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SPACE COMMERCIALIZATION AND THE FEDERAL INCOME TAX

JAMES V. BAIRD*

ALTHOUGH A COMMERCIAL, as opposed to a governmental, presence in space has been a reality for over twenty years in the form of privately owned and operated communication satellites, general interest in space commercialization has awaited a reliable method of access to space. With the initiation of operations of the Space Shuttle, commercial interests have now actively begun to identify and pursue commercial opportunities relating to space. Because an agency of the United States govern-

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See, e.g., The $30 Billion Potential for Making Chemicals in Space, CHEMICAL WEEK, Oct. 17, 1984, at 44-52; S.R.I. International, Market Analysis of Space Industries, Inc. Industrial Space Facility (May 1985) [hereinafter cited as S.R.I. International Market Analysis]. There are currently six major business segments related to space: communication satellites, remote sensing satellites, launch services, ground support services, platform services and platform user activities. The satellite communications segment is over twenty years old and represents an annual market of over three billion dollars. This segment consists of satellites that are launched into geosynchronous orbit approximately 22,000 miles above the earth, where a position relative to a point on earth is constant. Remote sensing satellites provide data from space relating to the earth's surface and atmosphere. While often identified as a potentially attractive commercial segment, all successful remote sensing to date has previously been undertaken by the government. However, pursuant to the Land Remote-Sensing Commercialization Act of 1984, a substantial portion of the United States remote sensing capability is being transferred to private industry. See Land Remote-Sensing Commercialization Act of 1984, 15 U.S.C.A. §§ 4201-4292 (West Supp. 1985); S.R.I. International Market Analysis. Launch services are required to support all space activities. This segment is divisible into three subsegments: expendable launch vehicles, reusable launch vehicles and upper stage launch vehicles. The NASA Space Shuttle is the only reusable launch vehicle to date. Private industry has already targeted the other two subsegments
ment operates the Space Shuttle, and because the government has been increasingly supportive of a private sector role in space, it appears certain that commercial interests located in the United States will have a competitive advantage in commercializing space. In evaluating the opportunities provided by space commercialization, United States commercial interests must consider, among other factors, the economic cost of the planned activity. The determination of economic cost necessarily involves an assessment of the impact of the federal income tax laws on any

as commercial opportunities. Most space operations require support services which are located on earth. These services include payload processing and integration, earth station equipment manufacture, space insurance, and ground control operations. Platform services include the provision of orbiting platforms that will provide both payload space and power to various users. Platform users will be those companies which will take advantage of the principal characteristics of space to conduct research and manufacture products. Space has two principal characteristics which, although not unique to space, are such that they can be duplicated on earth for only a short period of time or at considerable expense. These two characteristics are microgravity and vacuum. Due to the virtual lack of gravity, convection, sedimentation and buoyancy, and hydrostatic pressure are nonexistent in space. Convection, the gravity-driven stirring of mixtures of gases or liquids of different densities, is eliminated. During gravity-driven convection, the stirring of such mixtures can cause undesirable properties in crystals, alloys and composites, chemicals, or biological materials. Gravity-induced sedimentation and buoyancy are eliminated, thereby expanding the spectrum of new alloys and composites that may be formed by permitting materials of substantially different densities to remain in suspension until solidification. The lack of hydrostatic pressure exerted by liquids at rest under microgravity stops liquids or solids from deforming under their own weight; thus large single semi-conductor and electro-optical crystals can be grown without deformation and with fewer defects. Finally, the unlimited presence of an ultra-high vacuum, when combined with other characteristics of the microgravity environment, allows for containerless processing, which involves the mixing, manipulation and even solidification of liquids in a free suspension, away from the possible contamination caused by a container. As a result, the optical or physical properties of materials such as silicon and many of the metal-oxide glasses are improved. See generally The $30 Billion Potential for Making Chemicals in Space, CHEMICAL WEEK, Oct. 17, 1984, at 44-52; S.R.I. International Market Analysis.

2 In July 1984 President Reagan announced support for the commercialization of space. See President's Remarks at a White House Ceremony Marking the 15th Anniversary of the Apollo II Lunar Landing, 20 WEEKLY COMP. PRES. DOC. 1048, 1049-50 (July 20, 1984). In October 1984, NASA announced its Commercial Space Policy. See NASA, COMMERCIAL SPACE POLICY (Oct. 1984). In February 1985, President Reagan endorsed the increased commercialization of space in his State of the Union Address. See President's State of the Union Address, 21 WEEKLY COMP. PRES. DOC. 140, 144 (Feb. 6, 1985).
planned activity. The application of such laws could significantly increase or decrease the after-tax economic cost of such activity and influence the structure of the business entities that engage in such activity.

This article will address the impact of the Internal Revenue Code of 1954, as amended (the "Code"), on the structure and conduct of space business activities operated by United States taxpayers. In order to illustrate the issues to be discussed, an example, based in part on an actual proposed commercial venture, will be used as the context in which to discuss the application of the Code. Use of an example serves a number of purposes. First, by placing the discussion in the context of a business activity, the interaction between the Code and business decisions can be highlighted. Second, when the Code is seen as discriminating against the described activity, the reader can appreciate that the problem is real and not just theoretical. Third, by describing a space commercial activity that, although largely fictional, is based on the activities of an existing company, this article hopefully will be of interest to the non-tax community. It should be noted that at the time of writing this article, Congress is considering substantial revisions to the Code. As a result, much of the discussion contained herein could be subject to change. Where relevant, mention is made of pending or proposed legislation.

