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AMORTIZATION OF MACHINERY AND EQUIPMENT IN SOVIET INDUSTRY

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FOREWORD

The amortization practices that the USSR has adopted for state-owned industry, particularly for the amortization of industrial machinery and equipment, are examined in this report. Soviet practices are compared with those adopted primarily for income tax purposes in the US. In addition, some of the implications for the growth of Soviet industry also are considered.

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AMORTIZATION OF MACHINERY AND EQUIPMENT IN SOVIET INDUSTRY*

Summary and Conclusions

In the postwar period the Soviet government, like other governments, has reexamined its policy with respect to the amortization (or depreciation) of fixed assets, especially industrial machinery and equipment. The inadequacy of official prewar rates usually is ascribed to the postwar acceleration of technological progress, a development that has increased the incidence of obsolescence in industrial equipment. In the USSR an additional factor behind current reform of the amortization system is the recently announced decision to use industrial fixed assets more intensively, a practice that normally tends to shorten the useful lives of industrial equipment.

Following World War II, both the US and the USSR, unlike some other industrial nations, continued to adhere to the orthodox ("original [historical] cost - useful life") concept of depreciation accounting as the basis of depreciation policy. Now, however, the USSR is preparing to adopt a form of "price-level" depreciation accounting. Beginning in 1963, Soviet fixed assets are to be amortized on the basis of their current replacement cost instead of their historical cost. At the same time, a revised schedule of standard amortization rates containing newly computed allowances for obsolescence and physical wear is to be introduced.

Although it is premature to pass judgment on the new Soviet amortization rates at this time, there is evidence that the rates will be higher than previously, particularly in the case of machinery and equipment. The average rate for the category production machinery and equipment, which accounts for approximately one-fourth of the value of the productive fixed assets in Soviet industry, reportedly is being set at 13.3 percent. The rates for the categories power machinery and equipment and transportation equipment are to be 9.9 and 8.8 percent, respectively.

* Although this report anticipates the revision of the US Treasury Department's Bulletin "F," the report was already in process of publication at the times that the new depreciation regulations (Depreciation Guidelines and Rules, US Internal Revenue Service Publication No. 456, July 1962) were actually issued. (See, however, the first footnotes on pp. 28 and 53, below.) Because it will be some time before the impact of these new regulations can be studied, it has not seemed advisable to hold up the publication of this report.

These standard rates reflect a significant increase above the basic rates of 1930, which have remained essentially in use up the present time.

In the USSR, where virtually all industrial fixed assets are state property, amortization deductions have been a source of financing capital investment for many years. Accordingly, a rise in Soviet amortization rates could signify an intention to increase the amount of capital investment that is financed through amortization deductions. When considering the significance of amortization rates and amortization deductions in the USSR or when comparing them with depreciation rates and depreciation accruals in the US, however, allowance should be made for certain features of the Soviet system, primarily the division of the amortization rate between a subrate for capital investment and a subrate for capital repair.

Unlike most US depreciation rates, Soviet amortization rates are not the reciprocals of the service lives of the fixed assets to which they pertain, precisely because they include a very substantial allowance for capital repair. Under the new over-all standard rate of 13.3 percent for the category production machinery and equipment in the USSR, for example, a subrate of 6.5 percent is to be established for the capital investment component of amortization, and a subrate of 6.8 percent is to be established for the capital repair component.

The allocation of the amortization deductions of Soviet industry follows the prevailing division of the over-all amortization rate between the subrate for capital investment and the subrate for capital repair. Under the 1960 plan, for example, approximately 2.7 billion rubles* (47 percent) of the amortization deductions of state-owned industrial enterprises and construction organizations were to be used for financing capital investment in industry, and approximately 3.1 billion rubles (53 percent) were earmarked for capital repair. Therefore, when Soviet economists discuss amortization deductions as a percentage of capital investment, they ordinarily refer only to those amortization deductions that are computed by using the capital investment subrate. At present, about one-sixth of the centralized capital funds invested annually in Soviet industry (including the construction industry) is currently financed from these amortization deductions. In general, amortization deductions have tended to be

* Ruble values in this report are given in new rubles established by the Soviet currency reform of 1 January 1961. A nominal rate of exchange based on the gold content of the respective currencies is 0.90 ruble to US $1. This rate, however, should not be interpreted as an estimate of the equivalent dollar value of similar US goods or services.

weighted slightly in favor of capital investment in most branches of heavy industry and heavily in favor of capital repair in light industry and in the food and paper industries.

The amortization deductions that industrial enterprises deposit with the state for use as centralized capital investments may be redistributed within industry in accordance with the requirements of the state investment plan. For this reason it is sometimes said that these amortization deductions represent a form of state tax on fixed capital. The state may use such funds either for the replacement in kind (simple reproduction) of fixed assets that are being retired from use or for net additions (expanded reproduction) to existing stocks of fixed assets.

There is no real counterpart of the Soviet capital repair system in US industry. Virtually all capital repairs in Soviet industry are financed from amortization deductions, and these deductions are deposited by industrial enterprises with the local Gosbanks in special accounts earmarked for the use of the depositor. Generally the deductions are deposited before the repair work itself is performed. Capital repair provides some leverage for deferring the replacement of fixed assets in Soviet industry, although sometimes at considerable economic cost. Of the total amortization deductions for capital repair, a very significant share is used for the repair of machinery and equipment. Based on 1956 data, a Soviet source has estimated that 60 to 75 percent of the outlays for capital repair of productive fixed assets in Soviet industry were expended on equipment alone in that year.

A significant point to be noted about the Soviet capital repair program is that it is a form of capital investment. Capital repair is referred to in Soviet publications as partial replacement of fixed capital (in distinction to full replacement accomplished through bona fide capital investment). The capital repair program is designed to restore machinery and equipment to its original operating condition, insofar as is possible, through the replacement or repair of working parts at regularly scheduled intervals during the service life of the item of machinery and equipment. When the capital repair of a fixed asset is completed, the cost of the work is entered as an offset to amortization charges, thereby restoring value to the asset and extending its service life.

Because amortization deductions for capital repair do represent a capital consumption charge in Soviet industry and are used for capital replacement, they are relevant to Soviet policy on capital investment. If Soviet officials alter the scale of the capital repair program but leave the over-all amortization rate intact, either more or less capital is available for investment.

The assumption that amortization deductions for capital repair represent an alternative form of capital investment is implicit in Soviet criticism leveled at the costliness and ineffectiveness of capital repair relative to capital investment in new machinery and equipment. Economically a capital repair program of such magnitude would not be feasible in a market economy and probably is not entirely justified in the Soviet planned economy. For example, Soviet spokesmen acknowledge that the cost of the capital repair of a given item of equipment may well exceed the cost of completely replacing it with a new asset. Certainly over the entire service life of an item of machinery and equipment subject to four or five capital repairs an inordinate amount of resources is expended to preserve an asset that is usually no more productive at the end of the repair process than it was when originally acquired.

The principal justification of the Soviet capital repair program has been and continues to be the unavailability of a sufficient number of new assets for replacement. This unavailability follows in some measure from the priority given to newly constructed plants in the allocation of new machinery and equipment as well as to chronic problems in the supply of machinery and equipment.

Directly calculable costs are not the sole criterion for judging the efficacy of the capital repair program. The program was adopted originally as a measure of central control to maintain standards of operating efficiency in state enterprises at a time when many personnel could not or would not voluntarily maintain them. To this day the capital repair program is centrally planned and is monitored through the centralized finance system. The extensive use of capital repair of old machinery and equipment to permit the forced expansion of new industrial plant probably has exacted a high economic price. For the present and immediate future, however, the capital repair program appears to be a firmly established and integral part of the Soviet system of amortization.

I. Introduction [redacted] STAT

Except in very specific cases, the term depreciation has largely supplanted the more restricted term amortization in US usage, even though the two terms are not entirely synonymous. The term depreciation may have any one of several meanings depending on the context in which it is used -- decrease in value, amortized cost, difference in value between an existing old asset and a hypothetical new asset taken as a standard of comparison, or impaired serviceableness. 2/ Only in the case of amortized cost does the term depreciation necessarily coincide in meaning with the term amortization.

Amortization is essentially an accounting concept. Its function is to allocate systematically the cost (or other basis of valuation) of fixed assets over their estimated service lives as a "prepaid expense of operation." 3/ Generally speaking, amortization of a capital cost does not involve accounting for economic factors that may independently influence the current value of fixed assets.** Under accounting convention, therefore, amortization is properly concerned with the recovery of historical cost, not the recovery of current economic value. The practice of recovering the historical cost of a fixed asset during the period of its useful life is commonly known in the US today as "orthodox depreciation accounting." 4/

It is sometimes assumed that the unamortized cost (book value) of a fixed asset is, for most practical purposes, a reasonable measure of its economic value. Today this assumption is largely discredited in the US. In the postwar period, obsolescence and inflation have tended to widen the gap between the economic value of most fixed assets and their accounting value as measured by unamortized cost. Nevertheless, depreciation accounting in US industry remains largely orthodox. From the point of view of accounting principles and business practices, orthodox depreciation accounting has several features that recommend it to the private firm. It is highly conventionalized, it is sanctioned by the accounting profession, and it meets the practical requirements of US tax legislation.

In authorizing allowances for depreciation, the US Internal Revenue Service has held steadfastly to the "original [historical] cost -- useful life" concept of depreciation. Because of the inconvenience

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** This statement does not imply, however, that economic factors do not independently influence the period of usefulness of fixed assets and, hence, the period over which capital recovery may be allocated.

and cost of maintaining more than one set of books, many US firms have tended simply to pattern their depreciation accounting on the requirements of federal tax legislation.

In recent Congressional hearings, several alternatives to orthodox depreciation accounting were discussed on the basis of experience in other countries. Even if an alternative system of depreciation accounting were permitted for tax purposes, many US firms, preferring to meet the effects of obsolescence and inflation through other fiscal measures, might well continue to use orthodox depreciation accounting.* At present, steps are being taken by the US Government to revise the table of useful lives established for machinery and equipment. In recognition of the considerable influence of obsolescence, these steps will tend to sanction shorter periods of capital recovery without disturbing traditional US adherence to the principles of orthodox depreciation accounting.

Characteristically, under the Soviet system of state ownership of industrial enterprises and suppression of market forces, concepts of depreciation other than amortization have been virtually nonexistent. Attention has been focused almost exclusively on amortization (amortizatsiya) as a tool of state accounting. Obsolescence either was held not to exist under the Soviet system or was not recognized officially as a factor affecting the service lives and values of fixed assets. State enterprises acquired new fixed assets at prices established by the state on the basis of the accounting cost of production. In the event that a used fixed asset was "sold" by one state enterprise to another state enterprise, the exchange value was normally taken to be its unamortized cost. As fixed assets are owned by the state, the exchange of such assets was largely a bookkeeping operation unattended by considerations of "fair market value." Consequently, the depreciation of fixed assets from causes other than wear and tear was not a subject of discussion.

About 1955 an awakened awareness of the economic impact of technological advances in the period since World War II resulted in a revision of the official Soviet position concerning obsolescence and the valuation of fixed assets. Recognition of discrepancies between the unamortized cost of productive industrial fixed assets valued in prices of different years (mixed prices) and the current cost of replacing them was an important factor leading to the revaluation of Soviet fixed assets at current replacement cost as of 1 January 1960.

* This attitude is partly explained by the desire of some firms to show maximum profits in their financial reports. To the extent that depreciation charges are decreased, profits may be correspondingly increased. The corporate profits tax tends, in some cases, to moderate the desire to show maximum profits.

Under present plans the use of historical cost is to be discontinued in the valuation and amortization of fixed assets in the USSR. Instead, a uniform cost basis reflecting current replacement value expressed in the prevailing planning prices is to be used. Such a system would place the USSR in the group of countries that practices some form of "price level" depreciation.

Meanwhile a major objective in the current revision of the schedule of amortization rates in the USSR is the inclusion of an allowance for obsolescence. In recognizing obsolescence as an independent factor contributing to a decline in the value of fixed assets, the Soviet government has retained the sole right to determine the "proper" allowance for obsolescence. This solution prevents any weakening of state control over the determination of value and the planning and accounting system built thereon.

Although Soviet convention, like US convention, regards the useful life of an asset as the period over which capital recovery should properly be effected, the Soviet position on the capital sum to be recovered through depreciation during this period differs markedly from the US position. Traditionally, in the USSR the planned cost of capital repairs scheduled to be performed during the service life of an asset has been added to the historical cost of the asset as part of the sum to be recovered through amortization.

Because of current concern in the US and the USSR with rates of capital investment and economic growth, there has been an increasing tendency to identify depreciation accruals and amortization deductions as actual or potential sources of capital investment. Comparisons have been made between the ratio of depreciation accruals and annual capital investments in US industry and the ratio of amortization deductions and annual capital investments in Soviet industry.* Although it is entirely possible to make such comparisons, they are of limited usefulness and may actually be misleading because of differences between the two economic systems.

* See, for example, source 5/.

II. Comparison of Amortization Practices in the US and the USSR

A. Treatment of Fixed Assets

1. Fixed Asset Accounts and Depreciation Reserve Accounts

a. General

This section of the report is concerned with the types of items that are entered in the fixed asset accounts of industrial firms and with the methods of classifying and grouping them in order to facilitate depreciation accounting. Ordinarily a close interrelationship exists between the character and composition of the items entered in a fixed asset account, the type of depreciation reserve account that is established for them, and the method of depreciation employed.*

Only durable or semidurable items that are charged off to the cost of production over more than one annual accounting period are capitalized and entered in fixed asset accounts. Not every item entered in the fixed asset account of an industrial firm, however, is necessarily depreciated. The most notable exception in the case of US firms is land (except when used for agricultural pursuits). In the USSR, no formal economic value is placed on land itself; so it is not even entered in the fixed asset accounts of Soviet industrial firms. Small tools and fixtures are items that may be capitalized but not necessarily depreciated. Because of the relatively small value involved, the replacement of tools and fixtures is often simply charged to current maintenance accounts without disturbing the fixed asset account.

In contrast to Soviet practice, in the US an item need not have an officially established minimum value to qualify as a fixed asset. In both the US and the USSR, machinery, equipment, and accessories used for testing or experimental purposes usually are not capitalized if their usefulness is expected to be of short duration. In the US the cost of such expendable items is often treated as a current or deferred expense and charged to a developmental account.

b. In US Industry 6/

Bulletin "F," issued by the Internal Revenue Service of the US Treasury Department, contains a compilation of average useful

* Examples of the primary classes of machinery and equipment used by US and Soviet industrial firms are shown in Appendix A, p. 67, below.

lives* of individual types of buildings, structures, machinery, and equipment used in US industry.** The bulletin is quite detailed and contains entries for thousands of items. Generally, individual items are listed under the industry in which they are used.*** There are, however, independent headings for the categories buildings, motor and other vehicles, and office furniture, inasmuch as these items are common to virtually all industries.

Bulletin "F" also contains composite average lives applicable to groups of heterogeneous fixed assets used in combination in various industries or production processes. The use of composite average lives usually simplifies the setting up and keeping of accounts.

Other than to place various types of machinery, equipment, structures, and fixtures under the appropriate industries, however, Bulletin "F" itself does not attempt to classify fixed assets on the basis of similarity of type or other criteria. Such classification is left to the individual firm.†

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* For a discussion of useful lives of fixed assets, see 3, p. 24, below.

** Because depreciation accounting in the US is so closely related to Federal income tax legislation, it will be assumed for the purpose of this report that Bulletin "F" provides a reasonable basis for discussing the practices followed by most US business firms equally for internal accounting as for tax depreciation purposes. Although Bulletin "F" is designed primarily to help taxpayers determine reasonable rates of depreciation, the approach to depreciable property accounts followed in the bulletin undoubtedly has influenced individual US business firms in the setting up and keeping of their accounts.

*** In general, a US business firm can tell whether tax depreciation is allowable for a given asset by consulting Bulletin "F" or representatives of the Internal Revenue Service. The introduction to the current reprint of tables from Bulletin "F" (revised in 1942) acknowledges that the bulletin is out of date and states that "as soon as possible, a supplement ... will be issued containing schedules of useful lives of new types of equipment not shown in the 1942 edition." 7/

† The attitude of many US industrial firms toward centralized regulation of depreciation practices is summed up well in the following:

> Nationally standard or industrially standard rates or methods, whether for tax or control purposes, are not practicable because they do not realistically reflect the facts or requirements of a dynamic technology. Individual plants present individual problems due to the diversity of assets and their varied employment. The incidence of wear and obsolescence is not constant or uniform but is as subject to change as any factor in any business. 8/

Bulletin "F," however, does prescribe four acceptable types of "depreciable property accounts" that may be used in the preparation of tax schedules. These fixed asset accounts provide some latitude to individual US business firms in their approach to depreciation accounting. A US company may have a single account, comprising all depreciable assets of whatever kind or nature used in the business, with accrued depreciation set up in one reserve. Or it may have a number of fixed asset accounts each consisting of a group of assets or even an individual asset with a separate depreciation reserve account for each group or single asset. The range of possibilities open to US enterprises in the establishment of depreciable asset accounts is in marked contrast to the standard system required of all Soviet industrial enterprises.

Based on available information concerning actual US practice, it is the view of competent authorities that many firms have abandoned single-asset accounts (item accounts) in favor of multiple-asset accounts (composite, classified, or group accounts), not only because bookkeeping is facilitated but also because tax regulations tend to discourage item accounting. Apparently it is common practice for many companies, especially the smaller and medium-size companies, to maintain classified accounts that have only four account headings: buildings, machinery and equipment, transportation equipment, and office furniture and fixtures.

