

CONFIGURATION MANAGEMENT

FOR

SAN MARCO RANGE

SEPTEMBER 1971

## CONFIGURATION MANAGEMENT FOR SAN MARCO RANGE

### BACKGROUND

Under the present arrangements, the Scout launch sites and the factory in the United States operate within a system of Configuration Management. This system is fully described in the document Configuration Management System for Scout, Report Number 3-15000/SR-240. The San Marco Range does not operate within this system at the present time.

The Configuration Management mechanism encompasses the total Scout launch vehicle system including hardware (vehicle and Ground Support Equipment) and documentation (drawings and standard operating procedures).

Benefits which can be derived from the Configuration Control Management system include such things as:

- a) Assurance of compatibility between vehicle - GSE - Procedures.
- b) Increased confidence in repeatability of factory data in the field through the use of standardized equipment.
- c) Providing a means for rapid exchange of information for the identification and solution of problems.
- d) Systematic pooling of knowledge and experience.

### REQUIREMENTS

The ensuing paragraphs identify the requirements for Configuration Management and summarize the current operating practices for Scout.

Any Configuration Management system must be comprised of at least three fundamental elements, i.e.:



- a. Configuration Identification
- b. Configuration Control
- d. Configuration Accounting

The Configuration Identification element is the technical documentation which defines the approved base line or standard system.

The Scout standard vehicle configuration is identified by a numerical list of drawings which shows effectivity and outstanding Engineering Orders (EO). Included is a numerical specification index. The index is updated and re-issued quarterly.

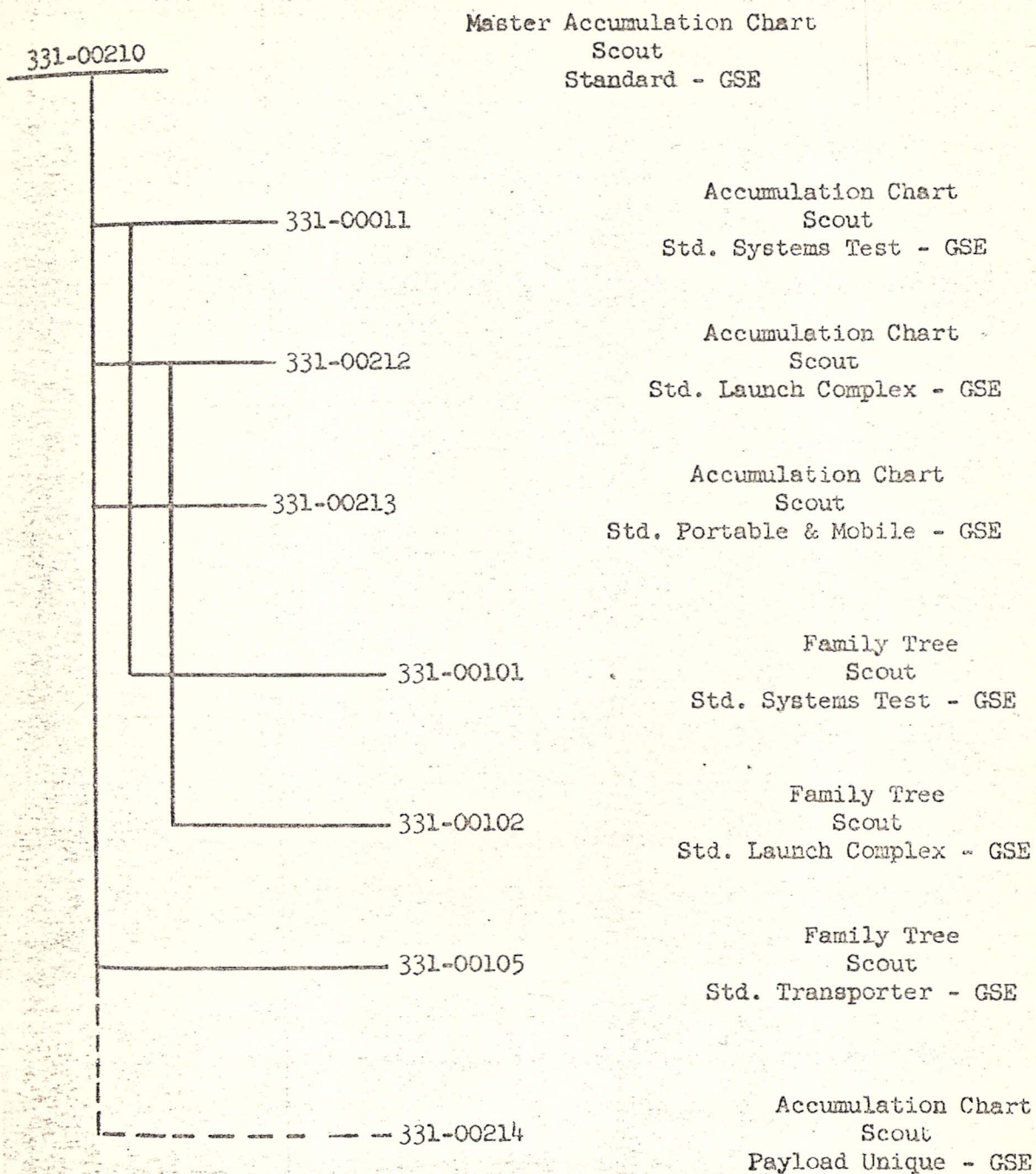
From this total drawing index is extracted a drawing list for each individual vehicle. A vehicle drawing index printed in tabular form is included with the log book for each vehicle.

