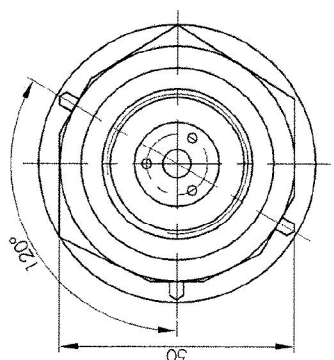




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NOTE- ALL ARTICLES AND MATERIALS USED TO MANUFACTURE THE ELECTROMAGNET MUST CONFORM TO VALID STANDARDS AND SPECIFICATIONS.

[illegible]

TECHNICAL REQUIREMENTS :-

Electromagnet must conform to the requirements of these specifications & set of documents as per specifications M 74M.000, OST B3 - 1164 - 72. All articles and materials used to manufacture the electro magnet must conform to valid standards and specifications.

1.1. Basic parameters and dimensions

1.1.1. Electromagnet has the following main parameters.

- a) rated voltage - 27V ;
- b) operating condition - 2 activations of 1.5 min. with interval between activations as 5 min.; after that break fill complete cooling.

c) circuit diagram

d) version

e) electromagnet force

with 11mm clearance - 6Kgf ;

f) coil resistance at 20° C - not less than 6 ohm ;

g) working position

- any position

h) nominal armature

stroke - 13 mm

i) mass, not more than - 1.7 Kg

1.1.2 Overall dimensions of electromagnet as per drg.

1.1.3 Plug with nut Cδ is a vital part of electromagnet joint which does not form part of electromagnet supply set.

1.2 SPECIFICATIONS.

1.2.1 Electromagnet must conform to drawings & M 74M.000 T4 and & M 74M.000 w.r.t overall and installation dimensions and exterior view.

1.2.2 Electromagnet must develop a force of not less than 6Kgf under normal climatic conditions and practically in cold state at 16v with 11mm clearance between armature and stop. Electromagnet current in this case must not be more than 2.67 A.

1.2.3 Insulation resistance between coil and casing must be :

- a) under normal climatic conditions and practically cold state - not less than 20 Mohm ;
- b) at high temperatures - not less than 3 Mohm;
- c) under high moisture conditions - not less than 1 Mohm.

1.2.4 Insulation between coil and casing must withstand 550 V (effective value) AC test voltage of 50Hz without breakdown or surface flash-over under normal climatic conditions.

1.2.5 Electromagnet must be capable of operation and preserve its parameters under the conditions, specified in the national standard OST B 3 - 1164-72 at high ambient temperature upto 80°C and after action of ambient temperature upto 100°C, and also upto 5 atm. pressure of oil (MT - 8 П or M Г E-10A) in internal cavity of electromagnet (armature chamber).

1.2.6 Electromagnet must withstand 4000 activations on test stand in order to ensure guaranteed operating time.

1.2.7 Electromagnet design (coil chamber) must be water proof.

1.2.8 Electromagnet operating life must prolong over 8000 activations.

1.3. Complete Set.

1.3.1 Delivery includes :

a) electromagnet 3M - 74M ;

b) certificate

1.4. Marking

1.4.1 Electromagnet must be marked as per the set of documents on specifications 3M - 74M.000.

1.5. Packing and preservation.

1.5.1 Electromagnet must be packed according to the requirements 6T/ national standard / OST B - 3 - 1164 - 72 and valid packing drawing.

Preservation must be carried out taking into account the requirement 6T OST B3 - 2381 - 74.

2. ACCEPTANCE RULES.

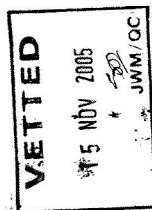
2.1 These specifications, OST B-3-1164-72 and set of documents on specifications 3M - 74M.000 are the main documents for manufacture, testing and acceptance of electromagnet.

2.2 All purchased articles and materials used for manufacturing the electromagnet must be inspected by external acceptance group of quality inspection department. Scope and procedure of input-checking is established in agreement with the customer's representative.

2.3 Electromagnet tests are divided into acceptance, periodic and type tests.

2.4 Each electromagnet is subjected to acceptance tests in scope and sequence given in table 1. Electromagnet are sent for acceptance in batches of 36 - 54 pieces.

