



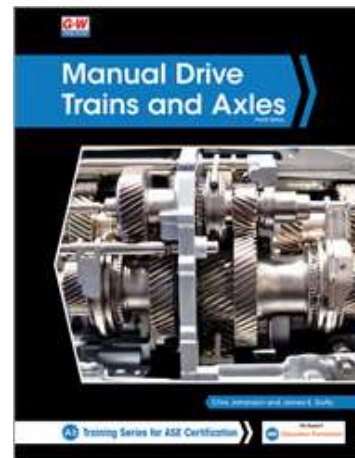
**Correlation of
Manual Drive Trains and Axles, Johanson and Duffy
(Goodheart-Willcox Publisher ©2021)**

**to the
2022 ASE Education Foundation Master Automobile Service Technology (MAST) Task
List**

The following chart correlates the *Manual Drive Trains and Axles* textbook and shop manual (©2022) to the 2022 ASE Education Foundation Master Automobile Service Technology (MAST) Task List.

The correlation below lists the ASE Education Foundation Master Automobile Service Technology Tasks, priority levels, corresponding page numbers from the *Manual Drive Trains and Axles* textbook, and corresponding job numbers from the *Manual Drive Trains and Axles* Shop Manual.

For more information on the ASE Education Foundation standards, please visit www.aseeducationfoundation.org.



MANUAL DRIVE TRAIN AND AXLES

For every task in Manual Drive Train and Axles, the following safety requirement must be strictly enforced:

- Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

Task Number and Description	Priority	G-W Content
III. MANUAL DRIVE TRAIN AND AXLES		
A. General		
1. Research vehicle service information such as fluid type, vehicle service history, service precautions, technical service bulletins, and recalls including vehicles equipped with advanced driver assistance systems (ADAS).	P-1	Textbook: pg. 52–56, 99-100, 172 Jobs 1, 2, 3, 4, 5

Task Number and Description	Priority	G-W Content
2. Identify manual drive train and axles components and configurations.	P-1	Textbook: pg. 12-22, 105-121, 158-177, 206-222, 244-253, 258-272, 310-330, 366-390 Jobs 2-3
3. Retrieve and record DTCs, OBD monitor status, and freeze frame data; clear codes and data when directed.	P-1	Textbook: pg. 51-52, 401-402, 456-470 Job 4
4. Check fluid condition; check for leaks; determine needed action.	P-1	Textbook: pg. 180-183, 227, 238-239, 290-291, 338, 396, Jobs 5-6
5. Drain and refill manual transmission/transaxle and final drive unit; use proper fluid type per manufacturer specification.	P-1	Textbook: pg. 172, 188, 201, 227, 239, 267, 339, 414-415, Jobs 26-27, 35
6. Diagnose drive train concerns; determine needed action.	P-1	Textbook: pg. 126-132, 180-184, 227-229, 258-260, 290-291, 336-338, 396-405, 422-424 Jobs 5, 7-10
III. MANUAL DRIVE TRAIN AND AXLES		
B. Clutch		
1. Check and adjust clutch master cylinder fluid level; check for leaks; use proper fluid type per manufacturer specification.	P-2	Textbook: pg. 117, 119, 134-135 Jobs 16, 18
2. Diagnose clutch noise, binding, slippage, pulsation, and chatter; determine needed action.	P-2	Textbook: pg. 127-132 Job 16
3. Inspect clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots, and springs; determine needed action.	P-2	Textbook: pg. 114-115, 134-135 Jobs 16-17
4. Inspect and/or replace clutch pressure plate assembly, clutch disc, release (throw-out) bearing, linkage, and pilot bearing/bushing (as applicable).	P-2	Textbook: pg. 141-142, 145-150 Jobs 19-20
5. Bleed clutch hydraulic system.	P-2	Textbook: pg. 119-120, 136-137 Job 18
6. Inspect flywheel and ring gear for wear, cracks, and discoloration; determine needed action.	P-2	Textbook: pg. 142-145 Job 20
7. Measure flywheel runout and crankshaft end play; determine needed action.	P-2	Textbook: pg. 142-143 Job 20
8. Describe the operation and service of a system that uses a dual mass flywheel.	P-3	—
III. MANUAL DRIVE TRAIN AND AXLES		
C. Transmission/Transaxle		