The Scout Ground Support Equipment includes the Standard Scout Test Equipment (S<sup>3</sup>T), the Scout Standard Launch Complex (SLC), the Portable and Mobile Test Equipment (P&M), and the Scout Vehicle Transporters. Facilities are not a part of the Configuration Control system.

All GSE may be traced through the GSE Master Accumulation Chart 331-00210. Other accumulation charts and Family Trees are used to identify the assemblies, sub-assemblies, and details of the various categories of GSE. See Figure 1.

The Scout Standard Operating Procedures are contained in six volumes which also show the effectivity of the procedures. A procedure index is included in the log book for each vehicle.

The Configuration Control element is the systematic evaluation, coordination, approval and/or disapproval of all changes to the established base line configuration, standard configuration. Temporary changes,



ACCUMULATION CHARTS AND FAMILY TREE DRAWINGS

REQUIRED TO DEFINE STANDARD SCOUT GSE

FIGURE 1



deviations or non-conformances may be required and are governed by other mechanisms and documentation. The "Change Request" (CR) is the only document unique to Configuration Control.

It is the responsibility of Quality Control to ascertain that the hardware complies with the standard definition and that the proper procedure is being used for vehicle processing. All change paper written against a particular vehicle becomes a part of that vehicle's log book.

In the U.S., any action which revises the standard (vehicle, GSE, or procedures) receives approval prior to incorporation by a configuration control review group established at Vought Missiles & Space Company, Dallas. In addition, any permanent change to the standard configuration receives approval from the NASA Langley Research Center, Scout Project Office and is coordinated with field sites, where affected prior to implementation.

All proposed changes are categorized as either normal Change Requests or Emergency Change Requests. Emergency change requests are used only when mandatory deviations from established standards require Vought Missiles & Space Company, Dallas approval and due to time limitations cannot be handled with a normal Change Request.

Normal Change Requests are forwarded to Dallas for processing. The change recommendations are received by the Configuration Control Review Group for total impact on Scout System, such as, the effect on procedures, vehicle, GSE, and Spares. Those items selected for permanent incorporation are forwarded to NASA for approval. After approval and upon completion of the modification, the C/R is closed out to complete the documentation loop. A functional flow block diagram of the configuration control loop is shown in Figure 2.