2.5 Periodic tests are conducted twice in a year on two specimens in scope and sequence given in table 1.



ELECTROMAGNET 3 M-74 M FOR DISTRIBUTION COCK ASSY. (188-66-015CQ-1) TRANSMISSION GEAR UNIT. CODE - 45 / T-90		नाम NAME	दिनांक DATE	2005	अंशित ORIGIN	19/10	GMK
		मापन SCALE	NTS	जाँचा CHECKED	अनुमोदित APPROVED	11/11	✓
		द्वारा कला BY	रिप्लेस REPLACED	द्वारा कला BY	रिप्लेस REPLACED		
मशीनी औजार आदिरूप फैक्टरी, अम्बरनाथ MACHINE TOOL PROTOTYPE FACTORY, AMBERNATH		कार्यालय OFFICE	D.O.				
		आरेखण क्र. DRAWING NO. 2/7					
		3 M-74 M.000 TY					
		EM-74M.000 TY					

2.6 Type tests are conducted in order to check the conformance of electromagnet to requirements of these specifications; in case of major changes in design or manufacturing technology of electromagnet which may affect operational characteristics; in case of necessity to check service life of electromagnet and measures taken for elimination of electromagnet defects and also on initial batch of series production. Necessity of conducting type tests is determined and agreed by manufacturer and customer's representative in scope sufficient for checking the effectiveness of measures undertaken as per the agreed test programme guided by the type of tests in table 1.

3. TEST PROCEDURE METHODS

3.1 All tests are conducted under normal climatic conditions, except these climatic conditions are specifically given.

- Characteristics of normal climatic conditions;
- a) ambient air temperature = $25 \pm 10^{\circ}\text{C}$
 - b) air relative humidity = 45 - 80 %
 - c) atmospheric pressure = 630 - 800 mm Hg col.

Note : At a temperature higher than 30°C , relative humidity must be higher than 70 %.

Test instruments must have class of accuracy not less than 1.5.

3.2 During visual inspection, complete set, conformance to the requirements of drawings, quality of assembly, finishing, quality of soldering and absence of loose fixtures are checked. Setting and overall dimensions are checked with the help of test instruments.

3.3 Checking of force developed by electromagnet is conducted on a special stand. Clearance between electromagnet armature and stop is kept as 1 mm. 6Kgf load is fixed to the stem and electromagnet is connected to 16 V five times.

Duration of each activation not more than 1S. Electromagnet current is checked during checking of force in the last activation whose duration may be increased to 5S. Electromagnet is considered as withstood the test, if it operates overcoming 6 Kgf opposing force and current consumption is not more than 2.67A.

3.4 Insulation resistance test is conducted using 500 V DC mega ohm meter. Insulation resistance is measured between electromagnet casing and any contact of plug connection.

Electromagnet is considered as withstood the test, if the measured values of insulation resistance correspond to cl.1.2.3 of these specifications (for respective test conditions).

3.5 Insulation electrical strength is checked on a special high-voltage installation of not less than 0.5 kVA capacity by feeding total test voltage for 1 S. test voltage is applied between casing and any contact of plug connection. Electromagnet is considered as withstood the test if during checking no break-down or surface flash-over takes place.

Note : in case of subsequent checkings of electromagnet before installation on machine, after moisture resistance test and in case of necessity to check insulation electrical strength during guaranteed operating time, test voltage is set at 80 % of that envisaged by the requirements of these specifications.

3.6 Electromagnet pressure testing is done with MT-8 П or M F E 10 A oil at a pressure of 5 atm. for 10 minutes. Oil is supplied from the stem side. electromagnet is considered as withstood the test, if there is no oil leakage.

3.7

In case of moisture - resistance test, electromagnet in disconnected state is put into hygrostat with 93 - 97 % relative humidity and $20 - 25^{\circ}\text{C}$ temperature and held in it for 5 days Rise in humidity upto 98% and temperature upto 35°C is permitted.

After withdrawal of electromagnet from hygrostat, check immediately, not later than 3 minutes, the following:

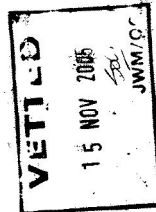
- a) insulation resistance according to the procedure in cl.3.4 of these specifications.
- b) force, developed and current consumption as per the procedure in cl.3.3 of these specifications;
- c) absence of corrosion except on seating surfaces, whose anti corrosion protection is not envisaged by drawings;
- d) state of preservation of varnish and paint.

