STANDARDIZATION OF AGENA B

A PRESENTATION
of the
CASE FOR
STANDARDIZATION
including
CONTRACTUAL ASPECTS

PREPARED BY
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and
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DEPUTY FOR SATELLITE SYSTEMS
SPACE SYSTEMS DIVISION

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STANDARDIZATION OF AGSNA B

SUMMARY

The presentation covers the evolution of AGSNA configurations from the early beginnings under WS-117L, through the AGSNA A, to the present day AGSNA B. The evolution from three basic configurations to the multiple configurations serving the present array of military satellites is outlined. The expanding role of AGSNA serving other governmental agencies such as NASA is noted. The role of AGSNA as a stage vehicle offering not only orbit mission capabilities but also ascent-only mission capabilities is recognized.

Analysis led to the conclusion that a single basic vehicle could be produced that would be capable of fulfilling a satisfactory portion of the requirements of each program. A comprehensive study was initiated to determine if a configuration could be selected to achieve standardization. The results of the study were conclusively positive. Charts used in the oral presentation are included in this brochure for your reference.

There is a discussion of the procurement aspects of obtaining the Standard AGSNA on a competitive basis, utilizing a fixed price contract. The advantages and disadvantages of competition to establish a second source at this time are discussed. Likewise, utilization of a fixed price type contract at this time is explored. Conclusions and recommendations are presented regarding the procurement aspects of obtaining the Standard AGSNA at this time. Soliciting competition for establishment of a second source and utilizing a fixed price type contract at this time is not feasible, practicable, nor desirable. Charts used in this portion of the presentation are also included for reference.
In early 1959 the capability to build a restartable liquid engine was confirmed at Arnold Center. This one fact immediately allowed the use of higher altitude orbits with practical weight lifting capability using two stage vehicles instead of the three and four stage combinations then available. A vehicle was configured, called the AGENA B, and assigned for use by the multiple programs using the AGENA A. The level of development of the respective mission payloads was substantially higher at this time; therefore, the increased capability of the AGENA B enabled each program to specifically identify mission requirements.

However, the background of minimal mission capability which prevailed continued the development of optimized vehicles for each program. Six additional configurations were defined in three programs; two Discoverer, caused by engine development status; two MIDAS, caused by progressive design improvements; and two SAMOS, due to different missions. Status of these configurations is as follows:

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Programmed</th>
<th>Built</th>
<th>Launched (To Date)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. Discoverer</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>7. Discoverer</td>
<td>23</td>
<td>13</td>
<td>7</td>
</tr>
<tr>
<td>8. MIDAS, Series II</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>9. MIDAS, Series III</td>
<td>4</td>
<td>1</td>
<td>0 (1 cancelled)</td>
</tr>
<tr>
<td>10. SAMOS</td>
<td>2</td>
<td>1</td>
<td>1 reprog - 1 canc.</td>
</tr>
<tr>
<td>11. SAMOS</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

II - PROGRAM STATUS

During the design and test of the AGENA B, recognition of the capability of the vehicle induced several additional programs to consider its use, a process which is still continuing. The development defined for each of the three programs previously mentioned is also progressing as approved. Each is being pursued using the optimization technique that was necessary due to "state-of-the-art" at the inception of WS-117L. Limited capability available at the start of WS-117L demanded complete integration of an entire vehicle to make the mission feasible. The programs now schedule heavier payloads and greater life requirement associated with assured reliability making redundant equipment and large weights the result, and continuing the requirement for optimized vehicles. Following the optimized vehicle concept, eleven more configurations have evolved; six SAMOS, (1) two new missions; with two steps in one mission; (2) one reprogrammed mission, with program schedule and costs causing an increase from two to three configurations; four NASA, caused by four missions; one Advent; and one MIDAS, required to demonstrate operational capabilities. These program configurations are scheduled as follows:

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Programmed</th>
</tr>
</thead>
<tbody>
<tr>
<td>12. SAMOS F-2</td>
<td>1 (Reprogrammed from Configuration 11)</td>
</tr>
<tr>
<td>13. SAMOS F-2</td>
<td>3</td>
</tr>
</tbody>
</table>
Configuration (cont'd)  
Programmed (cont'd)

14. SAMOS P-3
15. SAMOS E-5
16. SAMOS E-5
17. SAMOS E-6
18. NASA Ranger
19. NASA S-27
20. NASA Comsat
21. NASA NIMBUS
22. Advent
23. MIDAS, Series IV

At this time, four additional missions are being identified for the future with at least twenty flights planned. One, SAINT, 4 each; two, SNAPSHOT, 4 each; three, VERA HOTEL, 5 each; and four, MIDAS, Series V, more than 7 flights.

