

# Maintenance Schedule

Diesel Engine

**12V/16V2000Mx6**

**12V/16V2000M96L**

**Application Group 1D, 1DS**

**MS50149/03E**



*Power. Passion. Partnership.*

Engine model	kW/cyl.	Application group
12V2000M86	106 kW/cyl.	1D, continuous operation, variable, medium utilization
12V2000M96	112 kW/cyl.	1DS, continuous operation, variable, low utilization
12V2000M96L	119 kW/cyl.	1DS, continuous operation, variable, low utilization
16V2000M86	102 kW/cyl.	1D, continuous operation, variable, medium utilization
16V2000M96	112 kW/cyl.	1DS, continuous operation, variable, low utilization
16V2000M96L	121 kW/cyl.	1DS, continuous operation, variable, low utilization

*Table 1: Applicability*

# Table of Contents

1	Maintenance Schedule		
1.1	Preface	4	
1.2	Allocation matrix application group 1D, 1DS	5	
1.3	Maintenance schedule matrix 6,000 h	6	
1.4	Maintenance tasks 6,000 h	8	
1.5	Maintenance schedule matrix 5,000 h		10
1.6	Maintenance tasks 5,000 h		12
1.7	Maintenance schedule matrix 4,000 h		14
1.8	Maintenance tasks 4,000 h		16

# 1 Maintenance Schedule

## 1.1 Preface

In the case of emission-certified products, nonobservance of the maintenance specifications can result in a violation of the statutory emission regulations. Modification or removal of mechanical or electronic components or the installation of additional components as well as the execution of calibration processes that might affect the emission characteristics of the product are prohibited by emission regulations. Emission-relevant components may only be maintained, exchanged or repaired if the components used for this purpose are approved by MTU or equivalent components. Emission-relevant components are for instance control units, data records, sensors, injectors, exhaust flaps and all components of exhaust aftertreatment systems.

The maintenance system for MTU products is based on a preventive maintenance concept. Preventive maintenance facilitates advance planning and ensures a high degree of equipment availability. The maintenance intervals and required maintenance scopes are based on operational experience and must therefore be regarded as recommendations. In the event of difficult operational and ambient conditions, additional maintenance tasks and/or changes to the maintenance intervals may be necessary.

Maintenance activities are specified with intervals based on hours in operation and time limits. The limit which occurs first is applicable.

The individual maintenance intervals are assigned to the qualification levels QL1 to QL4.

QL1: Operational checks and maintenance work that does not require disassembly of the product.

QL2: Component replacement (corrective, and thus not an element of the maintenance schedule).

QL3: Maintenance work that requires partial disassembly of the product.

QL4: Maintenance work that requires complete disassembly of the product.

### **Supplementary information on maintenance and preservation:**

Change intervals for fluids and lubricants and details on preservation can be obtained in the relevant specifications of the component manufacturers and MTU Fluids and Lubricants Specifications. The latest version is also available at: <http://www.mtu-online.com>, for engine-generator sets at: <http://www.mtuonsiteenergy.com>.

Components which are not listed in this maintenance schedule must be serviced in accordance with Manufacturer's Instructions.

This maintenance schedule does not apply to engines with an EPA/CARB emission certificate.