After holding for 24 hours under normal climatic conditions, insulation resistance and also insulation electrical strength are checked according to the procedure in cl. 3.4 and 3.5 of these specifications.

Electromagnet is considered as withstood the test, if it satisfies the requirements of cl.1.2.2 and 1.2.3C of these specifications; there is no peeling of varnish and paint and no corrosion and after holding under normal climatic conditions electrical strength and insulation resistance conform to the requirements in cl. 1.2.3a and 1.2.4 of these specifications.

3.8 In case of Cold-resistance test electromagnet in disconnected state is put into cooling chamber, in which temperature is reduced to minus 50°C and maintained with an accuracy of $\pm 3^{\circ}\text{C}$. On achieving this temperature the electromagnet is kept in chamber for 4 hours. Electromagnet force is checked as per the procedure in cl. 3.3 of these specifications not later than 3 minutes after withdrawal from the chamber. In this case, the current consumption is not monitored. Electromagnet is considered as withstood the test, if its force conforms to the requirements in cl. 1.2.2 of these specifications.

Note : It is permitted to put electromagnet in cooling chamber, in which temperature upto minus 50°C has been already attained. In this case electromagnet is kept in chamber for 4 hours.



ELECTROMAGNET 3 M-74 M FOR DISTRIBUTION COCK ASSY. (188-66-015Cd-1) TRANSMISSION GEAR UNIT. CODE - 45 / T-90		मापन SCALE	2006 आरेखित DRAWN	19/10 गोच CHECKED	नाम NAME
		NTS	अनुमोदित APPROVED	11	GMK
		द्वारा बदला REPLACED BY			
		हस्त बदला REPLACED FOR			
मशीनी औजार आदिरूप फैक्टरी, अम्बरनाथ MACHINE TOOL PROTOTYPE FACTORY, AMBERNATH		कार्यालय OFFICE	आरेखण क्र. DRAWING NO. 3/7		
		D.O.	3 M-74 M.000 TY		
			EM-74M-000 TY		

3.9

In case of thermal stability test, temperature in heating chamber is set at plus 100°C and maintained with an accuracy of $\pm 3^\circ\text{C}$. Electromagnet is retained in heating chamber in disconnected state for 4 hours, then temperature is reduced to $+ 90^\circ\text{C}$ and electromagnet is kept for 2 hours at this temperature. After that it is taken out of the heating chamber and within 3 minutes, force at 22V and insulation resistance are checked as per the procedure in cl. 3.3 and 3.4 of these specifications.

Electromagnet current is not monitored in this case.

Electromagnet is considered as withstood the test, if it operates overcoming 6 Kgf opposing force at 22V and also insulation resistance corresponds to cl. 1.2.4b of these specifications.

3.9a

Water tightness test is conducted in the following manner :

a) during acceptance tests electromagnet is put into a special chamber in disconnected state. Electromagnet coil chamber is connected to external medium with the help of a special union and rubber tubing. Dry air at 0.2 - 0.05 atm(g) pressure is supplied to the chamber for 5 minutes. Immediately after air supply, tubing end coming out of the chamber is immersed in a water tank by 2-3 cm. water tank is located 20 - 30 cm lower than the electromagnet.

b) during periodic and type tests, electromagnet, in disconnected state, is immersed in water bath for 1 hour.

Electromagnet temperature must exceed the water temperature by 10 - 15°C at the time of immersion.

Immersion depth from water surface to upper point of electromagnet must not be less than 50 - 55 cm.

After testing, electromagnet is taken out of the bath, dried and its force and current are checked as per the procedure in cl. 3.3 of these specifications.

Electromagnet is considered as withstood the test, if it satisfies the requirements in cl. 1.2.2 of these specifications.

Note : In the water - tightness test, armature stem exit location is sealed by any method.

3.10

In case of test on stability to the action of frost and dew, electromagnet, in disconnected state, is put into cooling chamber and kept in it at a temperature of minus $20 \pm 5^\circ\text{C}$ for two hours.

After this electromagnet is taken out of the chamber and kept under normal climatic conditions. During three hours under conditions of frost and dew formation immediately after withdrawal and after every 30 - 60 minutes, electromagnet force is checked as per the procedure in cl. 3.3 of these specifications.

Electromagnet is considered as withstood the test, if during stay time under normal climatic conditions after withdrawal from cooling chamber its force conforms to the requirements in cl. 1.2.2 of these specifications.