# CONFIGURATION CONTROL LOOP

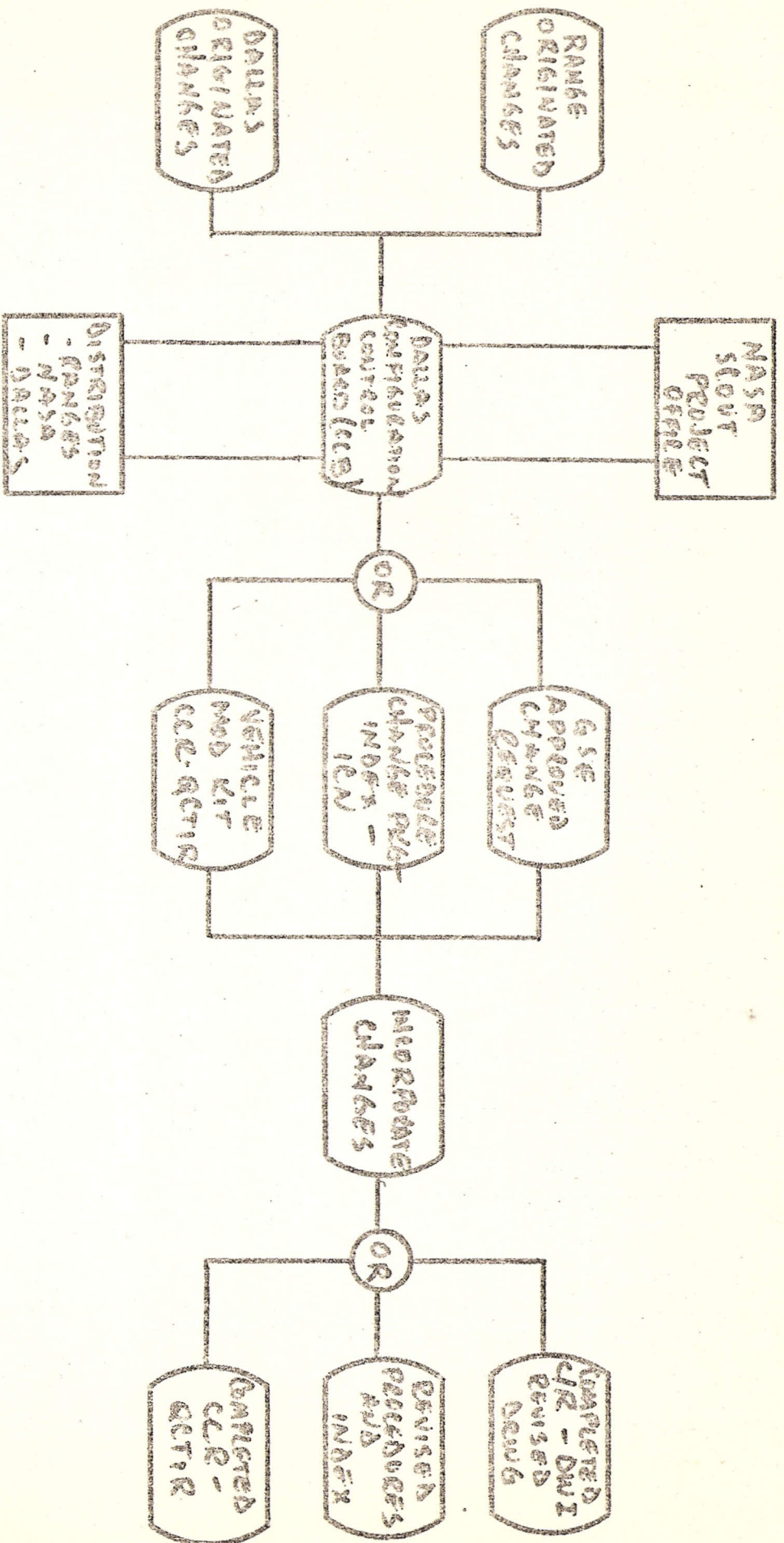


FIGURE 2



The method for processing Emergency Change Requests is dependent on the time during the vehicle processing cycle at which the need for a change occurs. These times are identified as "Prior to Dress Rehearsal" and "After Dress Rehearsal" and "Dallas Processing". Normally the emergency changes are effective for one vehicle only. Approvals are obtained verbally from the CCB at Dallas and/or signatures of designated personnel on-site.

Configuration accounting is the method of reporting and documenting changes made to the standard in order to maintain a current configuration identification.

Approved hardware changes are incorporated into the drawing system through Engineering Orders. The authority to incorporate the drawing change into the hardware is the Controlled Change Rework (CCR), a planning document which establishes effectivity and accountability. Drawing Index, Family Trees and Accumulation Charts are revised to reflect the change.

