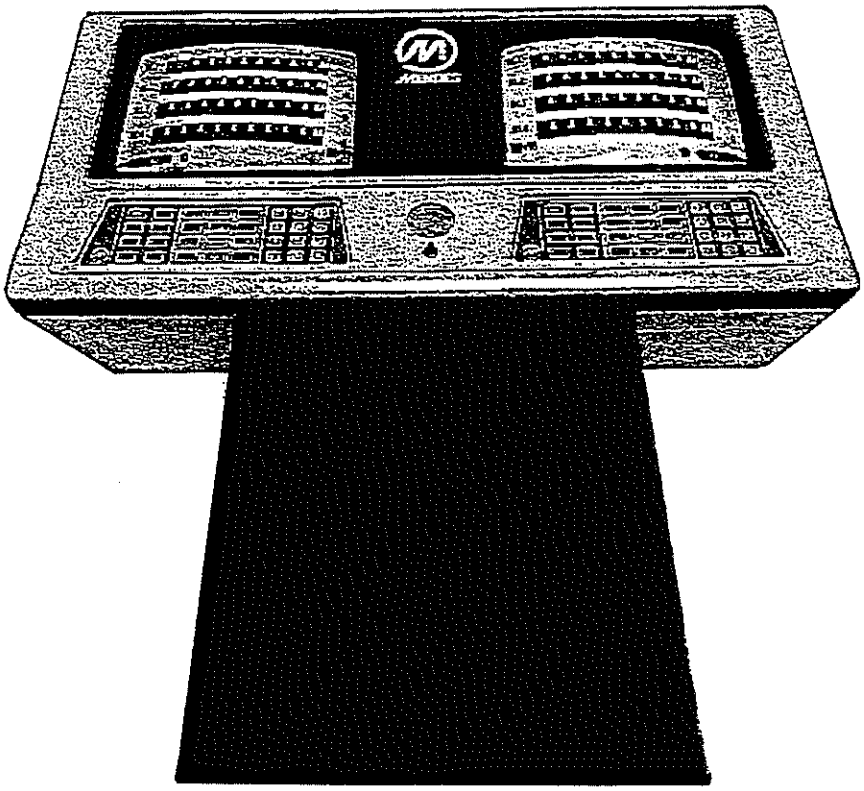
MENDES



MENDES 2001 AUTOMATIC SCORING SYSTEM

MENDES

TABLE OF CONTENTS

GENERAL DESCRIPTION

The **M**endes 2001 **A**uto**S**coring **S**ystem is made up of the following major components (items identified with an "*" are optional or are installation dependant):

- The player's console which includes the following sub components:

  - Two 13 inch color monitors;
  - Two keyboards;
  - The autoscoring electronics;
  - The intercom;*

- The 27 inch Overhead Units* which includes the following sub components:

  - Either two or three 27 inch color monitors;
  - The Coaxial Decoder Box (COAX BOX) which in turn can have 1*, 2* or 3* VIDEO CHANNELS.

- The Pinsetters Electronic Control Unit, which also includes a pair of Pinsetter Interface Units (PIU), one for each pinsetter.

- The pin detector system and ball detectors. In the case of the pin detection system there are two possible systems that are used:

  1) Normally, with free fall machines, we use our CCD pin detector camera.

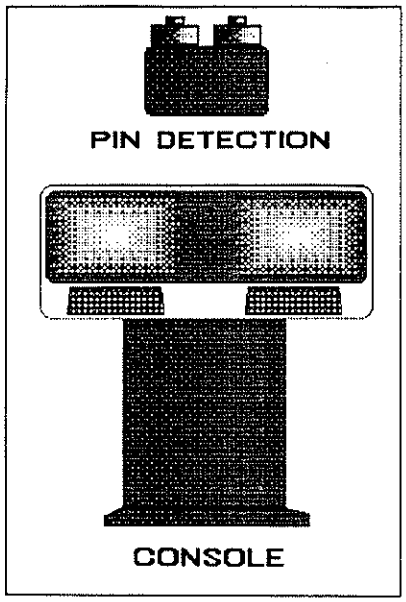
  2) With many string machines (not all of them) we are able to read the pin fall directly off the machine and translate the information for the autoscoring using specially designed electronics.

Please note, that the interface to a manager's control system is not covered since this component is quoted in all cases as a separate item.

There are five different possible configurations of the **M**endes 2001 **A**uto**S**coring **S**ystem they are:

MASS-V10
MASS-V20
MASS-V25
MASS-V30
MASS-V40

First of all, a small description of of each of the five possible configurations is in order.

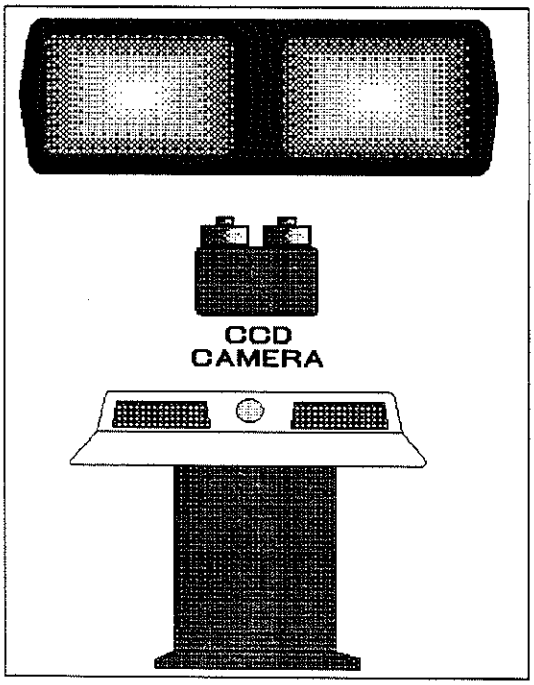


MASS-V10

Includes:

- Two 13 inch color Player's console and electronics;
- Pinsetter interface;
- Pin detection system for both lanes, be it the CCD camera or direct pinsetter reading.

This basic system is easily expandable at a later date to any of the other systems. Of course expansion to a overhead only system would no be the sugessted way to go but the conversion to MASS-V30 and MASS_V40 is simply a matter of adding an extra video board to the console and installing the overhead units. It is strongly recommended to have the wiring for the overheads installed at the same time as the intial installation if it is planned to upgrade at a latter date. This will cut down significantly on the installation costs of an upgrade. This system is aimed specifically towards low buget remodernisation and centers with low ceilings. It offers all the capabilities of the other systems lacking only in the TV / video interface.