III - ANALYSIS OF SITUATION

AGENA, because of somewhat strict adherence to the principle of optimization and to individual tailoring to satisfy peculiar mission requirements, has been produced in twenty-three different configurations. And at this time four more are in the final stages of planning and procurement, and may be subjected to the same technique. Several months ago it became overwhelmingly evident that AGENA had achieved a much larger role in military space systems endeavors than was originally envisaged for WS-117L. In addition, other agencies such as NASA were beginning to plan space missions using the AGENA as a stage vehicle. AGENA was also recognized to require not only orbit mission capabilities but also ascent-only mission capabilities, e.g., the ability to serve many and varied space missions and payloads.

Analysis of the several configurations clearly indicated a repetition of certain functions which were designed into the original WS-117L vehicle and remain in those now being configured. These functions are being performed by components that are still basically the same in function as they were in the beginning. Mission peculiarities that have acted to cause configuration change have gradually evolved as differences in the application of hardware from its original functional intent or in duplication to achieve a longer vehicle life.

The extent to which component developments and functional applications have changed the basic concept of AGENA has a direct bearing on the ability to produce a single basic vehicle capable of fulfilling an appreciable (satisfactory) portion of each program's requirements. It was determined that a comprehensive study should be initiated to review all programs, classify all functions-common and peculiar, and determine if a configuration could be selected to achieve standardization. This work was started in 1961.
IV - AGENA STANDARDIZATION

While the results of our contract study effort have not been officially presented as of 15 August 1961, the findings were clear that standardization could be satisfactorily achieved. Sufficient study was accomplished to indicate that singleness of functional design prevails for those components which are necessary to perform ascent functions. The degree of extension of these components functionally to accomplish on-orbit requirements is a peculiarity of each program.

In the study conducted the feasibility of placing a Standard AGENA into final design and production was established. All programs were canvassed throughout all systems and subsystems. All functions were assembled and categorized—common and non-common. All functions were compared with equipment capabilities and equipments were selected having common functional capabilities. Modifications, minor in nature necessary to other equipments were determined. All individual program requirements were assembled and categorized such as life, power, attitude, altitude, etc.

A design compatible airframe was conceived, a mockup was constructed, and mission common components were installed. Provisional space was set aside for mission peculiar functions and related components. Thus, a single vehicle, basically simple in design, and meeting all program requirements was established. This vehicle has built-in adaptability for advanced components without change in basic design of structure. A modular concept is employed in addition for flight and mission equipment. Vehicle equipment has not been co-mingled with payloads and payload peculiar equipment or with additional vehicle equipment necessary for a particular mission.

For the simple high-performance ascent type mission only a limited amount of equipment need be carried. For program systems where AGENA is used on orbit additional equipments are loaded in spaces where provisions have been made for these equipments. When not required, the equipment and its wiring harnesses may be left out.

To date, the AGENA has been designed, engineered, and produced on an experimental basis as an R&D item for use on military satellite systems. In most cases there have been "block type" releases of three or four vehicles of a particular configuration to satisfy mission requirements of an R&D nature. In no case to date has there been identification of vehicle or mission in operational terms. Design for production on a line basis with the associated standard requirements for uniform installation of certain equipment and provision for additional special equipment has not been practiced. Also each vehicle, because of its narrow configuration orientation, has not had the advantages of design for accessibility, maintainability, reproducibility, or interchangeability. These refinements, more common to production items, were not economical nor feasible.
Neither were they considered compatible with schedule requirements. Contractual arrangements further inhibited wide spread generalization of vehicle requirements, hence standardization has not heretofore been a subject for serious consideration.

Times have changed as has been pointed out above. The use of AGENA is expanding and the numbers to be considered are ample enough to require that the vehicle be engineered for production. The experience and know-how accumulated over the past three years coupled with the results of the recent study add to the desirability and practicability of standardization.

