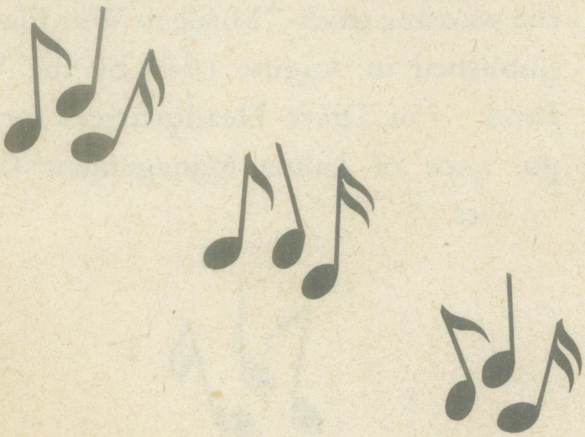
Music in industry

MUSIC

WHILE WE WORK



UNITED STATES DEPARTMENT OF LABOR
DIVISION OF LABOR STANDARDS • July 1947

AS THE official depository of records of the War Production Drive Headquarters, the Division of Labor Standards has had continuing inquiries from industry and labor about the value of music as an aid to production.

The Division therefore has reprinted the wartime study, "Music in War Plants," published in August 1943 by the War Production Drive Headquarters for the guidance of Labor Management Committees.

MUSIC

in

War Plants

BY

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FOREWORD

War Production Drive Headquarters was established in the War Production Board to promote the establishment of joint War Production Drive Labor-Management Committees in order to increase production efficiency. These committees have actively concerned themselves with production problems, suggestions systems, plant efficiency and morale, safety and health, transportation and housing difficulties, conservation of materials, reduction of absenteeism and other activities which help improve the rate and quality of production.

In connection with these committee activities, the question arose as to the efficacy of using music in war plants to improve worker morale and production. Except for one investigation made under controlled conditions [1] and the report of the British Ministry of Information, "Music While You Work," little was known about the use of music in industry. However, fragmentary information indicated that its use was growing at mushroom speed.

It was felt that an authoritative study of current practices in the use of music in industry was needed in order that War Production Drive Headquarters might intelligently inform Labor-Management Production Committees on the subject, and perhaps offer some guidance to them in the conduct of an in-plant music program. Therefore, the services of Mr. Beckett were secured and a comprehensive survey undertaken. Mr. Beckett, conductor-composer, is well versed in all phases of music, and has conducted symphony orchestras in San Francisco, Boston, New York, and other cities in this country and Europe.

War Production Drive Headquarters.

[1] Survey on Industrial Music made by Profs Burris-Meyer and Cardinell, Stevens Institute, Hoboken, N. J.

INTRODUCTION

After a preliminary study of the type of information which seemed to be needed regarding music in industry, a report with sheet some 50 questions was prepared and taken into the field.

The term "Music in War Plants" means music reaching workers either during work, lunch, rest periods, or change of shift. Most of this music originates from phonograph records broadcast over a public-address system reaching all or part of the plant. The broadcasting room is either in the plant or elsewhere in the city. When the plant has its own turntable, the public address system (known in abbreviated form as a P. A. System) is usually used also for paging, announcements, air raid alarms, and radio broadcasts. When the music originates outside the plant it is usually supplied by companies which furnish music to restaurants. Lately these companies have offered music to war plants on a chain system, the plants taking as little or as much as they wish. This music reaches them over leased telephone wires and is available in most cases on a 24-hour schedule, thus covering the night and graveyard shifts as well as the day shift.

This survey covers 100 war plants in all sections of the country. Of these, 76 conform to the conditions of supplying music as outlined above. The other 24 plants either have live bands, orchestras and choruses composed of plant personnel, or they secure outside talent for lunch hour programs. A few of them have portable equipment over which phonograph records are played in lunchrooms and other places of assembly. These plants are considered separately in the report.

The recognition of the value of music in American industries is of fairly recent date. Fifty percent of the installations of public-address systems in the 76 plants surveyed dated from July, 1942, or later.

Plants in 25 States, from Vermont to California, were visited on a 3-month trip. As no advance information was available as to which plants used music and which did not, it took considerable

inquiry in each city to find the plants that used music. Every effort has been made to make the report representative of various types of industry and to cover territory where climatic conditions varied greatly.

Three or four production officials were interviewed in each plant, some representing management and some representing labor. Conversations were held with workers, foremen, shop stewards, personnel directors, and top company and union officials, as well as with engineers to discuss mechanical arrangements. It was only after all of these conversations had been weighed that the answers to such vital questions as the effect of music on morale and increased production were set down. The investigation was undertaken with no preconceived opinions as to the value of music. It aimed to be as unbiased a factual survey as possible; if this report on Music in War Plants errs, it does so on the conservative side.

I

HIGHLIGHTS OF THE SURVEY

The survey brought to light a number of interesting facts. Foremost among these is the discovery that the music program is universally liked by the worker. Its success depends upon this popularity which was substantiated in numerous instances. Many plants reported that when music programs were temporarily discontinued because of breakdown in equipment, or suspension of operation while alterations and improvements of a mechanical nature were being made, or because they were purposely discontinued for a short while to ascertain the workers' reactions, the demand for their continuance from the majority of workers was instantaneous and emphatic. The survey also shows that music programs were liked equally well by management once they were given a fair trial.

A condensed summary of the answers to the most important questions on the report sheets follows.

1. Of the 76 plants using phonograph records, 87 percent claimed that music improved morale. Ten percent did not know what the effect was beyond the fact that the workers liked it, and only 3 percent noticed no improvement in morale. (See table 6, p. 21.)

2. A relationship was discovered to exist between the length of the music program and the claims of improved morale. All of the 39 plants which use more than 1 hour of music per shift answered "yes" to the query "Does music improve morale?" In contrast, of the 6 plants having less than ½ hour of music per shift, 3 of them—only 50 percent answered the question affirmatively, 1 said "no" and 2 were uncertain. (See table 7, p. 22.)

3. To the question "Do you think music increases production?", 57 percent of the answers were "yes." (See table 11, p. 33.)

4. The length of programs seems to have the same bearing upon increased production as it does upon improved morale. Of the 39

plants having over an hour of music per shift, 66 percent claimed increased production; it was only within this group that percentage figures on how much production actually increased were ventured by management. These range from 5 to 10 percent. (See table 8, p. 23.)

5. The survey shows that music is as successful in noisy departments as it is in quiet departments. It appears that if enough of the right type of loudspeakers are obtainable and properly placed, there is practically no machinery noise loud enough to render a music program ineffective, with the exception of riveting and noises of similar quality. The rumble and clatter of machinery which registers as high as 102 decibels in a department at one plant were successfully overcome.

6. The success of a music program depends upon mechanical as well as psychological factors. On the mechanical side it appears that two noteworthy improvements could be made. They are: First, increased efficiency in the quality of the sound equipment and the placing of loud speakers. Secondly, the use of phonograph records maintaining a fairly constant level of sound. Records of this type cannot be procured in the open market at this time and recourse must be made to manual or automatic monitoring (controlled to prevent too great a variation in volume) of the records to prevent "blasting" of the loud parts and a fading-out of the softer portions.

7. The psychological attitude of the workers to the music program is important. For example, in one or two plants the programs were rendered relatively ineffective because the workers suspected that they were "guinea pigs" for a music experiment. On the other hand, very effective programs, such as one in a Vermont plant, were carried out under conditions where the workers were reminded daily that "this is your program—tell us what you want and we will try to give it to you." This attitude, provided care is taken to secure sufficiently large samples of opinion, seems to produce the best results.

8. The kind of music played is of paramount importance. A

number of plants have issued questionnaires to ascertain what the workers like. A comparison of answers shows that Strauss Waltzes are first in popularity; Hit Parade numbers second; patriotic music third; semiclassical and light salon music fourth; classical music fifth; hymns and Negro spirituals sixth; with hot swing and jitterbug last. Some plants which have experimented by introducing more music of good quality, have been amply rewarded by worker response. In one of these plants 33 percent of the workers now favor classical music during lunch period. The idea that the only kind of music workers wish to hear is popular swing, turns out to be erroneous, if for no other reason than that variety cannot be obtained without going outside this field, especially variety in tone color. Without variety, the music program bogs down. (See tables 8, 9, 10.)

9. The correct moment to use music varies with the plants, and different kinds of music tie-in better at various times of the shift. In general, it seems advisable to begin the shift with cheerful music, frequently, but not necessarily always, of the "march" type. Whenever possible, music should be carried over into the actual beginning of the work period. (See Right Moment To Use Music, p. 37.)

The next installment of music should act as a restorative to the so-called fatigue period, occurring usually toward the end of the first half of the shift; or, if 10-minute rest periods are instituted, 2 or 3 minutes of music should precede and follow news and announcements at this time. Music with meals is generally accepted and liked by the workers if it is not too forceful. During the last half of the shift, short intervals of music may be used with great effectiveness to take the worker's mind off the fatigue of work and make the day seem shorter. It also serves to bridge the after-lunch fatigue period. Where music is not carried right up to the closing time, martial airs used to play the old shift out and the new shift in are very effective.

