FAULT DIAGNOSIS ON HERMETIC COMPRESSORS BASED ON SOUND MEASUREMENTS

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Master of Science Thesis

Electrical and Electronics Engineering Program

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COMMITTEE AND GRADUATE SCHOOL OF SCIENCES APPROVAL

Süha Toprak's Master of Science Thesis "**Fault Diagnosis on Hermetic Compressors Based on Sound Measurements**" at the Electrical and Electronics Engineering Program has been evaluated and accepted on 12 October 2006 by the committee stated below according to the related rules of Anadolu University Graduate Education and Exam Regulations.

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This thesis has been approved by the Anadolu University Graduate School of Sciences Executive Committee Decision dated ……………….….… and numbered …………………………… .

Director of the Graduate School of Sciences

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ABSTRACT

Master of Science Thesis

FAULT DIAGNOSIS ON HERMETIC COMPRESSORS BASED ON SOUND MEASUREMENTS

Süha TOPRAK

Anadolu University
Graduate School of Sciences
Electrical and Electronics Engineering Program

Supervisor: Prof. Dr. Altuğ İFTAR

2006, 92 pages

In this thesis, a fault detection study is made, using sound power level of hermetic compressors. Measurements took place in a room where microphones located at different places of a virtual hemi-sphere, which is designed according to international standards. Following the study for determining the faults to be used in this thesis, an experiment design is made, including normal and defective compressors. Consequently, manufactured compressors are tested in the sound power level measurement room and results are reported. The data obtained are examined by using Artificial Neural Network (ANN) method. The Multilayer Perceptron (MLP) model is used for the ANN. The data are divided in two groups; the former group is used for training the MLP network and the latter group is used for testing the model at hand. In the first of the basic experiments, only the summary data that emanated from the information coming from all microphones are used. On the other hand, in the second experiment, all data coming from all microphones are used. The results, showing that the first experiment is partially successful and the second is successful, are presented in the thesis.

Keywords: Fault Diagnosis, Artificial Neural Networks, Multilayer Perceptrons, Back Propagation, Hermetic Compressors, Sound Measurements.

ÖZET

Yüksek Lisans Tezi

HERMETİK KOMPRESÖRLERDE SES ÖLÇÜMLERİNE DAYALI HATA BULMA

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Danışman: Prof. Dr. Altuğ İFTAR

2006, 92 sayfa

Bu tezde, hermetik kompresörlerde ses gücü düzeyi ölçüm sonuçları kullanılarak hata bulma çalışması yapılmıştır. Ölçümler, belirli bir standarda göre tasarlanmış bir odada, sanal bir yarım küre üzerine çeşitli konumlarda yerleştirilen mikrofonlar aracılığı ile gerçekleştirilmiştir. Bu çalışmada kullanılacak hataların belirlenme çalışmasının ardından, normal ve hatalı kompresörlerden oluşan bir deney tasarımı yapılmıştır. Bunun sonucunda, üretimi yapılan kompresörler, ses gücü düzeyi ölçümü odasında test edilmiş ve sonuçlar raporlanmıştır. Elde edilen veriler, yapay sinir ağları yöntemi kullanılarak incelenmiştir. Yapay sinir ağı modeli oalrak çok katmanlı perseptronlar kullanılmıştır. İki ayrı bölüme ayrılan bu verilerden ilk bölümü çok katmanlı perseptronlar ağının eğitiminde, ikicisi ise elde edilen modelin testinde kullanılmıştır. İki temel denemeden ilkinde, sadece tüm mikrofonlardan gelen bilginin derlendiği özet veriler kullanılmıştır. İkincisinde ise, tüm mikrofonlardan gelen veriler kullanılmıştır. İlk denemenin kısmen başarılı ve ikinci denemenin başarılı olduğunu gösteren sonuçlar sunulmuştur.

Anahtar Kelimeler: Hata Bulma, Yapay Sinir Ağları, Çok Katmanlı Perseptronlar, Geriye Yayınım, Hermetik Kompresörler, Ses Ölçümleri.

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Süha TOPRAK

Kasım, 2006

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

ANN	: Artificial Neural Network
dB	: Decibel
Hz	: Hertz
L_P	: Sound Pressure Level
MLP	: Multilayer Perceptron
Pa	: Pascal
PAP	: Proper Assembly Procedure
P_{ref}	: Reference Sound Pressure
S/N	: Serial Number
SPL, L_W	: Sound Power Level
TE	: Initials for the Compressor Model
W	: Watt
W_0	: Reference Sound Power

1. INTRODUCTION

Hermetic compressors used in refrigerators are produced in large plants by mass production methods. From time to time, there may be some missing parts or faults in production. These are usually eliminated by periodic tests that are conducted on manufactured compressors. One of these tests is sound power level measurement test. This test is usually performed in a semi-anechoic room [1]. After the compressor reaches to steady state, the sound pressure is measured through the microphones located in a hemi-sphere according to international standards [2]. Then a frequency spectrum analyzer processes the measured data, and the output is given in 1/3 octave band as dB values [3].

The results of the compressors' sound power level test are evaluated according to the test specifications. The result may be above or below the limits of the specifications. When the result is not satisfactory, compressor has to be disassembled to identify the reason behind, which requires some workload. At this point, it is wondered if one can identify the fault just after the sound is measured and before the disassembly.

Most of the advanced topics related with hermetic compressors as well as other types of compressors are discussed in Compressor Engineering Conferences organized by faculty from The Ray W. Herrick Laboratories with help from many sponsoring and co-operating organizations from around the world [4]. The conferences have taken place every two years for over thirty years on the campus of Purdue University, West Lafayette, Indiana. Their focus is primarily on research and advanced development of components and systems. Within the published papers of these conferences [4] and in the thesis search portal of Turkish Council of Higher Education (YÖK) [5], there was no literature on research related to the fault diagnosis by Artificial Neural Networks (ANNs) using sound power levels on a hermetic compressor.

In this study, a method is investigated to examine the compressors' fault without disassembling the compressor. Multilayer Perceptrons (MLPs) in the area of ANNs is selected to be used to identify the faults. MLP network is trained using the back propagation algorithm. The results are given for many MLP network configurations; however the best results are obtained with one hidden layer and ten neurons in the hidden layer. In order to perform the back propagation learning many experiments are needed, which will supply training data to the MLP network. According to the results of a Design of Experiments (DOE) study, five different common faults are selected according to rationality, applicability and also by considering the quality reports [6]. Each time the same ten compressors, from each fault type, are assembled and tested sequentially under the same test conditions. In order to do these tests; initially, the compressors are tested without any faults with extra care among the mating parts and assemblies. In other words, these compressors are assembled without any faults and tested as normal compressors. Afterwards, compressors are disassembled and reassembled with each fault type defined in Chapter 4 followed by the tests. This procedure is repeated until all of the faults are tested.

All of the compressor assembly, disassembly and sound power level tests are conducted in ARÇELİK Inc. Compressor Plant, Eskişehir, Turkey within 6 months, from October 1999 through March 2000.

Two approaches are applied in this study. First one uses sound power level data that are given as a weighted average of all 12 microphones that are located on a virtual hemi-sphere at various positions. Second approach uses all 12 microphones' data, which means large input files and high computation time for MLP network training when compared to the first approach. According to the results that are given in Chapter 5, second approach gives satisfactory findings when compared to the expected targets, which are in this case defined as faults.

2. HERMETIC COMPRESSORS

The compressor is an important component of a refrigerator or an air conditioner. Compressors are used for moving gas in refrigerators. There are many types of them. However, the basic mechanics are the same.

The main working principle behind a refrigerator is very simple: It uses the evaporation of a liquid to absorb heat. The refrigerant, used in a refrigerator evaporates at an extremely low temperature, so it can create freezing temperatures inside the refrigerator. In a refrigerator, the cycle is continuous in a closed loop (see Figure 1).

There are five basic parts in any refrigerator (see Figure 1) [7, 8]:

1. **Compressor**: Located at the rear bottom of a refrigerator.
2. **Heat-exchanging pipes:** Condenser coils outside the refrigerator.
3. **Expansion valve:** Capillary tube.
4. **Heat-exchanging pipes:** Evaporator coils inside the refrigerator.
5. **Refrigerant**: Liquid creating cold temperatures via evaporation in the refrigerator. Nowadays, many compressors use R134a or R600 gas as the refrigerant.

The basic mechanism of a refrigerator works like this (see Figure 1) [7, 8]:

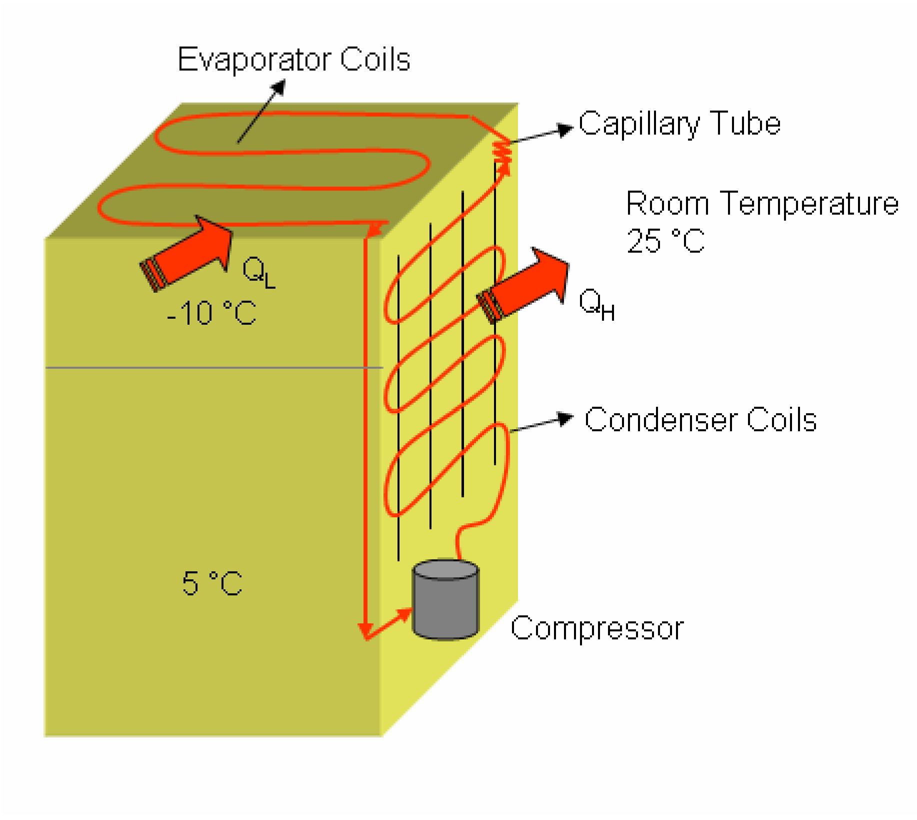


Figure 1: A Refrigerator and a Compressor

1. The compressor compresses the refrigerant gas, which heats up as it is pressurized.

2. The hot refrigerant dissipates its heat through the coils on the back of the refrigerator. The refrigerant condenses into liquid form at high pressure.

3. The high-pressure refrigerant liquid flows through the expansion valve (capillary tube), which acts as a flow restrictor. On one side of the restrictor there is high-pressure refrigerant liquid whereas, on the other side there is a low-pressure area out of which the compressor sucks gas .

4. The liquid refrigerant immediately vaporizes, which leads to constant heat absorption by the evaporator coils. This process causes inside of the refrigerator to be cold.

5. After the compressor sucks up the cold refrigerant gas, the cycle repeats.

Hermetic compressors, subject to this thesis, move gas within refrigerators, using compression mechanical action created by pistons driven by an electric motor in the same closed environment (casing, see Figure 2). They have a suction (intake) side and a discharge side. Compressors have means to cool and lubricate their motors and moving parts.

A hermetic compressor is made of more than 70 parts/components. Some parts that are related to this thesis are given in Figure 3.

Figure 2: A High Capacity Hermetic Compresor (TE-180)

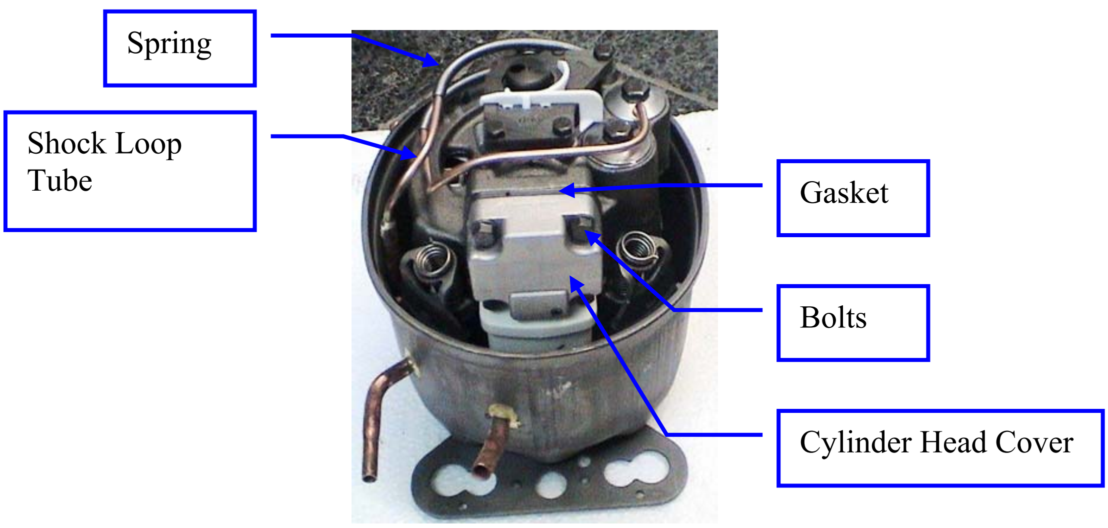


Figure 3: Inside View of the Compressor

3. METHODOLOGY

3.1. Artificial Neural Networks

In this thesis, Artificial Neural Network methodology is used. This methodology is selected for its proven identification and fault detection capabilities. ANN approaches for the identification of nonlinear dynamic systems offer efficient and profitable solutions. Building intelligent systems that can model human behavior is a very common approach in many fields today. Application of ANNs is one of the most appealing methods that are applied to almost all processes due to its certain advantages. ANNs [9]:

- provide problem solving based on sample data and learning mechanisms, which do not require expert knowledge representation, logical inference schemes, statistical algorithm or specialist/analyst to develop and code solution,
- they are trained either on-line real-time or off-line by a sample data set, to identify self contained key features and associations so that they can distinguish different patterns,
- provide solutions to pattern matching and recognition, data compression, also near optimal solutions to optimization problems, non-linear system modeling and control, function approximation, etc.,
- provide inherent parallel processing structure which brings faster solutions to a number of computation intensive problems,
- provide robust performance in view of noisy and distributed input signals,
- are inherently fault tolerant.

ANNs are parallel distributed processors, which have neurons as computing components [10]. There are weighted interconnections between the neurons, which leads to capability of storing experimental knowledge through a learning algorithm and make it available for use. The knowledge is stored in interneuron connection strengths (synaptic weights) that are modified until a desired model is acquired.

MLPs, which proved their success in pattern recognition problems, have received considerable attention in the area of ANNs [11]. MLP network consists of source nodes that form the input layer, one or more hidden layers of computation nodes, and an output layer of computation nodes. The calculations are done by the input signal propagating through the network in a forward direction, on a layer-by-layer basis. Typically, a neuron is a computation node that is processing information and is composed of three basic elements: a set of synapses, an adder, and an activation function. Usually the processing units have responses like (see Figure 4):

$$y = f\left(\sum_{i=1}^{n} w_i x_i\right) \qquad (1)$$

where

y = output signal of the neuron
$f(.)$ = nonlinear activation function such as the ones given in Figure 5
w_i = weight connecting the i^{th} input to the neuron
x_i = i^{th} input of the neuron
n = number of inputs to the neuron

MLP network is also the basis of the system identification composed of perceptrons with many hidden layers shown in Figure 6.

In this thesis, back propagation algorithm is applied and satisfactory results that are shown in Chapter 5 are obtained.

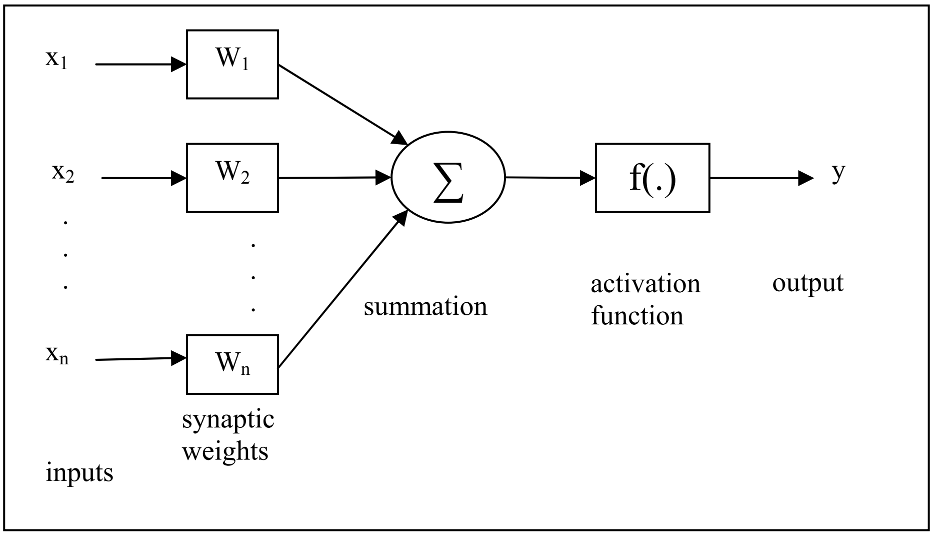


Figure 4: A Perceptron

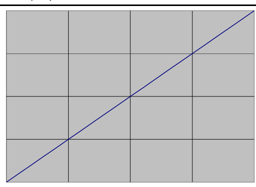
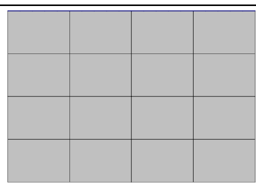
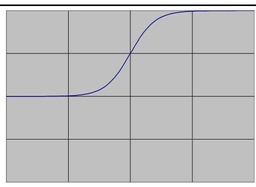
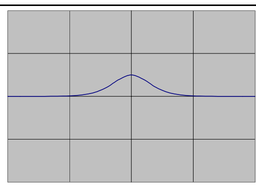
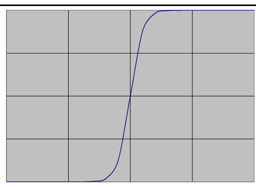
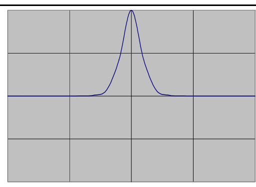
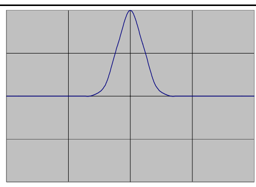
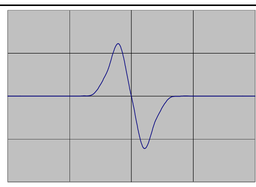
Name	Function y=f(x)		Derivative $\partial y / \partial x$	
Linear	x		1	
Logistic	$\frac{1}{1+e^{-x}}$		y(1-y)	
Tanh	Tanh(x)		$1\text{-}y^2$	
Gaussian	$e^{-x^2/2}$		$-x.e^{-x^2/2}$	

Figure 5: Possible Activation Functions for Each Neuron.

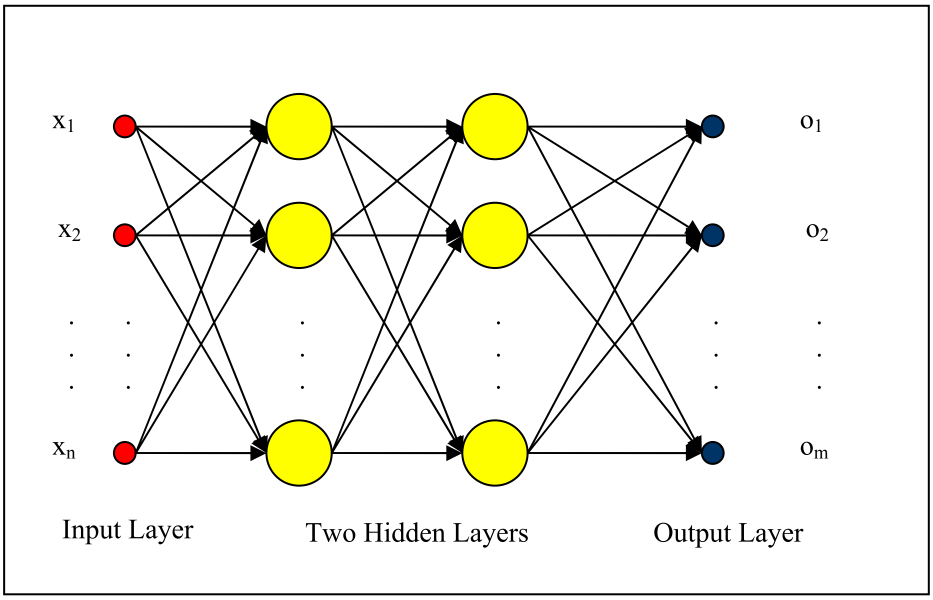


Figure 6: A Multilayer Perceptron Model with Two Hidden Layers

3.2. Back Propagation Algorithm

In this thesis, the back propagation algorithm is used to train the MLP network for fault detection. Learning with the back propagation algorithm consists of two passes through the different layers of the MLP model: in addition to forward pass, which is explained in the previous section, there is a backward pass. During backward pass, the synaptic weights are all adjusted in accordance with an error correction rule. Specifically, the actual response of the network is subtracted from a desired (target) response to produce an error signal. This error signal is then propagated backward through the network, in the reverse direction of synaptic connections. Hence, the synaptic weights are adjusted to make the actual response of the network move closer to the desired response [10].

In the back propagation algorithm, there are three basic steps [10, 12]:

1. **Initialization of the weights:**

   Weights are to be randomly initialized in such a way that the argument of the activation function of each neuron, should lie in a region where the derivative of the activation function is not near zero.

2. **Iteration:**

Introduce the training set in an order, which may be straight, random or user specified. For each training pattern (i.e. for n=1, 2, 3, ..., P) in the training set follow steps 2.1, 2.2 and 2.3.

2.1 Forward Pass:

The output of the j^{th} neuron in the l^{th} layer at the n^{th} iteration is given as:

$$y_j^l(n) = f\,(v_j^l(n)) \tag{2}$$

where n indicates the iteration, f is the activation function and

$$v_j^l(n) = \begin{cases} \sum_{i=1}^{m_{l-1}} w_{ij}^l(n) y_i^{l-1}(n) & , l = 2, 3, \dots, L \\ \sum_{i=1}^{m_0} w_{ij}^1(n) x_i\,(n) & , l = 1 \end{cases} \tag{3}$$

where all the variables are defined in Table 1.

The j^{th} output of the MLP network at the n^{th} iteration is given as:

$$o_j(n) = y_j^L(n) \tag{4}$$

The error at the j^{th} output at the n^{th} iteration is given as:

$$e_j(n) = d_j(n) - o_j(n) \tag{5}$$

2.2 Backward Pass:

Weights are adjusted according to the generalized delta rule in layer *l* during backward calculations:

$$w_{ij}^{l}(n+1) = w_{ij}^{l}(n) - \mu \delta_j^{l}(n) y_i^{l-1}(n) \quad (6)$$

where *δ's* are the local gradients given as :

$$\delta_j^l(n) = \begin{cases} e_j(n) f'(v_j^L(n)) \ , \ l = L \\ f'(v_j^l(n)) \sum_{k=1}^{m_{l+1}} \delta_k^{l+1}(n) w_{jk}^{l+1}(n) \ , \ l = 1,2,\dots,L-1 \end{cases} \quad (7)$$

2.3 Error Calculation:

Calculate total error energy ε(n) as:

$$\varepsilon(n) = \frac{1}{2} \sum_{j=1}^{m_L} e_j^2(n) \quad (8)$$

2.4 Cycle:

Go to step 2.1 for the next training pattern until n=P.

If n=P , then calculate the cost function, which is given as:

$$\varepsilon_{av} = \frac{1}{P} \sum_{n=1}^{P} \varepsilon(n) \quad (9)$$

And continue with the following step.

3. Stopping Criteria:

Various criteria may be used to stop the iterations. One of the criteria that can be used for stopping the iterations is given as:

- Absolute value of the difference between the present value of the cost function (calculated by (9)) and its value calculated in the previous iteration is sufficiently small.

Moreover, there are other criteria to stop the iterations. For example, according to [10], the network can be tested for its generalization performance after each learning iteration.

If the stopping criterion is not satisfied, repeat step 2 using the last calculated (by (6) with n=P) synaptic weights as the initial weights.

If the stopping criterion is satisfied, then the learning procedure is terminated and the last calculated synaptic weights are used as the weights of the MLP network.

Table 1: The Notation for the Equations and the Algorithm

Notation	Meaning
d_j	*Desired response of the j^{th} neuron in the output layer*
e_j	*Error signal for the j^{th} neuron in the output layer*
$f(.)$	*Activation function*
$f'(.)$	*Derivative of the activation function with respect to the argument*
l	*Layer number*
L	*Total number of layers except the input layer*
m_0	*number of neurons in the input layer*
m_l	*number of neurons in layer l*
o_j	*Output of the j^{th} neuron in the output layer (y_j^L)*
P	*Total number of patterns in the training set*
v^l_j	*Argument of the activation function of the j^{th} neuron in layer l*
w_{ij}^l	*Synaptic weight of the connection from the i^{th} neuron of layer l-1 to the j^{th} neuron of layer l*
x_i	*Input of the i^{th} neuron in the input layer*
y^l_j	*Output of the j^{th} neuron in layer l*
δ_j^l	*Local gradient for neuron j in layer l*
$\varepsilon(n)$	*Instantaneous sum of error energy at iteration n*
ε_{av}	*Average error energy or cost function*
μ	*learning rate*

3.3. MLP Application

In this thesis, two different approaches are tested. In the first approach, processed sound measurement data are used, which is going to be eplained in Section 3.3.2 in details. In the second approach, all the data from the tests are used. QwikNet software [13] is used for the MLP network analysis.

Two back propagation methods were tested [13]: 1- Online Backprop, and 2- Online Backprop - Rand. Online Backprop updates the weights after each pattern is presented to the network. And Online Backprop - Rand is similar to Online Backprop with the order of the input patterns randomized prior to each iteration. This makes the learning process stochastic and is preferred in most cases.

In both approaches:.

- All of the weights are randomly initialized between -1 and 1
- All of the activation functions given in Figure 5 are examined. The best learning from the training set is obtained with the Logistic activation function.
- MLP model is trained with various learning rates between 0.01 and 10. The best learning is obtained when the learning rate is 0.1.
- Due to software limitations 1 hidden layer and maximum allowable 10 nodes in the hidden layer are used. The MLP network details are given in Table 2.

Table 2: MLP Network Details

Learning Rate (μ)	0.1
Layer	3
Hidden Layer	1
Nodes in Hidden Layer	10
Activation Function	Logistic

3.3.1. Test Outputs

After each test, a report is generated in a format as given in Table 3, where the compressor sound power level for each frequency at 1/3 octave band and for each microphone in dB units can easily be found. That is the data from all of the microphones, which are processed and given in single row of values, for each frequency. The output is in 1/3 octave band between 100 Hz and 10 kHz. The outputs for microphones 1 thru 12 are sound power levels in dB unit. The last row is sound power level of all the microphones for related frequency. The column "L" is linear average of the related row. The column "A" is the filtered average of the related row. Filter "A" is a specific filter type tuned for human ear. The corrections for A-weighting are given in Table 4.

The columns "L" and "A" which are given in Table 3 are calculated as follows:

- Column "L" (L-averaged Sound Power Level) is calculated by using (12).
- Column "A" (A-weighted Sound Power Level) is calculated by using (13).
- The last row "S.POW." for 1/3 octave band frequencies is calculated by using (17).

The software loaded in the measurement device of the laboratory automatically did these calculations.

Sound Power Level is defined as [1]:

$$L_W = 10.\log_{10} \frac{W}{W_0} \qquad [\text{dB}] \tag{10}$$

and conversely

$$W = W_0.10^{\frac{L_W}{10}} \tag{11}$$

Table 3: Sample Output File Generated at the End of a Test

TARİH :	18.10.1999	MODEL :	TE 180 YT	ÖZELLİK :	NORMAL İMALAT
SES SONUCU :	40.5 dBA	DOSYA NO :	2280	SERİ NO :	1

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	20,86	9,88	12,63	12,75	9,62	17,59	12,61	17,29	10,11	7,88	16,60	10,47	12,32	20,81	17,78	27,33	20,18	31,68	24,62	26,20	26,88	35,90	35,75
mic.2	21,56	10,81	12,29	12,06	11,89	21,21	20,27	16,81	9,35	6,30	13,68	10,13	11,87	22,22	24,10	22,01	27,14	28,90	23,91	23,44	22,78	34,89	34,73
mic.3	20,81	14,11	18,93	13,83	9,19	23,05	24,27	18,41	10,94	9,83	14,93	10,18	12,02	19,99	27,26	19,47	21,85	24,46	19,21	21,75	23,28	33,93	33,10
mic.4	22,27	9,22	9,24	11,50	8,06	15,10	19,24	13,57	10,44	10,93	19,31	14,23	12,18	19,59	24,03	23,05	24,34	25,94	21,94	25,45	21,78	33,74	33,47
mic.5	15,11	7,05	13,16	9,07	15,72	25,25	19,63	13,30	11,07	11,94	11,89	15,11	12,90	17,46	24,14	17,25	18,71	21,77	19,93	22,36	19,18	32,03	30,98
mic.6	22,21	15,15	20,61	11,55	5,65	17,38	20,11	14,04	10,68	6,45	14,91	13,08	11,81	20,68	23,10	21,88	21,12	27,62	21,50	23,24	23,08	33,68	33,04
mic.7	23,61	17,71	23,30	16,79	15,02	25,61	17,33	16,39	11,21	9,59	14,06	11,64	11,59	19,73	20,62	28,38	18,32	28,38	26,81	27,11	27,04	36,31	35,34
mic.8	23,95	12,63	10,63	16,21	8,68	19,36	20,98	18,09	7,08	6,94	15,50	10,21	12,82	19,01	20,72	20,54	22,02	25,38	20,94	23,66	24,37	33,27	32,14
mic.9	24,73	13,70	13,75	16,52	12,95	20,97	24,28	15,72	9,63	8,62	12,90	12,83	14,97	22,54	21,58	19,98	20,26	26,71	18,64	24,24	24,03	34,00	32,74
mic.10	22,55	9,64	8,61	13,47	9,19	17,50	20,84	14,39	9,97	11,01	17,36	12,84	15,24	21,24	19,45	23,42	25,49	25,71	22,18	23,05	25,31	33,86	33,35
mic.11	23,40	12,23	16,25	15,31	14,13	22,08	23,99	16,58	13,26	9,34	14,13	17,80	17,22	23,54	21,12	26,11	23,50	24,95	23,52	24,34	26,98	35,13	34,29
mic.12	22,08	11,61	14,32	13,45	13,45	21,42	20,34	13,66	9,71	7,90	12,65	10,60	13,85	24,01	18,95	22,74	27,28	27,30	23,73	23,75	24,29	34,65	34,29
S.POW.	0,00	7,44	23,37	19,85	18,32	28,42	28,05	22,61	16,29	14,96	21,92	19,45	20,02	28,06	29,49	30,65	30,29	34,07	29,60	30,75	31,36	40,83	40,52

Table 4: A-weighting Corrections for Unweighted One-Third-Octave Band [1]

Band Center Frequency (Hz)	One-Third-Octave Band Weightings (dB)
100	-19.1
125	-16.1
160	-13.4
200	-10.9
250	-8.6
315	-6.6
400	-4.8
500	-3.2
630	-1.9
800	-0.8
1000	**0.0**
1250	0.6
1600	1.0
2000	1.2
2500	1.3
3150	1.2
4000	1.0
5000	0.5
6300	-0.1
8000	-1.1
10000	-2.5

where

W = sound power,

W_0 = reference sound power, standardized at 10^{-12} W

L-averaged Sound Power Level is defined as [1]:

$$SPL_L = 10.\log_{10} \sum_{i=1}^{n} .10^{\frac{L_{Wi}}{10}} \qquad \text{[dB]} \qquad (12)$$

where

L_{Wi} = sound power level at ith frequency band, dB

n = number frequencies in 1/3 octave band (n = 21 for this case)

A-weighted Sound Power Level is defined as [1]:

$$SPL_A = 10.\log_{10} \sum_{i=1}^{n} .10^{\frac{L_{Wi}+R_{Ai}}{10}} \qquad \text{[dB]} \qquad (13)$$

where

R_{Ai} = A-weighting corrections for unweighted 1/3 octave band at ith frequency band, given in Table 4

Sound Pressure Level is defined as [1]:

$$L_P = 10.\log_{10}\left(\frac{P}{P_{ref}}\right)^2 = 20.\log_{10}\frac{P}{P_{ref}} \qquad \text{[dB]} \qquad (14)$$

and conversely

$$P = P_{ref}.10^{\frac{L_P}{20}} \tag{15}$$

where

P = instantaneous sound pressure,
P_{ref} = reference sound pressure, standardized at $2x10^{-5}$ N/m^2 (20 μPa) for airborne sound.

Since the microphone positions are associated with unequal partial areas of the measurement surface, the following equation is used to obtain surface sound pressure level, $\overline{L_P}$ [2]:

$$\overline{L_P} = 10.\log_{10}\frac{1}{S}\left[\sum_{i=1}^{N} S_i 10^{0.1L_{P_i}}\right] \qquad \text{[dB]} \tag{16}$$

where,

L_{Pi} = band pressure level resulting from the ith measurement
S_i = partial area of the hemi-sphere associated with the ith measurement
S = total area of the measurement hemi-sphere
N = number of measurements

For a free field over a reflecting plane, the sound power level L_w of the source is calculated from the following equation [2]:

$$L_W = \overline{L_P} + 10.\log_{10}\frac{S_2}{S_0} + c \qquad \text{[dB]} \tag{17}$$

where,

$S_2 = 2\pi r^2$ is the area of the test hemi-sphere (of radius r)

$S_0 = 1\ m^2$

c = the correction term, in decibels, for the influence of temperature and atmospheric pressure and taken as 0.3 specifically at the measurement facility.

3.3.2. First Approach

Once all of the tests were accomplished, sound power levels in dB for 21 frequency points from 100 Hz to 10 kHz in 1/3 octave band (e.g. the last row in Table 3) were used as inputs to MLP model for each compressor. The input data format for MLP that is given in Figure 7 was generated in 1x23 matrixes also by adding the “L” and “A” columns to the frequency points using the last row “S.POW” in Table 3. The output for the compressor was in accordance with the compressor faults. It was generated in 1x6 matrixes as given in Figure 8. Finally, MLP Network training file was composed as. given in Figure 7.

After the clarification of these input and output formats, the necessary file was generated. MLP network was trained with many options. Hence, matrixes of weights were obtained. Once these weights were obtained, the network was used for test purposes. The results are given in Chapter 5.

SPL data including L and A for Compressor #1 (1x23 matrix)	Fault (1x6 matrix)
SPL data including L and A for Compressor #2 (1x23 matrix)	Fault (1x6 matrix)
.	.
.	.
.	.
SPL data including L and A for Compressor #n (1x23 matrix)	Fault (1x6 matrix)

Figure 7: MLP Network Training File Composition for First Approach (nx29 matrix, where n is the total number of compressors to be used in the training file)

$$[1\ 0\ 0\ 0\ 0\ 0]$$

(a)

$$[0\ 1\ 0\ 0\ 0\ 0]$$

(b)

$$[0\ 0\ 1\ 0\ 0\ 0]$$

(c)

$$[0\ 0\ 0\ 1\ 0\ 0]$$

(d)

$$[0\ 0\ 0\ 0\ 1\ 0]$$

(e)

$$[0\ 0\ 0\ 0\ 0\ 1]$$

(f)

Figure 8: Output Data Format for MLP Network: (a) Normal Compressor; (b) Compressor with Fault #1; (c) Compressor with Fault #2; (d) Compressor with Fault #3; (e) Compressor with Fault #4; (f) Compressor with Fault #5.

3.3.3. Second Approach

According to the results of the First approach, it was necessary to include each microphone data to the training data file (i.e. the rows for microphones 1 to 12 in Table 3). Since there were 12 microphones data in the test results file, there was 252 inputs (12 microphones x 21 frequency points) for one compressor in the MLP Network input file. The last row "S.POW." and columns "A" and "L" in Table 3 were not used in this approach. Output format for the MLP Network was not changed. MLP Network training file was composed as given in Figure 9.

With this method, the directionality information for the compressor sound was included, whereas in the first approach this information was lost due to the data processing and averaging of the 12 microphone data into a single data for each frequency range.

The network was trained for different number of nodes in the hidden layer. The results are given in Chapter 5. Both approaches are discussed in Chapter 6.

SPL data including 12 microphones for Compressor #1 (1x252 matrix)	Fault (1x6 matrix)
SPL data including 12 microphones for Compressor #2 (1x252 matrix)	Fault (1x6 matrix)
.	.
.	.
.	.
SPL data including 12 microphones for Compressor #m (1x252 matrix)	Fault (1x6 matrix)

Figure 9: MLP Network Training File Composition for Second Approach (mx258 matrix, where m is the total number of compressors to be used in the training file)

4. EXPERIMENTS

4.1. Design of Experiments

Tests are based on the faults, given in Table 5, selected according to the rationality, applicability and also by considering the yearly quality reports [6] among the most common errors experienced for the last two years.

For these tests, ten compressors were selected. All the experiments were done with these compressors. In addition to the selected faults, one more experiment was set up with the compressors assembled without fault. Six experiments for each of the ten compressors, that is 60 experiments were designed and conducted within six months. The first experiment was to obtain normal and base test results. These 10 compressors were carefully assembled with the spring on the shock loop tube, cylinder head cover bolts were tightened between 66-78 lbf.in, with correct size gasket and then were tested. After that, these 10 compressors were disassembled and following the necessary process of cleaning and spring removal for fault #1, the compressors were reassembled. As the test results were obtained, the process continued until the last results for fault #5 were obtained. Details of the test progress were as given in Table 6 . It is mentioned in Sequence #24 of Table 6 that there is a last set of compressors assembled with the fault combinations given in Table 7. Test results of these compressors were also analyzed and the results are given in Chapter 5. All of the test outputs are given Appendix 1.

Table 5: Selected Faults

Fault #	Fault Definition
1	Shock loop tube assembled without spring
2	Cylinder head cover bolts torque 60 lbf.in
3	Cylinder head cover bolts torque 90 lbf.in
4	One size thin gasket assembled to cylinder head
5	Two size thick gasket assembled to cylinder head

Table 6: Test Sequence

Sequence #	Description
1	10 compressors were assembled according to the Proper Assembly Procedure (PAP) from carefully selected parts.
2	Sound power level measurement tests were conducted for these compressors.
3	These 10 compressors were disassembled and cleaned.
4	Springs on vibration tubes were removed in all compressors (Fault #1).
5	10 compressors were assembled again according to PAP other than Fault #1.
6	Sound power level measurement tests were conducted for these compressors.
7	These 10 compressors were disassembled and cleaned.
8	Springs on vibration tubes replaced and cylinder head cover bolts were tightened to 60 lbf.in (Fault #2).
9	10 compressors were assembled again according to PAP other than Fault #2.
10	Sound power level measurement tests were conducted for these compressors.
11	These 10 compressors were disassembled and cleaned.
12	Cylinder head cover bolts were tightened to 90 lbf.in (Fault #3).
13	10 compressors were assembled again according to PAP other than Fault #3.
14	Sound power level measurement tests were conducted for these compressors.
15	These 10 compressors were disassembled and cleaned.
16	One size thin gaskets were assembled to cylinder head (Fault #4).
17	10 compressors were assembled again according to PAP other than Fault #4.
18	Sound power level measurement tests were conducted for these compressors.
19	These 10 compressors were disassembled and cleaned.
20	Two size thick gaskets were assembled to cylinder head (Fault #5).
21	10 compressors were assembled again according to PAP other than Fault #5.
22	Sound power level measurement tests were conducted for these compressors.
23	These 10 compressors were disassembled and cleaned.
24	Compressors were assembled according to PAP other than the faults for each compressor given in Table 7.
25	Sound power level measurement tests were conducted for these compressors.
	END OF TEST

Table 7: Mixed Set

Compressor S/N	Fault #1	Fault #2	Fault #3	Fault #4	Fault #5
7	☒	☒	☐	☐	☐
8	☒	☐	☒	☐	☐
9	☒	☐	☐	☒	☐
10	☒	☒	☐	☐	☒

4.2. Test Room

All the tests were conducted in the same semi-anechoic sound test room between the dates October 18 1999 and March 15 2000. Test room, which is designed in accordance with ISO 3745 [8], is shown in Figure 10. The main purpose of this test room is to determine the sound power level of the hermetic compressors. The measurements are done after the compressor reaches its steady state: a condition, duration of which is usually an hour and a half. Test room is being calibrated twice a week.

The microphone positions in the Cartesian coordinates (x, y, z) with their origin at the center of the source were tabulated in Table 8. The coordinates of 12 locations are on the surface of a sphere of radius r, which is 914.4 mm.

In Figure 11, microphone positions are given with the numbers from 1 to 12. The microphones are located at the positions given in Table 8. They are directed towards the source, which is located at the center of the sphere. The z-axis is chosen perpendicularly upward from a horizontal plane (z=0).

Measurement system main components, which are shown in Figure 12, are microphone multiplexer, spectrum analyzer and a personal computer for data processing and report generating.

Table 8: Coordinates of Microphone Positions for 3 ft (914.4 mm) Radius Hemi-sphere

No.	X (mm)	Y (mm)	Z (mm)
1	0	838.2	330.2
2	533.4	533.4	533.4
3	838.2	330.2	127
4	330.2	0	838.2
5	838.2	-330.2	127
6	533.4	-533.4	533.4
7	0	-838.2	330.2
8	-533.4	-533.4	533.4
9	-838.2	-330.2	127
10	-330.2	0	838.2
11	-838.2	330.2	127
12	-533.4	533.4	533.4

Figure 10: A Compressor in the Test Room (date taken: 20-April-2006)

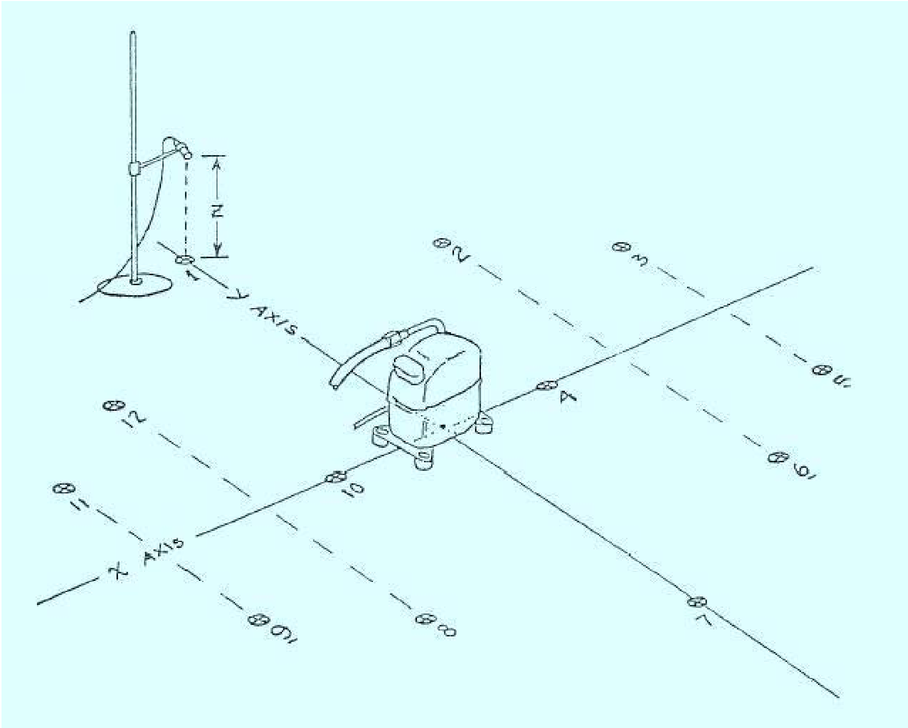
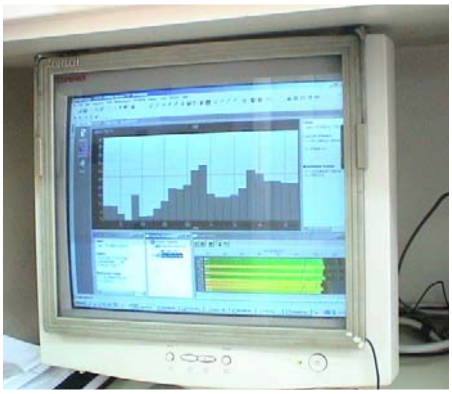


Figure 11: Microphone Positions

(a)



(b)

Figure 12: Measurement System. (a) Microphone Multiplexer and Spectrum Analyser; (b) Personal Computer for Data Processing.