3.11

In case of test on the action of sea (salt) fog, electromagnet sealed from the stem exit side is put into a chamber in which temperature of $27 - 30^\circ\text{C}$ is maintained and subjected to the action of salt fog. Before putting into the chamber, visual inspection to ensure absence of damaged coating is conducted. Electromagnet is located in the chamber in such a way that during testing solution splash and also drops from ceiling, walls and suspension system do not fall on it. Fog is formed by spraying with centrifugal aerosol equipment or pulverizer of salt solution, which is prepared by dissolving sodium chloride in distilled water according to GOST 4233-77 in the quantity of $33 \pm 3 \text{ g/l}$.

Fog must have particle size of 1 - 10 μ (95% drops) and 2 - 3 g/l water content.

Solution is sprayed for 15 minutes after every 45 minutes. Total duration test is 2 days. Test duration is counted from the start of the first spray of solution.

At the end of the test, electromagnet is washed with distilled water, after this dried for 1 hour at a temp. of $55^\circ \pm 2^\circ\text{C}$ followed by cooling and visually inspected.

Electromagnet is considered as withstood the test, if no traces of corrosion and damage to coatings will be observed.

3.12

In the test on stability to cyclic changes in temperatures, electromagnet is subjected in disconnected state to three cycles of change in temperature continuously following each other.

Each cycle is conducted in the following order. Electromagnet is put into cooling chamber, in which temperature is already brought to minus 50°C and kept at this temperature for four hours.

From cooling chamber electromagnet is immediately transferred to heating chamber at $+65^\circ\text{C}$ and kept in it at this temperature for 4 hours.

Holding time in heating and cooling chamber is counted from the time of achieving the specified air temperature in the chamber after putting the electromagnet.

At the end of the last cycle of test, electromagnet is withdrawn from the heating chamber and kept under normal climatic conditions for 4 hours.

Then it is visually inspected and its force and current are checked as per the procedure in cl. 3.3 of these specifications.

Electromagnet is considered as withstood the test, if it satisfies the requirements in cl. 1.2.2 of these specifications.

Note : it is permitted to conduct test on stability against cyclic changes in temperature in one chamber with rate of change in temperature not less than 0.50°C per minute.

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ELECTROMAGNET 3 M-74 M FOR DISTRIBUTION COCK ASSY. (188-66-015Cd-1)		2005		नाम	नाम
मापमान	SCALE	आंशिक	DATE	19/10	GMK
NTS		जाँचा			
		अनुमोदित			
TRANSMISSION GEAR UNIT		APPROVED			
CODE - 45 / T-90		REFLECTED			
मशीनी औजार आदिरूप फैक्टरी, अम्बरनाथ		REFLECTED			
MACHINE TOOL PROTOTYPE FACTORY, AMBERNATH		FOR			
D.O.		DRAWING NO.		4/7	
		3 M-74 M.000 TY			
		E M-74 M.000 TY			

