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Technical Report 204

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SILVER SPRING, MARYLAND  
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**DESIGN AND DEMONSTRATION  
OF A MANAGEMENT INFORMATION  
AND CONTROL SYSTEM  
FOR THE OFFICE OF CIVIL DEFENSE**

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Work performed under Contract OCD-OS-62-286  
for the Assistant Secretary of Defense  
(Civil Defense)

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## **PREFACE**

This report describes the work performed by Operations Research Incorporated in designing and demonstrating the feasibility of a management information and control system for the Office of Civil Defense (OCD). This system was designed and installed during the first 6 months of FY63 and includes theoretical and practical models indicating solutions to identified OCD management problems. The system was successfully demonstrated during January, February, and March 1963.

## SUMMARY

The National Fallout Shelter Program provided for the location of potential fallout shelter areas, the verification of structural compatibility with engineering and architectural criteria, the subsequent obtaining of federal-owner licensing agreements, the marking and stocking of approved and licensed shelter areas, and the training of shelter managers. Thus OCD had an internal requirement to monitor progress and to coordinate effort on a complex program. This generated a need for predictive models related to probable completion dates of a series of significant events. ORI designed predictive models tailored to the program requirements and assisted OCD in the test demonstrations that proved the practical value of the tools.

A major OCD problem area was the program for procurement of shelter provisions. The ORI management team provided detailed analyses of this program and through the use of Program Evaluation and Review Technique (PERT) determined the time sequence of significant events in the development, procurement, and delivery of major items. Management systems models were designed, developed, validated, computed, and demonstrated in these areas.

A different category of OCD management problems was encountered in the implementation of a program of federal assistance to state and local civil defense echelons. This problem dealt with the expediting of actions taken and the clarification of relationships. ORI designed information-flow networks that permitted substantive analysis in this area.

A management information and control system designed by ORI coordinated the networks and information-flow procedures with the output of the management models. A training plan was developed to assist OCD personnel to assume responsibility for operation of the management information and control system.

## I. INTRODUCTION

1.1 The purpose of this project is to design and demonstrate the feasibility of a management information and control system of CD functions under the jurisdiction of the Assistant Secretary of Defense (Civil Defense). The specified areas of analytical interest are those of communication, problem definition, and policy implementation.

1.2 This technical report identifies the scope of research effort undertaken by Operations Research Incorporated during performance of Contract No. OCD-OS-62-286. Since the management information and control system and the theoretical and practical models included therein were made available to the appropriate management levels of OCD as developed, OCD has already realized initial benefits from system implementation. The system and models are described in detail in separate technical reports; these indicate the analytical reasoning and observed results as appropriate.

1.3 The research program undertaken by ORI included a survey of OCD management problem areas with emphasis as specified by OCD on the areas of internal communications, problem definition, and policy implementation. The results of this analysis were made available to an OCD steering committee, which then assigned areas for more detailed analysis and model development. The developed models were of either a theoretical or practical nature and indicated solutions to management problems within the areas of operation, organization, and policy implementation. The management information and control system functions within the framework of OCD goals and organizational structure.

## II. DESIGN AND DEMONSTRATION OF A MANAGEMENT INFORMATION AND CONTROL SYSTEM FOR THE OFFICE OF CIVIL DEFENSE

2.1 The primary emphasis within OCD during the contract period was directed toward successful implementation of the National Fallout Shelter Program. Therefore a significant portion of the early technical effort included a detailed analysis of existing OCD information-flow and reporting system within the program. This study and analysis gave the management systems team a basis for recommending an integrated information-flow procedures system to reduce duplication of effort and to facilitate the rapid procurement and dissemination of data and reports.

2.2 The National Fallout Shelter Program provided for the location of potential fallout shelter areas, the verification of structural compatibility with engineering and architectural criteria, the subsequent obtaining of federal-owner licensing agreements, the marking and stocking of approved and licensed shelter areas, and the training of shelter managers. The requirement within OCD for the monitoring of progress and the coordination of effort within the National Fallout Shelter Program generated a need for predictive models related to such aspects as probable completion dates for survey action, the obtaining of licensing agreements, completion of phased marking and stocking actions, and training results. Operations Research Incorporated designed predictive models tailored to the program needs, and assisted OCD in the test demonstrations, which proved the practical value of the tools. These areas of investigation and model design are the subject of ORI Technical Memorandum 109-63.

2.3 Another major management area within the National Fallout Shelter Program was the program for procurement of shelter provisions. The ORI management team provided detailed analyses of this program, which gave particular emphasis to optimistic and pessimistic predictions of arrivals of individual items of supply, of assembled kits, and of complete modules ready for issue. The management technique used in this instance was PERT. Networks were constructed, timed, and processed through a computer in order to determine optimistic and pessimistic predicted arrival dates. Certain specific areas were given particular attention, on instruction of OCD. These were the development and procurement of sanitation kits, medical kits, water containers, radiological detection kits, and food. Management systems models were designed, developed, validated, computed, and demonstrated in these areas.

2.4 Development and validation of the above models indicated that particular delivery scheduling problems existed in the sanitation kit area. The Assistant Secretary of Defense (Civil Defense) assigned ORI the task of assisting in the development of information and follow-up data in the form of management models in sufficient detail and clarity of design to permit OCD and its subcontractors to maintain a satisfactory delivery schedule. The research and practical demonstrations carried out by ORI in the procurement area are detailed in ORI Technical Memorandum 110-63.

2.5 Operations Research Incorporated Technical Memorandum 111-63 is a description of a management study of the relations in time, feasibility, cost, and production capacity for the three types of food provisioning utilized in the National Fallout Shelter Program. The PERT technique, supported by computer technology, was used in this research effort.

2.6 A different type of management problem was faced by OCD in the implementation of its program of federal assistance to state and local CD echelons. Information-flow models were developed to show the flow of reports and data from OCD headquarters to subordinate levels and the reverse flow. Similar problems were faced in the flow of training materials and the procedures relating to surplus property at federal, state, and local levels. This investigation permitted the ORI management team to make recommendations for changes and modifications in information flow in these areas where such changes and modifications would expedite action or clarify relations. Operations Research Incorporated Technical Memorandum 112-63 describes the work performed, the recommendations made, and the information flow.

2.7 The management models designed by ORI for OCD are part of the management system being developed for OCD use. Since many advanced management tools and techniques are involved, OCD needs trained civil servants to assume responsibility for system operation. Therefore a requirement placed on ORI was the development of a training plan in management systems for OCD use. Operations Research Incorporated Technical Memorandum 113-63 describes the technical effort and accomplishments in response to this requirement.

