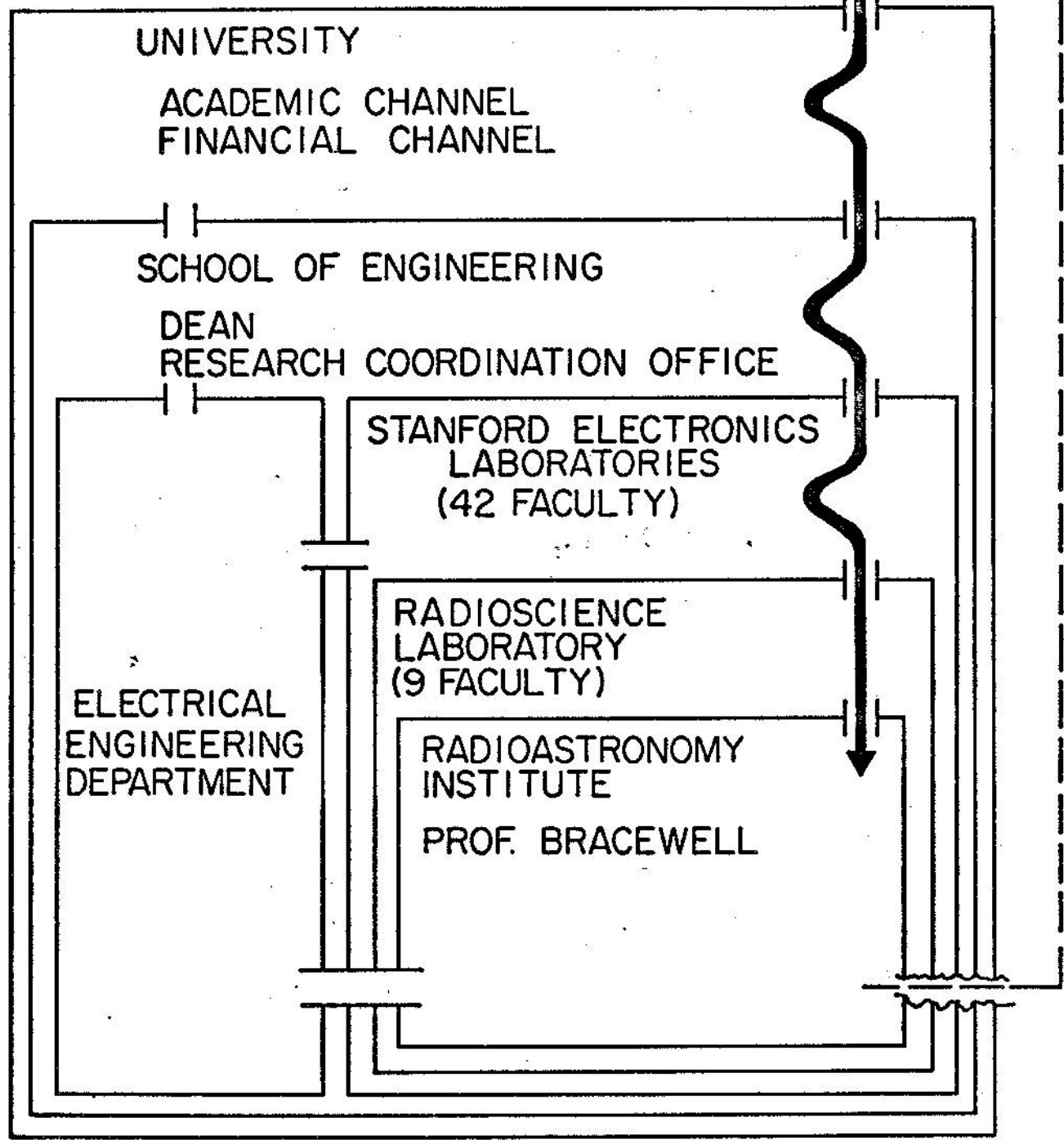