4.3. Test Outputs Data Processing

In the second approach, data processing is an important issue, which requires extra care to organize the data necessary to be used as input to the MLP Network. For this purpose, a small code (given in Appendix 2) is generated with the user interface shown in Figure 13.

Bu using this code, user can select the file to be processed, enter the number of compressors tested and the factor which is the number to be used as scale factor. Data scaling is essential for neural networks to be able to properly learn from training data. The type of activation function chosen for the output layer determines the range that the training data must be scaled. Logistic functions squash all incoming signals to the range of (0,1), therefore training data must be scaled to this range. This code is only to process the test output data which is in an excel file. As a result, an output file in the format explained in Figure 9, which will be used as the training file for MLP Network, will be created. Chart in this interface is only for checking purposes.

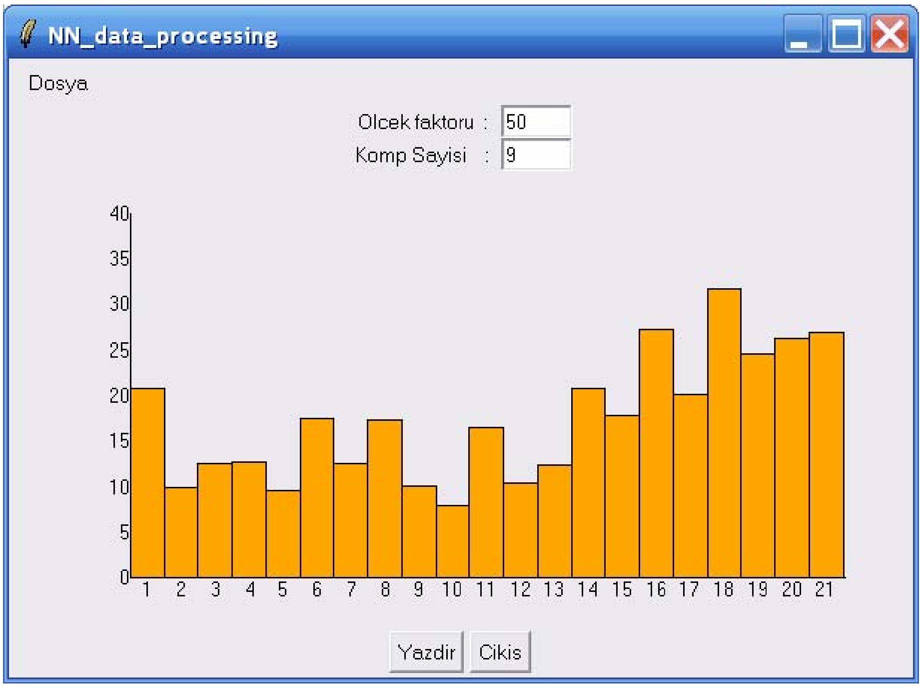


Figure 13: Test Outputs Data Processing Code User Interface

5. RESULTS

5.1. Test Results

The tests were accomplished within 6 months. For each test all of the measurements and resultant reports were recorded and stored in an excel file (given in Appendix 1). The results were normally reported in 1/3 octave band as given in Figure 14. In this figure, sound power level of compressor 1, which is assembled without fault, is reported as 40.5 dB A-Weighted Average and as 40.8 dB L-Average.

The results of all tests are given in Figure 15 thru Figure 20. According to these charts, a comparison of the compressors can be made. However, it is difficult to evaluate or post process these charts at the first glance. In Figure 21, the average of the ten compressors test results for each set of experiments are given. In this chart, post processing is possible to a certain extent. For example for fault #2, an increase in SPL around the frequencies 125 Hz and 400 Hz can be found, but other than that, the SPL values are almost the same.

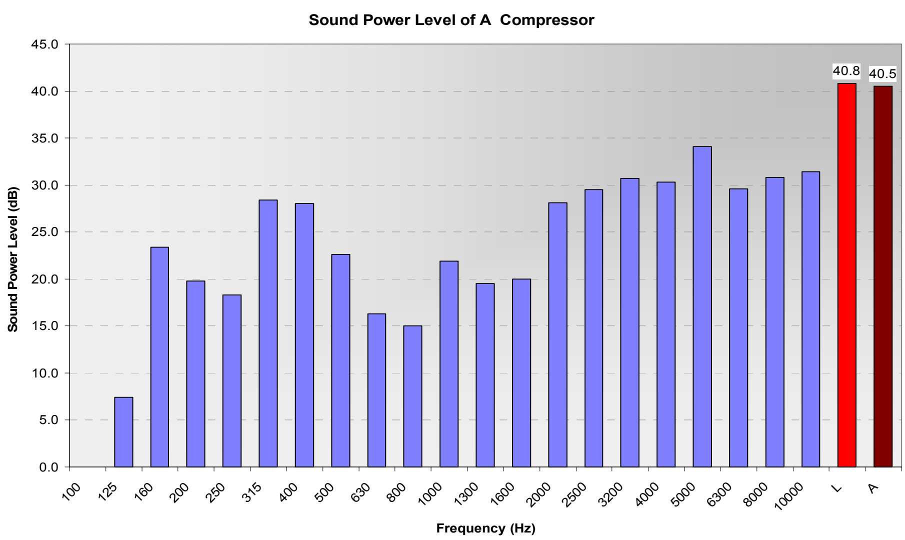


Figure 14: Sound Power Level of Compressor #1 Assembled without Fault

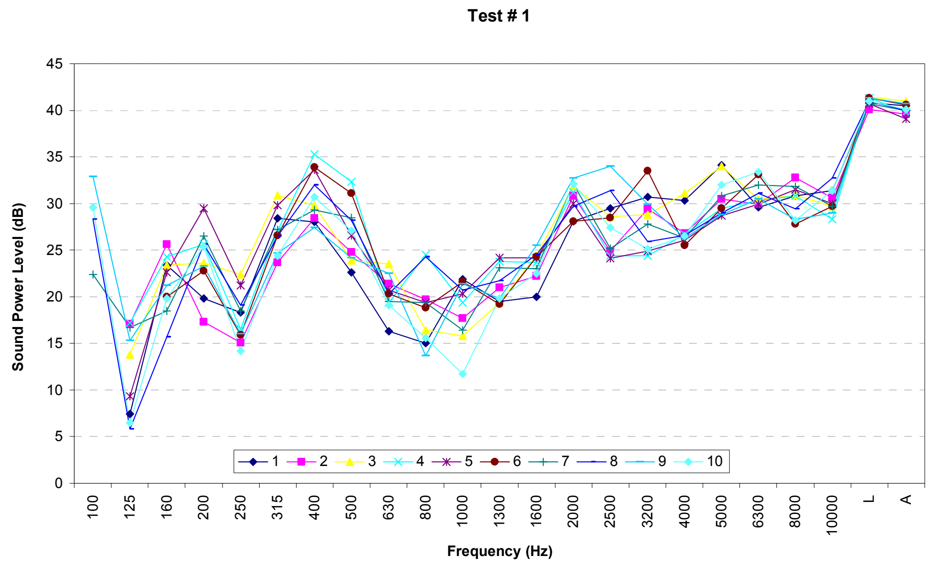


Figure 15: Test Results for 10 Compressors without Fault (Normal)

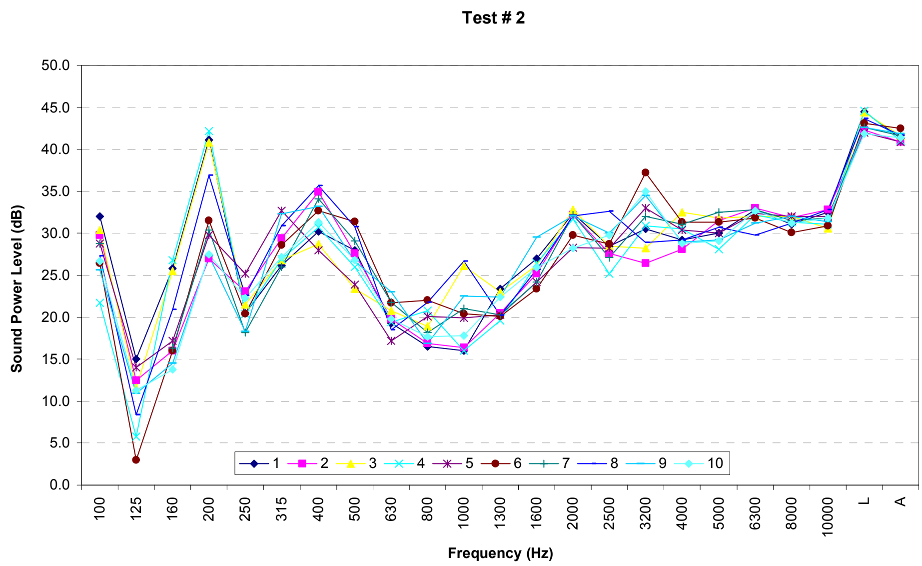


Figure 16: Test Results for the Compressors with Fault #1.

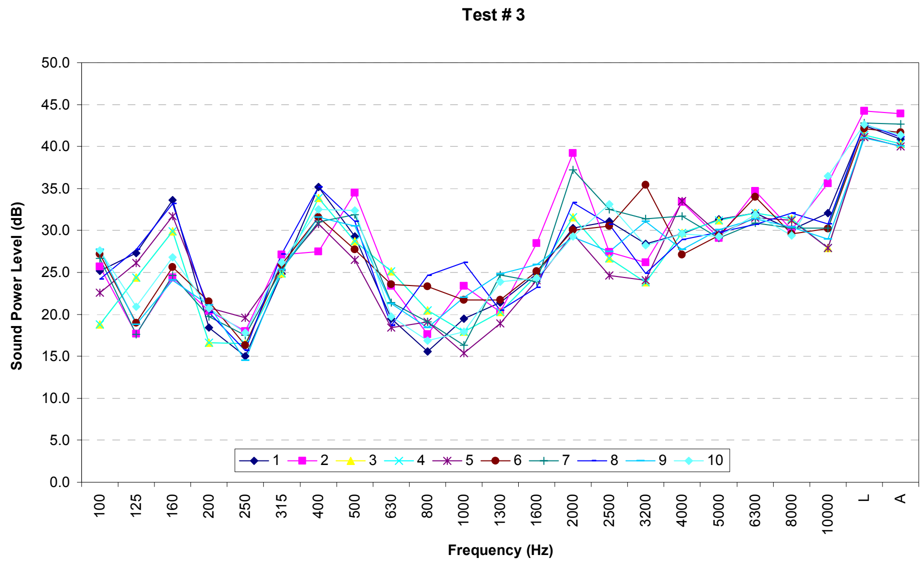


Figure 17: Test Results for the Compressors with Fault #2.

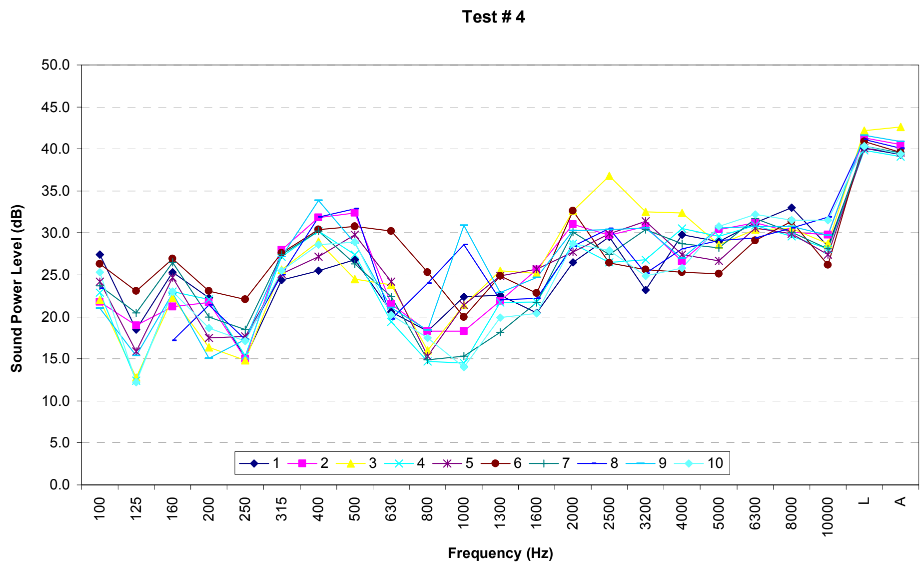


Figure 18: Test Results for the Compressors with Fault #3.

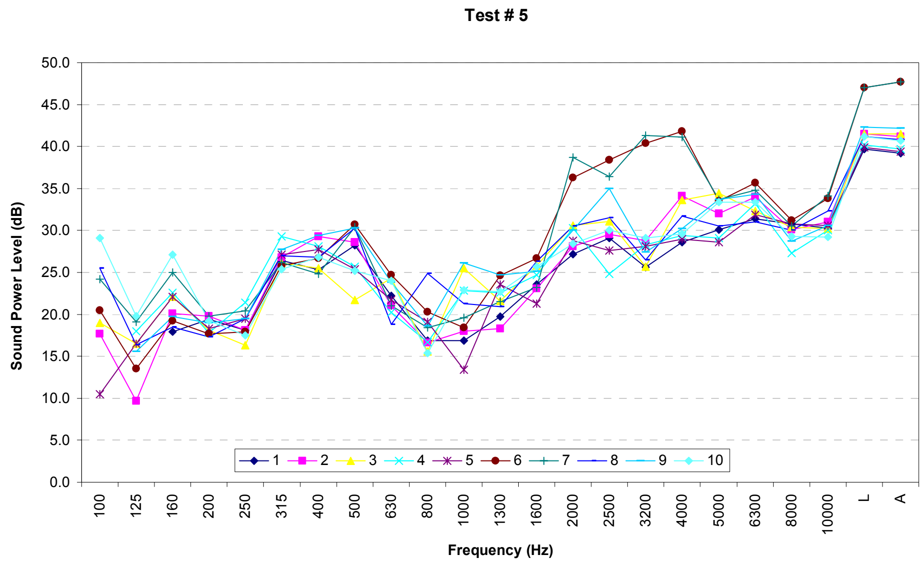


Figure 19: Test Results for the Compressors with Fault #4.

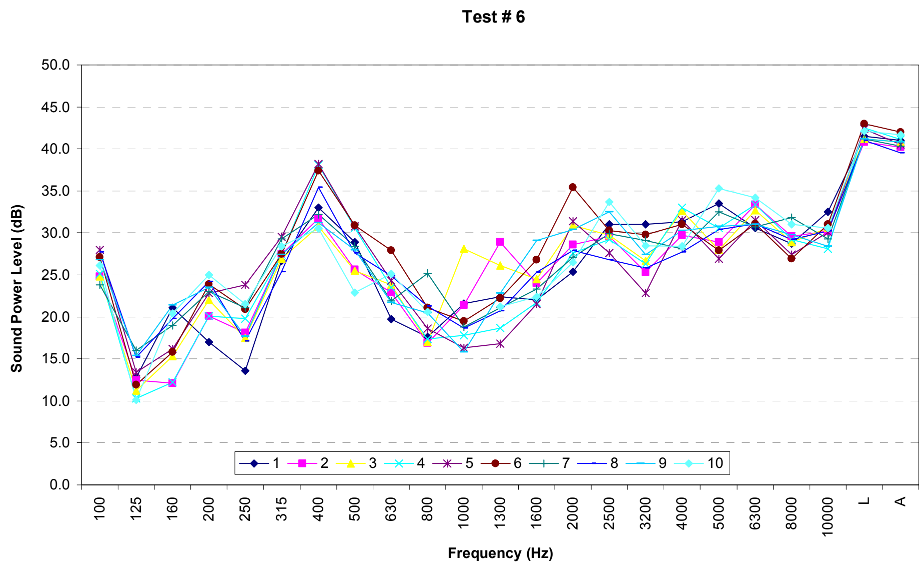


Figure 20: Test Results for the Compressors with Fault #5.

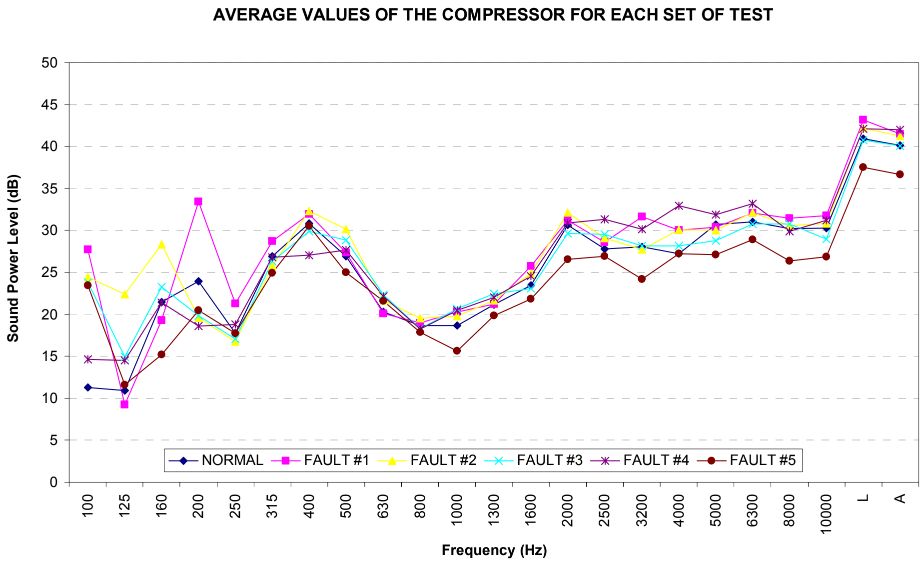


Figure 21: Average Values of the Compressors for Each Set of Tests.

5.2. Results for the First Approach

In the first approach, five analyses (see Table 9) were done with the data shown in Figure 15 thru Figure 20.

Table 9: Analyses Explanation for the First Approach

Analysis No.	Explanation
1	Compressor Numbers 1 thru 5 from each set of experiments used for both training and test.
2	All of the compressors used for training and Compressor Number 10 from each set of experiments used for test.
3	Compressor Numbers 1 thru 5 from each set of experiments used for training and Compressor Numbers 6 thru 10 from each set of experiments used for test.
4	Compressor Numbers 1 thru 9 from each set of experiments used for training and Compressor Number 10 from each set of experiments used for test.
5	Compressor Numbers 1 thru 9 from each set of experiments used for training and Compressor Number 10 from each set of experiments used for test. However, L-averaged and A- weighted SPL removed from the training and test data.

Success in finding the faults is defined as:

- Output is more than 70 % close to the related target,
- No other output is higher than 30 % of the above mentioned target.

The expected value which is **target (T)** in this case and the test result of the network that is **output (O)** are given in Table 10 thru Table 14.

In Analysis #1, 30 tests (first 5 compressors from each set) were included in the training data file since the training and test data files were the same, the analysis results were successful (see Table 10). That is also the case in Analysis #2 when 60 tests (10 compressors from each set) were included in the training set (see Table 11).

Analysis #3 results are given in Table 12. In this table, some deficiencies from the target values are realized. 14 out of 30 test patterns are successful and success ratio is 46.7 %.

As the Analysis #4, 54 tests (9 compressors from each set) were used in the training data file. The other 6 tests from each set of experiments were used in test data file. The results are given in Table 13. Although some faults in the compressors were detected, fault 3 was not detected and trained MLP network had some difficulties in finding and/or being assured of the faults 4 and 5. 3 out of 6 test patterns are successful and success ratio is 50 %.

Analysis #5 was made by removing L-averaged and A-weigted SPL from the training and test data. The results were slightly improved as shown in Table 14 but still above mentioned deficiencies were examined. As a result, 3 out of 6 test patterns are successful and success ratio is 50 %.

The main problematic faults for these analyses after evaluation are 3 and 4. Fault 3 was to torque the cylinder head cover bolts to 90 lbf.in and fault 4 was to use a one size thin gasket at the same area. Both of the faults are trying to decrease the clearance between cylinder head and its cover.

Table 10: Results for Analysis #1.

Normal		Fault #1		Fault #2		Fault #3		Fault #4		Fault #5	
O1	T1	O2	T2	O3	T3	O4	T4	O5	T5	O6	T6
1.0	**1.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.0	**1.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.0	**1.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.0	**1.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.0	**1.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	**1.0**	**1.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	**1.0**	**1.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	**1.0**	**1.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	**1.0**	**1.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	**1.0**	**1.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	**1.0**	**1.0**	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	**1.0**	**1.0**	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	**1.0**	**1.0**	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	**1.0**	**1.0**	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	**1.0**	**1.0**	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	**1.0**	**1.0**	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	**1.0**	**1.0**	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	**1.0**	**1.0**	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	**1.0**	**1.0**	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	**1.0**	**1.0**	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**1.0**	**1.0**	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**1.0**	**1.0**	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**1.0**	**1.0**	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**1.0**	**1.0**	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**1.0**	**1.0**	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**1.0**	**1.0**
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**1.0**	**1.0**
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**1.0**	**1.0**
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**1.0**	**1.0**
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**1.0**	**1.0**

Table 11: Results for Analysis #2.

Normal		Fault #1		Fault #2		Fault #3		Fault #4		Fault #5	
O1	T1	O2	T2	O3	T3	O4	T4	O5	T5	O6	T6
1.0	**1.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	**1.0**	**1.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	**1.0**	**1.0**	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	**1.0**	**1.0**	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**1.0**	**1.0**	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**1.0**	**1.0**

Table 12: Results for Analysis #3.

Normal		Fault #1		Fault #2		Fault #3		Fault #4		Fault #5	
O1	T1	O2	T2	O3	T3	O4	T4	O5	T5	O6	T6
0.2	**1.0**	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.0	0.0	0.0
0.0	**1.0**	0.0	0.0	0.0	0.0	**1.0**	0.0	0.0	0.0	0.0	0.0
0.0	**1.0**	0.5	0.0	0.0	0.0	0.0	0.0	0.2	0.0	**0.5**	0.0
0.5	**1.0**	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.2	0.0
0.9	**1.0**	0.1	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.1	0.0
0.0	0.0	**0.9**	**1.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	**1.0**	**1.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.1	0.0	**1.0**	**1.0**	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0
0.4	0.0	**1.0**	**1.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	**1.0**	**1.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	**1.0**	**1.0**	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	**0.0**	**1.0**	0.0	0.0	**1.0**	0.0	0.0	0.0
0.0	0.0	0.0	0.0	**0.4**	**1.0**	0.1	0.0	0.0	0.0	0.3	0.0
0.0	0.0	0.0	0.0	**0.4**	**1.0**	0.1	0.0	0.0	0.0	0.3	0.0
0.0	0.0	0.0	0.0	**0.0**	**1.0**	0.2	0.0	0.1	0.0	0.1	0.0
0.0	0.0	0.0	0.0	0.1	0.0	**1.0**	**1.0**	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	**0.8**	0.0	**0.0**	**1.0**	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.1	0.0	**0.8**	**1.0**	0.0	0.0	0.0	0.0
0.5	0.0	0.0	0.0	0.0	0.0	**0.7**	**1.0**	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.1	0.0	**1.0**	**1.0**	0.0	0.0	0.0	0.0
0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.0	**0.2**	**1.0**	0.0	0.0
0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	**0.9**	**1.0**	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**1.0**	**1.0**	0.0	0.0
0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.8**	**1.0**	0.0	0.0
0.3	0.0	0.0	0.0	0.0	0.0	**0.8**	0.0	**0.0**	**1.0**	0.0	0.0
0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.0	**0.1**	**1.0**
0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**	**1.0**
0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**	**1.0**
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**1.0**	**1.0**
0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	**1.0**	**1.0**

Table 13: Results forAnalysis #4.

Normal		Fault #1		Fault #2		Fault #3		Fault #4		Fault #5	
O1	T1	O2	T2	O3	T3	O4	T4	O5	T5	O6	T6
1.0	**1.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	**1.0**	**1.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	**0.9**	**1.0**	0.0	0.0	0.0	0.0	0.0	0.0
0.2	0.0	0.0	0.0	0.0	0.0	**0.1**	**1.0**	0.1	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	**0.6**	**1.0**	0.0	0.0
0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	**0.6**	**1.0**

Table 14: Results for Analysis #5.

Normal		Fault #1		Fault #2		Fault #3		Fault #4		Fault #5	
O1	T1	O2	T2	O3	T3	O4	T4	O5	T5	O6	T6
1.0	**1.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	**1.0**	**1.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	**1.0**	**1.0**	0.0	0.0	0.0	0.0	0.0	0.0
0.1	0.0	0.0	0.0	0.0	0.0	**0.5**	**1.0**	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	**0.5**	**1.0**	0.1	0.0
0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	**1.0**	**1.0**

5.3. Results for the Second Approach

According to the results of the first approach, in the second approach, it was thought to be useful to include each microphone data in the training data file. Since there were 12 microphones data in the test results file, there were 252 inputs (12 microphones x 21 frequency points) for each test in the MLP network input file. The L-averaged and A-weighted SPLs were not used in this approach. With this method, since the microphones are positioned on a surface of a hemi-sphere as shown in Figure 11, the directionality information for the compressor sound was included, whereas in the first approach this information was lost due to the data processing and averaging of the 12 microphones' data into a single data for each frequency range. Six analyses, which are explained in Table 15 were made by using second approach. Selected compressors for test of MLP network in analysis #11 are given in Table 16. The results of these analyses are given in Table 17 thru Table 22 and Figure 22 thru Figure 27. It is shown on these tables that results are also satisfactory for faults 3, 4 and 5.

Table 15: Analyses Explanation for the Second Approach

Analysis No.	Explanation
6	Compressor numbers 1 thru 5 from each set of experiments used for training and compressor numbers 6 thru 10 from each set of experiments used for test
7	Compressor numbers 6 thru 10 from each set of experiments used for training and compressor numbers 1 thru 5 from each set of experiments used for test
8	9 compressors other than compressor #2 from each set of experiments used for training and compressor #2 from each set of experiments used for test.
9	9 compressors other than compressor #5 from each set of experiments used for training and compressor #5 from each set of experiments used for test.
10	9 compressors other than compressor #10 from each set of experiments used for training and compressor #10 from each set of experiments used for test.
11	Randomly selected compressors from each set of experiments as given in Table 16 used for test and other compressors used for training.

Table 16: Randomly Selected Compressors for Analysis #11.

Compressor No.	Test 1 (Normal)	Test 2 (Fault 1)	Test 3 (Fault 2)	Test 4 (Fault 3)	Test 5 (Fault 4)	Test 6 (Fault 5)
2	☒	☐	☐	☐	☐	☐
3	☐	☒	☐	☐	☐	☐
4	☐	☐	☒	☐	☐	☐
6	☐	☐	☐	☒	☐	☐
8	☐	☐	☐	☐	☒	☐
9	☐	☐	☐	☐	☐	☒

Analysis #6 is done by dividing data set into two. First half is to be used for training and second half is to be used for test. All 6 tests of compressors 1,2,3,4 and 5 are included in the first set. The rest is included in the second set. The results for this analysis are shown in Table 17 and Figure 22. After the training is converged, test results have shown that, 20 out of 30 test patterns are successful and success ratio is 66.7 % according to the criterion defined previously. It can be easily seen from Figure 22 that MLP network is 100 % successful in finding faults 1 and 4 which are the missing spring on the shock loop tube and the use of one size thin gasket.

Table 17: Results of Analysis #6.

Test Pattern	Normal		Fault #1		Fault #2		Fault #3		Fault #4		Fault #5	
	O1	T1	O2	T2	O3	T3	O4	T4	O5	T5	O6	T6
1	**0.02**	**1.00**	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.03	0.00
2	**0.72**	**1.00**	0.21	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
3	**0.24**	**1.00**	0.38	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
4	**0.02**	**1.00**	0.01	0.00	0.00	0.00	0.94	0.00	0.00	0.00	0.00	0.00
5	**0.00**	**1.00**	0.26	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.00	0.00
6	0.00	0.00	**0.98**	**1.00**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	**0.99**	**1.00**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.05	0.00	**0.99**	**1.00**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.07	0.00	**0.76**	**1.00**	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	**0.94**	**1.00**	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
11	0.00	0.00	0.03	0.00	**0.28**	**1.00**	0.01	0.00	0.17	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	**0.63**	**1.00**	0.39	0.00	0.00	0.00	0.00	0.00
13	0.14	0.00	0.00	0.00	**0.99**	**1.00**	0.10	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	**0.25**	**1.00**	0.36	0.00	0.00	0.00	0.00	0.00
15	0.00	0.00	0.07	0.00	**0.67**	**1.00**	0.02	0.00	0.01	0.00	0.00	0.00
16	0.01	0.00	0.00	0.00	0.05	0.00	**0.97**	**1.00**	0.00	0.00	0.00	0.00
17	0.00	0.00	0.00	0.00	0.01	0.00	**0.98**	**1.00**	0.01	0.00	0.00	0.00
18	0.01	0.00	0.00	0.00	0.00	0.00	**0.90**	**1.00**	0.00	0.00	0.01	0.00
19	0.02	0.00	0.00	0.00	0.01	0.00	**0.89**	**1.00**	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.02	0.00	**0.42**	**1.00**	0.05	0.00	0.00	0.00
21	0.00	0.00	0.17	0.00	0.01	0.00	0.01	0.00	**0.96**	**1.00**	0.01	0.00
22	0.00	0.00	0.08	0.00	0.03	0.00	0.00	0.00	**0.97**	**1.00**	0.00	0.00
23	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	**0.89**	**1.00**	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**1.00**	**1.00**	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.99**	**1.00**	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**1.00**	**1.00**
27	0.04	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.00	**0.72**	**1.00**
28	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	**0.98**	**1.00**
29	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	**0.75**	**1.00**
30	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.49	0.00	**0.65**	**1.00**

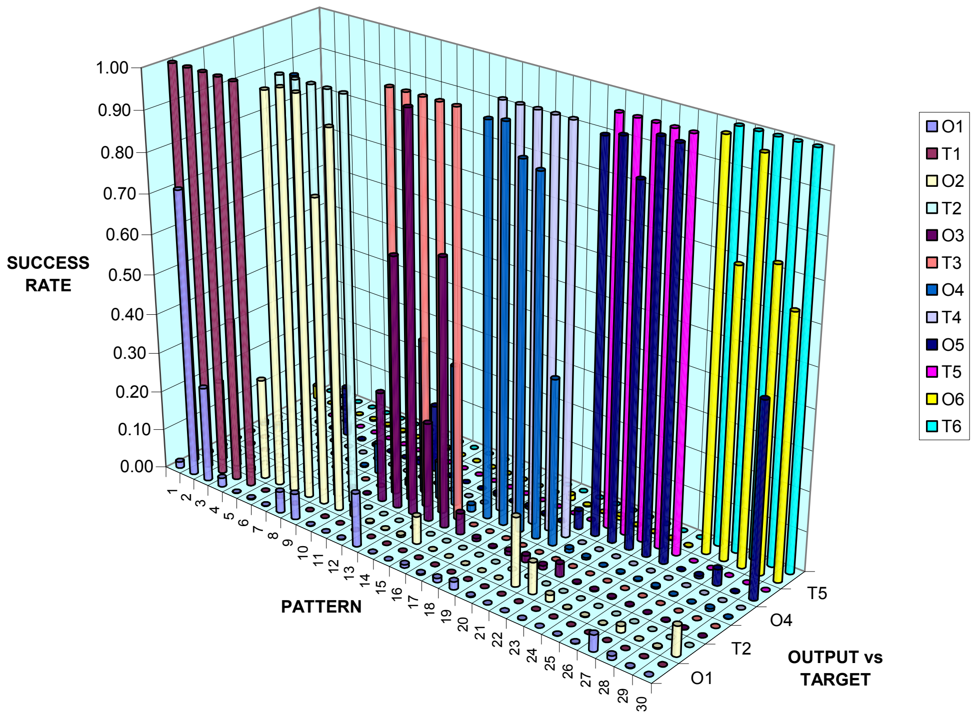


Figure 22: Output and Target Comparison Chart for Analysis #6.

Analysis #7 was done by reversing the training and test data used in analysis #6. Test data is used to train the MLP network and training data is used to test the MLP Network. The results for this analysis are shown in Table 18 and in Figure 23. In Table 18 it is shown that, 19 out of 30 test patterns are successful and success ratio is 63.3 % according to the criterion defined previously. It can be easily seen from Figure 23 that MLP network is 100 % successful in finding only fault 1 which is the missing spring on the shock loop tube.

Analyses numbers 6 and 7 have similar results with respect to each other. In the second approach when compared to first one, results have improved; i.e. success ratio is increased by almost 20 %.

Table 18: Results for Analysis #7.

Test Pattern	Normal		Fault #1		Fault #2		Fault #3		Fault #4		Fault #5	
	O1	T1	O2	T2	O3	T3	O4	T4	O5	T5	O6	T6
1	**0.16**	**1.00**	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00
2	**0.04**	**1.00**	0.00	0.00	0.01	0.00	0.82	0.00	0.00	0.00	0.00	0.00
3	**0.03**	**1.00**	0.06	0.00	0.00	0.00	0.06	0.00	0.02	0.00	0.03	0.00
4	**0.77**	**1.00**	0.00	0.00	0.06	0.00	0.01	0.00	0.00	0.00	0.01	0.00
5	**0.22**	**1.00**	0.25	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.01	0.00
6	0.05	0.00	**0.96**	**1.00**	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	**0.99**	**1.00**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	**1.00**	**1.00**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	**0.99**	**1.00**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.01	0.00	**0.98**	**1.00**	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	**1.00**	**1.00**	0.00	0.00	0.01	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	**0.16**	**1.00**	0.01	0.00	0.59	0.00	0.00	0.00
13	0.00	0.00	0.00	0.00	**0.85**	**1.00**	0.06	0.00	0.00	0.00	0.01	0.00
14	0.02	0.00	0.00	0.00	**0.76**	**1.00**	0.12	0.00	0.00	0.00	0.01	0.00
15	0.00	0.00	0.00	0.00	**0.34**	**1.00**	0.64	0.00	0.00	0.00	0.00	0.00
16	0.04	0.00	0.00	0.00	0.08	0.00	**0.54**	**1.00**	0.00	0.00	0.01	0.00
17	0.00	0.00	0.00	0.00	0.00	0.00	**1.00**	**1.00**	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.01	0.00	**0.97**	**1.00**	0.00	0.00	0.00	0.00
19	0.01	0.00	0.00	0.00	0.00	0.00	**0.99**	**1.00**	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	**1.00**	**1.00**	0.00	0.00	0.00	0.00
21	0.00	0.00	0.00	0.00	0.00	0.00	0.99	0.00	**0.01**	**1.00**	0.01	0.00
22	0.00	0.00	0.02	0.00	0.00	0.00	0.03	0.00	**0.89**	**1.00**	0.00	0.00
23	0.01	0.00	0.00	0.00	0.00	0.00	0.04	0.00	**0.98**	**1.00**	0.00	0.00
24	0.01	0.00	0.00	0.00	0.00	0.00	0.83	0.00	**0.08**	**1.00**	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.99	0.00	**0.00**	**1.00**	0.00	0.00
26	0.00	0.00	0.00	0.00	0.03	0.00	0.08	0.00	0.00	0.00	**0.42**	**1.00**
27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.98**	**1.00**
28	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	**0.96**	**1.00**
29	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	**0.98**	**1.00**
30	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	**0.98**	**1.00**

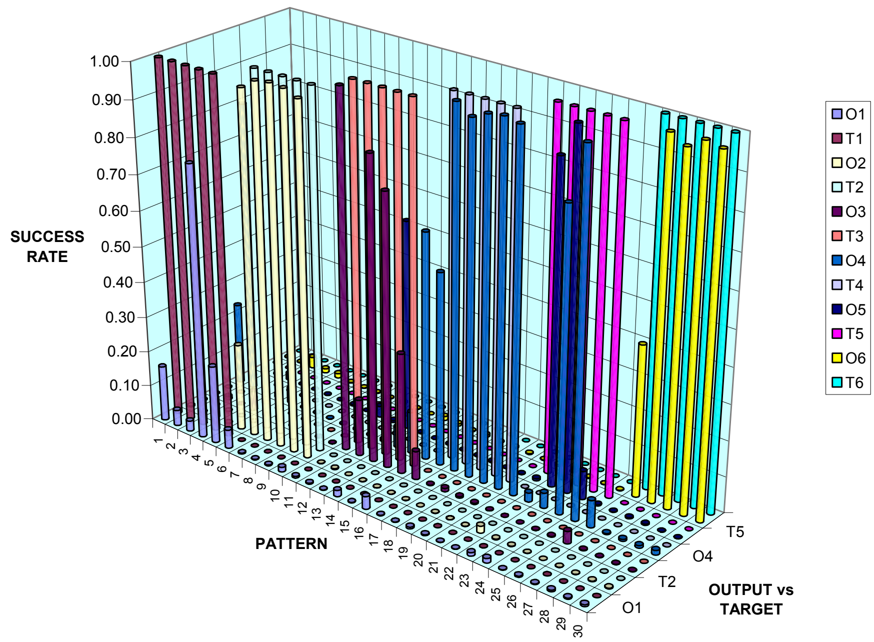


Figure 23: Output and Target Comparison Chart for Analysis #7.

Four other analyses are done in addition to these analyses. In the first three of those, each time a compressor data for all of the tests is chosen only for MLP network test purposes. The training and test data files are arranged according to the selected compressor number. In analysis#8, compressor #2, in analysis #9, compressor #5 and in analysis #10 compressor #10 are selected to be used as test data. Therefore, the data related to those are removed from their relevant MLP Network training file.

The results for all these three analyses are shown in Table 19, Table 20 and Table 21. It is shown that, 6 out of 6 test patterns are successful and success ratio is 100 % according to the previously defined criterion. It is also shown in Figure 24, Figure 25 and Figure 26 that MLP Network is successful as regards not indicating another irrelevant output.

Table 19: Results for Analysis #8.

Test	Normal		Fault #1		Fault #2		Fault #3		Fault #4		Fault #5	
	O1	T1	O2	T2	O3	T3	O4	T4	O5	T5	O6	T6
1	**0.94**	**1.00**	0.00	0.00	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00
2	0.02	0.00	**0.96**	**1.00**	0.02	0.00	0.00	0.00	0.01	0.00	0.01	0.00
3	0.00	0.00	0.02	0.00	**0.87**	**1.00**	0.01	0.00	0.09	0.00	0.00	0.00
4	0.02	0.00	0.00	0.00	0.01	0.00	**0.99**	**1.00**	0.00	0.00	0.01	0.00
5	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	**0.99**	**1.00**	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	**0.99**	**1.00**

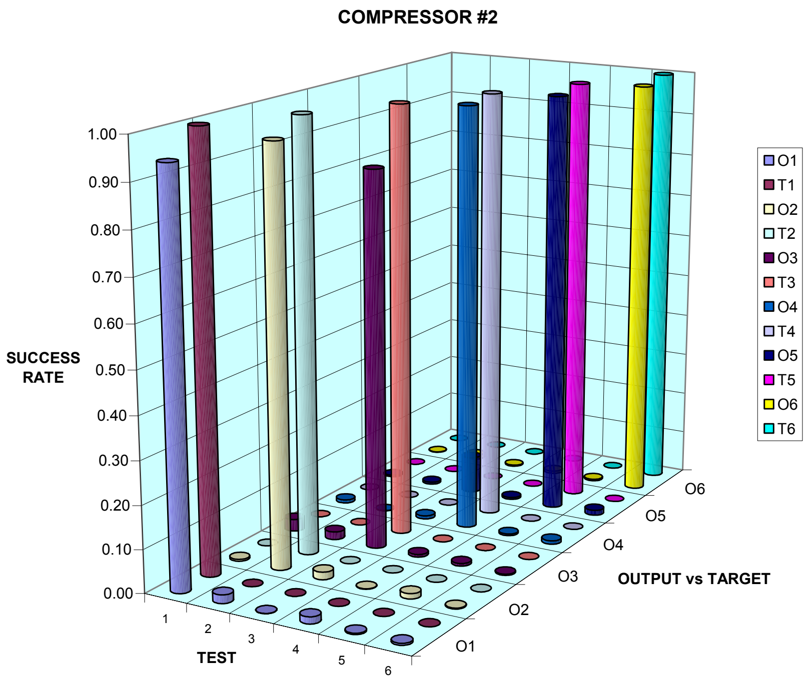


Figure 24: Output and Target Comparison Chart for Analysis #8.

Table 20: Results for Analysis #9.

Test	Normal		Fault #1		Fault #2		Fault #3		Fault #4		Fault #5	
	O1	T1	O2	T2	O3	T3	O4	T4	O5	T5	O6	T6
1	**0.95**	**1.00**	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00
2	0.07	0.00	**0.96**	**1.00**	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00
3	0.01	0.00	0.00	0.00	**0.97**	**1.00**	0.01	0.00	0.01	0.00	0.00	0.00
4	0.01	0.00	0.00	0.00	0.00	0.00	**0.99**	**1.00**	0.02	0.00	0.01	0.00
5	0.00	0.00	0.01	0.00	0.01	0.00	0.15	0.00	**0.81**	**1.00**	0.00	0.00
6	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	**0.99**	**1.00**

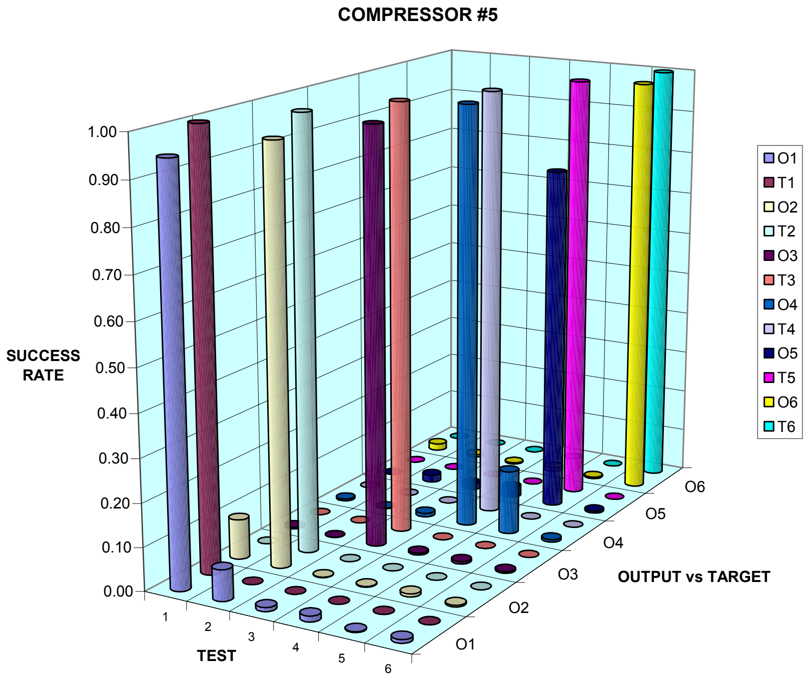


Figure 25: Output and Target Comparison Chart for Analysis #9.

