PRINCE 'MB' MODELS
(MB21BB5C1 SHOWN)

ITEM: PART NO.: DESCRIPTION:
1 * 660270005 VALVE BODY
2 * 660570003 RELIEF CARTRIDGE, ADJUSTABLE
3 * LOAD CHECK CARTRIDGE
4 660170005 SPRING CENTER KIT, GFN
5 660170056 HANDLE HOUSING KIT, GFN
6 660170055 HANDLE KT
7 660170057 SEAL KIT (1 THRU 6 SPOOLS)
8 660570003 - NOT SERVICED SEPERATELY

PRINCE MODEL 'MB' SPECIFICATIONS:
MAXIMUM OPERATING PRESSURE: 3500 PSI
MAXIMUM TANK PRESSURE: 500 PSI
NOMINAL FLOW RATING: 8 GPM
MAX. OPERATING TEMPERATURE: 180°F
FILTRATION RECOMMENDATIONS: ISO 4406 19/17/14
STD. PORT SIZE (INLET, OUTLET, POWER BEYOND AND WORK PORTS): 5/8 SAE ORB, 3/4-16UNF-2B
RECOMMENDED FLUID: HIGH QUALITY MINERAL BASED HYDRAULIC FLUID WITH VISCOSITY FROM 12 cSt TO 400 cSt.

RELIEF VALVE: AN ADJUSTABLE RELIEF VALVE CARTRIDGE IS STANDARD ON ALL 'MB' MODELS. THE STANDARD FACTORY SETTING IS 2500 PSI @ 6 GPM. STANDARD ADJUSTMENT RANGE IS 2000 PSI TO 3500 PSI.
THE RELIEF SETTING IS ADJUSTED BY LOOSENING THE JAM NUT, AND TURNING THE ADJUSTING SCREW. TURNING THE ADJUSTING SCREW CLOCKWISE INCREASES RELIEF PRESSURE AND COUNTERCLOCKWISE DECREASES RELIEF PRESSURE (A PRESSURE GAUGE MUST BE INSTALLED IN THE INLET LINE OR PORT WHENEVER THE RELIEF PRESSURE IS ADJUSTED).

WARNING: OVERPRESSURE MAY CAUSE SUDDEN AND UNEXPECTED FAILURE OF A COMPONENT IN THE HYDRAULIC SYSTEM RESULTING IN SERIOUS PERSONAL INJURY. ALWAYS USE A GAUGE WHEN ADJUSTING A RELIEF VALVE.

FOR STANDARD MODELS AVAILABLE & ADDITIONAL INFORMATION GO TO: www.princehyd.com

TORQUE NOTES:
RELIEF CARTRIDGE: 350-400 IN-LBS.
LOAD CHECK ASSY: 200-230 IN-LBS.
CAP SCREW, 5 mm (GFN): 10-12 IN-LBS.
H.P. CARRYOVER PLUG: 55-65 IN-LBS.
NOTE: CARRYOVER PLUG IS 1/4-19 BSPT AND IS NOT COMPATIBLE WITH 1/4-18 NPTF PLUGS.
EXAMPLE 'MB' VALVE HYDRAULIC CIRCUIT, STANDARD OPEN CENTER:

STANDARD OPEN CENTER OPERATION: DO NOT INSTALL THE HIGH PRESSURE CARRY OVER PLUG. EITHER THE TOP OR THE SIDE T PORTS OR THE C PORT MAY BE USED AS THE OUTLET. STEEL PLUGS MUST BE INSTALLED IN UNUSED PORTS.

NOTE: INTERNAL H.P. CARRY OVER PLUG IS NOT INSTALLED. EXTERNAL STEEL PORT PLUG IS REQUIRED. DISCARD H.P. CARRY OVER PLUG.

PRESSURE RELIEF VALVE
NOTE: THIS RELIEF LIMITS THE MAX PUMP PRESSURE IN THE CIRCUIT.

SIDE & TOP OUTLET PORTS
PRESSURE LINE (INLET)

RETURN LINE (OUTLET)
NOTE: THIS PORT MUST RETURN TO TANK.