## 1.2 Allocation matrix application group 1D, 1DS

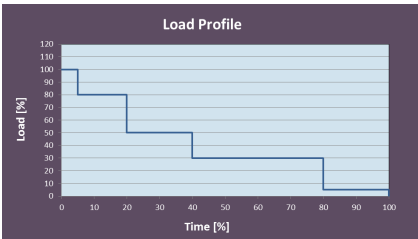
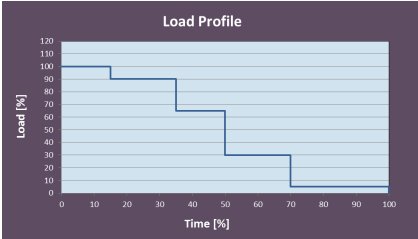
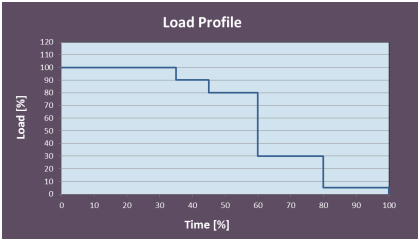
Load profile		Non-EPA, V2000Mx6, V2000Mx6x						
Load %	Time %	Load factor %	Load indicator %	0 - 103 kW/cyl.	104 - 112 kW/cyl.	113 - 122 kW/cyl.		
110 <sub>(100-110)</sub>	—	0 - 40	≤ 8	6,000	6,000	6,000	—	
100 <sub>(90-100)</sub>	5							
90 <sub>(80-90)</sub>	—							
80 <sub>(65-80)</sub>	15							
65 <sub>(50-65)</sub>	—							
50 <sub>(30-50)</sub>	20							
30 <sub>(5-30)</sub>	40							
Idle <sub>(0-5)</sub>	20							
110 <sub>(100-110)</sub>	—	41 - 50	≤ 23	6,000	5,000	4,000	—	
100 <sub>(90-100)</sub>	15							
90 <sub>(80-90)</sub>	20							
80 <sub>(65-80)</sub>	—							
65 <sub>(50-65)</sub>	15							
50 <sub>(30-50)</sub>	—							
30 <sub>(5-30)</sub>	20							
Idle <sub>(0-5)</sub>	30							
110 <sub>(100-110)</sub>	—	51 - 63	≤ 41	6,000	4,000	4,000	—	
100 <sub>(90-100)</sub>	35							
90 <sub>(80-90)</sub>	10							
80 <sub>(65-80)</sub>	15							
65 <sub>(50-65)</sub>	—							
50 <sub>(30-50)</sub>	—							
30 <sub>(5-30)</sub>	20							
Idle <sub>(0-5)</sub>	20							

Table 2: Allocation matrix application group 1D, 1DS

## 1.3 Maintenance schedule matrix 6,000 h

### 0 to 6,000 Operating hours

Task	Limit	Operating hours [h]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
		Daily	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					

w = weeks  
m = months  
a = years

Task	Limit	Operating hours [h]																			
		Daily	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000							
W3003	18 a													X							
W3004	18 a													X							
W3005	18 a													X							
W3006	18 a													X							
W3007	18 a													X							
W3011	18 a													X							
W3012	18 a													X							
W3013	18 a													X							
W3040	18 a													X							
W3041	18 a													X							
W3042	18 a													X							
W3043	18 a													X							
W3056	18 a													X							
W3057	18 a													X							
W3100	18 a													X							
W3108	18 a													X							
W3152	18 a													X							
W3177	18 a													X							
w = weeks m = months a = years																					