I. The Venture

A group of persons (the "Founders"), who share an

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9 This example is based in part on the work of Space Industries, Inc., a Houston company founded in 1982. Space Industries conceived and developed initial plans to construct an industrial space facility. In August 1985 NASA announced the signing of two agreements with Space Industries that were immediately acclaimed as milestones in the commercialization of space. The Space Systems Development Agreement provides Space Industries with three shuttle launches on a deferred cost basis to place in operation the first two industrial space facility modules. The second agreement, a Memorandum of Understanding with the NASA Office of Space Station Programs, was the first of its kind and outlines a mutual objective of operational compatibility between the NASA Space Station and Space Industries' Industrial Space Facility. Except for these facts, no other
idea of developing a commercial space station, form a corporation (the "Company") for the purpose of determining the technological and economic feasibility of such a venture. The Company obtains funds for operations by selling its stock to the founding group. The Company uses the proceeds principally to pay salaries, consulting fees, rent, and office expenses. During Year 1, the Company develops a conceptual design for an industrial space facility (the "ISF"). This facility would be a platform, permanently located in low earth orbit, providing potential users with basic requirements for materials research, development, and processing in space, including large payload capacity and electrical power. In order to make the project commercially viable, maximum use is made of modular design, existing components and technology, and low cost commercial manufacturing and assembly techniques. In addition, the ISF would not be manned permanently but would be pressurized for servicing and would supply a "shirt-sleeve" environment utilizing the life support system of the Space Shuttle. The ISF would be deployed and tended by the Space Shuttle. In between visits from the Space Shuttle, the ISF would operate on a fully automated basis.

The Company concludes that the ISF project is feasible but needs substantial additional capital to continue work on the ISF. In order to raise the necessary capital, the Company contributes all of its assets to a limited partnership (the "Partnership") in which it is the controlling general partner. The Company sells partnership interests, or units in the Partnership, to the public, and the units begin trading on a securities exchange. The proceeds are used in Year 2 to complete the initial design and detailed specifications for the ISF, including the design for a docking portion of the example is intended to suggest any similarity with Space Industries. The author is grateful to Space Industries for permission to use the term "Industrial Space Facility" and "ISF." The Space Shuttle Commercialization Act of Year 3 is based on the Land Remote-Sensing Commercialization Act of 1984. See supra note 1.
system to permit the Space Shuttle to dock with the ISF. In addition, the Company, on behalf of the Partnership, successfully negotiates an agreement with NASA (the "NASA Agreement") whereby the Partnership acquires the right to payload space on a Space Shuttle flight for purposes of deploying the ISF. The NASA Agreement provides that the Partnership may pay for the flight out of a percentage of the revenues of the Partnership, beginning two years after deployment of the ISF.

During Year 3, the Partnership enters into two agreements ("User Agreements") for lease of space on the ISF. The first User Agreement is with Materials Processing, Inc. ("Processing"), a subsidiary of a major pharmaceutical concern. This agreement provides that Processing will lease one half of the capacity of the ISF for purposes of conducting applied research and manufacturing selected pharmaceuticals. The second User Agreement is with the United States government, pursuant to which the government agrees to lease the remaining half of the ISF for purposes of conducting basic research. The Partnership raises additional capital by selling new limited partnership interests and begins construction of the ISF.

During Year 4, the Partnership completes construction of the ISF. NASA, pursuant to the Space Shuttle Commercialization Act of Year 3, turns over operation of the Space Shuttle system to a private company, Transportation, Inc. ("Transportation"). In connection with the transition, the Space Shuttle Commercialization Act authorizes the government to pay Transportation a one-time lump sum (the "Transition Amount") to compensate Transportation for the costs of Space Shuttle flights it must provide pursuant to agreements previously negotiated by NASA, including the NASA Agreement with the Partnership. The Partnership concludes an agreement with Transportation providing for routine visits to the ISF subsequent to deployment.

In Year 5, the ISF is transported into space aboard the Space Shuttle and successfully deployed and tested for
operations. When the ISF is declared operational, Processing and the government both make initial lease payments and initiate activities on board the ISF. After conducting initial research and testing on a potential product, Processing completes its first commercial production run. The resulting product is collected by the crew of a Space Shuttle flight and returned to earth where, amidst great publicity, Processing sells the first product manufactured in space.

II. DISCUSSION

A. General

The following discussion will highlight, in general terms, the effect of the Code on the course of action described in the example above and describe other federal income tax aspects of the projected venture. Before beginning the discussion, it will be helpful to briefly explain how the Code operates. Corporations and individuals are subject to tax on their taxable income.\(^4\) Taxable income is defined as gross income less allowable deductions.\(^5\) Gross income is defined to be all income from whatever source derived.\(^6\) The resulting tax owed may be reduced by certain allowable tax credits.\(^7\) If deductions exceed income, the resulting loss may be carried back three years or carried forward fifteen years and applied to income in those years.\(^8\) Credits which exceed tax liability may similarly be carried to preceding or subsequent years.\(^9\)

B. Formation of the Company; Choice of Entity.

The Founders desired to pool their resources in an entity and explore the feasibility of developing a commercial space station. In choosing the appropriate entity to en-

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\(^4\) I.R.C. §§ 1, 11 (1982).
\(^5\) Id. § 63.
\(^6\) Id. § 61.
\(^7\) See, e.g., id. §§ 30, 38.
\(^8\) Id. § 172(b).
\(^9\) Id. § 39.
gage in this endeavor, the Founders considered the relative advantages and disadvantages of: (i) a corporation not electing to be treated as an S corporation (a "C corporation"); (ii) a corporation electing to be treated as an S corporation (an "S corporation"); and (iii) a limited partnership.\textsuperscript{10}

1. \textit{C Corporation.}

A C corporation has traditionally been the most commonly employed vehicle for start-up ventures because it is relatively easy to establish and operate, and offers some flexibility in structuring the economic participation of the investors.\textsuperscript{11} In addition, the corporate form offers certain advantages with respect to the public sale of securities and tax-free reorganizations.\textsuperscript{12} A shareholder in a corporation generally has no personal liability for the debts and obligations of the corporation. For tax purposes, a corporation is a separate taxable entity.\textsuperscript{13} The shareholders of a corporation are not entitled to any flow through of the corporation’s tax benefits. Distributions with respect to their stock are generally treated as taxable dividends.\textsuperscript{14}

2. \textit{S Corporation.}

An S Corporation is treated as a corporation for state law purposes, providing limited liability to its investors.\textsuperscript{15} However, an S corporation is not generally subject to tax;

\textsuperscript{10} The comparison of business entities is an analysis that is not limited to a space commercial endeavor. In this respect, a start-up company analyzing its options with respect to this venture is no different than any other group of persons starting a new company.