V - ADVANTAGES OF STANDARDIZATION

1. Technical considerations.
   a. Standardization will facilitate production and permit the employment of common tooling capable of higher rates. Special jigs and other tooling would primarily be limited to the mission peculiar bits of structure, modules and other assemblies.
   b. Line production techniques automatically provide for lower costs and firmer scheduling.
   c. Basic vehicle is not committed to a program requirement until complete, thus allowing the best in flexibility of assignment.
   d. Test practice in present programs is to test at levels of successive complexity. No change in this basic policy is contemplated. Contrary to present practice but beneficial, single test specifications and written procedures are applicable to standardized vehicles. As test experience is gained, additional simplification will result.
   e. The processing of vehicles of different configuration has caused duplication of checkout test facilities under present practices. This has been considered preferable to continuous modification as production proceeds. Standardization will permit a single checkout line for the basic vehicle geared to higher processing rates with reduced equipment and facilities required.
   f. Checkout of basic standard vehicles after mission equipment modules are added is a separate operation equipped especially for the total vehicle being processed.
   g. The test results of a vehicle flight or ground test will be directly applicable to all programs after standardization. Presently, vehicles are considered as separate design problems.
and application of test results must be made by inference.

h. Standardization provides for additional line development of the AGENA and product improvement by scheduled production blocks becomes possible.

i. Standardization provides adaptability for advanced components without necessity for change in basic design.

j. All the "ilities" are enhanced by standardization—producibility, accessibility, maintainability, reliability, interchangeability, etc.

k. Weight penalties normally expected to be associated with standardization are non-existent with but one exception—Discoverer on THOR. Refer to the weight comparison chart.

2. Programming considerations

a. Standardization will promote more efficient production programming activity. By separating the common elements, the AGENA can be budgeted and scheduled on a production basis with an orderly progression of blocks. The block concept for configuration purposes, while in existence for small numbers of vehicles in most programs, becomes really effective when total numbers for all programs are considered. Bulk procurement of subcontracted components may be encouraged as well as larger lot production releases.

b. The programs gain from standardization by having the capability to use any basic vehicle coming down the line. Present practice allocates vehicles at an early date and exclusively by contract. Any malfunction or accident to the AGENA can cause a launch date slippage months in advance.

c. Development of mission packages need not be paced by AGENA production schedules. The totally integrated vehicle, which has been the rule of the past, required payload completion dates in sufficient time to allow installation of flight hardware during the assembly process, four to six months prior to launch. Standardization of AGENA would permit this installation just prior to the system test period, normally two to three months prior to launch. Development problems and slippages on one mission package would not hold up another program activity. The Standard AGENA would accept the next available mission package should such a problem exist.

d. The Standard AGENA will be procured on a contract separate from the payload or mission contract. The accumulation and segregation of costs will be improved as will the efficiency of fabrication and test. Learning will take its proper and regular place in the production scheme.
3. Management considerations

e. Standardization will facilitate management control of
vehicle development and production through a single contract for
AGENA effort. The single contract will assure more accurate audit
of effort and more precise cost determination. Under present practice
all costs are collected within a given program for both complex and
simple vehicles. Resultant cost analysis and negotiation are now too
dependent on experience and judgement.

b. Program management would not be hampered by necessity
of precisely meeting a specific launch date with a standard AGENA.
The standard vehicle production line would generate the capability
for meeting any series of launch dates with each AGENA having equal
importance. This would reduce over-emphasis of effort on any individu-
al AGENA to the exclusion and detriment of following or preceding
vehicles.

c. It is expected that the continued technical development
of the standard vehicle will benefit from a single line of direction
and be given full support by top engineering talent. The present
contractor organization, for development of the AGENA, has been
derived by dividing and demudaing a central engineering organization
and giving each program office a share of the technical talent.
Standardization will require re-grouping and return technical talent
to the responsible central organization.

d. Vehicle development may be monitored more closely by a
smaller amount of management talent. At present, six separate engine-
ering organizations representing the program managers have authority
to approve design modifications to the AGENA. Each claims necessity
for monitoring development of the AGENA for their program purposes.
Standardization will require consolidation of this effort in so far
as it applies to AGENA.

e. Advanced development of AGENA is presently studied and
justified under each individual program. It is recognized that such
studies should be continued to a minor degree. Management of this
type of effort after standardization would be under the AGENA contract
and applied to vehicle capability changes. Advanced development and
application of mission capability would remain under the program contract.