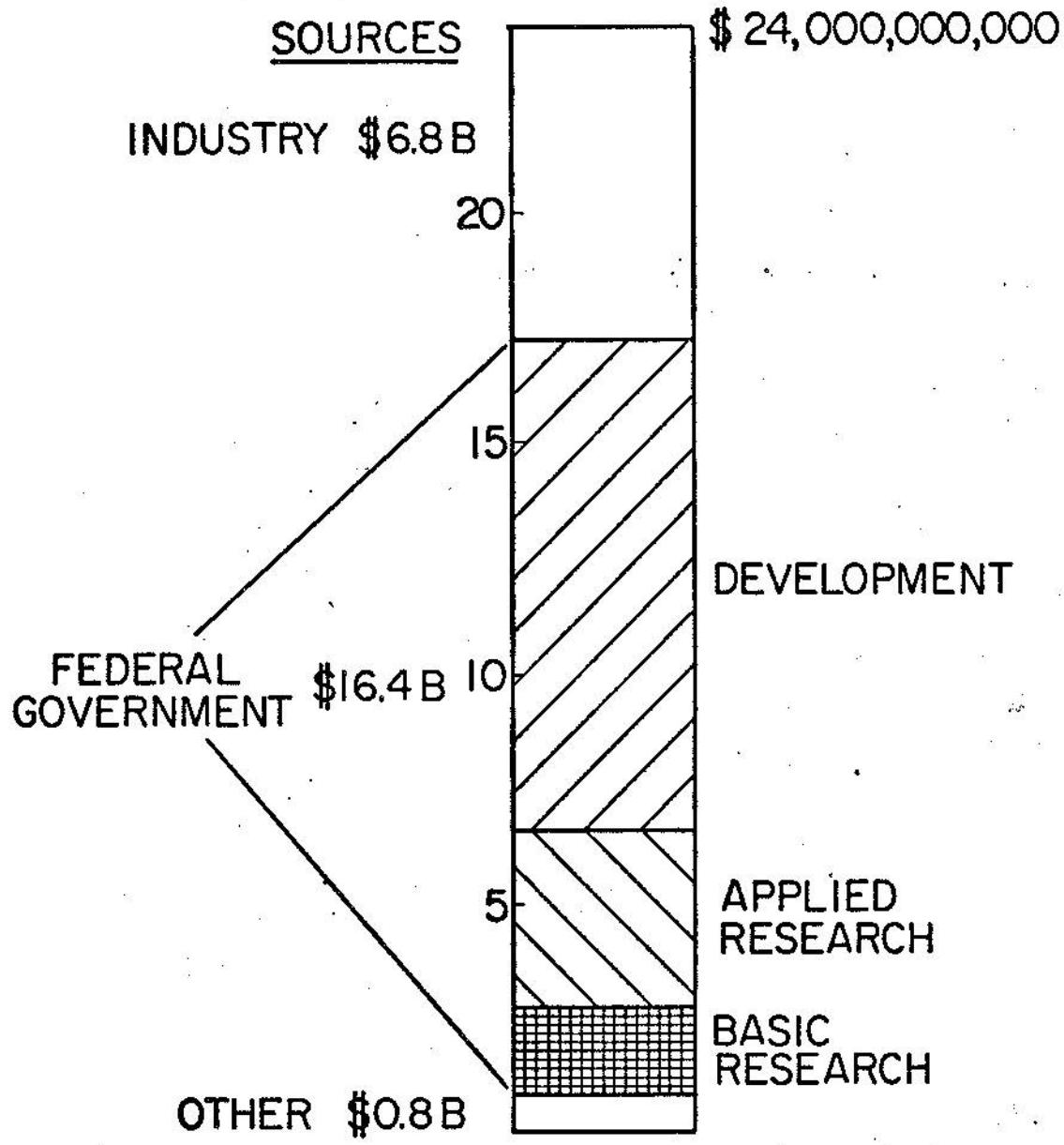