\textsuperscript{11} For example, the capital structure of a C corporation may include one or more classes of common stock, one or more classes or series of preferred stock and numerous types of debentures. In addition, the preferred stock and the debentures may be convertible into common stock of the corporation.

\textsuperscript{12} I.R.C. § 368 (1982). This section provides that certain corporate transactions, such as mergers or exchanges of stock, may be accomplished without tax. \textit{Id.}

\textsuperscript{13} \textit{Id.} § 11.

\textsuperscript{14} \textit{Id.} § 316.

instead, each shareholder must account for his own pro rata share of the corporation's income, loss, deductions, and credits. The benefits of S corporation status generally are limited to corporations having only one class of stock held by thirty-five or fewer individuals. Therefore, S corporation status restricts the number and type of investors, limiting flexibility in structuring the economic participation of the investors.

3. **Limited Partnership.**

A limited partnership is an entity formed pursuant to state law by agreement of the partners. A general partner in a limited partnership is liable for the debts and obligations of the partnership, but a limited partner is generally liable only for his agreed investment in the limited partnership. A limited partnership is generally not a separate taxable entity, although under certain circumstances it may be treated as an association taxable as a corporation for tax purposes. Instead, all partnership

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16 I.R.C. § 1366 (1982). Under proposed tax legislation, the utilization by a shareholder of his share of losses from an S corporation to offset income from other sources could be restricted. See Joint Committee on Taxation, Summary of Tax Reform Provisions in H.R. 3838, as Ordered Reported by the Senate Committee on Finance (JCX-5-86), May 12, 1986.

17 I.R.C. § 1361.

18 Id. § 1361(b). The capital structure of an S corporation is limited to one class of common stock and debt. Id. § 1361(b)(1)(D).

19 A limited partnership is generally formed pursuant to a uniform limited partnership act, although the agreement among the partners may vary the provisions of such act. See, e.g., Texas Uniform Limited Partnership Act, Tex. Rev. Civ. Stat. Ann. art. 6132a (Vernon 1970).

20 Under the laws of most states, a limited partner who takes part in control of the partnership business may lose his limited liability status and be treated as a general partner. See, e.g., id. § 8.

21 I.R.C. § 7701 (1982). The regulations state:

An organization which qualifies as a limited partnership under State law may be classified for purposes of the Internal Revenue Code as an ordinary partnership or as an association. Such a limited partnership will be treated as an association if . . . the organization more nearly resembles a corporation than an ordinary partnership or other business entity.

Treas. Reg. § 301.7701-3(b) (1967).

Four considerations generally regarded as corporate characteristics are: (i) continuity of life; (ii) centralization of management; (iii) limited liability; and (iv) free
items of income, gain, loss, deduction, and credit are allocated to its partners for inclusion in their respective income tax returns. In this regard, a limited partnership offers maximum flexibility to the investors in structuring their economic participation. The partnership agreement may provide for disproportionate distribution of cash and may allocate items of partnership income, loss, deduction, and credit for federal income tax purposes in any agreed manner, so long as such allocations have substantial economic effect. A limited partnership is not a traditional entity for raising capital in the public markets, but public offerings involving limited partnerships have recently gained popularity.

22 I.R.C. § 702 (1982). Losses allotted to a partner may not be available to offset income from other sources. See supra note 17.

23 Because a partnership is principally a contractual agreement among the parties thereto, virtually any sharing of economic participation may be drafted into the document. See generally Henn & Alexander, supra note 15, § 20.

24 I.R.C. § 704(b) (1982); Treas. Reg. § 1.704-1(b)(1) (1985). Under these rules, an allocation of a partnership item(s) will generally be respected by the Internal Revenue Service only if the allocation has substantial economic effect. The determination of whether an allocation has substantial economic effect involves a two-part test. First, the allocation must have economic effect, that is, in the event there is an economic benefit or burden corresponding to an allocation, the partner receiving such allocation will also receive such economic benefit or bear such economic burden. Generally, an allocation will not have economic effect unless the partnership agreement provides for capital accounts of the partners which are maintained properly, and requires that liquidation proceeds be distributed in accordance with the partners' capital account balances. In addition, any partner with a deficit in his capital account must generally restore such deficit upon liquidation. Under the second part of the test, the economic effect of the allocation must be substantial. Under this test, the allocation must have a reasonable possibility of affecting the dollar amounts to be received by the partners, independently of tax consequences. See Treas. Reg. § 1.704-1(b)(2)(1985).

25 In an effort to enhance shareholder values and minimize the effect of double taxation on corporate earnings, many corporations, primarily in the natural resource area, have formed limited partnerships in which interests have been sold to the public in initial public offerings or distributed to shareholders of such corporations. These entities, trading on the New York and American Stock Exchanges,
The Founders were concerned primarily with limitation of individual liability, maximum use of tax benefits, and simplicity. The Founders, who numbered fewer than thirty-five, desired that tax benefits be shared among them in proportion to their ownership. After due consideration of the factors discussed above, they chose to form a corporation and elected treatment as an S corporation. The S corporation provides limited liability for its shareholders, yet permits any tax deductions to be passed through to them, and is relatively simple to form and operate. The Founders rejected the limited partnership alternative because it offered no additional benefits over the S corporation, was more complex to establish, and required that one person or entity serve as general partner with general exposure to liability. However, if: (i) the corporation had been unable to elect S corporation status for one reason or another; (ii) the Founders desired to share tax benefits in a ratio different than their ownership interests in the corporation; or (iii) the shareholders anticipated borrowing at the corporate level, the Founders would have had to choose the limited partnership format in order to obtain a pass-through of tax benefits.
C. Tax Treatment of Initial ISF Development Costs.