One of the most important considerations in the grouping of fixed assets for purposes of depreciation accounting is generally held to be the homogeneity of the assets with respect to their estimated average lives. Such grouping facilitates the computation and recording of depreciation charges. There are usually practical limitations on the degree of homogeneity that can be established with respect to other factors, such as type and age, in setting up accounts for machinery and equipment:

> This requirement of homogeneity does not mean that all assets in any one account must be physically similar. For example, in some circumstances it is justifiable to include in a single machinery account such different assets as milling machines and drop hammers. Inevitably there is bound to be some dissimilarity between the assets in a single account, even if it is merely the difference between a 1930 milling machine and a 1950 one. 9/

Frequently, however, fixed assets with similar life estimates are subdivided on the basis of the common year of acquisition.

c. In Soviet Industry 10/

The fixed asset accounts and the depreciation reserve accounts of US industrial firms appear to be more complementary than those of Soviet industrial firms, largely because of the difference in the approach to the classification of fixed assets. Unlike the US, where the setting up of depreciable property accounts can be ordered largely to the convenience of the individual firm, the USSR has a rigid system of fixed asset classification that severely limits the freedom of Soviet industrial enterprises in the establishment of their accounts. Furthermore, the present fixed asset classification system does not correspond entirely to the classification system on which the still operative schedule of basic amortization rates established in 1930 was based (see Appendix D*). Present comments will be confined to Soviet attempts to use a standard classification system of fixed assets for purposes of accounting for amortization.

Perhaps the major point to be noted is that the Soviet standard classification system is expected to serve a multipurpose role in the planning and administration of the national economy. It must meet the statistical requirements of national accounting as well as the operational needs of the individual state enterprise. In the process of developing a classification system suitable for a number of interrelated functions and indexes, the effectiveness of the system with respect to any one function may be weakened. Thus the present standard classification system for fixed assets in the USSR represents but the latest stage in a continuing search for the most effective all-round system in terms of the multiple requirements of a planned national economy. Characteristically, then, Soviet accounting for amortization is keyed to the Soviet fixed asset classification system, the new schedule of amortization rates to be introduced in 1963, for example, being based on the standard fixed asset classification system of 1959.

Although the standard fixed asset classification system of 1959 was drawn up with the revaluation of fixed assets and the preparation of new amortization rates in mind, it does not depart significantly in its primary categories from its numerous predecessors, including the classification system of 1954.** These categories reflect major types of fixed assets, not unlike the conventional divisions of fixed assets found in the so-called classified accounts of US industrial firms.***

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* P. 79, below.

** The number of primary categories used in classifying Soviet industrial fixed assets gradually increased from 3 in 1925 to 10 in 1947 and, with some slight variation, has remained approximately at that number down to the present time.

*** See p. 11, above.

In the past, Soviet economists have sometimes charged that the standard fixed asset classification system was not sufficiently developed for purposes of establishing widely differentiated amortization rates for individual types of equipment having different life characteristics. Under the classification system in effect when the basic amortization rates were established in 1930, for example, all machinery and equipment (with the exception of transportation equipment) fell under one primary category, equipment of enterprises. For purposes of establishing amortization rates, this category was divided into only six subgroups (see Appendix D*). One subgroup included all the machinery and equipment of such diverse industries as metallurgy, perfumes and cosmetics, machine building, pharmaceuticals, footwear, and canning -- to name but a few. Such a grouping of disparate types of equipment under one heading could hardly be expected to produce meaningful results.

Under this classification system, apparently, there was no attempt to classify machinery and equipment by various types, such as generators, machine tools, compressors, and the like. As a result, machinery and equipment generally common to all industries, such as materials handling equipment and machine repair equipment, was depreciated at different rates among the six groups of industries, even if the life characteristics and use pattern of such equipment happened to be similar.

In the half dozen or so revisions of the Soviet fixed asset classification system that have occurred since 1925, increasing emphasis has been placed on subdivision of fixed assets in the classification system, allegedly so that the system could be utilized more effectively for differentiating amortization rates. The increase in the number of primary categories actually has been quite limited compared with the increase in subcategories.

Although the complete classification system of 1959 itself is not available in published form, it is reported that the 10 or so primary categories are subdivided into about 470 subgroups for which approximate average service lives have been established. These average service lives are being firmed up as work on the new amortization rates is completed; the subgroups are being further divided into smaller groups of fixed assets having the same service lives and approximately the same amortization rates. In this way the USSR hopes to eliminate many of the past inadequacies that have resulted from the superimposition on the amortization system of a standard classification of industrial fixed assets.

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* P. 79, below.

Apparently there remains on the part of at least some Soviet economists, however, an element of confusion as to the exact correlation between the formal classification of fixed assets and the amortization of fixed assets:

> Some Soviet economists think that the present classification of fixed assets by type is unsatisfactory for subdividing the various elements of fixed assets on the basis of service life, that it hampers control over the condition of fixed assets, that it makes ascertainment of the degree of wear difficult, and that it is unsatisfactory for making amortization charges. However, the grouping of fixed assets by type is not designed primarily for the purpose of determining the size of amortization deductions or the length of service life.
>
> A special grouping of fixed assets must be elaborated in order to calculate amortization ... .
>
> Of course in grouping fixed assets for the purpose of calculating amortization it is necessary to hold to the maximum to the grouping by type -- that is, to build the one in conformity with the other. Furthermore, the grouping of fixed assets for purposes of calculating amortization may fully coincide in the primary divisions with the grouping of fixed capital by type. However, the internal structure must be more patterned to the requirements of differentiated calculation of amortization. 11/

The reader may well wonder exactly why amortization has become so involved with the standard classification of fixed assets in the USSR. A full explanation lies outside the competence of this report. It may be noted, however, that a standard classification of fixed assets is needed by the state planners in gathering data on the composition of industrial fixed assets in the various branches of industry and in planning the distribution of new fixed assets among these industries. Fixed asset accounts are the basic source of the information needed to plan and monitor the development of industries with respect to the physical types and numbers of fixed assets, their ages, and their values. To the extent that amortization rates and amortization deductions influence the unamortized value of such assets and inasmuch as composite amortization rates established for individual

industries as a means of planning investment and production costs are based on the composition of the major types of fixed assets in each industry, it is undoubtedly considered desirable to have a single system of classification for purposes of coordinated planning.*

Soviet regulations limit the minimum value and minimum estimated service life of items that can be entered in fixed asset accounts. Only fixed assets with a service life of more than 1 year and a cost of more than 50 rubles are entered in the fixed asset accounts, all others being treated as working assets.

In view of the Soviet distinction between productive and nonproductive fixed assets and the Soviet position that it is proper to amortize only assets that are materially productive, some industrial fixed assets do not fall under the amortization system or are not amortized under certain conditions. Nonproductive industrial fixed assets include the buildings of industrial enterprises that are used for housing the workers as well as for educational, health, cultural, and social activities. Productive industrial fixed assets are not amortized when they are prematurely retired because of flood, earthquake, and the like. They are not amortized when they are unused, abandoned, shut down, declared surplus, in storage,** undergoing prolonged repair, or idle for an excessively long time. An exception, however, is unused equipment that is kept in so-called "normal production reserve," a category which includes standby and emergency equipment that is kept available to forestall possible interruptions in normal production. Because repairs are considered necessary to the production program, equipment continues to be amortized as long as it is in a normal repair status.

2. Valuation

a. General

The book value*** assigned to a fixed asset when it is first acquired by a firm plays an important role in the subsequent

* For a discussion of the composite amortization rates of Soviet industries and their relation to the composition of fixed assets, see B, 2, b, p. 44, below, and Appendix C, p. 73, below.

** When stored in a warehouse, equipment falls in the category of "potential fixed assets." 12/

*** The term book value is used conventionally to denote the value at which an asset is carried in the accounts of an enterprise. When the current valuation of the asset represents the difference between its original cost and the total of the depreciation charges made as of the current date against the asset, the term unamortized cost is considered more accurate and less ambiguous than the term book value. 13/

depreciation (amortization) of the asset. Under orthodox depreciation accounting the original book value of a fixed asset represents a capital cost that is to be recovered during the useful life of the asset. As such the capitalized valuation will have a direct bearing on the amount annually charged to depreciation.

In most cases, industrial firms are concerned with maximizing their returns from the use of fixed assets and with recovering at least the equivalent of their investment. Some spokesmen for industry contend that capital charges during the life of an asset should be set so as to cover the cost of replacing the asset if it differs from the original cost.*

No one can predict with complete certainty how long a given asset will be economically useful to a firm. An asset may recover for a firm either more or less than its original cost, depending on a number of factors, including the durability of the asset itself. Among the factors that may influence the economic value of equipment in a market economy are (1) changes in the supply of and demand for such equipment, (2) changes in demand for the article that the equipment produces (with resulting inadequacy or obsolescence), (3) the appearance on the market of new and improved equipment that is substitutable, (4) the development of entire new technologies of producing the article that the equipment was designed to produce, (5) changes in the interest rate, and (6) inflation.

Thus the placing of an initial valuation on equipment when it is entered, generally at acquisition cost, in a fixed asset account does not preclude the necessity of subsequently reexamining the value of the asset on the basis of its economic worth. However, the adaptation of depreciation accounting to reflect roughly the current economic value of an asset rather than merely its unamortized cost, as some contemporary theorists propose doing, poses many problems. The question of the economic value of fixed assets is central to the problem of replacement policy, a subject that is too large and complex to be treated adequately in this report. The present section, therefore, is concerned primarily with current practices in the accounting valuation and revaluation of fixed assets in the US and the USSR.

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* There is serious doubt whether or not the provision of future replacement funds is a legitimate aim of depreciation accounting, inasmuch as it implies the charging of the cost of a future obligation to current operating expenses. It also raises many questions connected with changing price levels and the character of replacement assets.

b. In US Industry 14/

Under existing US tax legislation "the basis for computing the amount deductible on account of depreciation and obsolescence of property is, in general, the cost of such property."* 15/ Most authorities on depreciation accounting in the US are rather well agreed that for purposes of depreciation the proper initial valuation of a purchased asset is the historical cost to the owner. For purposes of tax depreciation, US law permits owners of fixed assets to recover the original cost of an asset and no more.**

Between tax regulations and accounting literature in the US, there is also general agreement on the elements of cost that should properly be included in the original book value assigned to machinery and equipment for purposes of capitalization. Bulletin "F" states that "the costs ... of installation, as well as freight charges ... are capital expenditures to be added to the cost of the property recoverable through depreciation deduction." 18/ The accounting manual of the Machinery and

* Bulletin "F" of the US Internal Revenue Service contains detailed provisions for establishing the book value of assets acquired by means other than purchase (for example, by gift, bequest, exchange, merger, termination of lease, and the like). In some cases the basis for valuing such assets is their fair market value as of the date of acquisition rather than the unamortized cost shown in the account of the previous owner. Bulletin "F" employs the term cost or other basis to cover the acquisition value of all depreciable fixed assets.

** Bulletin "F" reads as follows on this point:

> The proper allowance for exhaustion, wear and tear, including obsolescence, of property used in trade or business is that amount which will, at the end of the useful life of the property in the business, equal the cost or other basis of the property. In no instance may the total amount allowed be in excess of the amount represented by the difference between the cost or other allowable basis and the salvage value which reasonably may be expected to remain at the end of the useful life of the property in the trade or business. 16/

A Report of the Select Committee on Small Business of the United States Senate in 1960 noted that, in spite of other measures to liberalize depreciation in the postwar period, "there has been no change in the total amount of depreciation permitted," which "has been limited to the actual, historical cost of an item ... ." 17/

Allied Products Institute (MAPI) advocates inclusion of the cost of transportation, the cost of original foundations, the cost of installation, "and also the cost of motors, accessories, and attachments, which appertain to and are necessary for the proper functioning of the machine or equipment." 19/

Although there is agreement that the original cost of an asset to the owner is a legitimate expense to be recovered from income* and is therefore the value properly entered in the fixed asset account, problems of valuation insofar as capital recovery and replacement are concerned arise from the fact that the original cost is recovered over a period of time during which factors outside the accounting system may substantially affect the economic value of the asset. A measure of protection against some of these contingencies is provided for under existing regulations for tax depreciation.** In spite of some talk, however, there has been no serious consideration on the part of either the US Government or the business community of revaluing fixed assets at roughly their current economic value for purposes of tax depreciation, partly because of insurmountable practical difficulties connected with equitably establishing the "current economic value" of the assets of all taxpayers and partly because the purpose of such a revaluation, usually a change in the size of annual depreciation allowances, can be achieved more simply by other means, primarily a change in the depreciation rate or the method of writeoff.***

Although changes in the book value of fixed assets made solely to reflect changes in their nominal economic value are rarely made in fixed asset accounts in US industry, changes in book value resulting from "additions, improvements and betterments" are required to be added to the cost or other basis under provisions of Bulletin "F." 21/ Similarly the "cost of all property retired, abandoned, sold, destroyed,

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* If a US firm does not, in a given year, take the full tax depreciation allowable, it cannot apply the allowance, or portion thereof, to another tax year (Sec. 2.1016-3, Internal Revenue Code of 1954).

** Primarily an allowance for "normal obsolescence" and provisions for the taxpayer to revise estimates of useful life in the face of rapidly changing economic conditions (see 3, b, p. 27, below).

*** As an alternative to the use of historical cost, some witnesses at recent Senate hearings on tax depreciation allowances have proposed doing what several other nations have done in the postwar years -- namely, to permit substantial, even multiple, increases in value or depreciation bases of equipment purchased at prewar or preinflation prices. 20/ This idea has not gained popular support or the serious consideration of most US Congressmen and economists currently interested in reform measures for tax depreciation.

or otherwise disposed of" is deducted from the fixed asset account, 22/ so that in practice there may be frequent adjustments other than merely for annual depreciation charges.

Bulletin "F" states that the "cost of incidental repairs which neither materially add to the value of property nor appreciably prolong its life, but merely keep it in an ordinarily efficient operating condition, may be deducted as expense items." 23/ Thus in the US, as in the USSR, routine repair and maintenance costs are not entered in the fixed asset accounts but are charged off to current expenses.

In a different category, however, are "amounts spent in restoring property or in making good the exhaustion thereof, for which an allowance is or has been made, or amounts spent for replacements which arrest deterioration and appreciably prolong the life of the property." 24/ Such expenditures are capital expenditures and should be shown in the capital account. If a new major part is used to replace an old one, for example, the value of the asset should be adjusted to reflect the difference between the cost (including installation) of the new part and the unamortized cost (less scrap value) of the part that is replaced. To simplify accounting procedures, Bulletin "F" stipulates that "it is permissible to charge the cost of rehabilitations or small replacements directly to the depreciation reserve, leaving the capital account undisturbed, provided there has been no material change in price levels and no substantial improvements in the new equipment." 25/

In practice the line between repairs that are properly chargeable to capital account and those that are chargeable to current account is often hard to distinguish. There are indications that in the US costs connected with repairs and partial replacements which properly should be capitalized sometimes are charged to current expenditures. Often the ambiguity of terminology and the lack of clarity in the line of demarcation between capital and current repairs permits the individual enterprise, whether in the US or the USSR, to handle the accounting of such expenditures in the way that is most favorable to it rather than in strict accordance with official regulations.* Although US legislation is unequivocal about the necessity of capitalizing improvements and betterments to assets already entered in the books, the valuation of such changes is often difficult to determine,

* The existence of a large number of ill-defined concepts such as replacement, rehabilitation, restoration, and the like in most regulations governing repair work necessarily contributes to a loose interpretation of such regulations and a certain loss of control by governmental authorities over accounting at the enterprise level.

open to interpretation, or negligible in amount. The result is that no very satisfactory solution has been found to the problem of controlling the valuation and charging of repair work in borderline cases.

In many ways the pragmatic approach to the matter of valuation followed in the US is the byproduct of a market-oriented economy. Although the practice of deciding problems of valuation, often on an individual and ad hoc basis through consultation with the Internal Revenue Service, has sometimes given rise to charges of unequal treatment among the taxpayers, it is difficult to see a way around the problem. Many of the problems of valuation that confront Soviet economists have not assumed critical importance in the US, primarily because it is not necessary to justify the valuation of fixed assets within the framework of a doctrinaire economic theory. The fact that Plant A and Plant B in the US may have identical assets entered in their respective accounts at different valuations because of a price change or some other occurrence is not considered a disturbing fact. And yet a similar situation in the USSR is cause for great concern. Such discrepancies in a Soviet-type planned economy, with its emphasis on uniformity of prices and standardization of accounting, was an important factor leading to the revaluation of all industrial fixed assets at full replacement cost (in 1955 prices) as of 1 January 1960.

c. In Soviet Industry 26/

As in the US the machinery and equipment of Soviet industrial firms are generally "capitalized" at their full original (acquisition) cost. The major part of this cost represents funds transferred by the state, generally through accounts in the state banking system, to the producer (or the transferor, if the equipment is not new); a supply organization; or a construction organization, as the case may be.* The full original cost of fixed assets is entered in the fixed asset account of Soviet firms in current rubles -- that is, in the prices of the year in which the asset was acquired or the construction work was completed and accepted.**

The elements included in the full original cost of Soviet machinery and equipment are generally similar to those included in the cost of fixed assets in the US, although they vary in certain details. The Soviet elements are as follows 27/:

* As in the US the historical cost of given types of machinery and equipment has varied, depending on when and how they were acquired.
** The "mixed" price system is to be discarded in favor of a uniform system of valuation for fixed assets when new amortization rates, currently scheduled for January 1963, go into effect.

(1) The current wholesale price of the asset.* For serially produced machinery and equipment, such prices are contained in official government wholesale price lists. In the case of small-batch and individual production, prices were set, previous to 1957, by the ministry in charge of production; they are now set by the regional economic council (sovnarkhoz) of the region where the equipment is manufactured. When a product is manufactured on contract, the price usually is stipulated in the contract concluded between the producer and the purchaser.

(2) The cost of packing and crating (when not already included in the wholesale or contract price).

(3) Transportation charges (to the extent that they are not included in the wholesale or contract price).**

(4) The cost of foundations for machinery and equipment (except in several industries where the cost of such foundations is included in the value of the building or structure).

(5) The cost of installing, lining, insulating, and enameling (or painting) machinery and equipment.