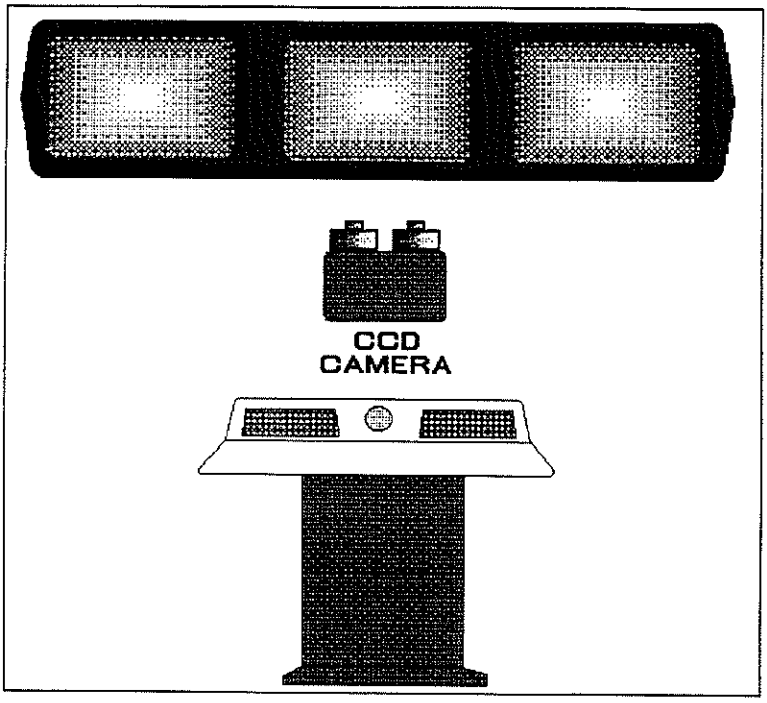


MASS-V20

Includes:

- Lower table with keyboards (no lower monitors) and electronics.
- Two 27 inch overhead monitors.
- Pinsetter interface;
- Pin detection system for both lanes, be it the CCD camera or direct pinsetter reading.

This system is expandable at a later date to any of the other systems. The ideal expansion would be to the MASS-V30 which is simply a matter of adding an extra video board to the console and adding the monitor table top. This system is aimed specifically towards low bugdet remodernisations and for proprietors who want a low console. It offers all the capabilities of the other systems lacking only in the TV / video interface.

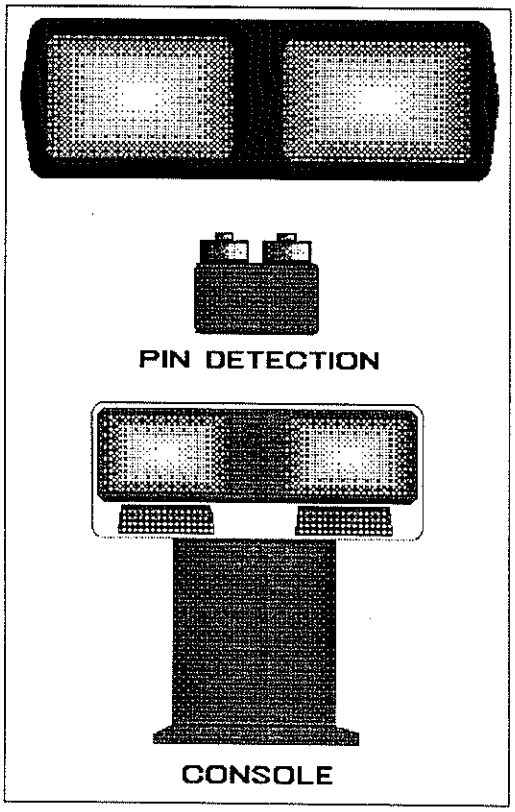


MASS-V25

Includes:

- Lower table with keyboards (no lower monitors) and electronics.
- Three 27 inch overhead monitors.
- Pinsetter interface;
- Pin detection system for both lanes, be it the CCD camera or direct pinsetter reading.

This system is expandable at a later date. The ideal expansion would be to the MASS-V40 which is simply a matter of adding an extra video board to the console and adding the monitor table top. This system is aimed specifically towards low bugdet remodernisations but still want TV / Video capablities or for proprietors who want a low console.

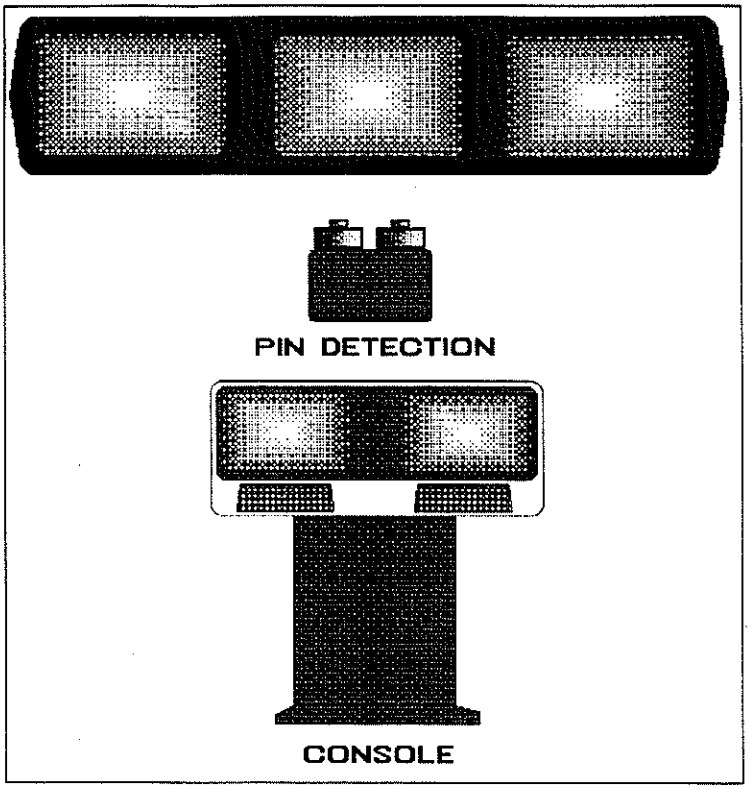


MASS-V30

Includes:

- Everything described in MASS-V10 plus;
- Two 27" overhead monitors
- The additional video board required in the console to drive the overhead monitors.

