and see that corporate delivery and pricing commitments are met. The Marketing Department determines packaging and shipping requirements.

2.1.3 The Manufacturing Department provides the Purchasing, Shipping and Receiving, Inventory, Manufacturing, and Production Testing operations of the company. It is the responsibility of the Manufacturing Department to procure materials and manufacture products to meet the quality, specification, cost, and time commitments of the company.

2.1.4 The Engineering Department performs research and development for new products and prepares documentation. The Engineering Department is responsible for the design and documentation of all new HAL products. The Engineering Department sets the production and test standards for each product. A Project Engineer is assigned to head each new product or project. The Engineering Department initiates all Engineering Change Orders (ECO's). With the approval of the Quality Assurance Manager, the Engineering Department sets the specifications for all components used in HAL products and approves manufacturers for these components.

2.1.5 The Quality Assurance Department (Q/A) is responsible for implementation, interpretation, and administration of all HAL Communications Quality Assurance activities.

2.1.6 The Administration Department oversees the financial, clerical, legal, and other administrative operations of the company, including administration of document control.

3.0 QUALITY ASSURANCE MANAGER

3.1 The Quality Assurance Manager reports to President. The Quality Assurance Manager is not directly supervised by the marketing or manufacturing departments or by any other corporate personnel who might exert influence that is contrary to the goals of maintaining the highest quality level in HAL products. All program specific inspection criteria is set by the Quality Assurance Manager.

3.2 The Quality Assurance Manager maintains an effective and efficient system of Quality Assurance to assure the delivery of a quality product.

3.3 The Quality Assurance Manager maintains a system of quality controls which meet or exceed contract requirements. The minimum or baseline control program shall be in accordance with the guidelines of MIL-I-45208.

3.4 The Quality Assurance Manager shall continuously review the status and adequacy of the HAL Quality Assurance Program to ensure compliance with established controls.

3.5 When changes in the Quality Assurance Program are required, they shall be initiated by the Quality Assurance Manager with the approval of the President.

3.6 When appropriate and with the permission of the President, the Quality Assurance Manager shall maintain communications with Customer and Government Quality Assurance personnel to assure that contract Quality Assurance requirements are met.

3.7 The Quality Assurance Manager shall maintain a system for the collection of Quality Assurance data. This data shall be used to periodically inform HAL management of the quality level of received materials, in-process activities, and finished products.

3.8 The Quality Assurance Manager (QAM) is responsible for the technical and administrative support of company and contractual activities associated with Quality, Reliability, and Maintainability activities. Such activities include:

a. Quality Assurance plans, procedures, instructions, and Quality Assurance tools and aids.

b. Design review and analysis (Manufacturing, test, and inspection flow, inspectability to drawing data, and inclusion of product assurance requirements)

c. Deliverable product acceptance criteria (workmanship standards).

d. Procurement Quality Assurance requirements, supplier evaluation, approval, and tracking.

e. Manufacturing process and test control requirements. f. Trouble and failure disposition, trend tracking, and corrective action.

g. Qualification of reliability and maintainability analysis and testing as required.

h. Records, analysis, and periodic reports.

i. Project and customer (Quality Assurance) liaison and contract compliance.

j. Participate in program costing and product cost control.

k. Training and Certification of Q/A-related activities.

l. Quality Assurance participant in the configuration change process.

m. Audit of Quality Assurance system effectiveness.

3.9 The Quality Assurance Manager is responsible to assure that the following company and/or contractual Quality Assurance requirements are met:

a. Receiving Inspection (including source inspection at suppliers facilities when required).

b. In-Process Inspection of deliverable goods.

c. Audit/Surveillance of manufacturing, test, and shipping activities.

d. Final product acceptance of deliverable goods.

e. Configuration status verification and accounting

f. Presentation of deliverable goods for customer and/or government source inspection.

g. Control of discrepant goods pending Material Review Board action.

h. Reporting of inspection status and results

3.10 The Quality Assurance Manager is responsible for the administration of the company's test equipment control program including:

a. Definition of requirements and maintenance of the calibration system

b. Maintenance and calibration of company's test equipment

c. Monitoring of company's test equipment location and usage

d. Supply of test equipment and services to projects and other users on a timely basis

4.0 INSPECTORS

4.1 All Inspectors are directly supervised by the Quality Assurance Manager. Assignment of tasks, approval of work records (time cards), and evaluation of the performance of Inspector employees shall be the responsibility of the Quality Assurance Manager.