2.8 The OCD participated in the 1962 annual meeting of the United States Civil Defense Council Conference. This participation included a display that highlighted the major aspects of the National Fallout Shelter Program. ORI was assigned the tasks of designing certain display material and providing technical personnel to demonstrate this material at the conference. Operations Research Incorporated Technical Note 63-4 describes this effort.

### III. SUMMARY SYSTEM DESCRIPTION

3.1 The management information and control system designed and developed for OCD is depicted in summary form by the network inclosed with this report. Detailed aspects of the system are described in:

Technical Memorandum 109-63	Design and Development of Information Flow and Predictive Models Within the National Fallout Shelter Program
Technical Memorandum 110-63	Design and Demonstration of Management Models for Procurement Scheduling
Technical Memorandum 111-63	A Management Study of Food Provisioning Relations
Technical Memorandum 112-63	Information-Flow Models for the Federal Assistance Directorate, Office of Civil Defense
Technical Memorandum 113-63	Development of a Management Systems Training Plan for the Office of Civil Defense
Technical Note 63-4	Design and Demonstration of a Display of the National Fallout Shelter Program

3.2 The management information and control system as depicted on the enclosed summary network (Appendix B) integrated the diverse activities of the National Fallout Shelter Program. The program objectives were set forth in detailed time sequence, which reflected the interrelations between objectives. The reporting procedures, as delineated in the information-flow models, provided for rapid dissemination of data to the appropriate management echelons. These data were compared with the projections that had been made by use of the predictive models.

3.3 The summary network was on continuous display in the OCD Management Center. The display was maintained current so that accomplishments were noted, changes

in projections and specific targets were posted, and the effect of actions that occurred in subsystems were related to other portions of the total program. Computer support, maintenance of management subsystems as reported in the referenced technical reports, and continuous monitoring provided OCD with a management information and control system for the National Fallout Shelter Program.

3.4 The enclosed summary network is one of several summary nets used to present the management information and control system in a dynamic series. The enclosed net is the most recent of the series and highlights the June - December 1962 time frame. It is representative of the series.

3.5 Appendix A is a listing of PERT networks developed during the course of this contract. It indicates those networks that are enclosures to technical reports in this series. All networks cited in Appendix A are maintained at the OCD Management Center.

