DIRECTORATE GENERAL BORDER ROADS

GENERAL MAINTENANCE INSTRUCTION NO. 246

ON OPERATION AND MAINTENANCE OF SNOW SWEEPER MAKE SCHMIDT MODEL CJS 914 SUPER-II

INTRODUCTION:

(a) The Snow Sweeper make Schmidt model CJS (Compact Jet Sweeper) 914 Super-II fitted with Mercedes Benz Engine model OM 501 LA V-6 turbocharged, water cooled, developing power output 260 KW (354 PS) at 1800 rpm meets Euromot-III A guidelines (main engine for carrier vehicle) and Sweeper/Blower Engine model OM 502 LA developing power output 230 KW (313 PS) at 1800 rpm (auxiliary engine mounted on rear for providing drives of hydraulic pump of Blower, Cross Brush, Steering pump and Dual action pump of Oil cooler and control of cross brush & Blast nozzle flaps) with Power steering, 2 Circuit compressed air-pressure brake system, variable speed Transmission, Auxiliary rear axle steering. **It is a combined Snow Plough (Optional), inter axle Sweeper and Blower**.

(b) This GMI gives the technical specification and know how on the operation, maintenance and repair procedure of Snow Sweeper make Schmidt model CJS 914 Super-II to ensure maximum performance and safe/satisfactory operation. Compliance with procedure given in this GMI will enable to get desired maximum service from the equipment.

(c) Maintenance of Snow Sweeper make Schmidt model CJS 914 Super-II will lead to long life, trouble free operation and less frequent break downs and also to reduce maintenance cost. The periodic maintenance must be carried out according to the **'Periodic Maintenance Schedule'** described in this GMI. Daily care, inspection and Periodic Maintenance are essential for preventing troubles and accidents to ensure satisfaction and safe operation for prolonging the operating life of the equipment. All information and instructions given in this GMI is based on the latest Operator's manual and service booklet provided by the firm.

AIM:

The instructions are issued as guidelines for general, preventive maintenance schedule and lubrication of Snow Sweeper make Schmidt model CJS 914 Super-II manufactured by M/s SCHMIDT Winterdienst-und, Germany for regular attention to keep the equipment in good mechanical condition which must be strictly followed.

ACTION BY:

(a) User unit: To carryout periodic inspection and monitor regular/periodical maintenance as laid down in this instruction and record the tasks done in log book.

(b) Field Workshop:

(i) To carryout and monitor maintenance schedule and oil changes as per periodical maintenance laid down in the maintenance instructions and to check the record of maintenance including lubrication.

(ii) To advise the user unit in respect of any lapse noticed.

(c) Mobile Maintenance Team**:** To ensure that proper maintenance is carried out and submit report accordingly to Task Force Commander and OC Wksp for their necessary action.

DETAILS:

This instruction includes the following aspects:-

a)	Procedure for Operation and Maintenance	- Appendix 'A'
b)	Periodic Maintenance schedule	- Appendix 'B'
c)	Technical Specification	- Appendix 'C'
d)	Recommended Lubricants with filling capacity	- Appendix 'D'
e)	Telligent Maintenance System	- Appendix 'E'

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Appendix 'A'

PROCEDURE FOR OPERATION AND MAINTENANCE

1. Ensure that the machine is operational and safe before use.

2. The safety belt provided must be worn properly.

3. Ensure that no persons are located in the immediate hazardous area around the machine.

4. Ensure that the machine moves in the expected direction of travel. If the steering wheel is turned too sharply before moving, the machine may move at a sharp angle from the desired direction of travel.

5. Lower the speed before turning the steering wheel. Steering wheel is only to be turn quickly if driving slowly.

6. The machine may only be run at top speed if the driver/operator is completely familiar with the machine operation.

7. When traveling down hill, ensure that the machine is always kept under control. Don't drive too fast.

8. Ensure that the hand brake is actuated, ignition key removed and all windows/doors closed/locked before exiting the machine.

9. Maximum permitted speed must not be exceeded under any circumstances.

10. Before reversing the machine ensure that nobody is behind the machine.

11. Don't operate the machine if the covers or flaps are loose or missing.

12. If the machine is to be towed and the brakes are defective, a tow bar must be used. The permitted maximum speed for towing is 5 km/h.