Table 21: Results for Analysis #10.

Test	Normal		Fault #1		Fault #2		Fault #3		Fault #4		Fault #5	
	O1	T1	O2	T2	O3	T3	O4	T4	O5	T5	O6	T6
1	**0.96**	**1.00**	0.01	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.02	0.00
2	0.02	0.00	**0.95**	**1.00**	0.00	0.00	0.01	0.00	0.02	0.00	0.02	0.00
3	0.00	0.00	0.03	0.00	**0.89**	**1.00**	0.01	0.00	0.01	0.00	0.00	0.00
4	0.01	0.00	0.01	0.00	0.05	0.00	**0.80**	**1.00**	0.04	0.00	0.01	0.00
5	0.11	0.00	0.01	0.00	0.10	0.00	0.00	0.00	**0.81**	**1.00**	0.01	0.00
6	0.01	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.03	0.00	**0.97**	**1.00**

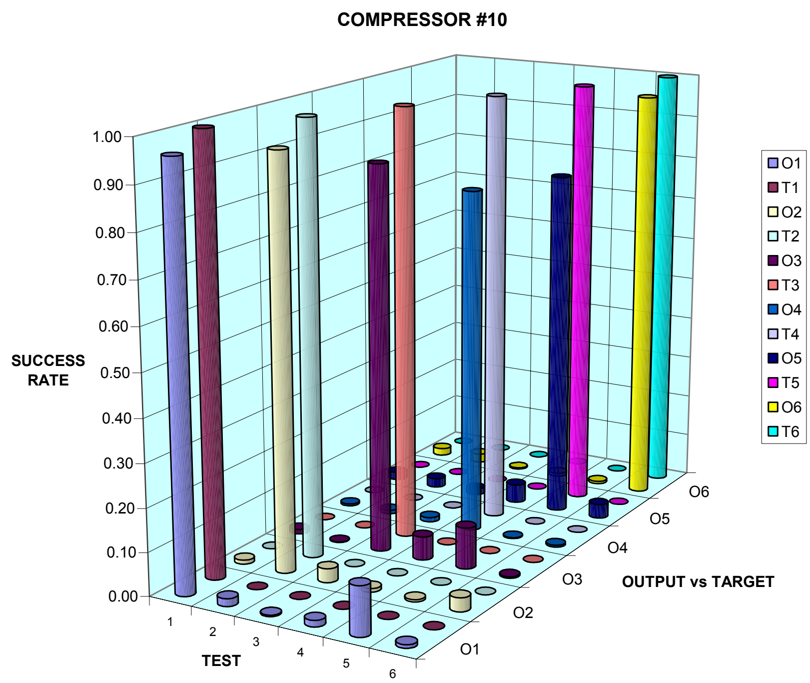


Figure 26: Output and Target Comparison Chart for Analysis #10.

For analysis #11, test file of MLP network is composed of randomly selected compressors from each set of experiments. The main reason behind this analysis is to see the behavior of MLP Network when it is tested with different compressors from different set of experiments. Therefore, compressor numbers 2, 3, 4, 6, 8 and 9 respectively from experiment sets 1, 2, 3, 4, 5 and 6 (see Table 16) are selected to be used for test purposes and others are used for learning.

The results for analyses #11 are shown in Table 22. It is shown that, 6 out of 6 test patterns are successful and success ratio is 100 % according to the previously defined criterion. It is also shown in Figure 27 that MLP network is successful as regards not indicating another irrelevant output.

The C Code, given Appendix 3 and Matlab Code, given in Appendix 4 were generated for analysis #11. These codes, which include resultant weights for the network, may be used for testing appropriate test data files.

Table 22: Results for Analysis #11.

Comp. #	Normal		Fault #1		Fault #2		Fault #3		Fault #4		Fault #5	
	O1	T1	O2	T2	O3	T3	O4	T4	O5	T5	O6	T6
2	**0.85**	**1.00**	0.01	0.00	0.14	0.00	0.06	0.00	0.02	0.00	0.01	0.00
3	0.02	0.00	**0.97**	**1.00**	0.02	0.00	0.00	0.00	0.03	0.00	0.01	0.00
4	0.12	0.00	0.00	0.00	**0.93**	**1.00**	0.01	0.00	0.02	0.00	0.03	0.00
6	0.02	0.00	0.00	0.00	0.09	0.00	**0.94**	**1.00**	0.02	0.00	0.05	0.00
8	0.05	0.00	0.04	0.00	0.07	0.00	0.00	0.00	**0.77**	**1.00**	0.01	0.00
9	0.05	0.00	0.01	0.00	0.02	0.00	0.01	0.00	0.00	0.00	**0.89**	**1.00**

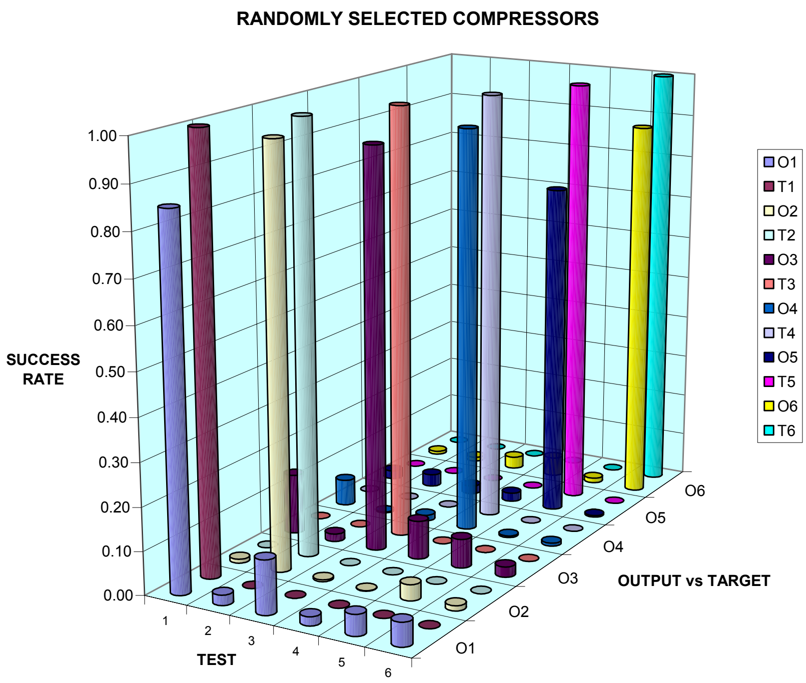


Figure 27: Output and Target Comparison Chart for Analysis #11.

5.4. Mixed Set Analysis

Two analyses as given in Table 23 are made by using mixed set data that is shown in Table 7. In analysis #12, mixed set test data are used to test the obtained MLP Network in Analysis #11. Results as seen in Table 24 are not satisfactory.

However, when this mixed set is used in the training set (analysis #13), the test result becomes satisfactory. As shown in Table 25, MLP network is successful in testing when this set is used in the training set. However this result may incorporate suspect of memorization of the data. Since there are not any additional compressors tested with mixed faults, this study was stopped at this point.

Table 23: Analyses Explanation for Mixed Set

Analysis No.	Explanation
12	New mixed set data used for testing of previously obtained MLP Network in analysis #11.
13	New mixed set added to previous tests, which makes 64 input patterns for MLP Network training. Mixed set is then used for test.

Table 24: Results for Analysis #12.

Normal		Fault #1		Fault #2		Fault #3		Fault #4		Fault #5	
O1	**T1**	**O2**	**T2**	**O3**	**T3**	**O4**	**T4**	**O5**	**T5**	**O6**	**T6**
0.00	0.0	**0.00**	**1.0**	**0.00**	**1.0**	0.08	0.0	0.07	0.0	0.87	0.0
0.00	0.0	**0.00**	**1.0**	0.00	0.0	**0.05**	**1.0**	0.04	0.0	0.94	0.0
0.00	0.0	**0.00**	**1.0**	0.00	0.0	0.11	0.0	**0.05**	**1.0**	0.83	0.0
0.00	0.0	**0.00**	**1.0**	**0.00**	**1.0**	0.04	0.0	0.04	0.0	**0.92**	**1.0**

Table 25: Results for Analysis #13.

Normal		Fault #1		Fault #2		Fault #3		Fault #4		Fault #5	
O1	T1	O2	T2	O3	T3	O4	T4	O5	T5	O6	T6
0.0	0.0	**1.0**	**1.0**	**1.0**	**1.0**	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	**1.0**	**1.0**	0.0	0.0	**1.0**	**1.0**	0.0	0.0	0.0	0.0
0.0	0.0	**1.0**	**1.0**	0.0	0.0	0.0	0.0	**1.0**	**1.0**	0.0	0.0
0.0	0.0	**1.0**	**1.0**	**1.0**	**1.0**	0.0	0.0	0.0	0.0	**1.0**	**1.0**

5.5. Training Error Minimization

MLP networks of the first and second approaches in this thesis were trained with one hidden layer but with different number of nodes in that hidden layer. The errors according to equation (9) were minimized when 10 nodes were used in all the networks used for this study. Since the node numbers are limited with 10 and number of hidden layer are limited with one in QwikNet [13], higher number of nodes and different number of hidden layers were not examined.

In Figure 28, the MLP network training error is given for analysis #2 with 5 nodes and 10 nodes in the hidden layer. In Figure 29, MLP network training error is given for analysis #4 with 2, 4, 6, 8 and 10 nodes in the hidden layer. It is obvious from the figure that as the number of nodes in a hidden layer is increased to 10, convergence is improved. In Figure 30, MLP network training error is given for analysis #10. It is shown in this figure that, other than using two nodes in the hidden layer, which has too much oscillation, as the number of nodes in a hidden layer is increased to 10, convergence is improved. Consequently, increasing number of nodes in a hidden layer to 10 minimizes training and test error. It is also obvious that second approach, by adding directionality information to the training data file, decreases the number of iterations for convergence.

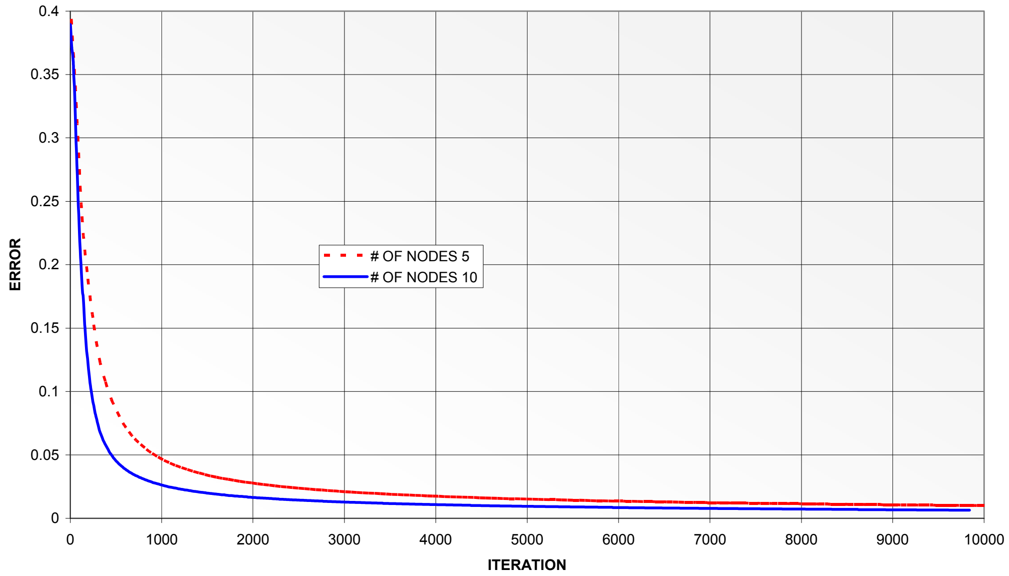


Figure 28: Error vs Training Iteration Number for First Approach Analysis #2

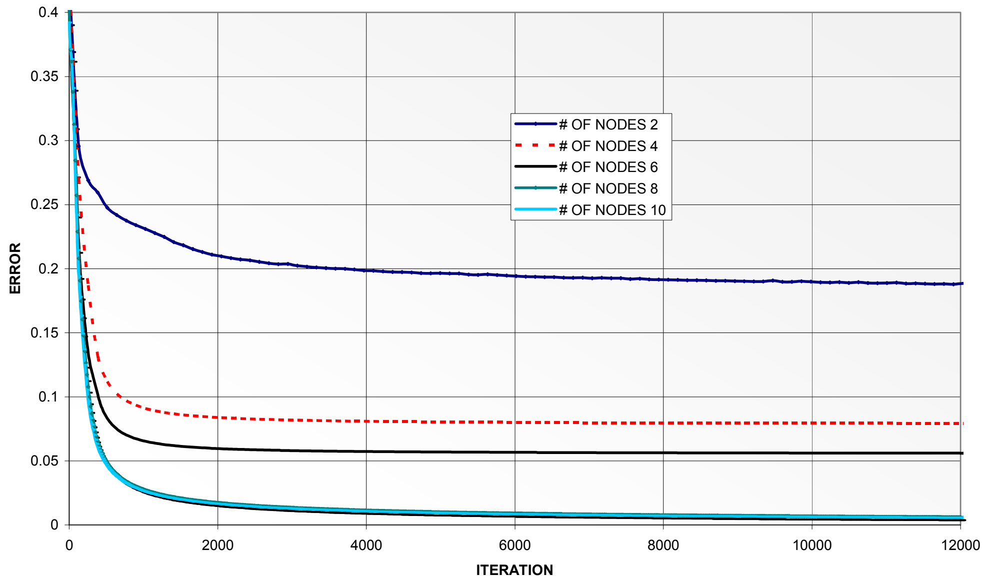


Figure 29: Error vs Training Iteration Number for First Approach Analysis #4

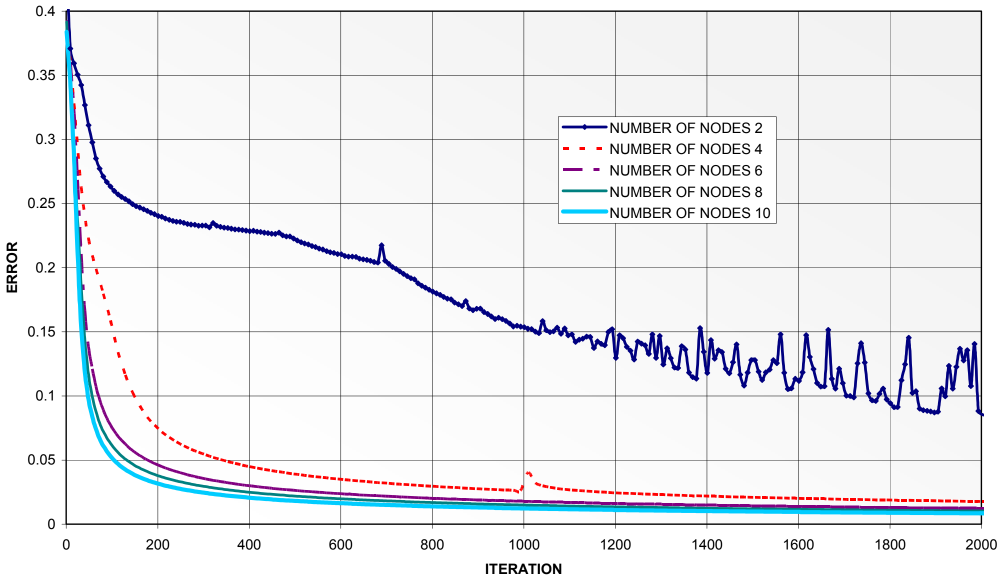


Figure 30: Error vs Training Iteration Number for Second Approach Analysis #10.

6. CONCLUSION

This study has focused on fault diagnosis on hermetic compressors with artificial neural networks using sound data, which are obtained by sound power level tests of the compressor in a semi-anechoic test room.

The results of the second approach using 252 sound power levels in dB unit of 12 microphones (which also means sound power level and directionality) are satisfactory although the training data file, which is composed in consequence of 54 tests, may be considered not enough for this kind of an ANN application.

The results show that within the selected fault set MLP network can detect the faults. The second approach when compared to the first approach is more successful. The main reason behind this is the use of all of the data measured by all 12 microphones.

A comparison of first approach and second approach is given in Table 26. The results show that success ratio for both approaches are improved by increasing the number of training data. By the implementation of second approach, highly satisfactory results are obtained if enough training data is available. Success ratio is increased to 100 % when a training data file, which is composed of 54 tests, is used.

Table 26: Summary of Results

Analysis # First/Second	# of Training Data Set	Success Ratio of First Approach (%)	Success Ratio of Second Approach (%)
3 / 6	30	**46.7**	**66.7**
4 / 11	54	**50**	**100**

A success criterion was defined previously 70 % of the relevant target value as output and no other output is higher than 30 % of the above mentioned target value. Even if this criterion percentages were changed as obtaining 90 % of the relevant target value as output and no other output is higher than 10 % of the above mentioned target value, the success ratio for the second approach will be 100 % for most of the cases.

The results of the mixed set are not satisfactory. Main reason of this is the lack of training data. When this mixed set is used for training, it is seen that MLP Network is successful in finding faults.

The proven method developed in this thesis as second approach can also be applicable for new fault sets. Therefore, for future work, new faults can be tested in addition to the faults that are given in this thesis. Afterwards, this study can be extended by using different ANN models.

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APPENDIX-1: EXPERIMENT RESULTS

TARİH : 18.10.1999 ***MODEL*** : TE 180 YT ***ÖZELLİK*** : NORMAL İMALAT
SES SONUCU : 40.5 dBA ***DOSYA NO*** : 2280 ***SERİ NO*** : 1

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	20,86	9,88	12,63	12,75	9,62	17,59	12,61	17,29	10,11	7,88	16,60	10,47	12,32	20,81	17,78	27,33	20,18	31,68	24,62	26,20	26,88	35,90	35,75
mic.2	21,56	10,81	12,29	12,06	11,89	21,21	20,27	16,81	9,35	6,30	13,68	10,13	11,87	22,22	24,10	22,01	27,14	28,90	23,91	23,44	22,78	34,89	34,73
mic.3	20,81	14,11	18,93	13,83	9,19	23,05	24,27	18,41	10,94	9,83	14,93	10,18	12,02	19,99	27,26	19,47	21,85	24,46	19,21	21,75	23,28	33,93	33,10
mic.4	22,27	9,22	9,24	11,50	8,06	15,10	19,24	13,57	10,44	10,93	19,31	14,23	12,18	19,59	24,03	23,05	24,34	25,94	21,94	25,45	21,78	33,74	33,47
mic.5	15,11	7,05	13,16	9,07	15,72	25,25	19,63	13,30	11,07	11,94	11,89	15,11	12,90	17,46	24,14	17,25	18,71	21,77	19,93	22,36	19,18	32,03	30,98
mic.6	22,21	15,15	20,61	11,55	5,65	17,38	20,11	14,04	10,68	6,45	14,91	13,08	11,81	20,68	23,10	21,88	21,12	27,62	21,50	23,24	23,08	33,68	33,04
mic.7	23,61	17,71	23,30	16,79	15,02	25,61	17,33	16,39	11,21	9,59	14,06	11,64	11,59	19,73	20,62	28,38	18,32	28,38	26,81	27,11	27,04	36,31	35,34
mic.8	23,95	12,63	10,63	16,21	8,68	19,36	20,98	18,09	7,08	6,94	15,50	10,21	12,82	19,01	20,72	20,54	22,02	25,38	20,94	23,66	24,37	33,27	32,14
mic.9	24,73	13,70	13,75	16,52	12,95	20,97	24,28	15,72	9,63	8,62	12,90	12,83	14,97	22,54	21,58	19,98	20,26	26,71	18,64	24,24	24,03	34,00	32,74
mic.10	22,55	9,64	8,61	13,47	9,19	17,50	20,84	14,39	9,97	11,01	17,36	12,84	15,24	21,24	19,45	23,42	25,49	25,71	22,18	23,05	25,31	33,86	33,35
mic.11	23,40	12,23	16,25	15,31	14,13	22,08	23,99	16,58	13,26	9,34	14,13	17,80	17,22	23,54	21,12	26,11	23,50	24,95	23,52	24,34	26,98	35,13	34,29
mic.12	22,08	11,61	14,32	13,45	13,45	21,42	20,34	13,66	9,71	7,90	12,65	10,60	13,85	24,01	18,95	22,74	27,28	27,30	23,73	23,75	24,29	34,65	34,29
S.POW.	0,00	7,44	23,37	19,85	18,32	28,42	28,05	22,61	16,29	14,96	21,92	19,45	20,02	28,06	29,49	30,65	30,29	34,07	29,60	30,75	31,36	40,83	40,52

TARİH : 18.10.1999 ***MODEL*** : TE 180 YT ***ÖZELLİK*** : NORMAL İMALAT
SES SONUCU : 39.6 dBA ***DOSYA NO*** : 2282 ***SERİ NO*** : 2

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	18,04	14,32	19,24	11,74	11,71	19,54	14,51	20,16	13,59	8,04	12,39	14,20	13,55	16,74	12,79	21,47	17,14	24,81	25,94	25,09	24,27	33,15	32,17
mic.2	19,16	12,51	14,72	9,57	5,33	13,92	18,13	17,38	9,28	9,80	12,46	10,46	14,20	22,13	18,27	21,75	23,80	26,31	22,83	23,94	22,31	33,05	32,77
mic.3	19,59	11,81	10,46	13,05	13,45	20,86	23,61	17,50	10,02	9,22	12,23	12,56	15,15	25,38	19,40	18,39	18,18	25,61	21,92	23,35	21,33	33,21	32,50
mic.4	20,39	10,23	10,72	10,75	7,71	14,72	20,53	13,26	16,16	18,04	11,78	14,51	16,16	24,50	16,63	25,75	21,21	22,98	22,39	27,73	23,31	34,01	33,63
mic.5	9,68	8,24	14,03	5,05	11,07	19,18	20,90	14,27	10,83	9,21	9,80	14,55	15,35	18,73	17,89	15,54	14,90	16,62	20,66	22,24	19,35	30,01	28,96
mic.6	20,39	15,64	20,49	8,70	11,36	18,82	22,32	16,11	12,28	9,95	9,13	13,20	13,93	19,22	19,45	19,90	17,74	22,68	23,62	27,50	24,04	33,44	32,12
mic.7	22,06	16,25	20,17	16,29	8,01	16,83	18,48	22,36	18,90	11,97	11,05	14,58	15,94	23,47	14,13	25,14	18,74	24,55	25,68	27,04	24,34	34,63	33,74
mic.8	22,11	15,01	17,92	10,07	5,01	14,04	20,82	18,56	14,30	12,44	11,10	13,86	16,11	26,79	16,61	21,59	19,57	23,85	22,09	26,27	24,98	34,00	33,31
mic.9	23,04	16,36	19,77	12,45	8,27	15,96	23,88	15,68	9,84	11,37	11,47	14,92	17,18	27,91	21,67	18,71	17,91	20,90	20,05	27,13	24,07	34,32	33,46
mic.10	20,67	12,28	16,58	10,98	5,36	12,58	20,86	13,05	17,97	18,23	13,76	16,67	17,36	26,48	15,52	27,56	21,24	23,68	22,93	25,73	23,73	34,52	34,36
mic.11	21,26	17,47	23,21	14,91	9,43	15,22	24,91	20,01	17,40	12,49	11,22	17,38	16,53	21,03	20,46	19,76	19,97	22,65	23,31	26,88	24,65	34,28	32,75
mic.12	19,80	16,44	22,01	13,47	7,66	11,97	21,78	18,13	13,99	11,87	10,13	13,26	14,25	21,40	18,15	21,09	22,67	24,06	22,76	27,42	26,29	34,14	33,02
S.POW.	0,00	17,09	25,62	17,32	15,07	23,69	28,44	24,75	21,37	19,67	17,68	21,00	22,23	30,82	24,87	29,42	26,76	30,53	29,92	32,76	30,60	40,14	39,60

TARİH : 18.10.1999 ***MODEL*** : TE 180 YT ***ÖZELLİK*** : NORMAL İMALAT
SES SONUCU : 41.0 dBA ***DOSYA NO*** : 2284 ***SERİ NO*** : 3

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	19,50	10,54	11,36	19,66	19,17	26,79	19,47	19,36	17,54	10,35	10,70	13,17	16,18	23,28	12,65	23,82	19,85	28,98	25,07	24,98	26,08	35,42	34,39
mic.2	21,47	11,47	9,43	13,54	18,20	25,30	15,42	15,82	12,15	8,30	7,05	9,99	16,36	24,83	21,84	18,65	24,50	27,51	24,53	24,34	23,51	34,63	34,00
mic.3	21,12	13,08	14,67	10,58	15,97	22,95	20,65	15,26	13,83	10,04	11,85	12,49	19,26	25,56	23,19	16,82	21,26	25,52	19,97	22,15	19,90	33,42	32,88
mic.4	21,38	11,26	12,09	8,56	18,18	25,63	19,47	13,26	15,73	12,27	9,76	12,65	14,98	21,87	22,20	26,95	24,79	25,02	23,80	26,39	21,47	34,88	34,32
mic.5	10,46	10,55	16,62	5,96	17,94	26,12	17,06	11,33	13,14	10,43	7,37	13,00	16,43	20,22	20,43	17,02	20,00	20,08	16,78	21,11	20,00	31,62	30,12
mic.6	20,16	18,02	23,90	12,94	14,07	22,84	24,13	14,75	16,51	7,67	6,40	9,93	15,03	24,91	19,50	18,61	22,13	25,00	22,58	23,97	20,68	34,04	32,72
mic.7	22,81	15,12	17,56	23,99	11,19	25,16	24,27	21,37	23,11	12,11	9,03	12,37	16,95	25,16	15,56	20,83	21,26	28,76	28,24	27,63	25,23	36,55	35,35
mic.8	24,18	15,86	17,81	7,65	7,32	17,52	19,36	18,07	15,06	8,35	9,08	13,64	18,28	26,93	20,30	19,15	26,77	29,52	22,63	24,28	22,44	35,31	35,07
mic.9	23,63	15,72	17,91	14,17	13,02	21,98	24,64	14,45	12,99	8,34	12,64	15,16	18,90	28,26	25,62	17,72	23,34	25,08	18,45	23,51	22,36	34,92	34,40
mic.10	21,66	10,70	12,02	13,55	6,63	17,00	20,27	13,24	15,29	12,51	10,53	13,92	19,75	24,36	19,85	26,81	27,59	28,13	23,68	23,78	21,21	35,10	35,21
mic.11	22,79	11,99	13,45	19,38	15,59	23,85	27,99	19,31	15,76	9,52	11,99	15,19	18,63	24,22	25,21	19,59	22,72	26,69	22,98	24,44	24,34	35,52	34,37
mic.12	20,74	10,51	11,05	19,19	15,50	23,45	25,82	18,65	17,02	11,10	8,65	12,13	18,04	25,70	21,35	19,54	27,66	29,04	24,50	23,52	22,95	35,77	35,26
S.POW.	0,00	13,83	23,42	23,57	22,39	30,85	29,83	23,85	23,46	16,38	15,80	19,40	24,36	31,88	28,57	28,77	31,11	34,05	30,45	30,94	29,65	41,42	40,95

TARİH : 18.10.1999 ***MODEL*** : TE 180 YT ***ÖZELLİK*** : NORMAL İMALAT
SES SONUCU : 39.8 dBA ***DOSYA NO*** : 2286 ***SERİ NO*** : 4

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	19,90	13,97	17,45	21,85	8,82	14,56	26,55	24,77	13,33	13,38	13,66	18,11	16,53	25,26	12,11	15,76	19,78	22,74	25,35	25,33	22,20	34,50	33,10
mic.2	22,03	11,89	10,27	17,77	10,44	16,48	23,18	23,21	11,52	13,28	11,52	12,79	14,91	25,04	19,80	16,55	20,22	24,81	23,63	23,70	21,63	33,61	32,70
mic.3	20,88	14,11	16,13	11,62	14,32	23,71	30,32	27,23	11,45	13,45	11,71	19,43	14,63	29,09	20,01	16,27	21,21	23,57	20,37	20,74	18,74	35,86	34,43
mic.4	22,13	10,09	6,96	11,85	10,18	16,65	24,88	21,42	15,68	22,62	15,19	16,58	14,16	21,80	13,99	17,87	18,88	20,20	23,61	25,21	21,52	33,31	31,95
mic.5	14,29	10,34	14,85	13,54	10,22	22,76	23,63	22,36	12,50	15,68	11,96	22,29	16,55	21,39	18,05	14,43	20,90	17,56	18,45	21,51	18,59	32,23	30,99
mic.6	21,31	18,98	23,78	17,92	11,06	21,17	30,06	22,93	9,48	14,23	8,14	10,66	15,57	19,99	15,20	16,82	17,92	22,58	22,75	22,39	22,13	34,64	31,77
mic.7	22,74	13,17	12,51	25,30	9,71	23,87	33,13	26,31	15,87	13,94	13,68	13,87	16,08	20,60	13,02	17,87	17,33	25,16	27,40	27,58	25,11	37,39	34,74
mic.8	23,95	15,95	18,35	16,89	8,66	14,89	27,31	27,47	12,14	15,76	13,86	14,42	17,81	20,39	16,21	21,08	21,26	23,10	22,49	25,29	21,01	34,72	32,82
mic.9	24,35	17,53	20,31	14,19	11,28	18,87	27,39	26,49	11,16	14,08	11,98	18,00	20,43	23,91	20,47	20,92	20,05	19,86	20,05	24,33	20,40	34,68	32,85
mic.10	22,84	10,89	12,32	12,46	8,47	15,92	27,12	21,75	15,05	23,73	15,31	13,64	17,21	23,28	15,62	15,17	18,41	21,40	23,54	24,18	21,50	33,88	32,35
mic.11	21,33	15,62	19,38	20,81	11,22	21,68	29,73	28,69	12,16	14,18	13,85	17,87	20,25	26,32	20,09	17,29	20,51	22,41	25,02	23,87	23,00	36,11	34,31
mic.12	21,96	12,74	15,07	19,75	9,10	19,02	27,80	25,28	12,37	17,33	10,74	12,63	14,81	25,51	18,34	17,66	21,16	24,10	22,67	24,32	19,96	34,60	33,13
S.POW.	0,00	17,19	24,30	25,63	16,50	27,09	35,35	32,27	19,44	24,47	19,39	23,76	23,74	31,24	24,35	24,38	26,66	29,50	30,32	30,83	28,32	41,30	39,77

TARİH : 18.10.1999 ***MODEL*** : TE 180 YT ***ÖZELLİK*** : NORMAL İMALAT
SES SONUCU : 39.1 dBA ***DOSYA NO*** : 2288 ***SERİ NO*** : 5

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	19,94	9,52	11,29	25,07	10,89	16,82	24,46	17,38	16,25	12,13	13,33	15,19	16,42	22,46	11,97	19,40	16,72	23,57	25,12	23,85	25,28	33,90	32,29
mic.2	20,62	10,86	6,30	11,89	14,27	21,37	19,96	17,68	11,52	10,84	10,93	10,58	15,09	25,02	18,08	17,54	21,00	22,97	23,35	22,83	22,43	32,78	32,05
mic.3	20,81	11,99	13,03	9,97	17,52	26,11	29,14	22,65	14,18	12,21	14,25	15,24	15,00	23,45	20,46	15,69	17,03	19,97	20,72	22,51	21,99	34,38	32,05
mic.4	22,18	9,29	8,86	13,85	14,27	21,19	23,38	14,93	13,87	13,71	9,85	12,11	17,03	23,42	15,54	15,31	19,73	21,71	24,60	24,90	23,94	33,25	31,99
mic.5	13,98	9,63	15,18	10,71	15,18	25,37	18,78	19,30	15,21	16,24	16,38	20,90	16,95	22,24	17,49	12,85	15,40	15,61	19,37	21,46	18,22	31,80	30,37
mic.6	22,18	17,48	22,51	16,35	16,14	23,88	27,90	17,10	12,84	10,40	11,48	15,15	15,13	21,97	15,53	15,24	18,21	22,42	21,88	23,59	22,06	34,01	31,51
mic.7	22,69	13,17	16,01	30,48	16,13	25,87	30,83	19,09	16,72	14,60	13,10	16,51	17,59	23,19	13,80	20,81	17,49	25,47	25,70	28,38	24,50	37,31	34,49
mic.8	24,79	15,31	18,51	20,91	12,49	16,94	23,31	21,01	11,90	12,02	11,25	12,44	17,38	23,01	15,69	22,46	20,18	22,21	22,63	25,22	22,72	33,88	32,29
mic.9	25,37	16,29	19,20	13,89	16,03	22,83	25,98	20,36	10,52	10,38	13,32	17,89	19,37	23,44	18,71	16,69	16,29	18,94	18,66	26,26	22,76	34,10	31,93
mic.10	22,53	10,37	12,04	13,69	9,90	18,23	24,44	16,11	16,20	14,74	12,35	14,74	19,47	22,29	15,71	20,11	20,39	20,55	22,86	25,00	23,71	33,24	32,01
mic.11	23,75	11,69	13,17	24,48	14,86	24,22	29,49	24,01	13,73	12,30	18,11	24,11	20,67	23,99	19,92	16,58	21,83	19,00	22,98	23,43	25,61	35,89	33,83
mic.12	21,54	9,45	11,05	24,72	12,53	21,28	27,51	19,40	13,94	11,97	14,20	12,46	15,82	22,41	19,61	16,72	22,57	23,02	24,01	27,11	22,03	34,78	33,04
S.POW.	0,00	9,33	22,64	29,53	21,20	29,83	33,58	26,60	20,74	19,42	20,30	24,20	24,24	29,96	24,14	24,90	26,13	28,66	29,87	31,49	30,01	40,74	39,13

TARİH **: 18.10.1999** ***MODEL*** **: TE 180 YT** ***ÖZELLİK*** **: NORMAL İMALAT**
SES SONUCU **: 40.6 dBA** ***DOSYA NO*** **: 2312** ***SERİ NO*** **: 6**

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	17,64	10,28	9,67	14,35	7,81	13,05	22,81	19,78	13,76	10,42	15,76	11,52	18,51	20,18	15,85	30,29	19,40	24,98	29,52	22,84	25,28	35,58	35,52
mic.2	18,22	11,10	11,28	16,01	7,07	16,95	20,71	24,48	10,95	11,42	10,32	9,87	14,60	21,70	23,14	24,10	21,68	23,82	29,18	20,71	22,93	34,48	34,06
mic.3	18,91	13,62	15,59	15,36	13,40	21,59	28,32	28,62	11,57	13,62	13,40	15,26	17,61	24,72	24,76	24,08	19,00	23,45	24,93	19,68	22,79	35,61	34,38
mic.4	18,51	9,59	9,40	10,89	7,71	15,61	20,81	20,76	16,72	15,26	12,20	12,11	17,19	17,17	22,48	23,87	17,85	20,67	25,47	21,07	20,34	32,52	32,06
mic.5	7,00	6,15	9,99	8,48	11,04	24,12	26,14	22,36	17,51	10,39	16,24	15,51	18,71	21,65	21,75	18,95	13,89	17,32	21,23	18,99	19,06	32,66	31,23
mic.6	18,11	16,09	20,54	7,08	11,90	20,77	28,63	20,84	12,42	11,03	14,19	10,28	16,14	19,76	23,15	26,58	16,98	22,98	24,63	20,79	24,35	34,78	33,55
mic.7	21,75	12,91	13,85	23,96	11,73	21,75	31,61	19,49	14,08	11,40	12,74	8,86	16,65	18,48	15,92	32,64	18,01	24,71	28,17	23,89	24,46	37,59	36,69
mic.8	21,92	12,59	8,33	15,62	9,41	11,67	25,03	26,37	11,79	12,94	10,70	10,07	17,03	17,83	19,48	24,77	17,92	22,61	24,13	22,06	20,68	33,67	32,45
mic.9	22,33	13,63	13,42	17,18	10,95	18,12	27,60	24,68	9,56	11,35	18,03	13,89	18,17	21,88	23,27	23,30	17,56	19,86	23,15	20,61	20,80	34,10	32,69
mic.10	19,61	8,54	7,03	11,97	7,29	14,20	24,67	19,66	15,05	15,92	15,36	11,59	17,54	19,97	21,42	22,04	16,96	23,02	25,94	23,33	22,77	33,34	32,55
mic.11	20,51	12,96	14,86	16,28	9,36	22,30	28,62	28,08	13,99	9,38	19,38	16,79	19,85	23,57	20,88	25,99	20,65	22,18	25,68	21,36	24,48	35,84	34,51
mic.12	18,95	10,56	12,01	13,47	7,64	20,08	26,22	22,15	12,46	10,18	11,54	9,62	17,05	22,62	20,06	25,19	21,28	22,74	25,68	22,43	22,95	34,15	33,33
S.POW.	0,00	0,00	20,04	22,83	15,87	26,59	33,86	31,12	20,32	18,78	21,61	19,19	24,30	28,12	28,47	33,51	25,52	29,53	33,06	27,76	29,65	41,33	40,58

TARİH **: 20.10.1999** ***MODEL*** **: TE 180 YT** ***ÖZELLİK*** **: NORMAL İMALAT**
SES SONUCU **: 40.0 dBA** ***DOSYA NO*** **: 2344** ***SERİ NO*** **: 7**

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	21,61	13,03	11,97	16,23	11,83	18,63	19,10	22,58	13,41	12,23	8,68	11,90	19,03	22,84	12,32	25,05	18,44	25,38	26,32	28,08	26,60	35,03	34,21
mic.2	23,16	14,46	9,59	19,94	8,20	18,36	20,46	22,38	11,57	12,86	9,26	18,36	15,54	25,49	17,99	17,80	22,22	28,24	28,41	25,35	21,54	35,23	34,65
mic.3	22,91	15,05	13,64	22,44	12,96	21,10	22,51	25,16	13,43	9,88	8,28	14,42	15,05	26,46	19,61	17,71	20,18	23,42	24,58	24,86	22,30	34,56	33,31
mic.4	22,36	10,16	7,69	12,20	9,78	18,18	20,84	16,74	14,09	13,31	14,37	19,92	16,60	19,71	16,30	16,48	19,14	25,21	26,48	26,81	21,14	33,65	32,81
mic.5	11,58	3,92	6,46	9,87	16,38	25,01	25,96	16,78	15,18	18,01	8,79	18,03	16,71	25,86	20,15	14,95	16,90	17,51	20,26	21,49	16,92	32,94	31,76
mic.6	26,60	15,41	16,63	19,19	10,28	19,57	19,55	18,42	10,87	10,56	9,08	13,06	14,68	22,44	17,13	19,43	17,15	24,79	23,43	24,89	20,46	33,56	31,83
mic.7	24,83	16,67	12,81	25,44	16,36	23,66	27,16	22,90	14,84	14,60	8,32	12,74	15,68	21,33	12,46	24,46	16,69	25,61	28,57	26,34	24,15	36,11	34,31
mic.8	24,79	17,34	10,54	21,66	8,19	13,43	21,76	24,35	9,67	10,75	10,30	17,13	16,18	22,11	17,38	18,16	20,16	22,86	23,59	23,10	22,39	33,57	31,88
mic.9	24,19	16,08	12,78	20,47	8,93	15,96	23,79	20,76	9,58	11,58	10,34	14,41	16,43	25,39	20,80	21,81	17,04	18,17	20,47	24,26	21,79	33,44	32,13
mic.10	22,60	11,66	10,02	17,61	5,67	15,17	20,06	18,65	15,22	13,69	12,30	17,85	16,74	27,45	19,99	16,70	20,41	21,31	23,56	26,15	24,20	33,99	33,38
mic.11	23,82	14,98	15,10	17,31	11,81	20,79	20,30	23,17	11,83	9,43	11,90	18,18	16,67	27,00	20,56	24,22	20,09	21,54	23,87	23,64	25,35	34,63	33,80
mic.12	22,60	13,61	14,18	14,30	13,54	21,47	14,88	17,24	13,68	9,83	8,70	11,47	15,31	28,48	19,02	21,28	22,34	22,48	24,32	24,76	22,03	34,13	33,76
S.POW.	22,40	16,74	18,54	26,49	18,55	27,22	29,30	28,46	19,49	19,39	16,38	23,09	23,00	32,10	25,18	27,84	26,31	30,76	32,00	31,82	29,73	40,70	39,98

TARİH **: 20.10.1999** ***MODEL*** **: TE 180 YT** ***ÖZELLİK*** **: NORMAL İMALAT**
SES SONUCU **: 40.0 dBA** ***DOSYA NO*** **: 2346** ***SERİ NO*** **: 8**

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	25,42	11,99	11,08	20,91	12,35	16,86	21,35	20,23	13,90	11,69	16,65	15,64	17,90	24,20	14,82	15,36	18,72	23,97	26,76	25,68	28,48	35,04	33,56
mic.2	26,88	13,09	9,26	21,14	11,14	19,07	24,55	20,90	10,95	15,42	13,31	12,74	16,62	23,47	26,55	19,63	22,29	23,37	24,08	20,69	25,65	35,02	33,72
mic.3	27,23	14,42	11,71	21,26	13,57	20,25	28,90	24,06	14,89	15,03	16,11	16,49	16,49	23,87	26,88	20,18	18,58	24,74	22,37	20,93	25,33	35,91	34,18
mic.4	24,58	10,39	7,57	13,10	10,65	18,67	22,08	19,68	11,94	22,08	13,71	13,47	16,51	17,17	25,16	18,98	19,14	20,44	23,42	21,82	22,74	33,31	32,18
mic.5	11,63	3,31	4,74	7,54	16,57	23,93	26,07	18,92	18,38	13,73	15,56	17,58	18,29	22,85	27,55	19,21	21,04	20,66	23,37	20,59	24,19	34,37	33,72
mic.6	27,38	12,84	13,03	17,43	15,29	22,28	24,25	19,01	12,80	14,51	10,56	12,12	15,64	20,18	22,96	18,70	16,96	20,25	21,62	20,25	25,03	33,81	31,40
mic.7	25,14	15,14	12,46	24,76	13,40	19,33	22,53	20,50	16,01	11,03	12,01	13,19	18,11	20,06	17,96	17,75	15,99	24,71	28,81	25,87	29,02	35,72	33,96
mic.8	23,57	14,14	8,07	18,77	9,10	13,97	26,67	23,80	10,16	14,68	13,97	12,21	16,18	20,84	21,64	21,24	21,59	20,65	23,50	23,90	22,32	33,97	32,46
mic.9	24,07	14,57	10,01	17,77	12,29	18,80	27,48	22,24	12,85	14,22	17,35	14,26	17,39	23,58	26,73	21,34	18,38	20,12	22,17	23,20	26,17	34,98	33,72
mic.10	23,52	9,83	5,05	8,44	6,16	12,30	23,02	18,93	14,27	24,13	11,38	12,58	18,81	24,20	24,08	18,41	19,00	21,33	23,00	23,85	23,99	33,86	33,09
mic.11	25,89	13,10	13,22	15,31	12,35	21,10	25,57	24,37	11,55	15,95	12,54	20,16	21,54	24,37	24,72	18,30	20,81	20,49	23,52	21,83	26,65	35,15	33,75
mic.12	24,15	12,30	11,83	14,81	12,34	19,19	20,88	18,22	10,25	15,26	10,72	11,12	15,82	24,60	22,41	17,89	21,94	21,96	22,01	23,59	25,99	33,69	32,63
S.POW.	28,27	5,76	15,74	25,63	19,11	26,54	31,98	28,22	20,27	24,34	20,71	21,71	24,47	29,72	31,42	25,86	26,61	28,99	31,06	29,38	32,69	41,05	39,99

TARİH **: 20.10.1999** ***MODEL*** **: TE 180 YT** ***ÖZELLİK*** **: NORMAL İMALAT**
SES SONUCU **: 40.7 dBA** ***DOSYA NO*** **: 2356** ***SERİ NO*** **: 9**