This system offers the capabilities most centers require (overheads and lower monitors). The overhead and lower monitor displays are totally independent, meaning the overheads are not a virtual copy of the lower monitors. The overhead is used to display the score sheets and graphic animation's while the lower monitors are used to display the score sheets or menus during player interaction with the keyboard. The TV interface, for both screens, (be 1, 2, or 3 channels) is a low cost and efficient option to this version of the Mendes Autoscoring System. The upgrade to MASS-V40 is done by changing the overhead casing for the three monitor one and adding a third 27 inch monitor.



MASS-V40

Includes:

- Everything described in MASS-V10 plus;
- The three monitor overhead unit.
- One TV / Video channel, expandible to 3.display.

This is the flagship of the Mendes AutoScoring Systems. It offers all the that any center could require. The system comes basic with the possibility to display 1 TV /Video channel but 2 or 3 channels are available as options giving you the possibility of displaying up to 3 different channels throughout the house.

Software Highlights

- 1 to 12 players in open play.
- 1 to 6 players in league play.
- Zoom capability that maximises display area.
- Score correction, frame replay and all the standard options found in all autoscoring systems.
- 256 different color combinations possible on both lower and upper monitors.
- real-time animated exciters.

Hardware Highlights

- Full color upper (27") and lower (13") monitors.
- Individual keyboard for each lane.
- Easy upgrades (plug and play) from MASS-V10 to MASS-V40.
- Independent overhead display. The overhead displays are independent of their corresponding lower displays (not just a projected copy).
- Is available for and actually installed for Tenpin, Duckpin, Candlepin, Fivepin.

The score console consists in the following sub components:

- The Autoscoring Main electronic elements (CPU and Video control);

- The console itself (with or without monitors);

- The console power box.

CPU and Video Control

This metal chassis contains virtually all the Autoscoring electronics. It is made up of 2 different boards. The top board is the CPU board . The lower one is the video board, in the case of 2 monitor per lane installations (MASS-V30 and MASS-V40) there will be a second video board.

CPU BOARD (MD3-91)

The CPU board is the only board within the scorer that is installation dependant, meaning that it has to be configured to each individual installation. The elements that affect the configuration are:

- The AutoScoring Version (V10, V20, V25, V30, V40);

- The Pinsetter type (Mendes Free Fall/String, Brunswick, AMF, etc.)

- The language;

- The type of keyboard;

- The type of bowling game (Tenpin, Duckpin, Fivepin);

- And various configurable software set-ups:

    - Score approximation for strikes activated or not;
    - Frame count on console score sheet instead of game count;
    - etc.

All these elements are configured through the use of DIP switches and/or the change of the four main EPROMS. Refer to Figure 1 for the location of the main elements of the CPU board.

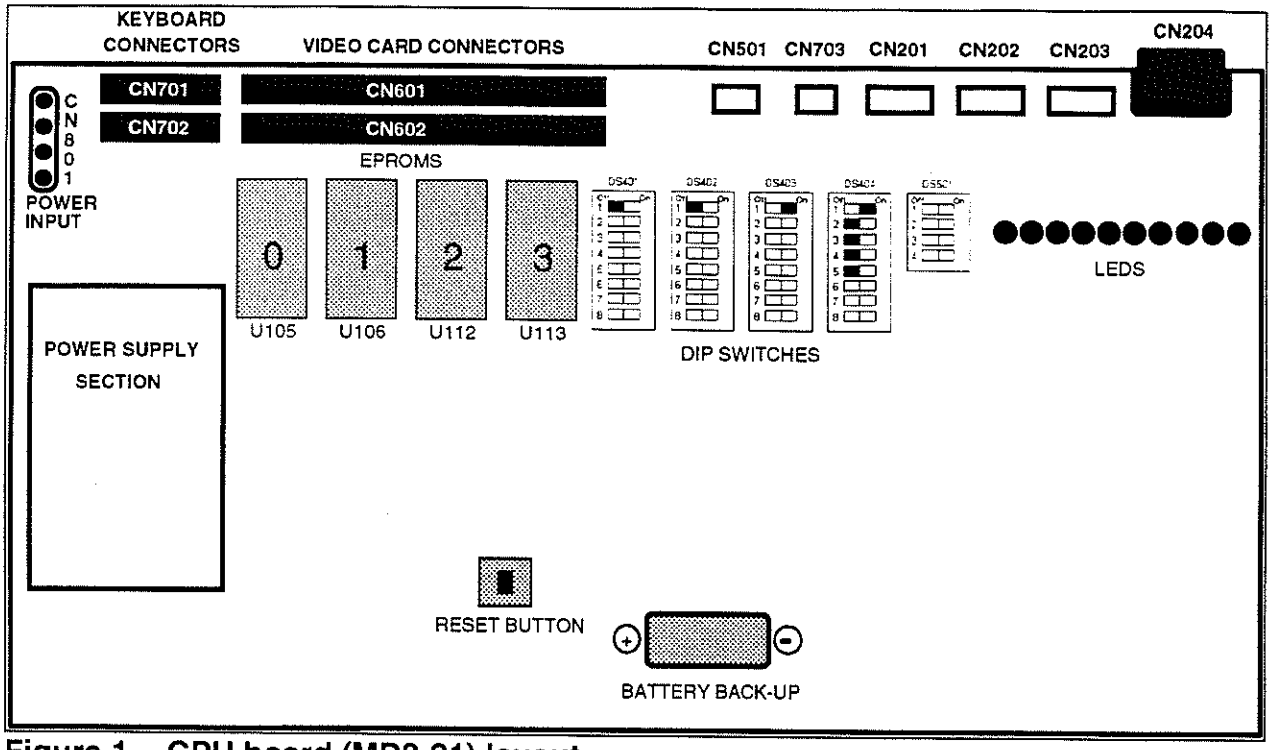


Figure 1. - CPU board (MD3-91) layout

CPU BOARD COMPONENT IDENTIFICATION

IDENTIFICATION	DESCRIPTION
CN801	POWER FROM CONSOLE POWER BOX
CN701	KEYBOARD CONNECTOR LANE 2
CN702	KEYBOARD CONNECTOR LANE 1
CN601	VIDEO BOARD CONNECTION LOWER MONITORS
CN602	VIDEO BOARD CONNECTION OVERHEAD MONITORS
CN501	FOUL LIGHT COMMUNICATION
CN703	CONSOLE BUZZER
CN201	SPARE RS-422 SERIAL PORT
CN202	MULTIPLEXOR COMMUNICATION
CN203	PINSETTER CONTROLLER COMMUNICATION
L601	LED SERIAL PORT AUX RCV
L602	LED SERIAL PORT AUX TX
L603	LED SERIAL PORT MUX RCV
L604	LED SERIAL PORT MUX TX
L605	LED SERIAL PORT PINSETTERS RCV
L606	LED SERIAL PORT PINSETTERS TX