## 1.4 Maintenance tasks 6,000 h

Qualification level	Interval [h]	Limit	Item	Maintenance tasks	Option	Task
Engine						
QL 1	-	1 a	Fuel servicing plant	Check alarm function of differential pressure gauge.	X	W1245
				Check pump capacity.	X	W1246
QL 1	-	2 a	Fuel servicing plant	Check function of bar electrode.	X	W1244
				Replace filter elements.	X	W4126
QL 1	-	2 a	Engine oil filter	Fit new engine oil filters each time the engine oil is changed or, at the latest, on expiry of the time limit (given in years).		W1008
QL 1	Daily	-	Engine operation	Check engine oil level.		W0500
				Carry out visual inspection of engine for general condition and leaks.		W0501
				Inspect intercooler drain system.		W0502
				Inspect service indicator of air filter.		W0503
				Check relief bores of coolant pump(s).		W0505
				Check for abnormal running noises, exhaust gas color and vibration.		W0506
				Drain off water and contamination from fuel prefilter.	X	W0507
				Check differential pressure gauge of fuel prefilter.	X	W0508
QL 1	500	2 a	Fuel filter	Fit new fuel filter or new fuel filter insert.		W1001
QL 1	500	2 a	Fuel prefilter	Fit new fuel prefilter or new fuel prefilter insert.	X	W1675
QL 1	1000	1 a	Engine mounts	Carry out visual inspection of engine mounts for general condition.		W1463
QL 1	1000	2 a	Valve gear	Check valve clearance, adjust if necessary.		W1002
QL 1	3000	3 a	Air filters	Fit new air filters.		W1005
QL 1	3000	3 a	Coolant expansion tank	Replace valve.		W1296
QL 1	6000	18 a	Combustion chambers	Inspect cylinder chambers using endoscope.		W1011
QL 1	6000	18 a	Fuel injectors	Replace fuel injectors.		W1006
QL 1	6000	18 a	Engine governor	Reset parameters of drift correction (CDC) and enter injector coding (IIG).		W1636
QL 3	3000	5 a	Engine mounts	Check for cracks. Measure height of rubber element.		W1812
QL 3	6000	18 a	Component maintenance	Before starting maintenance work, drain the coolant and flush the cooling systems.		W2000
				Clean air ducting.		W2002
				Clean intercooler and inspect for leakage.		W2003
				Check engine coolant thermostat and fit new thermal actuator.		W2006
				Clean engine coolant cooler and inspect it for leaks.		W2017
				Clean engine oil cooler and inspect it for leaks.		W2018
				Clean fuel cooler.		W2059
				Fit new seals/sealing materials for all disassembled components.		W2062
				Inspect rocker arms, valve bridges, pushrods and ball joints for wear.		W2074
				Overhaul engine coolant pump.		W2110
				Overhaul raw-water pump.		W2111
				Overhaul bilge pump.	X	W2112
				Clean raw-water based intercooler and check for leaks.		W2166
QL 3	6000	18 a	Cylinder heads	Overhaul cylinder heads.		W1134
QL 3	6000	18 a	Crankcase breathers	Fit new oil separators.		W1055
QL 3	6000	18 a	Turbochargers	Overhaul turbochargers.		W1038
				Fit new compressor wheels for turbochargers.		W1472
QL 4	6000	18 a	Extended component maintenance	Completely disassemble the engine. Inspect engine components as per assembly instructions and repair or fit new components as required.		W3000
w = weeks m = months a = years						



Qualification level	Interval [h]	Limit	Item	Maintenance tasks	Option	Task
				Replace all elastomeric parts and seals with new ones.		W3001
				Fit new conrod bearings.		W3003
				Fit new crankshaft bearings.		W3004
				Fit new cylinder liners.		W3005
				Fit new antifriction bearings for auxiliary PTOs.	X	W3006
				Fit new high-pressure fuel pump.		W3007
				Fit new actuating cylinders for air flow control flaps.		W3011
				Fit new actuator cylinders for exhaust flaps.		W3012
				Fit new exhaust flap bearings.		W3013
				Fit new pistons.		W3040
				Overhaul starter.		W3041
				Overhaul battery-charging generator.	X	W3042
				Fit new fuel pressure relief valve.		W3043
				Fit new wire meshes for crankcase ventilation system.		W3056
				Fit new high-pressure fuel sensor.		W3057
				Fit new rubber elements of engine mounts.		W3100
				Check vibration damper, fit new one if necessary.		W3108
				Replace diverter valve.	X	W3152
				Check engine oil pump, replace if necessary.		W3177
w = weeks m = months a = years						

## 1.5 Maintenance schedule matrix 5,000 h

### 0 to 5,000 Operating hours

Task	Limit	Operating hours [h]																									
		Daily	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000															
Engine																											
W1245	1 a																										
W1246	1 a																										
W1244	2 a																										
W4126	2 a																										
W1008	2 a																										
W0500	-	X																									
W0501	-	X																									
W0502	-	X																									
W0503	-	X																									
W0505	-	X																									
W0506	-	X																									
W0507	-	X																									
W0508	-	X																									
W1001	2 a		X	X	X	X	X	X	X	X	X	X															
W1675	2 a		X	X	X	X	X	X	X	X	X	X															
W1463	1 a			X		X		X		X		X															
W1002	2 a			X		X		X		X		X															
W1005	3 a						X					X															
W1296	3 a						X					X															
W1011	18 a											X															
W1006	18 a											X															
W1636	18 a											X															
W1812	5 a						X					X															
W2000	18 a											X															
W2002	18 a											X															
W2003	18 a											X															
W2006	18 a											X															
W2017	18 a											X															
W2018	18 a											X															
W2059	18 a											X															
W2062	18 a											X															
W2074	18 a											X															
W2110	18 a											X															
W2111	18 a											X															
W2112	18 a											X															
W2166	18 a											X															
W1134	18 a											X															
W1055	18 a											X															
W1038	18 a											X															
W1472	18 a											X															
W3000	18 a											X															
W3001	18 a											X															
w = weeks m = months a = years																											