4.2 Incoming Inspectors are responsible for inspection of all received parts and materials.

4.3 In-process Inspectors are responsible for inspection of all assemblies and modules during manufacturing, and for assuring compliance with test procedures.

4.4 Final Inspectors are responsible for inspection of all products prior to their release for shipment, and for assuring compliance with final test procedures.

5.0 CONFIGURATION CONTROL BOARD (CCB)

5.1 The Configuration Control Board (CCB) is comprised of one representative from each of the following activities: Manufacturing, Engineering, Purchasing, and Quality Assurance.

5.2 The primary role of the Configuration Control Board is to assure that all design and manufacturing documentation, software, and firmware track the product from initial inception through final acceptance testing and delivery and that all changes and modifications are efficiently and accurately recorded.

5.3 The CCB shall meet as required by Engineering Change Orders (ECO's) generated.

5.4 The HAL Configuration Management Program and Board are detailed in the HAL Configuration Management Plan document.

6.0 MATERIAL REVIEW BOARD (MRB)

6.1 The Material Review Board (MRB) is comprised of a member from each of the following activities: Engineering, Manufacturing, Purchasing and Quality Assurance. The function of the MRB is to review and determine disposition of discrepant materials, including those supplied by vendors and those that may become discrepant during the manufacturing, test, or inspection processes. The MRB shall meet as required by discrepant material found, however not to exceed two days after Q/A generates a Discrepant Material Report (DMR).

6.2 Upon notification of the existence of a discrepant material, Quality Assurance personnel shall fill out a DMR form (as described in Section 14 of this manual), and the material will be placed in segregated storage until an MRB meeting is held. The MRB meeting shall be conducted within 2 working days from the date of the DMR.

6.3 The MRB may choose one of the following means of disposition of a discrepant material:

a. Return the material to the Vendor for correction or replacement
b. Return the material to the Vendor for credit
c. Remand the material for in-house re-work to conform to specifications
d. Scrap the discrepant material.

6.4 The Quality Assurance Manager will serve as the MRB Coordinator. His responsibility is to assure that the material submitted for MRB action is covered by a properly completed Discrepant Materials Report (DMR) signed by the Quality Inspector and the applicable part and/or vendor history is present, if required. The Q/A Manager shall schedule MRB meetings as required.

6.5 The MRB coordinator shall:

a. Administer the MRB activities to insure that the review is complete.

b. Monitor the activities of the MRB to assure that adequate records of all board actions are properly documented, maintained and made available for customer review.

c. After MRB disposition has been determined, the Marketing Manager shall obtain customer concurrence when required.

d. For "Return-to-Vendor" action, see that all material is moved to Shipping for return to the shipper and record the shipping number on the original DMR.

6.6 When the MRB cannot reach a unanimous decision concerning disposition of material the matter will be resolved by the decision of the President.

6.7 All MRB action shall be noted in minutes or log form and be made available for Government/Customer review when required under the terms of a contract. The MRB coordinator (Q/A Manager) shall be responsible that minutes are maintained.

6.8 MRB shall make the decision with regard to non-conforming material without jeopardizing end product performance. Due consideration must be given to interchangeability, safety, reliability, cost, and schedule impact.

6.9 All MRB dispositions are subject to review by the President of HAL Communications.

7.0 PURCHASE ORDER CONTROL

7.1 All purchase orders issued by HAL Communications Corp. to its suppliers and vendors require authorization by the Company President or his representative. All purchase orders shall be reviewed by the Quality Assurance Manager to ensure that Q/A requirements will be met.

7.2 The Purchasing Agent and Quality Assurance Manager shall determine when it is necessary to investigate and evaluate a potential vendor's capability to produce a product or component with the required quality. If a visit to the vendor's factory or facility is required, a written evaluation of the visit shall be made and become part of the corporate vendor file. This information shall be considered proprietary to HAL and the vendor except in the case of required disclosure by Government agencies. Selection of a vendor is based upon quality, cost, availability, and experience.