13. Don't mount the machine in areas that are not provided with foot steps or hand holds.

14. Before starting work on the machine or on the moving parts, hand brake must be actuated and ignition key be removed.

15. Keep loose items of clothing away from moving machinery.

16. Don't remove the radiator cap if the engine and radiator are hot to avoid serious scalding.

17. Before raising the machine with a vehicle jack, ensure that the machine has been parked on solid/flat surface.

18. Never work under a machine ie. only supported with jacks.

19. Don't place tools or parts on the battery to avoid electric shock or burns.

20. The hand brake must not be engaged while driving except in an emergency. Engaging the parking brake can damage the transmission.

21. When driving between work locations, ensure that working machinery (snow plough, cross brush, blow unit) are fastened in transport position.

22. Don't start the engine if the oil level warning light glows and oil level is too low.

23. Don't run the engine at the top rpm till normal operating temperature is obtained.

24. Don't warm up the engine at the minimum rpm with no load to obtain operational temperature quickly either drive the machine or switch on for additional load.

25. To avoid damage to engine and turbo charger do not switch off the engine immediately and allow cooling for at least two minutes at low rpm before stopping.

26. Don't pour coolant to a hot engine to avoid damages.

27. Disconnect the negative battery pole before carrying out any electrical work and arc welding works.

28. Faults in auxiliary steering can lead to serious accidents. The auxiliary steering only works with the engine is work.

29. Depressurise the hydraulic couplings completely before connecting the hydraulic system. Depressurise all hyd lines before dismantling for repair work and check all hyd hoses regularly and replace if necessary.

30. If the auxiliary engine is cold, engine switches to a warm up phase after the start process. The remaining warm up time and the temp difference (Eng oil, Hyd oil, Coolant) to set start temp are shown.

31. Ensure that snow plough and sweeper is raised while reversing the machine.

32. Electro hydraulic pump is provided to enable actuation of hydraulic control functions for service work without starting engine.

33. The machine is not to be used for sweeping corrosives or explosive materials, combustible liquids or other hazardous goods.

34. Automatic operation in automatic mode is only possible with the hand brake disengaged.

35. No arrows or flashing arrows indicate that the sweeper machine is not in the end position or in working position. If the sweeper in to working position, 2 arrows must be illuminated (sweeper is in lowered and pivoted position).

36. Switching off or adjusting the snow plough relief has a negative influence on the sweeping area or the sweeping performance of the sweeper.

37. When the Cross Brush is switched on, working travel is only to be initiated if the adjustment process of the cross brush is complete. The 'Brush speed' and 'Drive power' symbols must be finished flashing. The setting is done after each restart and after pressing the 'RESET' button.

38. In manual mode, the snow plough can be pivoted and raised in any position.

39. Working lights can also be switched on via a switch in the switch panel of the vehicle.

40. Before parking the machine, lower snow plough to float position, raise & switch off blower and cross brush and shut off auxiliary engine.

41. Sweep range adjustment is always to be performed on an even surface.

42. Various sweeping surface characteristics (rough/smooth, dry/wet etc) cause the wear of the brush to be uneven so that the sweep range will have to be adjusted. By actuating the button, sweep range is reset without having to start the sweeper again (switch off ignition).

43. Castor wheels can be damaged. Before reversing the sweeper machine, raise Snow plough & Sweeper.

44. All safety and hazard instructions must be observed and retained in full and in a legible condition.

45. Maintenance, repair and service work must only be carried out when the machine and machine components are safely parked on a level, load bearing surface and secured against rolling away or tipping over. Maintenance in higher lying areas (adding oil, engine air filter, fan cleaning, etc.) must be carried out using appropriate climbing aids (ladder) and service platforms.

46. The cutting edges of snow plough must be replaced when the wear limit of 80 mm is reached.

47. Brushes of cross brush must be replaced when a bristle length of 30 mm is reached.

48. Always set distance of the rubber bars (Blast nozzle) to level ground: 60 mm. If the setting of the rubber bars is exceeded, it must be reset via the slots. If this is no longer possible, the rubber bars must be replaced.

49. Central lubrication unit will only function when the snow sweeper ignition is switched on.

50. The lubrication points marked in gray in the lubrication schedule are supplied though the central lubrication unit.

51. Always change filter elements and Lub oils at the same time.

52. Manually operating the hydraulic solenoids in the case of an emergency can result in dangerous movements. Appropriate safety measures must be made before any such work is under taken.