w = weeks  
m = months  
a = years

Task	Limit	Operating hours [h]																											
		Daily	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000																	
W3003	18 a											X																	
W3004	18 a											X																	
W3005	18 a											X																	
W3006	18 a											X																	
W3007	18 a											X																	
W3011	18 a											X																	
W3012	18 a											X																	
W3013	18 a											X																	
W3040	18 a											X																	
W3041	18 a											X																	
W3042	18 a											X																	
W3043	18 a											X																	
W3056	18 a											X																	
W3057	18 a											X																	
W3100	18 a											X																	
W3108	18 a											X																	
W3152	18 a											X																	
W3177	18 a											X																	
w = weeks m = months a = years																													

## 1.6 Maintenance tasks 5,000 h

Qualification level	Interval [h]	Limit	Item	Maintenance tasks	Option	Task
Engine						
QL 1	-	1 a	Fuel servicing plant	Check alarm function of differential pressure gauge.	X	W1245
				Check pump capacity.	X	W1246
QL 1	-	2 a	Fuel servicing plant	Check function of bar electrode.	X	W1244
				Replace filter elements.	X	W4126
QL 1	-	2 a	Engine oil filter	Fit new engine oil filters each time the engine oil is changed or, at the latest, on expiry of the time limit (given in years).		W1008
QL 1	Daily	-	Engine operation	Check engine oil level.		W0500
				Carry out visual inspection of engine for general condition and leaks.		W0501
				Inspect intercooler drain system.		W0502
				Inspect service indicator of air filter.		W0503
				Check relief bores of coolant pump(s).		W0505
				Check for abnormal running noises, exhaust gas color and vibration.		W0506
				Drain off water and contamination from fuel prefilter.	X	W0507
				Check differential pressure gauge of fuel prefilter.	X	W0508
QL 1	500	2 a	Fuel filter	Fit new fuel filter or new fuel filter insert.		W1001
QL 1	500	2 a	Fuel prefilter	Fit new fuel prefilter or new fuel prefilter insert.	X	W1675
QL 1	1000	1 a	Engine mounts	Carry out visual inspection of engine mounts for general condition.		W1463
QL 1	1000	2 a	Valve gear	Check valve clearance, adjust if necessary.		W1002
QL 1	2500	3 a	Air filters	Fit new air filters.		W1005
QL 1	2500	3 a	Coolant expansion tank	Replace valve.		W1296
QL 1	5000	18 a	Combustion chambers	Inspect cylinder chambers using endoscope.		W1011
QL 1	5000	18 a	Fuel injectors	Replace fuel injectors.		W1006
QL 1	5000	18 a	Engine governor	Reset parameters of drift correction (CDC) and enter injector coding (IIG).		W1636
QL3	2500	5 a	Engine mounts	Check for cracks. Measure height of rubber element.		W1812
QL3	5000	18 a	Component maintenance	Before starting maintenance work, drain the coolant and flush the cooling systems.		W2000
				Clean air ducting.		W2002
				Clean intercooler and inspect for leakage.		W2003
				Check engine coolant thermostat and fit new thermal actuator.		W2006
				Clean engine coolant cooler and inspect it for leaks.		W2017
				Clean engine oil cooler and inspect it for leaks.		W2018
				Clean fuel cooler.		W2059
				Fit new seals/sealing materials for all disassembled components.		W2062
				Inspect rocker arms, valve bridges, pushrods and ball joints for wear.		W2074
				Overhaul engine coolant pump.		W2110
				Overhaul raw-water pump.		W2111
				Overhaul bilge pump.	X	W2112
				Clean raw-water based intercooler and check for leaks.		W2166
QL3	5000	18 a	Cylinder heads	Overhaul cylinder heads.		W1134
QL3	5000	18 a	Crankcase breathers	Fit new oil separators.		W1055
QL3	5000	18 a	Turbochargers	Overhaul turbochargers.		W1038
				Fit new compressor wheels for turbochargers.		W1472
QL4	5000	18 a	Extended component maintenance	Completely disassemble the engine. Inspect engine components as per assembly instructions and repair or fit new components as required.		W3000
w = weeks m = months a = years						