The initial activities of the Company consisted principally of designing the ISF. In general, when a taxpayer invests in or creates an asset with a useful life longer than a year, the taxpayer is required to capitalize the costs of acquiring or manufacturing the asset and is entitled to recover such costs through depreciation or amortization, if applicable. Following the general rule, the Company would be required to capitalize all of its costs attributable to development of the ISF. However, section 174 of the Code provides an exception to this general rule. Under that section, a taxpayer can elect to treat research or experimental expenditures ("R&D Costs") paid or incurred during a taxable year in connection with a trade or business as currently deductible (the "Research Deduction"). Accordingly, if the costs of developing the ISF constitute R&D Costs, the Company could immediately deduct all of such costs in determining its taxable income.

In addition to the section 174 deduction for costs that would otherwise have to be capitalized, the Code provides for a credit against tax in an amount equal to twenty-five percent of certain qualified research expenses in excess of a base amount (the "Research Credit"). In general, the amounts) while an S corporation shareholder would not be entitled to utilize the same deduction.

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30 Id. § 174.
31 Id.
32 To the extent that the initial expenditures of the Company do not constitute R&D Costs, the Company probably would be required to capitalize such expenditures as start-up costs. I.R.C. § 195 (1982). The Company would be entitled to recover such costs through amortization over a 60-month period. See id. § 195.
33 Id. § 30. The use of a base amount results in the credit being applied to not more than one-half of total research expenses in a taxable year. Accordingly, the effective rate of the Research Credit is 12-1/2%. Id. As currently in effect, section 30 applies only with respect to amounts paid or costs incurred after June 30, 1981 and before January 1, 1986. The Tax Reform Bill of 1985, as passed by the House of Representatives in December 1985 (the "House Bill"), contains a provision to extend the Research Credit for an additional three years. H.R. 3838, 99th Cong., 2d Sess. 160-61 (1985). The amendment to the House Bill to be reported out by the Senate Committee on Finance (hereinafter referred to as the "Senate Bill")
term "qualified research expenses" means expenses incurred in the conduct of qualified research.\textsuperscript{34} Qualified research has the same meaning as the terms "research" or "experimental" under section 174 of the Code, with certain exceptions.\textsuperscript{35} Accordingly, if the costs of developing the ISF constitute R&D Costs, such costs should also be "qualified research expenses."

The Code does not contain a definition of the term "research or experimental expenditures." Treasury regulations promulgated under section 174 loosely define the term to mean research and development costs in the experimental or laboratory sense, including "all such costs incident to the development of an experimental or pilot model, a plant process, a product, a formula, an invention, or similar property, and the improvement of already existing property of the type mentioned."\textsuperscript{36} Proposed Treasury regulations under section 174 expand on the definition and provide examples of activities which do or do not constitute research or experimentation.\textsuperscript{37}

Based on the definition of research or experimental expenditures contained in the Treasury regulations, it appears that a substantial portion of the Company's initial expenditures would qualify as R&D Costs. As a result, the Research Deduction will be passed through to the shareholders and may be used to offset income of the shareholders from other sources. The availability of the Research Credit, however, is subject to question.

\textsuperscript{34} I.R.C. § 30(b) (1982).
\textsuperscript{35} Id. § 30(d).
\textsuperscript{36} Treas. Reg. § 1.174-2(a) (1986).
\textsuperscript{37} For example, the term research or experimental expenditures does not include consumer surveys (including market research) or market testing and development (such as advertising or promotions); the construction of copies of prototypes after construction and testing of the original prototype has been completed; planning for commercial production and trial production runs; and engineering follow-through or trouble-shooting during commercial production. Treas. Reg. § 1.174-2 (proposed Jan. 21, 1983).
When the Research Credit was first enacted into law, Congress did not want the credit available to passive investors in the same manner as the Research Deduction. Consequently, section 30 provides that the Research Credit will be available only with respect to research expenditures paid or incurred in carrying on a trade or business of the taxpayer.\textsuperscript{38} The phrase "in carrying on any trade or business" was intended to have the same meaning for Research Credit purposes as under the business deduction provisions of section 162(a).\textsuperscript{39} As a result, the Code imposes a more stringent requirement on expenditures which will qualify for the credit than would apply to the deductibility of expenditures under section 174, which merely requires that such expenditures be paid or incurred in connection with a taxpayer's trade or business.\textsuperscript{40} Even if the Research Credit is available with respect to R&D Costs, it would be available to a shareholder of the S corporation only when the shareholder has tax attributable to taxable income arising out of the research endeavor.\textsuperscript{41} Based on these provisions, it appears that the shareholders of the Company would not be entitled to the Research Credit with respect to the R&D Costs.

D. Bias Against New Entities.

The restrictions on use of the Research Credit illustrate a bias in the Code against new or start-up entities which do not generate net taxable income and therefore do not have a tax liability. If a competitor of the Company, otherwise generating taxable income, engaged in a development effort identical to that of the Company, the competitor would reduce its taxable income by the amount of the Research Deduction and would reduce the resulting tax liability, if any, by the amount of the Research Credit. By use of the Research Credit, the competitor would shift

\textsuperscript{38} I.R.C. § 30(b)(1) (1982).
\textsuperscript{39} See id. § 162(a).
\textsuperscript{40} See infra notes 49-52 and accompanying text.
\textsuperscript{41} I.R.C. § 30(g)(1)(B) (1982).
a portion of the development cost to the United States Treasury without any additional investment. This point may be illustrated by a simple example:

<table>
<thead>
<tr>
<th>Shareholders</th>
<th>The Competitor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tax due prior to Research Deduction and Research Credit*:</td>
<td>$90,000</td>
</tr>
<tr>
<td>Research Deduction:</td>
<td>100,000</td>
</tr>
<tr>
<td>Tax due after Research Deduction:</td>
<td>40,000</td>
</tr>
<tr>
<td>Research Credit:</td>
<td>-0-</td>
</tr>
<tr>
<td>Tax due after Research Credit:</td>
<td>40,000</td>
</tr>
<tr>
<td>Current amount saved in taxes:</td>
<td>$50,000</td>
</tr>
</tbody>
</table>

(*Taxes due for shareholders are based on a 50 percent rate of tax; taxes due for the competitor are based on a 46 percent rate of tax.)