- 3.13 Vibration strength test is conducted in disconnected state of electromagnet is rigidly fixed on stand with one - component horizontal or vertical vibration alternatively in two mutually perpendicular positions, in one of which armature axis is perpendicular to the test stand plane (stem down ward), and in another parallel and subjected to test in each position by fixed frequency method as per the standards given in Table 2.
- Test on vibration strength is conducted alongwith the test on guaranteed operating time as per the following condition: 1/4 of total vibration time in first position of electromagnet before testing on guaranteed operating time, 1/2 of total vibration time in second position of electromagnet in the middle of test on guaranteed operating time and 1/4 of total vibration - time in first position of electromagnet after test on guaranteed operating time.
- After testing electromagnet is visually inspected, its force and current are checked and pressure testing with oil is conducted as per the procedure in cl. 3.3 and 3.6 of these specifications.
- Electromagnet is considered as withstood the test if during visual inspection no mechanical damages are observed and it satisfies the requirements in cl. 1.2.2 of these specifications and there is no leakage of oil.
- 3.14 Impact strength test is conducted in disconnected state of electromagnet in the middle of the test on guaranteed operating time. It is visually inspected before the test.
- Electromagnet is rigidly fixed on stand alternatively in two mutually perpendicular positions, indicated in cl. 3.13 of these specifications and subjected to the action of impacts in each position as per the standards given in Table 3.
- Total number of impacts is equally divided for different positions of electromagnet. After test, electromagnet is visually inspected, its force and current are checked and pressure testing with oil is conducted as per the procedure in cl. 3.3 and 3.6 of these specifications.
- Electromagnet is considered as withstood the test, if during visual inspection no mechanical damages are observed and electromagnet satisfies the requirement in cl. 1.2.2 of these specifications and there is no leakage of oil.
- 3.15 Test on electromagnet for guaranteed operating time is conducted on a special device, which imitates its operation under real conditions. Electromagnet is activated on a spring, whose force equals to 3.5 ± 0.35 Kgf and rate to 0.23 ± 0.02 kg/mm with 11 mm gap between armature and stop.
- Electromagnet is activated by series with 60 activations per series under condition 1S connected and 1S disconnected. Interval between series - full complete cooling.
- Forced blast is permitted.
- Number of activation series :
- at 22V 22;
 - at 27V 27;
 - at 29V 29;
- At the end of electromagnet testing, 40 additional activations are made, after that force and current are checked and pressure testing with oil is conducted as per the procedure in cl. 3.3 of these specifications.
- Electromagnet is considered as withstood the test, if during testing no failure occur and it satisfies the requirements in cl. 1.2.2 of these specifications and there is no leakage of oil.
- 3.16 Conformance of electromagnet and its installation to the requirements of stability against destructive action of single shocks with large accelerations is confirmed by full scale tests on the machine.

- 3.17 Before working out the procedure for stand tests on stability to the anti freezing compound and fuel and lubricant conformance of electromagnet to this requirement is confirmed by full scale tests and its operation on the machine. Test for the action of χ and η - back ground is not conducted. Conformance to this clause of requirements is ensured by design of the electromagnet.
- 3.19 Test on electromagnet for service life is conducted after periodic tests as per the procedure in cl. 3.15 along with vibration strength and impact strength tests as per the procedure in cl. 3.13 and 3.14 of these specifications. Electromagnet is considered as withstood the service life test, if it remains functional after additional test amounting to 20 activations.
- Note : Number of activations made during guaranteed operating time test, is taken into account in case of service life test.

4. TRANSPORTATION AND STORAGE

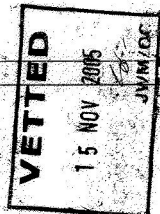
- 4.1 Packed electromagnet can be transferred by any means of transport with protection against the action of precipitations and mechanical damages.
- 4.2 Electromagnet must be stored according to the requirements in / national / OST B3-1164-72 and OST B3-2381-74.

5. INSTRUCTIONS FOR OPERATOR

- 5.1 Electromagnet must be operated under operating conditions conforming to the requirements of these specifications.
- 5.2 Use of electromagnet must be according to the GOST 2.117-71.

6. SUPPLIER GUARANTEES

- 6.1 Electromagnet must be accepted by quality inspection department of supplier plant. Supplier guarantees the conformance of article to the requirements of these specifications and non-failure operation if operating, transportation and storage conditions given in the specifications are observed by the user.
- Guarantee period is specified as 500 motor hours of main engine operation (6000 Km running of machine).
- Self life of electromagnets in user stores, preserved according to / the national standard / OST B3-2381-74 must not exceed 5 years & in case of packing in hermetically sealed covers according to / the national standard / OST B3-2381-74 not more than 8 years.



2005		रिजिस्ट्रार	नाम
मापक	अंश	19/10	GMK
SCALE	DRAMA	11	
NTS	चैक		
	अनुमति		
द्वारा वरदा		REPLACED	BY
द्वारा वरदा		REPLACED	FOR
आखण क्र.		DRAWING NO. 5/7	
3 M-74 M.000 TY			
EM-74 M.000 TY			

ELECTROMAGNET 3 M-74 M		कार्यालय
FOR DISTRIBUTION COCK ASSY. (188-66-015Cd-1)		OFFICE
TRANSMISSION GEAR UNIT.		
CODE - 45 / T-90		
मशीनी औजार आदिरूप फैक्टरी, अम्बरनाथ		D.O.
MACHINE TOOL PROTOTYPE FACTORY, AMBERNATH		