MOVING HANDLE TOWARDS VALVE DIRECTS FLOW TO THE PORT CLOSEST TO THE SPRING ATTACHMENT END OF VALVE. MOVING THE HANDLE AWAY FROM VALVE DIRECTS FLOW TO THE PORT CLOSEST TO THE HANDLE.

EXAMPLE 'MB' VALVE CIRCUIT USING OPTIONAL POWER BEYOND OPTION:

OPTIONAL POWER BEYOND OPERATION: INSTALL THE HIGH PRESSURE CARRY OVER PLUG (1/4-18 BSPT) INTO THE INTERNAL THREADS TO THE INSIDE OF THE "C" PORT. CONNECT A HYDRAULIC LINE FROM THE "C" PORT TO A DOWNSTREAM FUNCTION AND THE "T" PORT TO TANK. WITH ALL SPOOLS CENTERED, OIL FLOW IS DIRECTED TO THE POWER BEYOND PORT 'C' FOR USE BY THE DOWNSTREAM FUNCTION. WHEN A SPOOL IS SHIFTED, OIL WILL BE DIRECTED TO A WORK PORT AND THE RETURN FLOW TO TANK.

NOTE: INTERNAL H.P. CARRY OVER PLUG IS NOT INSTALLED. EXTERNAL STEEL PORT PLUG IS REQUIRED. DISCARD H.P. CARRY OVER PLUG.

PRESSURE RELIEF VALVE
NOTE: THIS RELIEF IS OPTIONAL. IT CANNOT BE SET HIGHER THAN THE FIRST VALVE'S RELIEF, BUT MAY BE SET LOWER.

THE INTERNAL H.P. CARRYOVER PLUG MUST BE INSTALLED IN THIS VALVE FOR POWER BEYOND OPERATION.

PRESSURE RELIEF VALVE
NOTE: THIS RELIEF LIMITS THE MAX PUMP PRESSURE IN THE CIRCUIT.

POWER BEYOND FLOW
PRESSURE LINE (INLET)

RETURN LINE (OUTLET)
NOTE: THIS PORT MUST RETURN TO TANK.

RETURN FROM UPSTREAM VALVE
NOTE: THIS PORT MUST RETURN TO TANK.

VALVE WITH POWER BEYOND CONFIGURATION

CLOSED CENTER OPERATION:
BOTH THE INTERNAL HIGH PRESSURE CARRY OVER PLUG AND A STEEL PLUG MUST BE INSTALLED IN THE C PORT. RELIEF PRESSURE MAY NEED TO BE ADJUSTED SO IT IS NOT SET LOWER THAN THE PUMP SETTING.

FOR STANDARD MODELS AVAILABLE & ADDITIONAL INFORMATION GO TO: www.princehyd.com

ADDITIONAL SERVICE PARTS

PART NO.: DESCRIPTION:
612100001 SPool, Motor
660270006 No-Relief Plug
671900122 High Pressure Carry Over Plug (NOTE: PLUG IS 1/4-19 BSPT AND IS NOT COMPATIBLE WITH 1/4-18 NPTF PLUGS)
660170058 3 Position Detent Kit
671400307 End Cap, GFN (w/ Screws)
671400306 End Cap, Aluminum (w/ Screws 50-60 In-Lbs)
660170060 Handle Housing Kit, Aluminum (w/ Screws 50-60 In-Lbs)
670400111 Knob, Rubber
660170061 Joystick Assy, Complete (SEE www.princehyd.com FOR INSTALLATION DETAIL)