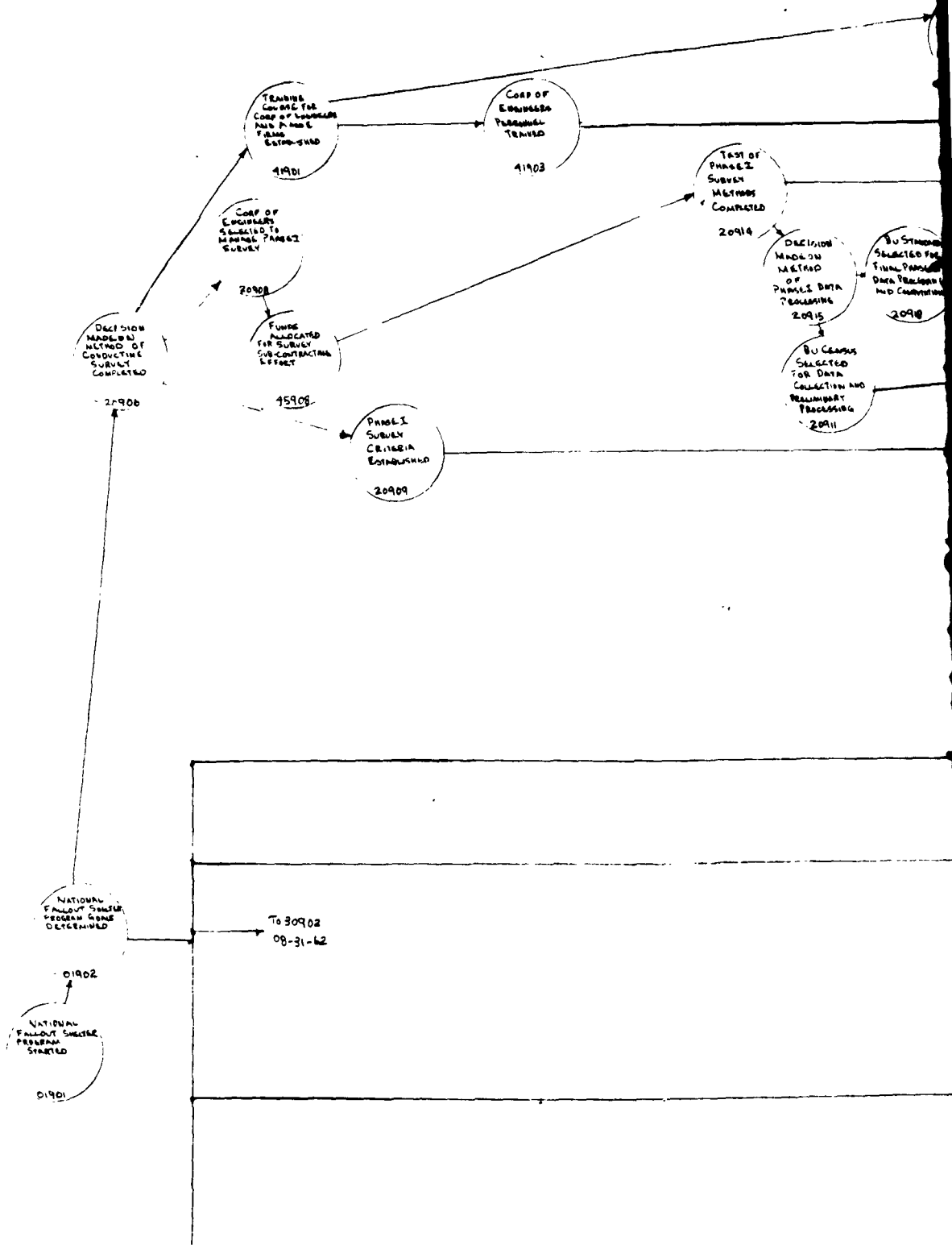
**APPENDIX A**  
**PERT NETWORKS DEVELOPED FOR OCD**

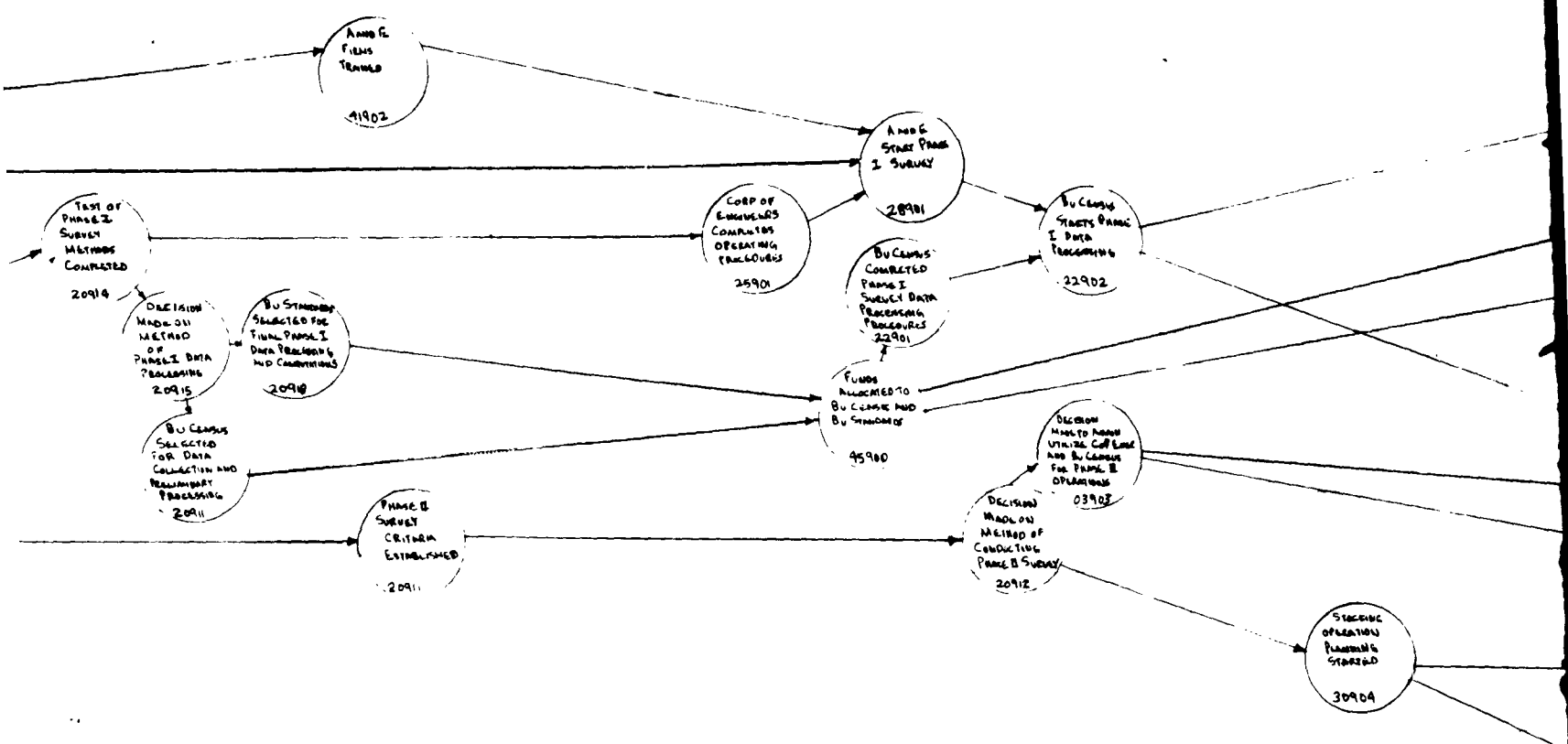
Network No.	Title	Appears in Document
28	PERT Network for Water Container	TM 110-63
32	PERT Network for Sanitation Kit Procurement and Assembly (General)	TM 110-63
29	PERT Network for Medical Kits	TM 110-63
36	PERT Dependency Net and Planning for Designing a Model to Predict Success in Obtaining Fallout Shelter Licenses Nationally	TM 109-63
38	Phase II Survey (Time Scaled)	
39	Phase I Survey (Time Scaled)	
40	Bulgur (Time Scaled)	TM 111-63
41	Food Biscuit (Time Scaled)	TM 111-63
42	Redef (Procurement Grouped)	
43	Redef (Time Scaled)	TM 110-63
44	Preliminary Information Flow and Distribution Net	
45	Continuing Shelter Survey Program Test Plan	
46	DGSC Programming and Initial Issue of Requisitions, Shipping Orders, and Reports (Time Scaled)	
47	Preliminary PERT Net for Establishment of OCD Data-Processing Capability	
48	Preliminary PERT Net for DGSC Activities in Support of OCD (Exclusive of Procurement)	TM 109-63
49	Provisioning, Sanitation Kits, Project 927	TM 110-63
50	Management Summary	204

Network No.	Title	Appears in Document
51	OCD Start-Up Operations for Information-Flow System	TM 109-63
52	Bureau of the Census Start-Up Operations for Information-Flow System	
53	Carbohydrate Tablet	
54	Local CD Operations (Knoxville Conference)	
56	Fire Management Net	
57	NFS Survey and Stocking Operations	TM 109-63
59	Relationship of CD Elements, Responsibilities, and Functions for Planning Effective Management and Budgeting Resources Under the Program Package Concept	