7.3 Prior to the release of the purchase order, the Purchasing Agent shall obtain all required drawings, specifications, and source inspection documents from Configuration Control. When required, the Purchasing Agent shall supply these documents and the P.O. for review by Q/A before sending them to the Vendor.

7.4 When required by contract clause, copies of all purchase orders applicable to a specific product or contract shall be maintained on file for review by the Quality Assurance Manager, other HAL staff, or by the customer. Purchase orders shall be sequentially numbered and cross-referenced so that information concerning the part or vendor may be easily retrieved.

7.5 It is the policy of HAL Communications to use qualified vendors and suppliers. Vendors who have not previously supplied materials to HAL (particularly custom manufactured materials) may require validation through a vendor qualification visit as described in paragraph 7.2. Enhanced product/material inspections and or testing IAW specific quality assurance procedures may also be required for some products or materials.

7.6 All Quality Assurance requirements placed upon HAL by the customer are in turn placed upon HAL's suppliers by Q/A requirements on Purchase Order or through sub-contract.

8.0 INCOMING MATERIALS INSPECTION

8.1 All parts, supplies, and materials are received and logged in the receiving log by the receiving department. The receiving log shall indicate the HAL P.O. number, HAL part number, description, quantity received, vendor, date received, and initials of the receiving clerk.

8.2 Within two working days of receipt, parts, supplies, and materials are inspected by the Incoming Q/A Inspector for conformance to the purchase order and applicable Q/A requirements. An incoming inspection log shall be made that lists all parts inspected, HAL P.O. number, HAL part number, description, quantity inspected, quantity accepted, quantity rejected, sampling basis (if used), date of inspection, and initials of the inspector.

8.3 A copy of the applicable Q/A procedure shall be maintained by the Incoming Inspector. The Quality Assurance Manager with the engineering department shall prepare the Q/A procedure, indicating the accept/reject criteria.

8.4 Incoming Inspectors shall use 100% or sample inspection as indicated by the relevant Q/A procedures.

8.5 The Incoming Inspector shall not accept any parts, supplies, or materials that are not in conformance with written incoming/test inspection criteria and the HAL P.O.

8.6 Parts in conformance with the purchase order and Q/A requirements are forwarded to inventory where they are logged under the appropriate HAL part number and placed in protected storage. A copy of the accepted receiving report is forwarded to the Administration department for use in approval of billing.

8.7 Parts not in conformance with either the purchase order or the Q/A requirement are tagged as discrepant materials, a Discrepant Materials Report (DMR) is written by Q/A, and the material is placed in segregated storage.

8.8 Discrepant materials remain in segregated storage until disposition is authorized by the Material Review Board.

8.9 A discrepant material report log shall be maintained by the Incoming Inspector. The discrepant material log shall be reviewed periodically by the MRB. Suppliers with a continuing discrepant material record shall be disqualified until they prove to the satisfaction of the MRB that such problems have been resolved.

9.0 IN-PROCESS INSPECTION

9.1 A Manufacturing Work Order (MWO) or "Traveler" shall be prepared by the Quality Assurance Manager and the Manufacturing Manager for each separate module, assembly, sub-assembly, or other identifiable unit of production effort. These MWO's shall be be used for the in-process inspection of each unit.

9.2 Manufacturing is responsible for development of the work-unit breakdown of each product, based upon specific job or contract requirements and logical assembly of the completed product. The Quality Assurance Manager shall establish a separate inspection criteria for each logical work-unit.

9.3 Rejected items must be so identified by an entry on the Manufacturing Work Order noting the failure and at what point of the manufacturing process the item was in. All rejected items must be diverted to a segregated area to assure that they may not be accidentally used in the manufacturing process before corrective action is made.

9.4 A rejected item must either be re-worked and re-inspected before it may be used in a customer product or it must be sent to Q/A for a DMR to be written and the Material Review Board decides disposition. A DMR log shall be maintained by Quality Assurance personnel.

9.5 All items that pass inspection are to be so marked by the appropriate inspection stamp, mark, or tag. A log shall be kept indicating the part number, quantity accepted, quantity rejected, inspector identification, and date.