Qualification level	Interval [h]	Limit	Item	Maintenance tasks	Option	Task
				Replace all elastomeric parts and seals with new ones.		W3001
				Fit new conrod bearings.		W3003
				Fit new crankshaft bearings.		W3004
				Fit new cylinder liners.		W3005
				Fit new antifriction bearings for auxiliary PTOs.	X	W3006
				Fit new high-pressure fuel pump.		W3007
				Fit new actuating cylinders for air flow control flaps.		W3011
				Fit new actuator cylinders for exhaust flaps.		W3012
				Fit new exhaust flap bearings.		W3013
				Fit new pistons.		W3040
				Overhaul starter.		W3041
				Overhaul battery-charging generator.	X	W3042
				Fit new fuel pressure relief valve.		W3043
				Fit new wire meshes for crankcase ventilation system.		W3056
				Fit new high-pressure fuel sensor.		W3057
				Fit new rubber elements of engine mounts.		W3100
				Check vibration damper, fit new one if necessary.		W3108
				Replace diverter valve.	X	W3152
				Check engine oil pump, replace if necessary.		W3177
w = weeks m = months a = years						

## 1.7 Maintenance schedule matrix 4,000 h

### 0 to 4,000 Operating hours

Task	Limit	Operating hours [h]																			
		Daily	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000											
Engine																					
W1245	1 a																				
W1246	1 a																				
W1244	2 a																				
W4126	2 a																				
W1008	2 a																				
W0500	-	X																			
W0501	-	X																			
W0502	-	X																			
W0503	-	X																			
W0505	-	X																			
W0506	-	X																			
W0507	-	X																			
W0508	-	X																			
W1001	2 a		X	X	X	X	X	X	X	X											
W1675	2 a		X	X	X	X	X	X	X	X											
W1463	1 a			X		X		X		X											
W1002	2 a			X		X		X		X											
W1005	3 a					X				X											
W1296	3 a					X				X											
W1011	18 a									X											
W1006	18 a									X											
W1636	18 a									X											
W1812	5 a					X				X											
W2000	18 a									X											
W2002	18 a									X											
W2003	18 a									X											
W2006	18 a									X											
W2017	18 a									X											
W2018	18 a									X											
W2059	18 a									X											
W2062	18 a									X											
W2074	18 a									X											
W2110	18 a									X											
W2111	18 a									X											
W2112	18 a									X											
W2166	18 a									X											
W1134	18 a									X											
W1055	18 a									X											
W1038	18 a									X											
W1472	18 a									X											
W3000	18 a									X											
W3001	18 a									X											
w = weeks m = months a = years																					

w = weeks  
m = months  
a = years

Task	Limit	Operating hours [h]																											
		Daily	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000																			
W3003	18 a									X																			
W3004	18 a									X																			
W3005	18 a									X																			
W3006	18 a									X																			
W3007	18 a									X																			
W3011	18 a									X																			
W3012	18 a									X																			
W3013	18 a									X																			
W3040	18 a									X																			
W3041	18 a									X																			
W3042	18 a									X																			
W3043	18 a									X																			
W3056	18 a									X																			
W3057	18 a									X																			
W3100	18 a									X																			
W3108	18 a									X																			
W3152	18 a									X																			
W3177	18 a									X																			
w = weeks m = months a = years																													