VI - CONCLUSION

The Standard AGENA is a logical conclusion of the development and
experience gained since the beginning of WS-117L. A vehicle may now be
achieved which will perform functions which have been established as
being common to all space missions. This vehicle may be quickly applied
to all missions that are now scheduled or that are now scheduling its use. This is particularly interesting since the basic vehicle is an ascent vehicle which because of its excellent design and built-in characteristics may also perform for on-orbit missions. It has developed the ability and the capability to serve many and varied space missions and payloads.

The application of recognized and experienced development, programming, and management techniques to the common elements making up the Standard AGENA can produce a reliable, producible, and maintainable vehicle at minimum cost. Its ready adaptability and responsiveness to changing program schedules and requirements is clearly evident.

The degree of independence which clearly attaches to the concept of a Standard AGENA under its own procurement contract opens opportunities for:

a. More economical production.

b. Better reliability.

c. Accuracy in the collection of costs and better future pricing.

d. More freedom for the program offices with less worrying to be done about the vehicle.

e. Better opportunity for planned product improvement in both vehicle and mission payload areas.

These are but a few of the advantages to be gained. There are no "cons," only "pros" in this technical analysis of the Case for Standardization of the AGENA B.
I - ASSUMPTIONS

In considering the procurement aspects of obtaining the Standard AGEMA certain assumptions have been made in order to confine the investigation to relevant areas.

1. Second Source. Consideration is being given to the feasibility and practicability of soliciting competition from industry to establish a second source for production of the Standard AGEMA.

2. Fixed Price Contract. Consideration is being given to the feasibility and practicability of contracting with the second source on a fixed price basis to produce the Standard AGEMA.

3. LMSC Production. LMSC will continue to produce AGENAS, including a limited number of Standard AGENAS.

4. Uniform Configuration. It is required that identical configuration be maintained between Standard AGENAS produced by LMSC and the second source.


II - COMPETITION - SECOND SOURCE

In considering the establishment of a second source by soliciting industry on a competitive basis, there are certain advantages to obtaining competition.

1. Advantages

a. Price. It is possible, although not guaranteed, that AGENAS can be obtained at a lower cost by soliciting competitive proposals from industry. The price advantage, if any, would certainly not accrue to the Air Force until a significant number of units had been produced at some considerable time in the future.

b. Back-up. Establishment of a second source would provide the Air Force with a back-up source for AGENAS if and when needed.

c. Utilization of Industrial Base. Establishment of a second source makes use of many of the existing industrial base and
promotes development and advancements of U.S. technology. Assistance might also be given to distressed labor areas.

d. Industrial Relations. Establishment of a second source tends to promote industrial relations throughout the United States by spreading our production requirements.

e. Stimulate Efficiency. Competition between the new and old source should promote interest in producing a better item at a lower price. It removes the old producer from the dominant, monopolistic position and stimulates interest in doing a better job for the Air Force.

2. Disadvantages

a. Duplicate Costs. Establishment of a second source would entail certain duplication of costs to the Air Force. Such items as facilities, special tools, test equipment, management and overhead are estimated at approximately 10 million dollars, with an immediate cash outlay of 5 million dollars.

b. Longer Lead Time. A second source would require at least six months more production and test time before the first AGENA was ready to launch. An additional eight months would be required to complete design, work statement, procurement action, source selection, and award a contract. Thus, total lead time would take approximately 14 months more to get the first AGENA from a second source.

c. Need Firm Configuration. Unless it is desired to go through the conceptual and preliminary design stages with a second source, a reasonably firm configuration is needed to solicit competition. Some of this work has been completed by LMSC but is not in state such that it can be used in soliciting competition.

d. Management Problems. Countless management problems are created for the Air Force and old source by introduction of a second source. Air Force personnel are presently fully occupied managing the programs at LMSC. A second source would require additional Air Force management personnel to exercise surveillance and direction over the program. Moreover, LMSC would have to create a technical liaison office to assist the second source with technical and manufacturing aspects of the vehicle.