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	29,40	13,41	14,84	9,52	10,11	11,43	16,13	17,94	20,70	9,01	14,02	11,15	18,67	24,51	16,13	25,71	16,44	24,29	26,01	24,29	25,40	35,21	33,70
mic.2	29,98	13,00	10,08	18,08	8,77	17,14	15,42	15,78	16,48	7,12	14,11	10,27	17,38	25,58	26,29	20,62	21,09	23,51	25,51	21,28	22,36	35,16	33,74
mic.3	31,73	15,59	17,14	18,88	10,30	19,43	22,77	18,88	15,45	8,77	15,10	16,37	18,23	28,81	31,40	20,58	21,35	25,24	23,31	22,70	19,83	37,34	36,35
mic.4	28,27	11,83	11,78	11,15	7,78	14,01	19,47	18,13	8,89	9,45	13,52	11,19	17,68	19,64	27,19	20,29	18,51	20,76	23,14	23,40	21,02	33,93	32,63
mic.5	13,82	5,40	8,83	9,59	15,23	23,72	24,00	13,84	13,09	10,69	14,43	15,84	18,76	24,85	28,43	21,77	22,76	19,16	21,96	21,63	21,09	34,18	34,06
mic.6	28,27	15,34	17,90	18,96	13,22	21,57	21,15	14,56	14,73	7,01	13,88	12,23	17,78	24,98	27,26	21,71	17,55	19,57	20,98	20,65	21,59	34,53	33,11
mic.7	25,63	14,44	14,29	23,94	10,39	17,16	21,75	18,18	20,32	8,27	13,26	13,12	17,45	24,74	22,15	26,83	16,25	24,64	28,05	23,21	23,68	35,46	34,56
mic.8	22,91	14,49	6,96	14,35	7,51	11,41	21,03	19,38	14,11	6,73	16,58	10,02	18,91	25,62	24,35	25,64	21,17	20,46	22,06	22,25	21,34	33,73	33,53
mic.9	23,98	15,72	13,54	11,44	8,10	14,43	21,84	15,98	12,05	7,80	16,95	13,56	20,29	25,58	27,65	22,36	18,50	20,14	19,56	20,87	20,97	33,76	33,53
mic.10	25,99	10,72	10,42	13,19	4,89	11,88	18,13	19,03	9,43	8,37	14,91	11,08	19,87	26,13	27,78	19,52	17,33	18,91	21,57	21,38	21,26	33,81	33,41
mic.11	27,99	16,11	18,98	13,10	6,21	17,12	20,11	18,89	14,37	7,81	13,99	17,40	20,51	28,58	27,45	21,12	19,61	18,39	20,77	20,74	23,82	35,15	34,40
mic.12	27,30	14,63	17,19	13,17	8,44	15,73	17,94	16,01	14,32	6,86	15,90	9,92	17,64	25,30	26,24	23,28	20,03	22,55	22,97	22,10	22,62	34,35	33,53
S.POW.	32,93	15,35	21,23	23,33	16,01	24,70	27,45	24,22	22,48	13,69	21,42	19,83	25,46	32,67	33,96	29,90	26,34	28,85	30,46	28,33	29,04	41,27	40,72

TARİH **: 20.10.1999** ***MODEL*** **: TE 180 YT** ***ÖZELLİK*** **: NORMAL İMALAT**
SES SONUCU **: 40.1 dBA** ***DOSYA NO*** **: 2358** ***SERİ NO*** **: 10**

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	26,58	12,30	14,72	13,43	8,32	12,16	17,99	17,52	14,16	9,92	7,83	11,38	15,43	25,92	15,80	18,37	15,64	27,16	29,26	24,01	26,29	35,23	34,31
mic.2	26,52	12,22	9,05	20,71	5,52	16,22	21,11	20,15	11,57	8,48	5,54	10,74	15,71	25,23	22,36	16,25	20,57	29,28	27,30	20,24	27,39	35,62	34,67
mic.3	28,76	14,23	15,45	22,37	11,66	20,84	28,10	24,58	14,32	7,90	6,00	13,52	15,62	26,98	23,92	17,43	19,10	30,69	27,49	23,73	22,77	37,15	35,82
mic.4	25,49	10,53	9,59	12,67	7,64	15,33	23,80	21,40	10,91	10,02	7,17	7,92	15,03	21,66	19,38	16,55	18,51	22,95	25,63	22,46	24,69	33,54	31,96
mic.5	12,29	4,43	7,33	6,32	7,59	20,52	25,44	17,89	15,98	11,91	9,70	15,75	15,23	26,45	24,14	18,81	22,78	21,11	26,31	20,99	20,10	33,88	33,60
mic.6	25,59	13,97	18,02	18,35	10,42	20,68	25,31	18,96	11,48	8,09	7,91	9,60	15,29	26,58	20,07	16,68	17,95	19,45	27,31	20,46	21,59	34,29	32,86
mic.7	24,57	13,71	13,33	24,57	6,53	11,45	20,34	17,78	14,67	13,92	7,87	13,10	13,97	24,48	14,69	23,37	14,84	24,74	29,35	23,61	25,91	35,11	33,99
mic.8	23,15	13,67	8,68	19,74	4,68	10,70	24,18	21,95	9,10	8,92	5,34	7,46	12,84	24,42	18,51	18,68	18,49	23,01	25,87	21,92	23,90	33,59	32,38
mic.9	23,98	14,81	11,51	17,86	8,81	16,33	24,47	20,05	7,21	6,50	7,73	12,74	17,72	25,62	21,63	17,84	18,47	19,60	21,88	21,04	22,59	33,17	31,96
mic.10	25,14	9,71	7,41	12,30	7,83	14,56	23,19	19,12	11,92	10,51	6,18	11,03	17,61	25,16	17,90	14,32	19,35	20,77	23,82	23,02	22,69	33,09	31,82
mic.11	27,24	14,28	16,53	15,69	10,98	20,01	22,81	21,38	12,77	7,36	7,69	19,87	18,16	23,57	19,85	19,87	22,13	18,67	23,00	21,12	25,97	34,24	32,42
mic.12	26,81	12,98	15,64	13,90	10,53	17,73	20,22	15,54	13,07	7,29	4,79	8,70	15,05	25,02	19,40	15,73	22,48	23,63	25,99	20,13	26,17	34,16	32,82
S.POW.	29,55	6,50	19,78	25,38	14,20	24,35	30,70	27,09	19,11	15,63	11,69	19,77	22,50	32,12	27,39	25,13	26,49	31,99	33,43	28,24	31,43	40,98	40,12

TARİH : 08.11.1999 MODEL : TE 180 YT ÖZELLİK : TİTREŞİM BORUSU YAYSIZ
SES SONUCU : 41.3 dBA DOSYA NO : 2726 SERİ NO : 1

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	27,41	11,61	23,09	38,51	15,30	14,69	20,85	20,99	13,16	8,22	10,57	10,69	21,39	26,38	17,56	26,90	20,33	24,54	27,65	26,64	27,70	40,56	35,94
mic.2	28,25	11,57	15,85	30,06	9,17	14,72	23,45	21,14	13,29	6,80	8,11	9,03	20,48	26,86	23,73	21,61	26,06	24,84	26,95	23,40	26,22	36,97	35,18
mic.3	28,55	12,91	21,33	36,36	17,73	22,74	26,88	24,48	13,19	10,16	9,83	17,80	18,30	27,63	24,32	26,29	22,44	23,64	24,41	24,67	24,88	39,51	35,73
mic.4	26,64	9,07	15,05	30,08	10,72	15,63	19,49	21,82	15,14	10,53	10,58	14,62	19,84	19,99	19,75	21,35	23,44	22,85	25,25	24,85	23,87	35,58	33,08
mic.5	11,53	2,26	12,82	28,09	11,57	22,77	23,78	17,90	12,42	10,78	11,22	23,52	17,69	23,33	21,08	17,93	16,47	18,91	23,92	21,59	20,51	34,05	32,23
mic.6	27,67	10,64	21,01	36,49	17,13	23,81	18,85	19,60	10,66	9,91	9,41	9,88	19,20	25,45	19,57	22,28	21,34	23,50	24,11	23,36	23,93	38,72	33,86
mic.7	24,63	13,51	22,61	37,87	14,09	18,99	23,50	20,70	13,58	9,74	9,48	14,14	17,62	23,34	16,73	23,67	19,83	26,35	29,52	25,99	26,44	39,98	35,42
mic.8	23,87	12,60	12,25	25,72	10,27	15,23	22,10	22,71	9,14	6,86	7,97	8,86	20,93	24,05	21,25	24,57	21,84	24,29	26,55	23,75	26,29	35,32	34,18
mic.9	23,63	12,97	13,79	27,20	13,21	17,67	25,72	20,12	9,77	8,27	10,15	15,23	18,97	25,39	24,12	24,85	19,46	20,19	23,23	23,93	25,53	35,33	33,85
mic.10	25,23	8,77	8,20	19,26	10,44	16,34	22,88	22,01	15,33	11,75	11,50	11,21	20,50	24,85	21,99	22,93	22,46	21,68	25,61	24,97	24,55	34,73	33,78
mic.11	27,26	10,89	19,97	34,86	15,10	18,91	24,30	21,34	12,89	13,29	11,74	21,22	21,55	26,91	22,39	23,97	19,88	21,03	24,68	23,36	26,09	38,20	34,73
mic.12	26,86	12,44	19,76	34,57	13,41	16,11	22,46	17,17	13,10	13,34	9,13	9,62	22,55	27,16	21,94	21,40	25,87	21,59	25,57	24,30	27,80	38,18	35,11
S.POW.	32,01	15,04	25,78	41,05	20,46	26,15	30,24	28,02	19,29	16,51	15,99	23,37	26,95	32,37	28,53	30,53	29,15	30,02	32,80	31,07	32,47	44,50	41,33

TARİH : 08.11.1999 MODEL : TE 180 YT ÖZELLİK : TİTREŞİM BORUSU YAYSIZ
SES SONUCU : 40.9 dBA DOSYA NO : 2720 SERİ NO : 2

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	24,33	13,07	13,68	17,06	13,89	18,66	27,70	19,42	15,21	9,18	11,16	12,57	19,02	23,56	16,62	22,71	20,07	26,87	29,06	27,62	26,90	36,25	35,08
mic.2	24,98	9,69	9,15	19,05	11,73	17,85	27,45	21,24	11,12	8,39	8,61	10,11	16,93	26,65	22,88	21,47	24,20	25,09	27,33	24,62	25,66	35,85	34,88
mic.3	25,75	11,26	13,03	23,47	19,28	25,45	19,31	22,22	14,13	7,45	11,19	16,63	18,70	28,22	23,33	19,57	20,65	23,54	25,07	23,92	24,11	35,59	34,37
mic.4	25,65	8,06	8,48	20,76	14,11	18,79	27,25	18,64	10,98	13,82	10,67	12,34	17,19	21,33	19,07	20,62	21,04	23,65	25,39	25,47	23,89	34,71	32,97
mic.5	10,02	3,23	6,49	14,87	14,30	24,42	25,26	19,03	17,17	9,36	11,06	17,31	18,40	23,45	18,91	13,03	17,34	21,03	23,33	20,79	21,85	32,91	31,59
mic.6	25,97	10,38	10,80	23,95	20,47	27,05	24,00	17,46	11,79	9,65	10,38	10,47	17,76	25,22	19,36	18,14	20,77	24,94	24,23	23,60	24,96	35,34	33,29
mic.7	22,35	11,86	13,53	24,68	17,10	24,09	31,52	21,64	14,28	7,98	10,73	11,69	18,70	23,71	16,73	20,19	17,53	27,19	30,25	27,38	25,43	37,35	35,57
mic.8	22,01	11,02	8,86	7,38	13,52	18,67	30,47	22,52	11,47	8,79	8,88	10,39	16,36	24,78	18,34	18,48	19,16	26,66	25,09	25,32	27,13	35,83	34,22
mic.9	22,73	12,31	10,52	11,84	17,65	22,33	31,83	22,73	10,08	10,38	11,72	13,21	17,53	25,46	22,76	19,53	18,22	22,73	22,66	25,51	24,71	36,03	34,02
mic.10	24,81	8,30	7,59	7,59	13,96	18,57	25,23	17,12	10,18	13,24	10,95	12,29	19,14	24,24	21,54	18,69	20,74	22,22	25,49	24,78	26,85	34,55	33,32
mic.11	26,84	9,65	10,23	21,31	17,13	21,99	28,67	23,85	14,68	13,08	10,26	18,44	21,67	26,77	22,46	18,89	21,71	23,55	22,96	24,61	27,43	36,28	34,57
mic.12	26,93	9,43	9,55	19,66	15,29	19,59	21,90	17,80	14,02	11,76	8,44	11,29	16,98	26,44	21,43	18,96	26,08	24,18	26,04	25,19	28,58	35,83	34,72
S.POW.	29,78	12,45	16,04	27,01	23,09	29,37	34,88	27,63	19,85	16,90	16,40	20,47	25,16	32,17	27,60	26,37	28,13	31,48	33,02	31,89	32,77	42,31	40,93

TARİH : 08.11.1999 MODEL : TE 180 YT ÖZELLİK : TİTREŞİM BORUSU YAYSIZ
SES SONUCU : 41.6 dBA DOSYA NO : 2724 SERİ NO : 3

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	25,20	9,35	20,47	35,76	14,45	16,90	17,77	15,61	16,73	13,98	18,17	15,04	21,16	24,76	17,68	19,39	22,59	26,52	28,28	27,88	25,88	38,72	35,26
mic.2	26,81	9,64	11,66	25,49	8,28	17,24	21,50	16,96	13,97	10,63	20,67	16,67	18,70	24,79	23,40	19,68	32,48	23,68	26,22	24,79	22,77	36,91	36,50
mic.3	27,82	11,17	18,39	33,19	19,12	24,84	25,24	19,87	13,31	10,39	14,91	15,47	18,74	30,69	24,88	21,59	22,06	24,84	24,74	25,54	22,93	38,26	36,00
mic.4	25,16	8,25	14,08	28,85	11,09	17,12	19,30	16,27	16,34	15,47	23,56	18,60	19,51	19,61	18,95	20,76	25,21	23,89	23,49	25,61	22,48	35,34	33,59
mic.5	12,12	2,54	13,55	28,18	9,76	18,51	23,71	14,80	11,34	12,28	12,94	15,08	17,20	22,32	21,50	17,90	17,22	19,15	22,96	21,17	18,65	33,20	31,14
mic.6	27,10	9,81	22,68	37,87	17,79	22,09	19,48	13,88	11,51	7,51	17,08	14,94	18,54	23,71	19,67	21,81	24,11	23,69	23,81	22,66	21,41	39,48	33,92
mic.7	23,64	12,54	22,94	38,23	16,30	19,39	21,20	16,63	16,49	13,46	15,65	13,86	18,40	22,89	17,36	24,94	20,82	30,16	27,78	25,74	23,83	40,22	35,92
mic.8	23,61	11,80	10,13	23,44	12,03	18,34	20,15	17,42	11,92	9,75	20,15	16,15	18,34	22,62	20,76	22,55	20,03	24,59	23,32	25,42	25,30	34,36	33,25
mic.9	23,48	11,77	10,83	24,12	14,19	20,38	23,51	16,33	10,95	8,74	15,21	14,41	19,58	26,35	23,91	24,82	18,92	21,16	23,44	25,77	23,32	34,89	34,01
mic.10	24,05	8,23	9,66	23,33	12,25	17,61	21,37	16,34	16,22	15,42	24,29	19,96	21,16	24,60	20,62	18,90	23,11	24,20	25,16	25,51	26,10	35,26	34,35
mic.11	24,46	10,80	19,95	35,33	15,86	21,01	22,94	18,35	12,14	10,26	12,14	17,06	20,23	28,23	23,52	18,89	22,63	24,63	23,83	25,52	24,23	38,28	34,97
mic.12	25,73	9,36	22,27	37,40	15,59	19,17	20,67	14,68	14,70	13,59	17,38	14,82	20,27	28,65	21,45	18,67	30,08	24,30	24,62	24,48	24,22	39,83	36,32
S.POW.	30,35	11,60	25,52	40,83	21,49	26,84	28,70	23,36	20,78	18,85	26,06	23,01	26,23	32,82	28,51	28,21	32,51	31,83	31,96	31,96	30,58	44,35	41,61

TARİH : 08.11.1999 MODEL : TE 180 YT ÖZELLİK : TİTREŞİM BORUSU YAYSIZ
SES SONUCU : 41.0 dBA DOSYA NO : 2728 SERİ NO : 4

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	20,47	9,58	21,93	37,29	15,09	17,96	26,07	20,29	15,91	9,91	10,34	10,88	20,55	26,21	17,04	23,34	21,51	24,10	29,46	26,50	26,45	39,68	35,65
mic.2	20,48	9,12	9,03	21,57	9,57	19,57	25,26	19,07	13,43	12,39	8,39	9,66	20,01	26,55	19,83	21,57	27,75	22,29	26,03	23,54	25,45	35,29	34,74
mic.3	19,14	9,76	18,91	34,15	16,60	22,91	25,78	22,04	13,97	15,15	8,98	15,10	17,57	28,65	19,99	25,09	22,37	19,71	23,57	24,15	22,51	37,63	34,77
mic.4	19,61	7,71	14,15	29,30	10,93	17,73	19,23	18,69	13,00	18,79	11,52	9,94	17,47	21,70	12,55	22,76	25,09	21,89	24,12	25,35	24,22	34,88	33,09
mic.5	8,45	1,48	15,36	30,41	8,14	20,23	23,55	16,00	10,33	11,65	9,72	15,81	18,11	22,25	16,89	13,13	19,48	15,01	22,06	21,62	17,93	33,77	30,53
mic.6	22,19	9,23	24,28	39,45	16,33	23,24	20,12	14,56	11,06	13,88	8,47	11,39	20,82	26,14	16,14	24,26	22,42	20,77	24,47	21,81	22,35	40,58	34,51
mic.7	22,82	11,69	22,07	37,57	15,62	20,91	24,18	18,84	15,50	10,07	10,02	9,58	17,01	23,48	16,75	27,22	19,36	25,10	28,18	25,15	24,02	39,61	35,20
mic.8	22,43	11,19	12,29	26,76	9,05	17,66	23,65	20,41	11,87	10,22	8,91	9,82	19,49	22,31	18,41	27,46	23,35	23,18	25,06	23,79	23,56	35,09	34,02
mic.9	22,47	11,51	12,52	26,85	11,25	18,87	22,64	16,80	10,92	10,41	10,45	13,84	21,32	23,39	22,40	26,05	21,46	15,98	23,48	24,24	24,43	34,70	33,47
mic.10	21,09	4,70	10,44	24,55	10,74	15,14	21,33	20,41	12,79	18,69	12,88	11,52	19,73	22,34	17,45	21,91	23,80	19,87	24,64	24,67	23,35	33,90	32,81
mic.11	22,09	7,41	23,83	38,95	16,33	21,34	24,77	20,30	11,43	12,70	10,61	18,58	21,27	24,56	19,90	20,89	22,44	18,14	22,70	26,37	25,38	40,34	34,47
mic.12	21,71	7,06	23,28	38,43	15,59	19,14	24,91	18,32	13,05	12,82	9,05	9,48	19,40	25,19	18,44	21,03	26,79	19,19	23,94	25,59	26,77	40,06	34,88
S.POW.	21,74	5,79	26,82	42,15	20,40	26,89	30,74	25,98	19,43	20,77	16,01	19,61	26,39	31,74	25,25	30,85	30,51	28,07	32,17	31,30	31,11	44,64	40,95

TARİH : 08.11.1999 MODEL : TE 180 YT ÖZELLİK : TİTREŞİM BORUSU YAYSIZ
SES SONUCU : 40.9 dBA DOSYA NO : 2732 SERİ NO : 5

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	23,37	9,82	12,01	24,99	13,61	20,73	14,03	18,38	11,68	12,22	17,18	13,87	19,35	22,19	15,54	26,45	22,92	25,41	27,04	25,08	27,67	35,55	34,58
mic.2	25,96	10,32	7,50	15,36	15,80	24,34	20,46	17,83	9,90	13,15	11,95	13,00	18,56	22,58	22,08	24,25	27,47	23,78	26,27	24,84	27,05	35,69	34,78
mic.3	24,67	11,38	12,16	23,73	18,06	24,62	26,25	20,91	11,64	10,75	11,22	13,38	17,03	24,72	23,71	24,93	21,61	21,87	25,31	23,97	24,76	35,56	34,12
mic.4	24,22	9,21	7,19	20,60	16,67	24,41	20,31	12,06	10,27	17,49	11,45	14,74	16,74	14,60	18,64	29,13	24,15	23,61	26,29	26,38	25,84	35,62	34,85
mic.5	9,46	4,14	7,86	14,96	24,11	31,36	15,17	16,58	11,39	12,92	18,14	15,48	17,69	18,14	18,40	16,96	18,65	19,74	23,83	21,03	20,44	34,43	31,50
mic.6	26,68	11,79	14,31	24,84	24,28	30,89	15,20	16,02	11,84	10,33	13,44	11,98	15,55	21,60	18,38	27,92	21,53	24,11	26,16	23,24	23,83	36,61	34,38
mic.7	23,29	13,04	13,91	26,28	15,62	27,19	22,02	16,82	13,27	13,95	11,88	13,06	15,65	19,67	16,12	26,35	20,96	24,98	27,45	26,84	25,55	35,99	34,36
mic.8	23,49	13,66	12,18	12,67	7,42	15,35	21,37	18,13	11,00	9,97	8,55	12,69	16,62	21,87	21,00	25,54	22,24	24,78	26,73	23,54	24,67	34,33	33,78
mic.9	23,53	13,54	12,97	17,37	14,48	21,49	21,70	16,31	9,96	13,11	10,31	12,97	16,50	22,07	22,80	28,35	19,72	19,42	18,83	24,38	24,10	34,17	33,51
mic.10	23,65	8,81	7,83	12,95	7,40	17,45	22,64	13,94	11,40	17,63	11,26	14,95	18,39	21,63	20,97	25,80	26,24	22,76	24,55	26,48	23,98	34,71	34,23
mic.11	24,98	9,88	12,16	26,77	15,01	20,89	20,82	18,42	10,87	10,05	13,95	15,50	19,76	20,98	24,51	23,19	22,09	21,59	22,39	27,78	25,59	35,31	33,76
mic.12	23,43	8,98	10,89	25,80	16,86	22,55	20,46	15,59	9,78	12,49	11,15	13,69	15,45	21,59	24,48	26,22	26,34	22,86	26,48	26,15	25,66	35,79	34,89
S.POW.	28,83	14,04	17,18	29,78	25,24	32,68	28,03	23,93	17,18	20,11	19,89	20,35	24,20	28,30	28,24	33,01	30,42	30,04	32,40	32,01	32,03	42,00	40,90

TARİH **: 08.11.1999** ***MODEL*** **: TE 180 YT** ***ÖZELLİK*** **: TİTREŞİM BORUSU YAYSIZ**
SES SONUCU **: 42.5 dBA** ***DOSYA NO*** **: 2738** ***SERİ NO*** **: 6**

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	21,18	8,39	12,03	26,90	12,52	21,13	22,61	25,98	18,22	12,55	10,83	11,16	19,20	22,31	19,04	32,66	20,55	27,37	28,38	25,39	27,70	37,74	37,25
mic.2	22,08	8,63	5,38	13,52	9,95	18,86	25,56	25,66	14,86	12,53	10,44	9,74	17,47	23,12	23,47	23,82	24,95	24,69	27,35	22,53	24,01	35,30	34,58
mic.3	22,32	9,62	11,88	24,81	17,33	24,53	30,36	27,68	15,73	14,86	14,91	16,20	15,45	28,25	25,14	26,39	21,17	27,63	22,51	22,30	21,90	37,27	36,04
mic.4	22,01	7,59	8,20	21,87	11,42	17,99	23,09	19,42	17,49	19,33	15,68	13,09	17,59	19,02	21,98	24,57	25,18	22,01	23,40	23,40	23,14	34,16	33,36
mic.5	8,96	2,14	5,98	17,97	13,76	22,25	24,30	20,98	11,88	14,89	12,33	17,74	16,77	19,71	18,70	22,04	15,97	18,49	21,83	20,21	19,10	32,07	30,84
mic.6	25,10	9,81	13,74	28,16	18,59	25,95	21,72	21,13	11,53	13,48	11,39	9,51	16,56	20,47	20,75	28,37	24,89	25,78	23,03	22,11	22,61	36,03	34,51
mic.7	24,16	9,93	12,75	28,68	13,39	24,61	29,57	26,02	16,38	14,02	13,46	10,64	15,53	19,53	20,11	34,37	22,35	25,08	27,15	23,71	24,40	38,59	37,81
mic.8	24,27	10,34	5,45	14,06	11,42	20,31	25,61	26,41	13,82	14,36	13,66	9,94	15,21	21,82	20,08	30,15	26,57	25,46	26,38	23,70	26,41	36,58	36,02
mic.9	24,35	10,67	7,66	11,63	12,59	19,84	24,66	24,33	11,51	11,25	14,48	12,08	16,64	23,74	22,19	31,25	20,92	20,71	21,20	23,95	22,26	35,59	35,28
mic.10	22,74	6,86	5,80	10,34	11,40	18,50	24,64	20,50	16,90	20,24	18,08	12,46	16,98	20,67	23,73	31,11	28,26	23,89	24,34	24,64	23,89	36,38	36,40
mic.11	22,65	9,58	12,75	26,93	13,25	19,74	25,10	25,73	12,42	7,65	12,05	18,14	16,28	24,91	21,43	34,08	23,95	19,71	22,51	22,84	23,01	37,47	37,27
mic.12	21,47	8,47	13,24	27,75	11,59	16,96	23,87	22,04	13,71	15,55	12,98	9,03	15,38	22,72	21,26	25,94	27,14	24,34	25,07	25,12	25,12	35,83	34,76
S.POW.	26,42	2,99	16,00	31,51	20,35	28,61	32,74	31,40	21,66	22,04	20,38	20,11	23,40	29,85	28,66	37,19	31,34	31,35	31,84	30,13	30,90	43,05	42,48

TARİH **: 08.11.1999** ***MODEL*** **: TE 180 YT** ***ÖZELLİK*** ***: TİTREŞİM BORUSU YAYSIZ***
SES SONUCU **: 41.6 dBA** ***DOSYA NO*** **: 2740** ***SERİ NO*** **: 7**

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	24,47	6,57	11,37	25,63	11,75	17,32	23,23	20,10	15,94	9,73	12,62	11,82	17,93	27,79	16,64	23,09	21,37	27,39	28,05	26,66	26,52	36,31	35,39
mic.2	23,85	6,44	8,11	16,77	7,83	15,07	27,14	22,53	16,49	11,29	15,33	12,79	16,67	25,56	21,47	20,62	27,89	26,27	28,06	24,11	24,81	36,07	35,43
mic.3	24,95	7,81	11,95	24,58	14,44	22,06	32,01	26,60	18,46	11,81	14,37	14,30	17,64	25,85	23,31	24,37	22,65	26,83	24,98	24,86	24,18	37,38	35,59
mic.4	24,22	5,50	7,54	20,93	9,61	15,21	26,03	21,35	16,53	13,42	16,97	13,66	18,20	21,58	19,23	20,15	25,11	25,56	26,03	24,29	24,22	34,96	33,85
mic.5	10,82	2,85	6,24	17,22	8,52	19,03	24,96	18,96	15,43	15,57	15,83	16,47	17,53	21,41	20,49	16,02	16,91	23,24	23,76	21,24	20,37	32,53	31,64
mic.6	26,58	8,03	13,08	27,34	13,67	20,84	23,93	19,20	10,94	10,90	14,07	11,65	17,29	26,44	21,67	27,36	23,86	24,84	24,04	24,87	23,15	36,09	34,88
mic.7	24,40	7,88	12,09	25,83	12,00	20,30	23,55	20,26	16,00	11,74	12,47	11,13	15,65	24,40	15,48	27,90	20,11	27,52	27,71	25,27	25,76	36,19	35,24
mic.8	23,68	8,53	9,38	6,81	8,93	19,98	29,60	24,69	12,06	9,12	13,99	11,73	15,75	25,14	17,54	29,27	25,18	27,11	26,62	24,71	25,04	36,83	36,07
mic.9	23,06	10,69	11,49	16,40	11,25	20,69	29,01	22,76	14,03	12,03	10,85	11,42	18,26	22,57	22,14	27,65	21,32	22,78	23,15	24,31	23,27	35,39	34,27
mic.10	22,78	6,46	8,16	13,49	10,98	17,40	27,82	22,55	15,80	13,52	16,46	13,24	17,54	26,95	19,35	21,77	25,70	25,65	25,65	26,03	27,18	36,04	35,19
mic.11	25,12	8,45	13,22	26,63	14,66	18,89	26,02	22,72	13,53	8,73	11,97	18,77	19,15	26,02	21,24	24,30	20,63	23,48	24,58	25,05	25,80	35,84	34,33
mic.12	24,08	7,15	11,90	26,34	13,73	18,86	22,18	18,39	11,55	8,56	14,11	11,38	17,52	25,78	20,11	22,88	28,06	24,39	25,66	24,39	26,29	35,82	34,90
S.POW.	28,78	0,00	16,30	30,39	18,22	26,02	34,10	29,15	21,79	18,15	20,96	20,34	24,22	32,19	27,14	31,97	31,12	32,51	32,79	31,48	31,82	42,58	41,63

TARİH **: 09.11.1999** ***MODEL*** **: TE 180 YT** ***ÖZELLİK*** **: TİTREŞİM BORUSU YAYSIZ**
SES SONUCU **: 41.7 dBA** ***DOSYA NO*** **: 2: 2748** ***SERİ NO*** **: 8**

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	21,20	8,34	15,70	31,79	14,59	25,55	20,99	19,79	12,83	8,20	17,53	11,56	18,22	24,05	17,77	24,76	19,63	26,33	24,80	26,57	29,22	37,15	34,76
mic.2	21,85	9,15	9,50	22,60	13,43	24,95	29,09	24,25	9,99	12,98	13,24	10,04	17,52	25,02	28,15	22,32	26,69	24,36	24,25	23,33	27,28	36,79	35,75
mic.3	22,44	10,28	16,02	30,90	16,37	26,11	34,06	28,10	12,09	10,35	18,25	14,75	17,64	26,32	27,59	22,34	20,08	23,49	22,20	24,86	25,56	38,81	36,12
mic.4	23,14	7,87	12,44	27,91	13,09	20,71	26,88	23,35	11,17	19,56	17,84	12,95	16,83	21,30	26,88	19,28	23,11	23,35	22,62	26,41	24,24	35,95	34,30
mic.5	12,12	2,59	8,78	22,35	19,15	26,56	28,46	23,15	15,22	10,56	17,74	16,11	19,15	22,68	26,30	16,02	17,15	18,56	21,36	21,34	21,90	34,87	33,10
mic.6	23,43	9,16	17,36	33,10	21,15	28,04	26,25	22,14	11,84	13,27	17,81	10,73	15,79	22,02	24,94	22,04	21,53	25,13	22,04	22,04	23,95	37,40	33,98
mic.7	24,32	10,52	17,46	33,62	16,05	23,17	25,78	20,49	15,13	12,09	21,64	13,36	18,02	22,02	21,64	23,67	19,57	26,61	27,24	25,34	24,98	37,73	34,79
mic.8	24,55	10,67	9,24	12,65	10,95	22,60	28,78	24,50	10,06	13,16	15,94	11,35	19,21	23,98	25,79	23,51	19,68	25,23	22,57	23,68	25,77	35,79	34,49
mic.9	25,13	11,70	12,12	24,90	12,31	22,54	30,12	24,05	10,22	13,82	21,04	14,43	19,32	27,25	26,78	22,90	18,66	19,96	19,25	25,30	24,19	36,51	34,94
mic.10	23,56	7,66	7,50	19,68	8,51	16,29	27,87	22,88	11,54	21,07	16,67	11,38	20,95	26,36	24,20	19,56	22,55	22,17	22,22	24,29	25,21	35,33	34,26
mic.11	24,51	10,61	16,94	33,07	16,44	20,09	29,87	26,53	11,74	11,29	26,37	18,25	22,35	27,90	26,65	21,17	20,32	22,21	20,16	24,02	28,23	38,54	36,11
mic.12	23,33	9,36	16,35	32,36	13,83	16,18	25,71	21,73	11,12	14,84	17,73	11,52	18,89	27,61	24,91	21,59	27,14	22,53	22,13	23,87	26,48	37,28	35,29
S.POW.	27,30	8,35	20,86	36,92	22,56	30,86	35,70	30,85	18,46	21,75	26,68	20,16	25,75	32,10	32,61	28,86	29,23	30,67	29,84	31,16	32,81	43,71	41,69

TARİH **: 09.11.1999** ***MODEL*** **: TE 180 YT** ***ÖZELLİK*** **: TİTREŞİM BORUSU YAYSIZ**
SES SONUCU **: 41.9 dBA** ***DOSYA NO*** **: 2752** ***SERİ NO*** **: 9**

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	21,44	10,20	10,01	20,50	11,56	25,63	26,85	20,03	19,72	11,68	15,02	12,74	20,36	24,17	20,29	25,95	21,30	26,64	28,94	26,57	26,12	36,54	35,57
mic.2	21,87	9,83	10,44	16,44	9,41	28,36	29,02	21,61	16,20	9,10	9,78	12,82	20,34	23,45	23,68	21,75	25,63	23,47	25,23	24,67	25,40	36,24	34,71
mic.3	22,79	10,82	12,79	21,24	15,19	26,65	30,46	23,59	16,51	10,35	18,44	17,45	22,70	28,86	24,65	26,27	20,39	22,44	23,75	24,86	23,94	37,09	35,92
mic.4	22,29	8,37	8,27	18,34	9,68	21,96	16,39	17,16	9,87	12,13	15,14	13,14	22,48	20,10	24,60	20,74	22,95	22,45	24,27	25,94	22,62	33,97	33,38
mic.5	12,26	2,50	5,65	14,47	8,49	22,72	21,10	14,80	16,16	11,62	17,78	19,92	23,92	24,37	26,70	21,03	17,50	16,70	18,84	22,42	19,78	33,39	33,36
mic.6	22,70	9,30	11,30	24,44	15,62	23,36	20,14	15,20	15,34	10,03	11,08	13,22	21,20	21,86	23,22	24,75	20,63	22,04	23,78	23,97	21,69	34,25	33,17
mic.7	22,77	11,01	9,81	23,71	11,25	28,28	23,74	16,59	20,94	11,18	15,67	13,83	20,14	20,91	19,41	29,99	20,26	24,49	27,78	26,18	25,78	36,73	35,71
mic.8	23,91	12,36	8,06	9,07	9,42	26,62	29,27	22,31	15,89	6,74	10,41	11,35	20,55	22,83	19,47	33,49	24,05	21,49	23,58	23,94	26,92	37,65	37,12
mic.9	23,70	11,44	9,61	16,55	12,27	26,89	29,69	21,77	14,50	7,04	18,45	12,29	26,26	25,46	23,77	29,51	20,31	20,14	19,46	26,31	24,59	36,93	35,95
mic.10	22,71	8,81	6,01	13,07	10,58	21,33	20,41	17,92	9,83	13,52	15,52	13,14	22,22	23,82	21,42	19,28	20,13	20,46	22,64	26,90	23,16	33,71	32,88
mic.11	23,45	10,14	10,31	23,38	13,17	24,75	24,70	21,10	14,09	11,15	19,17	21,36	25,26	28,89	23,19	27,99	20,63	20,18	20,72	25,59	25,85	36,53	35,96
mic.12	21,61	8,94	9,36	22,70	10,91	17,07	17,47	15,50	15,24	10,82	9,10	10,56	21,45	27,78	21,97	27,71	25,52	20,27	22,16	24,72	24,27	35,11	35,03
S.POW.	25,59	10,87	14,51	27,27	18,26	32,25	33,16	26,68	23,02	16,94	22,46	22,39	29,52	32,12	30,00	34,45	29,02	29,15	31,20	32,03	31,35	42,56	41,88

TARİH **: 09.11.1999** ***MODEL*** **: TE 180 YT** ***ÖZELLİK*** **: TİTREŞİM BORUSU YAYSIZ**
SES SONUCU **: 41.4 dBA** ***DOSYA NO*** **: 2750** ***SERİ NO*** **: 10**

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	22,07	10,67	12,12	22,45	6,88	13,84	21,91	17,77	16,71	12,15	13,47	12,20	19,93	22,92	15,02	24,40	17,58	24,83	29,11	26,07	27,77	35,43	34,53
mic.2	21,45	9,41	6,32	15,92	15,40	20,93	25,35	21,24	12,18	10,91	8,68	10,72	20,37	21,90	25,28	22,77	24,27	22,72	26,48	24,11	25,40	35,01	34,28
mic.3	22,46	10,61	11,57	21,33	19,71	21,19	28,60	24,04	10,84	7,64	9,10	16,53	19,05	22,77	22,81	20,58	18,58	24,11	26,39	23,89	23,78	35,36	33,76
mic.4	21,80	7,64	6,77	17,21	12,95	16,41	21,00	19,35	11,54	13,54	7,19	11,59	19,70	17,26	24,43	22,74	21,40	22,55	24,76	24,62	25,65	33,86	33,14
mic.5	10,87	2,19	5,77	14,47	12,00	20,79	22,98	17,55	12,73	13,60	13,62	19,95	19,24	20,65	26,63	22,02	17,85	16,47	23,22	22,18	22,91	33,21	32,90
mic.6	22,82	8,61	10,54	25,01	14,68	22,21	18,52	15,25	12,82	8,03	9,23	12,78	18,85	20,80	22,28	23,62	19,27	23,22	27,45	24,91	22,91	34,52	33,38
mic.7	24,28	10,89	10,54	24,51	14,87	24,00	25,15	17,32	17,53	10,99	10,59	12,47	17,93	18,49	18,12	30,04	20,89	25,20	28,93	25,69	25,15	36,51	35,62
mic.8	24,57	12,62	8,15	10,86	10,25	19,42	27,25	22,62	11,54	8,41	7,12	11,07	17,14	20,90	25,23	36,71	27,68	21,44	24,76	23,30	26,38	39,05	39,43
mic.9	24,50	13,35	9,00	16,66	18,36	23,48	26,42	20,26	10,88	7,96	12,67	15,02	20,03	21,60	22,61	27,69	19,63	18,78	21,13	26,42	24,24	35,16	33,96
mic.10	23,16	7,83	5,76	14,48	10,79	15,61	22,24	19,12	13,02	15,33	14,01	15,82	18,10	22,15	19,02	19,44	20,97	20,43	24,48	24,93	24,93	33,41	32,34
mic.11	24,09	9,76	9,08	22,77	19,50	18,96	22,91	21,24	12,02	8,14	14,80	21,36	21,22	23,85	22,37	23,99	18,21	20,02	22,51	22,91	24,75	34,45	33,26
mic.12	22,95	8,89	9,48	21,68	15,64	13,69	17,80	15,78	12,16	12,04	10,40	12,09	16,37	19,99	19,90	21,14	23,97	21,43	23,78	22,91	24,08	33,07	32,05
S.POW.	26,66	11,31	13,76	27,51	22,29	27,15	31,28	26,82	19,76	17,71	17,84	22,41	25,94	28,22	29,79	35,02	28,79	29,13	32,70	31,17	31,82	41,88	41,35

TARİH : 22.11.1999 MODEL : TE 180 YT ÖZELLİK : SİLİNDİR KAFASI TORKU 60
SES SONUCU : 40.9 dBA DOSYA NO : 3196 SERİ NO : 1

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	18,93	18,93	25,40	9,88	5,22	14,77	26,53	24,79	15,97	11,29	12,13	14,23	18,93	24,13	17,76	22,72	21,83	25,52	28,76	26,01	27,92	36,29	34,99
mic.2	18,74	22,20	28,39	12,04	8,72	16,63	25,00	21,09	11,33	8,18	13,66	13,64	16,06	23,59	26,25	21,09	26,48	24,74	26,81	22,81	24,39	36,04	34,82
mic.3	18,57	18,57	24,78	16,26	11,00	18,87	24,80	24,50	14,59	10,60	12,55	17,35	19,32	26,31	27,53	26,97	23,13	24,99	24,12	23,70	25,08	36,22	35,68
mic.4	18,83	19,67	25,48	13,11	4,53	11,30	22,02	16,64	13,91	10,64	15,11	13,02	14,94	19,41	24,94	19,41	23,53	24,82	24,92	26,45	24,87	34,71	33,64
mic.5	9,45	13,00	19,11	7,02	8,72	19,84	30,69	19,68	11,78	7,14	13,07	18,46	19,70	21,80	22,10	13,54	18,31	21,07	20,20	18,76	18,27	33,92	31,95
mic.6	18,69	23,96	30,45	13,40	11,21	17,59	30,60	20,58	11,90	8,86	12,04	12,58	15,24	22,83	23,21	18,41	22,76	25,82	24,34	22,13	23,82	36,62	33,85
mic.7	21,23	17,89	22,43	9,54	7,16	18,20	29,65	23,25	14,90	10,97	10,39	12,34	16,27	22,48	15,44	23,58	19,21	24,92	28,31	23,82	24,88	35,75	34,16
mic.8	22,85	20,95	26,85	8,65	7,26	12,74	18,22	24,85	12,03	7,92	12,06	11,47	17,23	22,50	21,72	20,83	20,41	24,26	24,10	22,90	23,39	34,48	32,73
mic.9	24,46	20,56	26,41	12,07	11,45	18,68	27,99	22,13	12,61	8,23	12,30	13,10	19,80	22,72	26,63	20,58	19,40	26,15	23,14	22,18	25,43	35,87	34,19
mic.10	19,92	20,36	26,60	9,61	6,49	17,42	23,16	20,48	12,22	11,97	15,26	14,15	18,93	23,49	23,68	19,14	23,91	23,82	24,10	23,73	26,60	35,05	33,68
mic.11	22,43	22,36	28,61	14,88	11,89	21,25	32,47	23,74	11,68	7,45	12,60	18,05	18,50	24,10	25,74	19,23	19,21	20,62	21,82	23,25	27,58	37,23	34,46
mic.12	21,35	20,72	27,16	13,45	10,46	20,77	30,46	20,93	10,72	8,68	13,62	12,39	18,48	24,60	24,41	21,07	26,36	23,68	25,59	23,45	25,68	36,63	34,90
S.POW.	25,21	27,31	33,59	18,36	15,00	24,81	35,22	29,28	19,49	15,60	19,50	21,42	24,79	30,25	31,14	28,39	29,64	31,26	32,12	30,07	32,11	42,54	40,95

TARİH : 20.11.1999 MODEL : TE 180 YT ÖZELLİK : SİLİNDİR KAFASI TORKU 60
SES SONUCU : 43.9 dBA DOSYA NO : 3180 SERİ NO : 2