Procedure changes are implemented through formal Change Packages with dated pages and are released with a revised effectivity page.

#### IMPLEMENTATION AT SAN MARCO

Geographical locations, communication lines, and organizational interfaces make it impractical for the San Marco Range operation to participate in the existing Configuration Control Management System in the same manner as the other operational sites. However, sufficient benefits can be derived from participation in the system to justify its implementation. The ensuing paragraphs describe the minimum effort

required for participation in the existing system to achieve configuration control of the Scout vehicle, GSE, and procedures at the San Marco Range.

The first step to implement Configuration Management at the San Marco range would be to establish a responsible and responsive contact at the range. The second step would be to integrate San Marco into the data stream of the existing system.

The vehicle configuration is already identified by the present system and San Marco will require only the mechanism for control and accounting.

As for the Ground Support Equipment, it will be necessary to establish a San Marco base line configuration by identifying the differences in the existing configuration of equipment at the range and the current standard. The existing configuration must then be reflected in the accumulation charts and Family tree drawings that will be used to identify San Marco configuration. A set of reproducible reference drawings are required for the Dallas drawing system. The drawings maintained by S/M now would continue to be maintained by S/M. The accumulation charts and Family trees must be comparable with those required to define the Standard Scout GSE (Figure 1).

San Marco Operating Procedures (SMOP) are issued on a per vehicle basis. SMOP's are for the most part Scout Standard Procedures. However, some are modified to accommodate the unique conditions at the range. Where extensive modification is required, the SMOP is given a new second dash number in the seventy series; e.g., 4-3-2 becomes 4-3-70. San Marco does not issue a procedure index for each vehicle. The Standard Procedure Index published by Vought Missiles & Space Company, Dallas can



serve as the base line procedure configuration. A set of SMOP's will be required for Dallas files.

The existing documentation used by the range can adequately provide the control and accounting mechanisms required.

The change request form could be used for requesting any change to vehicle or procedures where adequate time is available for S&C<sup>2</sup> normal processing.

Physical changes to the vehicle after it is received at the range would be limited to safety-of-flight items. In addition, certain procedures and specific tasks are considered critical. Failure of equipment to meet the operating criteria specified may be the result of an incorrect procedure or malfunctioning equipment. The discrepancy would be recorded on a QCTIR. Where disposition of discrepancies in this category make it necessary to accept out-of-tolerance conditions or reposition an electronic adjustment which invalidates or changes system data, the disposition is treated as a configuration change.

In those instances where a mandatory change emanates from the CCB at Dallas, the range would be notified of the change by telex followed by a mod kit and CCR. The telex would be the official authorization to incorporate the change and would take precedence over receipt of mod kit and/or CCR. The range would reply by telex and follow it with one copy of the CCR stamped by QC at the range to verify satisfactory incorporation of the change to complete the accounting cycle.

The method for obtaining authorization to incorporate changes emanating from the range during vehicle processing would be dependent on the time during vehicle processing at which the need for a change occurs.



For changes required prior to the completion of dress rehearsal, Dallas approval would be required and the range would request approval from Dallas by telex. On receipt of a telex the CCB at Dallas would process the request as an emergency change request and would provide the range with a telex reply within 24 hours. For changes required after completion of dress rehearsal, approval would be obtained at the range and would be made jointly by CRA, NASA and LTV personnel. The disposition would be made on a QCTIR. Dallas would be notified immediately by telex which would be followed by a completed copy of the QCTIR to complete the accounting cycle. On-site approval would be made by the Dallas Scout Project Office Representative. He may at his discretion consult Dallas prior to approving the change on site. The CRA and/or NASA may also choose to consult Dallas prior to approving the change.

Figure 3 is a functional flow block diagram for Configuration Control Management of vehicle changes.

After a base line has been established for the GSE, change control would be accomplished through use of the Change Request form. Changes originating at the San Marco range would be submitted to Dallas for review to assure vehicle and procedure compatibility. Approval prior to incorporation would not be required. The drawings would be revised by the range to reflect the design intent of the standard change. Revised drawings would be forwarded to Dallas to update the drawing file. Where no drawing is available to adequately cover the change, it would be documented by the Change Request. In lieu of CCR's a completed copy of the Change Request would be forwarded to Dallas to complete the accounting cycle.