L607	LED SERIAL PORT RS-422 SPARE RCV
L608	LED SERIAL PORT RS-422 SPARE TX
L609	LED STATUS LED (ALWAYS ON)
L610	LED STATUS LED (ALWAYS ON)
U105	EPROM 0
U106	EPROM 1
U112	EPROM 2
U113	EPROM 3
DS401	DIP SWITCH BANK 401 (SEE TABLE 2)
DS402	DIP SWITCH BANK 402 (SEE TABLE 2)
DS403	DIP SWITCH BANK 403 (SEE TABLE 2)
DS404	DIP SWITCH BANK 404 (SEE TABLE 2)
DS501	DIP SWITCH BANK 501 (SEE TABLE 2)
RESET BUTTON	MAIN RESET BUTTON
BATTERY BACK-UP	RAM BACK-UP BATTERY
POWER SUPPLY	POWER SUPPLY SECTION FOR CPU AND VIDEO BOARDS

Table 1. - CPU board (MD3-91) component identification.

DIP switch settings on the CPU BOARD (MD3-91)

Note that the small numerical value within the paraenthesis stands for the version number of the EPROMs (0,1,2,3). The latest version contains all of the previous selections. Therefore each option requies at least the version number within the paraenthesis or less.

SW 401 - 1 (1.01) ON: French by default.
OFF: English by default.

SW 402 - 1 (1.01) ON: 1 monitor (lower **or** upper) per lane.
OFF: 2 monitors (lower **and** upper) per lane.

SW 403 - 1 (1.01) ON: Text based keyboard English or French.
OFF International keyboard (Symbols)

SW 403 - 2 (2.00) ON: French keyboard.
OFF English keyboard.

SW 403 - 3 (2.00) ON: Cannot define inactive players.
OFF Allows inactive players.

SW 403 - 4 (2.00) ON: No beeper feedback.

OFF Beeper feedback.

SW 404 - 1 (1.01) ON: Normal position : simulates a power failure reset (i.e. does not loose game data)
OFF: Complete reset position : Will cause the system to reset completely (i.e. -loose game data) should not be set to this position on a regular basis.

SW 404 - 2 (1.06) ON: At the end of practice will cause a POWER-OFF at the pinsetter.
OFF: At the end of practice will cause DISABLE CMD (regular setting)

SW 404 - 3 (1.06) ON: During practice sends a FULL SET (e.g. electrical pinsetter).
OFF: During practice sends a PART SET (e.g. A2, AMF)

SW 404 - 4 (1.06) ON: Will not send the SYNChronisation commands to the pinsetter (e.g. electrical pinsetter and any pinsetter that support a real FULL SET)
OFF: Will send the SYNChronisation commands to the pinsetter (e.g. A2, AMF)

SW 404 - 5 (1.07) ON: Pinsetter supports the SPOT PIN function (e.g. electrical pinsetter and the new Mendes Free fall pinsetter)
OFF: Pinsetter does not support the SPOT PIN function.

SW 404 - 6 (1.10) ON: Duckpin practice mode.
OFF: Tenpin practice mode

SW 404 - 7 (2.00) ON: No score extrapolation in effect.
OFF: Score extrapolation in effect.

SW 404 - 8 (2.00) ON: No score displayon strike series.
OFF: Score display on strike series.

EXAMPLES OF DIFFERENT DIP SWITCH SET-UPS

DEPENDING ON THE INSTALLATION THE DIP SWITCH SETTINGS CAN VARY. BELOW ARE 4 TYPICAL SETTINGS. NOTE THAT DIP SWITCHES WITHOUT ANY BLACK FILLERS IN THE DIAGRAMS SHOULD BE NORMALLY LEFT IN THE OFF POSITION.