e. Impact of Cut-Back. If there should be a cut-back in the AGENA program, there would be problems of which contractor to reduce or terminate, re-scheduling AGENA production and deliveries, industrial relations and possible utilization of a facility at less than optimum efficiency.

f. Reliability Decreased. It is axiomatic that quality of workmanship and thereby reliability of the additional units are produced. Introduction of a second source inevitably have an adverse effect upon reliability in the total AGENA production.
3. Requirements

a. **Industry capability.** In order to obtain desired competition, industry must have the technical ability, facilities, manpower, and financial resources to accomplish the task. These capabilities are present within our industry, but close guidance should be obtained from IMSC in order to benefit from their experience. A source list can be developed from companies known to possess the required capabilities.

b. **Firm configuration.** In order to obtain desired competition and not repeat much of the study and development work which IMSC has already completed on the Standard AGENA concept, it is necessary that the configuration be reasonably firm. It should also be in a form which can be transmitted to the potential sources for use in preparing their quotations.

c. **Company desire.** The potential second sources must have a desire to undertake production of a standard AGENA. The over-all program should be attractive; there should be good opportunity for a reasonable profit, and the company must feel it has a possibility of winning the competition.

d. **Lead time.** Establishment of a second source involves certain unavoidable time elements such as procurement, engineering, tooling, production planning, and production learning curve. Programs requiring the Standard AGENA must be able to be scheduled to absorb this additional lead time.

e. **Funds.** Production start-up costs for engineering, tooling, test equipment, special machines, and plant layout for a new source will require substantial cash outlay immediately. It will be necessary for IMSC to establish a technical and manufacturing liaison group to provide guidance to the new source. Initial requirements would be approximately 30 people and cost about $.5 million.

III. **FIXED PRICE CONTRACT**

1. **Advantages**

a. **Less Air Force contract management.** Under a Fixed Price type contract Air Force contract administration is simplified. There is no requirement for complex records and surveillance by Air Force over contractors' government property records. Likewise, the continuous requirement for auditing and approving all contractor expenditures is obviated.

b. **Incentive.** Contractors performing under a Fixed Price contract have strong incentives to increase their efficiency, make
prompt deliveries, and reduce costs in order to maximize their
profits.

c. Less overrun possibility. Because of the incentive to
minimize costs and maximize profits there is less possibility that
a contractor will overrun his contract price and cost the government
more when the contract is redetermined.

d. Air Force Budgeting facilitated. Under a Fixed Price
contract where there is incentive to reduce costs and avoid over-
runs, Air Force Budgeting is facilitated. Funds requirements and
costs are more reliable.

2. Disadvantages

a. Need complete procurement data. In order to arrive at
a complete meeting of the minds and to write a Fixed Price contract,
it is essential that complete procurement data be available. These
data include such things as engineering drawings, specifications for
material, performance, packaging, etc. This information is needed
by potential suppliers in order to submit Fixed Price proposal. At
this time no procurement data are available on the Standard AGENA.

b. More contract changes. Under a Fixed Price contract it
is necessary to negotiate a contract amendment each time a change is
desired in the original terms or specifications. It is not possible,
as in cost-type contracts, to issue CCMs to be consolidated and
negotiated at a later date. Therefore, procurement of undeveloped
item under a Fixed Price contract will inevitably lead to more
contract changes and increased work for the customer and the contractor.

c. Fixed Price mixed with CPFF contracts. Mixing Fixed
Price and CPFF contracts in the same plant and especially for the same
item increases the responsibility and importance of much closer Air
Force contract management surveillance by production and auditor
personnel to assure appropriate collection of cost by the contractor.

3. Requirements

a. Procurement data. Solicitation of industry for quotations
on a Fixed Price basis cannot be made without complete, detailed
procurement data. Potential contractors must have a well-defined,
precise description of the item on which they are to bid so that fair
and reasonable prices without exorbitant contingency factors may be
submitted.

b. Price knowledge. The procuring agency should have
knowledge regarding the price which should be paid for the item.
This knowledge may have been acquired through prior purchases of
the same or like items, familiarity with the type of item or detailed
and accurate price analysis. Utilization of a Fixed Price contract should not be attempted unless there is assurance that a fair and reasonable price may be obtained for the Government.