REF. SCHEMATIC FOR MB21BB5C1
PRODUCT NOTES:
1. SINGLE SPOOL VALVE ASSY, 4-WAY 3-POSITION CYLINDER SPOOL, SPRING CENTER ACTION. (POWER BEYOND AND CLOSED CENTER CONVERTIBLE)
2. MAX OPERATING PRESSURE: 3500 PSI
   RELIEF PRESSURE SETTING: 2500 PSI (ADJUSTMENT RANGE: 2000-3500 PSI)
   MAX TANK PRESSURE: 500 PSI
   NOMINAL FLOW RATING: 8 GPM
   MAX OPERATING TEMPERATURE: 180°F
3. PORT SIZE (INLET/OUTLET, WORK PORTS, POWER BEYOND):
   #8 SAE/ORB (3/4-16UNF-2B)
4. TOP INLET PORT, TOP OUTLET PORT AND POWER BEYOND PORT ARE TO BE SEALED WITH STEEL PLUGS.
5. NO PAINT
6. VALVE SHIPPED IN OPEN CENTER CONFIGURATION (HIGH PRESSURE CARRY-OVER PLUG IS TO BE SHIPPED UNINSTALLED).
7. HANDLE KIT IS TO BE SHIPPED UNATTACHED.
8. FILTRATION RECOMMENDATIONS: ISO 4406 19/17/14
9. NOTE: TORQUE ON CAPSCREWS HOLDING ON GFN HANDLE HOUSINGS AND GFN END CAPS TO BE 10-12 IN-LBS
10. FOR ADDITIONAL INFORMATION OR REPAIR KITS INFORMATION SEE INCLUDED INSTRUCTION SHEET OR WEBSITE: www.princehyd.com

INSTALL HIGH PRESSURE CARRYOVER PLUG FOR POWER BEYOND OPERATION. CONNECT "C" PORT TO DOWNSTREAM FUNCTION.
INSTALL HIGH PRESSURE CARRYOVER PLUG AND STEEL PORT PLUG IN "C" PORT FOR CLOSED CENTER OPERATION.

SINGLE SPOOL VALVE

SIDE INLET PORT
SIDE OUTLET PORT
POWER BEYOND PORT
VERTICAL OR HORIZONTAL HANDLE MOUNTING

HANDLE KIT (ONE PER SPOOL)
HIGH PRESSURE CARRY-OVER PLUG

B1 WORK PORT
A1 WORK PORT
A1' WORK PORT

M8 X 1.25 (REF)
3.78 (REF)
3.19 (REF)
2.09 (REF)
2.87 (REF)
1.30 (REF)

HEAVIES
MAT'L
P/N:
SEE DRAWING
ASS'Y:
N/A

PRODUCT NO: MB11B5C1
H/P: 1
D/O: 1
NEXT
ASSY: N/A
PRODUCT NOTES:
1. SINGLE SPOOL VALVE ASSY. 4-WAY 3-POSITION MOTOR SPOOL, 3 POSITION DETENT ACTION. 3 POSITION DETENT ACTION TO HAVE METAL END CAP AND HANDLE HOUSING. (POWER BEYOND AND CLOSED CENTER CONVERTIBLE)
2. MAX OPERATING PRESSURE: 3500 PSI
3. RELIEF PRESSURE SETTING: 2500 PSI @ 6 GPM FLOW (ADJUSTMENT RANGE: 2000-3500 PSI)
4. MAX TANK PRESSURE: 500 PSI
5. NOMINAL FLOW RATING: 8 GPM
6. MAX OPERATING TEMPERATURE: 180° F.
7. PORT SIZE (INLET/OUTLET, WORK PORTS, POWER BEYOND):
   #8 SAE/ORB (3/4-16UNF-2B)
8. TOP INLET PORT, TOP OUTLET PORT AND POWER BEYOND PORT ARE TO BE SEALED WITH STEEL PLUGS.
9. NO PAINT
10. VALVE SHIPPED IN OPEN CENTER CONFIGURATION (HIGH PRESSURE CARRY-OVER PLUG IS TO BE SHIPPED UNINSTALLED).
11. HANDLE KIT IS TO BE SHIPPED UNATTACHED.
12. FILTRATION RECOMMENDATIONS: ISO 4406 19/17/14
13. NOTE: TORQUE ON CAP SCREWS HOLDING ON GFN HANDLE HOUSINGS AND GFN END CAPS TO BE 10-12 IN-LBS.
14. FOR ADDITIONAL INFORMATION OR REPAIR KITS INFORMATION SEE INCLUDED INSTRUCTION SHEET OR WEBSITE: www.princehyd.com
PRODUCT NOTES:
1. TWO SPOOL VALVE ASSY, 4-WAY 3-POSITION CYLINDER SPOOLS, SPRING CENTER ACTION. (POWER BEYOND AND CLOSED CENTER CONVERTIBLE)
2. MAX OPERATING PRESSURE: 3500 PSI
   RELIEF PRESSURE SETTING: 2500 PSI @ 6 GPM FLOW (ADJUSTMENT RANGE: 2000-3500 PSI)
   MAX TANK PRESSURE: 500 PSI
   NOMINAL FLOW RATING: 8 GPM
   MAX OPERATING TEMPERATURE: 180° F.
3. PORT SIZE (INLET/OUTLET, WORK PORTS, POWER BEYOND):
   #8 SAE/ORB (3/4-16UNF-2B)
4. TOP INLET PORT, TOP OUTLET PORT AND POWER BEYOND PORT ARE TO BE SEALED WITH STEEL PLUGS.
5. NO PAINT
6. VALVE SHIPPED IN OPEN CENTER CONFIGURATION (HIGH PRESSURE CARRY-OVER PLUG IS TO BE SHIPPED UNINSTALLED).
7. HANDLE KITS ARE TO BE SHIPPED UNATTACHED.
8. FILTRATION RECOMMENDATIONS: ISO 4406 19/17/14
9. NOTE: TORQUE ON CAPSCREWS HOLDING ON GFN HANDLE HOUSINGS AND GFN END CAPS TO BE 10-12 IN-LBS.
10. FOR ADDITIONAL INFORMATION OR REPAIR KITS INFORMATION SEE INCLUDED INSTRUCTION SHEET OR WEBSITE: www.princehyd.com