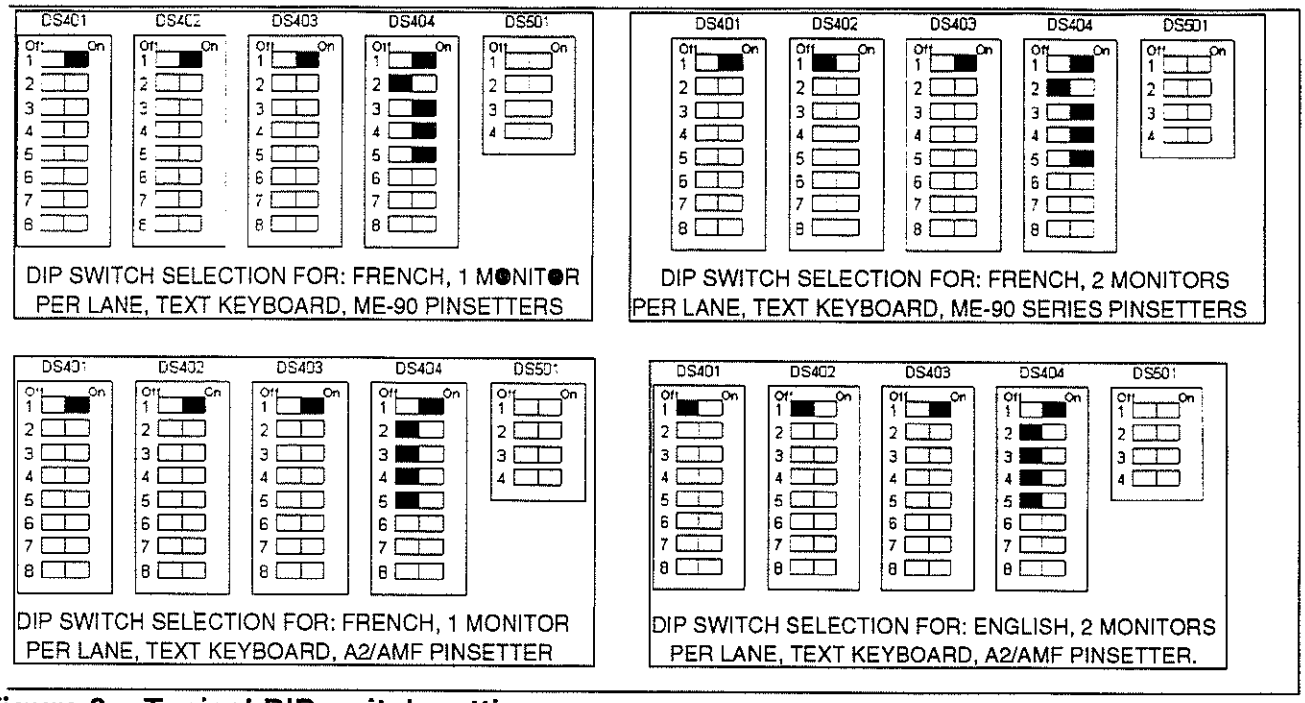


Figure 2. - Typical DIP switch settings.

From time to time you will be required to change the EPROMS. The main purpose of the change of EPROMS is to give you access to new features as the software for the console is change. When new EPROMS are to be changed follow the following instructions innumerated on the next page.

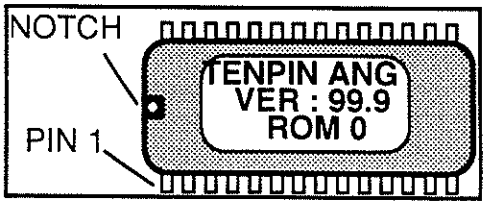
CONSOLE EPROM CHANGE SEQUENCE

STEP 1
OPEN CONSOLE BACK PANEL.

STEP 2
OPEN CPU COVER (GOLD BOX).REMOVE ALL POWER FROM CONSOLE BY DISCONNECTING THE WHITE MOLEX CONNECTOR OFF THE THE CPU BOARD. (CONNECTOR NUMBER - CN-801).

STEP 3
TOUCH METAL CASE WITH YOUR FINGERS (THIS IS TO ENSURE YOU DISCHARGE ANY STATIC ELECTRICITY YOUR BODY MAY HAVE ACCUMULATED. EPROMS ARE VERY SENSITIVE TO STATIC ELECTRICITY.

STEP 4
USING A FLAT OBJET LIFT EPROMS OUT OF SOCKETS TAKING CARE NOT TO TOUCH OR DAMAGE METAL PINS (THESE EPROMS SHOULD NORMALLY BE RETURNED SINCE THEY ARE RE-USABLE).



STEP 5
INSERT THE NEW EPROMS IN THEIR PROPER LOCATION AND PROPERLY ORIENTED (SEE FIGURE TO ORIENT). THE CHIPS ARE INSERTED FROM LEFT TO RIGHT 0, 1, 2, AND 3. AGAIN TAKE CARE NOT TO DAMAGE THE PINS AND ENSURING THAT ALL THE PINS ARE INSERTED IN THEIR CORRESPONDING SOCKETS.

STEP 6
THE FOLLOWING SEQUENCE IS VERY IMPORTANT. FOLLOW IT IN ORDER:

- SWITCH DIP SWITCH 404-1 TO THE OFF POSITION;
- RECONNECT POWER;
- PRESS THE RESET BUTTON FOR 3 SECONDS;
- REPLACE THE 404-1 DIP SWITCH TO THE ON POSITION;
- PRESS THE RESET BUTTON AGAIN.

STEP 7
REPLACE CPU COVER AND CLOSE CONSOLE.

EPROM CHANGE IS NOW COMPLETE

VIDEO BOARDS (MD3-92)

The video boards are not user configurable. The only changes that may be done in the future will be the replacement of the Font EPROMs. Note that for two monitor per lane installations (MASS-V30 and MASS-V40) there are 2 video boards. The difference between the boards is the type of connectors. The overhead board has BNC connectors while the lower monitor video board has DB-9 Female connectors.