10.0 FINAL INSPECTION

10.1 Final inspection shall be conducted on all products manufactured by HAL Communications.

10.2 Final inspection criteria shall be prepared and supervised by the Quality Assurance department.

10.3 Final inspection criteria shall be in accordance with applicable Assembly Drawings and Quality Assurance Procedures. A physical inspection and compliance with approved final test procedures shall be included in the final inspection procedure.

10.4 Inspection and test records shall be maintained by Quality Assurance personnel for each product manufactured and filed under the model and serial number of the product.

10.5 Products that pass final inspection are to be so marked by the inspector, logged, and delivered to inventory.

10.6 Products that fail final inspection are to be marked with a reject tag that indicates the reason for rejection, inspector identification, and date. A log of all rejected products shall be kept.

10.7 A rejected product must be segregated so that it will not be accidentally shipped.

10.8 A rejected product shall be either repaired and again inspected or determined to be discrepant material by the MRB. Such discrepant materials shall be so noted on a DMR form by Q/A personnel. The rejection log shall note the final disposition of each rejected product.

10.9 Records of rejected products shall be periodically reviewed by the MRB. These records shall be used to revise design, manufacturing techniques, and inspection criteria as required to reduce future rejections.

11.0 SHIPPING CONTROL

11.1 The Quality Assurance Manager shall periodically inspect the shipping area, procedures, and packages to assure that product quality is maintained and not compromised by the shipping function.

11.2 Shipping records shall be maintained by shipping personnel. The shipping records shall indicate the model and serial number of all products shipped. Inspection tags attached to the equipment shall be removed and delivered to the Quality Assurance department.

11.3 Incoming receiving shall maintain records of all shipping damage.

11.4 The Q/A Manager shall periodically review the damage record of each shipping agent or carrier. Those shipping firms with a history of frequent damage will be disqualified until such time as the firm can prove an improvement in service.

11.5 Finished products are held in secure inventory until such time as they are released for shipment.

11.6 A shipping procedure for each HAL product shall be prepared by the Marketing Manager and reviewed by the Quality Assurance Manager. Custom shipping procedures shall be prepared to meet all special contract shipping requirements. These procedures shall be approved by the Configuration Control Board (CCB). Copies of all current shipping procedures shall be provided to the shipping clerk and the responsible Quality Assurance Inspector.

12.0 FIRST PRODUCTION ARTICLES

12.1 It shall the policy of HAL Communications Corp. that the first production run of all newly designed HAL products shall undergo additional First Article tests and verifications.

12.2 First article work-unit inspection shall be conducted by the Project Engineer and witnessed by the Quality Assurance In-Process Inspector.

12.3 No production shall be started until first article tests and inspection are complete and the first article is found to be in compliance with contract requirements.

12.4 All first article test and inspection results are to be maintained in a file for the given product and maintained by the Quality Assurance department. Any problems determined in first article inspection shall be given consideration for possible revision of manufacturing techniques and verified by extended inspection of the first production lot.

12.5 After first article inspection and during production, each manufactured assembly or sub-assembly shall be inspected according to Q/A procedures established for that unit. All assemblies or sub-assemblies are to be inspected 100% unless Q/A procedures designate a sampling criteria.

12.6 All "First Article" requirements imposed under contract shall be met in addition to or in conjunction with the requirements listed above.

13.0 ENGINEERING CHANGE ORDERS

13.1 All changes in the design of a HAL product shall be made only as a result of submitting an Engineering Change Order (ECO) to the Configuration Control Board (CCB). No changes or modifications shall be made without the express approval of the Configuration Control Board.

13.2 All changes shall be documented with an Engineering Change Order (ECO), issued by the Engineering Department, and approved by the CCB.

13.3 All ECO's shall be reviewed by the Engineering Manager prior to submission to the Configuration Control Board for approval.

13.4 All ECO's which may cause substantial changes in cost or product operation must be approved by the Administration and Marketing Departments prior to submission to the Configuration Control Board.

13.5 Upon approval of the Configuration Control Board and release to production, the ECO replaces and supersedes all previous documentation for that work-unit. Previous documentation is to be marked "OBSOLETE".

13.6 The Configuration Manager shall maintain an ECO log of all documentation, ECO's issued, the date of issue, and date of replacement of a document by an ECO. The Configuration Manager shall assure that only the most recent version of documentation is used by other departments of the company.