# VEHICLE CHANGES

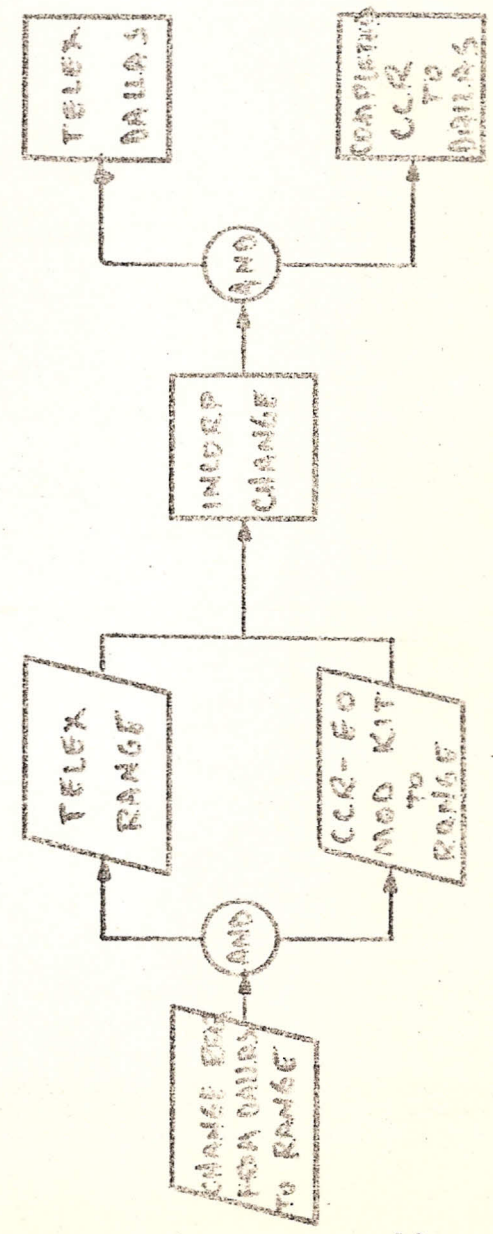
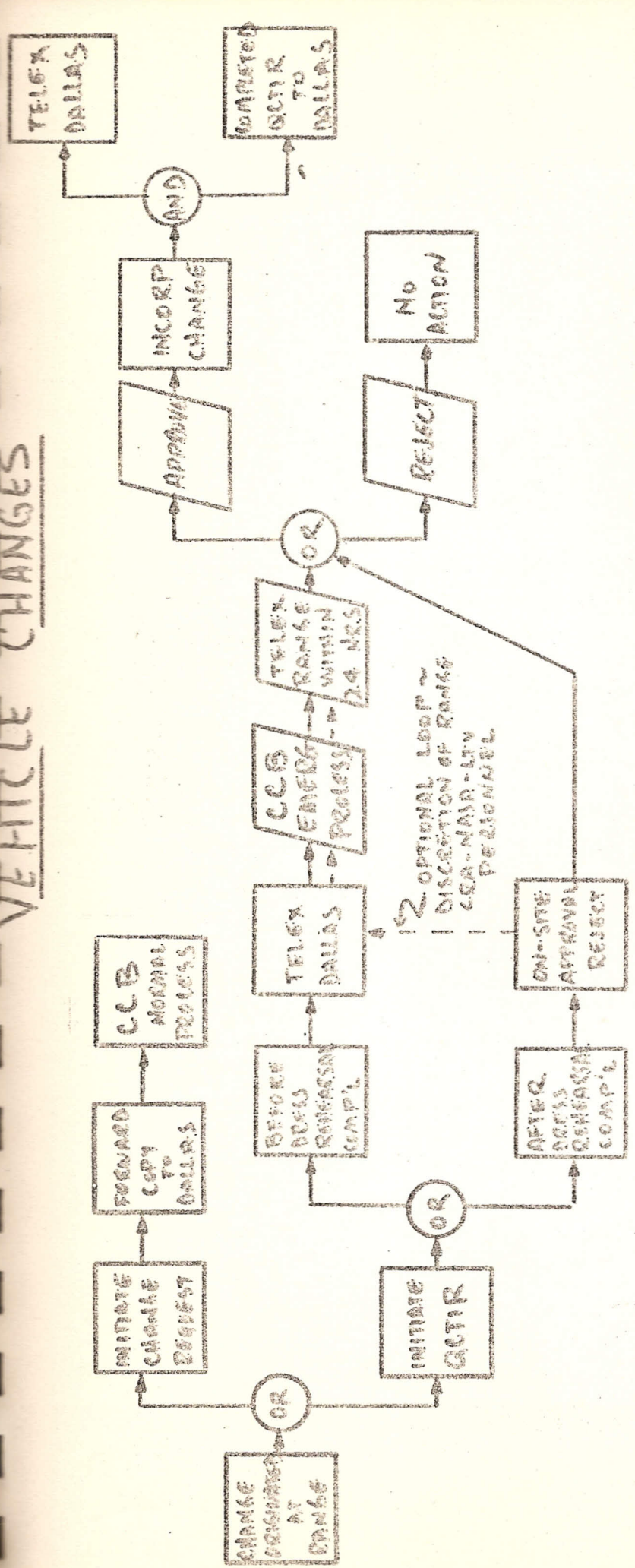