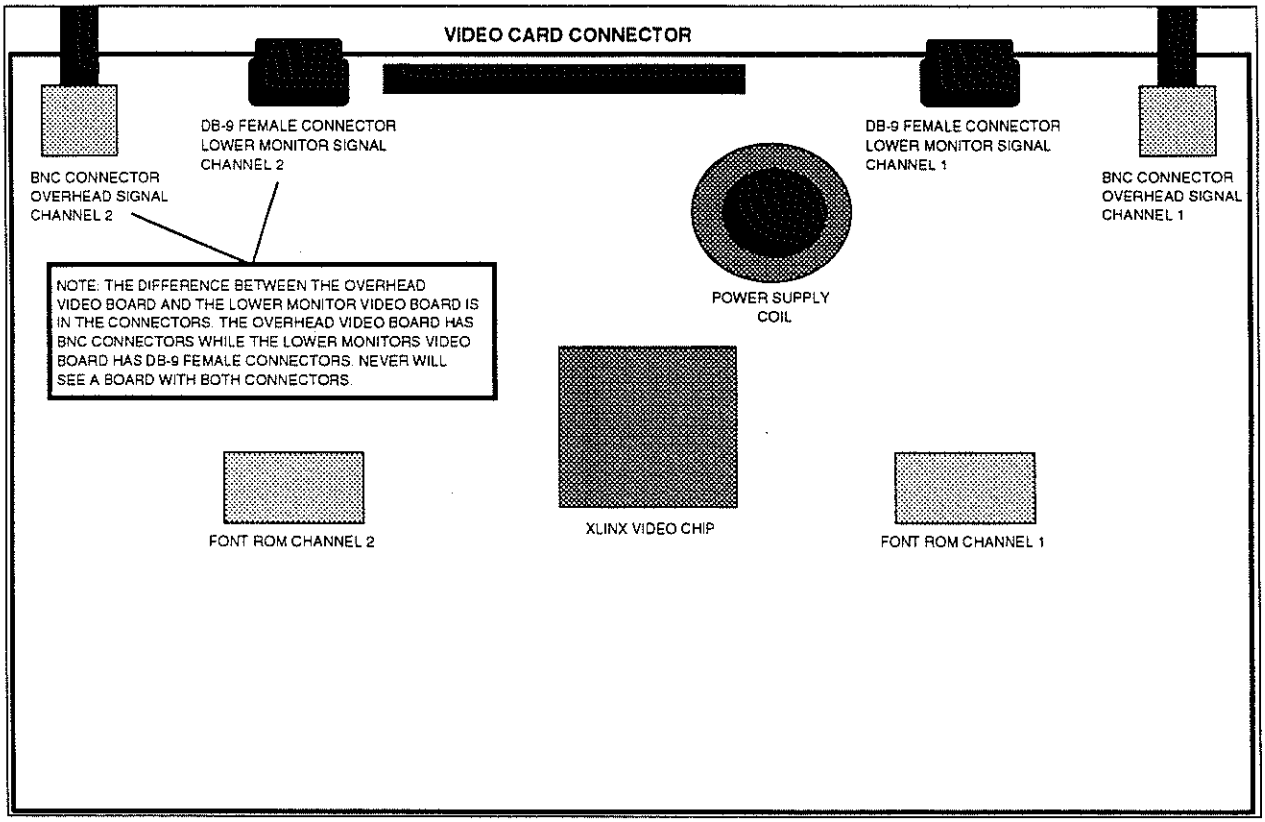


Figure 3. - Video board (MD3-92) layout

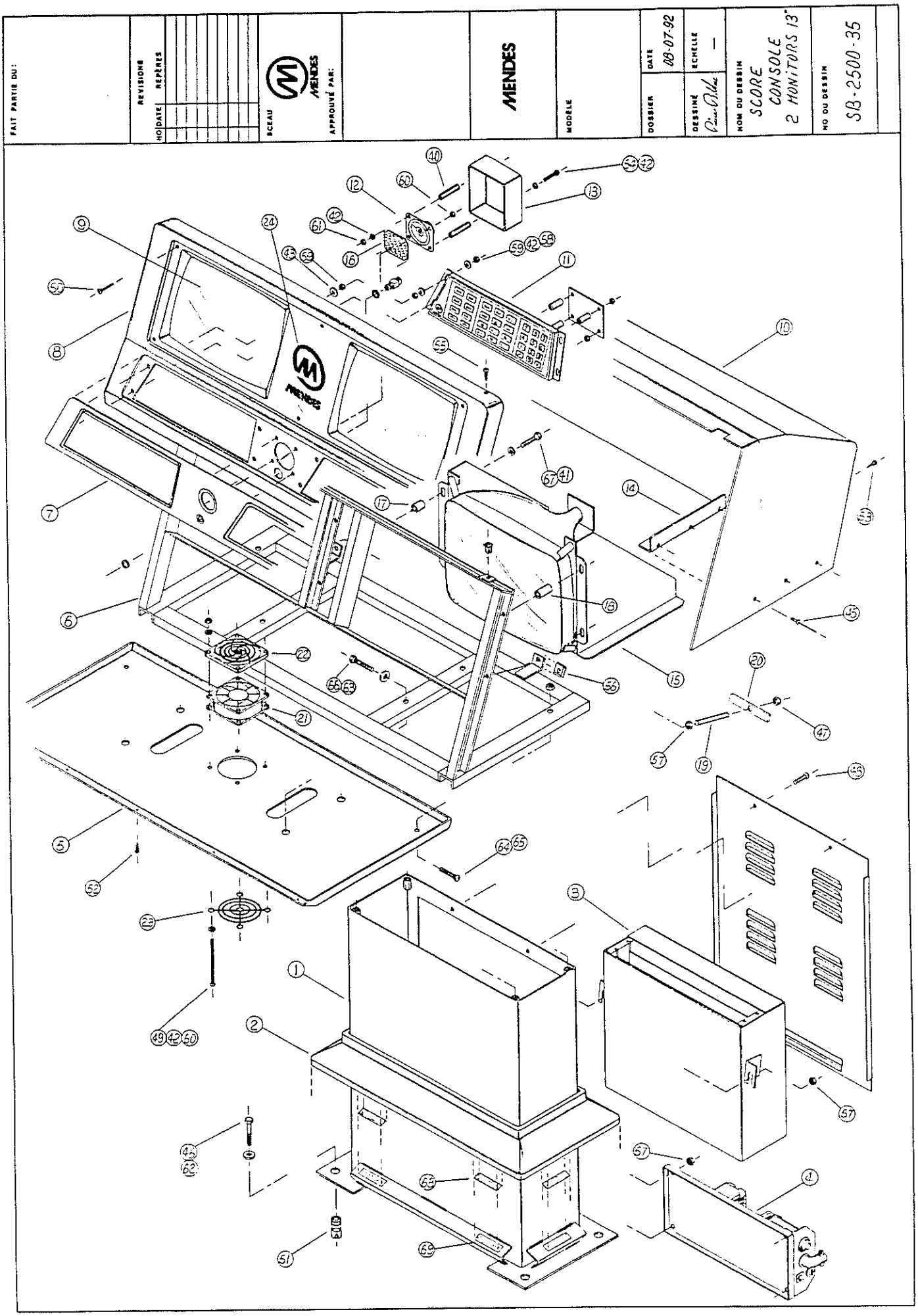
IDENTIFICATION	DESCRIPTION
CN301	OVERHEAD LANE1
CN302	LOWER LANE 1
CN601	OVERHEAD LANE 2
CN602	LOWER LANE 2
U203	FONT ROM LANE 1

U701	XILINX VIDEO CONTROLLER
CN701	VIDEO CARD CONNECTOR
L701	POWER SUPPLY COIL

Table 2. - Video board (MD3-92) component identification.

Console Power Box

The console power box contains various transformers and their corresponding breakers that supply all the power requirements of the score console. Care must be taken to turn the main console breaker off before servicing the console power box due to the voltage levels within. The power console box is available in two different versions one being 115 volts 50 /60 Hz the other being 240 volts 50/60 Hz. Refer to plans EL-2500-36(12) and EL-2500-36(24) for more details.