IV - CONCLUSIONS

1. Competition for Establishment of a Second Source

a. No firm configuration. The Standard AGENA configuration is relatively unstable at this time. IMSC has completed a feasibility study and a mock-up. However, the configuration certainly will change before completion of flight test.

b. Second source problems. Introduction of a second source to produce the Standard AGENA will create many additional difficult problems. Close technical guidance will be required by the new source. This will require additional IMSC manpower for which the Air Force will have to pay. Likewise, the Air Force will require additional manpower to exercise surveillance over another contractor.

c. Questionable cost savings. There is no real assurance that a second source can produce at less cost than the present contractor. There are significant start-up costs which must be amortized over considerable time before the Air Force would accrue benefits, if at all, from introduction of a second source.

d. No back-up requirement. Based upon firm and program requirements, there is no need at this time for a second source. IMSC is capable of delivering sufficient quantity to meet our requirements.

e. Cannot deliver by Jan 61. If the requirement for launch of the first standardized AGENA is Jan 63, it is not possible for a second source to deliver the standardized AGENA by Jan 63.

V - FIXED PRICE CONTRACT

1. Desirable. It is desirable to contract on a Fixed Price basis whenever conditions are such that this is feasible.

2. No procurement data. The Standard AGENA is presently in the development stage and procurement data are not available at this time.

3. Disadvantages versus advantages. Thus, it appears that the disadvantages of obtaining the Standard AGENA by soliciting competition and writing a Fixed Price contract out-weigh the advantages at this time.

VI - RECOMMENDATIONS

1. Approval of the Standard AGENA concept.
2. Grant immediate authority to award a contract to proceed with manufacture of the Standard AGENA.

3. Write a cost-type contract with DMSC immediately and obtain procurement data as soon as possible.

4. Consider competition and Fixed Price type contract at a later date when the concept, design, manufacture and flight test of the Standard AGENA has been proven.
OUTLINE

- HISTORY OF AGENA GROWTH

- STANDARD AGENA STUDY
  1. OBJECTIVES
  2. APPROACH

- STUDY RESULTS

- PROCUREMENT & CONTRACTING
  1. SECOND SOURCE
  2. FIXED PRICE CONTRACT

- CONCLUSIONS

- RECOMMENDATIONS
# Mission Requirements

<table>
<thead>
<tr>
<th>PROGRAM 8</th>
<th>ABSENT/ORB</th>
<th>LIFE REQ'D</th>
<th>ORBIT ATTITUDE</th>
<th>ORBIT ALTITUDE</th>
<th>BOOSTER</th>
<th>WEIGHT OF PAYLOAD</th>
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<tr>
<td>DISCOVERER</td>
<td>ORBIT/RECOVERY</td>
<td>1/4 DAY8</td>
<td>HORIZONTAL NOSE BACK</td>
<td>120/550</td>
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<td>MIDAB</td>
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6971-001
STUDY OBJECTIVES

- Gain in performance for all present programs
- Single basic vehicle meeting all program requirements
- Modular concept using present flight-proven equipment
- Simplification in:
  - Vehicle design
  - Fabrication
  - Checkout
- Production techniques for lower cost, firm scheduling
- Adaptability to advanced components without change to basic design
ENGINEERING STUDY APPROACH

- CANVASS ALL PROGRAMS FOR ALL SYSTEM AND SUBSYSTEM FUNCTIONS
- ASSEMBLE ALL COMMON FUNCTIONS - CATEGORIZE ALL NON-COMMON FUNCTIONS
- COMPARE FUNCTIONS WITH EQUIPMENT CAPABILITIES
- SELECT EQUIPMENT HAVING COMMON FUNCTION CAPABILITY - DETERMINE MODS NECESSARY TO OTHERS
- ASSEMBLE AND CATEGORIZE ALL PROGRAM REQUIREMENTS - LIFE, ATTITUDE, ALTITUDE, POWER, ETC
- DESIGN COMPATIBLE AIRFRAME, INSTALL COMMON COMPONENTS, PROVIDE SPACE FOR OPTIONAL MISSION-REQUIRED MISSIONS
STANDARD AGENA CONCEPT

