

**PROJECT FOR RESEARCH AND DEVELOPMENT OF DEMINING  
RELATED EQUIPMENT IN CAMBODIA**

**No. 4**

**REPAIR &  
MAINTENANCE**

**SWING TYPE MACHINE**

### 13. GENERAL MAINTENANCE WORK

#### 13.1. TOOLS AND EQUIPMENTS

##### 13.1.1. GENERAL EQUIPMENT FOR THE PROJECT

Table 56: General equipment for the project

No.	Name of the item, etc.	Period	Number	Remarks
1	Vehicle with driver	4 month	2	Pajero type
2	Vehicle for back up with driver	4 month	3	CMAC ambulance is acceptable. But without medical equipment
3	Trailer with driver	3 times	3	35 tons Drop bed type
4	Crane	4 weeks	2	Lifting capacity 25 ton
5	Fork lift	2 weeks	2	1 unit is OK. from workshop of CMAC
12	Hand tools set (1 set)	4 month	1	It is from w/shop Battambang
15	Diesel Fuel	Initially	22	22 drums (Total : 4400Litre)
16	Gasoline ( for Generator) 1 Drum	Initially	1	
17	4ton (isuzu truck) 4WD with owing	4 to 6 month?	1	For JICS mobile office
18	Generator	4 to 6 month?	1	handy for JICS

##### 13.1.2. GENERAL TOOLS FOR THE PROJECT FROM W/SHOP BATTAMBANG

Table 57: General tool from CMAC workshop in Battambang

No.	name of tool	Qty
1	Mechanic vise	1
2	Bolt cutter	1
3	Big size of box wrench	1
4	working lamp	1
5	Electrical welder kit	1
6	Big size hammer	1
7	Wire ropes	2
8	Caliper	1
9	Chisel kit	1
10	High speed cutter	1
11	Dolly (trolley) for pallet	1
12	Chain wrench for oil filter	1
13	Mechanic table	1
14	Generator 20KVA or more	1

##### 13.1.3. ASSISTED TOOL FROM CMAC

Almost all of the tools/equipment required to repair/maintenance the machines were brought by manufacturer from Japan.

#### 13.2. PERFORMANCE & ACCEPTANCE TESTS

Maintenance is implemented every morning by joint CMAC machine operators and manufacturers. The maintenance duration is taken approximately thirty to sixty minutes.

#### 13.3. SURVIVABILITY TEST

There is well prepared and send for the test.

## 14. GENERAL REPAIR WORK

### 14.1. PERFORMANCE & ACCEPTANCE TESTS

For the repair of demining machine push type during acceptance test, please see section 5.4.3.

### 14.2. SURVIVABILITY TEST

#### 14.2.1. GENERAL ASSESSMENT

- There is no damage done to the cabin
- There is no damage done to the engine
- There is no damage done to the body of the machine
- There is some damages done to the attachment

#### 14.2.2. DAMAGE TO THE ATTACHMENT OF THE MACHINE

Table 58: Damage from anti-tank explosion

	Broken parts	Quantity
a)	Chain	11
b)	Holder	6
c)	Rubber Plate	7
d)	Steel bar for rubber plate	5

#### 14.2.3. DETAILS OF THE REPAIR

- Time and type of transportation from the field: 5minutes by it's own trip
- Time and labor for fixing the problem

Table 59: Repair duration

a) Chain / Replacement	Time/1pc	Quantity	Total Time	Labor
b) Holder / Repair	2minutes	11		
c) Rubber Plate	15minutes	6	22minutes	1
d) Steel bar for rubber plate	10minutes	7	1h 30m	2
	*	-	1h 10m	2

\* These steel bars were found to be useless from the result of the test. Therefore, they were not repaired.

- Equipment used to fix the problem

Table 60: Equipment used for repair

Description	Equipment
a) Chain / Replacement	Hexagon wrench
b) Holder / Repair	Steel cable, Lever chain block, Burner
c) Rubber Plate	Spanners

- Picture of the problem

a) Chain



Figure 114: Chains are broken from Anti-tank blast

b) Holder



Figure 115: Holders are bending from Anti-tank blast

c) Rubber Plate



Figure 116: Rubber plate to protect dust are blown away by Anti-tank blast