(**Based on effective rate; see supra note 33).

On these facts, the competitor can be viewed as financing $12,500 of its development effort with tax dollars that would otherwise have been paid to the United States Treasury. After tax, therefore, the development effort has cost the shareholders $50,000 and the competitor $41,500. If the shareholders were restricted from using the Research Deduction to offset income earned from other sources or if the Company were a C corporation so that the tax benefits of the Research Deduction would not flow through to the shareholders, the competitor's benefit would be even greater, as illustrated below.

<table>
<thead>
<tr>
<th>The Company</th>
<th>The Competitor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tax due prior to Research Deduction and Research Credit*:</td>
<td>$-0-</td>
</tr>
<tr>
<td>Research Deduction:</td>
<td>100,000</td>
</tr>
<tr>
<td>Tax due after Research Deduction:</td>
<td>-0-</td>
</tr>
<tr>
<td>Research Credit:</td>
<td>-0-</td>
</tr>
</tbody>
</table>
The bias illustrated in these examples does not arise from the ability of the competitor to use the Research Deduction to reduce its current tax liability. Before application of the Research Credit, although the Research Deduction permits the competitor to shift some cash flow from the Treasury to the development project, the overall cash needs of the competitor are not decreased. Prior to the Research Credit, the competitor’s cash expenditures are $144,000 ($100,000 for the development project and $44,000 paid to the United States Treasury). While the competitor has shifted $46,000 from the government to its research project, it has had to invest $44,000 of its cash from other sources to complete funding of the project. This compares favorably with the Company’s cash expenditures of $100,000.

The impact of the Research Credit, however, is weighted heavily in favor of the competitor. Without any additional outlay of cash, the competitor is able to shift $12,500 from the government to the development project. After application of the Research Credit the competitor’s overall cash expenditures are reduced to $131,500 ($100,000 for the development project and $31,500 paid to the United States Treasury). Because the competitor has a tax liability, the Research Credit is the substantive equivalent of a $12,500 payment from the government to conduct the development project. The Company receives no corresponding benefit. All other things being equal, such an advantage could adversely affect the Company’s development effort.

Although the initial Founders of the Company are engaged in an effort which is as valid a research effort as the effort of any other business entity, the lack of availability of the Research Credit, either to the Company or to the
shareholders, discriminates against the business effort of the Company. One way to avoid this discrimination is to make the Research Credit a refundable credit.\textsuperscript{42} That is, instead of merely reducing a tax liability, those entities eligible for the credit would be entitled to receive a refund from the government in an amount equal to the credit. Although a refundable credit would equalize the treatment of taxpayers, it is doubtful that such a provision would be enacted into law in the current fiscal climate.

E. Formation of Partnership.

After the first year of development work, the Company determined that it was necessary to raise substantial additional capital to continue work on the ISF. The magnitude of the Company's capital needs made it likely that the sale of additional stock would result in more than thirty-five shareholders in the Company and the subsequent loss of its S corporation status.\textsuperscript{43} The Company compared the relative benefits of the C corporation and the limited partnership.\textsuperscript{44} Although the C corporation would result in a deferral in the use of the expected tax benefits, including the Research Deduction, the Company considered the vehicle because of the need to access the public capital markets. However, the recent success of publicly traded limited partnerships persuaded the Company that such a vehicle would give the Company access to the public capital markets and, when combined with the flow-through of tax benefits, enhance the ability of the company to raise funds. As a result, the Company decided to utilize a limited partnership to continue work on development of the ISF.\textsuperscript{45} Having made this decision, the Company had to decide whether to convert all of its busi-

\textsuperscript{42} The Code provides for a number of refundable credits. See, e.g., id. § 31.

\textsuperscript{43} See id. § 1362(d)(2).

\textsuperscript{44} See supra notes 11-25 and accompanying text.

\textsuperscript{45} As previously mentioned, a limited partnership must have a general partner who is liable for all of the debts of the partnership. See, e.g., \textit{Uniform Limited Partnership Act} § 9 (1916). In forming the Partnership, the Company decided to serve as general partner. In order to ensure that the Partnership is treated as a
ness to partnership form, or to restrict the partnership's activities to merely research while reserving the ability to conduct actual operations through the Company.

The latter method is the traditional approach used with respect to most so-called research and development limited partnerships ("R&D Partnerships"). R&D Partnerships are formed primarily to shift risk to investors who can obtain a tax deduction under section 174. Two basic structures have been employed to obtain these tax benefits. In one structure, the R&D Partnership obtains the right to certain base technology and agrees to conduct additional research. In order to conduct the research, however, the R&D Partnership will generally contract with a company (which is often the general partner or an affiliate thereof) to actually perform the necessary research. Once the research is concluded, the general partner or an affiliate has an option to license the rights to the technology from the R&D Partnership. Under the other structure, the R&D Partnership, in lieu of licensing its technology to the general partner, enters into a joint venture with the general partner or an affiliate for purposes of commercializing the technology. Under both structures, if the research effort is successful, the general partner or an affiliated company may have the option to purchase either all of the technology or the interests of the investors in the R&D Partnership for cash, stock, or some combination of both.

As previously discussed, R&D Costs are deductible if paid or incurred "in connection with [a] trade or business. . . ."46 This language is to be compared with section 162(a) of the Code which provides a deduction for ordinary and necessary business expenses paid or incurred "in carrying on [a] trade or business."47 Section 162(a) has been fairly consistently applied to prohibit

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47 I.R.C. § 162(a) (1982).
start-up companies or passive entities from deducting expenses. In 1974 the United States Supreme Court addressed the issue of whether a deduction under section 174 would be available if no trade or business were actually being conducted. In *Snow v. Commissioner* the Court ruled that Congress, in enacting section 174, intended to eliminate the tax law's discrimination against "upcoming" businesses. As a result, the Court allowed a deduction under section 174 to a partnership, notwithstanding the fact that no product had been produced or sold. Based on this decision, numerous R&D Partnerships were formed along one of the two lines discussed above.