NIH	ARPA	AEC	NAVY	ARMY	AIRFORCE	NSF	NASA
\$0.4M	0.1M	0.4M	2.3M	1.0M	2.9M	1.2M	2.1M

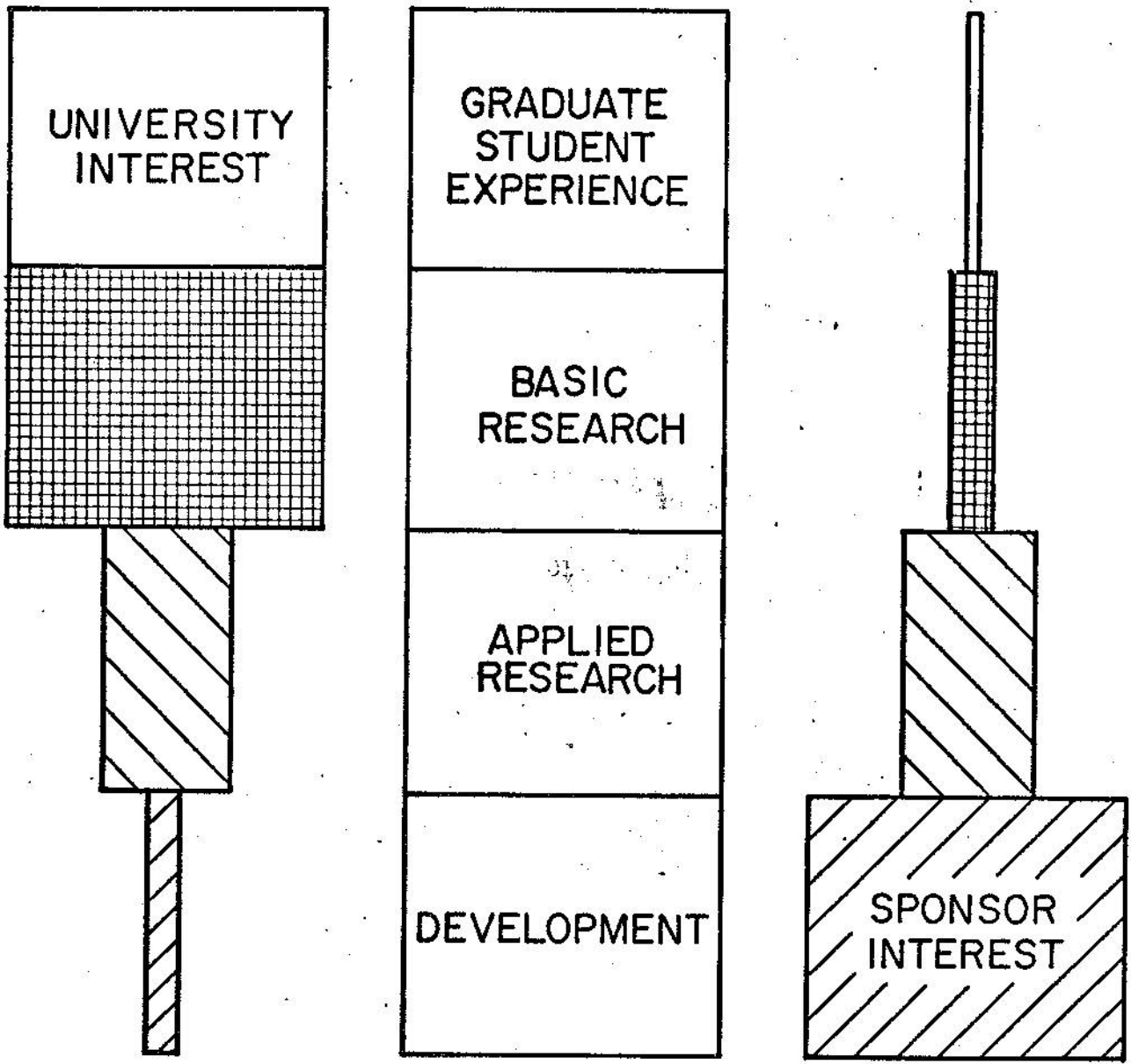
AFOAR ←



4/20



RESEARCH AND DEVELOPMENT EXPENDITURES BY SOURCE (1967 est.)



PATTERNS OF INTEREST  
IN UNIVERSITY PROGRAMS

(Suggested summary, in so far as we were able to determine the actual nature of this contract) using the phraseology of the Baxter summary)

Contract: Nonr 225(59)

Sponsor: Office of Naval Research, Surface and Amphibious Warfare Branch

School or Department: Systems Techniques Laboratory

Principal Investigator: B May, Research Engineer

Approximate Annual Funding Level: \$260,312 (1967-8)

This program is involved in research in two major areas: first, techniques for interception, classification and display of radar signals; and second, techniques for generation and control of radar jamming signals.

In the first area, the research consists of the development of techniques for the intercept of all radar signals present, separating the various radar signals, and identifying certain characteristics of the source of the signals.

The second major area involves the generation of radar jamming signals with particular emphasis on the recent developments in solid-state technology. Related aspects involve the modulation and tuning of these radar jamming devices together with the development of measurement techniques to determine the performance of the system.

Security clearance is necessary because classified background data is received from the sponsor and because a part of the research findings applicable to existing electronic warfare problems of the Navy are classified. The more general findings are unclassified.

No member of the academic council will be directly involved with this contract.

**AEL PROJECTS, AS THE BAXTER REPORTS SHOW THEM:**

1. The principal investigator is invariably listed as Rambo or Grace, members of the academic council (this includes contracts DAAB07-68-C-0149, Fo4701-68-C-0110, DAAB07-69-C-081, F33615-69-C-1414, N00123-69-C-1406). In reality none of these classified projects have on their project staff (or as project principal investigators or contract monitors) any members of the academic council (exceptions: 3 projects on 2 contracts have as principal investigator a member of the academic council; these are unclassified projects, and a small portion of the contract effort).
2. No project descriptions are listed in the Baxter reports; only general contract descriptions are given.
3. Contract descriptions are couched in broad scientific terms, in such a manner as to suggest systematic attempts to obscure the applied military nature of the projects.
4. Sponsors are listed in general terms, as for example: "Navy", in the case of the sponsor "Surface and amphibious warfare branch, office of naval research.