BASIC VEHICLE CONSISTS OF:
- FRONT RACK, TANK & AFT RACK
- 8096 ENGINE RESTARTABLE
- BATTERIES & POWER FOR ASCENT
- GUIDANCE & CONTROL FOR ASCENT
- TELEMETRY FOR ASCENT
- BRACKETRY, CABLE JUNCTION BOXES

EXAMPLES
- NOSE FAIRING
- SECONDARY PROPULSION SYS.
- EXTRA BATTERIES & GAS BOTTLES
- CONTROL MOMENT GYROS
- BEACONS, PROGRAMMERS
- BRACKETRY, CABLE JUNCTION BOXES
# Weight Comparison

**STD AGENA VS PRESENT DESIGNS**

<table>
<thead>
<tr>
<th></th>
<th>DISC.</th>
<th>MIDAS</th>
<th>ADVENT</th>
<th>PROG 101 A</th>
<th>PROG 101 B</th>
<th>PROG 102</th>
<th>PROG 210</th>
<th>NASA/ LUNAR</th>
<th>NASA/ ORBIT</th>
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</thead>
<tbody>
<tr>
<td><strong>STRUCTURE</strong></td>
<td>44</td>
<td>-168</td>
<td>-40</td>
<td>-159</td>
<td>-151</td>
<td>-34</td>
<td>+10</td>
<td>+2</td>
<td>-17</td>
</tr>
<tr>
<td><strong>PROP</strong></td>
<td>+3</td>
<td>+6</td>
<td>+8</td>
<td>+3</td>
<td>-15</td>
<td>+3</td>
<td>-13</td>
<td>+8</td>
<td>+8</td>
</tr>
<tr>
<td><strong>AUX PWR</strong></td>
<td>-15</td>
<td>-54</td>
<td>0</td>
<td>-51</td>
<td>-50</td>
<td>+9</td>
<td>-2</td>
<td>-17</td>
<td>-13</td>
</tr>
<tr>
<td><strong>GUID &amp; CONT</strong></td>
<td>+31</td>
<td>-11</td>
<td>+13</td>
<td>-23</td>
<td>-20</td>
<td>-5</td>
<td>-2</td>
<td>+8</td>
<td>+8</td>
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<tr>
<td><strong>C &amp; C</strong></td>
<td>-5</td>
<td>-6</td>
<td>+7</td>
<td>-5</td>
<td>+11</td>
<td>-1</td>
<td>0</td>
<td>-1</td>
<td>+5</td>
</tr>
<tr>
<td><strong>NET CHANGE</strong></td>
<td>58</td>
<td>-233</td>
<td>-12</td>
<td>-235</td>
<td>-225</td>
<td>-28</td>
<td>-7</td>
<td>0</td>
<td>-9</td>
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ADVANTAGES OF STANDARDIZED CONCEPT

IN ADDITION TO PERFORMANCE GAIN, PROVIDES:

- RELIABILITY
- ECONOMY
- MAINTAINABILITY
- ACCESSIBILITY
- PRODUCIBILITY
- BLUE SUIT OPERATION
AGENA

GO AHEAD
PROGRAM REPTS.
PRE PLANNING (AMR5)
FAMSCO
ENGRS RELEASE
PROCUREMENT
FAB/ASSY WOOD MOCKUP
FAB/ASSY METAL MOCKUP
WIRE HARNESS MOCKUP & FAB
FINAL RELEASE BRACKETRY & INSTL.
PLANNING & ORDER WRITING
TOOLING DESIGN & FAB
BREADBOARD ACTIVITY (D.T.L.)
FAB (D.T.V.)
STRUCTURES (D.T.V.)
FUNCT. MOCKUP ACT (D.T.L.)
PREMATE (D.T.V.)
STRUCTURE RACK TESTS
OPERATIONAL SEQUENCE
FIRST PRODUCTION VEHICLE
ESTIMATED COST OF STANDARD AGENA

- DEVELOPMENT OF BASIC VEHICLE _______________ $7.86
  DESIGN AND RESEARCH SUPPORT
  ENGINEERING AND MOCKUP
  TESTING
  PROCUREMENT DATA

- MANUFACTURING - 4 FLIGHTS + 1 DTV ____________ 9.61
  FABRICATION AND TOOLING SPARES
  VEHICLE TESTING
  TEST EQUIPMENT
  QUALITY ASSURANCE
  RELIABILITY