60	Threat Analysis	
61	Project 927, Phase II, Hand Cleaner	
62	Project 927, Phase II, Workshops	
63	Project 927, Phase II, Sanitary Pads	
64	Water Container Net for Continued Procurement	
65	2d Management Net for Blake	
66	Project 927, Phase II, Sanitation Kit Components Procurement	
67	1st Management Net for Blake	
68	Project 927, Phase II, Procurement	
69	Project 927, Phase II, Commode Seat	
70	Project 927, Phase II, General Components	
71	Surplus Property, Normal Acquisition Procedures	

Network No.	Title	Appears in Document
72	Surplus Property, Requested Acquisition Procedures	
73	Surplus Property, Disposal Procedures	TM 112-63
74	Surplus Property, Inspection Procedures	TM 112-63
75	Surplus Property, Combined Normal, Requested, and Disposal Procedures	
76	CD Summary Net (matrix)	
77	Test Net No. 2 for Recomp II Computer	
78	Standard Procurement Net No. 1 for M. Williams	
79	Standard Procurement Net No. 2 for M. Williams	
80	Three-Month Management Net for Blake	
81	Integration of Food	TM 111-63
82	Tech Ops, Support Division Net for Long-Range Programs	
83	Preparation of New Course Material for the Schools	TM 112-63
84	Flow of Training Materials From OCD to the Local Governments for Their Training Purposes	TM 112-63
85	Suggested Plan for Distribution of Materials From Federal Assistance to the Local CD Officials	TM 112-63
86	Flow of Materials From OCD to the Schools	TM 112-63
87	Flow of Materials From OCD to Other Agencies and Their Field Offices	TM 112-63
88	Distribution of Issuances as per OCD Instruction No. 5025.1	TM 112-63