A recent Tax Court case, *Green v. Commissioner,* has cast some doubt on these arrangements in a decision which denied deductions under section 174 to a typically structured R&D Partnership. In *Green* a general partner with limited experience in the acquisition or commercialization of technology formed a partnership which raised funds and then contracted with various inventors to acquire base technologies. The partnership entered into R&D contracts with an unaffiliated corporation to perform research programs with respect to these technologies, and the partnership executed exclusive licenses with the research company giving the company rights to commercialize any technologies developed. In denying deductions under section 174 with respect to amounts paid under the contracts, the court concluded that such payments were not made "in connection with a trade or business." Noting that the partnership had little control over the activities of the research company and the marketing of the technology, the court concluded that: "An examination

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49 Id.
50 Id. at 504.
51 Id.
53 Id. at 669.
54 Id. at 671.
55 Id. at 687-91.
of [the partnership's] limited activity reveals that it functioned only as a vehicle for injecting risk capital into the development and commercialization of the four inventions. Its activities never surpassed those of an investor. It was not the up-and-coming business which section 174 is intended to promote."

Although factual distinctions could be drawn between the facts in Green and the Company's situation, the decision in Green casts doubt on the viability of traditionally structured R&D Partnerships.

In addition to the tax issues, an R&D Partnership presents numerous complexities for the sponsoring general partner. With respect to the Company, these complexities would arise because of conflicts of interest between the R&D Partnership, substantially all of the economic interests of which would be owned by the investors, and the Company. For example, if the R&D Partnership contracted with the Company for the performance of research, the Company would be responsible for negotiating the terms of the contract between itself and the R&D Partnership, of which it is a general partner. In addition, the Company would have to allocate expenses between the research effort of the R&D Partnership and any other research effort in which it were engaged. Conflicts might exist as to the base technology which the Company would license to the R&D Partnership. If the Company entered into a license agreement with the R&D Partnership, the Company would be negotiating with itself with respect to the terms of such license agreement, including the calculation and amount of any royalties. Finally, if the Company sought to purchase any technology generated by the R&D Partnership, it would have conflicts relating to the price at which it would acquire such technology or interests.

After considering all of these issues, and being satisfied that operations through partnership form would permit them to access the public capital markets and provide tax

56 Id. at 687.
incents to investors, the Company decided to contribute all of its assets to a limited partnership and conduct all future activities through that entity. In this manner the Company would avoid any risks that the R&D Deduction would not be available to investors in the Partnership and would eliminate any inherent conflicts of interest between the Company and the Partnership. In much the same way as it affected the S corporation, however, the Code would limit the availability of the R&D Credit to partners in the Partnership.57

F. Tax Treatment of Costs of Constructing ISF.

As the Partnership completed design work and commenced construction of the ISF, it encountered additional tax issues. As previously noted, R&D Costs are generally deductible if such costs result in the acquisition or production of depreciable property to be used in the taxpayer's trade or business.58 However, the costs of the materials involved in the construction, installation, or acquisition of the property and the labor costs related thereto must be capitalized and are not deductible under section 174.59 While many of the costs relating to the ISF at this point constituted R&D Costs, a substantial portion of such costs included materials and labor required to build the ISF. The Partnership was uncertain how to treat such costs. The regulations permit a taxpayer to deduct the costs of building a pilot model but do not permit the current deduction of property used in a trade or business.60

The Partnership, not having unlimited funds, planned to build a single ISF. The ISF, if successful, would be used in the trade or business of the Partnership. At the time the ISF was deployed in space, the Partnership did not know for certain that the ISF would function as

57 See supra notes 38-41 and accompanying text.
60 Id. § 1.174-2(b)(4).
designed. It was, in every sense of the word, a prototype, the cost of which should be deductible under section 174.\textsuperscript{61} However, it appears that under the current provisions of section 174 the Company could be required to capitalize all the costs of material and labor in constructing the ISF with the result that such costs could only be recovered in the form of depreciation deductions.\textsuperscript{62}

G. Tax Treatment of Operating ISF.

The Code has no territorial or geographical limitations with respect to the definition of gross income, and thus income earned by the Partnership (and allocated to the partners therein) attributable to an activity conducted in space would be subject to United States tax.\textsuperscript{63} On the other hand, certain provisions of the Code are territorial in effect, being limited to and, therefore, benefiting primarily those activities conducted in the United States.\textsuperscript{64} For purposes of the Code, the term "United States" is defined in a geographical sense.\textsuperscript{65} Because space is not within the geographical limits of the United States, the territorial limitations of these Code provisions would operate to deny the benefits of such provisions to activities conducted in space by United States taxpayers.

1. Depreciation.

In general, when a taxpayer invests in or creates a tangible asset with a useful life of more than a year, the taxpayer is required to capitalize the costs of acquiring or creating the asset and is only entitled to recover such costs through depreciation.\textsuperscript{66} Section 167 of the Code provides that there shall be allowed as a depreciation deduction a reasonable allowance for the exhaustion or wear

\textsuperscript{61} Id. § 1.174-2(a)(1).

\textsuperscript{62} Id. § 1.174-2(b)(4).

\textsuperscript{63} See I.R.C. § 61 (1982).

\textsuperscript{64} See, e.g., id. §§ 48(a)(2), 168(f)(2).

\textsuperscript{65} Id. § 7701(a)(9).