53. When the work is finished, protective eqpt must be re-fitted and a check made to ensure that all parts are present. A functional test must be preformed.

54. All hydraulic lines must be checked for leak before the machine is cleaned.

55. After the machine is cleaned, check all hydraulic fluid lines are loose connections, abrasion marks and damage. Correct any defeats, identified in this check immediately. Before commencing repair work, all pneumatic, water or hydraulic circuits that will need to be open must be depressurized.

Appendix 'B'

PERIODIC MAINTENANCE SCHEDULE

Maintenance work	Service intervals in hours				Remarks
	Daily	50	100	500	
Twin Wheel					
Check Tyre pressure	*				
Check wheel nut for tightness	*				
Castor wheel lifting eqpt					
Ice-free	*				
Rubber bars					
Check Ground clearance	*				
Check Wear	*				
Blower					
Check intake Grille for damage	*				
Check impeller wheel housing for foreign objects	*				
Lubricate Left/right flap actuation linkage with machine oil lightly			*		
Check Flat mounting screwed connection	*				
Bearing (Greasing)(6 Nipples)			*		
Hydraulic System/Tank					
Check Oil level	*				
Leakage in Hyd system	*				
Change pressure and return Hyd filter		*		*	
Top up filter for wash out				*	
Changing hyd oil				*	Change when oil is warm
Cleaning of old grease from grease nipples					Before lubrication
Adding Hyd oil					Through filling filter only
Hydraulic oil Cooler					
Check intake Grille for damage	*				
Check Fan housing for foreign objects	*				
Display					
Observe error messages	*				
Cross Brush					
Tighten bolts and Screws	*				As and when required
Rotating assy (Greasing) (4 Nipples)		*			
Wear of cylindrical brush	*				
Check Left/Right cylindrical brush mounting screwed connection			*		
Check/adjust angle of inclination (approx 3^0)				*	
Lubricate Left/Right cylinder and castor wheel pivot point greasing (1 Nipple each)		*			
Lubricate Left/Right castor wheel hub, bearing and guide greasing (I Nipple each)		*			

Maintenance work	Service intervals in hours				Remarks
	Daily	50	100	500	
Wiper					
Maintain distance of 20 mm upto Cross brush	*				
Central Lubrication Unit (optional)					
Check the Lub level of the grease reservoir	*				
Functional test					After every 25 hrs /every repair/maint work
General Maintenance					
Drive shafts joint (Greasing) (1 Nipple)			*		
Emergency stop button for functionality			*	*	
Check status, routing suspension and leaks of exhaust system		*			
Check coolant level and leaks		*			
Check anti freeze in cooling system				*	
Check lighting and signal system		*			
Check and protect against grease contact of electrical plug-in connections				*	
Check battery connection and acid level			*		
Check for proper seal of drive components, hyd pumps and hyd motors		*			
Check for play, leakage damage & wear of axle components and steering components		*			
Check status, routing suspension and leaks of brake/hyd hoses and lines			*		
Check status and tension of drive belts of pump drive, cooling fan etc,			*		
Check condition of warning plates		*			

Appendix 'C'

TECHNICAL SPECIFICATION

Description	**Snow Sweeper make Schmidt model CJS (Compact Jet Sweeper) 914 Super-II**
Engine	
Make/Model/Type	Mercedes Benz Type OM 501 LA , 6 cylinder, 90^0 V Engine, Direct Injection (PLD), Exhaust turbocharger, intercooler
Engine capacity	11950 cm^3
Maximum output	260 KW (354 PS) at 1800 rpm
Maximum Torque	1730 Nm at 1080 rpm
Total weight	18,300 kg
Cross Brush weight	2,400 kg
Idle speed	550 rpm (approx)
Oil pressure at idle speed	Min 0.5 bar
Oil pressure at rated engine speed	Min 2.5 bar
Operating temperature	80 – 95^0C
Max permissible coolant temperature	110^0C
Blower Nozzle weight	150 kg
Rated engine speed	1800 rpm
Cooling	Water circulation
Exhaust level	EUROMOT II
Control	Fully Electronic Engine Management
Brush Drive	
Type of drive	Hydrostatic
Variable displacement pump	Delivery volume 125 cm^3/U with maximum pressure 420 bar
Constant Motor	Displacement volume 2x125 cm^3/rev with maximum pressure 420 bar
Fan Drive	
Variable displacement pump	Delivery volume 180 cm^3/rev with maximum pressure 420 bar
Constant Motor	Displacement volume 90 cm^3/rev with maximum pressure 420 bar
Sweeper apparatus	
Brush length	4200 mm
Sweeping range	3400 mm