- LAUNCH COSTS - 4 FLIGHTS _______________ 2.73

TOTAL $20.20
ESTIMATED PRODUCTION COSTS
STANDARD AGENA

- THIRD VEHICLE..........................1.3
- TENTH......................................1.1
- TWENTY-FIFTH............................1.0

- INCLUDES - SPARES

- EXCLUDES - MISSION EQUIPMENT
  MISSION PAYLOAD
  LAUNCH COSTS
PROCUREMENT OF STANDARD AGENA

- ASSUMPTIONS
  
  SECOND SOURCE

  FIXED PRICE CONTRACT

  LMSC PRODUCTION

  UNIFORM CONFIGURATION

  DELIVERY JAN 1965
SECOND SOURCE CRITERIA

- LICENSE
- LMSC CONFIGURATION
- SAME MAKE OR BUY STRUCTURE
- SAME SUBCONTRACTORS

<table>
<thead>
<tr>
<th>CONTRACTOR</th>
<th>ITEM</th>
<th>COST</th>
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<tbody>
<tr>
<td>BELL</td>
<td>ENGINE</td>
<td>$200,000</td>
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<tr>
<td>AEROJET-GENERAL</td>
<td>VELOCITY METER</td>
<td>40,000</td>
</tr>
<tr>
<td>M-H</td>
<td>ROCKETS</td>
<td>20,000</td>
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<tr>
<td>GE/BARNES</td>
<td>IRP</td>
<td>42,000</td>
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<tr>
<td>ENGINEERING MAGNETICS</td>
<td>HORIZON SENSOR</td>
<td>35,000</td>
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<tr>
<td>BENDIX/WESTON/STEERE</td>
<td>INVERTERS</td>
<td>11,000</td>
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<tr>
<td></td>
<td>POWER SUPPLY</td>
<td></td>
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<tr>
<td></td>
<td>GAS VALVES</td>
<td>7,000</td>
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<tr>
<td></td>
<td>MISCELLANEOUS ITEMS</td>
<td>45,000</td>
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<tr>
<td></td>
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<td>$400,000</td>
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COMPETITION - SECOND SOURCE

- ADVANTAGES

PRICE
BACK-UP
UTILIZATION OF INDUSTRIAL BASE
INDUSTRIAL RELATIONS
STIMULATE EFFICIENCY
COMPETITION - SECOND SOURCE

DISADVANTAGES

- DUPLICATE COSTS
- LONGER LEAD TIME
- NEED FIRM CONFIGURATION
- MANAGEMENT PROBLEMS
- IMPACT OF CUT BACK
- RELIABILITY DECREASED
COMPOSITION - SECOND SOURCE

- REQUIREMENTS
  - INDUSTRY CAPABILITY
  - FIRM CONFIGURATION
  - COMPANY DESIRE
  - LEAD TIME
  - FUNDS
FIXED PRICE CONTRACT

- ADVANTAGES

LESS AF CONTRACT MANAGEMENT
INCREASED INCENTIVE
LESS OVERRUN POSSIBILITY
AF BUDGETING FACILITATED
FIXED PRICE CONTRACT

- DISADVANTAGES

NEED COMPLETE PROCUREMENT DATA
MORE CONTRACT CHANGES
FP MIXED WITH CPFF CONTRACTS

- REQUIREMENTS

PROCUREMENT DATA
PRICE KNOWLEDGE
CONCLUSIONS

- **COMPETITION - SECOND SOURCE**
  NO FIRM CONFIGURATION
  SECOND SOURCE PROBLEMS
  QUESTIONABLE COST SAVING
  NO BACK UP REQUIREMENT
  CANNOT DELIVER BY JAN 63

- **FIXED PRICE CONTRACT**
  DESIRABLE
  NO PROCUREMENT DATA

- **DISADVANTAGES VS. ADVANTAGES**
RECOMMENDATIONS

- APPROVE STANDARD AGENA CONCEPT

- GRANT IMMEDIATE AUTHORITY TO AWARD CONTRACT

- NO FURTHER SECOND SOURCE CONSIDERATION

- COST TYPE CONTRACT WITH LMSC

- CONSIDER FIXED PRICE TYPE CONTRACT LATER