As in the US, "attachments and fixtures which are essential to [the operation] of machinery and equipment" are included in the original cost of such assets. 28/

For practical purposes, there are now two different systems of valuation in the USSR: one expresses the cost of the asset in the year in which it was acquired (historical cost), and the other expresses what the same asset would cost under contemporary conditions (full replacement cost). Both types of valuation are based on wholesale prices derived from production accounting costs. If a given type of asset is no longer being produced, replacement cost may represent a theoretically based value rather than an actual value. Also, replacement cost may be expressed in current planning prices rather than in actual prices. Both the full cost and the unamortized cost of an asset can be expressed in either system of valuation. When

* In the USSR, capital goods are usually "sold" by the producer to the user (generally both are state-owned enterprises) at enterprise wholesale prices. Sometimes, however, a supply or sales organization may be involved in the transaction, in which case small additional markups result in the goods being sold at industry wholesale prices.
** The wholesale prices of most machinery and equipment are quoted f.o.b. station of shipment in the USSR.

an asset is new, its historical cost and its full replacement cost will be identical if there is no divergence between current planning prices and actual prices. These Soviet concepts of the valuation of fixed assets are basic to an understanding of the recent Soviet revaluation of fixed assets and the role of this revaluation in the current Soviet amortization reform. The concepts are formally identified and described in Appendix B.*

One of the most significant differences between the US and the USSR in the matter of placing an economic value on industrial fixed assets subsequent to their original purchase arises from the absence in the USSR of market values and interest rates as a basis for making decisions regarding replacement and future income opportunities. In a market-oriented economy, such as the US economy, there are essentially two measures of economic value -- market value and value to the owner -- as distinct from accounting values such as original (historical) cost and unamortized cost. It is recognized that the interplay of many factors and forces determines the economic value of an asset. The principal criteria used to establish the economic value of a used asset, however, probably are its saleability and/or its usefulness to the present owner when measured against a real or hypothetical new asset taken as a standard of comparison. Although economic valuations short of an actual transaction are generally made in market economies by professional appraisers or experienced businessmen, it is the aim in the USSR, in the absence of such "subjective" criteria, to establish the current economic worth of an asset through a documented procedure that relies on a production theory of value supported by the statistics of Soviet cost accounting.

Because the monetary value of an object under the Soviet system is held to arise not primarily from the supply and demand situation or even from the usefulness of the object to actual or potential owners but rather from the "social labor" required to produce it, a synthetic system for trying to establish value "objectively" through accounting has been developed. The reasoning is that in a socialist society, where the state mobilizes the factors of production, the value (stoimost') of an article is essentially its production cost (sebestoimost') -- that is, the sum of the cost of the outlays required at a given time to produce such an article. Market situations of supply and demand are held to be eliminated through state planning of production and consumption requirements.**

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* P. 69, below.

** This statement does not imply that scarcities do not exist in the USSR or that they do not affect values outside of the state system (for example, in exchanges of certain consumer goods among private citizens). Theoretically, however, [footnote continued on p. 23]

Theoretically, prices follow production costs in the USSR. For any given item of machinery or equipment, prices are generally uniform throughout the economy. When an article is produced by several firms at differing costs, the differing costs are averaged and the standard price is set on the basis of the average cost. Thus Soviet prices, with some exceptions, are generally held to represent the inherent "social cost" of commodities in the USSR. The state, presumably having within its power the ability to mobilize production resources in a successively more efficient manner over a period of time, has merely to plan, control, record, and compute the outlays of production in order to establish the specific changing value of each article produced.* In the USSR the measure of the current economic value of used equipment is found by taking its full replacement cost (or the cost of a currently produced equivalent) and then adjusting this cost to reflect the degree of wear in such equipment.**

In contrast to the US, the USSR on occasion has revalued some of its amortizable fixed assets*** at their economic value (current replacement cost), the latest and most complete revaluation being that of 1 January 1960. The USSR has had a number of motives for revaluing assets. Most Soviet economists agree that it would be desirable to revalue all fixed assets at their replacement cost every year in order to have them reflect current economic value in a common price system. Such a procedure, it is claimed, would facilitate

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relative scarcity does not affect value within the state system. Nevertheless, under some circumstances the Soviet leadership has sanctioned the use of artificially high values for the scarcer commodities as a means of discouraging their use. Under a theoretically perfect planning system, there would be no critical scarcities, because planned supplies and planned consumption, in physical terms, would be balanced perfectly.

* This description of how Soviet cost accounting operates necessarily ignores the rationale for the valuation of the production resources themselves.

** This description of the Soviet process of valuation and revaluation is oversimplified and ignores many of the very real methodological and economic problems that confront Soviet planners and administrators. For a formal identification and description of the Soviet concepts of valuation and revaluation, see Appendix B, p. 69, below.

*** In addition to the exceptions already noted on p. 15, above, the fixed assets of so-called budgetary organizations -- that is, organizations financed entirely from the state budget -- are not subject to amortization. Such assets represent a relatively small share of the total Soviet fixed assets.

rational economic planning. The economists hasten to point out, however, that an operation of such magnitude is not feasible, and so most fixed assets have continued thus far to be carried at their full original cost in Soviet fixed asset accounts.*

3. Service Life

a. General 29/

Together with the valuation placed on a fixed asset, the estimated service life of an asset is a major factor in determining the size of annual allowances for depreciation. For if the valuation ordinarily determines the amount of capital to be recovered through charges to depreciation, the service life ordinarily defines the period of time over which the total recovery is to be effected. The estimating of the service life** of a fixed asset, like the valuing of it, is subject to problems of both a theoretical and a practical nature.

On the theoretical level the major problem probably is that of making reliable estimates of service lives. This problem centers, in part, on the inadequacy of statistical data available for making such estimates and, in part, on the limited usefulness of statistical averages computed from historical data as guides to life expectancies in the future, especially under conditions of rapid technological change. An unerring estimate of the economically useful life of a fixed asset presupposes knowledge of future developments -- not only knowledge of markets but also of scientific and technological breakthroughs as well as commercial applications of them. Obviously, such foreknowledge is outside the range of human power and imposes definite limitations on trying to establish exactly how long a given asset is going to be economically useful.

* It is believed that the replacement costs (in 1955 planning prices) computed for Soviet fixed assets as of 1 January 1960 have not yet been substituted for full original costs (in mixed prices) in the presently active fixed asset accounts. A transition to the new system of valuation probably will take effect when the new amortization rates are introduced in 1963.

** In discussing the service (or useful) life of a fixed asset, a distinction generally is made between the physical life, which is based largely on the serviceability of the asset itself, and the economic life, which is determined by a combination of factors relating to the economic feasibility of continuing to use the asset. It is possible, of course, for the physical life and the economic life of an asset to coincide. But such a coincidence is more apt to be the exception than the rule in a modern industrial economy in which price dynamics and technological advances tend to accentuate the difference.

In general, therefore, estimation of the probable service lives of given types or classes of equipment usually is based on average figures reflecting the historical experience of individual firms as reflected in their capital accounts and records of retirements. Estimates of service lives statistically derived from experiential data ordinarily will differ from engineering estimates based on the physical properties of the fixed assets in that the former reflect the influence of economic factors at work in the selected historical period.

The data acquired for statistical studies of this sort, however, usually are subject to a number of inconsistencies that reflect differences in the methods and quality of bookkeeping among individual firms surveyed. Even where accounting is highly standardized, as in the USSR, there are often serious inadequacies in records relating to the retirement of fixed assets. The reasons for retiring fixed assets in a market economy are various, ranging from complete decrepitude to obsolescence and inadequacy. Unless the reported historical data on service lives are analyzed to determine the basis of retirement, the resulting statistical average may not be very meaningful and may even be misleading to an individual firm that is trying to establish a realistic estimate of the life expectancy of a particular fixed asset under a particular set of conditions.*

Another factor limiting the validity of estimated average service lives based on empirical data is the difference between the period to which the sample data pertain and the period to which the estimated service life pertains. Differences in operating conditions and in the level of care and maintenance, as well as qualitative improvements introduced in machinery and equipment through continuing research and quality control programs may appreciably prolong the physical life of a new asset as compared with its predecessor. At the same time its useful economic life may well be shorter under conditions of continuously improving technology.

In at least one other respect, estimates of service lives may fall short in providing a reliable guide in the case of particular assets or particular conditions. Because depreciation accounting ordinarily is organized on an annual basis in conformity with business and tax procedures, the life expectancies of fixed assets generally are estimated in terms of years. It is clear that when machinery and

* The problem facing the individual firm in applying an estimated average service life generalized from a large statistical sample in such cases is essentially a problem of statistical averaging. There is always the chance that an average service life computed from group data reflecting the sum of many dispersions may not coincide with the actual service life of a particular asset.

equipment are operated under "abnormal" conditions or on an "abnormal schedule," the life expectancy based on data reflecting "normal" operation and care will have little relevancy.*

The estimating of average useful lives of new types of machinery and equipment for which no historical data are available also presents a problem. Although an estimate of the physical life under normal conditions may be made on the basis of engineering studies and tests, estimates of the useful economic life necessarily must rely largely on historical data pertaining to analogous assets.

With respect to practical accounting problems, the use of estimated average service lives based on historical data usually places a heavy burden on depreciation accounting whenever changes affecting the economic life of an asset occur. Strictly speaking, accounts should be adjusted to reflect such changes in order to recover capital value that otherwise might be lost. Undue reliance on average estimated service lives often prevents firms from undertaking an examination of the economic feasibility of early replacement with more efficient assets. Many fixed assets, both in the US and in the USSR, undoubtedly are used long after the point at which it would be economically feasible to retire them and replace them with new assets. In such cases the producers are incurring an unnecessary production cost, thereby reducing their level of profitability.

Every machine has a limit to its physical life, after which time absolutely no further use can be made of it (except possibly as scrap) -- "It has been aptly said that 'all machinery is on an irresistible march to the junk heap.'" 30/ When this limit is reached, retirement becomes mandatory because the asset has become decrepit and cannot be used in its existing form any longer. Before this limit is reached, however, a piece of machinery or equipment may reach a level of physical deterioration where its operability is impaired but not beyond repair. At such a time it is generally necessary for the firm to decide whether or not the asset is worth repairing or overhauling. If not, the service life of the asset is terminated. If this point in the actual service life happens to coincide with the estimated life,

* A machine that operates two shifts per day under adverse conditions may have only a third of the service life (measured in months and years) of one that operates only one shift a day under more favorable conditions. For some types of equipment, where service life is established by standards based on average hours of operation or average volume of work performed, the standards must be converted into years of anticipated service life on the basis of coefficients relating such standards to calendar years.

the asset is written off the books without any loss, the historical cost of the asset presumably having been recovered through the accrued depreciation charges plus the net salvage value of the asset.

Against the alternative of replacement by a new asset at such a time, however, the cost of repairing the old asset -- and thereby extending its service life -- must be weighed. It is clear that marginal costs, between repair and replacement, are important in making such a decision. Obviously, there is always a point beyond which it is not feasible to extend the physical life of a fixed asset, simply because the cost of repair or restoration is greater than the cost of complete replacement. The point at which extension of the physical life of an asset through repair or restoration is no longer economically feasible marks the maximum limit of the useful economic life of the asset. Thus there may be a wide variation in the length of the service life of similar assets in different firms, depending on the degree to which the accounting practices of a firm can be and are used to make economic calculations with respect to repair versus replacement.

From an economic point of view, the use of estimated average service lives for fixed assets is, at best, an imperfect method of establishing appropriate periods of capital recovery. Unfortunately, there appears to be no ready alternative to the use of such estimates. Thus it will remain necessary to make appropriate adjustments in capital and depreciation accounts as periodic physical examination of fixed assets and economic considerations may warrant. In the case of enterprises having large numbers of different types or classes of assets, physical inspection of them and detailed accounting adjustments may be out of the question. In such cases a sampling procedure may be used to determine what adjustments, if any, should be made.

b. In US Industry 31/

The most authoritative single source of information on the service lives of fixed assets in US industry is Bulletin "F" of the Internal Revenue Service, the major part of which is devoted to "Tables of Useful Lives of Depreciable Property." In 1955, and again in 1959, the tables of lives first issued in January 1942 were reprinted without change but with the following new introductory comments:

> The [Internal Revenue] Service recognizes that some of the schedules of useful lives in this reprint of the 1942 revision of Bulletin "F" are outmoded. In some cases they may be too long, in others too short ... . Although Bulletin "F" is out-of-date, the tables of useful lives are reprinted so that taxpayers may not be left without any guide. 32/

The weighted average life of the industrial equipment listed in Bulletin "F" is 19 years,* a period characterized by many persons as excessively long under present economic conditions.** 34/ It should be noted, however, that taxpayers have not been entirely bound by the lives contained in Bulletin "F":

> Taxpayers are cautioned that the useful lives shown are not mandatory, and were originally published solely as a guide to what might be considered reasonably normal periods of useful life.
>
> Taxpayers may determine reasonable periods of useful life for their depreciable property on the basis of their particular operating conditions, experience, and informed judgment as to technological improvements and economic changes. However, the periods of estimated useful life used by taxpayers are subject to review by the Internal Revenue Service, and taxpayers should be prepared to substantiate the periods so used. 35/

Thus the US industrial firm has an opportunity to use an estimate of service life that is considered more realistic with respect to its particular situation than the official one, provided the firm is willing to substantiate the estimate. This element of choice is in marked contrast with the USSR, where officially established service lives are mandatory for state enterprises. It is impossible to estimate the degree to which firms in the US use the service lives in Bulletin "F" in preference to establishing independent estimates. In

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* Revenue Procedure 62-21 issued by the Internal Revenue Service in July 1962 claims to provide "new guideline lives for machinery and equipment ... which, on the whole, average 30 to 40 percent shorter than those previously suggested for use by taxpayers." The new revenue procedure departs significantly from the approach of Bulletin "F," however, in that it does not seek to establish useful lives for individual items of machinery and equipment but rather average lives for about 75 broad classes of assets. The new procedure states that "the emphasis in this broad class approach is on achieving a reasonable overall result in measuring depreciation rather than a needless and labored item-by-item accuracy." 33/

** A consideration injected in the discussion of service lives in US industry is the economic effect of present lives on the position of US manufacturers in international trade. It is frequently claimed that the shorter lives permitted by the governments of other industrial countries place US industry at a relative disadvantage in meeting foreign competition.

a sense the initiative of individual firms in seeking to develop service lives that are more realistic than the sometimes outmoded official ones is an important method of keeping official thinking abreast of the times, a method that is absent in the USSR. In addition to individual firms, some trade associations in the US, using privately gathered data relating to the service lives of fixed assets, undertake research on depreciation.

Nevertheless, publication of schedules of useful lives in Bulletin "F" undoubtedly has had a great standardizing effect on the periods of capital recovery used by US industrial firms in setting up their depreciation accounts. It is sometimes alleged by private business, especially small business, that the alternative to acceptance of the official lives places too heavy a burden on their accounting departments and legal advisers to be worthwhile.

Of particular interest is the treatment accorded physical wear and obsolescence, respectively, in Bulletin "F." The Foreword states that the bulletin "contains information and statistical data relating to the determination of deductions for depreciation and obsolescence." 36/ It is clear from the context that depreciation is viewed in this passage as applying to loss of value due to wear (as distinct from loss of value due to obsolescence). The Introduction further states that "much of the discussion hereinafter having specific reference to depreciation only is in fact equally applicable to normal obsolescence." 37/ Bulletin "F" defines depreciation, however, as "a reasonable allowance for the exhaustion, wear and tear of property used in the trade or business, including a reasonable allowance for obsolescence." 38/ Subsequent passages in Bulletin "F" make it clear that the estimated average service lives contained therein are based on physical wear plus normal obsolescence. In other words, they reflect the existence of normal obsolescence as an element of depreciation in the historical data used to determine average useful lives.

With respect to obsolescence, Bulletin "F" contains the following definition:

> Obsolescence may be defined as the process of becoming obsolete due to progress of the arts and sciences, changed economic conditions, legislation, or otherwise, which ultimately results in the retirement or other disposition of property. As said by the Supreme Court in United States Cartridge Co. v. United States (1932 ...), 'Obsolescence may arise from changes in the art, shifting of business centers, loss of trade, inadequacy, supersession, prohibitory laws and other things which, apart from physical deterioration, operate to cause plant elements or the plant as a whole to suffer diminution in value.' 39/

The Bulletin draws a distinction between the "two principal forms or types of obsolescence" that the Internal Revenue Service recognizes -- normal obsolescence and extraordinary obsolescence:

> Normal obsolescence is caused by factors which can be anticipated with substantially the same degree of accuracy as other ordinary depreciation factors, such as wear and tear, corrosion or decay. Accordingly, it is included in estimating the normal useful life of depreciable property, the effect of which is to include the allowance for normal obsolescence in the depreciation deduction. 40/

The view of normal depreciation held by the Treasury Department assumes a fairly even and constant incidence of normal obsolescence in the average useful lives estimated for various types of fixed assets even though such obsolescence cannot be isolated and quantified. Thus it is held that the element of normal obsolescence is implicit in the experiential data on the useful lives of fixed assets in the particular period to which the data pertain and that such obsolescence will continue to be present in about the same degree in the future. The position taken by the Treasury Department is a practical solution to an otherwise complex and difficult problem, although the soundness of the assumption may sometimes be open to question. It is not hard to think of a number of types of fixed assets where the rate of "normal obsolescence" in the postwar period is perceptibly higher than in the prewar period, the period on which the average useful lives in Bulletin "F" are based.