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	20,84	10,18	14,98	7,20	8,16	14,16	12,23	17,90	18,04	10,11	14,04	11,97	21,87	32,83	17,17	21,35	26,95	25,28	33,68	28,01	31,92	39,04	38,90
mic.2	18,01	13,50	19,80	14,25	11,95	20,91	15,52	27,33	15,87	7,36	12,35	12,75	20,91	31,89	22,48	21,17	30,88	22,62	29,40	22,76	27,14	37,76	37,79
mic.3	17,93	13,30	19,34	14,78	14,26	24,07	23,32	30,85	18,85	10,38	14,48	14,99	20,97	32,85	23,98	19,93	22,31	20,05	25,37	23,32	29,03	37,85	37,23
mic.4	19,16	8,38	12,57	13,96	10,19	19,04	17,88	24,96	13,67	15,53	18,31	15,09	22,12	31,41	20,14	14,52	29,01	21,65	26,59	24,21	29,86	37,04	36,91
mic.5	8,88	5,92	12,20	8,39	6,86	15,28	22,50	24,55	15,63	10,13	12,93	13,19	21,51	30,76	19,70	11,87	17,99	18,17	24,48	18,86	24,12	34,49	34,48
mic.6	18,15	17,17	24,55	16,34	11,38	17,14	20,27	22,76	15,40	10,51	13,61	12,48	21,85	32,83	19,87	18,39	24,17	22,67	24,74	22,22	27,11	36,59	36,46
mic.7	21,39	10,39	14,60	17,70	10,25	18,15	24,71	23,44	18,78	12,13	15,61	12,97	20,59	30,99	15,56	22,17	22,66	25,30	28,07	25,65	27,23	36,64	36,27
mic.8	22,19	9,09	7,07	10,25	6,84	15,87	17,51	29,25	17,35	10,15	19,14	15,37	19,65	32,80	19,16	19,49	24,10	23,94	28,05	21,94	26,83	37,21	37,05
mic.9	24,74	10,82	11,31	16,02	12,44	22,04	19,90	28,11	15,57	8,61	16,16	13,67	22,74	32,51	22,32	19,31	22,27	19,00	23,73	22,02	28,98	37,03	36,54
mic.10	21,75	7,87	9,94	10,01	9,43	17,75	15,24	28,12	14,62	14,13	21,73	16,53	22,29	32,59	19,70	16,29	26,17	21,77	27,04	21,77	29,89	37,40	37,18
mic.11	22,22	12,86	18,59	14,81	15,25	23,58	23,39	31,53	18,38	10,86	13,75	11,63	22,71	32,85	21,91	19,93	23,35	18,15	25,79	23,27	30,17	38,19	37,40
mic.12	22,27	12,06	16,91	13,43	14,34	22,62	20,34	28,39	15,31	8,56	17,12	13,33	22,01	32,95	19,66	20,48	30,67	22,27	26,53	23,21	28,55	38,08	37,96
S.POW.	25,66	17,70	24,40	20,35	18,00	27,09	27,52	34,55	23,44	17,62	23,39	20,34	28,48	39,19	27,41	26,19	33,36	29,10	34,74	30,11	35,64	44,15	43,94

TARİH : 22.11.1999 MODEL : TE 180 YT ÖZELLİK : SİLİNDİR KAFASI TORKU 60
SES SONUCU : 40.3 dBA DOSYA NO : 3190 SERİ NO : 3

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	20,74	20,01	25,02	4,68	8,72	14,58	15,50	18,27	20,18	11,97	9,57	10,94	19,03	26,91	15,00	18,65	22,04	28,36	29,23	27,23	24,98	36,05	35,36
mic.2	18,34	17,14	21,97	14,09	8,98	15,73	27,09	21,45	16,18	13,03	10,32	9,78	17,57	26,50	23,19	18,93	26,69	24,18	26,25	24,51	20,30	35,33	34,68
mic.3	17,53	13,39	17,96	17,18	13,37	21,56	31,67	25,86	12,03	10,50	11,56	17,63	18,52	25,37	21,96	17,18	21,63	24,19	24,54	22,47	20,31	35,92	34,13
mic.4	16,54	15,63	21,18	10,01	8,29	14,64	25,79	20,26	19,79	17,93	13,13	12,17	16,19	24,49	22,38	15,72	23,32	23,46	26,07	28,45	20,31	34,94	34,10
mic.5	7,24	6,65	12,01	5,64	6,25	20,13	26,76	20,20	16,90	12,08	10,36	17,21	18,69	25,18	17,02	11,09	17,04	20,90	20,83	19,02	15,80	32,36	31,35
mic.6	17,02	16,72	22,76	10,06	11,26	16,13	24,60	19,31	18,91	11,97	9,10	10,44	16,60	26,13	18,86	16,79	18,74	25,02	24,34	24,01	19,78	33,85	32,95
mic.7	18,69	20,31	25,39	7,96	10,65	19,42	24,19	17,87	20,81	12,55	10,10	10,25	16,88	21,28	14,22	18,57	19,63	26,76	25,98	25,67	22,34	34,62	33,14
mic.8	18,03	19,30	24,17	8,48	6,67	16,67	25,44	22,03	13,14	11,35	9,82	11,23	16,67	20,50	16,27	18,81	20,45	25,79	24,74	21,98	19,75	33,71	32,21
mic.9	19,33	16,35	21,15	9,74	11,01	17,99	26,70	22,16	13,01	12,96	11,60	13,08	19,52	22,77	19,80	17,33	22,60	19,99	22,98	23,71	19,90	33,60	32,20
mic.10	16,46	15,09	20,79	6,39	7,03	13,54	26,67	21,68	19,89	18,25	15,26	14,22	19,42	25,11	17,89	16,18	24,41	22,57	24,48	26,55	20,15	34,58	33,67
mic.11	18,88	19,49	25,13	10,97	13,18	19,84	29,48	24,59	18,57	11,42	12,83	16,83	17,11	23,04	22,59	16,55	21,68	22,33	22,87	23,70	22,57	35,26	33,21
mic.12	18,77	20,27	26,08	9,36	12,51	19,92	26,81	21,78	20,60	14,23	12,30	11,85	16,89	25,00	19,61	16,96	26,62	22,39	25,14	23,40	22,53	35,29	33,87
S.POW.	18,77	24,40	29,93	16,58	16,47	24,87	33,88	28,70	25,12	20,53	17,92	20,31	24,61	31,57	26,70	23,83	29,74	31,25	32,06	31,41	27,87	41,41	40,28

TARİH : 20.11.1999 MODEL : TE 180 YT ÖZELLİK :SİLİNDİR KAFASI TORKU 60
SES SONUCU : 39.6 dBA DOSYA NO : 3170 SERİ NO : 4

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	20,86	16,65	23,33	11,01	13,01	14,35	21,17	25,82	15,55	10,96	11,12	9,92	15,12	27,63	13,59	20,53	21,24	26,25	30,39	26,01	24,58	36,14	35,40
mic.2	21,61	12,51	18,55	17,61	11,66	19,35	20,51	21,40	12,04	13,03	10,82	10,84	14,67	26,81	17,26	18,60	24,93	23,45	27,94	20,91	21,40	34,40	33,88
mic.3	21,58	9,37	13,18	20,07	15,53	24,26	26,05	23,67	11,11	11,44	12,59	16,85	15,11	26,99	17,58	15,70	18,33	20,80	20,00	20,78	21,77	33,96	32,39
mic.4	21,72	7,70	10,57	15,79	10,29	20,00	19,44	18,80	15,77	15,56	13,11	12,43	12,97	21,74	12,83	16,69	21,44	21,15	25,39	22,54	22,28	32,53	31,44
mic.5	9,09	6,01	11,66	8,32	6,32	20,10	24,36	17,77	13,07	13,89	12,27	17,63	15,92	24,90	17,89	11,12	15,21	19,18	21,16	17,54	17,28	31,37	30,62
mic.6	21,02	18,69	25,54	15,19	14,93	20,62	25,75	21,21	14,20	13,71	11,14	10,60	12,46	23,54	15,73	18,46	19,68	24,67	21,92	19,94	18,60	33,77	31,70
mic.7	22,55	16,69	23,18	15,47	12,22	20,08	28,03	24,95	15,63	18,48	10,90	10,46	13,12	26,12	11,96	18,71	18,57	24,10	25,11	23,84	22,57	35,13	33,38
mic.8	24,38	8,67	8,76	8,48	10,13	18,50	24,03	24,15	10,91	12,25	12,41	12,46	13,49	26,99	17,40	19,91	18,46	21,18	23,44	21,70	20,29	33,63	32,57
mic.9	25,50	12,21	16,63	10,44	13,74	21,31	25,68	20,44	11,13	16,06	12,23	10,30	16,77	25,05	19,26	18,51	17,97	19,99	21,55	21,05	21,73	33,53	31,73
mic.10	22,60	10,60	16,13	10,04	10,55	19,47	23,91	20,60	13,85	17,94	15,40	13,31	14,91	27,49	13,54	14,72	22,48	22,43	25,65	23,56	20,74	34,08	33,34
mic.11	23,82	18,74	25,25	13,56	15,51	21,25	27,37	21,70	13,23	14,29	13,33	19,35	14,67	25,58	18,48	18,74	19,86	21,75	24,29	23,96	22,73	35,02	33,06
mic.12	22,55	18,81	25,59	12,39	14,56	17,94	25,40	20,86	13,83	12,93	11,12	10,30	13,69	27,16	18,20	18,86	24,41	21,80	23,19	21,85	22,58	34,65	33,26
S.POW.	27,91	21,45	28,27	21,02	19,46	27,04	31,81	29,22	20,13	21,47	18,73	20,64	21,09	32,95	23,27	24,73	27,77	29,44	32,00	28,76	28,41	40,81	39,63

TARİH : 22.11.1999 MODEL : TE 180 YT ÖZELLİK : SİLİNDİR KAFASI TORKU 60
SES SONUCU : 40.0 dBA DOSYA NO : 3188 SERİ NO : 5

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	16,89	19,97	25,42	11,05	13,01	16,86	20,46	18,46	11,95	7,69	8,11	11,52	19,10	25,54	14,16	19,71	31,89	25,92	30,01	27,21	25,73	37,16	36,86
mic.2	18,77	19,92	24,81	16,27	13,19	19,90	22,01	18,84	9,26	10,23	8,21	10,82	17,03	24,29	20,91	19,40	30,90	21,82	25,45	23,87	19,17	35,44	35,01
mic.3	18,62	16,99	21,74	19,11	15,68	19,84	27,39	22,64	11,89	10,17	10,29	15,77	14,76	24,66	20,83	17,58	20,21	22,94	23,01	22,64	21,44	34,18	32,59
mic.4	18,47	16,59	22,05	15,65	9,14	17,44	22,28	16,66	11,91	15,91	10,92	13,09	18,52	22,21	19,81	14,52	28,35	22,68	24,47	27,46	20,75	34,57	33,98
mic.5	8,88	8,08	13,07	7,31	6,77	19,26	20,67	18,93	13,35	8,95	8,93	14,20	17,73	22,17	17,96	10,18	15,73	19,26	21,47	18,15	17,04	30,26	29,56
mic.6	19,54	18,18	23,84	15,90	13,90	17,40	25,21	18,15	13,68	11,73	8,63	9,92	16,08	22,29	15,87	16,91	24,64	22,62	22,06	24,53	19,28	33,56	32,06
mic.7	21,77	18,62	23,56	11,70	10,25	15,94	29,06	18,71	15,19	8,18	9,56	10,29	16,76	21,96	13,59	19,00	18,83	26,00	26,95	26,80	21,35	35,25	33,53
mic.8	20,48	17,47	22,45	9,47	9,35	16,17	21,56	20,57	7,14	9,05	9,52	11,38	17,23	21,00	15,82	17,42	21,25	22,15	22,29	22,78	20,71	32,41	30,96
mic.9	21,59	17,76	22,32	12,68	13,22	19,66	21,38	18,68	8,54	11,81	8,02	10,21	17,90	20,09	19,10	18,30	17,90	18,77	22,18	22,89	19,83	32,21	30,38
mic.10	19,30	18,18	23,98	10,32	11,14	19,37	23,42	17,70	13,26	17,94	12,44	13,38	18,13	20,10	13,75	13,52	21,82	21,92	23,11	24,86	19,47	33,08	31,39
mic.11	20,15	24,07	29,81	15,82	16,20	20,57	21,49	22,99	11,23	13,96	9,52	14,17	16,08	23,13	18,15	17,14	24,66	20,05	20,64	22,78	21,91	34,97	32,05
mic.12	18,65	22,37	28,39	14,63	15,76	21,17	21,02	19,97	12,56	11,66	8,77	12,25	17,78	22,84	17,54	18,77	29,96	23,35	24,62	25,07	21,87	35,77	34,51
S.POW.	22,65	26,08	31,71	20,80	19,56	25,63	30,82	26,54	18,43	19,08	15,37	18,90	24,08	29,63	24,61	24,09	33,51	29,58	31,52	31,22	27,88	41,07	39,96

TARİH : 20.11.1999 **MODEL :** TE 180 YT **ÖZELLİK :** SİLİNDİR KAFASI TORKU 60
SES SONUCU : 41.7 dBA **DOSYA NO :** 3174 **SERİ NO :** 6

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	21,05	15,15	21,45	10,63	7,41	15,40	22,39	21,35	19,90	16,91	11,83	10,16	17,36	20,48	19,07	34,17	21,00	25,52	32,86	27,59	25,66	38,48	38,54
mic.2	21,71	10,37	14,74	18,27	9,85	17,31	20,04	19,45	14,98	13,57	10,72	8,68	16,06	24,53	25,54	27,47	23,26	22,79	27,42	22,36	22,95	34,98	34,86
mic.3	22,64	11,18	16,59	19,58	12,19	22,00	25,88	23,51	16,33	14,50	18,19	16,05	16,62	27,44	27,37	26,61	20,03	23,37	24,87	23,32	24,28	36,03	35,52
mic.4	22,24	10,38	15,25	16,78	8,85	14,03	17,20	19,06	18,03	19,13	13,13	12,83	14,87	18,57	22,35	19,72	21,95	21,44	25,62	23,37	20,33	32,93	32,18
mic.5	10,27	2,20	4,11	8,13	6,79	20,74	25,61	18,06	14,13	13,28	16,48	18,81	20,22	21,84	23,23	17,56	14,55	18,78	23,07	18,83	17,89	32,33	31,61
mic.6	21,16	8,84	12,86	16,06	6,77	18,36	26,67	19,00	17,14	16,39	11,59	10,53	17,12	20,79	22,76	24,97	18,48	22,34	24,88	22,27	20,60	33,88	32,97
mic.7	19,51	12,32	18,10	13,94	8,36	21,94	22,03	21,91	19,47	18,05	13,33	14,39	17,54	20,67	16,62	32,94	19,02	25,04	29,89	23,91	23,11	36,89	36,93
mic.8	22,15	9,78	12,27	9,05	8,95	18,62	21,70	23,21	15,42	11,66	11,70	10,13	17,00	20,08	22,03	25,13	17,96	22,97	25,86	21,70	22,50	33,66	32,94
mic.9	23,52	10,91	13,27	12,37	13,08	20,20	23,31	19,55	11,38	15,62	16,18	15,81	21,73	23,76	25,43	25,00	18,37	18,68	22,67	21,59	23,69	34,14	33,52
mic.10	22,69	8,65	12,08	7,57	7,61	15,47	17,92	21,16	19,05	19,05	16,34	13,73	19,09	22,43	21,96	23,58	20,53	22,55	25,11	22,90	23,26	33,70	33,14
mic.11	23,82	18,08	24,45	16,10	13,51	19,21	29,55	21,39	15,98	18,01	18,85	20,76	19,35	24,29	24,33	29,58	20,08	20,29	26,24	22,87	26,76	36,90	35,80
mic.12	23,24	17,26	23,99	14,30	12,32	18,98	27,70	20,01	14,44	16,86	13,64	11,01	18,98	25,14	24,18	29,00	23,33	22,08	25,82	22,15	24,04	36,10	35,32
S.POW.	27,22	19,00	25,56	21,47	16,28	25,86	31,62	27,75	23,65	23,34	21,74	21,72	25,12	30,02	30,47	35,41	27,15	29,36	34,04	29,59	30,20	42,07	41,69

TARİH : 20.11.1999 **MODEL :** TE 180 YT **ÖZELLİK :** SİLİNDİR KAFASI TORKU 60
SES SONUCU : 42.7 dBA **DOSYA NO :** 3172 **SERİ NO :** 7

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	19,59	13,59	19,94	9,10	8,47	13,19	15,22	25,14	17,31	8,75	8,47	13,43	17,64	28,93	19,19	29,87	22,91	25,42	27,09	25,17	26,91	36,50	36,45
mic.2	19,82	13,12	19,87	18,67	11,90	16,46	20,08	24,43	14,89	11,57	9,12	12,42	16,09	29,49	27,82	25,87	26,25	23,52	26,36	24,58	24,72	36,42	36,43
mic.3	20,45	11,56	17,82	19,58	14,50	21,77	25,67	27,88	14,73	12,08	13,25	21,16	17,30	31,55	27,95	24,07	21,53	19,79	20,92	23,01	22,92	36,77	36,50
mic.4	21,72	7,18	10,36	11,35	10,95	14,99	22,94	20,03	16,14	15,11	9,44	12,31	16,31	26,99	25,62	19,88	25,22	22,02	24,33	24,12	22,82	34,53	34,33
mic.5	8,01	5,14	11,40	5,71	5,17	18,74	24,31	21,98	14,10	15,19	12,58	22,43	17,80	29,09	26,41	16,86	19,80	18,41	20,36	18,03	18,71	34,07	34,21
mic.6	21,12	16,46	23,44	11,78	8,13	17,45	25,35	22,08	14,48	14,41	8,60	13,45	15,50	29,61	23,23	22,06	20,43	23,16	22,95	24,39	21,63	35,21	34,62
mic.7	21,79	12,48	18,31	13,47	8,67	20,12	23,49	25,42	17,61	10,08	8,58	15,58	16,13	30,26	18,10	25,35	20,24	24,45	27,09	24,05	23,72	35,96	35,60
mic.8	23,02	8,72	7,47	7,02	9,07	17,49	23,02	27,72	11,70	9,82	9,02	13,47	16,93	31,39	24,74	25,89	22,03	22,27	22,83	23,07	23,07	36,20	36,08
mic.9	24,20	10,11	11,90	9,03	13,31	20,37	24,51	25,47	12,00	12,91	10,94	14,68	18,82	30,01	28,55	24,25	23,26	19,19	20,58	20,93	22,70	35,93	35,77
mic.10	22,39	7,59	10,16	8,74	7,61	15,73	24,76	22,34	14,84	14,55	11,10	13,33	18,08	32,31	24,36	21,52	27,56	21,80	23,56	24,64	23,00	36,46	36,63
mic.11	22,71	12,22	18,36	12,46	14,57	20,66	27,08	27,16	12,20	11,04	10,62	23,91	17,04	29,88	26,83	23,04	22,59	20,29	21,89	24,90	23,70	36,48	35,91
mic.12	22,27	12,58	18,56	9,24	12,68	19,47	24,86	22,81	13,83	8,89	9,22	12,37	17,43	32,24	24,88	23,24	30,79	22,86	23,94	25,21	24,20	37,33	37,49
S.POW.	26,66	17,60	24,59	19,75	17,48	25,36	31,00	31,85	21,42	19,06	16,34	24,69	23,85	37,23	32,53	31,41	31,72	29,14	30,88	30,32	30,27	42,79	42,73

TARİH : 22.11.1999 **MODEL :** TE 180 YT **ÖZELLİK :** SİLİNDİR KAFASI TORKU 60
SES SONUCU : 41.1 dBA **DOSYA NO :** 2280 3194 **SERİ NO :** 1 8

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	19,26	21,21	26,65	6,98	8,40	19,78	21,19	21,66	13,57	9,29	16,04	12,13	17,19	28,48	18,70	18,81	22,11	26,25	27,59	26,81	26,20	36,14	35,16
mic.2	17,90	20,18	25,89	15,43	7,50	14,32	27,75	25,07	11,80	11,80	13,03	9,85	16,46	28,39	26,74	20,11	25,63	22,11	25,35	27,19	22,60	36,52	35,63
mic.3	17,70	15,32	20,45	17,51	10,08	18,94	32,52	27,74	13,02	12,31	16,57	15,44	15,75	28,00	26,89	20,33	18,12	24,17	22,92	24,03	23,95	37,10	35,56
mic.4	18,52	16,69	22,68	13,79	5,54	11,98	25,83	23,84	10,99	19,11	13,70	12,52	16,29	22,75	24,96	17,13	23,65	22,75	23,37	28,05	25,27	35,20	34,10
mic.5	9,66	10,81	16,72	7,28	6,41	18,64	28,05	21,91	9,45	11,28	15,00	15,73	16,08	23,37	21,51	10,93	14,76	19,68	19,96	21,91	18,74	32,79	31,28
mic.6	21,19	21,21	27,58	15,26	10,70	22,29	28,22	22,17	10,32	13,07	9,71	10,13	15,61	24,67	21,96	17,07	19,16	22,57	21,26	23,21	21,26	35,06	32,56
mic.7	22,57	19,02	24,62	11,28	9,26	21,75	23,37	21,56	13,80	13,04	15,33	13,35	16,31	24,31	15,02	19,14	16,76	23,44	26,40	26,78	23,37	34,78	33,16
mic.8	21,98	19,04	24,10	10,65	7,87	14,41	25,96	25,79	11,45	13,66	12,13	9,54	15,68	25,46	21,51	17,42	17,96	22,97	23,63	23,89	21,40	34,53	32,92
mic.9	22,20	19,71	23,73	15,34	12,65	19,03	28,13	24,60	15,67	25,64	28,67	17,19	15,50	27,03	26,72	18,89	20,04	21,15	20,18	23,38	23,52	36,65	35,60
mic.10	19,35	21,35	26,74	8,53	6,70	17,73	28,24	21,63	11,87	20,36	15,45	11,61	17,92	25,94	24,08	17,38	22,43	22,20	23,16	27,72	22,79	35,85	34,27
mic.11	20,43	25,25	30,40	15,96	13,02	24,12	31,15	26,76	12,10	14,50	17,28	18,59	16,83	26,92	23,30	17,11	21,18	23,13	20,57	23,42	26,26	37,56	34,67
mic.12	20,37	25,00	30,41	15,10	12,06	25,00	28,81	21,78	10,82	14,65	10,72	10,18	18,44	27,89	22,65	19,26	27,19	23,07	24,48	24,60	26,60	37,46	35,33
S.POW.	24,19	27,71	33,22	20,16	15,70	27,25	35,19	31,09	18,69	24,59	26,21	20,52	23,24	33,32	30,70	24,90	28,91	29,82	30,65	32,13	30,78	42,71	41,14

TARİH : 20.11.1999 **MODEL :** TE 180 YT **ÖZELLİK :** SİLİNDİR KAFASI TORKU 60
SES SONUCU : 40.1 dBA **DOSYA NO :** 3166 **SERİ NO :** 9

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	21,47	9,15	11,17	12,61	8,28	11,52	18,41	27,42	17,52	9,17	13,83	14,09	19,92	21,83	17,03	30,41	23,87	25,75	28,98	25,99	25,14	36,50	36,26
mic.2	21,71	11,05	14,70	17,31	7,48	14,51	21,75	20,84	15,36	11,00	17,85	16,04	18,88	24,36	22,46	21,73	24,55	24,15	25,94	21,82	20,62	34,11	33,75
mic.3	21,86	11,87	16,31	20,52	10,97	18,62	26,17	22,07	16,76	7,87	12,55	21,20	19,32	24,99	24,07	22,50	18,10	22,73	23,37	21,88	20,14	34,39	33,49
mic.4	21,84	10,99	16,45	16,66	6,05	14,62	21,44	17,98	10,12	15,82	19,18	17,01	20,61	19,39	19,04	21,53	23,15	22,54	25,20	25,20	21,70	33,60	32,90
mic.5	9,47	4,79	9,21	8,27	5,66	20,17	24,52	20,74	11,66	7,75	10,69	21,30	20,03	22,69	19,68	15,82	13,47	20,10	21,07	18,46	15,28	31,70	30,95
mic.6	21,45	13,50	19,47	13,97	9,66	18,65	25,30	23,73	11,90	11,14	13,33	13,90	18,53	19,49	20,62	23,30	18,86	25,11	24,01	23,14	19,71	33,89	32,75
mic.7	22,05	13,02	18,43	10,43	6,53	20,48	27,67	27,04	18,03	12,13	13,75	13,56	18,67	18,29	16,10	27,70	17,77	24,80	26,38	23,09	22,24	35,48	34,27
mic.8	23,94	15,44	17,11	7,54	8,08	16,97	24,29	23,75	14,88	11,23	16,31	14,29	16,24	18,95	20,55	20,08	18,29	23,32	22,99	22,17	22,08	33,34	31,79
mic.9	24,74	12,82	16,16	10,77	10,47	21,26	23,76	19,97	14,91	11,69	12,33	13,17	19,85	22,89	21,83	21,03	17,52	21,12	21,90	21,64	22,09	33,33	31,93
mic.10	22,06	9,99	13,97	10,91	8,09	19,00	22,36	20,15	9,36	15,96	18,20	15,87	19,40	22,41	19,00	18,60	20,74	22,69	23,16	27,44	22,81	33,79	32,83
mic.11	23,70	16,27	21,04	14,48	11,51	20,08	27,84	24,43	13,96	10,27	10,93	23,30	18,59	23,16	21,72	23,77	19,11	20,69	21,18	24,22	24,85	35,13	33,56
mic.12	22,79	14,74	20,91	14,09	9,90	18,93	24,69	24,74	13,31	11,15	15,57	15,69	18,08	24,34	20,55	24,69	23,59	23,05	23,89	25,07	23,85	34,97	33,97
S.POW.	27,70	18,77	24,09	21,08	14,52	25,30	31,55	30,46	21,30	18,41	22,01	24,75	25,88	29,21	27,46	31,12	27,71	30,09	31,41	30,39	29,01	40,99	40,15

TARİH : 20.11.1999 **MODEL :** TE 180 YT **ÖZELLİK :** SİLİNDİR KAFASI TORKU 60
SES SONUCU : 41.4 dBA **DOSYA NO :** 3168 **SERİ NO :** 10

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	21,97	16,58	22,86	10,77	8,94	14,09	19,07	21,71	15,07	9,38	10,65	11,92	17,52	20,67	16,74	22,72	22,23	27,52	29,09	26,18	31,89	36,67	35,49
mic.2	21,66	11,83	14,60	18,60	11,10	19,45	22,81	26,46	11,17	7,62	9,36	10,77	16,13	23,73	27,80	21,19	25,49	22,91	27,49	22,11	28,01	35,97	35,30
mic.3	22,14	9,91	10,01	18,73	14,90	23,91	29,22	29,81	13,79	8,17	14,50	19,72	18,87	23,74	29,41	21,18	24,43	21,77	24,59	22,85	26,17	37,09	35,91
mic.4	21,86	9,32	11,63	16,57	8,92	15,82	25,43	22,61	13,65	11,65	11,75	11,04	19,04	19,81	24,78	17,96	23,34	22,82	24,64	22,94	25,67	34,26	33,27
mic.5	9,89	5,28	10,79	8,20	5,21	17,33	25,39	24,15	12,58	10,46	14,86	22,20	18,95	23,56	28,52	17,70	17,73	18,13	21,84	18,50	22,10	33,99	33,75
mic.6	21,49	16,48	22,67	15,10	12,70	21,33	23,66	22,29	13,05	10,74	10,84	12,08	16,67	21,33	22,15	23,16	20,08	21,66	23,44	21,52	24,62	33,93	32,48
mic.7	21,51	15,30	20,45	14,57	9,09	19,23	26,38	21,11	13,99	14,01	10,50	14,13	16,31	21,84	17,70	22,55	16,93	23,23	26,26	22,69	27,13	34,59	33,08
mic.8	23,23	11,70	8,69	7,64	8,69	19,23	25,25	27,65	10,98	10,86	9,45	10,83	16,13	24,29	24,36	23,14	21,30	22,62	25,44	22,76	27,42	35,43	34,27
mic.9	23,80	14,65	18,28	9,90	12,84	21,26	25,57	25,90	9,17	8,42	9,57	13,83	19,10	20,70	29,92	23,57	21,87	18,82	21,90	23,69	30,84	36,57	35,52
mic.10	22,62	11,66	16,46	9,68	9,47	14,48	27,25	21,40	13,66	12,37	11,03	12,55	16,32	22,24	27,47	19,30	21,23	20,88	23,56	22,41	32,90	36,52	35,07
mic.11	23,72	18,17	24,59	13,63	14,60	19,65	26,19	28,14	14,13	11,87	12,81	23,42	18,01	22,57	24,14	20,03	25,02	20,88	21,91	24,17	33,62	37,67	35,78
mic.12	23,21	17,83	24,04	10,84	12,65	17,59	25,16	23,80	14,65	8,28	9,55	11,15	16,30	22,86	24,91	20,04	25,14	21,57	23,82	23,14	30,67	35,98	34,45
S.POW.	27,57	20,86	26,80	20,72	17,77	26,19	32,52	32,37	19,67	16,93	17,87	23,85	24,31	29,28	33,14	28,20	29,57	29,32	31,88	29,42	36,49	42,60	41,43

TARİH : 03.12.1999 MODEL : TE 180 YT ÖZELLİK : SİLİNDİR KAFASI TORKU 90
SES SONUCU : 40.5 dBA DOSYA NO : 3602 SERİ NO : 1

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	13,59	11,50	13,48	17,31	8,25	15,22	21,10	28,72	16,02	9,24	12,51	13,97	19,59	22,86	17,71	26,55	19,59	26,79	28,72	27,21	25,82	36,16	35,49
mic.2	14,87	10,92	9,84	18,45	6,36	16,47	25,15	26,45	13,72	10,90	11,89	11,75	17,60	23,79	22,59	22,73	22,21	24,19	25,03	22,09	21,93	34,37	33,62
mic.3	16,47	14,40	10,78	19,55	11,63	21,32	30,28	27,88	14,73	11,25	11,25	20,63	18,33	26,80	24,96	26,54	20,26	25,22	21,74	24,12	23,81	36,60	35,55
mic.4	17,33	10,56	9,90	10,70	6,96	14,58	23,87	20,58	17,48	13,81	12,40	13,20	19,08	20,04	20,86	18,23	18,93	23,12	24,32	24,86	20,89	32,90	32,12
mic.5	7,04	2,80	3,63	5,42	10,83	25,17	20,26	18,94	14,16	11,51	8,99	17,88	20,56	23,08	26,77	21,81	23,43	20,70	23,48	20,49	19,76	33,73	33,57
mic.6	19,20	12,59	14,59	11,65	9,67	22,51	21,10	22,35	12,92	11,39	9,60	9,84	15,88	24,37	21,81	23,62	17,22	22,59	22,04	21,95	22,80	33,27	32,52
mic.7	21,14	13,68	7,24	17,00	10,39	20,74	26,99	28,85	16,24	13,28	11,70	12,41	14,64	20,95	16,22	25,16	16,41	26,26	26,99	22,74	22,34	35,50	34,14
mic.8	22,52	11,91	9,82	15,32	8,17	15,60	24,09	27,06	12,26	10,69	11,21	11,42	17,20	23,72	21,04	26,47	16,94	22,68	23,74	22,35	22,68	34,45	33,55
mic.9	22,88	15,47	12,34	14,46	10,27	21,73	24,64	23,68	12,11	11,14	13,89	14,84	19,37	24,27	22,08	24,41	16,98	20,17	20,79	22,03	22,53	33,88	32,77
mic.10	18,18	11,01	13,15	9,92	5,17	16,02	23,02	22,08	16,60	14,86	13,03	13,03	19,94	23,85	21,40	21,50	18,98	21,42	23,68	23,61	24,79	33,49	32,79
mic.11	17,23	17,65	19,81	7,51	7,07	24,99	23,98	23,48	16,12	10,29	14,19	17,98	20,94	25,60	21,81	21,84	18,80	21,44	20,33	23,88	23,91	34,40	33,28
mic.12	17,31	19,78	21,05	14,08	11,54	22,55	24,15	23,68	12,32	10,98	10,89	12,01	19,63	26,10	26,24	22,13	22,36	22,53	24,36	23,19	22,18	34,95	34,28
S.POW.	21,78	19,00	21,21	21,70	14,96	27,98	31,79	32,37	21,52	18,34	18,33	21,87	25,65	30,98	29,69	30,84	26,61	30,36	31,22	30,15	29,80	41,29	40,52

TARİH : 03.12.1999 MODEL : TE 180 YT ÖZELLİK : SİLİNDİR KAFASI TORKU 90
SES SONUCU : 39.3 dBA DOSYA NO : 3600 SERİ NO : 2

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	21,78	13,88	18,46	19,36	7,76	14,39	14,86	12,91	17,03	10,75	14,42	14,20	11,31	15,97	17,94	16,27	24,55	24,65	27,89	27,99	24,91	34,50	33,62
mic.2	20,99	15,37	19,95	18,19	8,22	15,11	14,14	20,05	13,49	10,50	17,67	14,10	10,29	19,30	22,66	16,54	27,36	23,39	23,06	26,42	21,51	33,94	33,37
mic.3	22,12	15,01	19,34	17,13	10,73	18,68	22,63	24,21	12,97	14,61	13,60	16,73	17,25	25,27	25,93	18,05	21,41	25,57	25,36	27,08	19,48	35,15	34,49
mic.4	22,25	11,03	15,78	12,65	8,84	15,71	20,32	15,71	8,47	12,98	15,69	17,12	10,51	12,68	20,93	14,56	22,23	20,30	23,38	26,58	20,89	32,54	31,44
mic.5	18,02	6,36	12,31	9,93	5,93	17,58	20,14	18,16	12,57	13,53	12,85	18,40	16,26	21,76	26,21	18,07	19,88	20,61	22,09	25,60	19,17	32,89	32,66
mic.6	22,37	17,67	23,31	12,82	10,07	15,41	14,19	16,21	14,14	12,71	12,80	12,92	13,58	17,65	20,89	14,87	17,93	21,01	21,50	25,67	20,66	32,33	30,60
mic.7	22,48	13,12	15,99	18,93	11,73	19,70	20,55	16,20	17,51	9,75	12,48	14,08	11,89	12,86	15,47	15,59	18,78	23,02	27,18	25,93	22,66	33,36	31,93
mic.8	23,62	12,73	12,55	13,82	8,71	17,18	15,42	20,97	12,78	8,71	19,39	13,49	12,52	15,20	20,97	15,82	20,47	20,45	22,31	25,65	22,68	32,57	31,23
mic.9	23,47	12,32	13,64	11,57	10,41	19,52	16,60	20,50	11,73	9,92	19,73	14,72	15,73	18,67	23,54	18,83	20,36	22,79	22,57	27,23	20,34	33,45	32,52
mic.10	20,98	9,41	13,90	12,25	6,61	14,44	14,60	13,92	9,64	9,92	13,66	13,78	11,24	14,04	20,04	15,62	22,13	21,24	26,67	26,95	21,61	32,80	32,06
mic.11	22,05	15,96	21,20	14,99	10,92	20,61	21,18	24,56	15,51	13,58	13,28	20,24	17,01	22,99	24,71	16,26	21,18	18,90	18,31	26,59	21,88	34,09	32,88
mic.12	21,56	15,26	20,46	16,04	8,93	18,27	18,15	19,66	14,53	11,29	14,51	14,60	11,26	19,75	21,30	17,05	27,02	19,73	22,95	25,23	20,98	33,44	32,64
S.POW.	27,40	18,50	25,30	22,35	15,05	24,35	25,47	26,81	20,60	18,34	22,42	22,58	20,48	26,48	29,45	23,18	29,76	29,01	31,15	33,20	28,35	40,12	39,30

TARİH : 02.12.1999 MODEL : TE 180 YT ÖZELLİK : SİLİNDİR KAFASI TORKU 90
SES SONUCU : 42.6 dBA DOSYA NO : 3596 SERİ NO : 3

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	15,92	10,91	15,00	15,12	8,77	12,93	13,55	15,99	19,87	9,71	15,69	13,48	19,26	26,69	23,31	29,66	25,21	24,39	28,41	26,22	25,52	36,17	36,36
mic.2	17,84	13,42	17,81	11,98	10,66	18,75	20,87	17,48	14,17	8,48	18,26	14,85	16,85	27,29	30,80	28,37	28,56	21,88	22,68	23,27	21,91	36,49	37,01
mic.3	18,89	12,71	16,40	11,49	13,11	21,08	27,62	22,05	17,84	9,32	15,18	24,47	18,89	27,62	33,88	26,68	24,16	24,19	22,87	24,23	22,68	37,89	38,19
mic.4	19,33	7,50	10,77	11,10	7,67	17,52	13,69	17,24	14,63	11,38	17,24	16,86	17,31	21,52	30,08	20,79	26,53	20,42	22,11	24,53	21,10	34,58	34,94
mic.5	9,72	4,33	9,11	5,91	3,49	18,23	21,41	13,53	15,58	8,26	11,44	19,90	19,06	25,53	34,65	23,90	24,80	20,09	23,08	22,42	16,42	36,84	37,72
mic.6	19,88	16,47	22,11	10,66	8,40	13,34	19,95	15,01	17,18	7,89	12,21	14,45	16,19	23,67	27,27	20,94	21,53	21,13	22,42	23,06	20,40	33,55	33,24
mic.7	20,27	11,40	15,30	11,45	6,22	19,72	26,36	19,40	20,20	9,85	13,66	19,07	16,95	22,24	24,95	29,09	21,04	22,59	26,12	23,39	22,57	35,39	35,06
mic.8	20,12	10,59	11,93	9,07	6,34	19,11	20,43	18,00	14,97	6,90	12,99	12,66	17,02	23,62	26,42	24,07	23,04	21,77	22,94	23,06	21,63	33,70	33,62
mic.9	21,23	11,10	11,87	7,54	10,30	21,73	21,89	15,71	12,22	10,60	14,11	18,03	18,88	25,40	28,05	25,30	24,85	19,49	21,07	22,50	19,99	34,53	34,61
mic.10	19,10	8,18	10,23	6,32	6,42	16,39	17,38	16,98	14,58	11,57	15,31	17,03	19,52	25,02	27,00	19,10	26,74	21,82	22,93	24,27	22,46	34,21	34,40
mic.11	19,01	12,19	15,74	9,37	11,21	20,87	22,02	18,66	18,47	11,89	14,24	21,95	20,54	28,12	29,20	24,33	23,13	19,27	20,38	24,26	22,21	35,41	35,59
mic.12	17,82	9,76	13,45	9,52	9,52	18,22	19,96	16,37	18,34	9,64	11,64	12,93	18,53	26,74	29,16	21,49	29,11	21,70	21,61	23,42	21,63	35,33	35,75
S.POW.	21,98	12,84	22,30	16,44	14,83	25,56	29,01	24,48	23,84	16,05	21,39	25,46	25,16	32,56	36,80	32,53	32,38	28,58	30,44	30,45	28,67	42,24	42,59

TARİH : 02.12.1999 MODEL : TE 180 YT ÖZELLİK : SİLİNDİR KAFASI TORKU 90
SES SONUCU : 39.1 dBA DOSYA NO : 3594 SERİ NO : 4

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	15,05	11,99	17,50	17,47	8,54	17,57	16,39	16,30	14,11	9,36	6,37	12,86	15,50	20,98	15,26	19,78	22,13	27,07	27,75	25,28	25,40	34,17	33,62
mic.2	16,78	12,07	17,08	16,87	9,13	17,67	21,39	19,95	14,14	7,23	6,48	12,64	12,47	22,21	19,72	17,84	26,33	23,08	25,15	22,68	20,54	33,26	32,80
mic.3	17,22	12,05	17,01	12,78	13,23	23,57	28,37	25,22	16,00	7,75	11,23	18,89	16,40	24,94	23,46	18,89	23,41	26,56	20,61	22,70	21,72	35,21	34,10
mic.4	19,29	8,37	12,35	14,02	7,53	17,97	23,10	17,62	10,47	10,80	9,17	11,08	13,95	15,57	18,72	23,61	24,86	19,97	23,66	23,24	20,79	32,65	32,02
mic.5	9,13	3,63	7,41	6,57	3,65	20,26	21,95	19,60	12,24	8,47	9,48	17,22	16,00	19,81	21,64	20,47	26,30	20,84	22,28	21,34	18,23	32,49	32,32
mic.6	19,95	14,33	20,16	17,18	11,41	16,19	19,46	17,95	11,51	7,02	6,87	11,60	12,40	19,41	19,55	21,46	19,20	21,69	23,46	22,47	18,85	31,95	30,88
mic.7	22,08	10,08	11,70	19,37	8,25	21,79	24,10	17,02	13,05	7,42	6,44	15,70	15,33	17,42	11,21	21,63	16,10	23,32	27,46	23,75	23,37	33,66	32,27
mic.8	21,93	9,30	10,08	10,52	6,01	21,08	23,20	21,34	11,11	6,10	7,54	11,56	13,93	18,33	19,23	19,65	18,66	20,83	23,74	20,97	19,98	32,11	30,68
mic.9	21,96	10,20	12,20	12,77	10,30	22,20	23,21	20,62	12,93	7,78	10,72	14,51	15,89	24,29	21,49	19,16	23,73	20,53	21,82	22,83	19,75	33,20	32,32
mic.10	20,04	7,99	11,80	7,81	7,43	17,00	23,96	18,30	8,75	10,56	9,64	13,59	15,50	19,78	19,10	18,34	22,84	20,48	23,21	23,82	21,05	32,34	31,40
mic.11	18,36	14,71	20,14	17,77	11,77	22,10	23,62	23,55	14,69	10,29	11,02	19,32	17,34	23,44	19,32	16,85	22,05	18,59	20,75	22,99	21,11	33,27	31,87
mic.12	17,57	13,59	19,38	16,46	10,56	20,53	22,01	19,66	11,14	9,52	7,22	11,26	14,98	25,30	19,02	18,67	26,90	22,06	21,80	22,65	20,69	33,53	33,04
S.POW.	22,90	12,44	23,03	22,10	15,43	27,17	30,23	27,37	19,35	14,73	14,47	21,74	21,78	28,71	26,50	26,80	30,49	29,63	30,88	29,58	28,07	39,85	39,11

TARİH : 02.12.1999 MODEL : TE 180 YT ÖZELLİK : SİLİNDİR KAFASI TORKU 90
SES SONUCU : 39.6 dBA DOSYA NO : 3584 SERİ NO : 5

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	16,18	12,16	17,59	11,99	12,68	18,51	13,83	23,35	14,16	9,34	13,33	13,59	20,44	17,97	16,89	28,48	18,84	24,20	27,35	25,21	23,73	34,65	34,37
mic.2	17,39	13,91	20,07	14,03	13,23	18,45	20,17	23,72	18,99	9,30	15,16	11,16	16,38	20,64	22,66	21,15	21,79	22,12	24,26	23,48	21,18	33,38	32,52
mic.3	19,65	14,38	20,16	15,44	14,57	21,88	25,31	26,73	21,95	8,80	12,47	20,26	18,89	24,12	24,09	20,23	19,08	20,16	22,54	23,20	20,42	34,65	33,37
mic.4	20,46	9,81	14,63	9,43	7,86	14,16	16,18	18,35	18,06	12,02	17,52	13,31	16,39	15,17	20,77	19,76	21,24	19,40	22,93	24,11	19,95	31,82	31,10
mic.5	11,44	5,16	10,75	2,73	8,78	18,61	18,96	20,54	16,68	7,49	12,00	23,48	19,60	22,30	27,08	22,96	21,36	17,55	22,91	21,90	16,45	33,33	33,55
mic.6	19,53	16,31	23,08	13,37	12,05	16,40	20,80	20,89	17,01	8,29	12,52	11,30	17,34	19,20	21,24	24,47	17,29	17,93	21,46	22,77	19,29	32,62	31,43
mic.7	21,70	11,02	14,81	14,74	11,56	17,98	22,45	21,98	14,15	7,42	11,42	16,62	16,62	17,16	18,17	28,78	15,59	22,17	26,97	22,57	20,85	34,22	33,76
mic.8	23,13	10,48	8,45	10,83	10,78	17,44	19,23	24,47	14,43	5,96	17,04	12,43	17,51	17,81	22,94	22,14	18,21	18,54	23,60	23,04	21,55	32,91	31,84
mic.9	22,46	11,99	11,19	10,58	13,38	19,56	20,36	22,60	16,81	9,38	15,38	14,88	21,61	21,47	25,25	22,22	18,53	16,98	20,72	22,93	19,40	33,12	32,45
mic.10	19,40	8,49	10,39	4,47	6,04	11,10	18,70	18,32	16,98	10,93	16,60	14,04	19,28	20,18	23,33	21,24	20,98	18,63	22,91	23,38	20,30	32,19	31,90
mic.11	20,10	14,90	20,61	5,89	11,46	20,43	20,47	25,29	18,71	10,15	13,20	23,93	21,41	23,67	23,55	25,08	19,41	15,63	21,55	23,79	20,26	34,33	33,70
mic.12	18,48	13,57	19,07	4,70	8,20	18,55	18,55	21,02	13,83	8,11	15,54	13,57	18,04	22,81	22,81	25,73	25,94	19,52	22,46	22,57	21,68	33,71	33,54
S.POW.	24,20	15,87	24,70	17,52	17,69	25,13	27,24	29,79	24,19	15,27	21,38	24,89	25,75	27,74	29,95	31,36	27,40	26,73	30,57	29,90	27,36	40,12	39,65