FAIT PARTIE DU:
REVISIONS
NO | DATE | REPÈRES
SCEAU
APPROUVÉ PAR:
MODÈLE
DOSSIER
DATE 08-07-92
DESSINÉ
ÉCHELLE —
NOM DU DESSIN SCORE CONSOLE 2 MONITORS 13"
NO DU DESSIN SB-2500-35

LIST OF MATERIAL

SCORE CONSOLE 2 MONITORS 13"

SB-2500-35

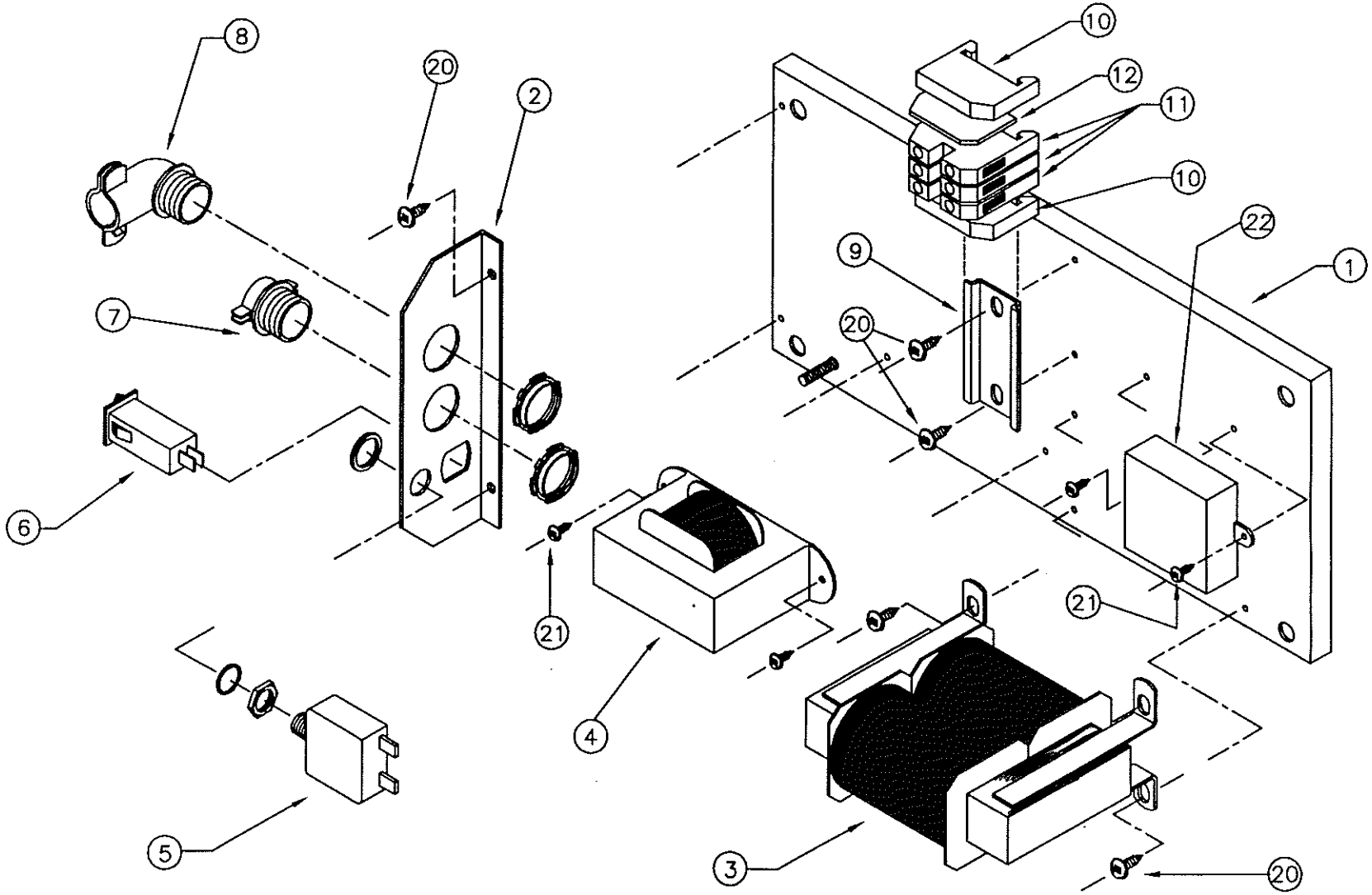
INDEX	CODE NUMBER	DESCRIPTION
1	M-2500-31	MONITOR PEDESTAL SUPPORT
2	P-2500-30	PEDESTAL BASE COVER
3	SB-2500-37	CPU AND VIDEO CTRL
4	SB-6410-02	CONSOLE POWER BOX
5	P-2500-27	BOTTOM PANEL
6	M-2500-25	FRAME MONITOR
7	M-2500-17	KEYBOARD RING
8	P-2500-26	SCOREBOARD COVER PLASTIC
9	P-2500-28	PLEXIGLASS
10	P-2500-25	SCOREBOARD FIBERGLASS
11	SB-2900	KEYBOARD SWITCH ASSY.
12	SB-2500-14	KIT SPEAKER
13	P-2500-14	SPEAKER COVER
14	M-2500-26	SUPPORT
15	E-13K7801	13"COLOR MONITOR
16	M-2500-14	SPEAKER COVER
17	M-2500-33	STEEL BUSHING .750"
18	M-2500-34	STEEL BUSHING 1.031"
19	M-2500-32	1/4"NC X 2.125"STUD
20	M-2500-37	RETAINING PLATE
21	SB-900	KIT FAN 24 V DC
22	E-09325	GRILLE PLAST.POUR FAN 3"
23	E-SC80-W2	GRILLE METAL POUR FAN 3"
24	Z-530	LOGO MENDES BLANC 3"X3.69
25	E-805	SNAP PLUG 1/2" PEINT 329A
40	E-TSP-10	1"X 6/32 NYLON SPACER
41	H-023	9/32" I.D. FLAT WASHER
42	H-024	3/16" I.D. FLAT WASHER
43	H-024B	3/4"O.D.X3/16"I.D. WASHER
44	H-033-7	BACK UP PLATE 3/16"DIA.
45	H-033-5	POP RIVET 1/8" X 7/8"
46	H-039A	5/16"-18X2"HH CAP SCW