The provisions of Bulletin "F" pertaining to extraordinary or special obsolescence apply to individual cases, probably not too common, of relatively sudden and complete obsolescence that cannot be predicted:

> The estimated useful lives shown herein ... do not contain any provision for extraordinary obsolescence, such as is occasioned by revolutionary inventions, abnormal growth or development, radical economic changes, or other unpredictable factors which may force the retirement or other disposition of property prior to the termination of its normal useful life. 41/
>
> Extraordinary or special obsolescence rarely can be predicted prior to its occurrence. However,

this does not necessarily imply that the assets already must have been completely discarded or become useless, but merely that a point has been reached where it can be definitely predicted that its use for its present purposes will be discontinued at a certain future date. Deductions for obsolescence of this type may be taken over the period beginning with the time such obsolescence is apparent and ending with the time the property will become obsolete. In every case the burden of proof is entirely upon the taxpayer to establish a claim for obsolescence by facts and evidence that are definite and indisputable. No amount may be charged off in any year merely because, in the opinion of the taxpayer, property may become obsolete a number of years later. The allowance will be confined to such items or such portion of the property on which obsolescence is definitely shown to be sustained, and cannot be held applicable to an entire property unless all portions thereof are affected by the conditions to which the obsolescence is found to be due. Nor can obsolescence be allowed retrospectively in the light of subsequent events or happenings not anticipated during the period for which the obsolescence is claimed. In no case may the deduction for obsolescence be extended to include shrinkage in value due to other causes, as, for instance, a general drop in the price of commodities. 42/

c. In Soviet Industry 43/

Much less attention has been devoted to the study of the service lives of individual fixed assets in the USSR than in the US. In particular, few statistical studies have been made on the service lives of individual types of equipment in Soviet industry.* In Soviet industrial enterprises the apparent lack of attention to developing and substantiating statistically based average useful lives for individual types

* Recently, there has been an awakened Soviet interest in the service lives of equipment in the US. In 1959 a book on Amortization and the Service Lives of Fixed Capital by the Soviet economist Ya.B. Kvasha was published by the Economics Institute, Academy of Sciences, USSR. Largely theoretical in nature, the book depends heavily on US sources for supporting statistical data, the author acknowledging the lack of Soviet data.

of machinery and equipment probably stems in part from the centralized method of planning service lives and from the almost universal adherence to multiple asset accounts. The use of such accounts has tended to obscure the importance of establishing reliable life estimates for individual assets.*

Another factor tending to discourage research in this area has been the relative absence under a planned economy of independent economic forces affecting the retirement of machinery and equipment. Reliance on periodic capital repairs to keep machinery and equipment in operation for a maximum period of time has tended to prolong the lives of many assets until they were fully depreciated or even longer. Therefore, study of the historical service lives of industrial machinery and equipment would have had little relevance to objective considerations.

Concern expressed over the service lives presently in effect has been connected primarily with the financial losses suffered by the state when individual assets have been prematurely written off at industrial enterprises. A number of writers have urged, in the name of stricter khozraschet (cost accountability) at the enterprise level, that such losses be borne by the individual enterprise rather than directly by the state. In recent years a number of Soviet economists have expressed the view, but without supporting data, that the present service lives established for industrial machinery and equipment in the USSR are much too long, particularly when compared with US service lives.

In spite of the longstanding demands of Soviet economists for a greater differentiation of amortization rates based on the study of the actual service life characteristics of individual types of fixed assets, the average service lives established in 1930 apparently have remained substantially in force down to the present time. Although the basic amortization rates of 1930 are available (see Appendix D**), the estimated average service lives on which these rates presumably were based are not available. Nor can they be inferred from the rates, inasmuch as there is not a simple inverse relationship between Soviet service lives and amortization rates.

* Strictly speaking, of course, multiple asset accounts should be based on groupings of fixed assets that have homogeneous service life characteristics. This grouping presupposes some study of the service life characteristics of the individual assets included in a given group. To the extent that Soviet multiple asset accounts contain machinery and equipment with highly diverse service life characteristics, Soviet group accounting practice does not always meet the basic requirements of sound depreciation accounting.

** P. 79, below.

It is logical to assume that the six categories of equipment differentiated by industry in the schedule of rates published in 1930 reflect, to some degree, differences in the length of the planned service lives of equipment in the respective industries and not merely differences in the number and cost of planned capital repairs.

It is not at all certain that the estimated average service lives on which the six broad categories of basic amortization rates are based have ever been published. One writer has asserted, however, that the "amortization rates established for equipment in 1930 ... were, on the whole, based on a 20-year service life," 44/ a figure not very different from the 19-year average given for industrial equipment in Bulletin "F."

Although the service lives of machinery and equipment were not differentiated by type in the schedule compiled in 1930, they were differentiated on the basis of operating load and daily hours of operation. Consequently, coefficients of operation must have been taken into account when establishing average service lives expressed in years of service. The 20-year service life, cited above as an average for all industrial equipment (with the exception of transportation equipment), probably reflects such an adjustment.* The same source refers to the fact that the service lives of equipment contained in the schedule of 1930 range from 10 to 22 years, suggesting that the average 20-year life planned for industrial equipment as a whole represents a weighted average.

In contrast to the Soviet schedule of 1930 with its table of rates differentiated on the basis of operating load and daily hours of operation, the average service lives shown in Bulletin "F," it will be remembered, are based on "normal operating conditions." 45/ The US firm that is faced with the prospect of other than normal conditions of

* Unknown is the percent of Soviet equipment that is operated on a one-shift basis and the percent that is operated more than one shift per day. Undoubtedly the percentage has fluctuated through the various periods of Soviet economic development. Because of the detailed provisions for computing amortization charges on more than a one-shift basis (compared with the lack of such provisions in the US Bulletin "F"), however, there is reason to believe that multishift operation of equipment has been far more common in the USSR than in the US. In any assessment of future patterns in the two countries, the influence of automation on the economic feasibility of multishift operation in certain industries must be weighed.

operation must establish its own rates and be prepared to support them on the basis of independently derived life estimates.*

Soviet estimates of average service lives are based on a specifically planned number of capital repairs that have the effect of prolonging the useful life of equipment. It is true that the useful lives shown in Bulletin "F" are "predicated on a reasonable expense policy as to the cost of repairs and maintenance." 47/ But US industry, lacking a comprehensive and uniform approach to capital repairs (probably because it is more inclined to replace than repair extensively), almost certainly does not put the same emphasis on planned repair work when estimating average service lives as does Soviet industry.**

There is no clear indication in Soviet publications on amortization as to just how the effects of planned capital repair are calculated when estimating the service life of machinery and equipment. It may be surmised, however, that engineering considerations rather than economic calculations primarily govern the relationship between the planned number and frequency of capital repairs and the estimated length of the service life of equipment. Although it is unquestionably true that capital repair does tend to prolong the useful life of machinery and equipment, it is also true that capital repair has as its primary aim the restoration of equipment as nearly as possible to its original technical performance characteristics in order to maintain productivity within given limits. As the service life of a machine can be extended almost indefinitely through repeated capital repairs (provided replacement parts are available), it is clear that some overall criterion must govern the number of years during which equipment is expected to serve in the USSR.

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* Bulletin "F" contains the following provisions with respect to such occurrences: "It is recognized that the useful life of some depreciable property, or items thereof, may be affected by a radical increase or decrease in plant activity, or diversion in use, extending over a period of time so that depreciation in excess of, or less than, the amounts allowable under normal operating conditions or use may be sustained. Such increase or decrease in depreciation is dependent upon the decrease or increase, respectively, in the normal useful life resulting from the exceptional operating conditions or use." 46/

** In a recent Soviet article entitled "Peculiarities of the Amortization of Fixed Capital in the USA During the Postwar Period," the authors take pains to point out that "outlays for capital repair [in the US] are included directly in the outlays of production (current expenditures) and are not provided for in amortization rates." 48/ This statement points up an important difference in Soviet and US approaches to capital repair when estimating the service life of equipment.

Under past Soviet economic policy the alternative between replacement and repair during the latter years of the service life of a machine has frequently been decided in favor of repair, primarily on the basis of maximizing the over-all industrial capacity of the country rather than on the basis of relative costs. Much of the new machinery and equipment that would have been available for purposes of replacement under a different economic system has been earmarked for new industrial enterprises, and the life of used assets has often been prolonged uneconomically through the labor-intensive and costly method of capital repair.

There is growing interest in the USSR, however, in establishing methods of determining the economic feasibility of replacing machinery and equipment before it has reached the limit of its planned service life. This interest stems in part from an increasing availability of new and more productive equipment for replacement. It also stems from increasing attention to the "qualitative" indexes of production, especially the cost index. In general, where early replacement is a possibility, the decision to replace is based on a consideration of the cost involved in replacing an existing asset with a new asset, the anticipated change in the level of productivity, the increased earnings (savings) to be derived therefrom, and the length of the period of recoupment in terms of the anticipated increase in earnings. Equipment retired from first-line production, if still in working condition, is ordinarily relegated to secondary use in the economy.

Until recently there has been no coordinated attempt to revise the schedule of basic amortization rates of 1930 or the estimated service lives on which presumably it is based. It is evident from information published on the proposed amortization rates for machinery and equipment for 1963,* however, that the planned service lives of such assets are now to be reduced. It is to be hoped that data on these new life estimates, which are based on engineering studies of physical life characteristics under current conditions of use as well as on coefficients computed for obsolescence, will be published by the Soviet authorities.

B. Mechanics of Depreciation and Amortization

1. Principal Methods of Depreciation 49/

The method of depreciation (or, as it is often called, the writeoff procedure) determines the pattern of capital charges during the service life of a fixed asset. The three most widely used methods in the US are the straight line method, the declining balance method,

* See B, 2, c, p. 49, below.

and the sum of the year digits method (see Table 1*). Of the three methods, the straight line method is the only one used in the USSR.

a. Straight Line Method

Straight line depreciation may be used with any type of depreciation account. The greater the number and diversity of assets in any one account, however, the more cumbersome the straight line method becomes. Under this method the cost or other basis of a fixed asset is written off in equal annual installments during the estimated service life of the asset. If the estimated salvage value of an asset is excluded from the sum to be recovered through depreciation, the rate is simply the reciprocal of the estimated service life.

Under existing US tax regulations a firm using the straight line method may revise its depreciation schedule when it becomes demonstrable that the actual service life and/or the actual salvage value will vary from the original estimate. In the revised schedule the remaining value to be recovered is simply prorated over the remaining estimated service life. Under existing US tax legislation, straight line depreciation may be used for all types of fixed assets regardless of their date of acquisition. Until 1954 the straight line method of depreciation was by far the most commonly used method in the US.

The straight line method is the only method of depreciation presently sanctioned in the USSR. As far as is known, there are no provisions under the Soviet system for revising schedules when and if it becomes apparent that actual service lives are going to deviate from life estimates.** Instead, a profit or loss is calculated on retirement of the asset.

The major disadvantage of the straight line method with respect to machinery and equipment is that the book value (unamortized cost) computed under this method rarely corresponds to the remaining use value, exchange value, or replacement value. Some US authorities on depreciation argue that under conditions of rapid technical change, unexpectedly heavy use, or intense inflationary pressures the pattern of capital recovery resulting from straight line depreciation of

* Table 1 follows on p. 37.

** It might be more accurate to refer to the estimated lives of machinery and equipment in Soviet industry as planned lives, inasmuch as economic factors have not been allowed significantly to hasten retirement and the program of capital repair usually has kept machinery and equipment physically operable for the full prescribed period.

Table 1

US: Comparison of Capital Recovery Under the Principal Methods of Depreciation a/

US $

	Straight Line Method b/		Liberalized Methods Authorized by the Internal Revenue Code of 1954			
			Double Rate Declining Balance Method c/		Sum of the Year Digits Method d/	
End of Year	Annual Deduction e/	Cumulative Amount Recovered	Annual Deduction f/	Cumulative Amount Recovered	Annual Deduction g/	Cumulative Amount Recovered
1	10,000	10,000	24,000	24,000	16,667	16,667
2	10,000	20,000	14,400	38,400	13,333	30,000
3	10,000	30,000	8,640	47,040	10,000	40,000
4	10,000	40,000	2,960 h/	50,000	6,667	46,667
5	10,000	50,000	0	50,000	3,333	50,000

a. A hypothetical example, assuming an asset account capitalized at $60,000 with an estimated useful life of 5 years and an estimated salvage value of $10,000.
b. The constant base is computed by subtracting the estimated salvage value from the capital cost ($60,000 minus $10,000 equals $50,000), and the rate is the reciprocal of the estimated service life (1/5 equals 0.20).
c. This rate is twice that allowable under the straight line method (0.20 times 2 equals 0.40).
d. The depreciable base is computed by subtracting the estimated salvage value from the capital cost ($60,000 minus $10,000 equals $50,000). The annual rate is a fraction in which the numerator is the number of years of the estimated useful life remaining (including the current year) and in which the denominator is the sum of the total years of the estimated useful life (1 plus 2 plus 3 plus 4 plus 5 equals 15). Therefore, the rates for this example would be as follows: for the first year, 5/15; for the second year, 4/15; for the third year, 3/15; for the fourth year, 2/15; and for the fifth year, 1/15.
e. The annual deduction is computed by applying the constant rate to the constant base (0.20 times $50,000 equals $10,000).
f. Computed by applying the constant rate to the declining balance. The base is not adjusted for the estimated salvage value but is reduced each year by the amount of the previous annual deduction. Therefore, the balance for this example would be as follows: for the first year, $60,000; for the second year, $36,000; for the third year, $21,600; for the fourth year, $12,960; and for the fifth year, $10,000.
g. Computed by applying the declining rate to the constant base.
h. The asset account cannot be depreciated below the estimated salvage value ($10,000) under the declining balance method. If the useful life of the account is extended and the estimated salvage value is reduced, depreciation continues (but not below the new salvage value) until assets are retired.

machinery and equipment is particularly unrealistic. Furthermore, in the event tnat capital recovery is to be accelerated or decelerated on the basis of changes in the life expectancy of fixed assets, extensive and detailed revision of the depreciation schedule may become necessary. The advantage of simplicity often attributed to the straight line method may be more apparent than real if, for any reason, the life expectancies and rates of a large number of diverse fixed assets are subject to revision.

b. Liberalized Methods

Proponents of realistic depreciation in the US have argued -- and so convincingly that some of their proposals were embodied in the Internal Revenue Code of 1954 -- that a more rapid recovery of capital than occurs under straight line depreciation should be authorized for purposes of tax depreciation. The pattern of capital recovery under the liberalized methods permits a greater percentage of the cost (or other basis) to be recovered in the first half of the service life of an asset than in the second (see Table 1*). The pattern of recovery thereby conforms more closely to the pattern of loss in economic value than is the case under the straight line method. Under the liberalized methods, as much as two-thirds of the original cost of machinery and equipment may be recovered during the first half of the estimated service life.

In permitting the preponderance of capital outlays for machinery and equipment to be recovered more quickly than under the straight line method, the liberalized methods of depreciation afford US industrial firms greater tax relief in the early years of operation and less of a financial loss in the event that unforeseeable economic developments in the later years preclude the possibility of full capital recovery. Compared with straight line depreciation, liberalized depreciation tends to accelerate economic activity by freeing invested capital more quickly. Against this advantage must be weighed the possible short-run loss of tax revenue to the government.

The principal liberalized methods of depreciation officially recognized in the Internal Revenue Code of 1954 are the declining balance method and the sum of the year digits method. It should be emphasized that although these liberalized methods permit a more rapid rate of recovery, they do not reflect a departure from the rules of orthodox depreciation accounting under which the historical cost less the salvage value represents the maximum recoverable sum and the useful life defines the over-all period during which recovery may be effected.

* P. 37, above.

(1) Declining Balance Method

Under the declining balance method of depreciation the annual capital charge to depreciation is greatest in the first year and gradually declines in size each subsequent year during the life of the fixed asset (see Table 1*). Although the annual charges are not uniform, as in the case of straight line depreciation, the depreciation rate is constant. The variation in annual charges is explained by the fact that a constant rate is applied to a declining recoverable base (balance). Thus the recoverable base is reduced each year by the amount of depreciation taken in the preceding year. The balance of unrecovered cost in any year is held to reflect the remaining use value of machinery and equipment more accurately than is the case under straight line depreciation.

It is obvious that to qualify as a more liberal method than the straight line method the constant depreciation rate used under the declining balance method must be higher in view of the constantly declining base on which annual charges are computed.** Actually the rate allowable under the declining balance method is established as a percentage of what the straight line rate would be, given the estimated service life of the asset. Although the declining balance method was recognized as a legitimate method in the 1942 edition of Bulletin "F," the allowable rate was only 1.5 times the corresponding straight line rate. The Internal Revenue Code of 1954 authorized the use of a rate that was twice that of the corresponding straight line rate. This provision has given rise to the designation of the more liberalized method as the "double rate declining balance method."

Under the declining balance method the original cost of an asset theoretically cannot be fully recovered, because the recoverable base never reaches zero. This feature ordinarily is not a practical obstacle, inasmuch as tax regulations provide that the recoverable base may not be reduced below a reasonable salvage value. Thus the original cost of an asset that is not recovered through depreciation is recovered through salvage on its retirement.

A firm that elects to use the declining balance method of depreciation is free at any time to shift over to the straight line method. In this event the unrecovered balance, less the estimated salvage value, is simply depreciated at the rate appropriate to the remaining life expectancy. The declining balance method is not authorized

* P. 37, above.

** It should be noted, however, that the cost recoverable through depreciation under the declining balance method is not reduced by the amount of estimated salvage value as is done in most other methods.

for depreciation of property with a useful life of less than 3 years or for depreciating intangible property such as patents, copyrights, and leases.

(2) Sum of the Year Digits Method

The sum of the year digits method is subject to the same restrictions of use as the declining balance method. As under the declining balance method, the size of depreciation charges (accruals) decreases each year (see Table 1*). The sum of the year digits method resembles the straight line method, however, in that the rate is applied to a constant base -- the original cost less the estimated salvage. It differs from both the straight line method and the declining balance method in that the depreciation rate changes each year in relation to the remaining estimated life of the asset.

In any given year the rate is a fraction in which the numerator is the number of years remaining (including the current year) in the average estimated useful life of an asset (or group of assets), and the denominator is the sum of the number of total years of estimated useful life (see Table 1). In the event that the useful life of an asset is extended, the unrecovered cost (less the estimated salvage) at the time of revising the life estimate becomes the new base, and the new rate is determined from the revised life estimate. As in the declining balance method, a firm is free to shift from the sum of the year digits method to the straight line method at any point in the service life of an asset or group of assets.