Angle adjustment	36^0
Brush diameter	914 mm
Brush rpm max	Approximate 770 rpm
Brush speed	Variable adjustment
Blast nozzle	
Blower output	530 cum/sec
Maximum speed	3300 rpm
Air outlet	Left/Right
Controller for blast nozzle and cross brush	Hydraulic pump on the line auxiliary drive of the auxiliary engine
Maximum delivery flow/volume	23 lpm
Permissible operating pressure	180 bar
Drive for brush, blast nozzle control and oil cooler fan	
Dual pump on auxiliary engine	Bosch HY/ZFF S 11/11+11
Circuit-1	Fan drive for oil cooler
Circuit-2	Control cross brush blow-out direction
Delivery volume	Circuit 1 & 2 – 11 cm^3
Maximum delivery flow	Circuit 1 & 2 – 24 lpm
Permissible operating pressure	Circuit 1 & 2 – 180 bar
Controller for snow plough, engine cover and auxiliary steering	Single or dual pump on the vehicle engine
Circuit-1	Snow plough control, engine cover open with 150 bar and closes with 80 bar
Circuit-2	Auxiliary rear axle steering
Delivery volume	Circuit 1 – 11 cm^3 Circuit 2 --19 cm^3
Maximum delivery flow	Circuit 1 – 23 lpm Circuit 2 -- 39 lpm
Permissible operating pressure	Circuit 1 – 230 bar Circuit 2 -- 160 bar
Tyre size and pressure	445/95 R25 and 9 bar
Battery	12V x 220 AH – 02 Nos
Dimensions	
Length excluding snow plough	9295 mm
Height upto top of cabin	3760 mm
Height of Eqpt on rear end	3170 mm
Wheel base	5400 mm
Length with snow plough in tilted position	12200 mm
Width with snow plough in tilted position	4750 mm

Width of Eqpt on rear end	3100 mm
Operating data	
Compressed air system (Supply pressure)	
Service brake	11-12.5 bar
Brake circuit-1	Minimum 6.8 bar
Brake Circuit-2	Minimum 6.8 bar
Brake Circuit on trailer/semi-trailer	Minimum 5.5 bar
Pressure regulator (Activation deactivations pressure)	11- 12 .5 bar (approx)
Spring loaded brake release circuit	Min 5.5 bar
External compressed air source (charging the compressed air system)	Min 10 bar
Gear shift	Min 7 bar
Auxiliary consumers	Min 5.5 bar
Steering play	
Max permissible steering play (Measured the ream of steering wheel with the engine running)	30 mm
Telligent level control (Pneumatic suspension)	
Filling the pneumatic suspension through the tyre inflator connection or front coupling head	Min 10.3 bar

Appendix 'D'