10. The cost of war plant public address systems suitable for music and other purposes varies from $250 to $80,000. The size

of the plant, acoustical conditions and the level of machinery noise are the principal price factors.

The average cost may be roughly figured at 5 cents per square foot of the area to be covered by sound. Although this amounts to a considerable sum, the survey shows that most firms would pay it gladly and install public-address systems, if materials could only be obtained. The scarcity of electrical equipment and telephone lines for wired programs, and the difficulties encountered by many plants in obtaining priorities, are the principal factors in slowing down new installations.

If these obstacles could be overcome and more P. A. Systems installed, it appears certain that increased production on a more extensive scale would result, not only from music programs but from the other valuable functions of P. A. Systems.

11. Aside from its findings on music, the survey shows that the value of a P. A. System is incalculable. Among its uses are paging, announcements, air-raid alarms, talks by visiting war heroes, radio broadcasts of news and important speeches, and the playing of dramatic recordings available from government agencies and other sources. These, and many other uses more fully developed in the report, all make large contributions to efficiency, morale and production.

12. Finally, the survey indicates that War Production Drive Labor-Management Committees have a great part to play in making music programs effective. Their activities are reflected in the answers to the final questions on the report sheet, "Has the Labor-Management Committee discussed the Music Program?" to which most committees replied "yes"; and "What does the Labor-Management Committee think about it?" Two-thirds of the replies were favorable on this point, while one-third had formed no opinion. This is not surprising in view of the fact that 50 percent of the music programs surveyed had been in operation less than 5 months.

To get maximum results from a music program, it is important to have labor members of joint production committees take a more active part in reporting workers' reactions. Their advice and guid-

ance can be very helpful in improving the effectiveness of music on morale and, as a byproduct of morale, on increased production. (See table 13, p. 44.)

To sum up, it appears conclusive from the evidence gathered in 100 plants that the principal value of music in relation to efficiency is not in speeding up the worker to greater effort, but in relaxing unnecessary nervous tensions and creating a pleasant atmosphere for work. The detailed report which follows shows that since the purpose of music is to relieve boredom and allay fatigue, the right moments to use it are suggested by these factors. Moreover, on the theory that an ounce of prevention is worth a pound of cure, it is conceivable that fatigue and boredom can in some degree be forestalled with a well-timed program of music.

II

HOW MUSIC IS USED IN DIFFERENT INDUSTRIES

The 12 major findings of the survey, summarized above, will be treated in more detail after presentation of 5 tables which give an over-all picture of the effect of music in 9 industrial classifications.

It seemed advisable to visit various types of industries in order to see whether any special problems prevailed. This turned out to be the case. Many shipyards and riveting departments in aircraft plants in particular, had special problems which necessitated a limited use of music during actual working hours. These points are brought out in the tables.

TABLE 1

Types of Industrial Plants Surveyed

Industrial classification	Number of plants	Total employees	Total female employees	Percent female employees
Aircraft	14	154,000	58,000	38
Shipbuilding	11	299,000	34,000	11
Communication, electrical equipment, and instrument manufacturing	18	43,000	22,000	52
Ordnance manufacturing	9	47,000	16,000	34
Machinery and machine tools	6	13,000	3,000	26
Auto and auto parts	4	8,000	3,000	44
Miscellaneous stamping and metal parts	3	1,000	325	25
Textiles	2	6,000	4,000	61
All other	9	6,000	4,000	67
Total	76	577,000	144,325	25

It was thought that plants predominately male or female would exhibit music preference. It was found that the kind of music played in shipyards employing 11 percent female workers differed

from the kind used in communication, electrical equipment and instrument manufacturing plants where the female employees amount to 52 percent of the total. As will be shown later, it seems more desirable to make efforts to improve the atmosphere and working conditions in plants predominately female than in those where male employees are more numerous. As shown in the table, the total number of workers covered by the survey was over 500,000 and, whereas only 25 percent of these were female at the time of the survey, new employment is causing a rapid rise in the percentage ratio of women to men, which makes music of more and more importance in maintaining efficiency among women workers.

TABLE 2

Analysis of Length of Music per Shift

Industry classification	Length of music program per shift				
	(1) Total plants	(2) Under ½ hour	(3) 30 to 59 minutes	(4) 60 minutes to 1 hour and 59 minutes	(5) 2 hours and over
Aircraft	14	2	7	4	1
Shipbuilding	11	2	6	3	.....
Communication equipment	18	.....	4	7	7
Ordnance	9	1	6	1	1
Machinery, etc	6	.....	1	2	3
Auto and auto parts	4	.....	.....	2	2
Miscellaneous metal stampings	3	1	2	.....	.....
Textiles	2	.....	.....	.....	2
All other	9	.....	2	1	6
Total	76	6	28	20	22

Columns 4 and 5 show that music programs lasting more than 1 hour are found for the most part in the communication equipment and "all other" miscellaneous manufacturing plants, with aircraft and machinery second, and auto parts third. Very long music

programs, however, occur mainly in communication equipment and "all other" groups. Column 3 shows that the length of program most favored seems to be between 30 minutes and 1 hour, with 28 of the 76 plants falling in this category. This is partly due to the fact that music in shipbuilding and aircraft plants has been limited to lunch periods, change of shifts and rest periods. The same is partly true of ordnance. These three classifications account for 24 of the 34 plants having music for less than an hour per shift; account for 19 of the 28 plants having music for 30 to 59 minutes per shift. This is pointed out to avoid an interpretation of the table to the effect that the ideal length of music programs is under an hour. If conditions permit, 2 hours of music per shift appear to be more effective than 1.

TABLE 3

Analysis of Length of Music per Shift During Working Hours Only

[Exclusive of lunch, rest periods, and change of shift]

Industrial classification	Total plants	No work music	Under ½ hour	30 to 59 minutes	60 minutes to 1 hour and 59 minutes	2 hours and over
Aircraft	14	5	2	5	1	1
Shipbuilding	11	8	.....	2	1	.....
Communication equipment, etc	18	.....	.....	4	7	7
Ordnance	9	6	1	.....	1	1
Machinery, etc	6	1	.....	1	2	2
Auto and auto parts	4	.....	.....	.....	2	2
Miscellaneous, metal stampings	3	1	2	.....	.....	.....
Textiles	2	.....	.....	.....	.....	2
All other	9	3	1	.....	1	4
Total	76	24	6	12	15	19

The absence of work music in a large part of the aircraft and shipbuilding industries is due to riveting and the general nature of the work. This, however, is not the reason that two-thirds of the

ordnance plants lack work music. It is true that the noise level in some of these plants is high, but the length of programs in some cases is governed by the policy of representatives of procurement agencies located at the plants. The table shows that with the four exceptions of aircraft, shipbuilding, ordnance, and miscellaneous stampings, the remaining classifications all favor large amounts of music during working hours.

It will be noticed that of the 14 aircraft plants, only 9 have any work music at all; and with 2 exceptions, these have less than 1 hour apiece. Of the 11 shipbuilding plants studied, only 3 attempt music during working hours and 2 of these have less than 1 hour per shift. A similar falling-off in length of programs is observable in ordnance plants, whereas communication equipment, auto parts, textiles, and most of the miscellaneous plants find music effective during working hours for as long as 2 hours or more per shift. This is because the type of machinery noise differs in quality from the riveting found in aircraft plants and shipyards.

TABLE 4

Analysis of Use of Music at Beginning and/or Ending of Shifts

Industrial classification	Total plants	Music at—				Data not available
		Both beginning and ending	Beginning but not at ending	Ending but not at beginning	Neither beginning nor end	
Aircraft	14	6	1	1	4	2
Shipbuilding	11	4	.....	.....	7	.....
Communication Equipment, etc	18	7	3	2	5	1
Ordnance	9	2	.....	.....	7	.....
Machinery, etc	6	3	.....	.....	2	1
Auto and auto parts	4	3	1	.....	.....	.....
Stampings and metal parts	3	.....	1	.....	2	.....
Textiles	2	1	.....	1	.....	.....
All other	9	5	.....	.....	4	.....
Total	76	31	6	4	31	4

Note that 31 out of the 76 plants have music at both ends of the shift while another 10 use it either at the beginning or the end. There would be more widespread use of music at this period of the day were it not for the fact that such music, when used in crowded areas, tends to disturb the sleep of either day- or night-shift workers since it it played out-of-doors, to greet workers coming to and leaving the plant. Whenever practicable, full use of music is recommended at both beginning and ending of shifts.