A variant of the sum of the year digits method is the so-called "remaining life plan." Under this plan, changing fractions are applied to a base reflecting the unrecovered cost (less salvage) rather than the original cost. Moreover, although the numerator of the fraction is again the remaining years in the estimated life of the asset, as in the conventional sum of the year digits method, the denominator changes each year to correspond to the sum of the numbers of remaining years in the estimated useful life of the asset. When the remaining life plan is used for multiple asset accounts, the remaining useful life of the account must be redetermined each year.

(3) Economic Effects

The economic effects of the decision by the US Treasury Department to permit accelerated depreciation through the use of the declining balance and the sum of the year digits methods is not fully known. At the present time the Treasury Department is

* P. 37, above.

engaged in a study of the depreciation practices of US firms, partly in order to determine the extent to which firms are using the faster depreciation methods authorized by the 1954 law. One of the most persuasive arguments advanced by the proponents of liberalized depreciation to allay official fears of revenue losses was that the more rapid recovery of capital by business firms would permit an upswing in investment activities, thereby creating a broader tax base.

Many methodological problems are involved in trying to measure the correlation between changes in the level of investment activity and liberalized tax depreciation, and in this particular instance it was not made mandatory that the firm commit the additional depreciation claimed or the tax savings realized from such claims to investment. There has been some adverse criticism of liberalized tax depreciation as a "tax gimmick." In support of this charge, critics have cited the opportunity for firms to take a liberalized depreciation allowance in their tax schedules and a less liberal allowance in financial statements prepared to impress public opinion and credit institutions with the profitability of the firm.

2. Amortization Rate and Amortization Charge in Soviet Industry

Inasmuch as the straight line method is the prescribed method of amortization in Soviet industry, Soviet amortization practices have many features in common with the practices of those US firms that employ the straight line method. There are, however, some noteworthy differences between the two systems, and these differences tend to invalidate a comparative approach to quantitative information on rates and annual charges. Differences stem primarily from the Soviet practice of including allowances for planned capital repair* in amortization rates and amortization charges.

Perhaps the most striking point of difference between straight line depreciation in the US and the USSR is the method of calculating the amortization rate. The amortization rate in the USSR is not the reciprocal of the service life as is ordinarily the case under US conditions.** Reflecting the inclusion of allowances for

* Under the Soviet capital repair program the cost of major repair work, including the replacement of major operating parts and components at scheduled intervals in the service life of equipment, is estimated at the time the equipment is acquired.

** It is precisely for this reason that it is incorrect to infer the service lives of Soviet machinery and equipment from published data on over-all amortization rates in industry. Service lives so derived will greatly understate the length of the planned lives. The new standard rates to be introduced in 1963, however, appear to reveal the average planned life for each primary category of equipment on an economy-wide basis (see the first footnote on p. 51, below).

capital repair, it is an adjusted rate.* This point will become clearer as the method of computing the Soviet rate is described.

a. Calculation of Basic Amortization Rates 50/

As the first step in calculating the amortization rate of a single fixed asset, an adjusted amortization sum** (raschetnaya amortizatsionnaya summa) is computed. The full original cost (V) of a piece of machinery, for example, is added to the cost of the capital repair (R) scheduled to be carried out during its useful life. From this sum the estimated terminal salvage value (S), less dismantling costs (D),*** is subtracted. Symbolically the adjusted amortization sum is represented by the following formula: V + R - S + D.

The size of the annual amortization charge (A) is determined by using the formula $\frac{V + R - S + D}{t}$, where t represents the estimated service life of the asset. Substituting hypothetical values, we find that in the case of a machine whose cost (V) is 20,000 rubles, whose capital repair (R) is estimated at 10,000 rubles, whose salvage value (S) is estimated at 3,500 rubles, less dismantling costs (D) of 500 rubles, and whose useful life (t) is estimated at 15 years, the formula reads as follows:

$$A = \frac{V + R - S + D}{t} = \frac{20,000 + 10,000 - 3,500 + 500}{15} = \frac{27,000}{15} = 1,800 \text{ rubles}$$

Thus the size of the annual amortization charge (A) is computed on the basis of the adjusted amortization sum (the total recoverable cost) and not simply on the basis of the full original cost at which the asset is capitalized.

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* To be the reciprocal of the service life, the amortization rate must be an unadjusted rate (see the footnote on p. 43, below).

** Sometimes referred to simply as the amortization sum. This sum represents the total value to be recovered through amortization during the life of an asset. In this sense it is a concept that is comparable with adjusted (depreciable) basis in US depreciation accounting. In the USSR, however, the adjusted amortization sum is greater than the original cost of the asset, whereas the adjusted basis in the US is usually less than the original cost. As a result, adjusted rates are generally lower than unadjusted rates in the US. In the USSR the opposite would be true if both adjusted and unadjusted rates were used.

*** Salvage value less the dismantling cost is commonly referred to as net salvage value.

The amortization rate (r) is then derived by expressing the annual amortization charge (A) as a percentage of the full original cost (V) of the asset -- thus $r = \frac{A}{V} \times 100$ percent.

Substituting the hypothetical values from the example above,

$$r = \frac{1,800}{20,000} \times 100 \text{ percent} = 9 \text{ percent}$$

It should be noted that the amortization rate is derived by relating the annual amortization charge not to the adjusted amortization sum but to the full original cost of the asset. If the adjusted amortization sum were used to determine the rate, the rate would be only 6 2/3 percent (the reciprocal of the estimated 15 year service life). To derive the amortization rate directly, the following formula may be substituted for the two steps shown above:

$$r = \frac{V + R - S + D}{t \times V} \times 100 \text{ percent}$$

It is clear that an amortization rate calculated in this manner is significantly higher than if the cost of capital repair were not included in the sum to be recovered through amortization and only the original cost of the asset less net salvage (V - S + D) were used to compute the adjusted amortization sum.

$$r = \frac{V - S + D}{t \times V} \times 100 \text{ percent} = \frac{20,000 - 3,500 + 500}{15 \times 20,000} \times 100 \text{ percent} =$$

$$\frac{17,000}{300,000} \times 100 \text{ percent} = 5.7 \text{ percent}^*$$

Thus, in effect, the charging of capital repair to amortization raises the amortization rate. At the same time, capital repair tends to

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* This rate, like the 9-percent rate, is an adjusted rate that would necessarily be applied to the full original cost of 20,000 rubles in computing annual amortization charges. An unadjusted rate of 6 2/3 percent (the reciprocal of the 15-year service life) would be in order if the annual charge were computed on a base of full original cost less net salvage (17,000 rubles).

prolong the service life of machinery and equipment, thereby offsetting, to some extent, the higher recoverable sum.*

From the preceding discussion it may be concluded that Soviet amortization rates are somewhat overstated relative to comparable US depreciation rates by the inclusion of a charge for capital repair. The effect of charges for capital repair has been partly offset, however, by the absence of an allowance for normal obsolescence in the Soviet rate.** Because of these differences in the structure of rates, comparisons of Soviet amortization rates and US depreciation rates are not entirely meaningful.

After calculating basic rates for individual fixed assets, an average basic rate may be computed for a group of assets. The basic rates contained in the schedule of 1930 (see Appendix D***), for example, are average basic rates. The new rates scheduled to be introduced in 1963 also will be average basic rates but, in distinction to the rates of 1930, are designated as standard amortization rates (yedinyye normy amortizatsii).†

b. Use of Composite Rates 51/

(1) Composite Rates for Industries

Aside from differences in the method of computing basic rates in US and Soviet industry, there is another major barrier to making comparisons. The problem here turns on the fact that there are scarcely any data available on official basic rates in Soviet industry for individual types of machinery and equipment. The practice in the USSR has been to establish average basic rates for broad groups of equipment, primarily for use in calculating composite (weighted average) rates that include all fixed assets (buildings, structures, and equipment) for each industry.

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* If the service life of the asset were reduced from 15 to 10 years because capital repair was entirely eliminated, then the adjusted rate would be 8.5 percent ($\frac{17,000}{200,000}$ times 100 percent equals 8.5 percent), and the unadjusted rate would be 10 percent. Prolongation of service lives, however, is not the sole economic function of the capital repair program, so that the chance of its elimination appears remote at the present time.

** This situation will be changed with the introduction of a new schedule of amortization rates in 1963.

*** P. 79, below.

† For a discussion of this apparent major difference between the average basic rates of 1930 and those of 1963, see c, p. 49, below.

The composite amortization rate established for each individual industry is designed primarily to facilitate planning. It provides a useful tool for the central planners in determining the budgetary revenues from amortization that will be available for capital investment and capital repair.* Aggregative data on charges to amortization at industrial enterprises also are needed by the planners to plan the cost of industrial output** and the prices based thereon.

Composite rates, being weighted average rates, reflect the composition of the various types of productive fixed assets found within the respective industries.*** Theoretically, composite rates should be recomputed each year to reflect changes that occur from year to year in the composition and use pattern of the fixed assets in each industry. Actually, there have been only three revisions of composite rates in the USSR since 1938 -- in 1950, 1952, and 1956 52/ (see Table 2†). Within the composite rate for industry as a whole, the value weight of the equipment component (exclusive of some equipment buried in the category of transmission facilities of fixed assets) was slightly above 40 percent during 1951-56 (see Table 7††). At the same time, there was a relatively high uniformity in the over-all composite amortization rates of most Soviet industries during 1950-56. A decline in the 1960 value weight of the equipment component from 40.1 percent to 37.3 percent occurred as a result of the revaluation of fixed assets at current replacement cost on 1 January of that year.†††

* Amortization charges for industry as a whole, for individual industries, or for individual enterprises may be computed simply by applying the appropriate composite rate to the aggregate value of the respective productive fixed assets. Depending on the requirements of the planners, over-all amortization deductions, amortization deductions for capital investment, or amortization deductions for capital repair may be computed with equal facility using composite rates. See (3), p. 48, below.

** Amortization as an element of cost in production of industrial output is discussed in III, C, p. 63, below.

*** Composite rates for individual industries and for industry as a whole are derived by multiplying the aggregate value (based on full original cost) of each major category of fixed asset by the appropriate basic rate established for that category in the schedule of 1930. The sum of the results is then divided by the total value of fixed assets in the respective industry to obtain the composite (weighted average) rate for that industry. For statistical data on value weights used to compute composite rates in Soviet industry, see Appendix C, p. 73, below.

† Table 2 follows on p. 46.

†† Appendix C, p. 76, below.

††† The effect of the revaluation on the value weights of machinery and equipment is shown in Table 8, Appendix C, p. 77, below. (Text continued on p. 48.)

Table 2

USSR: Comparison of Composite Amortization Rates in Industry a/
1938, 1950, 1952, and 1956

Percent of Full Original Cost of Fixed Assets

Industry	1938			1950			1952			1956		
		Subrate			Subrate			Subrate			Subrate	
	Over-All Rate	Capital Investment	Capital Repair	Over-All Rate	Capital Investment	Capital Repair	Over-All Rate	Capital Investment	Capital Repair	Over-All Rate	Capital Investment	Capital Repair
Total industry	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	5.3	2.7	2.6
Food												
Food	6.0	3.2	2.8	6.3	2.0	4.3	6.3	2.2	4.1	6.8	3.1	3.7
Fish	6.0	3.2	2.8	6.5	0.5	6.0	6.5	0.7	5.8	6.5	0.9	5.6
Meat and dairy	6.0	3.2	2.8	5.0	1.5	3.5	5.0	1.5	3.5	5.6	1.9	3.7
Heavy												
Chemical	5.6	3.2	2.4	4.5	1.1	3.4	4.5	1.6	2.9	4.6	2.2	2.4
Coal	5.6	3.2	2.4	4.2	0.9	3.3	4.2	1.1	3.1	4.3	1.7	2.6
Construction materials	5.6	3.2	2.4	5.5	0.7	4.8	5.5	1.3	4.2	5.2	2.6	2.6
Construction of heavy industry enterprises	5.6	3.2	2.4	5.8	1.4	4.4	5.8	2.3	3.5	N.A.	N.A.	N.A.
Electric power stations	5.6	3.2	2.4	5.3	1.5	3.8	5.3	2.1	3.2	4.5	2.3	2.2
Electrotechnical	5.6	3.2	2.4	4.5	2.2	2.3	4.5	2.5	2.0	4.5	2.7	1.8
Ferrous metallurgy	5.6	3.2	2.4	4.8	1.8	3.0	4.8	2.2	2.6	4.7	2.6	2.1
Petroleum	5.6	3.2	2.4	6.5	2.8	3.7	6.5	3.3	3.2	5.6	3.6	2.0
Light	5.5	1.9	3.6	6.5	0.7	5.8	6.5	1.1	5.4	6.6	2.3	4.3
Machine building												
Agricultural machine building	5.5	3.3	2.2	5.6	2.0	3.6	5.6	2.3	3.3	5.6	3.6	2.0
Communications equipment	5.5	3.3	2.2	4.4	1.9	2.5	4.4	2.1	2.3	4.4	2.9	1.5
Construction and road machine building	5.5	3.3	2.2	4.6	2.1	2.5	4.6	2.3	2.3	4.6	2.7	1.9

a. 53/

Table 2
(Continued)

Percent of Full Original Cost of Fixed Assets

Industry	1938			1950			1952			1956		
		Subrate			Subrate			Subrate			Subrate	
	Over-All Rate	Capital Investment	Capital Repair	Over-All Rate	Capital Investment	Capital Repair	Over-All Rate	Capital Investment	Capital Repair	Over-All Rate	Capital Investment	Capital Repair
Machine building (Continued)												
General machine building	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	5.7	2.8	2.9
Heavy machine building	5.5	3.3	2.2	5.5	3.0	2.5	5.5	3.4	2.1	5.6	3.6	2.0
Machine and instrument building	5.5	3.3	2.2	5.5	2.0	3.5	5.5	2.5	3.0	5.6	2.9	2.7
Machine tool building	5.5	3.3	2.2	5.6	3.2	2.4	5.6	3.5	2.1	5.7	3.7	2.0
Motor vehicle and tractor	5.5	3.3	2.2	5.5	3.0	2.5	5.5	3.2	2.3	5.6	3.6	2.0
Transport machine building	5.5	3.3	2.2	4.8	1.8	3.0	4.8	2.1	2.7	4.8	2.4	2.4
Timber and paper												
Paper	6.0	3.0	3.0	4.7	1.7	3.0	4.7	1.7	3.0	5.0	2.3	2.7
Timber	6.0	3.0	3.0	4.7	1.7	3.0	4.7	0.2	4.5	5.0	0.5	4.5
Transportation												
Maritime fleet	N.A.	N.A.	N.A.	7.0	0	7.0	7.0	1.0	6.0	N.A.	N.A.	4.6
River fleet	N.A.	N.A.	N.A.	4.0	0	4.0	4.0	0.1	3.9	N.A.	N.A.	2.8
Railroads	N.A.	N.A.	N.A.	6.5	0	6.5	6.5	0.5	6.0	N.A.	N.A.	5.2

(2) Composite Rates for Enterprises

A common complaint of Soviet economists has been that the individual industrial enterprises have calculated annual amortization charges by applying the composite rate established for their respective industries to the value of the fixed assets of the enterprise instead of computing separate composite rates.* This practice tends to distort the charge to amortization in the cost of output at the individual enterprise.**

As an alternative to using a composite rate, of course, a Soviet enterprise might apply basic amortization rates directly to the respective groups of assets for which such rates are established. Such a procedure requires only that similar types of assets be grouped together in multiple asset accounts and that the basic rate applicable to that group be used to compute amortization charges. The advantage of this method would be that it would avoid the necessity of periodically recomputing the composite rate and probably would allocate amortization charges more accurately among the cost accounts of the various articles produced by the enterprise.

(3) Division of Over-All Composite Rates into Subrates for Capital Investment and Capital Repair

The composite rates shown in Table 2*** are subdivided into a rate for capital investment and a rate for capital repair. Amortization charges for capital repair were incorporated when the basic amortization rates of 1930 were computed. It was not until the establishment of composite rates in 1938, however, that the practice of formally delineating separate rates for capital investment and capital repair was adopted. These subrates for capital investment and capital repair are also composite rates. In spite of the rather uniform over-all composite rates during the 1950's, the composite rates for capital investment and capital repair fluctuated markedly in most industries. The availability of composite rates for capital investment in various Soviet industries would appear to invite comparisons with US composite depreciation rates, where available, for corresponding industries. Unfortunately it is not usually possible to isolate the equipment component in such composite rates.

The problem of determining the division of over-all composite rates between capital investment and capital repair apparently continues to be a troublesome one for the Soviet planners. The exact

* See d, p. 51, below.
** See d, p. 51, and III, C, p. 63, below.
*** P. 46, above.

rationale behind the three revisions since 1938 is not known, but the rates for capital repair in 1950 were greatly increased at the expense of the rates for capital investment (see Table 2*).**

Some Soviet economists have claimed that the capital repair rates were revised to reflect changes in the estimated cost of capital repair and that the rates for capital investment were then established as the difference between the capital repair rate and the overall rate. If true, this policy reflects a strange bias in Soviet economic planning. Ostensibly it indicates a policy that favors the use of amortization deductions for capital repair in preference to using them for replacement (capital investment). Although the trend in most industries has been for the capital repair rate to decline slightly since 1950 relative to the capital investment rate, the new standard amortization rates proposed for 1963 do not indicate a continuation of this trend, particularly in the case of machinery and equipment.

c. New Standard Rates 54/

It would be premature to try to pass final judgment on the new Soviet amortization rates proposed for 1963, considering the preliminary and limited nature of the data available. These data, however, seem to indicate that the new rates will be considerably higher than existing rates. They also indicate that, compared with the procedure in 1930, a different approach has been taken in the establishment of average basic rates.

The new rates shown in the tabulation that follows*** are standard rates established for the primary categories (types) of fixed assets contained in the 1959 classification of fixed assets and used in the revaluation of 1 January 1960. These rates presumably have been derived by averaging all basic rates calculated for individual types and subgroups of fixed assets within each primary classification category. Unlike the other (1930) rates for equipment shown in this report, these standard rates apparently are applicable to all sectors of the economy regardless of conditions of use. In this respect the rates for equipment are not strictly comparable with the 1930 rates for equipment.†

* P. 46, above.