INSTALL HIGH PRESSURE CARRYOVER PLUG FOR POWER BEYOND OPERATION. CONNECT "C" PORT TO DOWNSTREAM FUNCTION.
INSTALL HIGH PRESSURE CARRYOVER PLUG AND STEEL PORT PLUG IN "C" PORT FOR CLOSED CENTER OPERATION.
INSTALL HIGH PRESSURE CARRYOVER PLUG FOR POWER BEYOND OPERATION. CONNECT "C" PORT TO DOWNSSTREAM FUNCTION. INSTALL HIGH PRESSURE CARRYOVER PLUG AND STEEL PORT PLUG IN "C" PORT FOR CLOSED CENTER OPERATION.

NOTE: FIRST SPOOL (FLOAT) IS TILTED AWAY FROM BODY IN NEUTRAL POSITION, AS SHOWN. FLOAT SPOOL HANDLE IS TILTED TOWARDS BODY WHEN IN FLOAT DETENT POSITION.

PRODUCT NOTES:
1. TWO SPOOL VALVE ASSY; SPOOL 1 IS 4-WAY 4-POSITION FLOAT W/ SPRING CENTER & DETENT, SPOOL 2 IS 4-WAY 3-POSITION SPRING CENTER ACTION. (THE FLOAT SPOOL IS TO HAVE METAL END CAP AND HANDLE HOUSING.) (POWER BEYOND AND CLOSED CENTER CONVERTIBLE)
2. MAX OPERATING PRESSURE: 3500 PSI
   RELIEF PRESSURE SETTING: 2500 PSI @ 6 GPM FLOW (ADJUSTMENT RANGE: 2000-3500 PSI)
   MAX TANK PRESSURE: 500 PSI
3. PORT SIZE (INLET/OUTLET, WORK PORTS, POWER BEYOND):
   #8 SAE/ORB (3/4-16UNF-2B)
3. TOP INLET PORT, TOP OUTLET PORT AND POWER BEYOND PORT ARE TO BE SEALED WITH STEEL PLUGS.
5. NO PAINT
6. VALVE SHIPPED IN OPEN CENTER CONFIGURATION (HIGH PRESSURE CARRY-OVER PLUG IS TO BE SHIPPED UNINSTALLED).
7. HANDLE KITS ARE TO BE SHIPPED UNATTACHED.
8. FILTRATION RECOMMENDATIONS: ISO 4406 19/17/14
9. NOTE: TORQUE ON CAPSCREWS HOLDING ON GFN HANDLE HOUSINGS AND GFN END CAPS TO BE 10-12 IN-LBS.
10. FOR ADDITIONAL INFORMATION OR REPAIR KITS INFORMATION SEE INCLUDED INSTRUCTION SHEET OR WEBSITE: www.princehyd.com