TABLE 5

Analysis of Length of Music Program During Lunch Period

Industrial classification	Total plants	No music	15 minutes or less	16 to 20 minutes	21 to 30 minutes	Over 30 minutes
Aircraft	14	3	.....	.....	9	2
Shipbuilding	11	.....	2	1	8	.....
Communications equipment, etc	18	4	3	.....	11	.....
Ordnance	9	.....	1	.....	8	.....
Machinery and machine tools	6	1	1	.....	4	.....
Auto and auto parts	4	1	.....	.....	3	.....
Miscellaneous stampings and metal parts	3	.....	2	.....	1	.....
Textiles	2	.....	.....	.....	2	.....
All other	9	.....	.....	1	6	2
Total	76	9	9	2	52	4

Both the aircraft and shipbuilding industries favor fairly long lunch programs because they lack music at other times. Plants having less than 30 minutes of music usually have the balance of the lunch period devoted to news broadcasts. Only a small number of plants have more than 30 minutes at lunchtime.

Workers in some of the smaller plants in the communications field especially, eat in nearby restaurants; hence there is no plant music during this period. However, workers often play juke boxes in the restaurants.

III

DETAILED ANSWERS TO IMPORTANT QUESTIONS

1. Relation of Music to Improved Morale

The positive effect of music on plant morale is the fundamental fact brought out by this survey. History is full of instances in which music has played a part in stimulating courage, fortitude, morale, but its application to industry is relatively new. One has only to recall the use of music in ancient times when the Greeks blew their trumpets amid the clash of battle, and in more recent times there have been marching tunes such as Dixie and The Marseillaise as well as music played by the Navy when coaling ships. Musician-soldiers playing bagpipes bravely marched in the first lines as the British Eighth Army attacked Rommel in Africa. Music and readings were employed in the cigar factories of Havana and Florida. Before the machine-age the use of music often set the pace for marching and certain manual movements; for instance, Song of the Volga Boatman accompanied the towing of barges; domestic songs of the Hebrides accompanied housework; and in southern quarries the Negro singers at either end of a granite block governed the beat of the hammer on the chisel.

With the advent of the machine age, the rhythmic possibilities of music are lessened because the machine sets the pace and the worker follows, performing manual functions almost automatically. Therefore, it is the broad psychological effect rather than the rhythmic effect of music which becomes important. We have only scratched the surface of possibilities of this psychological effect which touches the border of what might be called "music therapeutics."

What is meant by the expression "Music improves morale"?

In this report morale is defined as a state of mind conducive to sustained efficiency in the war effort under difficult conditions. For our purposes, the definition of music embraces all types from classical to swing.

TABLE 6

Relation of Music to Improved Morale

[Analysis of Answers of Labor and Management Representatives to the question "Does Music Improve Morale in Your Plant?"]

	Number of plants	Percent of plants
Plants in which morale was improved	66	87
Plants in which effect on morale was uncertain	8	10
Plants in which morale was not improved	2	3
Total	76	100

Only two plants claimed no improvement and each of these plants had music for less than one-half hour each day. The survey, as will be shown later, indicates it is quite possible that more music and better mechanical equipment would result in improved morale in these plants also.

2. Length of Music Program Affects Morale

This brings us to the length of the music program in relation to improved morale and table 7 shows that there is a definite relationship.

TABLE 7

Relation of Length of Music Program to Improved Morale

[Comparison of answers to question "Does music improve morale in your plant?"—with length of music program]

Length of music per shift	Number of plants	Percent stated improved morale	Percent uncertain	Percent stated did not improve morale	Percent refused opinion
Under half hour	6	50	17	17	16
Half to one hour	31	84	16	.....	.....
Over one hour	39	100	.....	.....	.....
Total	76	.....	.....	.....	.....

Improved morale is claimed in every instance where music programs last 1 hour or more, but in only half of the six instances where music lasts less than a half hour. The programs in many plants could be lengthened were it not for reluctance on the part of management to "overdo a good thing." This is a subject that cannot be dealt with in terms of generalities. Each plant has its own very specific conditions and problems. A little experimentation in lengthening music programs wherever they are under one hour in length is recommended, since the survey shows that such action is more likely to produce good results than bad.

3. *Does Music Increase Production?*

TABLE 8

Relation of Music to Increased Production

[Analysis of answers to question "Does music increase production in your plant?"]

	Number of plants	Percent of plants
Increased production claimed	43	57
Uncertain	23	30
Did not increase production	1	1
Refused to give opinion	9	12
Total	76	100

To the question "Do you think music increases production?" 57 percent of the answers were "yes" and 30 percent "uncertain." However, the "uncertain" column does not mean that everyone in these 23 plants doubted that music increased production, because these answers represent the composite opinions of foremen, personnel managers, union leaders, members of the Labor-Management Production Committee and others. Unless a "yes" response was received unanimously from all persons queried in the plant, it was listed as "uncertain." This accounts for about half of the cases, while the balance of the "uncertain" answers are mainly due to the extreme newness of the program. The one plant which was sure music did not increase production had a program of only 15 minutes per shift. The 12 percent which refused to give an opinion, disregarded the question on the grounds that their interest in music was other than its effect on production, i. e., making the plant an attractive place to work; to recruit workers by advertising "Music while you work"; because the workers liked it; or finally, because music is believed to improve morale.

4. *Length of Music Program Affects Production*

TABLE 9

Relation of Length of Music Program to Increased Production

[Comparison of answers to the question "Does music increase production in your plant?"—with length of music program]

Length of music per shift	Number of plants	Percent stated increased production	Percent uncertain	Percent stated did not increase production	Percent refused opinion
Under half hour	6	17	50	17	16
Half to one hour	31	55	35	.....	10
Over one hour	39	66	18	.....	16
Total	76	.....	.....	.....	.....

The length of the program seems to have the same bearing upon increased production as it does upon improved morale. Table 9 shows that of the 39 plants with over an hour of music per shift, 66 percent claim increased production, and it is only within this group that percentage figures are offered on actual production increases. These increases range from 5 to 10 percent; although the figures are not supported by much factual data, there is unanimity of opinion on this point.

Those who refused to give an opinion as listed in the last column, had the same reasons as those refusing in table 8 above.

The table shows that the longer the music program the more certainty is expressed as to its positive affect on production; conversely, the number of plants doubting production benefits decreases as the length of the program increases. Thus, for plants having programs under one-half hour, only 17 percent are sure that music increases production and 50 percent are doubtful; while in plants having programs over 1 hour in duration 66 percent are sure and only 18 percent are doubtful.

(*a*) *Relation between morale and increased production.*—It is both instructive and important to compare the 87 percent affirmative replies to the question, "Does music improve morale?" with 57 percent affirmative answers to the question, "Does music increase production?" Here is a gap of 30 percent of the plants. It would seem logical to assume that some of these, having claimed improvement in morale, would state for this very reason that production had increased also. This is probably due to the pressure of wartime conditions where so many factors enter into the situation. It leads to hesitancy on the part of officials to unequivocally link morale to production without factual data. Yet this relationship undoubtedly exists.

5. *Music in Noisy Departments*

At first, many plants felt that they could not have music because their departments were too noisy. Then it was discovered that, with proper engineering, even great noise could be overcome by music and that the effect of adding music to the machinery noise did not add to the total noise, but that the machinery noise somehow became the background for the music. After a trial it was found that the workers in noisy departments appreciated the music fully as much as the workers in more quiet departments. For example, the weaving shed of a large New Jersey worsted mill was almost as noisy, with 102 decibels of sound, as the din of riveting. Yet, when this area was covered by a great number of speakers of the proper design to spread and distribute the music as one distributes light, very excellent results were obtained; and it was unnecessary to tune the speakers so high as to produce a blaring sound. A record of the Skaters' Waltz, heard under these conditions, came through the 102 decibels of machinery noise in a remarkably satisfactory manner. The effect upon the workers seemed good and their response to questions shouted at them was that they liked the music.

Machinery noise in a heavy industry manufacturing machine guns in Detroit was also observed to be fully overcome by music.

The main tube assembly rooms in numerous plants manufacturing electrical equipment often register machinery noise as high as 90 decibels.

There are, of course, exceptions to the use of work music in noisy departments. The survey shows that music during actual working periods is ineffective in shipyards, not only because the nature of shipbuilding is noisy, but for the reason that it is less continuous, repetitive and boring than other industries and the area to be covered is much greater per worker. Hence, music in shipyards is usually confined to lunch periods. A similar situation exists in airplane factories where hundreds of hand-riveting machines are in use, and in other industries having blowers, or machines emitting loud tones of definite pitch, squeaks, or other high persistent sounds.

(*a*) *Acoustical conditions in plants.*—One cannot visit a great number of industrial plants without being impressed by the lack of thought paid to acoustical conditions, even in plants of recent construction. Aside from the benefits of a music program, acoustical treatment to reduce unnecessary reverberations bouncing off so many hard surfaces would undoubtedly save wear and tear on workers' nervous systems and thus increase morale and production. Mounting machinery on industrial cork to prevent transmission of sound through the floor will often reduce noise levels at a small cost.

6. *The Ideal Sound Equipment for Music*

We have already noted that the success of a music program depends upon mechanical as well as psychological factors. Often, music programs have been inaugurated by playing records over a paging system never intended for music. Paging systems are usually designed to operate on a band of from 500 to 2,000 cycles per second. This

makes for clarity and crispness in reproducing the vowels and consonants of the human voice. Music broadcast over such a system is deficient in bass notes as well as in over-tones which determine tone quality; thus, the sound of instruments is considerably distorted with harmony often left uncertain because of the absence of a strong fundamental tone.