Task Number and Description	Priority	G-W Content
1. Describe the operational characteristics of an electronically controlled manual transmission/transaxle.	P-2	Textbook: pg. 171–172 Jobs 4, 10
2. Inspect, adjust, lubricate, and/or replace shift linkages, brackets, bushings, cables, pivots, and levers.	P-2	Textbook: pg. 185, 226 Job 10
3. Diagnose noise concerns through the application of transmission/transaxle powerflow principles; determine needed action.	P-2	Textbook: pg. 180–184, 228–229 Job 5
4. Diagnose hard shifting and jumping out of gear concerns; determine needed action.	P-2	Textbook: pg. 180–184, 228 Jobs 5, 10, 16, 22, 24
5. Diagnose transaxle final drive assembly noise and vibration concerns; determine needed action.	P-2	Textbook: pg. 229 Jobs 5, 24
6. Disassemble, inspect, clean, and reassemble internal transmission/transaxle components.	P-3	Textbook: pg. 189–201, 231–238 Jobs 22, 23–25
III. MANUAL DRIVE TRAINS AND AXLES		
D. Drive Shaft and Half Shaft, Universal and Constant-Velocity (CV) Joints (Front, Rear, All-Wheel, and Four-Wheel Drive)		
1. Inspect and/or remove/replace bearings, hubs, and seals.	P-1	Textbook: pg. 71-78, 89-92, 261, 295–298 Jobs 11, 13
2. Inspect and/or service/replace shafts, yokes, boots, and universal/CV joints.	P-1	Textbook: pg. 89, 291–306 Jobs 11–12
3. Check for leaks at drive assembly and transfer case seals; check vents; check fluid level; use proper fluid type per manufacturer specification.	P-2	Textbook: pg. 89-92, 227, 267, 291-292, 338-339, 396, 398 Job 6
4. Diagnose constant-velocity (CV) joint noise and vibration concerns; determine needed action.	P-1	Textbook: pg. 290-291 Jobs 6, 12–13
5. Diagnose universal joint noise and vibration concerns; determine needed action.	P-1	Textbook: pg. 258–266 Jobs 6, 7, 8–9, 11
6. Check shaft balance and phasing; measure shaft runout; measure and adjust driveline angles; determine needed action.	P-2	Textbook: pg. 261–266 Jobs 7, 8–9
III. MANUAL DRIVE TRAIN AND AXLES		
E. Differential and Drive Axles		
E.1 Ring and Pinion Gears and Differential Case Assembly		
1. Inspect differential housing; check for leaks; inspect housing vent.	P-1	Textbook: pg. 314, 338 Jobs 33, 35
2. Check and adjust differential housing fluid level; use proper fluid type per manufacturer specification.	P-1	Textbook: pg. 338-339 Jobs 5, 35

Task Number and Description	Priority	G-W Content
3. Drain and refill differential housing; use proper fluid type per manufacturer specification.	P-1	Textbook: pg. –339 Job 35
4. Inspect and replace companion flange and/or pinion seal; measure companion flange runout.	P-2	Textbook: pg. 337-338, 353-354 Job 7
5. Inspect ring gear and measure runout; determine needed action.	P-2	Textbook: pg. 358–359 Jobs 33, 34
6. Diagnose noise and vibration concerns; determine needed action.	P-2	Textbook: pg. 336, 337–338 Job 5
7. Remove, inspect, reinstall or replace drive pinion and ring gear, spacers, sleeves, and bearings.	P-2	Textbook: pg. 350–359 Jobs 33–34
8. Measure and adjust drive pinion depth.	P-2	Textbook: pg. 354 Job 34
9. Measure and adjust drive pinion bearing preload.	P-2	Textbook: pg. 354 Job 34
10. Measure and adjust side bearing preload and ring and pinion gear total backlash and backlash variation on a differential carrier assembly (threaded cup or shim types).	P-2	Textbook: pg. 354–359 Job 34
11. Check ring and pinion tooth contact patterns; perform needed action.	P-2	Textbook: pg. 346–347, 359 Job 34
12. Disassemble, inspect, measure, adjust, and/or replace differential pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case.	P-2	Textbook: pg. 354–355 Job 34
13. Reassemble and reinstall differential case assembly; measure runout; determine needed action.	P-2	Textbook: pg. 352–361 Jobs 34, 35
E.2 Drive Axles		
1. Inspect and replace drive axle wheel studs.	P-2	Textbook: pg. 343 Job 31
2. Remove and replace drive axle shafts.	P-1	Textbook: pg. 339–345 Jobs 12, 28–30
3. Inspect and replace drive axle shaft seals, bearings, and retainers.	P-2	Textbook: pg. 340–344 Jobs 12, 28–29
4. Measure drive axle flange runout and shaft end play; determine needed action.	P-2	Textbook: pg. 336–338 Jobs 7, 28–29
5. Diagnose drive axle shafts, bearings, and seals for noise, vibration, and fluid leakage concerns; determine needed action.	P-2	Textbook: pg. 336–338 Jobs 5-6, 13
E.3 Limited Slip Differential		
1. Diagnose noise, slippage, and chatter concerns including electronically controlled systems; determine needed action.	P-3	Textbook: pg. 338–339, 345 Jobs 5, 33-34

Task Number and Description	Priority	G-W Content
2. Measure rotating torque; determine needed action.	P-3	Textbook: pg. 345, 354-355 Job 35
III. MANUAL DRIVE TRAIN AND AXLES F. Four-Wheel Drive/All-Wheel Drive		
1. Identify concerns related to variations in tire circumference and/or final drive ratios.	P-1	Textbook: pg. 396–397 Jobs 5, 36
2. Inspect, adjust, and repair shifting controls (mechanical, electrical, and vacuum), bushings, mounts, levers, and brackets.	P-2	Textbook: pg. 397-399 Jobs 4-5, 10, 38
3. Inspect axle locking mechanisms; determine needed action(s).	P-3	Textbook: pg.415 Job 38
4. Check for leaks at drive assembly and transfer case seals; check vents; check fluid level; use proper fluid type per manufacturer specification.	P-2	Textbook: pg. 396-399 Jobs 6, 36
5. Diagnose noise, vibration, and unusual steering concerns; determine needed action.	P-2	Textbook: pg. 396–399 Jobs 5, 36
6. Diagnose, test, adjust, and/or replace electrical/electronic components of four-wheel drive/all-wheel drive systems.	P-2	Textbook: pg. 399–406 Jobs 4, 10, 38
7. Disassemble, service, and reassemble transfer case and components.	P-3	Textbook: pg. 406–415 Job 37