HIGH PRESSURE CARRY-OVER PLUG

HANDLE KIT (ONE PER SPOOL)

SIDE INLET PORT

SIDE OUTLET PORT

TOP INLET PORT

TOP OUTLET PORT

POWER BEYOND PORT

'B2' WORK PORT

'A2' WORK PORT

'B1' WORK PORT

'A1' WORK PORT

'X' WORK PORT

PRINCE MANUFACTURING CORPORATION
612 NORTH DERBY LANE
P.O. BOX 7000
NORTH SIOUX CITY, SOUTH DAKOTA 57049-7000
www.princehyd.com
**THREE SPOOL VALVE ASSY**

- **P/N:** MB31BBB5C1
- **DATE:** 4/20/2009
- **DRAWN BY:** JM
- **CHECKED BY:** MO
- **APPROVED BY:** MO

**INSTALLATION:**
- **TOP OUTLET PORT**
- **SIDE OUTLET PORT**
- **SIDE INLET PORT**
- **TOP INLET PORT**
- **A1 WORK PORT**
- **B1 WORK PORT**
- **A2 WORK PORT**
- **B2 WORK PORT**
- **A3 WORK PORT**
- **B3 WORK PORT**

**PRODUCT NOTES:**
1. THREE SPOOL VALVE ASSY, 4-WAY 3-POSITION CYLINDER SPOOLS, SPRING CENTER ACTION (POWER BEYOND AND CLOSED CENTER CONVERTIBLE).
2. MAX OPERATING PRESSURE: 3500 PSI
   - RELIEF PRESSURE SETTING: 2500 PSI @ 6 GPM FLOW (ADJUSTMENT RANGE: 2000-3500 PSI)
   - MAX TANK PRESSURE: 500 PSI
   - NOMINAL FLOW RATING: 8 GPM
   - MAX OPERATING TEMPERATURE: 180° F.
3. PORT SIZE (INLET/OUTLET, WORK PORTS, POWER BEYOND):
   - #8 SAE/ORB (3/4-16UNF-2B)
4. TOP INLET PORT, TOP OUTLET PORT AND POWER BEYOND PORT ARE TO BE SEALED WITH STEEL PLUGS.
5. NO PAINT
6. VALVE SHIPPED IN OPEN CENTER CONFIGURATION (HIGH PRESSURE CARRY-OVER PLUG IS TO BE SHIPPED UNINSTALLED).
7. HANDLE KITS ARE TO BE SHIPPED UNATTACHED.
8. FILTRATION RECOMMENDATIONS: ISO 4406 19/17/14
9. NOTE: TORQUE ON CAPSCREWS HOLDING ON GFN HANDLE HOUSINGS AND GFN END CAPS TO BE 10-12 IN-LBS.
10. FOR ADDITIONAL INFORMATION OR REPAIR KITS INFORMATION SEE INCLUDED INSTRUCTION SHEET OR WEBSITE: www.princehyd.com
INSTALL HIGH PRESSURE CARRYOVER PLUG FOR POWER BEYOND OPERATION. CONNECT "C" PORT TO DOWNSTREAM FUNCTION.

INSTALL HIGH PRESSURE CARRYOVER PLUG AND STEEL PORT PLUG IN "C" PORT FOR CLOSED CENTER OPERATION.

PRODUCT NOTES:

1. FOUR SPOOL VALVE ASSY, 4-WAY 3-POSITION CYLINDER SPOOLS, SPRING CENTER ACTION. (POWER BEYOND AND CLOSED CENTER CONVERTIBLE)
2. MAX OPERATING PRESSURE: 3500 PSI. RELIEF PRESSURE SETTING: 2500 PSI @ 6 GPM FLOW (ADJUSTMENT RANGE: 2000-3500 PSI)
3. MAX TANK PRESSURE: 500 PSI
4. MAX OPERATING TEMPERATURE: 180°F
5. PORT SIZE (INLET/OUTLET, WORK PORTS, POWER BEYOND):
   - #8 SAE ORB (3/4-16 UNF-2B)
6. TOP INLET PORT, TOP OUTLET PORT AND POWER BEYOND PORT ARE TO BE SEALED WITH STEEL PLUGS.
7. NO PAINT
8. VALVE SHIPPED IN OPEN CENTER CONFIGURATION (HIGH PRESSURE CARRY-OVER PLUG IS TO BE SHIPPED UNINSTALLED).
9. HANDLE KITS ARE TO BE SHIPPED UNATTACHED.
10. FILTRATION RECOMMENDATIONS: ISO 4406 19/17/14