In as many as 25 of the plants visited, the paging systems had been or were being torn out. New and additional speakers were being installed and amplification stepped up to care for the greater load necessitated by these changes. The broadcasting range was being expanded to include frequencies lower than 500 cycles and up to 6,000–8,000 cycles.

The problem of the right type of speaker was being studied by many plants. In noisy corners a directional speaker of the trumpet type proved to be better than the cone type of speaker, while in areas where the machinery noise was uniform, 180-degree speakers spread the music in all directions most satisfactorily. Speakers of too light construction developed an unpleasant fabric buzz which interfered with enjoyment of the music.

(*a*) *Paging and announcements.*—Sixty-one percent of the plants used the public-address system for paging and 65 percent used it for announcements.

Since paging and announcements are more effective in a narrow broadcasting band of from 500 to 2,000 cycles, mechanical devices have been installed to permit paging within this limited band on the same system that carries music over a wider band. Actually, the most satisfactory paging takes place over a softened background of music. When paging is completed, the music returns automatically to its normal level of intensity. Thus, workers hear the music continually in spite of the paging; in instances where the tunes were stopped altogether during the paging, workers became considerably irritated. For announcements, of course, the music should stop altogether.

It is recommended that Labor-Management Committees study the problem of paging, which in some plants goes on so continuously that it seriously interferes with the effectiveness of the music programs. For this reason it was found that some plants have cut down their paging by as much as 70 percent.

A mechanical device of great usefulness is the compressor-expander which automatically controls, or monitors, the sound level of recordings, preventing fade-outs of the softer portions of the music and the blaring of the loud parts. This inexpensive device is attached to the first tube of the amplifier and the wiring plan can be obtained from any of the large manufacturers of P. A. Systems.

(*b*) *The care of phonograph records.*—Some plants have failed to file phonograph records in closed containers, with the result that grit and dirt rapidly accumulate in the grooves, producing unpleasant surface scratching and causing early deterioration of the records. An ordinary office file cabinet is an ideal place to store records. Proper needles should always be used, and records should be cleaned before and after each playing with a pad supplied by a gramophone company.

(*c*) *Maintenance of sound-equipment system.*—A frequent check on the intensity of each loud speaker should be made as these have a way of going awry without apparent cause. The hanging of the speakers should not be too high or too low, and if possible, they should be placed in sheltered positions where they will not be struck by extension ladders wheeled about the plant and used when replacing burned out lights. Proper intensity of the speakers cannot be adjusted by an outsider because the ears of the workers become accustomed to machinery noise in a manner similar to the adjustment of the eye in the motion-picture theater. Conversations with workers show that they are able to hear music satisfactorily when it is tuned down to a point that seems quite indistinct to an outsider. This is because their ears have become adjusted to the machinery noise and

any additional sounds become relatively audible. Therefore, adjustment of loud speakers should be made in accordance with this principle.

(*d*) *Manual monitoring.*—In the absence of a compressor-expander mentioned above, it is advisable to control variations in tone volume found in commercial records, or variations in intensity between various types and makes of recordings by monitoring the programs manually. This is done by an employee who listens to the program, watches volume fluctuations recorded on a meter and maintains the program at more or less constant level by a control knob.

(*e*) *Ideal records.*—Ideal recordings for industrial work music vary only slightly in volume, say from plus or minus two decibels of tone intensity. There are few such records available and the need for them is very great. The majority of the plants surveyed asked for them.

7. *Psychological Attitude of the Workers toward the Music Program*

As stated at the beginning of this report, some music programs were rendered relatively ineffective because the workers suspected that they were "guinea pigs" for a music experiment. Although observers have felt that some music programs might be resented by workers feeling that fast music was being played to urge them into speedier production, this was not observed in any of the plants covered by the survey. If such a policy ever existed it must have been abandoned very promptly in favor of the philosophy that greater efficiency results from using music to relieve boredom from repetitive operations, to reduce nervous tensions, to take the worker's mind off himself and in general, to make the plant a more attractive place in which to work. A quick march like Yankee Doodle or Dixie has a very limited use in industry. Talks with

factory officials on this point brought out that marches do brace the shoulders and raise the chins as workers leave the factory in a pouring rain at the end of the shift. At one aircraft factory, requested by the Navy to work 18 hours overtime to produce certain badly needed planes, martial music, accompanied by coffee and sandwiches, did wonders in sustaining the production rate. But these are unusual instances.

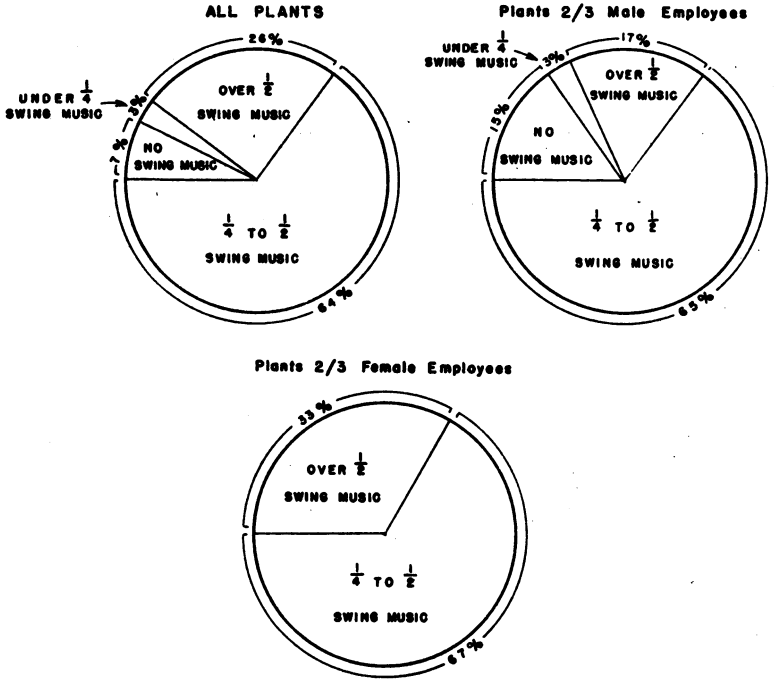
The best psychological attitude results from a feeling on the part of the workers that they have a voice in the music program. Although request boxes and suggestion boxes are recommended, the survey shows that questionnaires on music preferences are more reliable. It also appears that good results follow the practice of giving the Labor-Management Production Committee the responsibility of maintaining the music program. The labor members of this committee are in a better position to reflect the workers' desires and to correct faults in mechanical reception, while management members should supervise the kind of music played and check results. An alternative which appeared to be very successful in a number of plants of great size was to engage the services of an outsider, experienced in the field of entertainment, to run the music program with a trained staff, and to announce frequently over the P. A. System "This is your program, tell us what you want and we will try to give it to you."

8. The Kind of Music Played Is of Paramount Importance

In spite of the fact that Strauss Waltzes seem to lead all other forms of music in popularity, swing music in the aggregate occupies a preponderate place. The three pie charts below show the time devoted to swing music; defined as current popular music of today either with or without vocals but distinct from "jive" or "hot swing."

TABLE 10

Analysis of Amount of Music Time Devoted to Swing Music in All Plants, in Plants With Two-thirds Female Workers, and in Plants Where Two-thirds of the Workers Are Male

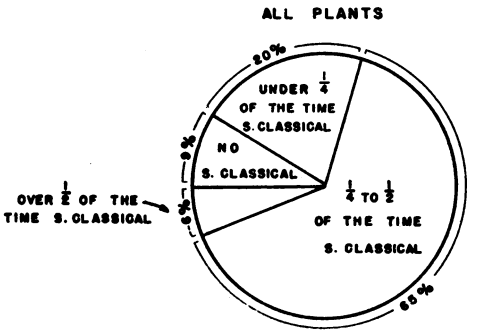


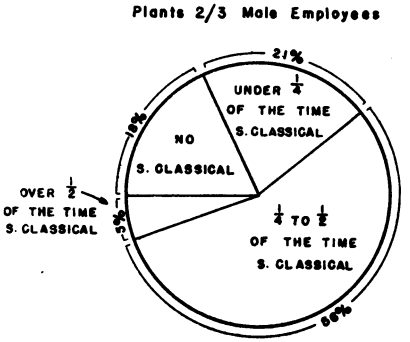
In all three cases from one-quarter to one-half of the time is devoted to swing music in roughly 65 percent of the plants. Curiously enough, 15 percent of the plants with two-thirds male employees have no swing at all. This is largely because the music is supervised rather strictly by managements that distrust swing. The longer swing programs are found in plants predominately female. This is partly due to the fact that communication, electrical equipment and instrument manufacturing companies as well as textiles employ a great many women on the night shift. When they enjoy programs of popular music they often join in and sing the words of their favorite tunes to the accompaniment of the loud speaker. This in no way interferes with the flow of production because their work is of a monotonous and repetitive manual nature. Visits to these plants during the night shift left the impression that music is a God-send to the workers.