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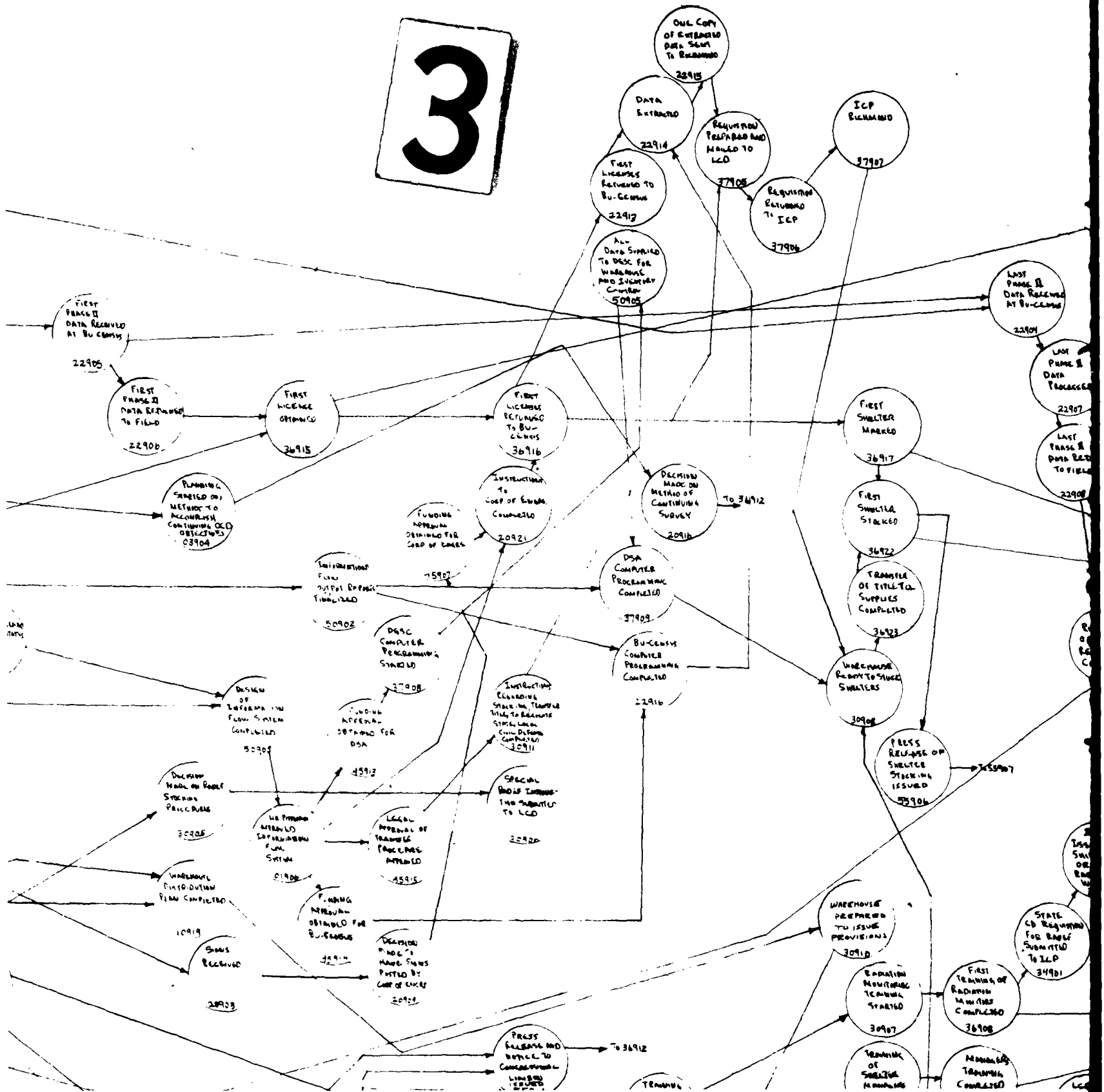
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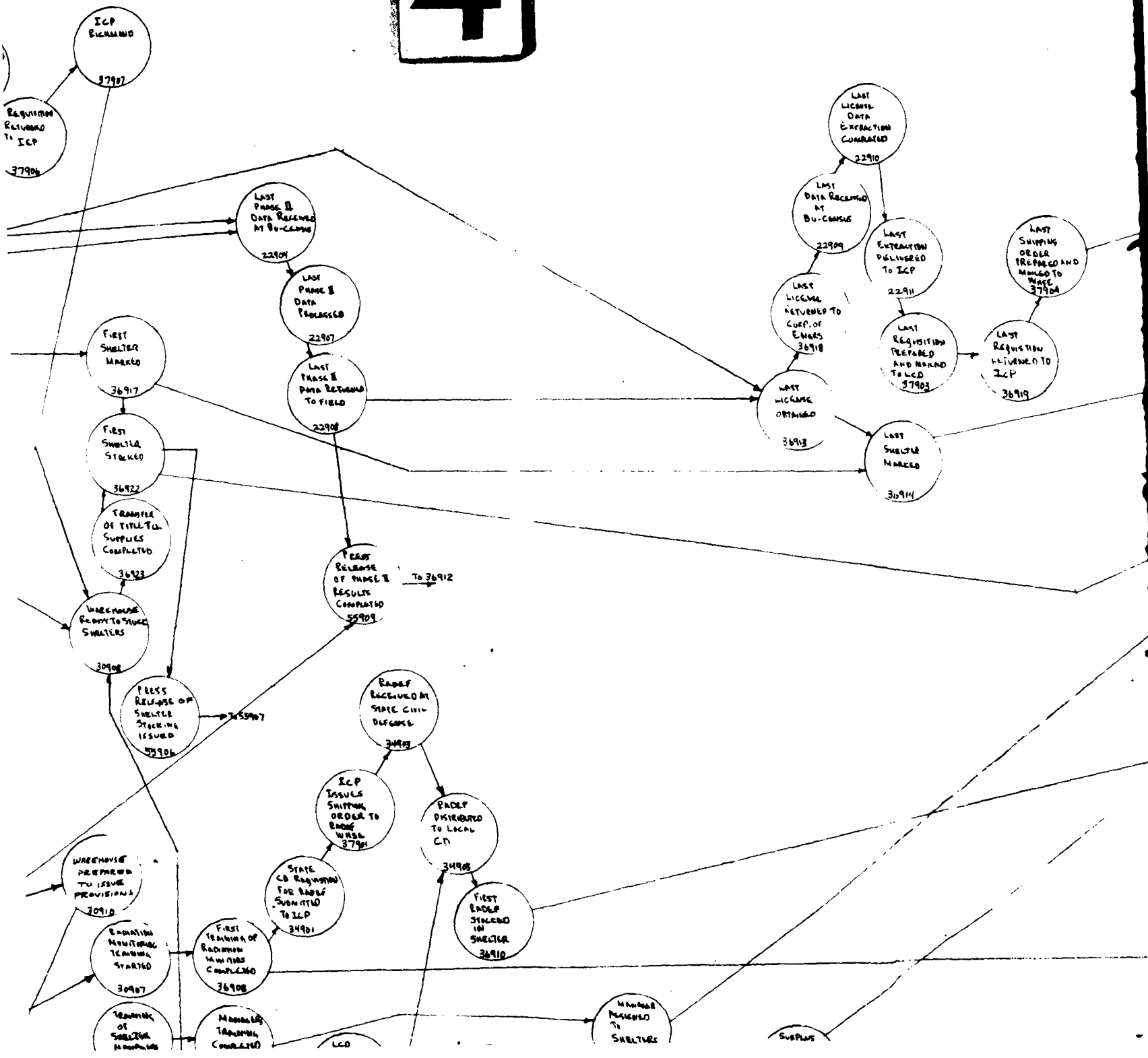