NOTE: TORQUE ON CAPSCREWS HOLDING ON GFN HANDLE HOUSINGS AND GFN END CAPS TO BE 10-12 IN-LBS.

FOR ADDITIONAL INFORMATION OR REPAIR KITS INFORMATION SEE INCLUDED INSTRUCTION SHEET OR WEBSITE; www.princehyd.com
PRODUCT NOTES:
1. FIVE SPOOL VALVE ASSY, 4-WAY 3-POSITION CYLINDER SPOOLS, SPRING CENTER ACTION. (POWER BEYOND AND CLOSED CENTER CONVERTIBLE)
2. MAX OPERATING PRESSURE: 3500 PSI
3. RELIEF PRESSURE SETTING: 2500 PSI @ 6 GPM FLOW (ADJUSTMENT RANGE: 2000-3500 PSI)
4. MAX TANK PRESSURE: 500 PSI
5. NO PAINT
6. VALVE SHIPPED IN OPEN CENTER CONFIGURATION (HIGH PRESSURE CARRY-OVER PLUG IS TO BE SHIPPED UNINSTALLED)
7. HANDLE KITS ARE TO BE SHIPPED UNATTACHED
8. FILTRATION RECOMMENDATIONS: ISO 4406 19/17/14
9. NOTE: TORQUE ON CAPSCREWS HOLDING ON GFN HANDLE HOUSINGS AND GFN END CAPS TO BE 10-12 IN-LBS.
10. FOR ADDITIONAL INFORMATION OR REPAIR KITS INFORMATION SEE INCLUDED INSTRUCTION SHEET OR WEBSITE; www.princehyd.com
PRODUCT NOTES:

1. SIX SPOOL VALVE ASSY, 4-WAY 3-POSITION CYLINDER SPOOLS, SPRING CENTER ACTION (POWER BEYOND AND CLOSED CENTER CONVERTIBLE)
2. MAX OPERATING PRESSURE: 3500 PSI
   RELIEF PRESSURE SETTING: 2500 PSI @ 6 GPM FLOW (ADJUSTMENT RANGE: 2000-3500 PSI)
   MAX TANK PRESSURE: 500 PSI
3. PORT SIZE (INLET/OUTLET, WORK PORTS, POWER BEYOND):
   #8 SAE/ORB (3/4-16UNF-2B)
4. TOP INLET PORT, TOP OUTLET PORT AND POWER BEYOND PORT ARE TO BE SEALED WITH STEEL PLUGS.
5. NO PAINT
6. VALVE SHIPPED IN OPEN CENTER CONFIGURATION (HIGH PRESSURE CARRY-OVER PLUG IS TO BE SHIPPED UNINSTALLED).
7. HANDLE KITS ARE TO BE SHIPPED UNATTACHED.
8. FILTRATION RECOMMENDATIONS: ISO 4406 19/17/14
9. NOTE: TORQUE ON CAPSCREWS HOLDING ON GFN HANDLE HOUSINGS AND GFN END CAPS TO BE 10-12 IN-LBS.
10. FOR ADDITIONAL INFORMATION OR REPAIR KITS INFORMATION SEE INCLUDED INSTRUCTION SHEET OR WEBSITE: www.princehyd.com

INSTALL HIGH PRESSURE CARRYOVER PLUG FOR POWER BEYOND OPERATION. CONNECT "C" PORT TO DOWNSTREAM FUNCTION.
INSTALL HIGH PRESSURE CARRYOVER PLUG AND STEEL PORT PLUG IN "C" PORT FOR CLOSED CENTER OPERATION.
VERTICAL OR HORIZONTAL HANDLE MOUNTING

HANDLE KIT (ONE PER SPOOL)