\textsuperscript{66} Id. § 263(a); Treas. Reg. §§ 1.263(a)-1(b), 1.263(a)-2(a) (1958).
and tear (including obsolescence) of property used in a trade or business or held for the production of income.⁶⁷ Prior to the Economic Recovery Tax Act of 1981 ("ERTA"),⁶⁸ the cost of an asset, reduced by estimated salvage value, was recovered over the estimated useful life of the asset.⁶⁹ The Accelerated Cost Recovery System ("ACRS"), enacted as part of ERTA, permits the cost of eligible property, without regard to salvage value, to be recovered at an accelerated rate over a predetermined recovery period that is generally shorter than the useful life of such property.⁷⁰ The favorable provisions of ACRS are generally denied, however, to property which is used predominantly outside the United States.⁷¹

2. Investment Tax Credit.

Section 38 of the Code provides that there shall be allowed as a credit against the income tax imposed by the Code an amount equal to the investment credit determined under section 46(a).⁷² Section 46(a) provides for the calculation of the amount of the credit which, in general, is equal to a specified percentage of the qualified investment in "section 38 property."⁷³ Section 38 property is generally defined in section 48 of the Code as being tangible personal property.⁷⁴ However, section 48(a)(2)(A) provides that the term "section 38 property" does not include property which is used predominantly outside the United States.⁷⁵ Because of these geographical limitations, tangible personal property used outside the United States is not eligible for either the rapid depreciation benefits of ACRS or

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⁶⁷ I.R.C. § 167(a) (1982).
⁶⁹ I.R.C. § 167(m) (1982).
⁷⁰ Id. § 168.
⁷¹ Id. § 168(f)(2).
⁷² Id. §§ 38(b)(1), 46(a).
⁷³ Id. § 46(a).
⁷⁴ Id. § 48(a)(1).
⁷⁵ Id. § 48(a)(2)(A).
the investment tax credit. Congress provided these exceptions because both ACRS and the investment tax credit are incentive devices designed to encourage investment in the United States. However, the geographical limitation overlooked those situations where property was not utilized in the United States but still primarily benefited the United States economy. As a result, Congress added to the Code certain exceptions to United States use to prevent an inequitable result. Those exceptions, found in section 48(a)(2) of the Code, but applying to ACRS as well, provide that certain property, otherwise used outside of the United States, will be eligible for ACRS and the investment tax credit.\textsuperscript{76} Included in these exceptions are the following types of property: (i) communication satellites;\textsuperscript{77} (ii) certain aircraft operated to and from the United States;\textsuperscript{78} and (iii) any vessels documented under the laws of the United States which are operated in the foreign or domestic commerce of the United States.\textsuperscript{79}

No exception exists for any space-related asset other than communication satellites. There is no reason that property owned and operated by a United States business and located in space should be denied the favorable tax benefits provided by ACRS or be ineligible for the investment tax credit. However, absent the addition of a specific exception for space-related assets or some other general change to the Code, such property would be denied the benefits of ACRS, and no investment tax credit would be allowed.

\textbf{H. Special Problems of Leasing ISF to Government.}

The fact that the Partnership leases a portion of the ISF to the government creates an additional problem with respect to depreciation and the investment tax credit. In general, if property is leased to or otherwise used by the

\textsuperscript{76} \textit{Id.} § 48(a)(2)(B).
\textsuperscript{77} \textit{Id.} § 48(a)(2)(B)(viii).
\textsuperscript{78} \textit{Id.} § 48(a)(2)(B)(i).
\textsuperscript{79} \textit{Id.} § 48(a)(2)(B)(iii).
United States or any agency or instrumentality thereof, investment tax credit will not be allowed with respect to such property. The favorable accelerated depreciation rules of ACRS will also not be permitted. These provisions were incorporated into the Code to prevent tax-exempt entities from enjoying tax benefits they were otherwise directly ineligible to use. Considering the probability that, at least initially, governmental agencies may use some or all of the facilities provided by private enterprise in space, this provision may operate unfairly to eliminate the availability of accelerated depreciation and tax credits for otherwise eligible property. Given the small number of users, consideration should be given to providing an exception to this provision for property used in space.

I. Tax Treatment of Payments to Transportation.

As previously discussed, in computing taxable income a taxpayer begins with gross income, which is defined to mean income from whatever source derived. In connection with the transfer of the Space Shuttle operations to Transportation, the government paid Transportation the Transition Amount. This amount was designed to reimburse Transportation for the losses it would suffer by providing contracted Space Shuttle flights at less than its costs. Although a number of arguments can be made that this payment is not income, no clear authority exists that would give Transportation adequate assurance that it would not be subject to tax on such amounts. If the dollar amount is calculated such that it exactly offsets the costs of Transportation providing such flights, and the income and the costs all occur in the same taxable year, Transportation will suffer no adverse effects from this payment. If,
however, the payment comes in a year in which no costs are incurred or if Transportation is successful at reducing the cost of operations, Transportation will be required to pay a portion of the funds back to the government in the form of income tax. In order to insure that the Transition Amount need be no larger than absolutely necessary, and to fully reimburse Transportation for the transition costs, it would seem desirable to amend either the Code or the Space Shuttle Commercialization Act to specifically provide that such payment not be included in the recipient’s income.

It is also interesting to note the effect of this arrangement on the Partnership itself. Because the Partnership negotiated the Space Shuttle flight at a price which was, in effect, subsidized by the government, the Partnership received a benefit by obtaining a flight at a cost which was substantially less than the cost which Transportation would charge for the identical flight. An issue is raised, therefore, as to whether the benefit derived by the Partnership constitutes income to the Partnership.

J. Tax Treatment of Processing.

Processing acquired tangible personal property, which it put in place aboard the ISF, and began to conduct initial research. Processing is subject to the same concerns relating to accelerated depreciation and investment tax credit that the Partnership faced. In addition, Processing will be ineligible for the Research Credit with respect to the costs of research conducted aboard the ISF. Section 30 of the Code defines qualified research to exclude research conducted outside the United States. Because the ISF is not within the geographical limits of the United States, research conducted aboard the ISF would not be eligible for the credit. Thus, the Code would discriminate against research undertaken on a facility located in space such as

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84 See supra notes 65-79 and accompanying text.
the ISF. Inasmuch as a substantial amount of research will probably be conducted in space, this provision unfairly discriminates against those who will conduct that experimentation.