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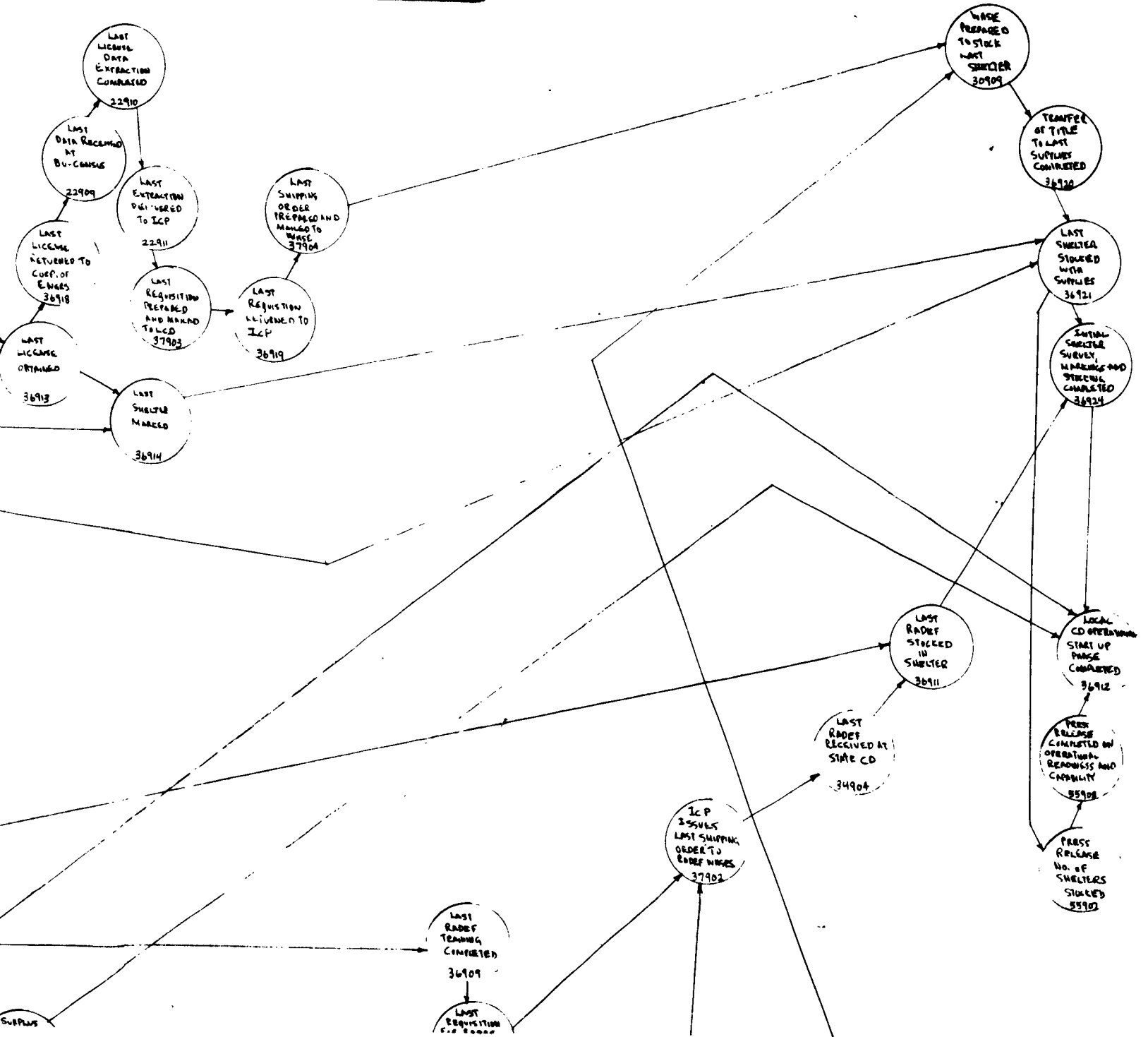
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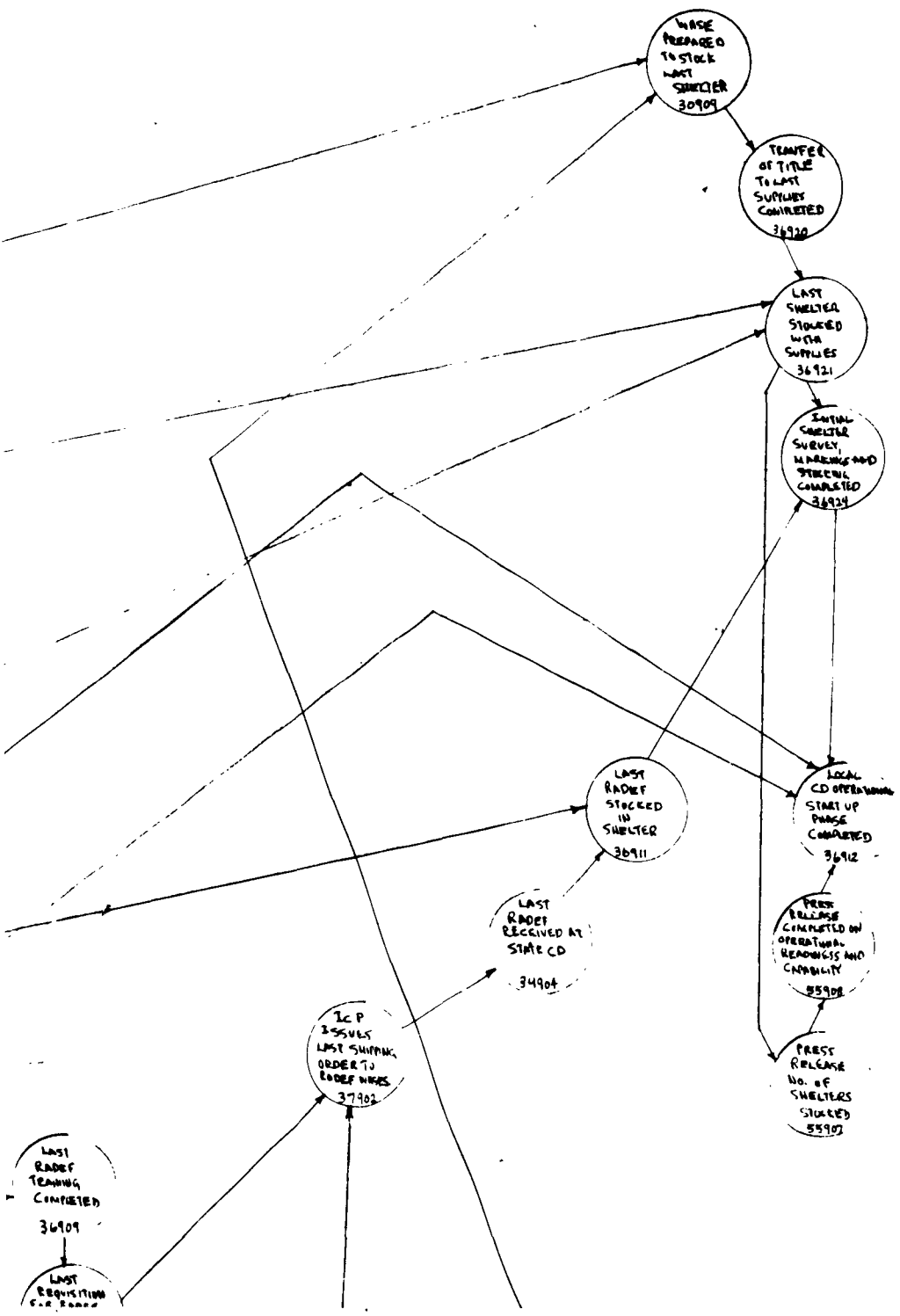