SELECTED AEL PROJECTS AND CONTRACTS: DESCRIPTIONS

1. FO4701-68-C-0010, Space and missiles systems organization, AF Systems Command. \$153,000, classified

Baxter description: "The first (area) is concerned with studies in electronic circuits utilizing new solid-state devices configured to withstand the rigors of operation in an outer-space environment."

Explanation: Development of electronic circuits for missile systems.

2. F33615-69-C-1414, Air Force Avionics Lab, AFSC. \$410,000, classified

Project	Project Leader	Project Title (explanation)
1607	Turner	"Advance electrical engineering research applicable to counter-measures". (radar jamming)
1809	Cole	"Pattern recognition of radar signals"
1855	Winter	"Radar-emitter location finding techniques"
2026	Snook	"Investigations of laser receiver and transmitter techniques" (presumably with future laser ECM applications)
2040	Turner	"Advance systems techniques and electron devices applicable to ECM"
2041	Cumming	"Systems limitations of RF power amplifiers" (applied to radar jamming systems)
2042	Wright	"Solid state RF sources" (for application to ECM jammers)
2043	Kochis	"Automatic control techniques" (")
2044	Ottoboni	"Random waveform synthesis" (*)
2121	Turner	"Laboratory consultation on Air Force electronic systems and electronic techniques problems"

3. DAAB07-69-C-0081, US Army Electronics Command. \$24,000, classified

1965 Hewitt "Microscan receiver field tests" (the "microscan" receiver is a radar surveillance receiver able to detect efficiently enemy radars over a wide frequency range)

4. N00123-69-C-1406, US Navy (branch?). \$25,000, classified

"Study of 'quiet' electromagnetic signals". ("spread" signals are used for secure communications; this contract is directed toward determining if such secret communications can be intercepted)

5. DAAB07-68-C-0149, U S Army Electronics Command. \$214,000, classified

1810 Cole "Study of digital spectrum analyzers"  
1811 Edwards "Measurement selection in time-series analysis"  
(these two projects are directed toward problems of the classification of radar signals intercepted by reconnaissance receivers)

6, Nonr 225(59), U S Office of Naval Research, Surface and Amphibious Warfare branch. \$260,000, classified

(for details see summary sheet)

(Unabridged contract summary filed by Baxter committee)

Engineering Research Program in Non-Communication Naval Electronics Techniques

Contract No: Nonr 225(59) Sponsor: U S Navy

School or Department: Systems TEchniques Laboratories

Principal Investigator: W R Rambo, Prof. of Electrical Engineering

Approximate Annual Funding Level: \$250,000

This program is involved in research in two major areas: first, techniques for reception, sorting, and processing of electromagnetic energy; and second, techniques for generation and control of electromagnetic energy.

In the first area, the research consists of the development of concepts for spectrum monitoring of signals, sorting of signals through a decomposition of the electromagnetic signal environment, and processing of these sorted signals to identify particular aspects or parameters of the signals.

The second major area involves the generation of electromagnetic signals with particular emphasis on the recent basic research in solid state microwave devices. Related aspects involve the modulation and tuning of these devices together with instrumentation to determine the physical character of the generated electromagnetic energy.

Security clearance is necessary because classified background data is received from the sponsor and because a part of the research findings applicable to existing problems of the sponsor are classified. The more general findings are unclassified.

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Glossary for the above (according to the EE caucus, April 3rd movement)

Electromagnetic energy: enemy radar signals

Generation of electromagnetic energy: generation of jamming signals

Spectrum monitoring: ferrett reconnaissance (searching for enemy radars)

Decomposition of electromagnetic signal environment: classification of enemy radars by characteristics

Signals: enemy radar signals, in particular

Devices: electronic jamming components and systems

Modulation and tuning: parameters to be optimized for most efficient jamming

Instrumentation: specialized radar analysis instrumentation

Problems of the sponsor: locating and jamming enemy radars

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Project titles, with explanation (and area of Baxter summary applicable)

1723 Hunter Development and applications of a technique for precision interpulse interval acquisition and tracking (1). (Explanation: "interpulse interval" is a parameter of radar signals used to classify radars)

1969 Hunter Application of self-adjusting voltage filters to adaptive signal sorting (1). (Self-adjusting filters are devices which modify their characteristics so that the radar signal can be more accurately measured; signal sorting refers to the classification of radar emitters according to certain parameters)

1974 Kochis RD-DF phase monopulse receiver techniques (1). (this refers to Range Finding- Direction Finding radar receivers, used to locate enemy radar emitters)

2022 May Navy Consulting (self explanatory)

2027 May Waveform synthesis and special measurement instrumentation (2).

(waveform synthesis here refers to the production of special types of radio signals, presumably used to jam enemy radars)

2028 Wright Solid-state microwave RF sources and companion elements (2).

(Transistor radio transmitters and related systems, presumably for compact radar jamming systems)