TARİH : 02.12.1999 MODEL : TE 180 YT ÖZELLİK : SİLİNDİR KAFASI TORKU 90
SES SONUCU : 39.6 dBA DOSYA NO : 3582 SERİ NO : 6

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	19,07	16,51	19,80	15,43	15,03	17,17	16,67	22,20	23,14	13,59	13,64	12,91	17,69	25,87	15,92	17,73	17,00	21,64	26,08	25,78	21,85	33,98	33,09
mic.2	18,75	17,60	21,13	16,17	16,64	21,84	19,86	23,93	23,22	18,85	13,16	13,06	15,74	27,29	21,18	19,60	20,92	19,58	22,21	25,48	19,72	34,47	33,51
mic.3	19,01	18,87	22,33	19,15	17,01	24,68	27,57	26,82	20,99	15,62	17,04	22,07	15,44	27,97	23,25	18,31	19,20	19,06	22,14	25,03	20,38	35,88	34,41
mic.4	20,46	15,29	18,68	16,39	12,49	17,52	15,57	24,04	28,55	23,29	17,05	14,94	17,08	22,56	14,72	15,83	18,11	17,76	21,19	23,99	19,66	34,04	32,55
mic.5	14,05	7,41	11,15	9,41	10,66	19,69	22,04	21,53	18,82	12,12	13,95	23,08	15,79	26,54	23,10	17,79	20,02	17,06	21,20	23,15	16,59	33,16	32,92
mic.6	22,30	20,44	23,74	19,41	16,19	16,23	23,93	22,35	23,60	17,34	13,29	11,70	14,92	24,54	16,94	15,69	16,75	18,09	20,84	24,00	18,26	33,76	31,60
mic.7	24,22	13,30	15,35	17,75	15,26	21,23	23,11	17,70	13,19	19,30	9,05	15,96	14,74	24,73	14,60	19,04	13,89	20,48	24,59	24,33	18,78	33,36	31,88
mic.8	23,91	14,29	12,01	15,20	15,49	21,91	19,72	23,95	16,03	15,44	10,22	11,09	15,49	24,96	17,04	20,40	16,90	18,61	22,26	24,07	22,00	33,36	31,88
mic.9	23,70	14,39	14,86	15,73	17,73	23,49	23,75	23,47	22,64	15,68	10,88	14,13	17,80	25,07	20,15	21,91	16,81	14,95	21,75	24,67	18,01	34,08	32,53
mic.10	20,91	12,91	15,54	8,16	11,10	14,32	17,38	22,25	22,86	23,35	13,66	16,74	16,79	24,55	15,40	15,26	17,99	16,79	21,12	25,14	19,99	33,00	32,01
mic.11	20,66	20,68	23,51	16,57	15,93	21,01	28,28	27,95	27,03	15,63	10,85	23,13	16,14	26,38	21,86	19,93	17,93	16,00	18,85	26,05	18,38	36,13	34,29
mic.12	18,27	19,49	22,69	17,33	16,79	19,63	25,02	23,49	20,74	12,25	11,43	11,00	14,95	26,36	19,33	20,60	22,36	18,20	21,49	24,27	18,81	34,19	32,85
S.POW.	26,28	23,07	26,90	23,08	22,11	27,57	30,40	30,81	30,22	25,25	20,00	24,91	22,80	32,61	26,41	25,63	25,30	25,13	29,11	31,39	26,20	40,88	39,62

TARİH : 02.12.1999 MODEL : TE 180 YT ÖZELLİK : SİLİNDİR KAFASI TORKU 90
SES SONUCU : 39.5 dBA DOSYA NO : 3580 SERİ NO : 7

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	16,72	14,13	18,77	11,64	8,30	17,71	12,65	12,49	13,90	7,31	6,94	11,15	14,98	22,93	15,85	29,16	20,98	24,44	29,56	26,98	23,19	35,34	35,28
mic.2	18,45	16,54	20,94	18,52	13,63	20,64	22,31	17,63	9,11	6,59	8,64	9,13	13,49	22,68	21,74	19,81	25,41	22,80	23,72	23,44	19,98	33,53	32,70
mic.3	19,51	15,53	20,40	17,84	16,02	23,29	29,17	23,83	18,45	9,04	11,60	15,79	17,22	27,01	23,81	19,48	21,20	19,36	21,41	23,43	22,56	35,30	33,81
mic.4	20,56	11,92	16,14	14,82	9,88	18,65	17,22	17,31	14,37	10,07	9,69	9,78	13,97	17,55	19,43	22,11	22,74	22,93	25,33	23,76	21,07	32,72	32,04
mic.5	12,07	7,34	11,72	6,64	10,14	19,10	15,32	17,90	14,19	8,90	9,20	14,75	17,06	21,24	23,90	21,64	23,55	18,07	22,49	21,71	18,28	31,93	31,97
mic.6	19,76	18,89	24,23	13,46	13,25	18,38	22,99	18,82	16,33	9,13	7,53	7,18	12,42	20,96	16,94	21,50	19,22	21,22	22,37	23,22	20,82	32,88	31,06
mic.7	21,30	12,46	15,51	12,08	7,85	18,31	25,30	16,55	12,18	7,17	7,02	10,08	13,63	19,47	14,83	26,03	16,69	23,23	27,91	23,68	22,36	34,02	33,18
mic.8	21,32	14,17	14,76	10,57	12,38	20,92	22,21	18,90	11,91	6,43	8,95	7,82	13,35	21,84	19,37	20,50	18,07	21,11	23,58	21,58	20,61	32,24	31,05
mic.9	22,41	13,99	15,07	11,97	15,02	24,27	22,17	19,21	15,71	7,92	11,33	11,73	14,93	23,75	22,43	22,53	21,84	19,94	23,30	21,66	22,88	33,61	32,51
mic.10	19,52	10,79	14,44	6,44	8,61	14,77	20,34	17,68	15,17	11,90	10,25	9,38	14,89	21,73	19,47	22,67	20,95	20,55	23,61	24,08	20,74	32,31	31,77
mic.11	19,91	18,38	23,15	12,88	12,88	22,57	25,34	23,53	20,19	10,64	12,05	15,86	17,16	25,76	20,61	22,82	19,95	19,81	20,80	21,51	21,15	34,24	32,83
mic.12	17,71	17,28	22,18	8,09	9,43	20,39	23,26	19,49	16,95	8,46	7,38	9,26	14,63	25,87	20,03	23,92	24,48	20,29	25,14	23,52	21,16	34,16	33,52
S.POW.	23,69	20,53	26,45	19,97	18,53	27,39	30,23	26,34	22,42	14,92	15,35	18,20	21,66	30,14	27,43	30,43	28,67	28,23	31,69	30,07	28,09	40,28	39,53

TARİH : 02.12.1999 MODEL : TE 180 YT ÖZELLİK : SİLİNDİR KAFASI TORKU 90
SES SONUCU : 40.1 dBA DOSYA NO :2: 3576 SERİ NO : 8

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	18,11	9,29	13,45	13,01	10,54	14,56	19,19	23,66	13,19	11,41	21,24	13,55	16,02	22,86	14,75	19,26	21,43	24,34	25,85	25,42	27,54	34,34	33,49
mic.2	18,40	10,64	12,97	17,23	10,26	17,48	23,86	25,67	12,64	15,32	25,11	14,45	14,78	24,07	26,14	18,99	26,05	22,21	23,27	24,19	23,60	35,16	34,68
mic.3	19,39	10,99	12,03	17,01	15,18	22,26	28,87	29,52	15,98	19,06	17,95	17,98	19,01	23,55	26,84	20,12	19,55	23,81	21,46	24,80	27,13	36,49	35,04
mic.4	19,19	7,06	7,95	14,16	9,67	18,46	25,40	21,10	11,64	22,34	24,39	16,37	14,35	17,66	23,66	16,14	21,43	21,40	20,42	25,40	24,06	34,03	33,01
mic.5	13,37	2,50	5,37	6,71	6,66	17,83	23,97	23,38	12,57	14,26	12,61	17,53	16,89	21,97	27,52	21,81	19,57	22,16	22,42	22,66	19,60	33,64	33,45
mic.6	19,22	11,51	14,92	16,49	12,82	18,80	23,83	23,50	14,24	15,08	17,08	10,80	13,84	20,89	19,90	17,74	17,34	23,69	20,16	23,53	23,69	33,03	31,65
mic.7	19,37	10,39	8,95	19,37	8,46	18,22	14,36	24,33	13,59	15,21	20,74	14,17	15,02	18,17	16,62	17,47	17,16	24,12	25,63	23,44	24,66	33,33	32,21
mic.8	22,21	10,74	7,72	12,92	8,34	15,79	23,48	28,30	9,87	14,15	23,08	12,24	13,04	19,25	21,11	18,45	19,25	21,44	22,40	22,73	23,86	34,04	32,50
mic.9	22,39	11,35	6,96	13,54	12,20	19,75	25,51	26,85	11,75	9,19	19,52	14,58	14,04	20,76	24,31	19,42	18,18	17,33	19,73	22,13	23,33	33,80	32,22
mic.10	19,28	7,34	6,23	7,17	7,90	15,47	26,41	22,13	12,98	22,48	26,08	16,77	16,18	20,08	23,85	16,51	22,69	21,57	21,85	24,27	27,28	34,92	33,94
mic.11	19,60	11,63	12,45	14,03	12,62	18,83	27,46	29,20	14,69	11,04	16,52	17,60	16,76	22,99	23,06	16,36	18,97	19,63	20,38	23,53	26,80	35,12	33,33
mic.12	18,41	11,21	13,68	11,36	11,50	16,34	25,44	25,09	13,21	13,00	19,78	11,36	13,14	22,32	20,86	16,69	24,13	22,32	22,39	24,50	24,48	34,02	32,94
S.POW.	23,37	0,00	17,16	21,38	17,27	24,98	31,93	32,87	19,73	23,98	28,61	21,96	22,21	28,43	30,53	25,24	28,08	29,11	29,36	30,62	31,94	41,09	40,06

TARİH : 02.12.1999 MODEL : TE 180 YT ÖZELLİK : SİLİNDİR KAFASI TORKU 90
SES SONUCU : 40.9 dBA DOSYA NO : 3574 SERİ NO : 9

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	15,36	9,83	13,24	8,02	6,82	17,14	19,19	23,78	14,70	9,67	25,42	16,09	17,99	23,68	17,73	27,59	21,61	26,55	27,07	26,41	24,01	35,57	35,40
mic.2	16,33	12,52	17,70	11,23	12,03	19,48	25,76	20,87	11,56	11,68	26,96	15,98	17,84	24,12	24,56	21,93	23,32	23,83	25,06	24,12	25,03	35,34	34,79
mic.3	16,97	14,05	18,54	13,18	16,35	23,93	31,52	23,41	16,71	10,03	19,06	17,46	18,42	25,53	26,11	21,60	20,02	25,15	22,30	24,09	22,59	36,34	34,89
mic.4	17,99	8,77	13,08	6,87	8,44	17,71	23,50	18,53	12,30	15,92	25,21	15,74	17,31	18,93	22,11	17,57	21,10	23,05	22,70	25,99	21,40	33,59	32,93
mic.5	12,87	4,73	10,00	5,02	7,65	18,21	25,48	18,49	14,21	8,26	16,16	18,61	19,34	22,94	26,77	24,61	19,03	21,97	21,50	21,71	18,54	33,66	33,57
mic.6	18,63	15,62	21,69	8,50	9,98	18,28	25,17	20,30	15,20	9,77	22,09	12,87	16,87	23,24	20,28	23,71	18,30	24,96	22,42	23,48	21,86	34,04	33,14
mic.7	19,82	14,27	17,35	8,32	8,53	20,08	23,75	23,68	14,69	11,94	21,39	16,13	16,60	21,79	21,04	27,23	16,36	26,00	27,60	23,61	23,30	35,18	34,66
mic.8	22,12	15,53	11,93	10,76	10,41	18,92	25,36	22,71	10,45	10,22	26,61	14,85	17,13	23,13	22,90	25,11	18,69	23,39	23,39	23,15	22,35	34,80	34,10
mic.9	21,89	10,91	9,26	11,71	13,09	22,62	29,16	20,72	11,90	9,43	22,97	16,34	19,14	23,49	25,04	23,58	17,47	19,73	19,33	22,60	22,39	34,83	33,56
mic.10	18,34	7,62	8,37	7,81	8,37	18,39	24,08	19,83	14,49	16,56	28,15	17,00	19,14	23,56	22,37	16,74	20,62	21,50	23,21	24,65	23,80	34,50	33,95
mic.11	18,14	13,16	17,39	10,50	12,66	22,73	30,42	24,31	17,01	9,42	15,46	17,60	18,26	24,24	25,04	21,22	18,26	23,25	22,94	23,86	23,93	35,60	34,09
mic.12	14,51	11,33	15,61	6,44	9,26	21,59	27,44	21,92	15,80	10,25	21,89	12,32	16,98	24,29	21,75	22,57	23,14	22,20	23,89	24,39	22,90	34,63	33,74
S.POW.	21,05	15,41	22,81	15,05	17,33	27,24	33,91	28,77	21,07	18,42	30,95	22,86	24,73	30,29	30,45	30,62	27,03	30,64	30,80	30,81	29,66	41,60	40,89

TARİH : 02.12.1999 MODEL : TE 180 YT ÖZELLİK : SİLİNDİR KAFASI TORKU 90
SES SONUCU : 39.4 dBA DOSYA NO : 3572 SERİ NO : 10

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	18,41	12,06	18,06	10,16	8,49	15,31	16,49	26,20	16,49	7,90	6,25	11,08	14,39	20,37	15,64	21,68	20,37	27,99	29,52	26,53	29,59	36,07	35,16
mic.2	18,83	12,73	18,26	15,89	11,35	18,87	19,65	21,77	11,44	9,13	6,78	8,95	13,39	22,64	23,25	18,14	20,92	23,22	26,40	25,22	23,76	33,79	33,03
mic.3	18,16	12,38	17,79	16,80	15,48	23,81	22,92	23,29	10,61	10,36	10,05	19,95	14,90	24,12	24,92	18,89	21,79	26,96	23,57	23,27	24,00	34,80	34,06
mic.4	17,31	8,16	12,77	13,17	9,69	15,31	21,52	13,59	15,22	14,75	6,87	9,13	14,70	17,33	21,50	16,32	18,49	22,11	24,44	27,42	23,73	32,90	32,02
mic.5	15,06	3,18	7,41	7,91	4,80	18,59	19,22	17,55	9,72	10,28	9,53	16,07	14,38	23,17	23,53	18,23	19,60	22,59	22,80	22,21	20,73	32,06	31,88
mic.6	21,10	13,67	19,36	13,13	11,37	17,67	23,74	21,24	12,97	10,00	6,90	8,97	14,26	21,36	17,88	18,26	15,62	23,43	23,67	23,55	22,37	32,84	31,39
mic.7	22,41	9,75	12,53	13,09	8,88	17,49	18,69	25,53	15,26	12,48	7,54	11,94	12,13	20,01	14,15	18,17	14,74	24,38	28,07	24,71	26,24	34,25	32,98
mic.8	22,75	10,15	10,95	10,64	9,14	17,23	19,65	23,37	9,89	11,42	7,72	9,28	11,89	19,77	17,20	17,13	16,00	21,81	23,74	23,13	22,68	32,21	30,73
mic.9	23,44	11,66	14,25	12,46	12,93	19,28	23,11	19,94	9,71	8,72	10,32	11,75	14,55	21,19	20,88	16,74	16,72	21,23	20,81	24,60	24,50	32,86	31,23
mic.10	21,85	7,71	10,42	7,55	7,67	13,76	22,15	17,03	14,89	14,35	9,29	9,29	13,50	21,68	20,27	17,21	18,77	22,79	24,34	26,20	24,20	33,10	32,12
mic.11	20,78	13,89	19,01	9,77	12,45	20,19	25,48	21,13	15,25	7,30	10,73	15,72	13,91	24,09	21,39	18,14	18,68	23,15	21,70	24,38	24,78	33,83	32,51
mic.12	20,29	13,28	18,67	6,93	10,84	18,46	20,65	20,15	15,05	9,31	7,00	8,91	14,48	23,02	21,68	17,28	21,80	22,93	27,00	24,41	23,40	33,68	32,92
S.POW.	25,34	12,24	22,96	18,68	17,14	25,48	28,56	28,91	20,19	17,49	13,97	19,90	20,45	28,73	27,94	24,89	25,83	30,83	32,22	31,55	31,54	40,30	39,40

TARİH : 03.01.2000 MODEL : TE 180 YT ÖZELLİK : CONTA KÜÇÜK
SES SONUCU : 39.2 dBA DOSYA NO : 4426 SERİ NO : 1

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	16,93	7,64	13,29	14,37	10,09	16,58	11,59	25,38	16,86	10,58	10,98	12,75	16,74	18,06	19,54	20,11	20,58	24,79	27,42	26,41	22,81	34,00	33,28
mic.2	15,34	5,40	8,31	15,89	12,45	19,74	15,41	19,81	9,93	8,08	7,30	10,05	15,18	21,41	22,66	20,47	26,68	22,80	25,27	23,93	22,96	33,55	33,35
mic.3	18,24	7,18	9,98	18,82	16,33	24,09	22,49	20,59	14,12	9,56	12,19	14,80	16,33	24,04	25,10	18,75	18,19	23,50	23,48	23,03	22,19	33,81	32,98
mic.4	16,30	5,36	9,34	12,35	10,56	17,52	17,83	15,50	14,30	11,24	8,14	10,09	16,37	18,56	19,78	16,72	23,66	23,07	25,92	28,65	22,70	33,61	33,04
mic.5	8,31	1,23	3,53	9,84	10,80	21,32	18,66	17,69	17,20	11,95	8,45	17,93	19,81	21,97	24,73	16,78	19,53	22,14	21,79	22,40	20,54	32,37	32,16
mic.6	17,18	4,40	6,47	15,53	14,26	22,40	20,16	22,02	18,61	12,82	7,09	9,65	14,42	21,15	20,33	18,09	20,42	23,67	23,46	21,90	21,27	32,67	31,71
mic.7	16,27	10,76	13,94	15,00	12,10	19,89	11,45	24,88	16,31	10,03	8,95	12,34	17,07	13,92	14,08	19,65	16,74	25,46	27,39	22,43	24,45	33,46	32,50
mic.8	16,87	7,84	12,57	9,37	8,34	14,87	16,73	21,30	9,98	5,75	6,88	10,90	15,09	16,83	21,01	19,70	18,50	22,24	23,32	20,57	24,82	31,77	31,01
mic.9	16,91	8,39	12,53	8,39	11,31	18,69	20,83	17,09	11,68	8,63	15,73	12,58	17,49	19,21	23,73	18,88	17,87	21,35	21,84	20,83	24,53	32,11	31,44
mic.10	13,92	4,96	10,82	10,51	7,55	16,04	18,39	16,39	13,29	12,32	8,65	11,24	16,27	20,34	19,87	16,32	22,53	21,75	23,66	25,38	22,18	32,12	31,67
mic.11	16,57	10,88	15,18	8,48	11,91	18,92	19,46	23,18	18,61	13,11	15,56	16,80	18,31	19,79	24,80	20,24	20,73	24,66	22,97	26,56	26,94	34,46	33,74
mic.12	14,32	8,67	14,93	11,05	8,79	15,52	17,85	20,43	15,57	11,21	6,02	11,10	17,68	21,54	22,48	19,42	24,79	23,02	23,40	23,82	23,30	33,01	32,74
S.POW.	0,00	-1,42	17,94	19,40	18,15	26,36	25,27	28,19	22,16	16,93	16,85	19,73	23,63	27,15	29,12	25,63	28,63	30,14	31,35	30,78	30,27	39,69	39,21

TARİH : 30.12.1999 MODEL : TE 180 YT ÖZELLİK : CONTA KÜÇÜK
SES SONUCU : 41.2 dBA DOSYA NO : 4425 SERİ NO : 2

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	17,45	6,14	10,32	12,98	8,98	13,55	14,11	25,09	17,26	10,49	10,30	10,54	16,04	19,99	15,87	22,37	23,45	27,19	31,14	25,75	25,80	35,69	35,24
mic.2	20,68	6,50	10,03	15,56	12,78	19,74	18,26	19,70	9,21	8,10	10,50	9,79	14,26	21,18	22,45	23,32	33,88	26,23	28,44	25,36	24,68	37,18	37,42
mic.3	21,62	7,20	11,67	19,34	15,91	25,48	26,49	18,99	12,21	10,40	16,33	12,10	14,85	24,02	25,29	21,58	21,43	25,13	24,54	24,30	23,81	35,16	34,05
mic.4	21,38	8,02	13,08	10,70	10,77	18,25	18,60	14,54	11,85	11,90	9,03	11,27	15,12	20,09	22,39	25,26	27,17	24,25	28,22	25,07	25,07	34,98	34,76
mic.5	7,84	3,13	8,54	10,03	9,74	19,53	19,90	19,88	15,67	13,69	14,28	13,93	18,14	20,19	25,81	19,25	20,47	24,30	23,10	20,56	20,70	32,75	32,65
mic.6	22,35	5,32	5,63	14,64	14,68	23,78	26,89	22,87	15,13	9,58	9,27	9,51	13,84	20,61	21,24	21,48	22,82	25,60	24,70	19,90	23,50	34,47	33,11
mic.7	23,91	11,42	17,42	17,51	12,39	20,24	21,35	26,24	16,81	10,27	10,79	10,55	14,29	18,69	15,87	22,71	19,96	28,71	29,79	24,41	23,84	35,77	34,80
mic.8	24,28	9,96	13,98	6,13	9,21	16,73	23,67	21,77	10,83	6,08	7,04	11,49	15,20	20,03	20,99	20,57	21,27	25,55	26,82	22,35	25,13	34,19	33,12
mic.9	24,29	8,91	12,41	9,36	11,97	19,40	22,62	18,79	10,98	11,52	13,05	10,77	18,60	20,46	25,58	21,54	23,30	21,19	23,54	23,70	24,55	33,98	33,16
mic.10	22,13	6,98	11,38	7,15	7,95	14,96	22,53	14,02	11,85	10,58	10,04	12,72	17,99	22,04	22,04	23,68	23,14	23,42	24,55	23,61	23,05	33,51	33,06
mic.11	21,58	12,31	18,33	11,89	11,09	18,94	21,04	22,87	16,92	9,39	14,24	16,22	18,36	22,68	22,54	17,77	23,60	22,49	26,33	24,00	24,40	34,21	33,39
mic.12	19,82	10,67	16,15	13,31	9,29	14,23	18,27	21,47	15,64	10,60	6,75	11,99	16,72	23,09	21,33	19,31	32,67	22,48	26,83	24,64	25,09	36,10	36,22
S.POW.	17,69	9,68	20,06	19,80	18,13	26,83	29,27	28,59	20,97	16,57	18,00	18,32	23,08	28,12	29,49	28,79	34,06	32,00	34,02	30,12	31,03	41,50	41,23

TARİH : 30.12.1999 MODEL : TE 180 YT ÖZELLİK : CONTA KÜÇÜK
SES SONUCU : 41.5 dBA DOSYA NO : 4424 SERİ NO : 3

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	19,40	9,71	13,31	10,68	8,70	21,66	14,46	15,52	14,84	9,48	16,53	14,39	17,71	24,11	18,60	18,84	21,38	28,34	26,95	25,17	24,93	34,59	34,20
mic.2	19,84	9,30	7,44	11,11	9,70	19,30	16,76	12,99	12,66	6,76	22,12	13,53	14,71	22,75	22,85	18,64	29,95	28,40	27,17	23,69	23,48	35,61	35,72
mic.3	21,60	10,80	13,23	16,54	15,25	24,16	22,30	14,87	17,93	7,42	11,79	15,60	19,58	24,37	25,64	18,52	21,48	30,40	25,79	23,15	24,14	35,71	35,30
mic.4	21,05	8,82	13,17	10,96	6,14	13,57	11,92	14,32	15,97	9,17	24,13	15,59	16,18	20,06	22,16	18,49	25,90	26,37	26,18	24,34	21,97	34,19	34,05
mic.5	6,80	2,29	5,37	8,17	3,77	16,54	19,67	13,39	19,03	11,79	9,98	17,65	22,37	22,14	26,77	18,61	22,44	24,18	21,53	24,16	20,77	33,40	33,59
mic.6	21,74	9,08	10,94	12,50	11,13	19,53	23,41	15,67	18,92	9,91	14,71	12,82	15,60	23,31	23,57	19,34	24,87	28,37	25,17	21,36	21,22	34,53	34,21
mic.7	23,75	14,13	19,21	10,74	8,32	20,01	18,24	18,17	19,18	10,20	13,77	13,49	17,80	23,61	20,31	20,67	23,04	27,72	27,39	24,81	25,68	35,14	34,42
mic.8	23,98	11,79	13,89	6,64	8,55	16,26	17,23	13,91	9,96	7,94	19,08	14,00	17,06	25,15	22,45	18,83	25,84	27,03	26,28	22,47	23,69	34,62	34,37
mic.9	24,36	14,51	13,78	12,93	11,71	20,17	16,65	12,39	15,14	8,56	14,01	13,85	19,82	23,70	27,79	20,17	23,07	25,40	22,15	24,90	23,54	34,63	34,29
mic.10	22,91	9,57	12,23	11,73	6,94	15,07	16,20	14,37	16,39	12,25	22,48	15,80	19,66	24,46	23,45	18,20	26,95	25,21	23,71	24,51	23,26	34,52	34,37
mic.11	22,02	14,47	20,33	15,96	12,24	19,53	19,41	17,34	21,30	11,39	13,56	17,74	22,52	24,64	25,86	18,64	25,93	28,89	23,58	24,59	23,86	35,64	35,37
mic.12	21,68	13,75	19,68	14,93	10,02	15,28	16,84	15,52	19,12	9,24	16,81	12,81	17,42	24,72	23,73	19,21	32,69	26,53	26,10	25,30	22,95	36,53	36,71
S.POW.	19,02	16,46	22,06	18,12	16,30	26,08	25,52	21,66	24,30	15,62	25,45	21,61	25,78	30,57	31,10	25,74	33,56	34,39	32,33	30,38	30,20	41,51	41,55

TARİH : 30.12.1999 MODEL : TE 180 YT ÖZELLİK : CONTA KÜÇÜK
SES SONUCU : 39.7 dBA DOSYA NO : 4423 SERİ NO : 4

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	17,50	11,95	16,09	13,15	12,32	15,50	20,81	17,76	15,40	10,91	13,64	11,24	19,73	24,62	12,58	20,53	19,14	22,67	28,34	24,34	26,11	34,14	33,52
mic.2	19,27	11,72	11,89	12,66	16,38	24,61	15,09	17,60	10,99	7,23	15,32	10,78	17,11	25,46	18,38	20,47	28,84	23,34	28,30	21,46	24,85	35,19	34,90
mic.3	21,86	12,17	13,67	15,53	19,11	28,00	19,81	20,14	14,52	9,82	11,98	16,99	16,49	26,11	20,00	21,27	17,15	19,83	24,47	21,55	20,92	34,19	32,72
mic.4	20,32	10,54	14,14	9,36	13,38	20,98	24,20	19,85	9,57	11,31	20,86	12,75	16,77	21,14	17,05	20,35	24,56	19,87	28,48	21,83	23,57	34,20	33,37
mic.5	8,54	2,12	4,97	11,15	9,72	17,90	24,51	18,49	14,31	12,05	10,92	21,88	17,48	23,01	19,65	19,69	18,77	19,20	23,31	21,57	20,23	32,36	31,80
mic.6	20,56	10,21	14,56	14,73	14,38	20,70	24,26	18,14	14,52	10,87	16,07	11,48	16,45	23,76	16,87	18,40	21,39	22,23	24,58	20,00	21,03	32,95	31,92
mic.7	22,95	15,21	18,95	14,27	14,74	20,50	15,75	17,42	16,53	10,51	13,19	11,68	19,09	22,17	13,70	23,11	16,76	27,93	29,67	22,03	23,11	34,91	34,27
mic.8	22,92	12,92	8,41	7,91	10,59	19,56	18,66	20,40	12,31	6,05	17,20	11,28	17,79	22,64	17,04	26,99	19,51	23,69	24,94	19,84	23,27	33,69	33,23
mic.9	23,47	13,92	15,54	9,43	16,76	24,85	19,42	18,25	11,38	10,06	13,09	14,32	17,78	22,39	19,61	22,31	18,10	16,74	25,09	21,47	22,17	33,23	31,80
mic.10	20,58	9,78	13,05	8,07	9,71	18,18	20,51	18,77	8,79	11,52	19,35	11,73	20,04	21,35	18,46	18,88	20,30	20,65	24,55	21,90	23,61	32,59	31,79
mic.11	19,13	16,12	21,32	13,39	15,84	23,51	22,66	21,20	15,02	12,19	14,69	21,32	18,05	24,78	20,47	16,71	18,54	19,72	22,47	21,44	23,76	33,64	32,32
mic.12	17,99	14,18	18,86	13,03	14,08	20,58	17,75	17,54	14,60	12,06	16,32	11,29	17,38	21,14	18,22	19,19	26,41	19,56	26,10	21,28	22,88	33,31	32,73
S.POW.	0,00	18,02	22,64	17,79	21,35	29,34	28,06	25,68	20,15	16,72	22,78	22,61	24,70	30,34	24,82	28,29	29,42	29,06	33,24	27,33	29,95	40,22	39,66

TARİH : 30.12.1999 MODEL : TE 180 YT ÖZELLİK : CONTA KÜÇÜK
SES SONUCU : 39.4 dBA DOSYA NO : 4422 SERİ NO : 5

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	18,53	9,01	12,18	11,57	12,82	10,98	20,01	17,92	14,84	11,43	6,70	9,52	14,58	20,20	13,52	19,05	19,07	23,17	25,92	27,73	26,04	33,56	32,62
mic.2	20,28	8,69	9,68	14,00	12,33	21,55	18,87	17,98	11,89	9,46	6,19	10,90	12,85	22,21	23,13	24,59	27,34	23,13	27,74	23,81	24,35	34,80	34,57
mic.3	21,76	11,88	16,00	16,28	16,05	26,26	24,14	21,08	15,81	13,79	10,57	18,64	14,85	21,03	19,36	21,27	16,40	22,66	24,96	23,72	22,63	34,12	32,42
mic.4	21,66	12,32	14,25	12,54	9,29	17,01	21,69	18,44	14,79	11,36	9,01	10,33	13,64	19,64	15,26	17,88	23,14	18,93	25,14	25,24	22,30	32,72	31,61
mic.5	8,94	4,92	10,24	11,70	5,39	16,35	13,72	17,60	16,94	13,77	9,93	23,46	16,99	23,41	26,40	21,50	18,66	20,56	24,33	22,75	21,08	33,20	33,41
mic.6	21,86	10,97	16,45	17,13	14,59	20,09	20,89	18,59	16,09	13,39	6,59	8,59	12,52	17,98	16,40	21,72	22,23	22,56	23,38	22,80	22,66	32,73	31,47
mic.7	23,54	14,67	20,17	9,89	13,21	19,51	22,22	16,57	15,56	13,89	7,57	9,00	14,17	20,31	15,56	19,04	19,02	24,69	27,58	24,52	25,32	34,13	32,78
mic.8	23,86	11,82	13,16	4,22	10,99	20,00	22,38	20,75	7,63	9,11	6,50	12,85	12,64	20,85	18,29	23,18	20,14	20,59	25,34	22,82	22,66	33,17	31,97
mic.9	23,44	11,87	6,04	7,36	14,81	21,89	18,74	18,10	11,66	11,42	8,63	17,21	15,45	22,81	23,35	21,70	18,03	18,90	22,48	24,36	23,42	33,14	32,16
mic.10	22,08	6,84	4,61	8,16	9,78	16,96	23,05	18,81	15,03	12,63	10,32	10,56	15,57	23,49	18,39	17,07	22,22	18,48	21,28	24,06	24,91	32,79	31,67
mic.11	21,04	13,86	19,39	13,39	14,24	19,86	17,74	19,74	17,79	15,34	9,58	21,86	16,69	23,72	20,92	22,85	20,54	22,47	23,95	25,39	25,34	34,18	33,39
mic.12	19,42	13,99	18,46	13,26	14,20	16,44	19,31	16,53	15,68	13,14	6,84	10,89	14,23	24,10	20,98	19,87	25,80	21,70	24,97	24,50	23,52	33,68	33,21
S.POW.	10,54	16,47	22,08	18,27	19,46	27,07	27,70	25,42	21,66	19,09	13,40	23,56	21,26	28,80	27,60	28,07	29,01	28,61	31,91	30,80	30,64	39,93	39,37

TARİH : 30.12.1999 **MODEL :** TE 180 YT **ÖZELLİK :CONTA KÜÇÜK**
SES SONUCU : 47.7 dBA **DOSYA NO :** 4421 **SERİ NO :** 6

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	19,54	8,14	8,16	12,13	11,81	16,13	14,84	21,03	17,22	13,24	11,12	11,88	20,77	27,23	26,44	36,22	32,50	27,49	31,09	27,66	26,18	40,14	40,77
mic.2	21,13	8,71	10,29	14,78	13,02	18,97	14,94	22,45	14,90	9,23	7,91	11,53	19,44	30,23	30,73	31,13	41,90	30,19	29,41	26,96	28,23	43,57	44,35
mic.3	22,75	9,30	10,36	17,88	15,81	23,27	22,02	26,89	16,19	14,45	13,67	20,05	18,42	33,36	34,30	32,39	27,86	25,13	28,51	24,82	26,80	40,19	40,69
mic.4	21,62	8,30	12,54	11,76	9,62	17,43	16,28	21,57	19,05	13,08	10,75	15,78	18,23	28,98	31,40	31,73	38,67	26,15	27,90	25,03	25,35	41,26	42,03
mic.5	9,46	3,39	8,57	9,41	8,05	18,40	19,79	24,44	20,07	13,37	16,26	23,06	21,55	28,44	32,09	31,48	28,84	22,84	29,26	24,96	22,87	38,46	39,05
mic.6	23,13	7,30	5,09	13,98	10,87	19,41	20,52	24,77	20,61	14,26	9,60	10,45	17,98	30,93	29,83	32,30	31,36	24,58	27,64	21,48	24,33	38,76	39,27
mic.7	24,78	11,63	15,19	8,74	9,16	19,82	23,44	20,85	15,96	10,79	9,16	12,67	18,78	26,59	25,79	36,28	27,39	30,40	30,36	25,39	28,57	39,93	40,29
mic.8	23,72	11,39	12,85	4,27	8,01	17,23	20,75	24,64	12,29	11,49	9,65	13,37	21,04	26,33	29,06	34,07	27,46	28,14	29,81	22,57	26,80	38,77	39,14
mic.9	24,20	12,62	14,41	6,93	12,34	19,30	20,50	23,63	15,33	13,33	11,82	16,48	19,21	26,24	33,20	34,90	30,12	21,75	28,24	22,81	26,60	39,57	40,15
mic.10	21,68	9,19	11,62	8,68	8,96	14,82	19,71	20,70	17,45	13,05	13,59	14,49	21,97	30,13	32,97	32,67	31,68	24,15	26,81	24,88	25,82	39,28	39,97
mic.11	21,48	12,80	17,58	12,31	13,84	20,47	20,43	26,94	21,74	16,78	14,78	23,72	20,05	30,75	33,24	31,88	29,36	25,11	26,45	23,65	29,17	39,57	39,93
mic.12	19,99	11,10	15,40	12,18	11,45	18,32	18,41	21,61	16,46	17,12	10,30	12,81	19,21	27,51	31,75	33,58	37,60	25,19	28,48	25,04	29,02	41,11	41,79
S.POW.	20,54	13,53	19,21	17,68	17,95	25,79	26,72	30,66	24,73	20,35	18,41	24,63	26,67	36,29	38,40	40,43	41,81	33,53	35,70	31,25	33,80	47,05	47,73

TARİH : 30.12.1999 **MODEL :** TE 180 YT **ÖZELLİK :CONTA KÜÇÜK**
SES SONUCU : 47.7 dBA **DOSYA NO :** 4420 **SERİ NO :** 7

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	20,30	13,48	19,57	13,66	15,36	14,25	12,21	22,20	14,30	8,35	10,56	12,18	16,27	31,14	22,20	38,24	31,56	28,90	29,73	25,33	26,83	41,04	41,78
mic.2	21,79	8,71	8,83	13,11	12,19	19,39	9,65	22,26	10,05	9,68	11,98	11,60	14,99	31,50	28,63	30,91	38,16	26,77	28,37	25,69	27,93	41,01	41,69
mic.3	22,99	11,63	16,28	17,39	17,81	24,47	17,86	26,14	13,72	10,83	12,28	14,75	16,99	33,05	31,95	32,49	28,35	27,20	27,01	24,66	25,57	39,53	39,96
mic.4	22,74	10,56	15,81	10,89	9,27	17,10	17,80	17,52	14,39	15,41	15,64	14,63	15,76	28,18	28,48	32,62	36,97	25,07	27,75	26,18	25,66	40,20	40,86
mic.5	8,90	1,93	2,62	12,02	7,04	17,01	15,88	22,33	14,78	11,32	12,52	19,46	18,68	29,83	31,95	31,88	29,90	25,69	26,94	23,57	23,64	38,38	39,14
mic.6	23,34	13,06	17,83	16,49	15,13	20,37	19,29	22,80	16,02	10,40	11,08	10,54	14,28	29,99	27,97	33,05	33,24	26,04	27,60	19,20	24,70	39,01	39,53
mic.7	25,70	16,50	21,49	15,14	15,49	19,02	21,96	25,16	14,36	7,99	10,22	10,43	14,93	28,92	25,23	38,71	28,33	30,47	30,59	24,81	28,78	41,40	41,90
mic.8	24,68	12,41	12,90	6,29	9,56	16,62	20,10	25,48	9,65	10,62	13,56	12,64	14,71	31,27	29,20	35,48	29,79	27,55	29,34	23,18	29,13	40,02	40,47
mic.9	23,21	13,07	13,61	9,76	14,51	20,64	15,42	24,36	13,66	9,50	13,28	12,98	17,47	31,13	32,38	32,31	31,04	23,91	24,93	23,44	27,09	39,10	39,66
mic.10	22,88	12,56	14,32	12,75	10,09	15,87	21,92	19,45	11,88	17,26	16,93	14,32	17,12	31,35	29,02	32,95	35,04	24,81	27,30	23,45	27,05	39,84	40,46
mic.11	22,94	16,94	22,66	15,13	14,73	21,32	15,91	26,35	18,59	12,83	13,20	20,00	18,38	35,74	30,09	31,43	32,37	25,39	25,53	23,25	28,28	40,36	40,85
mic.12	22,67	16,34	22,48	15,50	14,58	18,01	13,99	19,85	15,17	9,64	13,38	12,25	16,04	33,58	28,29	33,39	38,76	26,29	27,21	24,83	28,81	41,89	42,58
S.POW.	24,16	19,13	24,97	19,81	20,44	26,21	24,83	30,38	20,99	18,39	19,63	21,54	23,16	38,65	36,36	41,28	41,12	33,72	34,80	30,48	34,05	47,02	47,69

TARİH : 30.12.1999 **MODEL :** TE 180 YT **ÖZELLİK :CONTA KÜÇÜK**
SES SONUCU : 40.8 dBA **DOSYA NO :**2: 4419 **SERİ NO :** 8

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	20,48	8,16	8,40	10,56	8,68	13,85	18,39	24,60	13,38	12,13	13,03	13,45	20,08	22,51	17,87	19,31	17,83	25,38	25,68	24,06	27,12	34,11	33,25
mic.2	21,22	9,04	9,06	12,57	12,45	20,21	16,71	22,68	10,69	14,71	11,18	11,02	20,05	24,28	23,81	18,61	29,15	25,50	25,15	24,19	27,08	35,50	35,24
mic.3	22,37	9,49	10,43	15,18	16,82	25,20	20,82	25,53	13,44	13,79	11,96	14,61	18,31	27,93	27,90	19,25	20,59	24,92	22,59	23,13	22,35	35,50	34,98
mic.4	21,50	8,96	12,00	10,47	8,80	17,78	21,71	18,51	12,77	22,20	17,33	11,88	18,86	23,33	24,72	16,18	26,72	21,66	24,16	25,19	24,91	34,57	34,15
mic.5	8,92	4,03	6,64	9,56	4,43	15,06	16,82	20,66	12,54	16,16	12,17	18,00	19,29	23,03	26,87	18,35	18,16	21,69	22,80	22,49	20,70	32,79	32,95
mic.6	27,71	14,73	8,29	15,69	14,33	20,07	19,25	23,55	12,00	17,08	12,24	11,27	16,78	24,04	24,07	20,07	22,11	24,47	23,29	21,22	23,64	34,59	33,20
mic.7	27,02	16,64	15,07	11,59	14,50	19,37	21,32	25,39	14,69	17,30	14,50	12,53	19,87	19,58	17,44	20,62	18,45	25,86	26,03	24,59	26,43	35,14	33,44
mic.8	23,65	11,58	13,04	9,49	11,02	18,52	20,68	25,44	10,41	17,39	15,46	11,84	19,60	22,42	23,34	21,32	25,98	23,69	24,57	23,81	25,34	34,85	34,10
mic.9	23,04	11,78	13,21	9,07	14,86	22,22	16,91	23,37	11,17	17,94	16,39	16,15	20,62	23,09	26,83	22,76	16,41	22,62	24,08	20,69	24,57	34,39	33,79
mic.10	22,15	8,89	11,24	8,56	9,62	17,33	24,29	19,05	13,00	23,21	18,56	13,17	21,57	22,98	25,61	18,98	26,03	21,00	23,52	26,50	24,76	35,07	34,54
mic.11	21,60	12,57	16,33	13,77	15,20	22,49	17,30	25,04	13,25	14,87	15,67	18,28	20,24	23,62	24,05	20,14	18,66	22,31	22,89	23,53	28,59	34,84	33,70
mic.12	21,73	10,42	14,55	12,74	13,21	19,24	18,34	21,05	10,93	16,91	11,61	12,34	17,87	21,92	23,87	17,94	30,01	22,55	23,75	23,63	25,59	34,96	34,72
S.POW.	25,50	16,41	18,49	17,31	19,50	27,02	26,77	30,30	18,81	24,90	21,33	20,91	26,35	30,47	31,55	26,46	31,67	30,55	30,95	30,00	32,31	41,23	40,79

TARİH : 30.12.1999 **MODEL :** TE 180 YT **ÖZELLİK :CONTA KÜÇÜK**
SES SONUCU : 42.2 dBA **DOSYA NO :**2: 4418 **SERİ NO :** 9