** The relationship between the rate for investment and the rate for repair in any given industry is a fair reflection of state policy toward that industry with respect to replacement of plant and equipment. Indirectly, of course, this relationship reflects state policy with respect to the allocation of resources in its industrial production and construction programs.

*** P. 50, below.

† The 1930 schedule established average basic rates for equipment according to groups of industries and intensity of use but not according to major types of equipment (see Appendix D, p. 79, below).

Primary Categories of Fixed Assets	Percent of Full Replacement Cost		
	Over-All Rate	Subrate	
		Capital Investment	Capital Repair
Buildings	3.1	1.4	1.7
Structures and transmission facilities	4.6	1.6	3.0
Power machinery and equipment	9.9	4.6	5.3
Production machinery and equipment	13.3	6.5	6.8
Transportation equipment	8.8	3.3	5.5
Measuring and regulating devices	9.1	6.6	2.5
Tooling	18.6	13.9	4.7
Office and building equipment	12.7	7.5	5.2

The use of standard rates conforming to the classification of fixed assets in the accounts of state organizations should facilitate the centralized planning and accounting of amortization deductions. Although they readily lend themselves to the formulation of composite rates for industries and enterprises, standard rates of this type, if used in accounting at the enterprise level, would tend to distort the accounting cost calculated for individual products.

One of the most striking features of the new rates is the preponderant share of the subrates for capital repair in the over-all rates for buildings, structures and transmission facilities, and the three categories of equipment. Under the 1960 revaluation these categories account for 96.4 percent of the fixed assets revalued in the entire economy and 97.6 percent of those revalued in Soviet industry. Only in the case of measuring and regulating devices, tooling, and office and building equipment -- often items of shorter life -- is the rate for capital investment higher.

The new average rates for machinery and equipment reflect a significant increase above the rates shown in the 1930 schedule. In individual cases the new basic rates from which the average is derived probably are double or more the corresponding 1930 rates. The rise in rates apparently reflects a planned increase in the intensity of use (level of operating capacity and number of shifts) as well as an allowance for obsolescence.* The upward adjustment in the amortization rate for capital investment is said to be due to a reduction

* To the extent that the service life of an asset is shortened by more intensive use, the period of obsolescence also will be lessened.

in the length of the planned service life of equipment.* The upward adjustment in the amortization rate for capital repair is said to reflect the inclusion of allocations for modernization in cases where it is combined with capital repair as well as for some categories of repair work that formerly were treated as current repair. It is also possible that more intensive use may cause charges for capital repair to rise.

d. Amortization Charge 55/

The annual amortization charge, or the amortization deduction (amortizatsionnoye otchisleniye) as it is more commonly called in Soviet economic publications, ordinarily is determined at the enterprise level simply by multiplying the full original cost of the fixed assets of the enterprise by a composite rate. The most appropriate composite rate at this level, as noted above, would be an enterprise composite rate that reflected the composition of the fixed assets of the particular enterprise.** Theoretically this rate should change annually in accordance with changes in the composition and use pattern of the fixed assets of the enterprise in order to ensure the correct over-all capital charge.*** That such a procedure is more often the exception than the rule is amply indicated in Soviet self-criticism, which frequently alleges that industrial enterprises are given to using the composite rate established for their particular industry.

* Under the new standard rate system it may be possible to infer the average service lives for the major categories of machinery and equipment with respect to the economy as a whole. Assuming an inverse relationship between the standard rate for capital investment and the average life in each category, the following approximate average service lives may be inferred: power machinery and equipment, 22 years; production machinery and equipment, 15 years; transportation equipment, 30 years. The relatively higher subrates for capital repair in each category indicate that, on the average, the funds spent for capital repair during the service life of machinery and equipment are to exceed the original cost of such assets.

** The method of computing composite rates is explained in the third footnote on p. 45, above.

*** Changes in composite rates also would reflect any changes that might occur in basic rates resulting from a redetermination of service lives and capital repair costs. There have been no significant changes in Soviet basic rates since 1930, although new basic rates are now scheduled to be introduced at the beginning of 1963 (see c, p. 49, above).

If this latter practice were followed universally at all enterprises of an industry, receipt of the total amortization deductions which had been centrally planned would not be affected. Such a practice, however, probably would introduce significant distortions in the cost program of the individual enterprise, inasmuch as the rate relative to the theoretically correct composite rate for the enterprise would be either overstated or understated. In turn, amortization charges as an element in the cost of production would be either overstated or understated.* For this reason, Soviet theory opposes the use of the industry composite rate for purposes of calculating amortization deductions at the enterprise level.

On the other hand, if each enterprise were to use the composite rate appropriate to its own fixed asset accounts, the sum total of amortization deductions made at all enterprises would still be equal to the centrally planned total for the industry as a whole and at the same time would be the theoretically correct amount chargeable to amortization as a cost of production. As a matter of practice, some industrial enterprises apparently use the composite rate established for their industry, while others compute their own composite rates. As a result, there may well be an excess of amortization deductions in some industries and a shortfall in others relative to the planned total.

As far as the "theoretically correct" charge for amortization is concerned, it should be pointed out that amortization charges are correct only to the extent that the valuation and the rate are correct. Belated Soviet recognition that economic losses result from continued operation of obsolescent equipment has led to a branding of present amortization charges as incorrect and to the preparation of new rates. The problem of determining the "correct" allowance for obsolescence, however, is an extremely difficult one to solve, especially in a planned economy such as that of the USSR, in which there has been no previous experience. It may be anticipated that there will continue to be considerable discussion of the "correctness" of amortization charges even after the proposed new rate schedule is introduced.**

The disposition of amortization charges in the USSR provides an interesting contrast with US practice. In the US the amount of depreciation charged and the disposition of the depreciation accruals is largely a matter of intrafirm policy. The amount of accruals in any

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* For additional comments on amortization as an element of cost in the Soviet industrial production program, see III, C, p. 63, below.
** Soviet pricing policy with respect to producer durables and the effect of this policy on the correctness of capital (amortization) charges also is examined in III, C, p. 63, below.

one year may or may not be the same as the depreciation allowances claimed for that year in tax returns. Under the rules of orthodox depreciation accounting as widely practiced in US industry, the private firm is not obligated to commit its depreciation accruals for any one preestablished purpose, be it replacement, repair, new investment, retirement of indebtedness, or whatever. Depreciation accruals represent the recovery of a historical prepaid cost of operation that may be used as the firm determines. The government has no jurisdiction over the depreciation accruals of US industry,* although it can exert some influence through its fiscal policies on the use and disposition of such accruals.**

In the USSR the individual industrial enterprise has very little voice in the matter of amortization policy or amortization practice. The state, as the owner of industrial fixed assets, has full authority for the amount of amortization charged annually and for the disposition of the deductions. In the USSR the amortization deductions of all state industrial enterprises are earmarked for and committed to either one of two purposes: capital investment or capital repair. The allocation between these two funds presumably is determined, within limits, by the exigencies of economic planning and is regulated by changes in the subrates for capital investment and capital repair within the over-all amortization rate.

Amortization deductions for capital investment are deposited in the Construction Bank (Stroybank)*** and are not accessible to the contributing enterprises. Rather, they are at the disposal of the central government for financing its capital construction program, an integral part of the national economic plan that is drawn up by the State Planning Committee (Gosplan) and ratified by the Council of Ministers, USSR. These funds may be redistributed among industries as the plan requires. For this reason it is said sometimes that amortization deductions designated for capital investment represent a form of tax on fixed capital. Such funds may be used either for the replacement in kind of fixed assets that have been completely retired (simple reproduction) or for net additions to existing stocks of fixed assets (expanded reproduction).

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* The regulated public utilities are a different matter, of course, but it is beyond the scope of this report to go into the subject. Meanwhile, Revenue Procedure 62-21 issued by the US Internal Revenue Service in July 1962 does tend to limit the taxpayer more to capital replacement in the use of his depreciation accruals.

** More realistic than the use of depreciation allowances to stimulate internally generated investment by private industry is the recently proposed tax credit plan. Under this plan, private firms are committed to invest all the funds for which they receive tax credits.

*** Formerly the Industrial Bank (Prombank).

Industrial enterprises deposit amortization deductions for capital repair in special accounts established in their names in regional branches of the State Bank (Gosbank). The depositing enterprises are expected to draw on these accounts in accordance with the centrally planned capital repair program. In fact, it is incumbent on the Gosbank, as an arm of the central government, to see that enterprise directors use the capital repair funds in their accounts to carry out planned capital repairs on schedule.* Capital repair is referred to in Soviet publications as partial replacement of fixed capital as opposed to full replacement accomplished through capital investment.

* A limited redistribution of capital repair funds among industrial enterprises within a region may be authorized under certain conditions on the initiative of the regional economic council (sovnarkhoz).

III. Importance of Amortization in the USSR

A. As a Source of Financing Capital Investment 56/

In the USSR, all amortization funds are allocated either to capital investment or to capital repair. Nevertheless, when analyzing the availability and disposition of funds from amortization deductions, it is still sometimes useful and meaningful to consider over-all amortization deductions as an entity, viewing the two components as somewhat arbitrary and variable quantities within the given sum total. Furthermore, amortization deductions for capital repair could be an important source of financing additional capital investment in full replacement, should the Soviet planners choose to deemphasize the capital repair program.

For the immediate purposes of this report the term amortization deductions for capital investment has been used in the restrictive sense -- that is, to refer to those deductions that are deposited by state enterprises in the Stroybank and are available to the central government for financing its capital construction program.* What is the relative importance of these amortization deductions in capital investment? And what is their role in such investment?

A recent Soviet source states that "at present, one-sixth of the total state capital investments is covered from amortization." The following tabulation shows amortization deductions as a percent of the centralized (planned) financing of capital investments in the Soviet economy and in Soviet industry during 1956-60**:

Year	Economy	Industry (Including Construction)
1956	14.4	18.1
1957	13.9	16.5
1958	13.6	15.9
1959	13.9	16.5
1960	13.8	18.0
Arithmetic average	13.9	17.0

* In Soviet economic publications, amortization deductions earmarked for capital investment are often referred to as "amortization deductions for capital construction" rather than "amortization deductions for capital investment." Although the terms capital investment and capital construction are often used interchangeably in the USSR, they are not always synonymous.

** Percentages shown in the tabulation were derived from data contained in Table 3, which follows on p. 56.

Table 3

USSR: Amortization Deductions as a Source of Financing Centralized Capital Investment in the Economy and in Industry a/ 1956-60

Billion Current Rubles

Year	Centralized Financing of Capital Investments		Amortization Deductions for Financing Capital Investments	
	Economy	Industry b/	Economy	Industry b/
1956	16.08	10.44	2.31	1.89
1957	17.88	11.12	2.49	1.83
1958	20.38	12.99	2.77	2.06
1959	23.31	13.55	3.25	2.23
1960	26.24	15.00	3.61	2.70

a. Plan data. 57/
b. Including the construction industry.

A figure of one-seventh more appropriately expresses the ratio of amortization deductions to the centralized financing of capital investments in the economy as a whole.

It is not surprising that the share of amortization deductions in capital investments for the economy as a whole tends to be more constant than the share for industry alone, inasmuch as the emphasis in allocations among the individual sectors of the economy changes from year to year. It is logical, however, that a greater part of the capital investments for Soviet industry should be financed from amortization deductions, inasmuch as industry has proportionally fewer nonproductive (and therefore nonamortizable) fixed assets than the other sectors of the economy.* Because amortization deductions are computed using composite rates, it is not possible to calculate the share of such deductions that is derived from the amortization of machinery and equipment.

The amortization deductions that Soviet industry deposits with the Stroybank return to Soviet industry in the form of investment,

* If industry were excluded from consideration, only about 9 percent of the financing of capital investments in the remainder of the economy would be obtained from amortization deductions.

even though some of the investment funds may be redistributed among and within individual industries. Apparently, there is a wide variation from industry to industry in the percentage of capital investments financed from amortization deductions, as evidenced by the following data for 1955 58/:

Industry	Percent
Coal	10.0
Petroleum	27.9
Machine tool building	22.6
Light	15.8
Food	21.9

It is reasonable to assume that these percentages change from year to year as the proportions between amortization deductions and allocations of capital investments in each industry change.

It is sometimes thought that amortization deductions for capital investment represent the share of capital investments used for replacement* and, as such, indicate the scope of the Soviet replacement program. If amortization deductions for capital investment in the USSR are regarded as the repayment of a prepaid cost of operation, then it is clear that use of the deductions need not necessarily be limited to replacement.** Soviet economists have long acknowledged that amortization deductions for capital investment are used both for the replacement of fixed assets that are being retired and for net additions to existing stocks of fixed assets.

* A distinction is drawn in Soviet economic theory between the "full replacement" (polnoye vozmeshcheniye) of fixed assets, such as normally occurs when they are retired from service, and "partial replacement" (chastichnoye vozmeshcheniye), which occurs during capital repair. In this report the term replacement is used to denote "full replacement," any variation therefrom being appropriately qualified.

** It is significant, of course, that the use of these deductions is determined by the central government in accordance with the over-all national considerations and not by the enterprise. This procedure reflects the fact that it is the state that finances and owns the industrial fixed assets. The industrial enterprise in the USSR is entrusted with these state-owned assets merely for the purpose of operating them in accordance with a planned production program. Even fixed assets acquired by industrial enterprises through decentralized capital investment (from retained enterprise profits or through bank loans) are considered state property and are amortized in the same manner as fixed assets acquired through centralized capital investment.

Starting with the premise that the primary use of amortization deductions is properly the replacement in kind of fixed assets that must be retired, Soviet economists explain the use of deductions for financing net additions in terms of the theory of the declining investment cost of replacement.* The argument runs that the cost of producing an article declines with repetition of the production process under conditions of controlled prices. Assuming that the acquisition cost (price) of a given machine follows the production cost downward over a period of time and assuming further that the original cost of one such machine, which has been in use during this period has been fully recovered through amortization, there exists in the amortization reserve a greater sum than is needed to replace the old machine with an identical new machine.** This being the case, some amortization funds are available for net investment. These funds may be used to acquire additional fixed assets or to replace old assets with better and more productive new assets (possibly having a higher social cost). Such a position presupposes that the theory of the declining social cost of production under socialism rests on a sound basis in fact, a theory that clearly was not substantiated in much of Soviet industry before the wholesale price reform of 1949.***

Probably a more valid explanation of the availability of amortization deductions as a source of financing net additions to stocks of fixed capital is to be found in the over-all rate of growth of Soviet capital investments and in the nature of the Soviet capital repair program. When the annual growth of capital investment

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* The Russian term used to indicate replacement in kind through amortization is "simple reproduction" (prostoye vosproizvodstvo), and the term used to indicate net additions financed from amortization is "expanded reproduction" (rasshirennoye vosproizvodstvo).

** Rarely in a modern industrial economy will a machine that has served out its normal life expectancy be replaced with an identical new machine. The social cost involved in the development and manufacture of machines with improved performance characteristics is a factor that tends to raise replacement costs, sometimes possibly even to a level above the original cost of the old machine. From the point of view of the user, however, a replacement cost that is the same as or even higher than the cost of the asset being retired may be worth incurring, if it is more than offset by lower operating costs and higher productivity.

*** The theory of the declining social cost of production involves many complex questions that are beyond the scope of this report. Furthermore, under a Soviet-type economy there is always the plaguing question of whether the accounting costs which Soviet leaders cite to buttress their claims of the increasing efficiency of the socialist system of production reflect real costs.

remains as high as it has been in recent years, the percentage of young fixed assets in the economy tends to be maintained over the years. In such a situation, and assuming that the replacement rates do not change in response to changing relative costs in the economy, annual receipts of amortization deductions tend to exceed the replacement requirements arising from the retirement of wornout fixed assets. Partly because there has been this maintenance of a relatively large share of young fixed assets in the Soviet economy and partly because the service life of old assets has been prolonged through the capital repair program, the replacement requirements on centralized capital investment funds have been kept low.* The postponement of the replacement of older fixed assets through capital repair may properly be considered an investment cost even though it does not show up in data on state capital investments.**

Actually the question of the allocation of amortization deductions for capital investment as between replacement and net additions probably is an academic one. Amortization deductions presumably are consolidated with the balance of funds available for capital investment. Total available funds are allocated according to the requirements of the economy as determined by the central planners (primarily Gosplan). Even if the amount of funds allocated for replacement should fortuitously correspond to receipts of amortization deductions for capital investment, it should be remembered that centralized capital investment is not the only source of financing replacement. Some replacement is financed from decentralized capital investment.

Unfortunately there are no quantitative data published in the USSR to indicate the amount of replacement financed from decentralized capital investment. But were such data available, it still would not be justifiable to equate amortization deductions earmarked for capital investment with replacement financed from centralized capital investments and, at the same time, equate the balance of the replacement program with decentralized investment. Centralized capital investment in any given year may contain allocations for the replacement of fixed assets that are either greater or less than the funds available from amortization deductions for capital investment.

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* The demand on centralized capital investments with respect to funds for replacement is reduced further by the fact that a significant amount of decentralized capital investment is used to replace obsolescent plant and equipment. Decentralized capital investment is capital investment that is not provided for in the state plan. The total of such investments for any given year is not centrally predetermined.

** For the financing of the capital repair program from amortization deductions for capital repair, see B, p. 60, below.

B. As a Source of Financing Capital Repair 59/

The Soviet concept of capital repair has already been touched on in various sections of this report. The Soviet rationale for financing capital repair from the amortization fund is based on the fact that capital repair is a form of capital replacement -- in particular, partial replacement. Unlike other forms of repair work, which are charged to current account and necessarily consist of much unplanned repair work, capital repair is scheduled and largely financed in advance.