RECOMMENDED LUBRICANTS WITH FILLING CAPACITY

S/No	Item	Grade of Lubricant/oil	IOC Grade	Filling Capacity
a)	Engine Mercedes Benz OM 501 LA V-6 (with oil filter)	Engine oil 15W 40 (from -25^{0}C) / 5W 40 (from -40^{0}C)	SP CF4 15W 40/Servo Pride XL 15W 40/ SS MG 20W40	40 Ltrs
b)	Transfer case	Transmission oil	Servo Gear HP 80W/ Servo Gear Super 80W 90/ 10W30	10.2 Ltrs
c) (i)	Transmission with out oil cooler	Transmission oil		10 Ltrs
(ii)	Transmission with oil cooler	Transmission oil		15 Ltrs
(iii)	Transmission Torque converter Clutch	Transmission oil		50 Ltrs
d) (i)	All wheel drive Front axle	Hypoid Gear oil	Servo Gear HP 80W/ Servo Gear Super 80W 90/ 10W30	7 Ltrs
(ii)	Planetary Hub Front Axle	Hypoid Gear oil		1.5 ltrs each
(iii)	Through drive front axle	Hypoid Gear oil		(+) 1.0 ltrs
e) (i)	Rear axle	Hypoid Gear oil		14 Ltrs
(ii)	Planetary Hub Rear Axle	Hypoid Gear oil		3.25 ltrs each
(iii)	Through drive rear axle	Hypoid Gear oil		(+) 1.0 ltrs
(iv)	With Trilex Rim	Hypoid Gear oil		2.5 Ltrs
f)	Hyd Oil	ATF SUFFIX A (from -25^{0}C)/BP AUTRAN DX D-22309 (from -40^{0}C)	Servo Transmission Fluid 'A'	110 ltrs (Hyd Tank)
g)	Cooling system	Coolant	Antifreeze Coolant	45 Ltrs
h)	Multipurpose Grease for Nipples	K2 K20 DIN 51825 T-1(from -25^{0}C)/Utol K2 N40 (from -40^{0}C)	Servo Gem EP2	-
j)	Multipurpose Grease for Central Lubrication Unit	Fluid Grease NiGL 00/ Fluid Grease NiGL 0 (from-25^{0}C)		-
k)	Fuel Tank	Diesel fuels		300 – 1430 ltrs
l)	Auxiliary Heating system	Diesel fuels		40 ltrs
m)	Hyd Fan Motor and semi-trailer hydraulic (SLT)	Hyd oil HLP 32	Servo System HLP 32	150 Ltrs
n)	Retarder	Eng oil		5.9 ltrs
o)	AdBlue tank	AdBlue		2595 ltrs
p)	Windscreen washer/Head lamp cleaning system	Water with Wind screen washer concentrate S-for Summer & W- for Winter		16 ltrs
q)	All linkages, Couplings, Pins, slide piece and Joints	Multi purpose Grease	Servo Gem EP2	-
r)	Battery cable terminals	Acid proof grease		-
s)	Engine compartment & under body	Wax preservative		-

Note : Never mix two different brands of oil.

Appendix 'E'

TELLIGENT MAINTENANCE SYSTEM

1. Snow Sweeper is equipped with the Telligent Maintenance System. The maintenance intervals are calculated by a Computer and are dependent on vehicle load. The Telligent Maintenance System calculates service due dates for the machine and its assemblies based on the operating conditions. We can call up the service due dates calculated for the machine in the on-board computer. The predicted due date, remaining distance/period and maintenance work required on machine are shown in the display.

2. Additional load independent maintenance work, which is not calculated by Computer, is to be carried out as set time intervals.

3. Display messages are shown automatically in the display and can include:
   (a) Operating information
   (b) Fault messages
   (c) Warnings

To distinguish the different level of importance of messages, individual segments of the status display light up in white, yellow or red.

4. Display messages are shown automatically. Operating and Road safety of the machine may be impaired and jeopardised if there is a display message with any colour status indicator. Depending on the significance of the event, the status indicator will also light up in one of the following colours:
   (i) White
   (ii) Yellow
   (iii) Red

5. In addition to the display message, an indicator lamp can also light up on the instrument panel or the warning tone can sound. Display messages can be hidden and called up at a later time in the Event info menu. If an indicator lamp lights up in addition to the display message, this will not go out even after the display message has been acknowledged. If more than one display is displayed, the display shows the messages in succession. In the event of a serious malfunction, the display message is accompanied by a warning buzzer, and the STOP lamp lights up.

6. The service due dates are first displayed automatically 14 days before the respective service is due. When the service due date has been reached or exceeded, the display shows additional messages. Not observing service messages and not having service work performed on time can lead to increased wear and damage to the machine and its assemblies.