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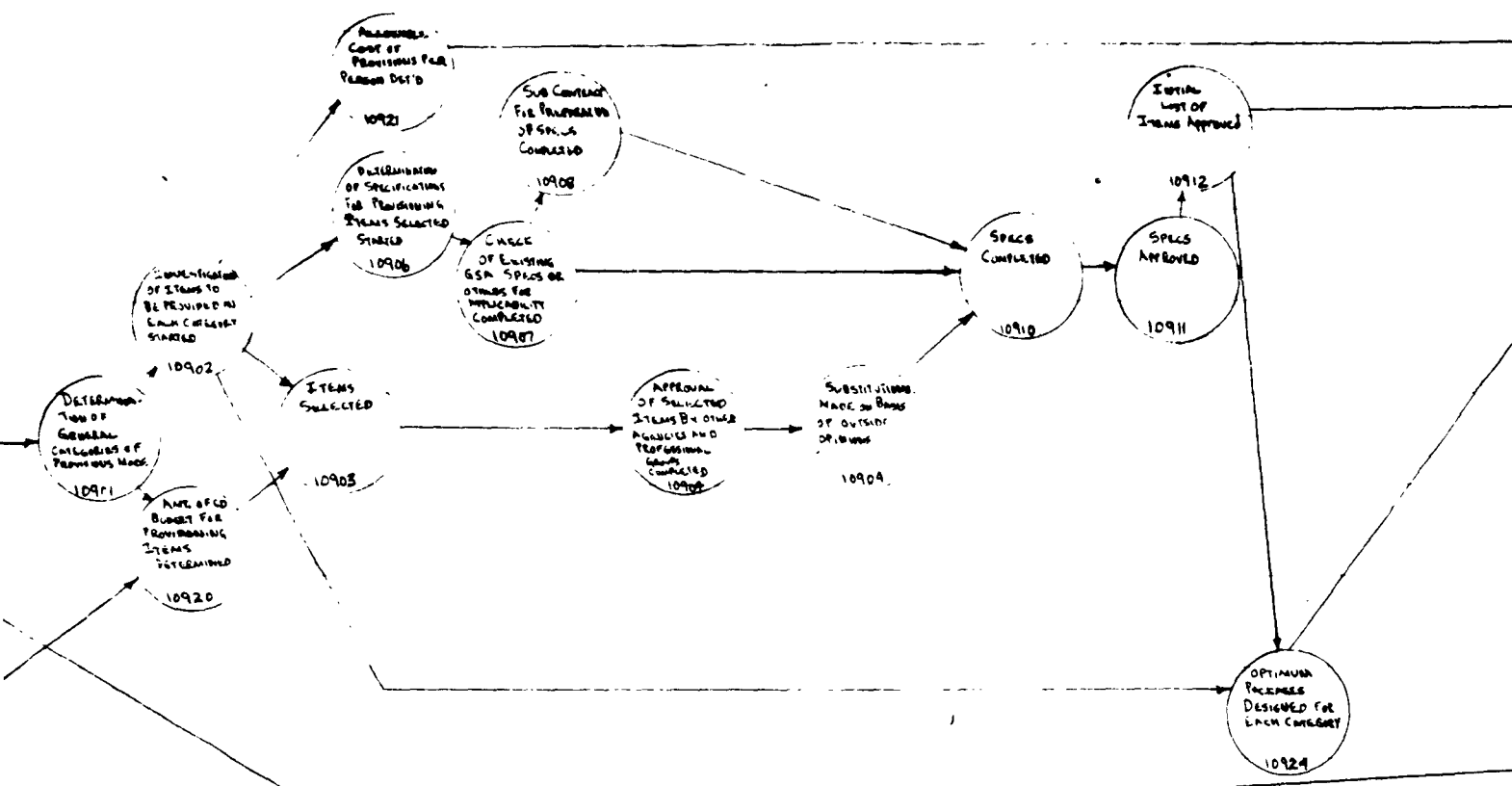
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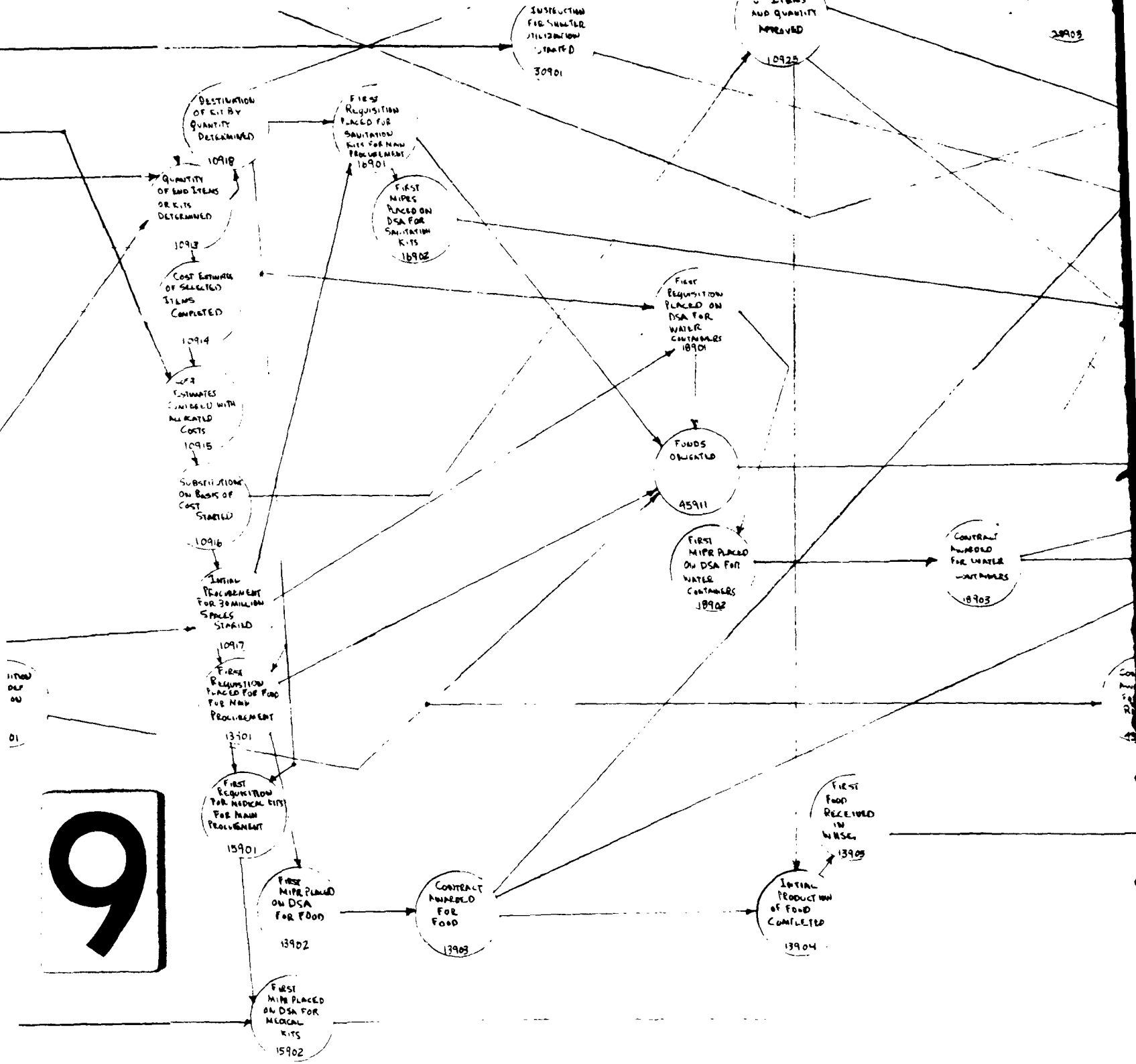