Without going into the finer distinctions between capital repair and other forms of repair, it may generally be said that capital repair may involve fairly lengthy shutdowns of machinery and equipment. Traditionally, capital repair has been carried out at the producing enterprise, although impetus is currently being given to a program under which capital repair centers would be established -- machinery and equipment would then be shipped by enterprises to the nearest center for the capital repair to be performed there.

Capital repair involves periodic complete overhaul of machinery and equipment, including the replacement of moving parts that wear out. Generally, machinery and equipment must be disassembled in order to effect the replacement of all the required parts. Then the machinery or equipment must be reassembled and tested to make sure that it operates according to technical specifications laid down by the state. The aim of capital repair is to restore machinery and equipment as nearly as possible to its original operating efficiency.

There is an increasing trend in Soviet industry toward modernizing machinery and equipment while it is undergoing capital repair. The term modernization has a very specific meaning in the Soviet context. With respect to machinery and equipment, it means replacement of wornout parts and components with new parts and components of more advanced design and with higher performance characteristics, which thereby raise productivity nearer the level of currently manufactured models. In some cases, modernization may involve not merely the overhaul and replacement of older standard parts and components with new improved ones but the individual redesigning and custom rebuilding of a machine or piece of equipment. Sometimes additional accessories are added to increase efficiency and productivity.

Modernization is regarded in the USSR as a form of "expanded reproduction."* To the extent that modernization is financed from amortization deductions for capital repair, it is analogous to net investment financed from amortization deductions for capital investment.

* See the first footnote on p. 58, above.

In other words, modernization involves not just a simple replacement in kind of parts and components but the creation of additional productive capacity compared with original capacity. As in the case of production, so presumably in the case of capital repair, economies in costs resulting from repetition of certain operations make some funds available for expanded reproduction. Only a limited amount of modernization, however, is currently financed from capital repair funds. Some Soviet economists insist that it is improper to finance any modernization from such funds, although they agree that a good time to modernize is when machinery or equipment is undergoing capital repair. It is clear that the combining of capital repair and modernization in the same operation poses a real accounting problem as far as valuation of machinery and equipment is concerned.

The Soviet capital repair program requires sizable financial outlays, in 1959 and 1960 equaling about one-fourth of the value of the centralized financing of capital investments in each of those years, as follows:

	Billion Rubles	
Year	Capital Investments	Capital Repairs
1959	23.31	6.00
1960	26.24	7.00

Unlike centralized capital investments, the major part of capital repairs in the economy as a whole and virtually all capital repairs in industry are financed from amortization deductions.

The following tabulation, which shows amortization deductions as a percent of the centralized (planned) financing of capital repairs, indicates that in 1959 and 1960 the USSR planned to finance more than three-fourths of the capital repairs in the economy and about 99 percent of the capital repairs in industry from amortization deductions*:

Year	Economy	Industry (Including Construction)
1959	78.7	99.3
1960	75.7	98.7

* Percentages shown in the tabulation were derived from data contained in Table 4, which follows on p. 62.

Table 4

USSR: Amortization Deductions as a Source of Financing Centralized Capital Repair in the Economy and in Industry a/ 1959-60

Billion Current Rubles

Year	Centralized Financing of Capital Repair		Amortization Deductions for Financing Capital Repair	
	Economy	Industry b/	Economy	Industry b/
1959	6.00	2.74	4.72	2.72
1960	7.00	3.14	5.30	3.10

a. Plan data. 60/
b. Including the construction industry.

Except for a relatively small amount of capital repair of the fixed assets of kolkhozes and possibly some in private housing, the data on centralized financing of capital repair can be considered complete for the USSR. Such data, then, reflect the over-all financial effort of the USSR and of industry, respectively, in the field of capital repair (plus that part that might more properly be considered modernization).

The high percentage of capital repair work in industry financed from amortization deductions reflects the very large share of fixed assets in industry that are subject to amortization.* Amortization deductions for capital repair deposited in the Gosbank by enterprises in the industrial sector are not available to organizations in other sectors of the economy. In certain circumstances, however, a regional economic council may redistribute excess funds from the capital repair accounts of industrial enterprises under its jurisdiction.

Based on 1956 data, a recent Soviet source estimates that 60 to 75 percent of the outlays for capital repair of productive fixed assets

* Capital repair of fixed assets that are not subject to amortization (primarily nonproductive fixed assets such as housing, public buildings, and the like) usually are financed from the state budget. As a result of the abolition of most industrial ministries and the creation of regional economic councils in mid-1957, the housing facilities of many industrial enterprises were transferred from the jurisdiction of industries and placed under the jurisdiction of local administrative organizations.

in industry are expended on equipment. Assuming that the reference here is to production equipment, as there is good reason to believe, it should be recalled that production equipment accounts for only about one-fourth of the value of the productive fixed assets of industry. It is apparent, then, that the capital repair of equipment is relatively costly compared with the capital repair of the remaining classes of fixed assets. The Soviet planners apparently have been willing to incur costly repair work on equipment as the price to be paid for maintaining it at, or near, the original level of productivity in preference to replacement.

C. As an Element in the Cost of Production 61/

Charges made for amortization, whether allocated for capital investment or capital repair, show up in the cost accounts of industrial enterprises as a capital cost of production. Amortization is referred to in Soviet economic publications as one of the primary economic elements of cost, being the accounting cost of the capital consumed in the production process during a given accounting period. In general, the total charges for amortization are simply lumped together, without any further notation, in the cost plan and the cost account of the enterprise.

The cost plan is intended to show the composition of cost, broken down by the various elements of cost, at the enterprise level and the industry level. When calculating the cost of particular units of output at industrial enterprises, however, charges for amortization are entered under the item shop expenditures and/or general plant expenditures, depending on whether the assets involved in producing the output are recorded in the account of a particular shop or of the plant in general.* For the purpose of this report the consideration of amortization as a cost of production is limited to its importance as an element in the composition of cost. Data on amortization charges as a percentage of the total outlays for production (cost) in Soviet industry as a whole and in selected Soviet industries are shown in Table 5.**

By any standard the share of amortization (3.5 percent) in the total outlays for production in Soviet industry as a whole is low. Even so it is clear that the share of amortization has crept upward during the last 20 years (from 2.2 percent in 1940 to 3.5 percent in 1959 (see Table 5**). This advance means that the rate of increase in the absolute value of amortization charges from year to year has exceeded the rate of increase in the absolute value of the total

* For a discussion of the methods of calculating cost in the Soviet machine building industry, see source 62/.
** Table 5 follows on p. 64.

Table 5

USSR: Amortization Charges as a Percent of Total Outlays for Production in Selected Industries a/
Selected Years, 1940-59

Percent

Industry	1940	1950	1952	1954	1955	1957	1959
Total industry	2.2	2.7	N.A.	N.A.	3.4	3.4	3.5
Coal	3.1	3.4	4.7	N.A.	N.A. b/	5.1	5.7
Construction materials	4.1	3.9	5.1	5.4	N.A.	N.A.	6.3
Electric and thermal power	10.5	9.7	N.A.	14.1	16.8	19.4	20.3
Food	1.0	1.0	1.2	1.3	N.A.	N.A.	1.2
Sugar refining	N.A.	N.A.	N.A.	N.A.	2.9	1.8	1.9
Meat processing	N.A.	N.A.	N.A.	N.A.	0.5	N.A.	0.5
Dairy products	N.A.	N.A.	N.A.	N.A.	0.9	N.A.	1.1
Light	0.8	0.8	0.9	1.03	N.A.	N.A.	0.8
Cotton textile	1.1 c/	N.A.	N.A.	N.A.	1.1	1.2	1.3
Garment	N.A.	N.A.	N.A.	N.A.	0.2	N.A.	0.3
Machine building and metalworking	2.9	N.A.	4.0 d/	N.A.	4.1	3.9	3.9
Machine tool building	3.7	4.5	4.9	N.A.	N.A.	N.A.	N.A.
Metallurgy	3.3	3.8	4.3	N.A.	5.1 e/	5.6 e/	5.8 e/
Petroleum extraction	36.5 c/	N.A.	N.A.	N.A.	42.8	45.2	46.5
Timber	N.A.	2.3	2.9	3.2	4.0	N.A.	4.7

a. 63/
b. In 1955, amortization charges amounted to 6.3 percent of the outlays of production in coal extraction and 1.2 percent in coal beneficiation.
c. Data are for 1939.
d. Data are for 1953.
e. Data are for ferrous metallurgy.

outlays of production. The marked increase in the share of amortization between 1950 and 1956 would have been even more pronounced than it was had there not been several reductions in the wholesale prices of machinery and equipment acquired during that period.

The same secular trend that occurred in industry as a whole is observable with respect to most individual industries in spite of the wide disparity between the share of amortization in the production outlays of individual industries (from 0.3 percent in the garment industry to 46.5 percent in the petroleum extraction industry).* A significant exception is the machine building and metalworking industry for which amortization charges declined from 4.1 percent of the outlays of production in 1955 to 3.9 percent in 1957. Also, if the data for light industry in 1954 and 1959 have a common basis, an even greater decline occurred in light industry (from 1.03 percent to 0.8 percent). In a period of increasing capital intensiveness it is difficult to explain these exceptions without a thorough investigation.

Given the Soviet doctrine of "proportional development" of the economy, many Soviet economists probably attach undue importance to stabilizing the share of amortization in the outlays for production at a historical normative level. Other Soviet economists profess to see a favorable development in an increase in amortization as a share of the cost of production, simply because it signifies an increase in the capital intensiveness of production; others qualify their approval. Only if an increase in the share of amortization results in an even greater increase in productivity is such a development to be regarded as economically desirable, they assert.

An increase in productivity ordinarily will be reflected by a decrease in the unit cost of output. Rises in productivity to be achieved by increasing the use of capital in production normally require the upgrading or augmenting of existing stocks of machinery and equipment. Although buildings and structures may be requisite to house most production operations, it is the machinery and equipment component of fixed capital that actually performs the work.** Within limits,

* It is beyond the scope of this report to consider the variations in amortization in the cost structure of individual industries and the reasons for these variations.

** In accordance with this division of fixed assets according to function in the production process, Soviet economists generally distinguish between the "conditions of labor" (usloviya truda), which embraces buildings and structures, and the "tools of labor" (orudiya truda), which consists of machinery and equipment, as the two components of the "means of labor" (sredstva truda). The means of labor, which is generally synonymous with fixed capital, and the "objects of labor" (predmety truda), which refers to working capital, together form the "means of production" (sredstva proizvodstva), a term that covers all productive capital.

therefore, buildings and structures are a constant factor in productivity, whereas machinery and equipment are a variable.

Because of their generally shorter service lives and higher capital repair costs the amortization rates for machinery and equipment are higher than those for buildings and structures. Hence an increase in the relative share of machinery and equipment in the fixed capital stocks of an industry (or an industrial enterprise) tends to raise the composite industry (enterprise) amortization rate, the size of amortization deductions, and the share of amortization in the total outlays of production. Such an increase, however, is ordinarily accompanied by an increase in the over-all productive capacity of the enterprise. Provided the resulting increase in output is sufficiently great, not only the cost of amortization per unit of output but also the cost of the total outlays of production per unit of output will decline.

Ordinarily the addition or replacement of machinery and equipment does not involve particularly large outlays for investment (compared with construction of new plant) nor a significant increase in the cost of production. At the same time the benefits, in terms of productivity, may be very great. For this reason the determination of the correct charge for amortization of machinery and equipment has more than a mere bookkeeping importance in Soviet planning. It underlies basic Soviet decisions on investment and the methods of maximizing the economic growth rate of the USSR.

Under the present Soviet policy of establishing low prices on the machinery and equipment which state enterprises produce and which the state then acquires under its capital investment program, it is almost certain that the cost of amortization of machinery and equipment is understated relative to the cost of other factors of production. In recent years, some Soviet economists have expressed concern that amortization charges do not reflect the full social cost of capital consumption (including the equivalent of an interest charge). Other economists, however, argue for the status quo on the grounds that any significant increase in amortization charges would in itself raise the cost of output, thus, in turn, leading to higher prices (acquisition costs) for machinery and equipment in the state industrial investment and replacement programs, a development considered detrimental to the interests of the state.* This argument reflects the essentially noneconomic Soviet approach to the subject of amortization as an element of cost.

* Prices of producers' machinery and equipment in the USSR essentially reflect only two elements: the production cost and a fixed margin of profit (much of which is returned to the state budget). Considering the present level of amortization charges, it is hard to believe that even a sizable percentage increase in such charges would have very adverse effect on the unit production costs (and prices) of producer goods.

APPENDIX A

COMPARISON OF THE PRIMARY CLASSIFICATION OF MACHINERY AND EQUIPMENT COMMONLY FOUND IN THE FIXED ASSET ACCOUNTS OF US AND SOVIET INDUSTRIAL FIRMS*

US

Ordinarily, assets are arranged on the basis of a primary classification by type (as below), although some firms prefer to set up accounts with assets arranged by physical location (building or department). Primary accounts may then be subdivided into group accounts based on the physical similarity of assets or on estimated useful life. Such group accounts frequently are subdivided further according to the year of acquisition of the assets contained in them.

A. Machinery and Equipment

1. Machinery
2. Electrical apparatus
3. Ovens and furnaces
4. Conveyor equipment
5. Shop fixtures and equipment

USSR

The Soviet classification system is built on the primary division of machinery and equipment by type and function (power, production, transportation, and the like), much as in the US. It may be subdivided further, however, on the basis of its immediacy to the production process (primary, auxiliary, and the like). More recently there has been a movement also to subdivide machinery and equipment on the basis of the degree of mechanization or automation involved in its operation.

A. Power Machinery and Equipment

1. Generating equipment
2. Engines and motors
3. Conversion equipment
4. Distribution equipment

* 64/

COMPARISON OF THE PRIMARY CLASSIFICATION OF MACHINERY AND EQUIPMENT
COMMONLY FOUND IN THE FIXED ASSET ACCOUNTS OF US AND SOVIET INDUSTRIAL FIRMS
(Continued)

US	USSR
B. Transportation Equipment	B. Production Machinery and Equipment
1. Rolling stock	1. Primary equipment
2. Automotive equipment	2. Equipment of auxiliary shops
	3. Hoist and transport (materials handling) equipment
	4. Nonstandard equipment
C. Office Equipment	C. Transportation Equipment
	1. Rolling stock
	2. Automotive equipment
	3. Water craft
	D. Measuring and Regulating Devices
	1. Instruments
	2. Laboratory equipment
	E. Office and Building Equipment

APPENDIX B

METHODS OF VALUING AND REVALUING SOVIET INDUSTRIAL FIXED ASSETS*

The value of industrial fixed assets in the USSR can be expressed in any of four possible ways: full original value, original value less wear, full replacement value, and replacement value less wear. All four valuations are based on the Soviet accounting approach to value.

Original Value

A. Full Original Value

The full original value of a piece of machinery or equipment in the USSR is its historical acquisition cost as described in the text.** This value is entered on the balance sheets of Soviet industrial enterprises and on various accounting and inventory control documents when the asset is acquired.

In the past the full original value of fixed assets, expressed in the respective prices of the years in which the assets were acquired, has served as the basis for computing annual amortization charges for capital investment as well as for Soviet statistical studies on the value, growth, age, and composition of fixed assets. The full original value of an asset

Replacement Value

A. Full Replacement Value

Soviet fixed assets were recently revalued from full original value in mixed prices to full replacement value in 1955 prices as of 1 January 1960.*** The full replacement value of a fixed asset may be defined as the current cost of replacing it with a reproduction or an equivalent substitute without regard to the remaining value of the existing asset. In the event that a substitute with higher performance characteristics relative to the existing asset is used as a criterion for determining replacement value, then its value must be reduced by a coefficient that reflects the difference in the productivity and versatility of the two assets.

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* 65/

** See II, A, 2, c, p. 20, above.

*** The results of this revaluation are treated briefly in Appendix C, p. 73, below.

METHODS OF VALUING AND REVALUING SOVIET INDUSTRIAL FIXED ASSETS
(Continued)

Original Value

theoretically represents its social cost in the year it was produced. Contrary to Soviet theories on social cost, however, the valuation of identical assets, even when acquired at the same time, has not always been uniform, primarily because different channels of acquisition frequently have resulted in different acquisition costs.

Full original value reflects the full use value of an asset, inasmuch as the serviceability of the asset presumably is unimpaired when it is new. Also, when an asset is new, its full original value and its full replacement value (see opposite column) will tend to be the same.

It should be noted that the full original value of a Soviet fixed asset does not represent the full sum to be recovered through amortization during the estimated useful life of the asset, inasmuch as planned outlays for capital repair also are included when calculating the over-all amortization rate.*

Replacement Value

The concept of full replacement value reflects the Soviet view that the value of an existing asset depreciates as a result of changes that occur in the real or hypothetical cost of replacing it with an equivalent new asset. Such depreciation usually is attributed to reductions in the social cost of producing the equivalent of an existing asset. When it is determined, for example, that the current full replacement value of a machine is less than the full original value entered in the fixed capital accounts, then the latter may be reduced by the amount of the difference. This has the effect of reducing the recoverable base of the asset and, if there is no accompanying change in the amortization rate,** of reducing the size of annual amortization deductions for capital investment. The size of amortization deductions for capital investment will then be more in line with capital replacement costs.

* See II, B, 2, a, p. 42, above.
** For a discussion of proposed changes in amortization rates in 1963, see II, B, 2, c, p. 49, above.

METHODS OF VALUING AND REVALUING SOVIET INDUSTRIAL FIXED ASSETS
(Continued)

Original Value

B. Original Value Less Wear

Original value less wear represents the full original value of an asset less charges made to amortization (residual value). This valuation is roughly comparable to unamortized cost in US depreciation accounting but with at least one important difference.

Because both the full original value and the planned cost of capital repairs are amortized in the USSR, total amortization charges are greater than would be the case in the US. Thus the residual value of machinery and equipment tends to be understated except for periods immediately following capital repair, when value is restored. The true residual value of a fixed asset at any given time is further obscured by the fact that planned annual amortization charges for future capital repairs may not necessarily coincide with the actual cost of such repairs.