FIGURE 3

To provide a single point for accounting information for the various items of GSE, log books should be established and maintained. These logs should contain copies of all changes and quality documentation associated with the day-to-day maintenance of the equipment as well as all information detailing configuration identification.

Figure 4 is a functional flow diagram for Configuration Control Management of GSE changes.

The standard vehicle operating procedures are an integral part of the Scout system and as such require some change control and accounting. This can be achieved by the following steps.

After a base line and index have been established for the San Marco Operating Procedures (SMOP), the method for control and accounting will vary according to the circumstances. A basic premise which must apply in all cases is that any SMOP bearing the same number as a Standard Procedure issued by Dallas will be identical in every respect.

In the case of changes emanating from Dallas, the range will receive a change package from Dallas with an updated index. Where the Dallas procedure can be used without change, it becomes a SMOP bearing the same number and only the San Marco index would be updated. Where the Dallas procedure must be changed due to range differences, the changed procedure would be given a new number (third part only) and the San Marco index updated. Copies of the changed procedure and index would be forwarded to Dallas for normal processing through the Configuration Control Board and to maintain SMOP file at Dallas.

Changes originating in the field would be the result of a procedure error discovered during vehicle processing or a recommended



# GSE CHANGES

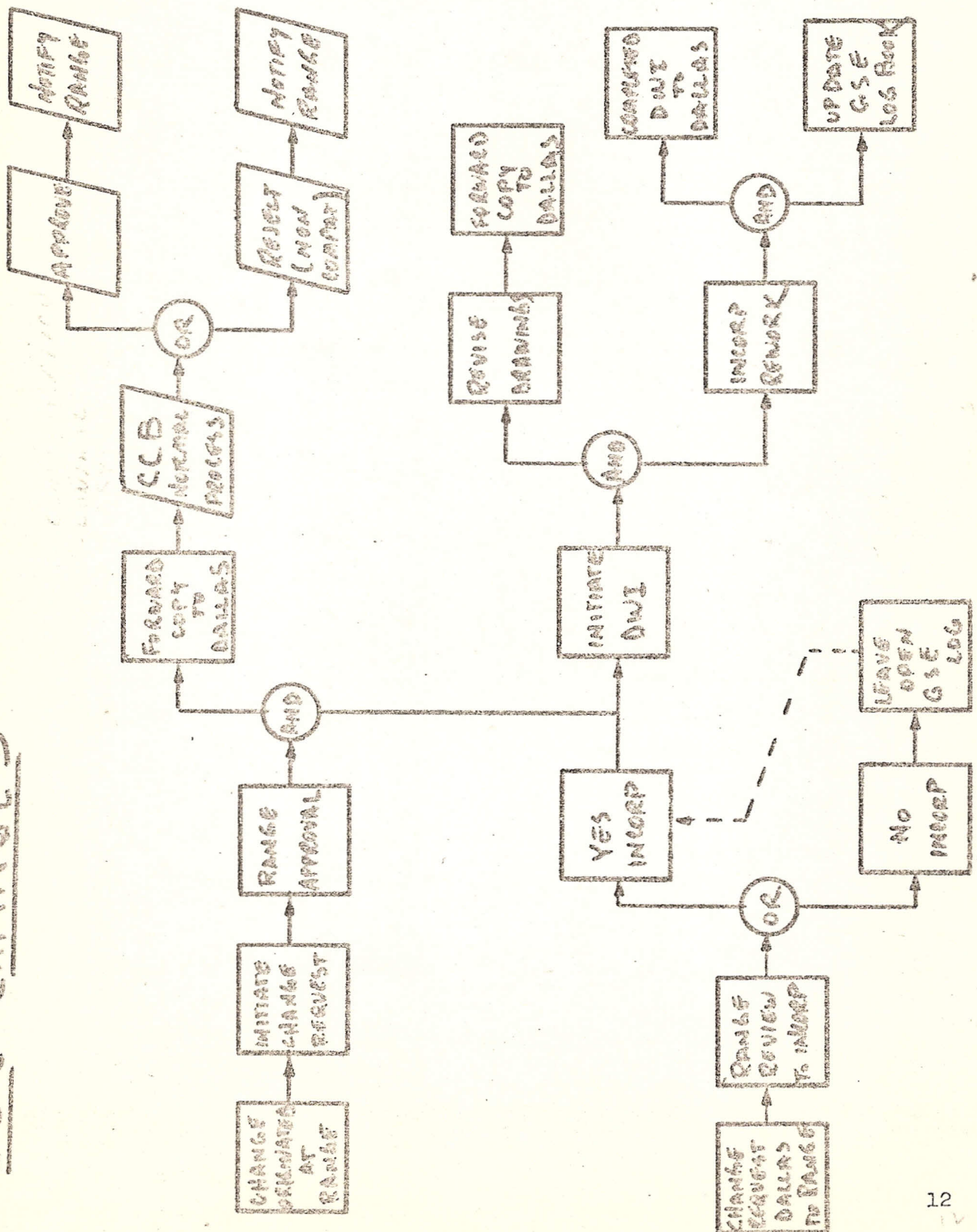


FIGURE 4

improvement. In the case of the latter, the Change Request form should be used and forwarded to Dallas for normal CCB processing. In the case of the procedure error, the discrepancy would be documented on QCTIR and dispositioned for one vehicle only. The completed QCTIR would then be forwarded to Dallas for normal processing by the CCB.

In every case, the result of the CCB review would be forwarded to the range regardless of whether the procedure had been accomplished or not. The SMOP's would not require approval of CCB prior to use by the range.

Figure 5 is a functional flow diagram for Configuration Control Management of Standard Operating Procedures.