13.7 The Configuration Manager shall inform Marketing personnel of any changes resulting from an ECO that may affect the customer or the advertised specifications, performance, or cost of the product.

13.8 Marketing personnel shall inform customers whenever an ECO may result in a substantial change in product performance or specifications.

13.9 ECO's shall not be originated by Marketing, Sales, Purchasing, or Manufacturing personnel. These personnel shall, however, provide written recommendations to the Engineering Manager when a configuration change is required.

14.0 NON-CONFORMING AND DISCREPANT MATERIALS

14.1 All non-conforming and/or discrepant materials shall be placed in segregated storage and clearly identified on a MWO by P.O., part number, lot size, non-conforming or discrepant characteristic(s), inspector's identification, date, and all other information which may relate to the rejection. All non-conforming or discrepant materials shall be logged on a DMR form.

14.2 When incoming materials are found to be non-conforming or discrepant, Quality Assurance shall be notified and a Discrepant Material Report (DMR) shall be prepared. An MRB (Materials Review Board) meeting shall be held within two working days to determine disposition. The Purchasing Agent shall arrange that rejected materials are replaced or returned on a timely basis. Non-conforming or discrepant materials shall not be removed from segregated storage until authorized for disposition by the MRB. Discrepant or non-conforming materials are not to be used for any purpose within HAL Communications unless specifically authorized by the Quality Assurance Manager.

14.3 The Quality Assurance Manager and Purchasing Agent shall periodically review the rejected material logs and evaluate a vendor's or supplier's performance. Vendors or suppliers with a history of non-conformance shall be disqualified until they can prove that a solution satisfactory to HAL has been enacted.

14.4 Work-units that fail in-process or final inspection shall be so marked on the MWO and placed in segregated storage. At the option of the MRB, these units may be re-worked, re-inspected, and placed back in the manufacturing process. Discrepant units are not to be used in further production until the discrepancy has been repaired and the unit passes re-inspection and/or testing to the original specifications.

14.5 A record of all In-process and Final Inspection failures shall be maintained using both the Manufacturing Work Order and the DMR's. These records shall include the part number, serial number, inspector identification, date, reason for rejection, the test and test procedure failed, and final disposition of the unit.

14.6 The logs for rejected materials and units shall be periodically reviewed by the Q/A Manager. When indicated, changes in manufacturing techniques or design shall be implemented to reduce the incidence of rejection, and the appropriate ECO's shall be generated.

15.0 CALIBRATION OF TEST EQUIPMENT

15.1 All test equipment used to assure product conformance to specifications shall be maintained and calibrated in accordance with MIL-STD-45662.

15.2 All HAL test equipment shall be regularly tested by either an outside firm or by using in-house facilities that assure conformance with MIL-STD-45662.

15.3 Measurement and test equipment standards shall be maintained in a controlled environment.

15.4 Written procedures for the test and calibration of each instrument shall be maintained by Engineering personnel. The procedures shall state the required accuracy of the equipment being calibrated and that calibrating equipment is of a higher level of accuracy than the equipment being calibrated. The procedures may be published standard industry practices, equipment manufacturer's written instructions, or other procedures as determined by contract requirements and validated by the Q/A Manager.

15.5 Test and measurement equipment shall carry a calibration sticker or stamp that indicates the last date of calibration, the initials of the calibrating technician, and the date re-calibration is due.

15.6 Items which are not calibrated shall be so marked.

15.7 All test and measuring equipment requiring calibration shall be supported by certificates, reports, or data sheets attesting to the date, accuracy, and environment conditions under which the calibration was performed. The certification shall contain the name and address of the calibration facility, the serial number of the calibrated unit, the required accuracy, the actual measured accuracy, and the performing technician. These records shall be maintained by Q/A personnel.

15.8 Quality Assurance personnel shall maintain a file of all test equipment in the calibration program. Each entry shall indicate the model number, serial number, date of calibration, accuracy of calibration, date of next calibration, and performing technician.

15.9 The calibration schedule shall be strictly followed and past-calibration date equipment shall not be used for quality assurance measurements.