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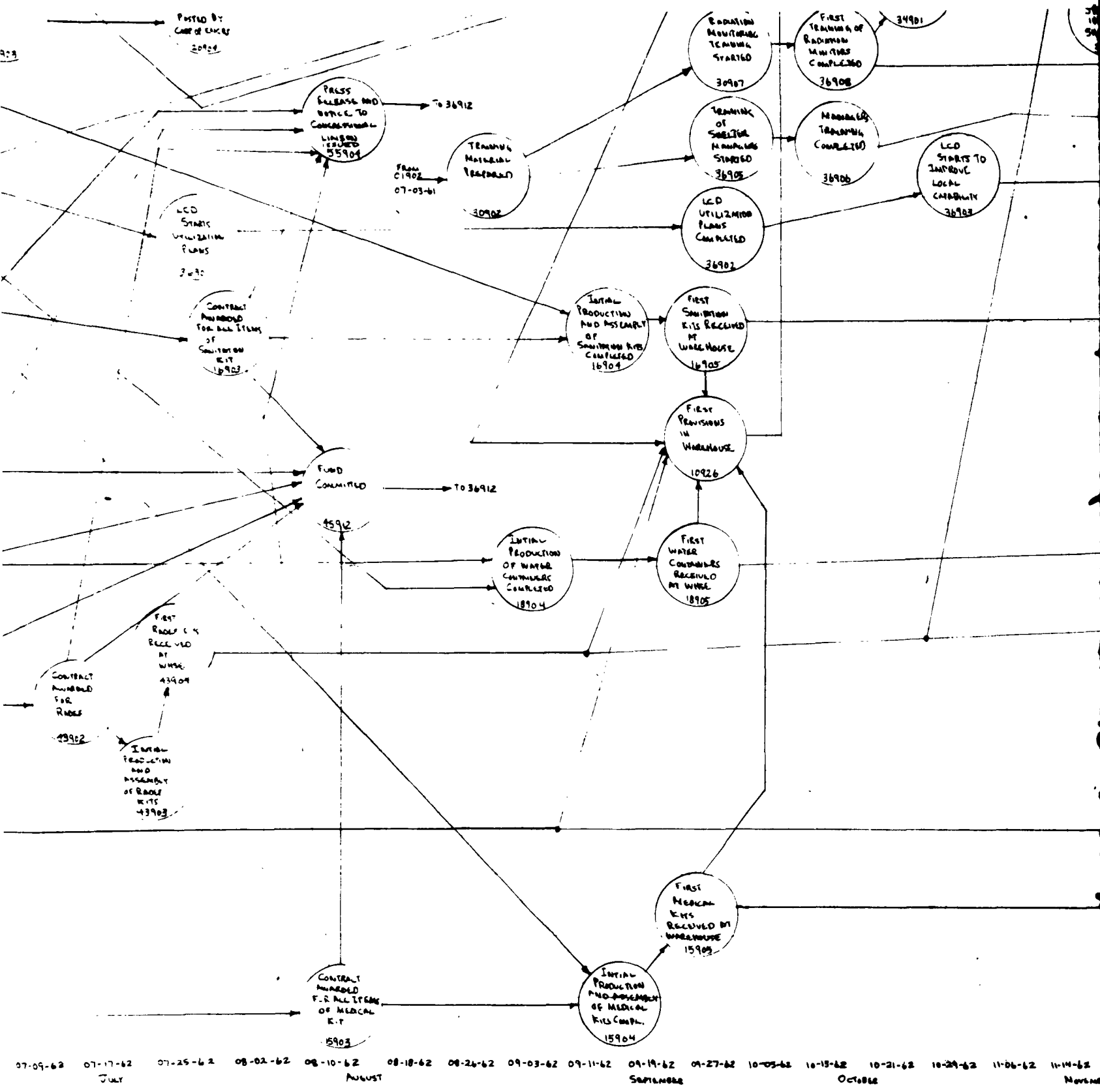
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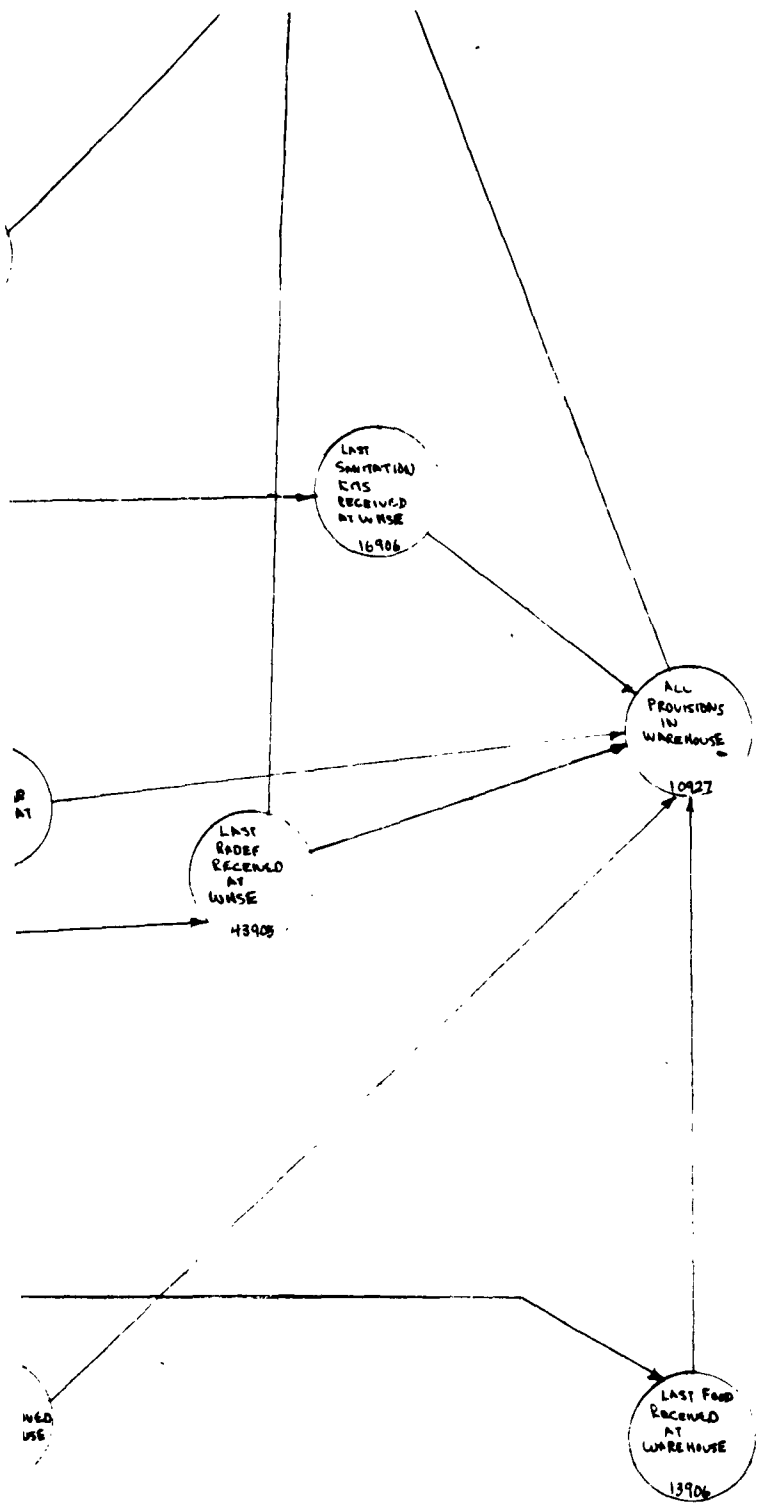
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November December January February March



APPENDIX B

NATIONAL FALLOUT SHELTER PROGRAM SUMMARY NETWORK

FUNCTION CODES		SPECIAL CODES	
01 PITTMAN	30 DURKEE	13 FOOD	
02 GALLAGHER	34 SINE CD	14 MED KIT	
10 BLAKE	36 LOCAL CD	15 SPANATION	
20 MCCREARY	37 ICE	16 WATER	
25 BU. CEMPLE	38 W. KIBUEY	17 RABEF	
26 BU. SIMMONS	39 ROMM		
28 CORP. ENNET	55 PUBLIC RELATIONS		
28 NYE FIENS			
			NET NO. 50
			4 SEPT 62

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**APPENDIX B**