Replacement Value

Beginning in 1963, Soviet fixed assets apparently are to be amortized on the basis of full replacement cost rather than full original cost. The price reform scheduled for 1963 may serve as the occasion for a new revaluation of Soviet fixed assets at current replacement cost in 1963 prices.

B. Replacement Value Less Wear

Under a Soviet-type economy, with its absence of market values, replacement value less wear is held to represent the current economic value of an asset. As such, it is a concept of importance in Soviet efforts to establish the economic basis of replacement and repair policy.

Replacement value less wear represents the full replacement value of an existing asset adjusted for physical wear and tear. Thus it reflects the current book value of an asset expressed in terms of replacement value rather than original value. With respect to amortization it is important primarily as an indication of how much of the replacement cost of an asset has been, or remains to be, recovered through amortization at any given time.

METHODS OF VALUING AND REVALUING SOVIET INDUSTRIAL FIXED ASSETS
(Continued)

Original Value

This fact suggests that there may be little correspondence between what the residual values of Soviet fixed assets are and what they should be. It is perhaps for this reason, among others, that original value adjusted for wear has rarely, if ever, been used in the USSR in compiling statistical data on the value of fixed assets in Soviet industry.

Replacement Value

Because of the diversity and complexity of the machinery and equipment that were revalued as of 1960, a number of different methods were used to determine the degree of wear. All of the methods used in the revaluation, however, were based on the engineering concept of impaired serviceability rather than on the unamortized original book value. This approach provided data needed to estimate the service life of machinery and equipment under current conditions of operation.

Through a laborious and time-consuming procedure the physical condition of all fixed assets subject to revaluation was examined. The remaining useful life of each asset was estimated and computed as a percentage of its total original or revised estimated useful life. This percentage was then applied to the full replacement value to derive replacement value less wear.

APPENDIX C

RELATIVE VALUE WEIGHTS OF PRIMARY CATEGORIES OF INDUSTRIAL EQUIPMENT USED IN COMPUTING COMPOSITE AMORTIZATION RATES FOR SOVIET INDUSTRY*

The weights shown in Table 6** represent the aggregative values of primary categories of industrial equipment expressed as percentages of the total value of all fixed assets in Soviet industries in 1956. Such weights are used in the USSR in computing composite (weighted average) amortization rates applicable to the fixed assets of Soviet industry as a whole and of individual industries.*** In Soviet economic publications the composition of industrial fixed assets expressed in terms of the relative value of primary categories, such as buildings, structures, and equipment, is generally referred to as the "structure of productive industrial fixed capital" (struktura promyshlenno-proizvodstvennykh osnovnykh fondov). As the composition of the fixed assets in an industry changes, so, naturally, should the composite amortization rate established for that industry change.†

In drawing up the 1930 schedule of basic amortization rates,†† industrial equipment was subdivided into six groups on the basis of the industry in which the equipment was used and not on the basis of the type of equipment. In establishing the schedule of rates there was no attempt, for example, to differentiate between power equipment and production equipment as has been done subsequently in Soviet classification systems. The six categories of rates for equipment in the 1930 schedule were further differentiated according to the percentage of capacity and the number of shifts per day that the equipment was in operation.

A category of fixed assets known as transmission facilities includes both structures, such as power transmission lines, pipelines, and the like, as well as the equipment required to operate them; it was made a separate category in 1936, having previously been divided, according to its respective components, between structures and equipment. Official data for 1939 contain only a combined relative value weight for production equipment and transmission facilities. In the revaluation of industrial

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* 66/

** Table 6 follows on p. 74.

*** Soviet composite amortization rates are explained in II, B, 2, b, p. 44, above, and shown in Table 2, p. 46, above.

† The method of computing composite amortization rates is explained in the third footnote on p. 45, above.

†† The schedule of basic amortization rates of 1930 is presented in Appendix D, p. 79, below.

Table 6

USSR: Relative Value Weights for Primary Categories of Industrial Equipment in Various Industries a/
1956

Industry	Percent of Total Productive Fixed Assets			
	Power Equipment	Production Equipment	Transportation Equipment	Total for Equipment b/
Total industry	9	25	7	41
Chemical	6.3	33.5	3.8	43.6
Coal	5.5	16.4	6.1	28.0
Construction and road machine building	3.4	37.0	3.7	44.1
Construction materials	6.7	29.8	8.4	44.9
Electric power stations	28.2	7.5	1.3	37.0
Electrotechnical	4.6	33.4	2.9	40.9
Ferrous metallurgy	7.4	32.8	4.6	44.8
Fish	3.6	7.7	61.7 c/	73.0
Food products	9.5	27.4	7.2	44.1
Heavy machine building	6.0	35.0	3.1	44.1
Instrument building and automation media	3.5	44.1	3.0	50.6
Light	6.6	47.5	2.8	56.9
Machine building	5.2	40.6	3.2	49.0
Machine tool building	2.6	42.1	2.9	47.6
Meat and dairy products	6.1	18.8	6.7	31.6
Motor vehicle	5.8	44.0	2.1	51.9
Paper and woodworking	12.5	35.9	4.1	52.5
Petroleum	3.8	18.9	3.4	26.1
Timber	9.1	14.2	34.3	57.6
Tractor and agricultural machine building	6.3	41.6	2.6	50.5

a. 67/. Data are as of 1 January. Industries listed conform to ministerial organization as of 1956.
b. The total is computed as the sum of the three categories of equipment.
c. Including the fishing fleet, which comprised 58.4 percent of the productive fixed assets of the ministry.

fixed assets as of 1 January 1960, transmission facilities was reported only in combination with structures,* an apparent reversal in classification policy. Because of this latest grouping of transmission facilities with structures and because the equipment component cannot be isolated, this category of fixed assets has not been included in considering the value weight of the equipment component of productive industrial fixed assets in this appendix.

As long as the 1930 basic rates for equipment remain in use, changes in the relative value weights of power equipment and production equipment have no significant effect on the composite rates of industry or its various branches, inasmuch as these two categories share a common basic rate structure under the schedule of 1930. The nonconformity of the classification used in the rate schedule of 1930 with the categories and subcategories of subsequent classifications of fixed assets was an important factor leading to the present reform of amortization rates.

The relative shifts in the value weights of the primary categories of industrial equipment in selected industries as well as in industry as a whole during 1951-60 are shown in Table 7.** Although the relative weight of total industrial equipment appears to have remained comparatively stable throughout the period, there was a marked shift in 1960 in the weight of production equipment and transportation equipment. During 1951-56, there was a decided increase in the share of total equipment in the fixed assets of the metallurgical industry and a decided decrease in the machine tool industry, caused primarily by changes in the relative weight of production equipment. Even where the shift in the total relative weight of equipment was less pronounced, as in light industry and in the food industry, the shares of the major types of equipment were rarely uniform throughout the period, reflecting, as they did, the changing patterns of retirement and investment.

As pointed out by Soviet economists themselves, the meaningfulness of relative value weights has suffered as a result of the fact that they have been expressed in mixed prices. Hence the biases inherent in the Soviet system of valuing fixed assets have been perpetuated in the value weights used to establish composite amortization rates for individual industries and for industry as a whole.

The revaluation of 1960 was designed to shift the valuation of fixed assets from a mixed price basis to a uniform price basis. It was also designed to express the value of fixed assets in terms of the cost of replacing them under the production technology of 1960. As a result of this revaluation, the relative weights of the primary categories of industrial equipment were somewhat altered, as shown in Table 8.***

* See Table 8, p. 77, below.
** Table 7 follows on p. 76.
*** Table 8 follows on p. 77.

Table 7

USSR: Relative Value Weights for Primary Categories of Industrial Equipment in Selected Industries a/
Selected Years, 1951-60

Percent of Total Productive Fixed Assets

Industry	Power Equipment				Production Equipment				Transportation Equipment				Total for Equipment b/			
	1951	1953	1956	1960	1951	1953	1956	1960	1951	1953	1956	1960	1951	1953	1956	1960
Total Industry	8	N.A.	9	8.9	27	N.A.	25	27.1 c/	7	N.A.	7	4.1	42	N.A.	41	40.1
Metallurgical	7.4	7.4	7.4 d/	N.A.	26.3 e/	32.0	32.8 d/	N.A.	5.7	5.5	4.6 d/	N.A.	39.4	44.9	44.8 d/	N.A.
Coal	6.9	6.1	5.5 f/	N.A.	N.A.	N.A.	16.4 f/	N.A.	8.1	7.2	6.1 f/	N.A.	N.A.	N.A.	28.0 f/	N.A.
Machine tool building	2.0	1.8	2.6 g/	N.A.	51.1 h/	49.4 i/	42.1 g/	N.A.	2.1	2.3	2.9 g/	N.A.	55.2	53.5	47.6 g/	N.A.
Light	6.8	6.7	6.6 j/	N.A.	45.5 e/	50.1	47.5 j/	N.A.	3.5	3.2	2.8 j/	N.A.	55.8	60.0	56.9 j/	N.A.
Food	10.2	10.3	9.5 k/	N.A.	26.4 e/	26.0	27.4 k/	N.A.	9.8	9.7	7.2 k/	N.A.	46.4	46.0	44.1 k/	N.A.

a. 68/. Data are as of 1 January. Data for 1960 are computed as shown in Table 8, p. 77, below.
b. The total is computed as the sum of the three categories of equipment.
c. Including the category "Measuring and regulating instruments and devices and laboratory equipment."
d. Data are for enterprises of the Ministry of Ferrous Metallurgy.
e. Data are for 1949.
f. Data are for enterprises of the Ministry of the Coal Industry.
g. Data are for enterprises of the Ministry of Machine Tool Building and Tool Industry.
h. Data are for machine building in 1949.
i. Data are for machine building.
j. Data are for enterprises of the Ministry of Light Industry.
k. Data are for enterprises of the Ministry of the Food Products Industry.

Table 8

USSR: Effect of the 1960 Revaluation on the Relative Value Weights of Major Types of Productive Fixed Assets in Industry a/

Type of Productive Fixed Asset	Valued at Full Original Cost b/		Valued at Full Replacement Cost c/	
	Billion Rubles	Percent	Billion Rubles	Percent
Buildings	22.00	27.3	21.71	27.5
Structures and transmission facilities	25.01	31.1	26.56	33.7
Power machinery and equipment	7.20	8.9	6.50	8.3
Production machinery and equipment (including instruments and laboratory equipment)	21.78	27.1	19.67	24.9
Transportation equipment	3.28	4.1	3.19	4.0
Office equipment, tooling, and miscellaneous	1.23	1.5	1.26	1.6
Total	80.50	100.0	78.89	100.0

a. 69/. Data are as of 1 January, at which time productive fixed assets were revalued at full replacement cost.
b. In mixed prices. Data were derived from full replacement cost by applying the coefficients of change in source 70/.
c. In 1955 prices.

APPENDIX D

AMORTIZATION RATES ESTABLISHED IN THE USSR IN 1930 a/*

Amortization rates established in 1930 for productive fixed assets in the USSR were differentiated according to the number of 8-hour shifts (or fractions thereof) that the assets were scheduled to be in operation. Expressed as a percent of the full original cost of the assets, the rates were as follows:

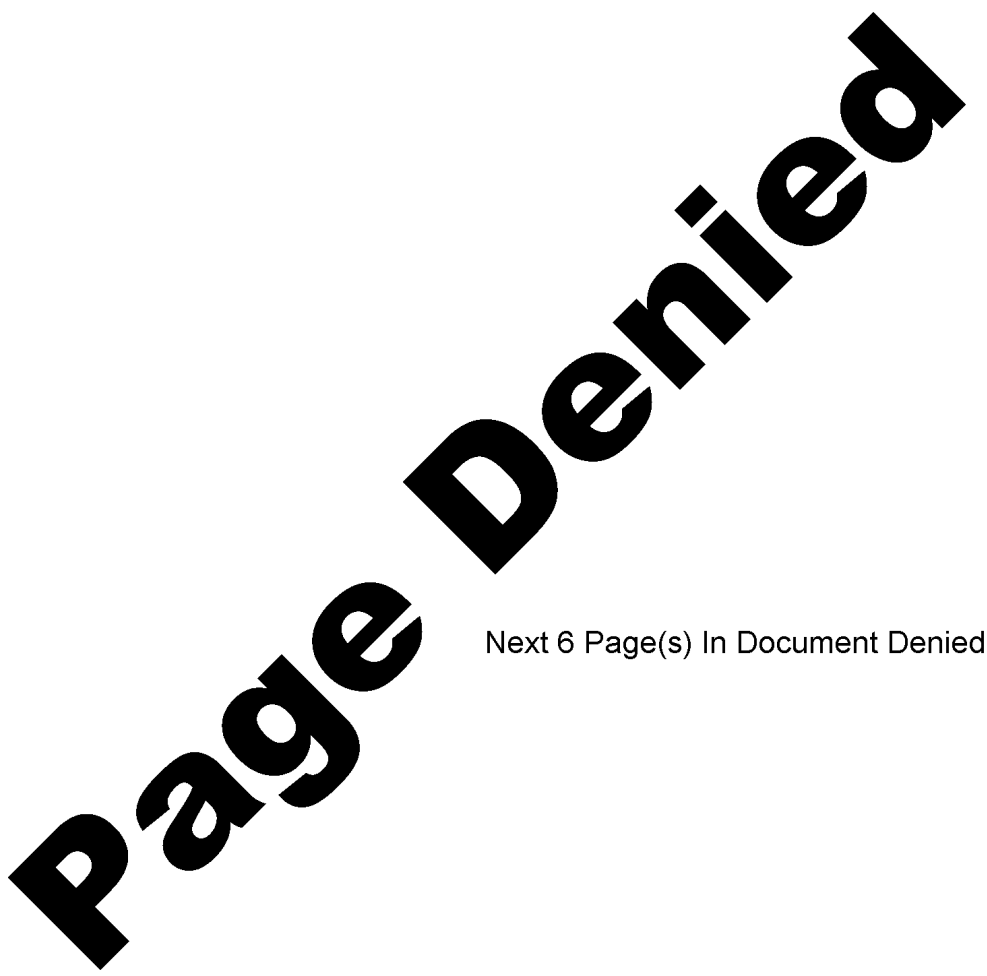
Type of Fixed Asset	Number of 8-Hour Shifts		
	One	Two	Three
1. Production buildings, normal-duty			
a. Stone, concrete, reinforced concrete	2.25	2.6	2.7
b. Mixed materials	3.4	3.9	4.1
c. Wood	4.5	5.2	5.4
2. Production buildings, light-duty			
a. Stone, concrete, reinforced concrete	2.75	3.2	3.25
b. Mixed materials	4.0	4.7	4.8
c. Wood	5.4	6.2	6.5
3. Structures	b/	b/	
a. Docks, moles, dams, canals, tunnels, wells, retaining walls			2.0
b. Underground pipe lines, drains, bridges, reservoirs, and auxiliary structures			3.5
c. Blast furnaces, open-hearth furnaces, other furnaces, factory smoke stacks, mine shafts, mine drifts, roads, fences, and auxiliary structures			4.0
d. Wooden dams, wells, piers, reservoirs, and platforms			9.0

* Footnotes follow on p. 81.

Type of Fixed Assets	Number of 8-Hour Shifts							
	One c/							
	Operating at a Capacity of		One to Two				Two to Three	
	50 Percent or Less	More Than 80 Percent	1 to 1.25	1.25 to 1.5	1.5 to 1.75	1.75 to 2	2 to 2.5	2.5 to 3
4. Equipment of industrial enterprises producing:								
a. Oils and soap	4.5	5.5	5.75	6.0	6.25	6.5	6.7	6.9
b. Peat, wine, brick, lime, gypsum, extracts, impregnated railroad crossties	4.8	5.2	6.1	6.4	6.7	7.0	7.2	7.4
c. Sugar, soda, gas, cement, asphalt-slate, wood pulp, cellulose, paper, and the like	5.0	6.25	6.6	6.9	7.2	7.5	7.8	8.0
d. Bone meal, matches, superphosphate, beer, starch, molasses, macaroni, confections, hats	5.2	6.75	7.1	7.4	7.7	8.0	8.2	8.5
e. Ores, gold and platinum, asbestos, coal, machinery and equipment, metal, rubber, roofing paper, wood products, leather footwear, sewn garments, pharmaceuticals, tobacco, canned goods, chemicals, perfumes and cosmetics, wallpaper, paper board, and the like	5.4	7.0	7.4	7.7	8.1	8.4	8.7	8.9
f. Storage batteries, electrocarbon products, glass and electric lamps, porcelain, baked goods, refined petroleum products	5.6	7.5	7.9	8.2	8.6	8.9	9.2	9.5

Type of Fixed Assets	Number of 8-Hour Shifts							
	One [c]							
	Operating at a Capacity of		One to Two				Two to Three	
	50 Percent or Less	More Than 80 Percent	1 to 1.25	1.25 to 1.5	1.5 to 1.75	1.75 to 2	2 to 2.5	2.5 to 3
5. Transportation equipment								
a. Railroad rolling stock	[d]	5.0	5.4	5.8	6.2	6.5	6.75	7.0
b. Motor transport	[d]	10.0	20.0	20.0	20.0	20.0	20.0	20.0
6. Tooling (cutting tips, dies, and the like)	10.0	12.0	12.5	13.5	14.5	15.0	16.5	18.0
7. Office and building equipment	[d]	10.0	10.5	11.0	11.5	12.0	13.5	15.0

a. [7]
b. There are no amortization rates established for structures on anything less than a 3-shift basis, because structures are subject to constant use and deterioration.
c. When equipment is operating with a load between 50 and 80 percent of capacity, the amortization rate is computed in direct proportion to the load. For example, the amortization rate for equipment in Group 4e operating at a 65-percent load would be 6.2 percent $[5.4 + \frac{(7.0 - 5.4) \times (65 - 50)}{80 - 50} = 5.4 + \frac{1.6 \times 15}{30} = 5.4 + \frac{24.0}{30} = 5.4 + 0.8 = 6.2]$.
d. No amortization rate was established.



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