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	22,48	9,67	10,25	13,85	9,92	16,27	14,65	27,23	19,03	13,01	14,72	14,53	18,23	23,64	18,56	21,03	21,71	26,67	28,41	22,86	23,24	35,05	34,34
mic.2	22,12	8,50	8,92	10,69	12,24	19,48	17,91	21,91	11,02	9,04	17,32	15,49	18,00	23,18	28,61	19,77	28,02	28,05	29,50	23,20	23,93	36,37	36,41
mic.3	21,01	10,26	12,17	17,29	18,28	25,79	25,93	20,28	16,24	11,09	14,80	16,02	18,14	25,17	31,45	19,93	20,07	26,23	25,24	21,01	23,93	36,43	36,11
mic.4	20,30	9,20	12,28	10,00	8,89	15,85	14,68	15,29	15,05	13,69	23,50	21,47	19,47	21,69	27,64	19,40	23,90	29,85	30,29	24,53	22,20	36,34	36,45
mic.5	6,66	2,57	6,50	9,98	7,37	20,28	22,91	20,02	17,67	12,99	12,82	17,86	19,03	22,44	29,81	20,26	21,86	24,49	23,90	20,87	19,36	34,46	34,68
mic.6	19,46	8,52	9,25	12,33	12,05	20,19	27,29	24,82	16,87	12,14	14,09	13,20	17,01	22,04	26,84	19,95	21,03	25,53	26,09	20,82	20,42	34,92	34,17
mic.7	22,99	13,63	16,57	15,09	10,15	19,96	23,35	28,26	20,34	11,73	17,84	15,84	16,13	22,22	21,04	22,52	20,67	27,72	29,11	23,98	24,66	36,13	35,12
mic.8	22,33	12,73	13,77	6,08	10,62	17,84	22,90	22,61	13,60	8,36	21,60	19,79	17,20	23,58	27,29	21,39	21,60	29,15	29,65	20,61	22,14	36,08	35,91
mic.9	21,14	12,93	12,60	12,13	15,19	23,00	22,03	19,07	14,39	13,38	19,35	14,41	18,32	21,80	30,76	22,62	19,68	20,32	22,01	21,68	22,74	34,92	34,83
mic.10	20,65	9,36	11,59	11,52	8,37	16,25	20,58	15,76	17,19	14,58	23,92	22,22	18,63	23,05	27,94	19,94	23,89	26,90	27,49	24,88	27,49	36,03	35,86
mic.11	21,04	14,22	17,63	15,63	15,84	23,69	21,11	23,37	19,53	12,73	18,78	18,57	21,18	24,28	28,47	20,94	20,59	26,26	25,20	22,28	25,06	35,69	35,22
mic.12	20,72	12,32	16,34	15,35	13,66	20,65	20,43	24,48	17,17	10,67	15,80	14,98	16,51	23,75	27,07	19,02	27,09	24,22	25,33	23,21	25,68	35,37	34,95
S.POW.	0,00	15,60	19,70	19,01	19,53	27,72	29,36	30,32	23,84	18,58	26,08	24,69	25,08	29,99	35,02	27,44	30,19	33,68	34,33	28,66	30,65	42,27	42,16

TARİH : 30.12.1999 **MODEL :** TE 180 YT **ÖZELLİK :CONTA KÜÇÜK**
SES SONUCU : 40.7 dBA **DOSYA NO :** 4416 **SERİ NO :** 10

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	21,26	13,50	19,73	18,51	5,55	12,53	14,04	20,58	20,44	9,57	15,15	14,82	20,11	21,17	19,29	23,42	21,05	30,93	30,01	25,33	24,58	36,23	35,90
mic.2	22,59	8,19	9,72	9,89	11,93	16,64	19,46	13,60	11,60	6,05	16,43	15,84	19,08	20,80	21,72	20,87	25,15	26,99	29,88	24,75	24,80	35,25	34,92
mic.3	24,00	10,94	14,52	10,87	16,59	23,36	23,81	17,55	12,14	9,06	17,48	16,73	17,18	24,70	25,34	19,25	18,71	27,43	26,16	21,13	20,61	34,84	34,16
mic.4	23,43	12,32	18,60	11,48	10,02	13,88	19,50	11,01	16,04	10,42	17,31	16,63	20,02	19,36	19,59	17,99	24,37	23,94	26,04	23,24	21,83	33,50	32,79
mic.5	9,67	2,29	5,16	5,63	11,11	21,20	17,79	17,34	18,16	10,14	12,78	18,35	19,43	21,27	24,54	19,62	20,89	24,49	22,11	20,35	19,17	32,54	32,50
mic.6	25,08	13,55	19,88	11,79	13,77	21,90	19,72	18,87	19,15	9,01	14,96	14,33	18,14	21,93	18,75	22,94	19,81	26,47	26,18	19,72	18,05	34,08	33,05
mic.7	27,18	19,11	26,08	11,52	11,78	21,30	12,88	20,48	18,93	11,42	18,03	14,95	18,95	19,25	13,63	22,45	17,54	26,22	28,76	22,69	22,43	35,37	33,56
mic.8	27,08	13,58	18,10	12,99	7,87	13,23	19,79	16,14	8,92	9,35	16,47	14,40	18,05	21,41	19,72	18,71	20,99	25,48	25,48	21,65	21,11	33,71	32,38
mic.9	27,37	12,58	16,58	14,48	9,85	15,09	21,70	14,20	14,20	9,24	17,68	16,18	20,15	21,99	24,90	22,64	16,20	22,90	21,00	22,01	20,69	33,77	32,54
mic.10	25,12	10,23	13,66	14,58	6,21	13,31	22,18	13,90	14,70	10,63	16,41	15,59	20,60	21,94	22,18	26,83	24,95	25,42	24,74	25,47	20,95	34,88	34,51
mic.11	25,39	16,43	23,51	14,05	10,38	18,61	21,01	22,47	19,95	9,09	15,51	17,98	17,67	21,95	25,15	21,44	20,59	27,76	24,12	23,08	25,41	35,36	34,26
mic.12	24,97	16,58	23,49	14,98	7,76	15,66	18,88	21,52	18,76	9,97	14,48	14,72	15,66	20,58	27,51	23,63	27,98	25,26	25,37	24,69	23,77	35,81	35,27
S.POW.	29,09	19,82	27,05	19,20	17,49	25,42	26,84	25,23	23,98	15,41	22,88	22,66	25,69	28,36	29,99	29,13	29,59	33,44	33,42	29,26	29,17	41,22	40,69

TARİH : 13.03.2000 MODEL : TE 180 YT ÖZELLİK : 2 SINIF BÜYÜK CONTA TAKILDI.
SES SONUCU : 41.0 dBA DOSYA NO : 6454 SERİ NO : 1

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	13,82	10,36	13,35	4,34	4,25	15,54	19,58	21,61	11,23	9,45	12,46	14,36	15,33	17,91	19,54	28,07	23,28	28,62	26,17	24,99	27,16	35,34	35,17
mic.2	13,17	10,44	8,21	11,15	5,79	21,00	13,76	19,78	11,76	11,50	9,88	16,21	15,67	18,70	24,82	22,16	28,74	29,47	22,98	19,24	24,16	34,96	35,15
mic.3	3,83	2,89	4,02	5,34	4,42	16,72	14,44	19,31	9,83	7,55	15,66	19,21	16,88	23,26	26,69	21,80	22,01	29,11	22,98	20,32	21,94	34,19	34,56
mic.4	18,76	9,11	9,82	9,35	5,87	17,25	20,78	16,43	15,35	16,29	15,49	17,25	15,75	15,51	19,44	20,36	24,78	25,27	22,71	21,18	21,16	32,65	32,30
mic.5	20,88	14,32	20,08	15,61	13,89	23,25	24,71	24,45	12,81	7,61	14,10	19,37	16,97	17,21	28,29	22,38	22,36	24,12	22,24	21,47	20,31	34,81	34,05
mic.6	20,09	13,34	17,90	12,26	9,22	17,83	23,83	19,24	11,13	8,66	12,21	12,66	14,30	17,52	24,30	22,46	21,45	26,06	21,52	20,63	22,98	33,39	32,71
mic.7	19,51	13,51	13,35	10,41	4,22	16,36	24,02	23,81	12,76	7,39	12,43	10,92	13,06	17,27	17,93	29,36	21,37	25,36	28,37	24,71	25,67	35,53	35,11
mic.8	17,37	11,34	6,24	10,31	6,62	19,60	22,85	21,72	9,09	7,13	12,69	12,94	13,30	17,44	25,10	22,45	23,50	26,40	22,73	20,89	24,09	33,76	33,37
mic.9	18,07	12,97	12,87	13,06	9,35	22,61	29,57	20,31	11,16	9,28	18,66	14,24	14,31	17,13	24,87	22,16	20,42	21,72	22,09	21,88	26,40	34,79	33,18
mic.10	14,57	7,96	9,09	9,47	6,03	18,19	21,44	19,89	16,69	15,30	19,01	14,17	15,16	17,39	20,83	20,28	26,24	27,11	22,05	21,13	28,96	34,58	33,98
mic.11	15,90	12,40	17,22	13,53	10,24	22,84	32,98	25,88	15,97	11,46	16,37	16,84	17,20	20,54	24,39	24,49	22,87	25,29	22,82	21,27	28,37	37,09	35,16
mic.12	15,11	11,19	16,24	10,90	7,92	18,74	28,52	23,56	13,94	11,82	10,97	12,17	14,93	18,22	23,25	22,31	27,39	26,14	23,09	22,80	27,53	35,55	34,59
S.POW.	0,00	12,79	21,08	16,96	13,62	26,71	33,03	28,89	19,67	17,58	21,64	22,40	21,99	25,37	31,05	31,03	31,27	33,52	30,60	28,75	32,52	41,54	40,99

TARİH : 05.03.2000 MODEL : TE 180 YT ÖZELLİK : 2 SINIF BÜYÜK CONTA TAKILDI.
SES SONUCU : 40.2 dBA DOSYA NO : 6130 SERİ NO : 2

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	17,45	8,40	8,30	5,79	3,81	10,49	26,20	19,99	19,17	9,83	9,46	16,04	15,78	23,31	20,86	18,37	18,14	25,99	29,94	25,47	25,36	35,23	34,55
mic.2	14,08	9,32	9,54	6,62	10,43	18,03	21,58	18,07	13,72	7,33	11,39	19,27	14,95	22,26	24,05	21,15	25,01	23,41	30,49	21,41	23,39	34,85	34,73
mic.3	5,59	2,42	2,82	0,56	5,66	12,41	18,67	17,66	11,66	8,18	13,78	18,03	16,27	24,50	26,31	20,34	21,56	21,21	23,16	23,96	22,13	33,06	33,28
mic.4	21,72	7,35	6,90	6,50	10,22	16,57	19,18	13,49	9,49	14,10	20,73	29,04	16,69	17,54	19,11	15,61	23,35	21,42	27,96	23,18	21,63	34,52	34,30
mic.5	21,81	9,18	10,52	12,45	14,82	23,62	21,69	16,30	17,32	11,84	12,92	18,96	15,93	21,03	24,75	18,21	20,84	20,40	24,30	21,06	19,48	33,13	32,25
mic.6	21,57	7,67	3,93	10,36	11,86	21,17	26,89	17,65	16,49	8,47	15,86	23,76	13,88	19,58	24,04	16,47	20,37	19,13	23,83	19,08	20,96	33,49	32,35
mic.7	24,35	10,47	8,47	17,32	14,07	22,40	25,24	19,71	19,57	8,94	10,33	16,89	16,14	19,13	16,28	17,88	18,61	24,65	28,21	24,30	25,95	34,84	33,29
mic.8	23,78	11,03	6,25	16,65	11,43	17,57	20,51	17,26	12,02	9,34	14,37	19,57	15,52	20,13	21,17	20,98	23,00	21,73	25,61	23,45	24,06	33,55	32,66
mic.9	23,55	11,27	7,21	17,08	13,44	23,34	22,73	17,18	10,45	5,75	12,55	18,87	17,95	21,34	22,47	18,59	17,77	17,81	20,85	21,74	22,64	32,80	31,25
mic.10	22,40	7,70	5,84	14,43	10,52	17,77	17,39	15,30	11,84	15,11	16,45	22,80	19,79	20,14	18,66	16,40	25,48	20,42	24,23	21,55	23,48	33,15	32,62
mic.11	21,16	9,78	8,06	17,28	14,13	24,74	29,72	22,88	19,33	9,73	12,39	22,57	21,44	23,77	23,51	18,43	20,88	22,13	22,97	22,41	25,00	35,56	33,97
mic.12	19,07	7,33	6,25	14,06	10,11	20,08	28,55	21,49	17,77	10,98	13,73	17,77	16,95	23,25	23,21	17,35	27,82	20,93	25,98	23,80	23,58	35,26	34,43
S.POW.	24,81	12,52	12,10	20,06	18,11	27,47	31,73	25,57	22,89	16,91	21,37	28,91	23,98	28,57	29,60	25,31	29,75	28,90	33,39	29,57	30,24	40,85	40,19

TARİH : 05.03.2000 MODEL : TE 180 YT ÖZELLİK : 2 SINIF BÜYÜK CONTA TAKILDI.
SES SONUCU : 40.8 dBA DOSYA NO : 6128 SERİ NO : 3

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	17,81	8,26	11,86	8,80	4,94	11,74	23,78	20,28	21,31	9,15	21,31	18,25	17,31	24,74	16,51	18,86	20,13	23,19	27,90	23,50	26,67	34,61	33,92
mic.2	20,64	8,62	11,30	5,73	6,45	15,25	20,92	17,30	15,96	9,84	21,88	19,41	16,71	23,30	22,52	22,61	29,25	22,50	28,28	22,40	23,01	35,23	35,25
mic.3	6,11	2,18	2,42	1,05	3,12	9,43	17,42	16,55	14,32	11,12	16,76	17,02	17,28	27,07	26,69	22,46	22,88	21,26	24,78	21,49	21,23	33,74	34,23
mic.4	22,08	6,67	6,32	7,68	7,05	15,51	17,68	14,83	14,64	14,62	23,30	21,70	18,01	18,17	19,51	16,81	29,01	21,68	25,27	22,52	22,36	34,19	34,07
mic.5	22,37	9,70	13,32	12,09	16,49	24,77	20,82	19,53	16,00	11,95	12,40	15,03	14,19	22,56	24,33	18,77	23,60	18,73	23,74	19,62	20,04	33,35	32,35
mic.6	22,35	7,82	8,31	12,71	10,31	21,01	26,94	19,15	13,62	9,18	17,65	16,00	14,24	21,50	21,62	16,59	24,84	19,48	22,02	18,40	21,25	33,34	32,06
mic.7	18,82	9,15	10,59	20,58	14,68	20,94	26,11	19,67	20,56	10,21	23,29	19,81	17,06	23,22	17,03	19,20	17,81	24,07	29,08	22,28	24,14	35,11	34,11
mic.8	24,18	9,83	7,24	18,86	10,72	17,50	19,80	16,46	15,64	10,02	24,48	21,92	18,44	23,47	22,01	21,97	22,81	20,72	24,65	24,39	23,26	34,38	33,73
mic.9	23,67	10,22	7,58	18,45	10,83	22,02	23,08	15,84	15,65	7,28	18,85	17,91	18,87	24,12	25,18	20,97	19,77	15,79	19,01	21,91	20,75	33,40	32,50
mic.10	22,54	7,16	7,44	16,35	9,70	18,21	17,30	16,38	15,48	12,73	25,01	22,35	20,66	25,72	21,93	16,57	28,19	20,35	25,17	21,84	26,87	35,28	35,03
mic.11	20,83	8,88	9,40	17,19	12,51	23,40	28,45	22,13	17,40	9,28	15,66	18,34	18,50	25,44	24,06	19,73	22,69	20,48	24,03	23,04	25,58	35,24	33,99
mic.12	19,80	8,20	10,46	14,88	9,99	20,13	26,69	20,01	16,32	10,41	19,44	17,42	18,48	23,89	23,25	19,21	29,75	21,75	27,32	23,37	24,17	35,73	35,35
S.POW.	24,82	11,24	15,30	21,99	17,47	26,95	30,84	25,45	23,76	17,04	28,14	26,08	24,51	30,89	29,71	26,68	32,65	27,98	32,66	28,93	30,60	41,18	40,77

TARİH : 05.03.2000 MODEL : TE 180 YT ÖZELLİK : 2 SINIF BÜYÜK CONTA TAKILDI.
SES SONUCU : 41.1 dBA DOSYA NO : 6126 SERİ NO : 4

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	16,23	7,32	8,66	4,80	4,16	11,20	32,62	25,14	20,11	8,45	8,59	10,84	16,16	18,39	16,70	17,78	23,05	26,34	30,39	24,30	23,19	36,79	35,16
mic.2	19,58	8,24	8,69	9,28	9,09	13,70	29,79	22,66	14,85	7,35	8,08	8,81	14,55	20,14	21,20	18,47	29,79	24,26	30,89	20,38	21,44	36,40	35,75
mic.3	5,92	1,26	2,51	2,70	6,25	11,31	25,47	20,29	12,08	10,23	12,86	15,89	15,49	23,80	27,51	20,17	26,03	25,96	23,18	22,81	19,87	34,48	34,57
mic.4	21,89	7,07	6,81	7,54	12,38	16,45	27,70	20,48	11,09	13,49	11,44	13,40	14,29	16,95	20,36	15,54	29,04	22,00	27,08	21,91	20,33	34,71	33,96
mic.5	23,36	8,92	9,67	12,28	18,09	24,73	27,41	22,73	15,76	14,71	10,31	13,04	14,19	21,34	23,60	18,40	26,28	20,77	23,60	20,42	18,40	34,56	33,14
mic.6	22,49	6,64	5,16	11,84	13,20	21,97	32,37	24,14	16,14	9,58	10,54	8,12	12,12	18,21	20,68	18,82	23,46	20,82	20,23	18,63	17,58	35,17	32,46
mic.7	24,04	9,67	8,73	19,53	16,05	22,87	32,13	24,49	21,17	9,72	9,95	10,40	14,38	19,31	15,53	19,10	19,29	24,28	29,78	24,04	23,29	36,69	34,48
mic.8	24,11	9,38	5,95	16,82	11,50	16,93	25,82	20,74	16,09	8,77	11,03	10,51	14,35	19,26	20,79	23,00	22,81	22,91	22,98	25,05	22,15	33,90	32,62
mic.9	22,05	9,68	7,63	15,93	12,78	21,93	30,26	22,33	12,17	9,46	15,37	12,55	15,06	20,80	24,31	20,78	22,26	18,94	19,95	22,09	20,97	34,58	32,70
mic.10	22,21	6,76	5,94	13,32	9,65	18,31	24,99	20,07	11,06	14,59	12,12	13,13	17,48	21,60	20,47	16,71	26,87	22,56	24,70	21,98	21,08	33,76	33,05
mic.11	20,20	9,54	8,77	15,31	16,11	24,06	35,91	27,89	18,43	10,98	14,08	15,35	16,60	23,30	22,97	22,39	24,08	25,89	23,11	22,34	22,88	38,42	35,81
mic.12	18,86	7,26	7,50	12,43	12,48	20,29	34,47	26,29	18,24	8,08	8,86	10,79	14,93	21,98	22,08	18,15	28,88	24,83	25,07	22,95	22,20	37,58	35,63
S.POW.	25,11	10,31	12,19	20,07	19,80	27,38	38,13	30,64	23,49	17,36	17,83	18,75	21,72	27,64	29,19	26,32	32,98	30,61	33,38	29,19	28,12	42,54	41,06

TARİH : 05.03.2000 MODEL : TE 180 YT ÖZELLİK : 2 SINIF BÜYÜK CONTA TAKILDI.
SES SONUCU : 40.5 dBA DOSYA NO : 6132 SERİ NO : 5

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	18,63	9,34	12,89	9,22	7,48	10,99	32,41	25,45	20,51	9,93	9,01	10,96	16,04	22,44	16,23	16,02	19,36	22,16	28,34	25,64	24,23	36,26	34,21
mic.2	21,23	7,68	3,37	4,97	6,29	15,11	29,32	23,20	11,06	8,85	10,03	7,89	13,89	24,49	21,60	15,46	28,54	21,04	26,96	19,13	22,80	35,29	34,42
mic.3	6,96	1,01	2,51	2,06	8,11	13,59	27,68	20,95	11,05	12,55	13,57	13,71	15,87	28,55	23,11	16,98	23,56	18,50	23,02	21,61	22,62	34,25	33,88
mic.4	23,27	7,45	6,53	6,46	11,82	18,03	27,65	20,97	17,82	12,60	9,42	10,57	14,74	19,28	14,95	14,74	27,48	20,01	24,52	19,23	20,29	33,84	32,55
mic.5	24,47	11,39	15,48	23,76	25,17	30,86	26,68	20,63	19,86	18,28	11,01	11,69	13,46	24,98	24,75	16,99	24,56	19,88	23,48	19,06	18,66	36,37	33,80
mic.6	23,83	7,60	6,03	11,06	16,47	22,94	32,02	23,95	18,99	11,91	8,99	8,19	11,39	17,95	18,82	13,70	22,77	17,91	21,88	17,46	20,42	35,05	31,97
mic.7	25,41	10,45	7,01	18,09	21,03	20,35	30,82	23,85	18,89	8,87	9,88	8,64	12,89	20,33	17,06	16,28	16,80	22,87	27,97	21,50	24,98	35,75	33,24
mic.8	24,93	10,65	9,50	16,82	13,19	16,46	26,20	19,33	18,11	10,02	9,67	9,88	13,36	21,75	18,86	16,27	21,14	20,44	23,47	19,31	23,71	33,25	31,33
mic.9	24,73	11,67	6,95	15,74	11,16	20,42	32,09	23,41	12,22	7,94	10,22	9,30	16,14	25,34	22,16	18,19	18,40	15,93	20,17	19,18	21,04	35,31	32,76
mic.10	23,93	8,12	7,75	15,70	10,80	18,35	25,29	21,60	16,26	13,32	10,38	11,37	17,08	25,22	18,31	15,18	25,34	18,87	23,34	23,15	25,08	34,14	32,97
mic.11	22,95	10,41	13,24	15,71	12,79	23,42	36,45	28,57	18,67	10,46	11,75	14,22	16,32	27,98	22,64	17,70	24,78	20,08	21,77	22,24	25,56	38,90	36,18
mic.12	20,78	9,61	12,51	14,36	11,12	20,76	33,89	26,26	15,92	9,54	7,05	8,67	14,58	24,48	21,00	15,82	27,68	21,02	23,30	20,43	24,50	37,01	34,84
S.POW.	28,00	13,41	16,23	22,79	23,76	29,48	38,17	30,82	24,28	18,60	16,29	16,83	21,48	31,44	27,61	22,77	31,49	26,91	31,53	27,80	30,05	42,42	40,46

TARİH : 05.03.2000 MODEL : TE 180 YT ÖZELLİK : 2 SINIF BÜYÜK CONTA TAKILDI.
SES SONUCU : 42.0 dBA DOSYA NO : 6134 SERİ NO : 6

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	18,25	7,25	10,19	12,07	4,12	10,37	22,84	19,57	23,97	12,89	11,29	15,52	23,03	27,19	19,33	25,87	19,05	22,98	27,12	22,72	25,61	35,13	34,90
mic.2	20,68	8,78	11,35	12,76	11,06	18,31	33,88	26,56	18,45	10,05	9,70	13,11	17,23	26,40	24,33	21,20	27,95	24,21	27,34	19,32	24,33	37,73	36,17
mic.3	7,26	1,83	2,42	4,42	3,90	11,50	29,25	22,31	11,10	15,02	15,71	18,76	18,15	32,38	26,71	24,10	23,77	22,86	24,67	21,09	22,41	36,76	36,86
mic.4	22,78	7,56	8,46	10,27	11,19	18,90	26,61	22,17	15,16	15,00	12,69	15,40	19,25	23,20	20,59	20,31	24,97	19,30	23,04	21,04	22,17	33,90	32,82
mic.5	23,62	10,45	14,38	19,36	20,82	25,01	30,16	24,33	22,42	19,74	13,04	15,88	17,57	25,45	24,44	22,61	19,83	17,83	23,78	17,93	20,47	35,87	34,00
mic.6	22,94	7,42	7,79	15,86	16,56	20,14	32,21	25,01	22,89	11,08	11,63	12,85	17,25	25,60	24,61	21,90	21,53	19,62	21,79	17,65	21,34	36,08	34,15
mic.7	25,52	9,37	5,84	17,27	13,86	22,61	35,78	28,63	24,70	12,92	13,62	13,18	19,81	25,05	19,62	25,34	18,30	22,37	25,50	21,71	24,47	38,68	35,94
mic.8	24,62	10,56	7,85	17,50	10,39	18,74	25,12	21,43	21,66	11,81	12,11	13,24	19,38	27,16	22,34	22,34	22,08	21,73	23,87	20,77	24,11	34,76	33,89
mic.9	24,07	10,38	11,09	19,67	13,09	22,28	23,72	15,44	7,06	13,58	14,33	16,52	20,47	27,83	23,67	23,13	17,55	17,95	20,64	18,99	22,75	34,14	33,41
mic.10	22,68	6,90	7,35	19,58	12,71	19,15	22,19	21,95	14,05	16,73	14,83	17,23	22,87	29,60	21,08	20,47	26,75	19,48	23,67	21,76	27,41	35,69	35,34
mic.11	22,27	10,25	13,02	20,17	14,91	23,37	31,46	24,74	22,86	14,22	14,62	17,94	19,63	32,97	24,76	22,22	20,50	20,34	21,28	19,73	26,52	37,78	36,98
mic.12	19,96	7,68	8,77	19,26	13,26	19,75	29,89	23,25	21,49	11,38	8,39	11,47	20,38	28,26	23,91	22,60	29,13	20,76	23,80	19,56	23,25	36,40	35,76
S.POW.	27,06	11,90	15,84	23,89	20,86	27,49	37,37	30,86	27,87	21,14	19,50	22,21	26,77	35,41	30,28	29,79	31,03	27,93	31,12	26,91	30,97	43,02	42,00

TARİH : 06.03.2000 MODEL : TE 180 YT ÖZELLİK : 2 SINIF BÜYÜK CONTA TAKILDI.
SES SONUCU : 40.3 dBA DOSYA NO : 6136 SERİ NO : 7

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	19,85	9,53	9,67	17,01	6,99	19,71	21,73	22,09	14,33	20,04	10,21	13,90	16,35	20,51	17,74	23,90	17,34	29,31	28,30	26,04	24,86	35,43	34,87
mic.2	21,67	8,83	6,41	13,13	13,65	25,29	21,55	23,30	12,97	12,83	8,52	11,77	13,44	19,84	25,76	24,33	24,40	23,93	24,99	24,38	22,35	34,78	34,06
mic.3	7,54	1,71	2,72	6,20	8,18	21,84	18,48	21,61	13,92	14,74	13,59	16,51	18,25	23,68	23,35	19,92	20,08	27,51	21,44	24,55	19,61	33,63	33,47
mic.4	18,45	8,83	9,07	13,58	14,08	16,64	22,83	21,04	14,43	18,08	12,74	15,44	15,65	17,37	18,57	19,37	23,02	22,66	23,39	25,23	20,71	32,90	32,04
mic.5	19,79	12,24	16,09	16,05	17,55	27,27	27,36	22,04	20,94	20,16	13,34	15,03	17,88	17,79	24,89	20,80	18,61	21,27	20,49	21,43	18,70	34,55	32,66
mic.6	20,07	9,81	12,33	12,85	17,98	21,62	21,88	17,22	14,24	18,40	10,33	10,66	14,66	18,19	22,96	22,52	20,61	23,67	22,02	21,41	19,22	32,74	31,93
mic.7	26,14	13,79	17,53	15,34	15,74	21,78	25,31	23,20	14,96	20,58	10,85	13,72	14,87	17,15	17,76	24,94	17,10	27,57	27,22	28,25	23,88	35,98	34,61
mic.8	23,24	13,52	12,98	18,20	13,69	22,01	25,24	22,72	12,63	14,75	10,86	13,05	13,90	17,71	21,26	20,79	19,71	27,05	24,27	22,67	22,39	34,26	32,91
mic.9	21,53	12,57	12,10	18,54	14,85	22,85	29,15	20,24	11,37	11,72	14,00	15,49	16,45	20,21	26,21	22,87	16,24	18,75	18,33	20,71	20,97	34,28	32,66
mic.10	18,78	8,08	9,04	17,81	12,62	16,54	24,66	22,54	14,64	19,27	15,13	15,41	16,19	20,38	20,17	19,67	23,67	22,68	23,27	26,68	23,08	34,00	33,02
mic.11	18,83	12,41	14,46	19,28	15,05	22,57	28,36	21,00	16,55	21,40	14,98	17,16	21,07	23,28	23,37	21,89	19,07	25,44	20,83	27,47	24,90	35,60	34,37
mic.12	18,01	9,49	11,02	18,15	13,09	19,87	26,12	16,81	13,28	18,74	9,89	12,83	14,34	21,23	24,31	22,27	25,11	27,02	22,50	24,19	24,64	34,78	34,16
S.POW.	23,79	16,01	18,98	22,97	21,12	29,31	32,22	28,35	21,90	25,21	18,85	21,11	23,30	27,07	29,86	29,08	28,09	32,45	30,74	31,76	29,34	41,15	40,26

TARİH : 06.03.2000 MODEL : TE 180 YT ÖZELLİK : 2 SINIF BÜYÜK CONTA TAKILDI.
SES SONUCU : 39.5 dBA DOSYA NO : 2: 6138 SERİ NO : 8

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	20,80	10,24	9,54	17,06	7,47	15,09	22,87	22,03	21,01	14,66	15,16	13,75	17,35	19,72	15,46	19,81	18,54	25,58	26,49	25,72	27,11	34,53	33,42
mic.2	22,00	12,93	12,74	12,50	8,72	16,19	20,85	21,18	12,48	10,20	17,56	14,97	15,49	21,11	21,89	18,99	24,52	23,96	25,67	22,47	24,17	33,75	33,09
mic.3	10,57	2,95	4,57	5,51	3,54	10,76	21,37	18,61	13,60	11,75	13,04	15,37	17,81	24,12	22,75	17,27	19,32	25,74	23,25	19,88	22,33	32,64	32,60
mic.4	20,56	10,14	7,86	10,36	9,91	15,01	22,40	18,02	12,92	16,52	17,53	16,00	17,34	18,47	19,83	14,71	21,25	23,62	25,86	22,54	22,61	32,88	32,11
mic.5	22,35	14,71	20,00	22,80	16,40	23,81	24,87	18,24	23,50	17,65	12,12	15,37	22,02	21,11	24,07	19,62	19,93	23,06	24,09	20,68	20,35	34,62	33,12
mic.6	21,09	11,66	11,85	16,22	10,44	16,98	33,07	17,12	19,75	19,24	12,11	11,52	15,50	20,39	19,26	20,06	19,54	23,75	23,21	20,51	19,96	35,59	33,10
mic.7	27,80	14,49	17,52	13,64	6,96	15,08	24,72	23,47	19,90	15,03	15,01	13,06	16,42	16,25	15,71	23,55	19,31	25,71	27,76	23,47	23,05	35,15	33,47
mic.8	24,10	12,81	11,33	17,47	6,02	17,61	26,83	23,05	9,99	13,47	12,56	11,61	16,65	19,59	16,67	17,92	20,41	22,53	21,45	21,09	23,28	33,37	31,32
mic.9	23,73	12,86	12,32	19,28	11,31	21,30	29,82	20,86	12,37	10,67	14,44	13,35	19,52	21,00	21,02	19,14	17,73	20,93	19,75	20,13	22,03	34,20	31,83
mic.10	21,66	10,84	6,04	17,28	7,90	14,46	26,88	20,01	15,12	18,44	16,86	14,72	19,26	18,84	17,43	14,09	22,37	22,41	22,93	22,51	24,41	33,54	32,04
mic.11	20,96	14,12	12,59	19,53	14,07	21,90	34,06	22,56	20,02	14,90	14,75	17,08	21,90	24,35	19,25	17,32	19,41	21,41	21,93	20,99	24,12	36,73	34,08
mic.12	19,48	11,32	7,72	18,10	12,64	18,80	29,32	18,99	19,84	13,77	12,38	11,02	16,83	22,59	18,59	18,97	23,46	21,27	23,01	24,56	23,65	34,48	32,88
S.POW.	27,72	15,16	19,81	24,19	17,10	25,40	35,39	27,57	24,93	21,32	18,70	20,75	25,27	27,93	26,84	25,78	27,67	30,42	31,12	29,15	30,24	41,05	39,50

TARİH : 06.03.2000 MODEL : TE 180 YT ÖZELLİK : 2 SINIF BÜYÜK CONTA TAKILDI.
SES SONUCU : 40.8 dBA DOSYA NO : 6140 SERİ NO : 9

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	19,02	11,07	12,78	17,18	3,56	16,29	23,01	24,52	17,60	14,83	13,79	14,15	20,61	24,78	21,74	24,19	17,96	25,29	26,42	25,46	23,74	34,89	34,34
mic.2	20,31	11,51	13,25	14,29	7,84	20,36	25,34	23,53	12,93	11,11	10,90	12,53	21,46	24,33	24,19	21,06	26,57	24,17	26,07	21,35	21,84	34,95	34,49
mic.3	12,24	2,55	4,83	7,30	4,83	18,36	19,98	20,61	15,63	14,36	13,23	18,36	22,19	26,66	29,13	21,81	22,28	26,47	24,94	22,66	20,73	35,18	35,56
mic.4	21,43	9,20	10,66	10,45	8,15	17,25	20,14	16,59	11,91	17,69	13,13	14,87	22,92	20,47	25,13	17,95	23,53	22,54	24,04	23,81	21,36	33,49	33,22
mic.5	23,01	14,83	19,13	21,53	18,59	24,75	28,91	17,74	20,38	17,58	12,92	18,87	24,56	21,53	26,19	19,34	17,44	22,59	22,12	20,73	17,74	35,36	33,78
mic.6	22,27	12,86	17,61	19,28	14,44	18,25	20,36	13,52	15,05	13,97	11,76	11,99	19,80	21,73	27,66	21,02	19,59	25,28	23,40	22,55	17,35	33,94	33,61
mic.7	24,51	15,92	19,66	14,80	5,06	20,96	26,56	25,87	16,94	16,14	13,64	13,38	20,18	21,66	19,88	22,53	19,85	26,56	26,70	23,24	24,89	35,57	34,15
mic.8	23,89	12,86	14,93	13,97	8,49	19,16	23,68	22,83	12,09	12,39	10,82	12,56	18,29	21,94	22,20	18,88	22,55	22,90	23,45	23,45	23,19	33,79	32,60
mic.9	23,63	13,38	12,34	16,76	10,08	19,40	26,34	20,06	11,75	11,87	15,38	15,87	21,84	23,47	28,20	19,23	18,74	20,36	20,06	21,73	20,01	34,32	33,61
mic.10	22,34	10,28	9,08	15,29	7,71	19,43	24,60	17,19	13,99	17,73	18,01	16,98	21,38	24,53	25,28	18,23	26,62	21,75	23,49	23,24	21,17	34,56	34,19
mic.11	21,25	12,54	13,04	18,71	11,65	23,20	21,08	17,86	15,88	10,69	14,50	20,85	26,84	23,50	24,92	18,78	21,15	22,56	21,79	23,48	21,62	34,44	34,02
mic.12	19,81	11,46	9,68	17,32	10,26	22,47	19,88	17,06	16,50	11,98	9,56	12,92	19,13	24,49	25,39	19,77	28,45	22,26	23,01	22,64	20,54	34,42	34,33
S.POW.	26,76	15,41	21,41	23,47	17,66	27,44	31,16	27,99	21,74	20,47	15,78	22,80	29,06	30,40	32,53	27,37	30,29	30,75	30,98	29,76	28,38	41,24	40,78

TARİH : 06.03.2000 MODEL : TE 180 YT ÖZELLİK : 2 SINIF BÜYÜK CONTA TAKILDI.
SES SONUCU : 41.7 dBA DOSYA NO : 6142 SERİ NO : 10

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	21,74	10,10	14,31	19,39	13,89	22,73	21,20	17,67	13,44	11,68	10,85	11,96	14,69	17,79	20,94	24,12	20,64	31,03	30,28	27,06	27,67	36,77	36,17
mic.2	21,75	9,91	11,51	13,44	14,36	21,67	18,78	14,41	12,48	8,95	10,67	11,87	14,71	18,41	26,78	21,20	25,32	28,90	31,11	24,10	23,63	36,16	35,98
mic.3	10,29	1,68	3,44	5,51	5,09	14,19	20,61	11,35	16,10	12,69	11,93	17,32	16,10	23,34	31,48	23,58	19,53	34,75	27,18	21,62	24,21	37,92	38,41
mic.4	20,78	6,99	6,52	11,25	14,07	15,51	20,52	11,04	12,50	16,35	11,18	12,90	15,88	15,39	27,22	20,28	20,99	24,35	27,22	24,75	23,90	34,15	33,87
mic.5	19,93	14,10	18,82	22,54	21,41	28,66	28,63	20,12	25,86	20,05	10,64	16,85	17,15	20,73	25,62	19,48	21,08	26,30	24,99	20,78	18,92	36,36	34,48
mic.6	19,68	11,33	15,45	16,98	14,70	21,02	18,95	17,07	19,40	16,46	9,95	11,92	13,61	17,78	25,59	20,60	18,62	25,23	25,70	21,75	20,86	33,51	32,95
mic.7	21,83	13,41	18,18	13,67	16,49	18,84	24,60	17,36	16,25	14,00	11,34	13,10	15,03	15,74	18,09	24,77	20,18	29,59	29,21	26,20	23,80	35,76	35,10
mic.8	23,26	12,13	12,96	18,04	11,69	19,45	21,14	16,06	17,71	13,71	11,54	12,91	12,84	15,83	23,21	19,14	20,22	25,82	24,79	23,40	22,29	33,48	32,49
mic.9	23,47	12,18	10,84	20,20	10,39	20,95	26,57	14,34	15,87	10,25	13,12	13,97	16,46	20,43	29,87	22,34	19,16	21,23	21,05	21,37	22,39	34,79	34,16
mic.10	21,92	7,22	6,37	18,79	11,19	16,91	23,78	13,66	16,79	16,72	12,75	15,80	16,86	19,61	25,28	18,88	21,31	24,15	25,92	25,33	25,47	34,39	33,60
mic.11	23,06	10,83	13,13	20,05	13,84	19,83	24,52	17,44	19,55	13,88	10,90	18,54	19,04	22,14	26,54	20,45	21,72	23,15	24,30	24,47	23,67	34,68	33,86
mic.12	21,72	10,55	12,78	19,95	13,16	18,57	22,97	17,13	15,65	13,44	8,99	12,36	13,86	22,00	27,20	20,57	24,68	27,39	26,92	24,35	23,27	35,24	34,89
S.POW.	26,13	10,15	20,39	25,01	21,52	28,45	30,54	22,89	25,07	20,63	0,00	21,20	22,38	26,54	33,68	28,47	28,35	35,33	34,16	30,95	30,61	42,13	41,72

TARİH : 15.03.2000 **MODEL :** TE 180 YT **ÖZELLİK :** SİLİNDİR KAFASI SIKMA TORKU:60-TİTREŞİM BORUSU YAYSIZ
SES SONUCU : 40.7 dBA **DOSYA NO :** 6498 **SERİ NO :** 7

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	15,49	4,84	6,04	12,36	4,48	9,33	15,70	16,97	21,49	9,45	9,00	13,94	18,22	25,25	15,09	26,66	24,71	22,64	29,84	27,09	28,33	35,88	35,63
mic.2	15,27	5,79	6,68	9,27	9,24	18,11	16,44	20,21	16,56	9,15	7,27	13,81	16,09	24,09	21,45	21,10	27,21	20,72	25,19	22,60	24,04	33,68	33,62
mic.3	0,61	1,67	2,56	5,85	4,87	14,20	14,18	21,47	13,07	7,99	9,43	16,06	18,51	30,08	22,81	21,12	21,63	21,31	24,76	23,45	25,89	34,59	34,82
mic.4	17,39	5,14	7,14	9,14	6,90	15,96	18,73	21,37	12,57	14,41	8,62	14,48	15,32	20,07	16,92	18,73	20,19	19,32	26,07	23,96	21,23	32,16	31,49
mic.5	19,35	8,65	12,43	16,43	19,70	21,39	21,58	27,44	20,69	11,73	8,48	17,44	19,25	24,76	23,72	22,99	26,69	20,69	25,28	22,10	21,23	35,20	34,55
mic.6	19,64	6,82	9,74	15,10	10,56	16,18	9,46	23,40	20,25	13,08	6,49	11,64	15,55	23,99	19,62	24,39	20,49	20,82	22,77	22,70	23,38	33,10	32,60
mic.7	22,19	7,30	6,95	13,82	6,22	10,78	14,24	18,40	23,25	10,43	8,43	13,49	16,57	20,64	16,50	27,79	22,45	21,91	28,82	25,76	26,96	35,23	34,77
mic.8	20,61	7,51	10,07	8,40	5,96	14,28	15,72	21,06	18,07	8,92	8,40	14,83	16,52	25,50	18,12	23,83	21,72	20,63	22,05	22,78	24,61	33,12	32,76
mic.9	20,64	10,19	15,23	15,51	9,93	18,71	16,66	21,29	14,26	10,80	10,62	12,43	16,83	25,25	23,48	22,45	24,89	19,06	24,54	23,46	23,10	33,82	33,50
mic.10	17,72	4,62	5,77	9,30	7,14	16,33	12,45	18,17	11,21	15,37	10,17	15,42	17,25	25,06	17,89	21,72	24,14	19,86	25,86	25,41	25,74	33,70	33,42
mic.11	13,93	9,39	15,34	16,99	10,89	20,37	14,49	27,08	20,70	13,74	11,01	17,57	16,56	25,19	22,72	24,04	24,82	18,58	25,31	22,72	23,78	34,69	34,17
mic.12	12,48	6,46	11,49	14,93	8,01	18,05	11,11	22,24	18,45	10,17	7,54	13,65	16,97	26,26	18,83	22,95	25,11	19,32	27,18	26,24	25,60	34,61	34,34
S.POW.	15,46	0,00	16,42	19,62	17,53	24,01	22,93	29,60	25,73	18,13	14,45	21,42	23,78	32,20	27,39	30,61	31,01	27,24	32,99	31,10	31,76	40,92	40,71

TARİH : 15.03.2000 **MODEL :** TE 180 YT **ÖZELLİK :** SİLİNDİR KAFASI SIKMA TORKU:90-TİTREŞİM BORUSU YAYSIZ
SES SONUCU : 41.5 dBA **DOSYA NO :** 2: 6500 **SERİ NO :** 8

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	15,26	5,80	5,66	11,94	4,06	11,78	22,59	21,04	21,61	10,06	11,87	12,29	20,03	22,85	16,93	30,43	22,12	25,23	30,10	27,49	28,52	36,82	36,61
mic.2	14,21	4,89	5,13	12,35	7,20	15,15	14,33	17,03	12,26	12,07	12,84	12,00	15,83	21,40	25,00	25,50	24,79	22,13	26,37	22,25	26,13	34,08	34,11
mic.3	1,17	1,43	2,11	6,70	3,85	12,49	16,37	17,07	13,36	10,13	18,04	16,34	17,87	24,76	26,93	25,54	21,80	24,53	27,40	24,97	28,03	35,32	35,36
mic.4	18,36	5,16	6,01	12,03	7,61	18,19	21,89	21,89	13,68	18,78	11,54	14,85	16,38	17,09	21,51	27,22	20,45	19,79	26,50	24,33	22,92	33,98	33,58
mic.5	20,69	7,09	10,27	19,58	12,55	19,98	26,15	24,38	20,97	10,41	10,15	18,08	19,35	20,81	29,04	31,51	22,92	21,23	26,55	20,92	21,14	36,72	36,72
mic.6	20,61	6,78	8,87	16,58	9,15	19,19	23,87	23,12	20,68	12,61	8,87	11,64	15,88	20,02	25,22	29,21	21,36	22,68	25,05	21,90	23,59	35,05	34,76
mic.7	22,28	6,90	7,47	11,37	2,88	15,18	24,05	22,07	20,26	9,56	14,87	13,65	17,06	17,96	18,97	23,60	19,25	23,44	30,51	25,06	27,90	35,57	34,64
mic.8	20,82	6,33	4,57	11,72	4,95	14,00	16,87	21,55	10,57	11,18	11,53	13,96	15,11	20,26	21,69	30,68	22,09	21,51	24,14	22,80	24,56	34,65	34,77
mic.9	19,41	6,74	5,84	16,14	9,35	17,98	13,49	19,25	14,38	11,09	13,67	16,00	18,38	19,91	25,46	23,69	20,52	19,39	24,49	23,62	24,59	33,36	33,05
mic.10	17,32	4,39	4,88	13,11	5,33	17,79	24,45	20,71	16,47	19,27	13,37	14,66	17,39	21,67	22,33	23,20	20,24	21,23	25,74	24,61	24,24	33,93	33,24
mic.11	18,26	5,48	8,42	18,40	10,73	19,97	22,94	24,82	22,82	12,23	14,92	19,03	19,48	23,08	23,97	22,09	21,20	17,13	25,33	22,14	25,01	34,45	33,60
mic.12	15,96	4,20	6,20	16,85	7,92	17,44	23,77	21,32	22,26	12,76	9,07	14,53	20,08	23,16	21,13	26,24	25,72	21,02	26,29	24,66	25,11	34,99	34,61
S.POW.	18,75	0,00	9,62	21,55	13,20	24,03	29,25	28,58	25,94	20,41	19,75	21,87	24,75	28,35	31,15	34,50	29,03	28,85	33,83	30,85	32,45	41,72	41,53