Another tax issue presented by the operations of Processing relates to the sourcing of income under the provisions of the Code. Although the Code taxes the income of United States taxpayers from all sources, certain provisions of the Code recognize that United States taxpayers may operate in foreign countries which have their own tax systems. For example, the sourcing of income as foreign may affect the ability of the United States taxpayer to utilize a foreign tax credit. Such a credit permits a United States taxpayer to offset United States tax by the amount paid to a foreign country. If income is deemed to be derived from operations on the ISF, Processing would have foreign source income under the Code. In line with other suggestions that United States spacecraft be considered as United States property for ACRS and investment credit purposes, income generated from such locations should be considered United States source income as well. Ironically, it is interesting to note that since space commercialization may be an international endeavor, such characterization might result in a foreign national being subject to tax on income which is considered United States source if that person earns a salary for work performed on the ISF.

Other non-tax problems an entity such as Processing potentially will face are the import and export concerns raised by transporting property to and from the ISF. Because the definition of "United States" does not include a United States spacecraft, an issue could be raised as to whether transporting products in spacecraft to and from space constitutes exporting from or importing to the United States.

86 id. § 33.
The major inequities presented by the Code in the application of some of its provisions to spacecraft operated by United States taxpayers have been the subject of Congressional discussion. Members of Congress have, from time to time, introduced legislation which would mitigate some of the problems. In June 1984 Congressman Bateman introduced a bill to provide that certain activities performed in space and certain articles produced in space be treated as activities performed and articles produced within the United States for purposes of any tax or tariff law of the United States (the "Bateman Bill").

The Bateman Bill did not provide for any specific changes to the Code; rather it sought to address all issues within a global statement. Although no action was taken on the Bateman Bill directly, a provision was included in the adoption of the Trade and Tariff Act of 1984 stating that products made in space by United States firms shall not be considered to be imports when returned to the customs territory of the United States. Without the adoption of this provision, products manufactured in space would have been subject to import duties even though they had never been in a foreign country. Along the same lines, launching a vehicle from the United States into

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87 H.R. 5975, 98th Cong., 2d Sess. (1984). The Bateman Bill provided that: purposes of (1) tax credit determined under section 46(a) of the Code and allowed by section 38, (2) the provisions contained in Part I of subchapter N of chapter 1 of such Code (relating to the determination of sources on income), (3) the provisions of the tariff schedules of the United States, and (4) any other provision of any tax or tariff law of the United States, activities performed in space for United States persons on any spacecraft a substantial interest in which is owned by United States persons (or which is owned by the United States) and articles produced in space primarily for sale or use within the United States on any such spacecraft shall be treated as activities performed within and articles produced within the United States.

88 Id. at 1-2.

89 Id.

space could be viewed as an export. This issue was addressed in the Commercial Space Launch Act, which basically exempts anything launched into space from any export provisions.90

Subsequent to the Bateman Bill, other bills were introduced into both the House and Senate.91 While some bills were more specific than others, all were designed to eliminate the problems identified herein with respect to the Research Credit, investment tax credit, ACRS, and source of income.92 The bills should ensure that commercial activity in space conducted by United States taxpayers would be treated identically to commercial activities by United States taxpayers within the geographical limits of the United States.

As of the date of this article, the tax reform legislation passed by the House of Representatives in 1985 and the Senate Bill reported out by the Senate Committee on Finance make adoption of any specific legislation relating to space commercialization doubtful. The House Bill93 and the Senate Bill both contain provisions which will dramatically impact all businesses. For example, both bills repeal the investment tax credit effective for property placed in service after 1985. If this provision is enacted into law, no taxpayer will be entitled to credits attributable to property placed in service by such taxpayer regardless of where such property is placed in service. As a result, there will be no need to consider the application of

92 See supra note 91 and accompanying text.
93 Tax Reform Bill of 1985, supra note 33.
the provisions to United States owned and operated spacecraft.

The House Bill would also substantially revise the system of depreciation provided by ACRS and replace it with a new incentive cost recovery system.94 Like the provisions of ACRS, the incentive cost recovery system is available only with respect to property placed in service in the United States.95 The drafters of the legislation, however, have specifically included a provision which excepts "spacecraft" from the exclusion rule.96 As a result, although the term "spacecraft" is not defined, it appears that tangible property placed in service in space would be eligible for the relative benefits provided by the new cost recovery system.

Although specific statutory language of the Senate Bill was not available at the time of writing and any bill passed by the Senate will be subject to revision by a Conference Committee, it is anticipated that the Senate Bill will liberalize the depreciation rules and it is hoped that similar language will be included in any bill ultimately enacted into law. In addition, the Senate Bill appears to enhance the tax treatment of R&D Costs. Despite these provisions, it is clear that a full integration of United States tax laws with the demands of space commercialization continues to be lacking.

IV. CONCLUSION

This article has examined the impact of the Internal Revenue Code on the structure and conduct of a new venture engaged in one aspect of the commercialization of space. As discussed, many of the tax issues which influence the course of action of the Company are issues that impact all businesses. A number of issues are peculiar to activities conducted in space. Members of Congress have proposed legislation which would eliminate some of the

94 Id. at 70-148.
95 Id. at 82.
96 Id.
discrimination of the Code against space-oriented activities. Yet Congress has failed to adopt any of these provisions. As Congress works toward substantial tax reform, at a minimum it should seek to adopt those provisions which would eliminate or minimize the discrimination of the Code against space businesses.

In addition, Congress should consider whether space commercialization involves activities that the Code should encourage, in which case a refundable tax credit should be considered. In any event, it should be remembered that as long as there is an income tax, the provisions of the Code will influence the economic decisions of taxpayers. If Congress intends to encourage space commercialization, it must provide clear direction in the Code to those commercial interests which will engage in this effort.