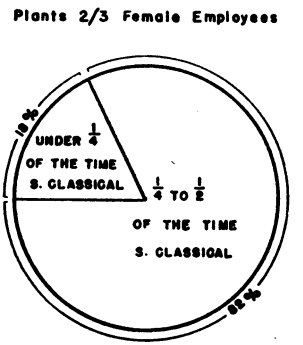
The use of semi-classical music (which must be defined broadly to include everything that is not swing, hot swing or strictly classical music and would therefore include such tunes as Strauss Waltzes, patriotic marches, national anthems, songs from the operettas, salon music, etc.), is just about as wide-spread as swing music in the total picture; 64 percent of the plants have this type of music from one-quarter to one-half of the total time allotted to music. The three pie charts below show a great divergence, however, in the amount of time devoted to semiclassical music on the part of plants having two-thirds male employees as compared with those having two-thirds female employees.

TABLE 11

Analysis of Amount of Music Time Devoted to Semi-Classical Music in All Plants, in Plants With Two-thirds Female Workers, and in Plants Where Two-thirds of the Workers are Male







As noted previously, the kind of music played is of paramount importance. This cannot be emphasized too often. Although the function of music in industry during war time is to improve morale and thereby indirectly increase production, it is not necessarily true that the request boxes alone can be trusted as a guide in formulating a program. If a majority of the workers request swing when the music program is inaugurated then, in the interest of morale building, efficiency and greater production, let them have swing. But even in this case the music taste of the workers may in itself be so limited that they are unaware of the existence of other types of music which might add enjoyable variety and which, by their nature, would also produce better psychological results than an exlusive diet of swing. Observation indicates that the tendency is to increase the amount of semi-classical music, especially since the present scarcity of new popular recordings has caused workers to grow tired of the old ones and to look for something different. No one type of music can be used exclusively without becoming a bore to the listener. Variety must be had if the program is to stay alive.

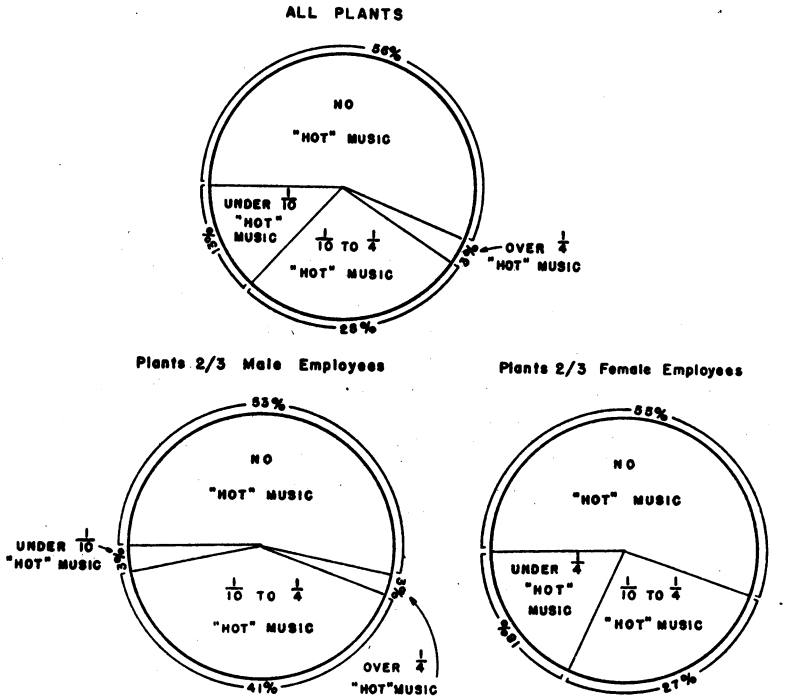
When request boxes are installed, it is often the young and enthusiastic "jive fans" who use them to the fullest, while the more conservative music lovers patiently sit back and take what comes. Sometimes this has led to the mistaken view that the whole plant desired the more raucous type of jitterbug music. After a trial of this type of music, some firms received unfavorable reports on production and lost faith in music. In some instances, music was then abandoned altogether, whereupon there was such an outcry from the workers that the program was reinstated, with hot swing eliminated entirely and in some cases the ban even included the so-called "corny" swing. Both of these extremes are bad.

Giving the workers what they want is a more difficult problem than it appears at first. It requires not one but a number of questionnaires over a period of time to keep up with changing tastes.

A questionnaire recently distributed to the workers of a Minneapolis ordnance plant disclosed the suprising information that one third of the employees preferred classical music to any other type during their lunch period. Such composers as Schubert, Tchaikovsky, and Beethoven were requested. In a southern California aircraft factory, a group of 100 workers organized a classical music appreciation hour once a week during their lunch period, and in a shipyard nearby one of the workers smashed a hot swing record that was being played on portable equipment during the lunch period. As he did so he remarked, "Why do we have to listen to that stuff, we hear enough noise all morning." In a shipyard in Oakland, Calif., the music was supplied by 7 live bands which play in various parts of the huge yard. The selections played by the largest band were of the classical and semiclassical type, such as one hears at the Goldman Band concerts in New York City. Judging from the applause, this music was received with considerable enthusiasm, which seems to show that music of a better quality finds favor with this type of worker, as well as the swing music which also figured on the programs. There is reason to believe that, as the seriounsess of the war bores into the consciousness of the workers and the sorrow of bereavement becomes more widespread, that there will be an increased demand for classical and semiclassical music of a cheerful yet solid quality, music that will give deeper and more lasting satisfaction than transient popular tunes which are more or less of a superficial and sentimental nature. (Some recommendations along these lines are made under the heading "Need for new recordings at constant tone level.") With more and more women coming into industry, many of whom are middle-aged and like semiclassical music, a need for more recordings of this kind becomes apparent. This is a necessary step if the benefits from a well-rounded music program are to be realized to the fullest.

TABLE 12

Analysis of Amount of Music Time Devoted to Hot Music in All Plants, in Plants with Two-thirds Female Workers, and in Plants where Two-thirds of the Workers are Male



The pie chart No. 12 showing the amount of "hot" music in plants preponderantly male, discloses that men take larger doses of this type than women. Programs having under 10 percent of "hot" music are found in 18 percent of the plants with two-thirds female workers but only 3 percent of the plants having two-thirds male workers have so little. Furthermore, none of the former plants has more than 25 percent of this music while 3 percent of the latter have over 25 percent.

After conversations with numerous personnel managers and labor representatives on this subject, the conclusion was reached that the amount of "hot" swing music would be reduced to the vanishing point if not for the vociferous demands of the ardent fans who still bring their own records and plead with management to play them. Workers who are opposed to this kind of music remain inarticulate so the minority has its way. From a production point of view, "hot" swing is certainly "music of diminishing returns," and only deserves a place in the program for variety's sake. The harsh tone quality of the orchestrations are also very unsatisfactory in competing with machinery noises.

9. *The Right Moment to Use Music*

Music must be played at the right time to obtain best results. Consider, for instance, the use of marches. After considerable experimenting by many plants, it is now generally agreed that with the exception of certain specific occasions such as the appearance of a war hero, government official, etc., marches serve best at the change of shift. At the beginning of the shift they create a cheerful atmosphere and prepare the way for playing quieter types of music. If they are used at the end of the shift, marches aid in promoting a "chin up" attitude as the workers leave the plant. In one plant when the autumn rainfall was heavy, the workers used to trudge dismally homeward with their collars turned up, but after the introduction of marches, they were seen to step out at a lively pace with shoulders braced and feet keeping step with the music.

During the lunch period, however, marches have been tried with negative results. "No marches during meals, please," has been one of the most frequent requests by employees. It is possible, however, that a march played at the moment of returning to work after the meal is over, might prove to be an excellent idea, if used occasionally. In general it appears that it is more satisfactory to add machinery noise to music than to superimpose music upon machinery noise. Music programs that carry over from change of shifts, rest

periods and lunch periods are psychologically satisfying even though the carry-over period is short. Once again, variety should be kept in mind and the same type of music not played at the same place in the program every day of the week.

During working hours an occasional march seems to find favor with the workers. Any feeling that marches cause women workers to think of their men in the Armed Forces and become depressed, was not substantiated by the survey. However, as our casualties increase, this may become true, and the situation should be checked frequently by those in charge of the music program.

The best time of day for Strauss Waltzes appears to be at the so-called fatigue periods. There is something about ¾-time that is very refreshing at moments of fatigue. Besides, the music is gay and lighthearted, it leads every form of music in popular appeal, according to questionnaires filled in by workers at three large plants. What better music could there be as a restorative at rest periods or during the lunch period?