15.10 All calibrated equipment shall be re-calibrated yearly or more frequently if required by contract or specific instrument requirement. The Quality Assurance Manager shall

establish the maximum calibration period for each instrument. 16.0 CUSTOMER REPAIR

16.1 It shall be the policy of HAL Communications that Marketing and Sales personnel will issue Return Authorization numbers and forms (RAF) for each customer unit returned for repair. Whenever possible, Return Authorization shall be issued prior to return of the unit by the customer. The Return Authorization Form shall indicate the customer's name, address, nature of complaint, date, and other pertinent data. Copies of this form shall be forwarded to receiving, customer repair personnel, and Quality Assurance.

16.2 All equipment received for repair shall be logged-in by the receiving department and inspected by the Incoming Q/A Inspector. The physical condition of the shipping carton, device itself, shipping carrier, and date received shall be noted on the log and on the Return Authorization Form (RAF).

16.3 If unsolicited equipment is received for repair, the receiving clerk shall immediately inform the Marketing and Sales Department and request further instructions. Marketing and Sales personnel may then either contact the customer, obtain the required information, and prepare a Return Authorization Form or instruct the shipping department to return the unsolicited device to the customer. Copies of all Return Authorization forms prepared shall be submitted to receiving, customer repair personnel, and the Quality Assurance Manager.

16.4 Units received for repair shall not be removed from the receiving department until a valid Return Authorization Form is prepared.

16.5 After repairs are complete, all units must pass through Final Inspection. Changes in appearance or performance which are due to customer wear-and-tear or modification are excepted.

16.6 Unless specified otherwise by the customer, all repaired equipment shall be packaged in new shipping materials in the same manner as a new item of the same model would be packaged.

16.7 No repaired item shall be shipped from HAL Communications until approval is given by the Final Inspector.

17.0 CONTROL OF GOVERNMENT OR CUSTOMER FURNISHED EQUIPMENT

17.1 Incoming government and customer furnished equipment (GFE/CFE) shall be subject to receiving inspection consistent with all applicable requirements of section 5 of this Quality Assurance Manual, including the following:

17.1.1 Examination to detect defects or damage incurred in transit.

17.1.2 Inspection for completeness and proper type, specification, or other applicable requirements. List all accessories received with the equipment.

17.1.3 Clear identification of the material consistent with paragraph 12.2 and protection from improper use or disposition by means of positive control and segregation from other materials.

17.2 The HAL Program Manager for government contracts shall report to the Government representative any GFE found damaged, malfunctioning, non-conforming, or otherwise unsuitable for use upon arrival at HAL Communications Corp. Such equipment shall be properly identified and segregated immediately until final disposition is determined in accordance with Government property control procedures. All necessary precautions shall be taken to ensure that non-conforming materials or equipment cannot be used in production or service.

17.3 All GFE/CFE shall be identified and traced using an inventory and tag system. The information on the tag shall include:

1. The acknowledgment number sent to the material supplier upon receipt of the material.
2. The customer name and Purchase Order number.
3. A full description of the equipment provided, including the serial and model numbers.
4. The project number assigned by HAL Communications Corp.
5. The names of the Point-Of-Contact (POC) person at HAL Communications.
6. Other data as may be appropriate by contract requirements.

17.4 The HAL Program Manager shall maintain an inventory and status log for all GFE/CFE.

17.5 The Quality Assurance Manager and Manufacturing Manager shall assure that all

GFE is entered on property control records as required by FAR 45.505.

18.0 CLASSIFIED MATERIALS

All classified materials and documents received shall be immediately delivered to the HAL Security Officer who will then assure proper handling, access, and storage according to the procedures of the HAL Communications Corp Standard Practice Procedure and the Industrial Security Manual for Safeguarding Classified Information (DOD 5220.22-M), latest editions.

19.0 QUALITY PROGRAM REVIEW

19.1 The Quality Assurance Manager shall conduct a review of the quality assurance procedures every six months or more often if required to assure accuracy and conformance with contractual requirements.

19.2 The review shall consist of analysis of the deficiencies recorded in inspection and test records and customer-reported deficiencies to determine the need for corrective action such as training, revised process controls or inspection procedures, or additional test and inspections to assure conformance with specifications.

19.3 A report of the results of the quality review and any recommended action shall be submitted to the President as soon as possible after the review is complete.