TARİH : 15.03.2000 **MODEL :** TE 180 YT **ÖZELLİK :** TİTREŞİM BORUSU YAYSIZ - 1 SINIF KÜÇÜK CONTA TAKILDI.
SES SONUCU : 43.1 dBA **DOSYA NO :** 6502 **SERİ NO :** 9

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	11,75	3,85	7,40	19,42	4,63	19,09	22,22	21,44	16,74	12,39	17,35	16,17	17,98	24,31	19,18	32,05	22,71	30,87	27,89	28,24	25,37	37,57	37,69
mic.2	12,44	6,05	8,63	15,24	5,43	24,51	21,62	16,82	17,27	12,58	18,54	16,09	17,74	24,93	23,90	25,03	25,03	27,52	24,56	25,73	22,28	35,28	35,10
mic.3	0,68	2,11	3,45	10,53	4,75	19,96	21,80	15,99	19,85	8,68	15,47	16,32	20,62	26,20	26,10	29,11	23,75	28,97	25,00	25,26	24,34	36,23	36,50
mic.4	16,50	5,61	8,06	16,64	5,42	15,96	19,79	12,50	13,30	17,70	22,92	19,04	19,91	20,76	24,45	24,50	23,11	24,52	25,93	22,24	20,12	34,05	34,11
mic.5	18,36	8,32	13,12	24,97	16,13	26,40	28,22	22,26	24,85	8,32	9,87	17,07	18,29	22,38	31,18	30,59	24,85	30,36	25,60	22,59	21,30	38,36	38,11
mic.6	16,58	5,98	10,66	22,32	10,42	20,16	26,77	20,65	21,83	11,90	19,12	13,67	17,36	24,23	26,93	26,23	19,50	26,11	22,65	21,43	21,95	35,34	34,85
mic.7	19,25	6,29	7,42	18,45	2,95	14,22	22,80	22,00	17,51	7,65	15,23	13,46	17,63	21,01	23,22	33,10	18,68	30,21	29,29	27,76	26,14	37,84	37,97
mic.8	20,38	8,59	9,84	13,60	6,90	22,87	20,14	16,57	17,30	8,83	19,04	16,85	15,91	21,95	26,82	28,23	21,51	26,07	23,65	24,40	23,83	35,21	35,14
mic.9	19,15	13,13	14,33	19,95	9,96	24,85	26,14	16,54	22,68	12,10	20,05	16,35	16,45	24,00	31,03	24,35	23,93	24,94	23,27	26,14	22,96	36,59	36,31
mic.10	14,26	3,33	4,62	14,64	6,41	19,98	23,34	14,24	16,52	17,18	21,79	17,42	17,89	28,07	27,81	23,20	23,91	25,84	24,92	23,67	23,84	35,61	35,76
mic.11	16,14	7,65	12,82	23,78	10,52	23,12	28,58	22,14	23,66	11,76	14,09	18,56	17,13	27,05	29,17	22,84	23,55	25,92	23,69	23,22	24,02	36,67	36,04
mic.12	12,86	4,08	9,00	22,31	8,15	19,04	25,98	20,78	20,95	11,21	16,45	15,02	16,31	26,78	27,08	23,98	22,92	25,44	24,87	24,17	25,60	35,77	35,37
S.POW.	0,00	0,00	15,66	27,03	15,00	28,92	31,77	26,33	27,36	19,28	25,40	23,24	24,68	31,72	34,31	35,19	29,90	34,63	32,34	31,85	30,58	43,12	43,07

TARİH : 15.03.2000 **MODEL :** TE 180 YT **ÖZELLİK :** TİTREŞİM BORUSU YAYSIZ-2 SINIF BÜYÜK CONTA-S/K TORKU:60
SES SONUCU : 41.6 dBA **DOSYA NO :** 6504 **SERİ NO :** 10

Freq. [Hz]	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	L	A
mic.1	14,13	3,80	4,60	11,82	3,68	6,13	13,47	19,21	12,34	11,54	13,40	15,47	16,48	18,85	15,44	27,86	21,44	33,39	27,89	27,79	26,24	36,97	37,05
mic.2	14,09	5,62	4,54	11,90	7,32	17,64	20,16	14,47	7,50	7,50	13,95	14,87	14,54	20,25	21,66	23,12	25,94	27,85	24,23	25,87	22,51	34,20	34,17
mic.3	1,15	2,04	2,21	5,95	5,10	14,91	19,52	17,02	10,06	9,99	13,71	20,25	18,46	24,67	25,59	22,81	21,14	28,24	25,19	25,05	23,40	34,64	34,83
mic.4	17,25	4,53	4,13	11,91	5,63	14,24	20,45	14,67	8,90	14,08	15,86	16,05	14,69	16,78	22,54	20,38	30,05	28,42	23,32	24,87	22,07	34,93	35,12
mic.5	19,56	7,17	10,53	19,58	14,74	24,85	24,83	24,55	12,53	12,20	15,23	19,37	15,44	20,17	25,02	21,25	20,97	25,06	24,10	25,04	18,90	34,72	33,66
mic.6	18,47	5,04	7,13	16,68	10,56	19,36	20,98	21,22	10,40	10,47	11,50	12,75	14,00	20,86	23,05	21,64	26,16	29,52	21,59	21,78	22,09	34,46	34,33
mic.7	21,53	6,27	4,41	11,77	3,21	9,75	13,70	18,92	13,13	12,59	11,11	12,19	14,52	19,46	17,56	26,59	22,87	27,69	29,27	26,82	25,46	35,36	35,11
mic.8	21,15	6,64	4,50	10,05	6,90	16,82	21,29	16,24	7,96	8,43	13,06	14,54	13,58	20,73	20,40	22,80	25,69	28,70	23,48	24,77	22,99	34,34	34,13
mic.9	21,58	6,78	7,53	15,46	10,24	20,40	24,14	17,15	7,84	10,33	13,09	17,51	15,95	20,35	28,11	25,25	20,42	25,76	22,78	26,00	22,52	34,91	34,63
mic.10	17,86	3,52	3,99	10,48	7,51	18,97	22,83	14,40	9,89	13,79	17,04	16,90	18,14	18,99	24,85	21,16	29,13	28,73	23,51	24,24	22,52	35,22	35,31
mic.11	16,00	4,64	7,88	18,51	11,74	21,08	25,12	24,21	12,42	11,20	12,63	17,69	16,30	21,01	23,41	22,14	21,60	24,44	22,14	23,22	24,86	34,17	33,22
mic.12	15,32	3,78	5,66	16,34	9,37	18,38	21,96	21,11	11,42	11,63	11,21	14,05	15,07	21,46	20,95	20,03	29,72	28,85	23,37	23,96	24,19	35,24	35,21
S.POW.	16,23	0,00	7,91	21,24	14,93	25,75	28,69	26,77	16,78	17,71	20,31	23,24	22,45	27,45	30,32	30,42	32,82	35,52	31,67	32,00	30,27	41,68	41,62

APPENDIX-2: DATA PROCESSING CODE

```
package require Plotchart
destroy .pencere
toplevel .pencere
wm title .pencere "NN_data_processing"
wm geometry .pencere +400+400

.pencere config -bd 1 -relief flat
frame .pencere.f0 -bg grey85 -bd 0
pack .pencere.f0 -fill both -expand 1

set olcek 50
set komp_sayi 9

frame .pencere.f0.mb -bd 0 -relief flat -width 200
pack .pencere.f0.mb -side top -fill x
menubutton .pencere.f0.mb.dosya -text "Dosya" -menu
.pencere.f0.mb.dosya.menu
catch {
  menu .pencere.f0.mb.dosya.menu -tearoff 0  -type menubar
  .pencere.f0.mb.dosya.menu add command -label "Veri dosyasi oku" -command
dosya_oku
  .pencere.f0.mb.dosya.menu add command -label "Menuden cikis" -command {
destroy .pencere }
}
pack .pencere.f0.mb.dosya -side left -padx 3
pack .pencere.f0

frame .pencere.f1
button .pencere.f1.button1 -text "Yazdir" -command dosya_yaz
button .pencere.f1.button2 -text "Cikis" -command { destroy .pencere }
pack .pencere.f1.button1 .pencere.f1.button2 -side left -fill both -padx 2 -pady 2
pack .pencere.f1 -side bottom

frame .pencere.f2
label .pencere.f2.yazi1 -text "Olcek faktoru  : " -width 12
entry .pencere.f2.deger -text "....." -textvariable olcek -width 6
pack .pencere.f2.yazi1 .pencere.f2.deger -side left
pack .pencere.f2 -side top


frame .pencere.f3
label .pencere.f3.yazi1 -text "Komp Sayisi    : " -width 12
entry .pencere.f3.deger -text "....." -textvariable komp_sayi -width 6
pack .pencere.f3.yazi1 .pencere.f3.deger -side left -anchor e
pack .pencere.f3 -side top
```

```
# set x $liste(1)

set c [canvas .pencere.chart -width 600 -height 300]
pack .pencere.chart -side top

set xlabels_ {1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21}
set yaxis_ { 0 40 5 }
set grafik [::Plotchart::createBarchart $c $xlabels_ $yaxis_ 1]

proc dosya_oku { } {
global olcek
global komp_sayi
global liste
global tablo
global grafik

set types {
   {{Txt dosyasi}      {.txt}      }
   {{Txt dosyasi}      {.wri}      }
   {{All Files}      *         }
}

set dosya_gecici [tk_getOpenFile -filetypes $types]
if { $dosya_gecici != "" } then {
set dosya_txt $dosya_gecici

set data_file [open $dosya_txt r 1]
set tablo 1
for { set ii 0 } { $ii < $komp_sayi } {incr ii} {
  if {[eof $data_file]} then { break }
                set liste($tablo) ""
        for {set i 0} { $i < 12 } { incr i } {
            gets $data_file line_data
            set gecici_liste [split $line_data { }]
            for {set iii 0} { $iii < 21 } { incr iii} {
                lappend liste($tablo) [lindex $gecici_liste $iii] }
                }
        incr tablo
}
close $data_file
set degerler [lrange $liste(1) 0 20]
$grafik plot "Ses seviyeleri" $degerler orange
}
}
proc dosya_yaz { } {
global olcek
global komp_sayi
```

```
global liste
global tablo
set types {
   {{Txt dosyasi}      {.txt}       }
   {{Txt dosyasi}      {.wri}       }
   {{All Files}       *            }
}
         set sonuc_dosyasi [tk_getOpenFile -filetypes $types]
if { $sonuc_dosyasi != "" } then {

                  set data_file [open $sonuc_dosyasi a+ 1]

                  for {set jj 1} { $jj < $tablo } { incr jj } {
                  for {set kk 0} { $kk < 252 } { incr kk } {
                           set deger [format {%10.6f} [expr [lindex $liste($jj)
$kk]/$olcek ] ]
                           puts -nonewline $data_file $deger
                           }
                           puts $data_file " 0 0 0 0 0 0 "
                  }
         close $data_file
                  }
         }
```

APPENDIX-3: NETWORK C CODE

```
/* Neural network C code created by QwikNet V2.23
 * Network file name: D:\suha\tez\data\yeni1\yeni1.net
 * Structure:        252/10/6
 * Date:            Mon Jun 05 01:05:15 2006
 */


#include <math.h>
#include <stdlib.h>

#define INPUTS    252
#define HIDDEN1   10
#define OUTPUTS   6

#define HIDDEN1_INDEX  (INPUTS)
#define OUTPUT_INDEX   (HIDDEN1_INDEX+HIDDEN1)

#define NUMNEURONS  (INPUTS+HIDDEN1+OUTPUTS)
static double NEURON[NUMNEURONS];

/* Weight arrays */
static const double W_In_H1[HIDDEN1][INPUTS+1] = {
 0.36423, 0.251449, 0.426709, -0.0149581, -0.0669013, -0.0284442, 0.169333,
0.0627626, 0.108502, 0.000815972, -0.0661229, -0.144084, 0.141993, 0.206058,
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0.100276, -0.170602, -0.0525066, -0.0832141, -0.0457419, -0.133898, -0.325617, -0.219611, -0.216703, 0.526987, 0.353477, 0.202941, -0.198646, 0.196264, 0.185597, 0.0100189, 0.0266285, 0.07502, -0.0393606, -0.117738, -0.308888, -0.0576408, -0.0731624, 0.144092, 0.215332, 0.316194, -0.0747026, 0.0580595, -0.0270632, -0.137991, -0.179213, 0.266691, 0.208577, -0.200927, -0.200081, -0.295833, -0.111875, -0.185026, 0.0829831, -0.0885472, 0.0428047, 0.0460532, -0.128915, -0.0740293, -0.0542675, -0.0419852, -0.193722, -0.320093, -0.3611, 0.0808466, -0.164213, -0.0623472, -0.18946, -0.407289, -0.0396379, -0.200125, -0.0628233, 0.203687, 0.0636713, -0.0408341, 0.102471, -0.000359964, 0.327955, -0.211345, -0.0596852, -0.0300293, 0.0266515, -0.135081, -0.232239, -0.0672816, 0.03458, -0.14095, 0.0786503, -0.00330327, -0.156937, 0.322727, -0.0455448, 0.117546, -0.0514043, 0.0203391, 0.225805, 0.0869988, 0.153967, 0.0836739, -0.198809, -0.0362562, -0.00226847, -0.202565, -0.112546, -0.206439, -0.19386, 0.0537585, -0.225128, 0.0821874, -0.0336117, -0.160693, 0.227534, -0.143927, 0.151767, 0.125876, 0.0935695, 0.0741181, -0.171654, -0.00399073, 0.161278, -0.067034, 0.083272, -0.0865267, -0.103407, 0.0493382, -0.18337, -0.22844, -0.0931086, -0.146807, -0.0979919, -0.0117247, -0.0786897, -0.0406495, -0.150074, -0.0698567, -0.233048, 0.128632, 0.181345, 0.0575845, 0.0592694, 0.267346, -0.0911803, -0.0807909, -0.0798375, -0.00710537, 0.0175563, -0.0831443, -0.0484358, -0.311768, -0.0419176, -0.192182, 0.0646696, -0.122494, -0.121429, -0.143481, 0.277147, 0.252169, 0.0885583, 0.193937, 0.0455938, -0.0785567, -0.173271, 0.0525401, 0.08717, -0.0733997, -0.020164, -0.0471725, -0.265435, -0.265312, -0.149941, -0.220085, -0.243724, 0.0772529, -0.137181, -0.160793, -0.0650655, 0.339405, 0.238918, 0.144016, 0.0915732, -0.07507, 0.101494, 0.126461, -0.096157, 0.0700306, 0.0232597, 0.0204242, -0.104971, -0.0481257, -0.242421, -0.141141, -0.290891, -0.0309268, 0.270516, 0.062531, 0.321168, -0.0244504, 0.11726, -0.0324653, -0.0740387, 0.1977, 0.0960834, -0.0180796, -0.12189, -0.316143, 0.176081, 0.153231, 0.148105, -0.0743979, 0.208842, 0.0433643, 0.210073, 0.178095, 0.121799, 0.120505, -0.15271, 0.0616223, 0.0615333, 0.0496285, -0.00673191, -0.000236642, -0.0350104, -0.0126076, -0.0573241, -0.104379, -0.197753, 0.231781, 0.112882, 0.14571, 0.0959238, 0.180033, -0.111062, 0.34416, 0.147679, 0.255347, 0.248831, -0.060396, 0.199757, 0.37449, 0.370904, 0.281394, 0.0582079, 0.00264385, -0.0199476, -0.125111, -0.018407, -0.0149576, 0.0699109, 0.0505414, -0.0383772, 0.110137, -0.180786, -0.0866504, 0.274796, 0.00156511, 0.134816, 0.0227539, -0.00625569, 0.268008, 0.372696, -0.0502881, -0.150559, -0.0252374, -0.00491412, -0.108989, -0.0630892, -0.027642, -0.191955, 0.0935388, 0.0908183, 0.0322567, -0.123271, 0.151637, 0.0940062, 0.294403, 0.28589, 0.249657, -0.527344, -0.427479, -0.216426, 0.12415, -0.382671, -0.27862, 0.0385701, 0.090702, -0.173625, -0.0856029, 0.130308, 0.247621, 0.201617, 0.0884544, -0.251697, -0.373982, -0.402526, 0.126589, 0.00653655, -0.243972, 0.00222031, -0.0101128, -0.268997, -0.0810019, 0.248055, 0.175265, 0.207217, 0.0110624, 0.225103, -0.0216412, 0.183665, -0.0670053, -0.0859387, 0.223478, 0.105308, -0.0529472, 0.0288807, 0.227225, 0.326957, 0.343587, -0.0295435, 0.00152803, -0.16383, -0.00275594, 0.449625, -0.154588, -0.0011867, 0.0382692, -0.179686, 0.00401846, 0.0901098, 0.00691911, 0.0017976, -0.205932, 0.225442, 0.0655529, -0.0438959, -0.0885576, 0.212739, 0.0888986, -0.00531706, -0.0861321, 0.0230929, -

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0.108319, -0.204001, 0.138789, -0.519, -0.0235077, 0.0447131, -0.0296866,
0.0485953, -0.0985352, -0.175224, -0.140381, -0.0944089, 0.0459307,
0.0311131, 0.0235993, 0.0655056, 0.0578192, 0.166361, 0.300122, -0.145877,
0.205923, -0.0221098, -0.199579, 0.0780903, -0.278106, 0.205895, 0.0226827, -
0.155154, -0.0223205, -0.0109811, 0.124735, -0.0565689, -0.288037, 0.12427, -
0.0760917, 0.0358432, 0.0561834, -0.0152044, 0.146015, 0.163792, 0.0204292,
0.22184, 0.0600241, -0.025868, 0.163686, -0.0976177, 0.245402, 0.309813,
0.0947798, 0.0621114, -0.177428, -0.00562936, -0.011259, -0.19403, 0.0993863,
0.0721431, -0.00902687, -0.115715, 0.151719, 0.101412, 0.191565, 0.349549,
0.0441534, 0.207006, 0.00475992, 0.241673, 0.121909, 0.396726, -0.223695, -
0.121043, -0.0858916, -0.257922, 0.0292748, -0.0355403, 0.14317, -0.0784781, -
0.0969762, 0.0553589, 0.0519654, 0.0357885, 0.110169, 0.120014, 0.298932,
0.240287, 0.286357, 0.0374234, 0.32362, 0.160265, 0.305745, -0.205584, -
0.0957999, -0.0082995, -0.0917615, 0.150686, 0.012074, 0.0260487, 0.207366,
0.0358594, 0.0179784, 0.0226974, 0.216989, 0.00574695, 0.261882, 0.124169,
0.356651, 0.105698
 };
static const double W_H1_Out[OUTPUTS][HIDDEN1+1] = {
 -1.0587, 3.10807, 1.71711, -3.63105, -2.9637, -1.79278, -0.22336, 1.7467, -
0.2561, -2.258, -1.00521,
 1.13118, 1.38662, -2.70409, 1.36552, -2.94382, -1.30393, 1.05149, -2.49788, -
2.51377, 1.17876, -1.06545,
 1.76329, -2.41567, 1.78651, -2.9026, 0.925023, -1.79078, -2.28571, -2.70703, -
0.819499, 1.8691, -1.02301,
 -2.55348, -2.31017, -0.174971, 2.25761, 0.779056, -3.79299, -2.54779,
0.918758, 2.76756, -2.59166, -1.7894,
 -1.89898, -2.23034, -2.09991, 0.878243, 0.12062, 2.89668, -1.70066, 1.46542, -
4.55553, 0.838901, -1.113,
 -0.910669, -1.11968, -2.10149, -1.99824, 0.235805, 2.46406, 1.8584, -2.83992,
1.55231, -2.56748, -0.841062
 };

/* Scale factors */
static const double R_MIN[INPUTS+OUTPUTS] = {
 0.33975, 0.1535, 0.204, 0.1085, 0.089, 0.25925, 0.28975, 0.31225, 0.25275,
0.18275, 0.15925, 0.238, 0.28275, 0.39925, 0.29925, 0.384, 0.411, 0.541, 0.6155,
0.568, 0.54625, 0.32925, 0.135, 0.08425, 0.12425, 0.13325, 0.3425, 0.24125,
0.32475, 0.22775, 0.1575, 0.15475, 0.19725, 0.25725, 0.4675, 0.4315, 0.3865,
0.5055, 0.4895, 0.55525, 0.47825, 0.47925, 0.09575, 0.02525, 0.0605, 0.014,
0.078, 0.23575, 0.361, 0.37175, 0.24575, 0.1855, 0.207, 0.2545, 0.3005, 0.49975,
0.4395, 0.39225, 0.41, 0.4625, 0.48025, 0.492, 0.4685, 0.4075, 0.134, 0.158,
0.1615, 0.11325, 0.2825, 0.298, 0.3015, 0.21175, 0.22925, 0.2035, 0.2445,
0.26275, 0.317, 0.31375, 0.363, 0.44625, 0.444, 0.5105, 0.48075, 0.4915, 0.1665,
0.03075, 0.0655, 0.06825, 0.08725, 0.3765, 0.343, 0.28325, 0.23625, 0.1785,
0.18425, 0.29225, 0.3225, 0.43025, 0.42225, 0.2545, 0.33675, 0.37525, 0.4195,
0.4385, 0.382, 0.4255, 0.11, 0.09825, 0.177, 0.14125, 0.3335, 0.35475, 0.338,
0.237, 0.16125, 0.16, 0.1795, 0.28475, 0.438, 0.38, 0.3425, 0.41875, 0.44775,
0.504, 0.4365, 0.43375, 0.40675, 0.197, 0.146, 0.199, 0.1055, 0.377, 0.28625,
```

```
0.405, 0.28025, 0.17925, 0.161, 0.216, 0.28975, 0.3215, 0.28025, 0.38975,
0.34725, 0.512, 0.61475, 0.5375, 0.4695, 0.42175, 0.196, 0.13625, 0.1055,
0.12525, 0.28525, 0.3855, 0.34775, 0.177, 0.14375, 0.1625, 0.1955, 0.313, 0.38,
0.39225, 0.3955, 0.4225, 0.4635, 0.5235, 0.48275, 0.49375, 0.42275, 0.20975,
0.151, 0.17325, 0.2025, 0.36075, 0.3855, 0.30975, 0.1765, 0.14375, 0.2005,
0.2325, 0.351, 0.42825, 0.46775, 0.41725, 0.406, 0.37375, 0.45825, 0.47475,
0.45025, 0.348, 0.1175, 0.11525, 0.11175, 0.12225, 0.2775, 0.365, 0.32625,
0.21875, 0.20925, 0.21625, 0.2345, 0.281, 0.351, 0.3385, 0.338, 0.424, 0.41975,
0.528, 0.52825, 0.48675, 0.3975, 0.18525, 0.2015, 0.14725, 0.15525, 0.3805,
0.39775, 0.4145, 0.27175, 0.18625, 0.238, 0.29075, 0.36675, 0.49475, 0.45375,
0.4065, 0.44825, 0.39075, 0.45775, 0.49325, 0.4595, 0.358, 0.1765, 0.15625,
0.1175, 0.191, 0.29925, 0.34975, 0.3415, 0.24275, 0.1715, 0.1505, 0.21675,
0.2815, 0.4555, 0.4385, 0.3955, 0.50075, 0.455, 0.53725, 0.489, 0.47025, 0, 0, 0,
0, 0, 0
 };
static const double R_MAX[INPUTS+OUTPUTS] = {
 0.735, 0.53025, 0.66625, 0.96275, 0.47925, 0.66975, 0.8155, 0.718, 0.59925,
0.501, 0.6355, 0.45625, 0.57575, 0.82075, 0.661, 0.956, 0.8125, 0.792, 0.842,
0.702, 0.798, 0.7495, 0.555, 0.70975, 0.7515, 0.455, 0.709, 0.847, 0.68325,
0.5805, 0.47125, 0.674, 0.48525, 0.5365, 0.79725, 0.77, 0.77825, 1.0475,
0.75475, 0.77225, 0.67975, 0.70575, 0.79325, 0.47175, 0.6195, 0.909, 0.482, 0.7,
0.8515, 0.77125, 0.54875, 0.4765, 0.4765, 0.61175, 0.5675, 0.834, 0.8575,
0.81225, 0.70875, 0.76, 0.71275, 0.677, 0.72575, 0.70675, 0.49175, 0.637, 0.752,
0.4545, 0.64075, 0.6925, 0.624, 0.71375, 0.58225, 0.63025, 0.726, 0.573,
0.78525, 0.785, 0.8155, 0.96675, 0.74625, 0.75725, 0.71625, 0.7465, 0.61175,
0.37075, 0.502, 0.76025, 0.62925, 0.784, 0.76725, 0.61375, 0.5875, 0.504,
0.4535, 0.588, 0.614, 0.769, 0.86625, 0.797, 0.7475, 0.64225, 0.7315, 0.64,
0.60475, 0.70675, 0.599, 0.76125, 0.98625, 0.607, 0.77225, 0.82675, 0.62525,
0.59, 0.481, 0.55225, 0.594, 0.54625, 0.82075, 0.74575, 0.82625, 0.831, 0.70925,
0.691, 0.6875, 0.67775, 0.695, 0.50775, 0.63475, 0.95575, 0.52575, 0.707,
0.8945, 0.72125, 0.6175, 0.5145, 0.58225, 0.49525, 0.51475, 0.77475, 0.64475,
0.96775, 0.70825, 0.76175, 0.76475, 0.7095, 0.7255, 0.62325, 0.52375, 0.67125,
0.669, 0.38725, 0.6655, 0.76175, 0.73125, 0.5415, 0.43475, 0.66525, 0.548,
0.526, 0.82, 0.73, 0.887, 0.74475, 0.738, 0.74525, 0.65675, 0.72825, 0.6375,
0.514, 0.66025, 0.68, 0.44325, 0.67225, 0.80225, 0.70275, 0.566, 0.641, 0.71675,
0.47175, 0.6565, 0.81275, 0.83, 0.8725, 0.776, 0.66775, 0.706, 0.68075, 0.7245,
0.64975, 0.53375, 0.6685, 0.61375, 0.349, 0.53325, 0.706, 0.703, 0.5715,
0.60325, 0.70375, 0.57, 0.57175, 0.81475, 0.82425, 0.82375, 0.876, 0.70325,
0.68725, 0.693, 0.74725, 0.69975, 0.63125, 0.76, 0.97375, 0.42825, 0.62475,
0.91125, 0.78825, 0.67575, 0.535, 0.65925, 0.60275, 0.671, 0.8935, 0.831, 0.852,
0.80925, 0.72225, 0.66125, 0.6945, 0.75425, 0.6825, 0.625, 0.76025, 0.96075,
0.4215, 0.625, 0.86175, 0.70975, 0.53725, 0.4685, 0.54725, 0.44425, 0.56375,
0.8395, 0.79375, 0.8395, 0.969, 0.726, 0.712, 0.6855, 0.7255, 1, 1, 1, 1, 1, 1
 };
static const double S_MIN[INPUTS+OUTPUTS] = {
 -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -
1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1,
-1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -
```

```
1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1,
-1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -
1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1,
-1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -
1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1,
-1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -
1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1,
-1, -1, -1, -1, -1, -1, -1, 0, 0, 0, 0, 0, 0
 };
static const double S_MAX[INPUTS+OUTPUTS] = {
 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1
 };


/* Nonlinearity functions */
static double sigmoid( double x ) { return(1.0/(1.0 + exp(-x))); }
static double ftanh( double x ) { return tanh( x ); }
static double gaussian( double x ) { return exp( -x*x/2 ); }
static double linear( double x ) { return x; }

/* Compute the network response
 * Arguments:
 *   inputs   pointer to (double) array containing the input values
 *   outputs  pointer to (double) array which receives the results
 * Return:
 *   NonZero (1) if successful, 0 if not.
 */
int eval_net(const double * inputs, double * outputs)
{
 double F;
 int i,j;

 /* Check for invalid arguments */
 if (inputs == NULL || outputs == NULL)
    return 0;

 /* Zero neuron sums */
 for (i=0;i<NUMNEURONS;i++)
    NEURON[i] = 0.0;

 /* Apply inputs */
```

```
 for (i=0;i<INPUTS;i++)
 {
    F = (S_MAX[i]-S_MIN[i])/(R_MAX[i]-R_MIN[i]); /* scale factor */
    NEURON[i] = F * inputs[i] + S_MIN[i] - F * R_MIN[i];
 }

 /* Compute hidden layer #1 */
 for (i=0;i<HIDDEN1;i++)
 {
    for (j=0;j<INPUTS;j++)
    {
       NEURON[HIDDEN1_INDEX + i] += NEURON[j]*W_In_H1[i][j];
    }
    NEURON[HIDDEN1_INDEX + i] += W_In_H1[i][INPUTS]; /* BIAS */
    NEURON[HIDDEN1_INDEX + i] = sigmoid( NEURON[HIDDEN1_INDEX
+ i] );
 }

 /* Compute network outputs */
 for (i=0;i<OUTPUTS;i++)
 {
    for (j=0;j<HIDDEN1;j++)
    {
        NEURON[OUTPUT_INDEX + i] += NEURON[HIDDEN1_INDEX +
j]*W_H1_Out[i][j];
    }
    NEURON[OUTPUT_INDEX + i] += W_H1_Out[i][HIDDEN1]; /* BIAS */
    NEURON[OUTPUT_INDEX + i] = sigmoid( NEURON[OUTPUT_INDEX +
i] );
 }

 /* Copy outputs to output array */
 for (i=0;i<OUTPUTS;i++)
 {
    F = (R_MAX[i+INPUTS]-R_MIN[i+INPUTS])/(S_MAX[i+INPUTS]-
S_MIN[i+INPUTS]); /* unscale factor */
    outputs[i] = F * NEURON[OUTPUT_INDEX + i] + R_MIN[i+INPUTS] - F *
S_MIN[i+INPUTS];
 }

 return 1;
 }
```

APPENDIX-4: NETWORK M CODE

```
%% Neural network function for Matlab created by QwikNet V2.23
%% Network file name: D:\suha\tez\data\yeni1\yeni1.net
%% Structure:        252/10/6
%% Date:             Mon Jun 05 01:05:25 2006
%%
%% function outputs = network(inputs)
%%
%% This function implements a neural network trained
%% by QwikNet that has 252 inputs and 6 outputs.
%% The input argument 'inputs' is a matrix arranged
%% in column format, i.e. one column per pattern and
%% one row for each neural network input.
%% The function output is a matrix with one row for
%% each neural network output and one column for each pattern.


function outputs = network(inputs)

%%
%% Check the number of input arguments
if (nargin ~= 1 | size(inputs,1) ~= 252)
   outputs = [];
   disp('inputs must be a 252 by n matrix');
   return
end

INPUTS = 252;

inputs = inputs';

%% Weight arrays
W_In_H1 = [
 0.36423, 0.251449, 0.426709, -0.0149581, -0.0669013, -0.0284442, 0.169333,
0.0627626, 0.108502, 0.000815972, -0.0661229, -0.144084, 0.141993, 0.206058,
0.0735169, 0.105411, 0.185671, 0.0807291, 0.267145, 0.173685, 0.17878,
0.236327, 0.0875518, 0.191421, 0.0875687, -0.171106, -0.140942, 0.203561,
0.00060008, 0.134541, 0.0324002, -0.110294, -0.0748324, 0.218874, 0.119154,
0.128107, 0.138386, -0.039986, -0.179894, 0.218816, -0.0418366, 0.0391836,
0.0838202, -0.0806672, 0.150231, 0.22565, -0.0605705, -0.100325, 0.114951,
0.0637408, -0.181388, -0.126221, 0.0448445, 0.0652076, 0.0662734, 0.15416, -
0.0741924, 0.124819, -0.00915728, -0.181106, 0.0536384, -0.118404, -
0.00763492, 0.187845, 0.0253276, 0.0660559, 0.400477, 0.000281037, -
0.158066, 0.131957, 0.0598137, -0.118528, 0.129676, -0.0667936, -0.0179408,
0.077065, 0.0161706, -0.020779, -0.0632299, 0.0220254, 0.00127457,
0.0486964, 0.0994083, 0.0931683, -0.109449, 0.0303488, 0.170802, 0.189749, -
```

0.0528822, 0.103116, 0.289626, 0.0551478, -0.285901, -0.0881006, 0.27979, 0.00561105, 0.0250208, -0.00759908, -0.416196, -0.455685, -0.424607, -0.211872, -0.127992, -0.516178, -0.178001, 0.0581041, -0.0203018, 0.17373, 0.251916, 0.0641494, 0.157685, 0.127757, -0.0913502, -0.234954, 0.0754095, -0.0211341, 0.0540822, 0.268636, 0.0572217, -0.0746217, 0.0699052, 0.0699181, 0.108849, 0.129062, 0.0886814, -0.0229395, -0.179431, -0.0516793, 0.295223, 0.0596315, -0.102644, 0.122254, 0.121656, -0.123305, 0.179397, -0.0272383, 0.0538221, -0.08032, 0.112245, 0.141767, -0.0598672, 0.0596495, 0.159711, -0.0986349, -0.0149077, 0.143791, -0.0304284, -0.125778, -0.0590984, 0.0347816, -0.159025, -0.154636, 0.0122174, 0.224373, 0.0512797, 0.0760259, -0.0516987, -0.0926955, -0.0585682, 0.0898758, 0.0584386, -0.0847881, 0.0844595, 0.0391746, 0.0696542, 0.0238536, 0.0547512, 0.0206163, 0.0784613, -0.041414, 0.12446, 0.018299, -0.0560051, -0.0688736, 0.261147, 0.070781, -0.0773633, 0.0671806, -0.094736, -0.234823, 0.146634, 0.0307005, -0.0935263, 0.093975, 0.00797362, -0.012222, -0.134232, -0.00898274, 0.0512075, 0.199197, 0.0411991, 0.0770563, 0.0699499, 0.172287, 0.259537, 0.192064, 0.199794, -0.131233, 0.0989533, -0.00210285, -0.088159, 0.0515214, 0.104612, -0.121199, -0.0771566, 0.0935924, 0.113707, 0.112594, 0.186623, -0.0526818, 0.349697, -0.0383705, 0.105386, 0.259343, 0.238437, -0.215694, 0.2894, -0.0329666, -0.437388, -0.0604187, -0.0670444, -0.0198217, -0.0429363, -0.00212113, -0.0310562, 0.171973, 0.0167664, -0.0579239, 0.0350561, 0.202944, 0.104016, 0.42651, 0.000466005, 0.17867, 0.189824, 0.174916, -0.0452185, 0.26403, 0.0224783, -0.19651, 0.116322, 0.0661933, 0.0587633, 0.142645, 0.113786, -0.0542984, 0.149744, 0.00332598, 0.0612671, 0.128604, 0.101549, 0.255971, 0.0457134;

0.256332, -0.0189867, -0.171469, 0.305146, 0.244517, 0.209673, 0.236793, -0.211882, -0.18607, -0.0982846, 0.116653, 0.0878374, -0.0288608, -0.0502433, -0.161314, 0.104345, -0.212634, 0.0120246, -0.238975, -0.284891, 0.0308109, 0.220474, -0.0068465, -0.247377, 0.0956991, -0.118928, 0.0181752, 0.0743023, -0.0928965, -0.0379953, 0.0371245, -0.114107, -0.0323457, -0.0191582, -0.028756, -0.106909, -0.0179091, -0.247105, 0.223701, -0.030041, -0.157468, 0.0371868, 0.173989, 0.169579, 0.0230392, 0.0872042, 0.033441, -0.0223437, 0.0803557, -0.016942, -0.246803, -0.0371341, -0.0702247, -0.184549, -0.137974, -0.0279457, -0.0843178, -0.0191298, 0.0175648, 0.0498602, -0.0810357, -0.211636, -0.0475826, 0.280481, -0.0420626, -0.327356, 0.146772, 0.147603, 0.137503, 0.0498348, -0.0839831, 0.0916606, 0.105961, -0.0610172, 0.147787, 0.0289553, 0.00543067, -0.049419, 0.297287, -0.225659, 0.0427057, -0.128404, -0.0830018, -0.0292011, 0.0530337, 0.0813106, 0.0756423, 0.159193, 0.4102, 0.368467, 0.0816785, -0.242439, -0.0862609, -0.0844357, 0.162888, -0.111376, -0.191682, -0.138358, -0.217999, -0.0578818, -0.142629, -0.385913, -0.198737, 0.0551095, 0.109972, 0.284323, 0.140453, 0.137659, 0.184497, 0.112116, 0.226526, 0.047136, -0.341597, -0.289286, -0.314733, 0.0632824, 0.171728, 0.0938173, -0.0370413, 0.022267, 0.127909, -0.0982736, -0.0517367, -0.0148027, 0.14862, 0.334346, 0.0558373, -0.0194414, -0.1965, 0.616516, 0.167248, 0.29649, 0.181376, -0.253098, 0.00579494, -0.172924, 0.00330972, -0.0974283, 0.0301851, 0.0599741, 0.0540285, 0.221006, 0.0270442, 0.0116347, 0.0551128, 0.42011, 0.23175, -0.0585255, 0.194796, -0.111627, 0.389533, -0.0471864, -0.23453, 0.23222, -0.0524382, 0.0375799, 0.125195, -0.0456525,

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0.0642034, 0.0250914, 0.116664, -0.126225, 0.118195, -0.00551828, 0.0969044,
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0.0602881, -0.199391, 0.0623311, -0.125284, 0.0958802, 0.0949836, -0.0793716,
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0.256493, -0.168322, -0.0962981, 0.042014, -0.138957, -0.157082, -0.116695, -
0.0423444, -0.130114, -0.0507733, -0.00761961, -0.143394, 0.121018, -
0.262886, 0.199203, -0.0596261, 0.0863481, 0.034484, -0.126926;
0.179761, 0.276561, 0.073974, -0.184731, 0.0463153, -0.0749669, -0.087071, -
0.0668911, -0.0325541, 0.0611319, 0.0779615, 0.00540452, -0.175875,
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0.180979, 0.102035, 0.272447, 0.201562, 0.0610064, 0.0452072, -0.0848496, -
0.10679, -0.0732497, 0.0533433, 0.138556, 0.0107013, -0.0185111, -0.195933,
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0.258978, 0.218857, 0.430558, 0.324406, -0.0732178, -0.0975567, -0.0578025,
0.163195, 0.145762, 0.0345379, 0.132956, 0.169135, -0.0821634, -0.178893, -
0.110937, 0.0198187, -0.154823, -0.148645, -0.175029, -0.313162, -0.303079,
0.117123, 0.0306301, 0.157516, 0.0198577, -0.183128, -0.0249672, -0.00918152,
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0.0208287, -0.216363, 0.0747377, -0.0154117, -0.546706, -0.0461637,
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0.132639, 0.178789, -0.147488, -0.256665, -0.252109, -0.300384, -0.295891, -
0.353086, -0.104844, -0.190304, 0.424546, 0.395371, -0.321285, -0.410044, -
0.207747, 0.178722, -0.0534995, -0.113675, -0.122421, -0.0695032, 0.194605, -
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0.13273, 0.0519867, 0.198605, -0.095827, 0.0704559, -0.0509619, -0.0813151, -
0.112375, 0.341787, 0.122973, -0.0841124, 0.250359, 0.19801, 0.0731855, -
0.295676, -0.372306, -0.0795496, 0.158012, 0.123672, 0.175738, 0.052719,
0.105914, -0.0696198, 0.0944915, -0.0908411, -0.140393, -0.0625884, -
0.105817, -0.241496, 0.0536793, -0.323715, 0.156318, 0.280857, 0.304627, -
0.100544, -0.237001, -0.315715, 0.0444069, 0.0798814, -0.0181634, 0.121176,
0.0675085, 0.0680387, 0.0625837, 0.232733, -0.0424449, -0.249034, 0.0795931,
0.106029, -0.126215, -0.0442305, 0.0640631, 0.0399614, 0.211912, 0.170138, -
0.166371, -0.34782, -0.206139, -0.157279, 0.062282, 0.0317052, 0.0690916, -
0.0706336, 0.0550894, -0.0824653, 0.179902, -0.0388013, 0.0558858, -0.154984,
0.13042, -0.0791863, -0.0671795, -0.0907332, 0.276753, 0.227374, 0.0837308, -
0.193379, -0.226177, -0.144195, 0.157398, 0.135599, -0.243793, 0.0339278,
0.0681023, 0.0445172, -0.113673, 0.0734895, 0.00205395, 0.109819, 0.119165, -
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%% Scale factors
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1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1,
-1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -
1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1,
-1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -
1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1,
-1, -1, -1, -1, -1, -1, -1, -1, -1, -1, 0, 0, 0, 0, 0, 0];
S_MAX = [ 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1];
%% Scale factor for inputs
Finps = (S_MAX(1:INPUTS) - S_MIN(1:INPUTS)) ./ (R_MAX(1:INPUTS) -
R_MIN(1:INPUTS));


Finps_mat = [];
Smin_mat = [];
Rmin_mat = [];
for i = 1:size(inputs,1)
   Finps_mat = [Finps_mat; Finps];
   Smin_mat = [Smin_mat; S_MIN(1:INPUTS)];
   Rmin_mat = [Rmin_mat; R_MIN(1:INPUTS)];
end
%% Scale the inputs
inputs = Finps_mat .* inputs + Smin_mat - (Finps_mat .* Rmin_mat);

%%  Compute hidden layer #1
%%  Add bias to inputs and transpose the matrix
inputs = [inputs ones(size(inputs,1),1)]';
%%  Get weighted sum and perform non-linear function
tmp = W_In_H1 * inputs;
hidden1 = 1./(1 + exp(-tmp));

%% Compute network outputs
%%  Add bias to hidden1
hidden1 = [hidden1; ones(1, size(hidden1,2))];
%%  Get weighted sum and perform non-linear function
```

```
tmp = W_H1_Out * hidden1;
outputs = 1./(1 + exp(-tmp));

%% Transpose the matrix so the new matrix has p rows and OUTPUTS columns
outputs = outputs';

%% Unscale the outputs

%% Scale factor for outputs
Fouts = (R_MAX(INPUTS+1:length(R_MAX)) -
R_MIN(INPUTS+1:length(R_MIN))) ./ (S_MAX(INPUTS+1:length(S_MAX)) -
S_MIN(INPUTS+1:length(S_MIN)));
Fouts_mat = [];
Smin_mat = [];
Rmin_mat = [];
for i = 1:size(outputs,1)
   Fouts_mat = [Fouts_mat; Fouts];
   Smin_mat = [Smin_mat; S_MIN(INPUTS+1:length(S_MIN))];
   Rmin_mat = [Rmin_mat; R_MIN(INPUTS+1:length(R_MIN))];
end

outputs = Fouts_mat .* outputs + Rmin_mat - (Fouts_mat .* Smin_mat);
outputs = outputs';

%% end of file
```