7. Only operate the on-board computer when the machine is stationery and the parking brake is applied. The on-board computer is accessed using the buttons on the multi-function steering wheel and instrument panel. The on-board computer activated when turn the veh key to the drive position in the ignition lock. The on-board computer provides following information while driving the machine:

   (a) Fuel consumption
   (b) Journey time
   (c) Events
   (d) Operating conditions
   (e) Service due date
   (f) Malfunctions and cause of malfunctions
   (g) Measures

Telligent Maintenance

S/No	Maintenance work	Remarks
	Engine oil service	
1.	Change Engine oil and oil filter (observe oil grade setting in maintenance system, change if necessary)	
	General Maintenance Work	
2.	Adjust V3-check valve clearances	
3.	Replace Fuel pre filter with water separator element	
4.	Clean fuel pre-filter element	
5.	Replace fuel filter	
6.	Check build gap of Retarder	
7.	Replace screen filter of clutch actuator	During 1st inspection
8.	Re-tighten Nuts and Bolts of Front axle spring clamp, anti roll bar arm and front spring bracket, anti roll bar arm and rear axle/tralling axle, wishbone on the rear axle, tralling axle, tensioning strap, fuel tank and cabin mounting on rear of cabin	During 1st inspection
9.	Oil change of manual transmission observe oil grade setting in maintenance system, change if necessary)	
10.	Clean filter of Torque converter clutch	
11.	Replace filter of power take off	
12.	Change oil of Retarder (including heat exchanger)	
13.	Change oil of transfer case (observe oil grade setting in maintenance system, change if necessary)	
14.	Change oil of front axle (observe oil grade setting in maintenance system, change if necessary)	
15.	Change oil of Through-drive housing (Front axle)	
16.	Change oil of rear axles (observe oil grade setting in maintenance system, change if necessary)	
17.	Change oil of Through-drive housing (Rear axle)	
18.	Remove dust from air filter with dust extraction valve	
19.	Replace AdBlue filter of engine	At every second maint service
20.	Replace filter for oil trap (every other Retarder oil change)	At every second maint service
21.	Oil change of Tipper unit	Once in a year

S/No	Maintenance work	Remarks
22.	Lubricating of steering knuckle, trailer coupling with grease gun, tipper unit, brake camshaft (drum brake only), axle load compensation (Four axle vehicle), All propeller shaft universal joint and Nummek axle	Once in a year
23.	Check function of signals, indicator lamp, wind screen wipers, wind screen washer system and head lamp cleaning system.	Once in a year
	Checking for leak and damage	
	Check for areas of abrasion and incorrect routing. In case of fluid loss, find cause and remedy	
24.	Engine, Transmission, Retarder, Transfer case, front axle, Rear axle, steering, power steering pump, auxiliary steering, hydrostatic cooling fan drive, cabin tipping unit (All major assys)	Once in a year
25.	All lines, hoses and censor cables	Once in a year
26.	All reservoirs, eqpt, shock absorbers, covers, bellows, protective caps	Once in a year
27.	Intake pipe between air filter and engine	Once in a year
28.	Check condition of radiator, tubes and hoses in the cooling and heating system	Once in a year
29.	Check corrosion/antifreeze protection in engine cooling system and Battery. Correct the fluid level	Once in a year
30.	Check poly-V-belt of engine for wear and damage	Once in a year
31.	Check and correct tyre pressure	Once in a year
32.	Replace the heating/ventilation dust filter	Once in a year
	Work relevant to safety	
33.	Readout the brake lining wear on the display	Once in a year
34	Check play and adjustment of automatic load dependent brake (Not applicable to vehicle with telligent brake system)	Once in a year
35	Check the release path of the wheel brake cylinders(drum brake only)	Once in a year
36	Check the condition of steering mechanism	Once in a year
37	Inspect visually for damage of leaf spring/air spring Bellows	Once in a year
38	Check function, play and adjustment of tipper unit, semi-trailer coupling and trailer coupling	Once in a year
39	Check setting of head lamps and adjust if necessary	Once in a year
40	Oil and filter change in rear mounted cooling system fan drive	After every two years
41	Renew grease; check tapered roller bearing of wheel hub of front axle and wheel hub of leading/trailing axle.	After every two years
42	Replace granulate cartridge of compressed air drier	After every two years
43	Replace air filter element of engine (observe installation date)	After every three years
44	Renew coolant in engine (observe coolant mixture ratio)	After every three years
45	Fill AdBlue pressure reservoir in engine	After every three years
46	Replace auxiliary air conditioning dust filter	After every three years
47	Confirm completed jobs (reset intervals). Check oil grade and SAE classification. Change the service data in the display. Change if necessary.	Final Jobs
48	Change oil grade using STAR DIAGNOSIS (Check oil grade set for transfer case and axles, change if necessary)	Final Jobs
49	Ensure that the machine is road worthy (visual inspection/road test/dynamometer)	Final Jobs