The best time of day for "jitterbug," if it is to be used for variety's sake, is between the opening of the shift and the first fatigue period. It is best to avoid this type of music during meals, in order, as one foreman put it, "To give the digestion a break." The best time of day for the hit tunes could not be ascertained by the survey, and too much importance need not be attached to the problem of when to play this kind of music. From a standpoint of production, the maximum effectiveness seems to be during the first half hour during the working day. Observation shows that workers "get into the groove" faster under the influence of music than they do without it. It has been stated that as much as 30 minutes of time has been saved in getting under way in the morning. There is reason to believe that the time saved in this period of the day largely accounts for the increased production claimed by many plants.

10. *The Cost of a Public Address System*

The simplest method of computing the cost of a P. A. System is 5 cents per square foot of the area to be covered by sound. This is merely an approximate figure, for in noisy departments the cost may rise as high as 7 or 8 cents, while it may drop to 3 cents per square foot in quiet departments. Cost will also vary according to the quality of music desired. It pays to get the very best equipment, but this is not always possible to find. One of the minor costs that can save money later is a properly designed control panel. The number of cut-out switches should be given careful thought and provision made for later hook-ups into certain departments of the plant which may not be considered suitable for music at the outset. The survey shows that, in a number of instances, noisy departments or engineering departments and clerical departments were left out of the installation on the assumption that not only was music unsuitable in such places but that the workers would resent it. After the program was put into operation in the other departments, however, requests began to come in from the departments that were omitted and rose to such a crescendo of insistence, that they had to be granted. This involved changes in the panel and in the amplification which might have been taken care of at small cost if this popularity had been foreseen in advance.

The worker's contact with the music is through the loud speaker, which in the aggregate, accounts for a large part of the cost. From the point of view of worker satisfaction and increased morale, the cost of the speakers should not be figured too closely. A sound system is something that has to be lived with day after day. Morale building can be seriously handicapped by a music program that sounds thin and inadequate. The plant should be carefully examined by experts equipped with meters for measuring machinery noises, etc. The possible uses for the system should be planned in advance so that an adequate number of cut-outs for departments and even smaller divisions can be provided. In actual operation it often turns out that some departments need music more frequently than others,

and if cut-outs are not planned from the beginning, the flexibility of the music program is seriously curtailed. A few extra dollars spent in getting first-class engineering and equipment will produce really fine results and yield dividends in increased morale and production. This is the enthusiastic opinion of plants possessing such equipment. The survey did not disclose a single plant which was cutting down on the number of speakers; on the contrary, the number per square foot was being increased in about 25 percent of the plants visited in order to achieve better coverage.

The survey showed that the cost of P. A. Systems in war plants varies from $250 to $80,000. The figures are determined by the size of the plant, acoustical conditions and the level of machinery noise. The explanation of the lowest figure is found in the fact that some small electrical communication equipment plants used their own engineers and equipment for small systems, while the large figure of $80,000 represents the cost of installing a P. A. System in a huge shipyard for inside and outside use. This $80,000 figure represents the largest installation cost uncovered during the survey, but by no means represents the greatest amount that might be spent in a single plant. One of the bids for installing a P. A. System in a very large Detroit airplane factory is said to be in the neighborhood of $400,000.

11. Other Uses of a Public Address System

Although music is, in the words of one large aircraft employer, "the backbone of the broadcasting program on our public address system," the other uses of the system for morale building and increased production should not be overlooked.

The existence of a P. A. System makes it possible for a single voice to reach all the workers at the plant at once. The advantages of this are obvious. Messages covering the major objectives of war production, either through a "live" voice or by means of recorded announcements are often made more effective when preceded by a minute of music. Here is a list of subjects covered by

1-minute recorded announcements used in all the plants of one large aircraft corporation:

Absenteeism.
Punctuality.
Quality.
Waste and spoilage.
Suggestions.
Tool breakage.
Recruiting new employees.
Safety.
Health.
Loose talk.
War bonds and stamps.

In addition to recorded talks and announcements by management and factory personnel, this company also believes in using morale building material of a general nature, including:

1. News and letters from former employees in the service.
2. Reports on the performance of company products.
3. Pledges to men leaving for the service.
4. War bonds—interviews with employees on why they are buying.
5. Telegrams and letters from Government officials.
6. Announcements of winners in departmental and individual competitions.
7. Rebroadcast of parts of important speeches and highlights of plant rallies.
8. Talks by President Roosevelt, Donald Nelson, etc., or excerpts.
9. Rules, regulations, company policies.
10. Employment opportunities.
11. Employee benefit announcements.
12. Transportation bulletins.

In addition, the management believes in broadcasting from time to time its own special company song, as recorded by a top-

ranking orchestra and vocalist. They believe that the fighting spirit in words and music has a fine effect on the workers.

In summing up the uses of their P. A. System, an executive of this company states that just as music and entertainment are the mainstay of radio broadcasting and serve as a setting for "commercials" and talks, so is music the backbone of any well-conceived plant broadcasting system and must be looked upon as the foundation of the program and not merely a side feature. This plant looks upon music as being valuable not only at lunch periods and between shifts, but at definite intervals throughout the working day, where it serves as inspirational background for daily labor.

This attitude towards music on the part of an aircraft manufacturer is particularly significant because, by the very nature of the work, which involves riveting, the opportunities to play music during working hours are much more limited than in the case of communications equipment, textiles, automotive parts and other industries.

Additional uses of the P. A. System not mentioned by this aircraft corporation, but used in a number of other industries, are announcements and messages to the employees of a more personal nature, such as congratulations on birthdays and anniversaries, and the like. This form of personal contact is generally very much appreciated because it makes workers feel that someone has thought of them.

12. Labor-Management Committees and the Music Program

Finally, the survey shows that Labor-Management committees have a vital part to play in making music programs effective. The organization of the Labor-Management committee usually includes a subcommittee on publicity and education, which handles numerous educational activities connected with the work of the committee. Music, as one of the services of the P. A. System, should be guided by this subcommittee.

It is important, therefore, that some of the publicity subcommittee members be musical, at least from a listening point of view, and able to appraise the value of various kinds of music played for the workers. In large plants, the music program becomes a full-time job. It must be thought of in terms of three shifts. It must be run as a "live" program would be run, with an ear to the ground for listener reaction. Even though there is no applause for a wired program, it should be assumed that attention is being paid to it. Questions should be asked and worker reactions gauged. There is nothing static about a music program. Equipment needs constant adjustment, tunes wear thin, variety becomes urgent, even a change of hours and timing may occasionally prove to be beneficial; and pieces of similar type, pace and orchestration should not follow one another too closely.

Music can increase production. The evidence is undeniable. Whether it does or not, depends on how it is handled. Too much emphasis cannot be placed on this. To illustrate how a Labor-Management subcommittee could improve a music program, the need for improvement in the manner of playing records in one large plant, may be pointed out. In this plant there was no control room, no case for filing records, no schedule of when the records were to be played. The records were brought in by the workers, and handed to a telephone switchboard operator, who stacked them in an automatic gramophone and pressed the starting switch. When the stack ran out she merely lifted the needle and put in a new supply. When she thought sufficient time had elapsed, she started the machine again. Many of the records were vocals and had unpleasant surface noises. While the records were being played, she also handled the paging, which in this plant amounted to as many as 1,100 calls a day. Each time the paging was made the music ceased entirely, so that the workers scarcely ever heard a piece without these interruptions. The result, needless to say, was an unsatisfactory music program and everyone was hesitant to claim any benefits from the program. A progressive Labor-Management com-

mittee could take such a situation in hand and correct these haphazard methods and create a constructive and efficient program.

TABLE 13

Analysis of Worker Reaction to Music

[Includes answers of individual workers and members of Labor-Management committees]

Reaction	Reaction of individual workers (number of plants)	Reaction of L-M committee members (number of plants)
Very enthusiastic	5	.....
Favorable	45	34
Neutral	6	9
Opposed	.....	1
No answer	[1] 20	[2] 13
Total	76	[3] 57

[1] No answers because interviewer was not able to contact workers.
[2] No answers because Labor-Management committee members were not available or held no views on music program.
[3] Exclusive of 19 plants reporting no Labor-Management committee.

IV

ANSWERS TO ADDITIONAL QUESTIONS

13. The Need for Recordings That Maintain a Constant Level of Sound

The question on the report sheet "Would recordings which maintain a constant level of sound increase the effectiveness of a program?" was answered in the majority of cases by an emphatic "yes." These answers show that the average gramaphone record, unless monitored, is unsatisfactory for industrial use, because such recordings have a considerable range of volume. In playing them from turntables hooked up to the P. A. System they reach many departments having a high level of machinery noises. It is impossible to set the sound system at any given point where the "lows" will remain audible over machinery noise without having the "highs" blast unpleasantly. If a P. A. System is set at a point where the "highs" are not unpleasant, a good portion of the record fades out and the workers do not hear the entire melody. The only way to overcome this situation at present is to monitor the system manually, which requires constant vigilance on the part of someone in the control room, or else to add a "compressor-expander," a device attached to the first tube of the amplifier which will monitor it automatically. Even the compressor-expander, however, is too slow for instantaneous response, which can only be obtained by more elaborate equipment at considerable cost.