20.0 QUALITY ASSURANCE RECORDS

20.1 Records containing all documentation required for a product or required by contract specification shall be maintained for a period of not less than three years after completion of the contract or as required by the customer.

20.2 The Quality Assurance Manager will prepare an inspection and test procedure development guide which assigns responsibilities for procedure development, specifies test and inspection procedure requirements and establishes record requirements for each product compliant with all applicable guidelines.

20.3 Quality Assurance Procedures will be "A" size Book Drawings. Only released procedures will be used in Inspection Testing. All Q/A Inspection Tests will be supported with released procedures.

21.0 MANUFACTURING WORK ORDER PROGRAM

21.1 The Manufacturing Work Order is a traveler designed around a specific assembly/sub-assembly and the manufacturing processes to build, inspect, and test the unit.

21.2 The Manufacturing Work Order (MWO) is prepared by the Manufacturing Manager working with the Quality Assurance Manager to assure that proper manufacturing practices and in-process Q/A controls are applied.

21.3 Type, quantity, and format of Inspection procedures to be used are determined by the Quality Assurance Manager. Inspection procedures shall be as described in this Quality Assurance Manual, tailored to the specific requirements of the work unit to be inspected.

21.4 The Manufacturing Work Order will reference the approved test procedures to be followed when testing the assembly/sub-assembly. If the item is a new product or sub-assembly, test procedures will be approved by Quality Assurance and the Configuration Control Board and placed under Configuration Control prior to being used in the Manufacturing process.

21.5 The MWO shall, at a minimum, include the following specifications:

a. Assembly/sub-assembly part number.

b. Assembly drawing numbers or Assembly instructions that are to be used.

c. Released test/inspection procedures that will be used.

d. Quality Assurance inspection procedures that shall be used for in-process and final inspections.

22.0 SOFTWARE QUALITY ASSURANCE

22.1 The purpose of Software Quality Assurance is to define procedures for the implementation of a process to evaluate software and software documentation developed by Hal Communications. These procedures shall be in accordance with contractual Software Quality Assurance requirements and HAL Communications internal policies. The goal of these procedures shall be to maintain and improve the quality of the software and its documentation by providing feedback and ensuring that necessary corrections are made.

22.2 The Quality Assurance and Configuration Managers are responsible for Software Configuration Management. They shall conduct independent periodic audits in accordance with required Software CM procedures. This activity shall include review and approval of software change documentation (ECO's), implementation, and verification that changes are in accordance with required configuration procedures.

22.3 The Quality Assurance Manager shall prepare and maintain records of results of software quality evaluations performed. These records shall be furnished to the Configuration Manager and included in the Configuration Control Program as detailed in the HAL Configuration Management Plan.

22.4 The Quality Assurance, Configuration, and Engineering Managers shall jointly develop a master schedule of events and milestones to be met during the software development cycle. When required by contract, the Program Manager shall also participate in schedule development and be the contract schedule coordinator. This schedule shall be used to coordinate software development with other phases of a development project.

22.5 The Quality Assurance Manager shall implement and utilize a plan, schedule, and check-list to identify and conduct internal reviews and audits during all phases of the software development cycle as required.

22.6 Software Reviews

22.6.1 The Quality Assurance Manager or his designated technical representative shall review software and software documentation to ensure compliance with contract requirements, standards, and procedures. Documents are subject to review prior to submittal to the procuring agency. As a minimum the following criteria shall be used when reviewing software:

a. Adherence to required format and documentation standards. (Data Item Descriptions (DID's), etc.)

b. Compliance with contractual requirements (Statement Of Work (SOW), Contract Data Requirements List (CDRL), contract referenced specifications, etc.)

c. Internal consistency (document does not contradict itself in content or style)

d. Verify that software documentation is understandable, technically adequate, and complete.

22.6.2 Software Quality Assurance reviews may include the following software documentation:

a. Software planning documents including software development plans, programming standards, and procedures manuals, software configuration management plans, etc.

b. Software requirements and/or performance specification documentation.

c. Software design documentation describing the top level and detail design of the software based on performance requirements defined in the specifications.

d. Interface design documentation describing the interface requirements between the software and other programs or systems which the software will interface.