# STANDARD PROCEDURE CHANGES

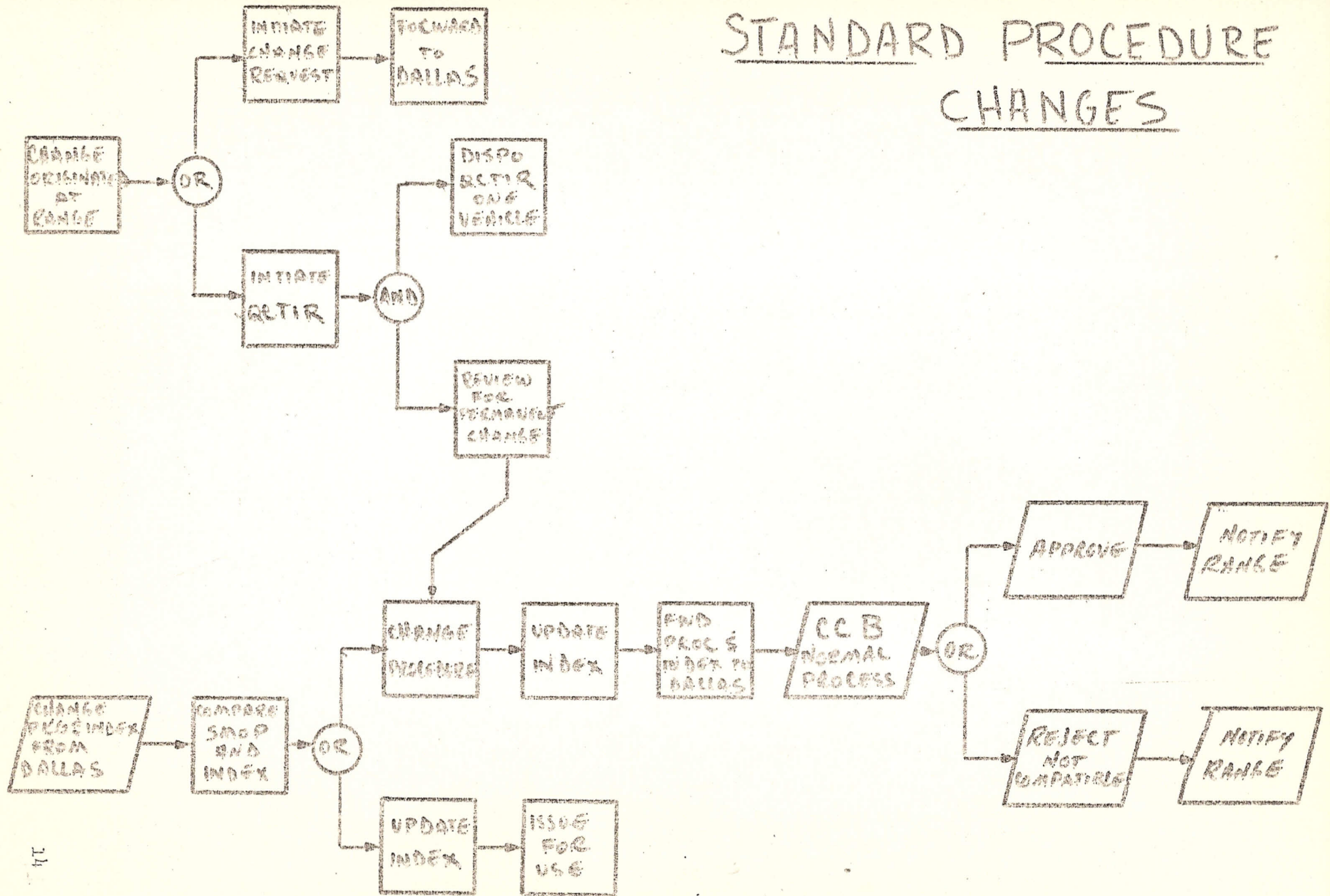


FIGURE 5

CONF I G U R A T I O N

M A N A G E M E N T



## ELEMENTS OF CONFIGURATION MANAGEMENT

- CONFIGURATION IDENTIFICATION
- CONFIGURATION CONTROL
- CONFIGURATION ACCOUNTING

CONFIGURATION MANAGEMENT

ENCOMPASSES

TOTAL SCOUT LAUNCH VEHICLE SYSTEM

INCLUDING

- HARDWARE - VEHICLE AND GSE
- DOCUMENTATION - DRAWINGS AND PROCEDURES

(FACILITIES ARE NOT INCLUDED)



## BENEFITS FROM CONFIGURATION MANAGEMENT

- COMPATIBILITY BETWEEN VEHICLE - GSE - PROCEDURES
- REPEATABILITY OF DATA USING STANDARDIZED EQUIPMENT
- MEANS FOR RAPID EXCHANGE OF INFORMATION
- SYSTEMATIC POOLING OF KNOWLEDGE & EXPERIENCE

## IMPLEMENTATION AT SAN MARCO

- 1 ESTABLISH SAN MARCO GSE BASE LINE
- 2 ESTABLISH GSE DRAWING & PROCEDURE  
FILE AT DALLAS
- 3 INTEGRATE SAN MARCO INTO DATA STREAM  
OF EXISTING SYSTEM
- 4 ESTABLISH RESPONSIBLE & RESPONSIVE  
CONTACT AT RANGE