If this equipment is not to be available for some time, it is certain that the problem of continuous audibility and enjoyment of music

can best be solved by creating special recordings for industrial use, which would not vary more than plus or minus two decibels. Any re-recording of existing music in the field of swing should be done, as far as possible, by the original name bands which the workers like to hear. It also suggests an opportunity to create excerpts from certain semi-classical and classical pieces which the workers will be sure to enjoy once they become acquainted with them. This is based on the excellent effect on workers of good music wired over telephone lines from companies furnishing industrial music. These programs are, in general, of a definitely higher value than those supplied by the plants themselves. The reason for this superiority is found in the fact that these companies have already re-recorded thousands of standard compositions in order to make them suitable for use in restaurants where there is considerable noise interference. The changes in intensity of volume between restaurant and plant are small, making them ideal for industrial use also; but unfortunately they are not obtainable in the open market.

14. The Use of Plant Talent in the Music Program

In addition to the music furnished by gramaphone records broadcast over the speaker system, about one-third of the plants surveyed have developed orchestras and choruses for the entertainment of their workers. These orchestras, composed of plant employees, do not perform during working hours but confine their activities to the lunch period. In large plants the half-hour lunch period is staggered over a two-hour interval, which keeps the "live talent" occupied certain days of the week for 2½ hours, including their own lunch period.

TABLE 14

Plants With Own Music Organizations—Band, Chorus, Swing Orchestra (Originating in Plant)

	Number	Percent
Total plants	76	100
No music organizations	40	53
Swing orchestra only	8	10
Symphony orchestra	1	1
Chorus only	7	9
Chorus and swing orchestra	6	8
Chorus, band, and swing orchestra	6	8
Band and chorus	3	4
Band only	3	4
Band swing orchestra	1	1
No information	2	3

Portable sound equipment is sometimes used to amplify live talent programs during the noon hour.

(*a*) *Orchestras and bands.*—These live-talent programs are thoroughly worthwhile and the quality of performance is often remarkably good, because the amount of first-class talent available in the majority of war plants is considerable. Only one symphony orchestra composed of workers was discovered in the course of the survey, and this was in Brooklyn, N. Y.

Several virtuoso bands, of the Goldman type, which played serious music as well as marches, were found in shipyards, one of which was in Oakland, Calif. This band music was picked up on portable equipment and amplified and relayed through a group of loud speakers so that more distant areas of the yard could be covered.

Swing bands of from 6 to 15 pieces were frequently found to be excellent. In far Western plants these bands accompanied singers and dancers brought in for "Lunch Time Follies" and were enjoyed by each of the lunch shifts. Because of favorable climatic conditions it has been deemed worthwhile to build permanent covered plat-

forms for the entertainers and semicircular bleachers for the 2,000 and more workers who eat their lunch while watching the show. The alacrity with which these workers return to their jobs after the lunch period, as compared to the lethargy before the "Follies" was introduced, was the theme of the majority of foremen, shop stewards, and plant officials.

(*b*) *Choruses.*—A few large industries had choruses before Pearl Harbor and many more have been developed during the past year. They range in size from a barber shop quartet, singing into the microphone, to choruses of a hundred voices and more, performing at special concerts in a downtown theater to which workers and their families are invited free by the management. Many of these choruses also sing a number or two on special programs in motion-picture houses, or over the air in connection with efforts to recruit more workers and for general advertising purposes, etc. (see table 14.)

(*c*) *Transportation problem (in relation to rehearsals).*—The growth of choruses and orchestras is retarded by the transportation situation. Rehearsals cannot be held after working hours because in many instances it means breaking up a car pool, and at the conclusion of the rehearsals the workers have no way of getting back to town. When attempts were made to hold rehearsals in the city, the same transportation difficulties were encountered. In spite of this, however, there is a gradual increase in the number of choruses and it is safe to prophesy that as the problems of transportation are ironed out, still more will come into existence. The presence of a fine chorus and orchestra within a plant has high morale value.

(*d*) *Community singing in war plants.*—Not much community singing was found during the survey. In a few plants, girls sang during working hours to the accompaniment of the P. A. System. During night shift, this kind of singing seemed to be very helpful.

In some of the plants visited, enthusiastic reports were made on plant singing led by Miss Lucy Monroe who visited war plants under the joint sponsorship of R. C. A. and War Production Drive Headquarters. It would appear that this is an excellent way to promote a feeling of "teamwork."

Leaders who have had experience in this field, such as Sigmund Spaeth, believe that the mass singing of war workers is important from a morale building point of view.

It would seem that a little effort to stimulate workers to sing a song or two during lunch period would not only be welcomed by them as an expression of participation, but would also have an inspirational and beneficial effect.

In plants where the workers gather in areas set aside for lunch-time entertainment, there is an excellent opportunity to sing a song. The words of the song could be mimeographed and distributed to the workers, or if more than one song were desired, song sheets procurable at various publishers could be distributed, or the words of a single song could be posted in large type on the bandstand. The best time to sing this song would be after a hundred or so workers were already seated and the rest were still coming in. The first hundred would act as a core which would be rapidly supplemented by the incoming workers who would join in, until the whole crowd was participating. As soon as all were seated, the community singing would stop and the main show would begin. It should not be difficult to find a personality to lead the singing among employees of the plant.

15. Original Music in War Plants

The amount of creative talent in every large war plant is considerable and is receiving more and more attention and encouragement. War Production Drive Headquarters has received a number of "production songs" written by workers who request aid in publication. As is to be expected in such cases, many of these are of mediocre quality, but one manuscript from a Minneapolis ordnance worker was published immediately by one of the largest music publishers in New York.

It is quite possible that more can be done in this inspirational field and it would seem that Labor-Management committees might well encourage such creative effort by putting on song writing contests and setting up boards of judges composed of leading local

musicians and others. If the winning compositions had only local interest, they could be chiefly reproduced for plant use. If some of them seemed to have more universal appeal and national significance, they could be sent to a list of recognized publishers who are only too eager for this type of music. If such creative activity became widespread, Whitman's words, "I hear America singing," would become thrillingly true.

16. Nationality and Type of Music

A good deal has been written in the newspapers about the necessity of ascertaining the predominating nationalities within the plant so that music can be planned accordingly. It is doubtlessly true that a small number of plants do have predominating nationalities. For example, a spark plug company in Detroit, Mich., has a preponderant number of Polish workers. A similar situation was found in two parts plants in Cleveland. These workers hear an unusual amount of Polish folk music and polkas. In the case of the Cleveland plants, this amounted to 10 percent of the music program, but after a trial of about 3 months this was reduced to approximately 3 percent by request of the workers themselves.

An insulator company in Baltimore has an unusual number of colored workers but there is no indication that they prefer Negro spirituals. Some Detroit and far Western plants have a high percentage of employees from rural areas and the mountain regions of Kentucky, Tennessee, and other States. As a result, their music programs have a higher percentage than usual of what is popularly referred to as "Hill-Billy" music, but the rest of the program is "normal."

17. Night-Shift Music

In spite of a few cases where night-shift music interferes with the sleep of the neighbors, the survey shows that it is used by 75 percent of the plants. The 21 percent reporting no night music are afraid of disturbing the neighbors, or have not yet put anyone in charge of the music program during the night shift. As to the

length of the program at night, 72 percent of the plants report that the music at night is the same as day; 1 percent reports more and 5 percent less music at night.

In general, night shifts are smaller than day shifts. But other factors being equal, the survey shows that music at night is even more valuable from the psychological point of view than in the day time. It is recommended that steps be taken to inaugurate a supervised program wherever it is lacking.

18. Use of Radio Programs

Radio programs for workers were seldom encountered during the survey. One large Portland (Oreg.) shipyard re-broadcast a news and music program during the lunch period. A New York City station, sensing that such a program would be useful, included it in their schedule but is uncertain as to its value because of small response. It would appear that some organized steps might be taken by war plants to bring radio into the production picture, as in England. The music programs would have to be guided by plant needs, as indicated by representatives of the Labor-Management subcommittee in charge of music.

19. Operating Cost of Running the Music Program

The cost of running music programs varies from engaging a full-time expert with a staff of assistants, to simply requesting the switchboard operator to play phonograph records on a nearby turntable. Between these two extremes, the survey found a number of plants charging the cost of music and P. A. System to various departments. In plants not possessing their own turntables, a leased wire music program is usually furnished on a monthly cost basis in proportion to the size of the plant area to be covered.

A total of 46 percent of the plants report monthly operating costs under $50, while 11 percent have monthly operating costs of $1,000 or more. The balance of the plants did not reply to the question because they do not separate operating costs from overhead or the expenses of other departments. Because the importance of

the program is gaining widespread recognition, the survey showed that there is a definite trend toward engaging full-time personnel to run the P. A. System.

For fairly large plants the ideal set-up would seem to be the employment of a trained director of broadcasting who would work closely with members of the Labor-Management committee.

As mentioned elsewhere in this report, the plant broadcasting program must remain fluid and subject to constant change to keep pace with the varying reactions of the workers; and, on the mechanical side, a constant check is necessary to keep equipment in efficient running order.