22.6.3 When required by contract, formal program reviews and/or Audits will be held as required in MIL-STD-1521B. These reviews may include Software Specification Review (SSR), Preliminary Design Review (PDR), Critical Design Review (CDR), Test Readiness Review (TRR), Functional Configuration Audit (FCA), and Physical Configuration Audit (PCA).

22.6.4 Quality Assurance shall review the evolving software requirements and requirement documentation using the criteria in 18.6.1 to establish traceability of requirements to system specifications and confirm that these requirements are tested.

22.6.5 Interim software reviews will be held during the development cycle as required. Such reviews may include a detailed exposition by the design engineers.

22.6.6 Software Quality Assurance shall review Software Development Files (SDF) to assure accuracy of status and scheduling information, traceability of unit test procedures and test results to unit test plans.

22.6.7 Software Quality Assurance design reviews shall be conducted prior to release of software for configuration control and/or production use.

22.7 Software Quality Assurance acceptance of the design shall be evidenced by sign-off of the applicable software development files (SDF's)

22.8 The Quality Assurance and designated Development Engineer(s) prepare test plans, specifications, and procedures to verify that the software under development meets technical, operational and performance requirements and acceptance criteria. Test planning shall address the following:

a. Test Requirements
b. Test Plan
c. Test Procedures
d. Test Reports
e. Software Acceptance Criteria

22.8.1 Quality Assurance shall review test documentation using the evaluation criteria of 18.6.1 to assure that the plan meets test requirements and is traceable to higher level documents.

22.8.2 The following software testing shall be performed as a minimum:

a. Software "units" shall be integrated into modules and informally tested to determine compliance with the applicable requirements. A "unit" is defined as the smallest independent and compilable software entity.

b. Computer Software Configuration Item (CSCI) testing shall be in accordance with appropriate test plans and procedures, verified by the Q/A Manager. The Q/A Manager will insure that the latest version of the software code is used as verified by Configuration Control, that it is in compliance with contractual requirements, and that it is in accordance with approved test plans and test procedures.

c. Systems Integration testing shall be in accordance with system requirements (if part of a System).

d. Other tests as may be required by specific contract specifications shall be conducted.

22.9 Any software modifications/updates made after release of the code to internal configuration control shall be verified by Quality Assurance for compliance with contractual requirements prior to submission to the Configuration Control Board for approval.

22.10 Software Acceptance shall be based on the following:

a. Satisfaction of criteria of the Statement of Work and contract (when applicable).

b. Completion of the Functional Configuration Audit (FCA) and/or Physical Configuration Audit (PCA), when required by contract.

c. Resolution of software and/or documentation errors.

d. Documented evidence of correlation between source and object code.

e. Consistency between code and software product specifications and version description documents. Prior to formal software acceptance Quality Assurance will assure that all products are available and that all requirements have been met.

22.11 When the computer program is a hardware configuration item (ROM or EPROM storage), Quality Assurance shall verify that the correct version of each CSCI is released for ROM production. Q/A shall also assure that production copies of the CSCI match the original controlled versions, are properly marked, and are correlated with the system configuration to which they belong.

APPENDIX A DISCREPANT MATERIAL REPORT NUMBER_____
DATE_____

PART #_____

PROG/PROJ#_____MFR_____P.O/WO#_____SERIAL # _____

MODEL #_____ SUPPLIER_____ DESCRIPTION_____

CONTRACT #_____ EST. REPLACEMENT COST_____

LINE NO. DISCREPANT CODE QTY DEFICIENCIES (IS vsSHOULDBE) DISPOSITION DEFECT

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

INSPECTOR/DATE_____

_____

DISPOSITION CODES

1. SCRAP 4. STD REPAIR 7. CORRECT IN HOUSE
2. USE AS IS 5. REPAIR NON-STD 8. SEE INSTRUCTIONS
3. REWORK 6. RETURN TO VENDOR 9. MRB

_____

MRB INSTRUCTION REMARKS MATERIAL DISPOSITION ACTION QUALITY CODE

_____
_____
_____
_____
_____

_____

DCAS DATE (AR)

_____

NON-RECURRENCE ACTION

_____

ENGINEERING PURCHASING QUALITY ASSURANCE MANUFACTURING

_____