## 1.8 Maintenance tasks 4,000 h

Qualification level	Interval [h]	Limit	Item	Maintenance tasks	Option	Task
Engine						
QL 1	-	1 a	Fuel servicing plant	Check alarm function of differential pressure gauge.	X	W1245
				Check pump capacity.	X	W1246
QL 1	-	2 a	Fuel servicing plant	Check function of bar electrode.	X	W1244
				Replace filter elements.	X	W4126
QL 1	-	2 a	Engine oil filter	Fit new engine oil filters each time the engine oil is changed or, at the latest, on expiry of the time limit (given in years).		W1008
QL 1	Daily	-	Engine operation	Check engine oil level.		W0500
				Carry out visual inspection of engine for general condition and leaks.		W0501
				Inspect intercooler drain system.		W0502
				Inspect service indicator of air filter.		W0503
				Check relief bores of coolant pump(s).		W0505
				Check for abnormal running noises, exhaust gas color and vibration.		W0506
				Drain off water and contamination from fuel prefilter.	X	W0507
				Check differential pressure gauge of fuel prefilter.	X	W0508
QL 1	500	2 a	Fuel filter	Fit new fuel filter or new fuel filter insert.		W1001
QL 1	500	2 a	Fuel prefilter	Fit new fuel prefilter or new fuel prefilter insert.	X	W1675
QL 1	1000	1 a	Engine mounts	Carry out visual inspection of engine mounts for general condition.		W1463
QL 1	1000	2 a	Valve gear	Check valve clearance, adjust if necessary.		W1002
QL 1	2000	3 a	Air filters	Fit new air filters.		W1005
QL 1	2000	3 a	Coolant expansion tank	Replace valve.		W1296
QL 1	4000	18 a	Combustion chambers	Inspect cylinder chambers using endoscope.		W1011
QL 1	4000	18 a	Fuel injectors	Replace fuel injectors.		W1006
QL 1	4000	18 a	Engine governor	Reset parameters of drift correction (CDC) and enter injector coding (IIG).		W1636
QL 3	2000	5 a	Engine mounts	Check for cracks. Measure height of rubber element.		W1812
QL 3	4000	18 a	Component maintenance	Before starting maintenance work, drain the coolant and flush the cooling systems.		W2000
				Clean air ducting.		W2002
				Clean intercooler and inspect for leakage.		W2003
				Check engine coolant thermostat and fit new thermal actuator.		W2006
				Clean engine coolant cooler and inspect it for leaks.		W2017
				Clean engine oil cooler and inspect it for leaks.		W2018
				Clean fuel cooler.		W2059
				Fit new seals/sealing materials for all disassembled components.		W2062
				Inspect rocker arms, valve bridges, pushrods and ball joints for wear.		W2074
				Overhaul engine coolant pump.		W2110
				Overhaul raw-water pump.		W2111
				Overhaul bilge pump.	X	W2112
				Clean raw-water based intercooler and check for leaks.		W2166
QL 3	4000	18 a	Cylinder heads	Overhaul cylinder heads.		W1134
QL 3	4000	18 a	Crankcase breathers	Fit new oil separators.		W1055
QL 3	4000	18 a	Turbochargers	Overhaul turbochargers.		W1038
				Fit new compressor wheels for turbochargers.		W1472
QL 4	4000	18 a	Extended component maintenance	Completely disassemble the engine. Inspect engine components as per assembly instructions and repair or fit new components as required.		W3000
w = weeks m = months a = years						



Qualification level	Interval [h]	Limit	Item	Maintenance tasks	Option	Task
				Replace all elastomeric parts and seals with new ones.		W3001
				Fit new conrod bearings.		W3003
				Fit new crankshaft bearings.		W3004
				Fit new cylinder liners.		W3005
				Fit new antifriction bearings for auxiliary PTOs.	X	W3006
				Fit new high-pressure fuel pump.		W3007
				Fit new actuating cylinders for air flow control flaps.		W3011
				Fit new actuator cylinders for exhaust flaps.		W3012
				Fit new exhaust flap bearings.		W3013
				Fit new pistons.		W3040
				Overhaul starter.		W3041
				Overhaul battery-charging generator.	X	W3042
				Fit new fuel pressure relief valve.		W3043
				Fit new wire meshes for crankcase ventilation system.		W3056
				Fit new high-pressure fuel sensor.		W3057
				Fit new rubber elements of engine mounts.		W3100
				Check vibration damper, fit new one if necessary.		W3108
				Replace diverter valve.	X	W3152
				Check engine oil pump, replace if necessary.		W3177
w = weeks m = months a = years						