20. Size of Record Libraries in War Plants

Record libraries varied greatly, with 15 percent owning between 10 to 25 records, 25 percent owning from 26 to 500 records, and 15 percent owning over 500. There is naturally some connection between the size of the plant, the length of its music program, and the number of records in the library. Record companies are developing rental services for plants not owning their own records. (Names furnished on request.)

TABLE 15

Number and Percentage of Plants Owning and Renting Records

[Classified by record ownership and record rental]

Type of plants	Number of plants	Percent of total plants
Plants owning and not renting any records	45	59
Plants renting and not owning any records	3	4
Plants both owning and renting records	9	12
Plants neither owning nor renting records	[1] 13	17
Not ascertainable	6	8
Total	76	100

[1] These plants obtained music over leased wires.

21. *Background Music Felt, but Not Really Heard*

Some plants feel that the psychological effect of "music in the air" is important regardless of whether or not the music is definitely heard by the worker, in the sense that the piece played over the loud speaker system can be identified. As one foreman put it, "It makes the women feel at home, more like having the radio on in the house."

This attitude is in direct opposition to producing music with the best equipment for the purpose of giving enjoyment and a change of mental pace to the worker, either while he works or during rest and lunch periods. It is analogous to target practice with blank cartridges—there might be some satisfaction in aiming the gun and hearing the explosion, but you don't hit anything. This attitude in plants is a hold-over from the original prevalence of weak P. A. Systems incapable of transmitting music effectively. The survey shows that such programs are operating far below their potential efficiency.

22. *Survey of Music in War Plants Not Possessing a P. A. System*

In plants of this classification, noon day programs largely replace the Music While You Work programs found in plants with a P. A. System. Out-of-door lunch programs are often used all year round in plants in the South, the Gulf States and on the West coast. In the East, navy yards and other shipbuilding operations employ music during the summer months.

(*a*) *Music at change of shift.*—By means of portable or temporary equipment at entrance gates, it is possible to play the workers in and out of the plant without the elaborate installation of a P. A. System, and the use of such equipment for this purpose is effective at all seasons of the year.

(*b*) *Lunch programs with portable equipment.*—A few Eastern plants use portable equipment in the cafeterias during the cold winter

months. This equipment was occasionally used in the plant for special events, such as rallies, War Bond drives, etc. The sound qualities from such equipment is much less effective than from a P. A. System, even when loudspeakers are connected with extension cords to the portable equipment. In general, the program is too centralized to be effective, except for those in close proximity. Lunch music reaches its lowest ebb in the use of juke boxes installed in cafeterias. In installations of this sort the sound issues from only one point, the juke box itself, with the result that due to the clatter of dishes, conversation and other noises, the music has a very limited range and somehow seems only to add noise and confusion to the cafeteria; conversely, music from the right number of properly placed speakers has just the opposite effect.

(*c*) *Concerts for morale building.*—Several large concerns feel that they get splendid returns in morale building and worker attitude by putting on two or three mammoth shows each year. The workers and their families are invited to attend without paying admission. Some plants restrict attendance to membership in the company's Recreation Club. Two examples are mentioned to illustrate the varying type of entertainment. An Oakland shipyard takes over the Oakland Arena Auditorium, seating many thousands, and puts on a Hollywood show with screen talent, name bands, etc. The company pays for this talent and feels that the expense is justified in terms of worker reaction and increased production. In Indianapolis, the Indianapolis Symphony Orchestra, succeeded in interesting several war plants in engaging the orchestra for a concert of popular music to which the workers and their wives were invited free. This proved to be so successful that it was repeated. Another suggestion was to take over the circus for one night, but it is not known whether this has been acted upon by any war plant.

(*d*) *The need for permanent seating arrangements.*—Many plants attempt to bring noon-day programs to their workers without providing for proper seating arrangments. Conversations with personnel managers show that this lack is keenly felt and steps

are being taken to establish areas where the workers will be somewhat protected by the weather and furnished with seats or benches that face a permanent grandstand.

(*e*) *Live talent.*—The value of bands and orchestras in plants not possessing their own P. A. Systems cannot be overestimated and the survey shows that full use of them is made wherever possible.

23. *Additional Effects of Music*

This report is not complete without touching upon a few questions which appear on the report sheet but which have not yet been mentioned in the text. These are:

Was music used for dancing?

Was rhythmic music in which manual movements conform, used?

In general, may greater punctuality, fewer accidents, longer hours of piece workers and fewer rejects, be listed as things related to music?

To all these questions, the answers were negative. There was not sufficient time for dancing. Manual movements to the rhythm of the music proved to be inconsistent with the demands of the machine. As for greater punctuality, accidents, piece work and rejects, a few plants said that there might be some relationship to music but no figures had been kept showing the influence of the music program. It is, of course, possible to attribute some improvement in these particulars to general improvement in morale, but the exigencies of war production afford no opportunities for controlled conditions and accurate measurements.

24. *Unfamiliar Music*

To the question "Is music unfamiliar to the workers used?" the answers were almost all "yes." This implies, in general, that some of the music is unfamiliar to some of the workers all of the time.

25. *Appreciation of Good Music*

To the question "Does the music program aim to develop the appreciation of good music?" there were about 15 percent affirmative answers. Those who had this aim said that they believed good music would assist the war effort more than swing.

26. *Peacetime Plans*

To the question about peacetime plans, 50 percent of the plants thought they would carry on the music program after the war.

27. *What to Avoid*

The final question not yet touched upon, "What should be avoided in starting such a program?" brought forth a great many interesting answers which formed the basis, together with other findings of the survey, for a short manual on How to Conduct a Music Program as Part of the War Production Drive. The answers to this question may be condensed into four equal groups. The first group advised those who would start a music program to avoid doing so without careful planning in all particulars, both mechanical and musical. They agreed that much valuable time had been lost in making the program effective through haphazard methods. The second group agreed that the main thing to avoid was to attempt to run the music program without having one person in charge. The third group urged that amateur mechanical installations be avoided, insisting that expert engineers be called in at the start. Finally, the fourth group urged the avoidance of boogie-woogie, hot swing, jive, vocals and all forms of bizarre music which arrested the attention of the workers.

28. Problem of Shortages

In all parts of the country, plants wishing to intsall P. A. Systems were found to be held up by lack of materials. In view of the excellent response and general improvement of morale and production, it seems desirable that the necessary electrical equipment and telephone circuits needs for P. A. Systems be made available for war plants. As pointed out before, such systems are valuable even without the use of music; with music added, they constitute a powerful psychological aid to the war production effort.

APPENDIX

The report sheet used in the survey

MUSIC IN WAR PLANTS

Date.....

FACTS PERTAINING TO THE PLANT

Name of company..... Address.....
No. employees..... No. employed each shift.....
Percentage female.....
Description of type of principal departments using music.....
.....

FACTS PERTAINING TO LISTENING WORKERS

Skilled and Semiskilled Workers:
Total number..... Female..... Male.....
Predominating nationalities.....
.....
Number of hours of music per shift.... Average length of program.....
Type of music.....
"Hot" Swing Semi-Classical Lively Quiet Marches Vocal
.....
Noonday recreational programs?..... Dancing?.....
.....
Is background music which provides pleasant atmosphere chiefly used?.....
Percentage
.....
Is rhythmic music in which manual movements conform used?.....
.....
Percentage
What is greatest noise in decibels permitting use of music effectively?
.....

Description of this department.....

.....

Are shifts begun with music?..... Ended?.....

Percent emp. so affected.....%

What about night shift?.....

.....

Benefits derived from music program in general: See below.....

Improved morale?..... Do piece workers work longer hours with music?.....

Greater punctuality?..... Are fewer accidents traceable to music?..... Fewer rejects?.....

TYPE OF EQUIPMENT

Name of sound-equipment manufacturer.....

Approximate installation cost $.....

Percentage of installation now complete.....

Operating cost per month.....

Number of turntables used.....

Do you have manual volume control?.....

Is system used for paging, announcements, etc.?.....

Are radio programs broadcast over speakers?.....

Type of broadcast.....

.....

Number of owned records in library.....

Are additional records rented?.....

GENERAL

Is music unfamiliar to workers used?.....

Is there an employee's "Request Box"?.....

Date of starting program.....

Does the program aim to develop appreciation of good music?.....

Would recordings which maintain constant level of sound increase effectiveness of program?.....

Peacetime plans.....

Is there a plant band?..... Size..... Chorus?.....

Size..... Orchestra?..... Size.....

Which of these performs for employees?.....

Broadcasts over speaker system?.....

GENERAL CONCLUSIONS

Does the music program increase production?.....

Approximately how much.....%

Do you think your music program would produce similar results in other plants manufacturing same products?.....

What should be avoided in starting such a program?.....
.....
.....
Has the Labor-Management committee discussed music?.....
What does the Labor-Management committee think about it?.....
.....
.....
What do the Labor Members of the committee say about the reactions of the employees?.....
.....

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