TABLE - I

	Types of Tests and Checks	Clause Number		Test Category		
		Require-ments	Procedure	Acceptance	Periodic	Type
1	Check on complete set conformance to drawings	1.2.1	3.2	+	+	+
2	Check on force developed and current consumption	1.2.2	3.3	+	+	+
3	Insulation resistance test a) Under normal climatic conditions b) Under high temperature conditions c) Under high humidity conditions	1.2.3a 1.2.3b 1.2.3c	3.4 3.4 3.4	+	+	+
4	Insulation electric strength test	1.2.4	3.5	+	+	+
5	Pressure testing with oil	1.2.5	3.6	+	+	+
6	Moisture resistance test	1.2.5	3.7	-	+	+
7	Cold resistance test	1.2.5	3.8	-	+	+
8	Thermal - stability test	1.2.5	3.9	-	+	+
9	Test on stability to the action of frost and dew	1.2.5	3.10	-	+	+
10	Test on the action of sea (salt) fog	1.2.5	3.11	-	+	+
11	Test on the action of cyclic change in ambient temperatures	1.2.5	3.12	-	+	+
12	Vibration strength test	1.2.5	3.13	-	+	+
13	Impact test	1.2.5	3.14	-	+	+
14	Guaranteed operating time test	1.2.6	3.15	-	+	+
14a	Test on the action of water	1.2.7	3.9a	+	+	+
15	Test on the action of single shocks with high accelerations	1.2.5	3.16	-	+	+
16	Test on the action of anti freezing compound fuel & lubricant	1.2.5	3.17	-	+	+
17	Test on the action of back ground and η	1.2.5	3.18	-	+	+
18	Service life test	1.2.8	3.19	-	+	+

19. Signs : "+" test is conducted.
 " - " test is not conducted.
20. Notes : 1. Sequence of conducting tests can be changed in agreement with the customer's representative.
 2. Sequence of conducting vibration strength and impact strength tests is determined by the test procedures.

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TABLE - 2

Fixed frequency Hz.	Amplitude		Total test duration hours
	Acceleration, g	Displacement mm	
10	1.0	2.0	3.0
20	2.0	1.0	9.0
30	3.0	0.8	6.0
40		0.6	4.5
50		0.4	
60	4.0	0.3	
80		Corresponds to acceleration	1.5
100			
120			

Note : Monitoring is done by one of the methods :
 By acceleration or displacement.

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ELECTROMAGNET 3 M-74 M FOR DISTRIBUTION COCK ASSY. (188-66-015Cd-1) TRANSMISSION GEAR UNIT, CODE - 45 / T-90		मासमान SCALE	सिचक DATE	नाम NAME
NTS	2005	अखित DOWN	19/10	GMK
		अनुमति APPROVED	4/11	
मशीनी औजार आदिरूप फैक्टरी, अम्बरनाथ MACHINE TOOL PROTOTYPE FACTORY, AMBERNATH		क्यालिप OFFICE		
D.O.		आरेखण क्र. 6/7 DRAWING NO. 6/7		
		3 M-74 M.000 TY E M-74 M.000 TY		

TABLE - 3

Acceleration g	Pulse duration, ms	Total number of impacts	Number of impacts per minutes
1.5	from 1.0 to 1.5	2000	upto 100

Appendix - I

Document title	Document Designation	Page numbers in specifications, where references to the documents have been made
1-National standard/GST "Electrical equipment of special transport machines. General specifications"	OSTB3-1164-72	2, 5, 18
2- Assembly units and parts of tracked vehicles. Methods and means of preservation	OSTB3-2381-74	5, 18, 19
4-State standard/(GOST) "Coordination on use of purchased articles."	GOST 2-117-71	19
5-State standard/(GOST), Sodium chloride.	GOST 4233-66	13

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ELECTROMAGNET 3 M-74 M FOR DISTRIBUTION COCK ASSY. (188-66-015Cd-1) TRANSMISSION GEAR UNIT. CODE - 45 / 1-90		2005 आरंभित DRAGAN	दिनांक DATE 19/10	नाम NAME GMR
		मसफा SCALE NTS	जोच CHECKED अनुमोदित APPROVED	
		द्वारा बदला REPLACED BY		
		हेतु बदला FOR		
मशीनी औजार आदिरूप फैक्टरी, अम्बरनाथ MACHINE TOOL PROTOTYPE FACTORY, AMBERNATH		कार्यालय OFFICE	DRAWING NO. 717	
		D.O.	3 M-74 M.000 TY EM-74 M.000 TY	