LIST OF MATERIAL

SCORE CONSOLE 2 MONITORS 13"

SB-2500-35

INDEX	CODE NUMBER	DESCRIPTION
47	H-044	1/4"-20 HEX NYLOCK NUT
48	H-051A	10-32X1/2"SOCK M. SCW RH
49	H-052-3	6-32 X 2" RH SOC.MACH.SCW
50	H-052F-1	6/32 X 3/4"HEX.AL.BOT.C.S
51	H-062-17	5/16NC SINGLE STAR #9655
52	H-072-10	#8 X 1/2"FH SOCK WOOD SCW
53	H-072-19	#8X1/2" RH SOCK TRUSS
54	H-072-4	6/32"X3/4" RH SO MA SCW
55	H-072B	#8X3/4 SOCK WOOD SCW F.H.
56	H-082-13	#8 SPRING NUT 202-035
57	H-082-5	1/4"-20 HEX KEPS NUT
58	H-085	10-32 HEX NUT
59	H-085-1	10-32 HEX NYLON NUT
60	H-086-1	6/32" HEX KEP NUT
61	H-086A	6/32 HEX.NUT PLATED
62	H-111	ANCHORS NUT#6&#8 225-028
63	M-0166	1 1/8"ODX5/16"ID FLAT WAS
64	H-054A	5/16-18X1/4" CARR. BOLT
65	H-080-5	5/16"-18 HEX KEP NUT
66	H-039	5/16"18 X 1 3/4" H.H.BOLT
67	H-048A	1/4-20X1 1/2 RH MACH SCW
68	MPD-250-1	VELCRO 1/2"MALE
69	MPD-260-1	VELCRO 1/2"FEMELLE



1	10/92	DWG. NO.	P.B.
NO.	DATE	REVISION	BY

MENDES
QUEBEC CANADA

MODEL:

CONSOLE POWER BOX

REV. 1

DRAWN BY PIERRE BOLDUC | SCALE: – | DWG. NO. SB-2500-36 | PAGE

DATE 29/10/92 | APPR. BY

FAIT PARTIE DU:

REVISIONS

NO	DATE	REPERES

SCEAU

MENDES

APPROUVÉ PAR:

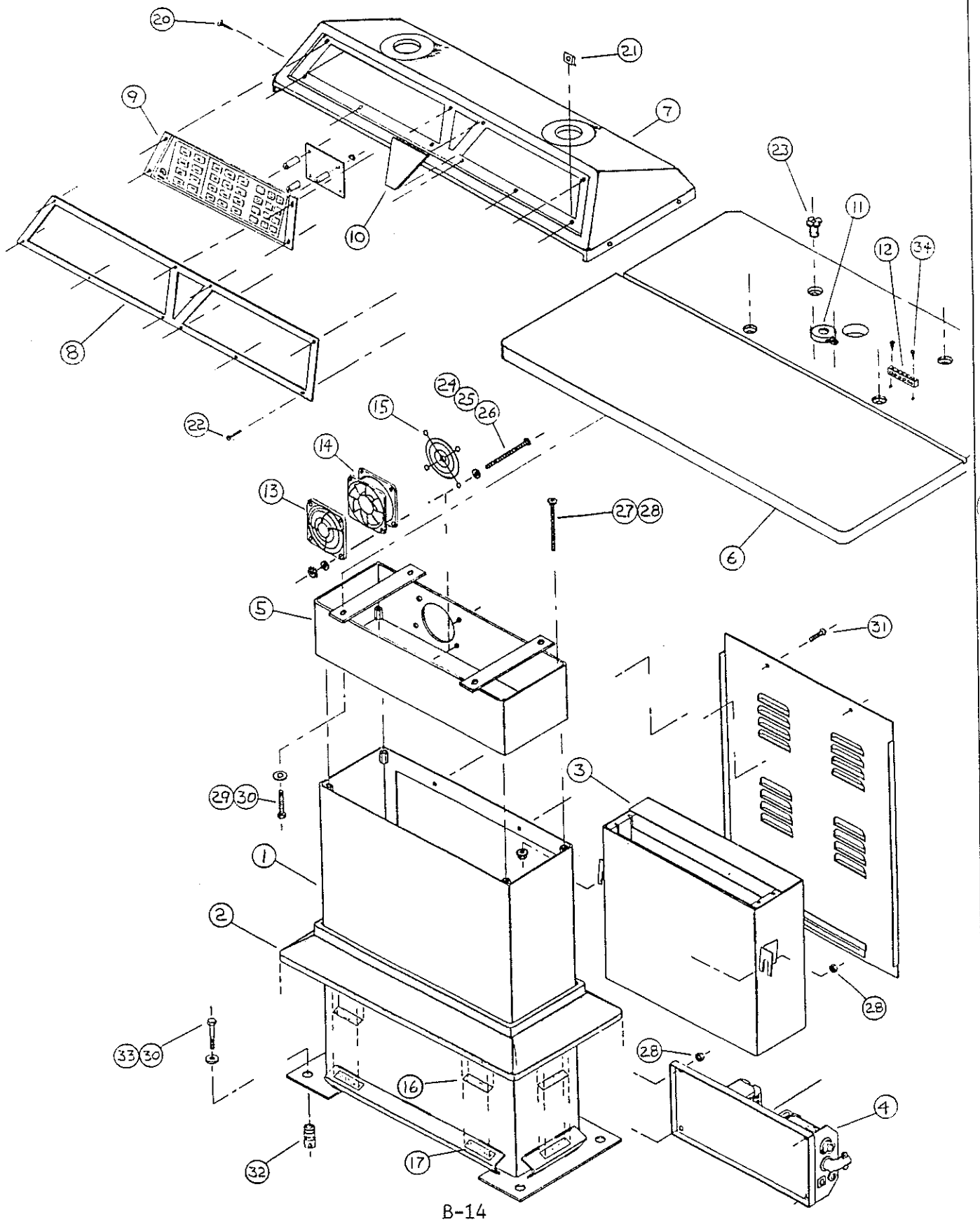
MENDES

MODÈLE

DOSSIER	DATE 27/08/92
DESSINÉ C. Poisson	ECHELLE 1/8"= 1"

NOM DU DESSIN
SCORE BOARD DIGITAL ASSY

NO DU DESSIN
Q88-2900-92



LIST OF MATERIAL

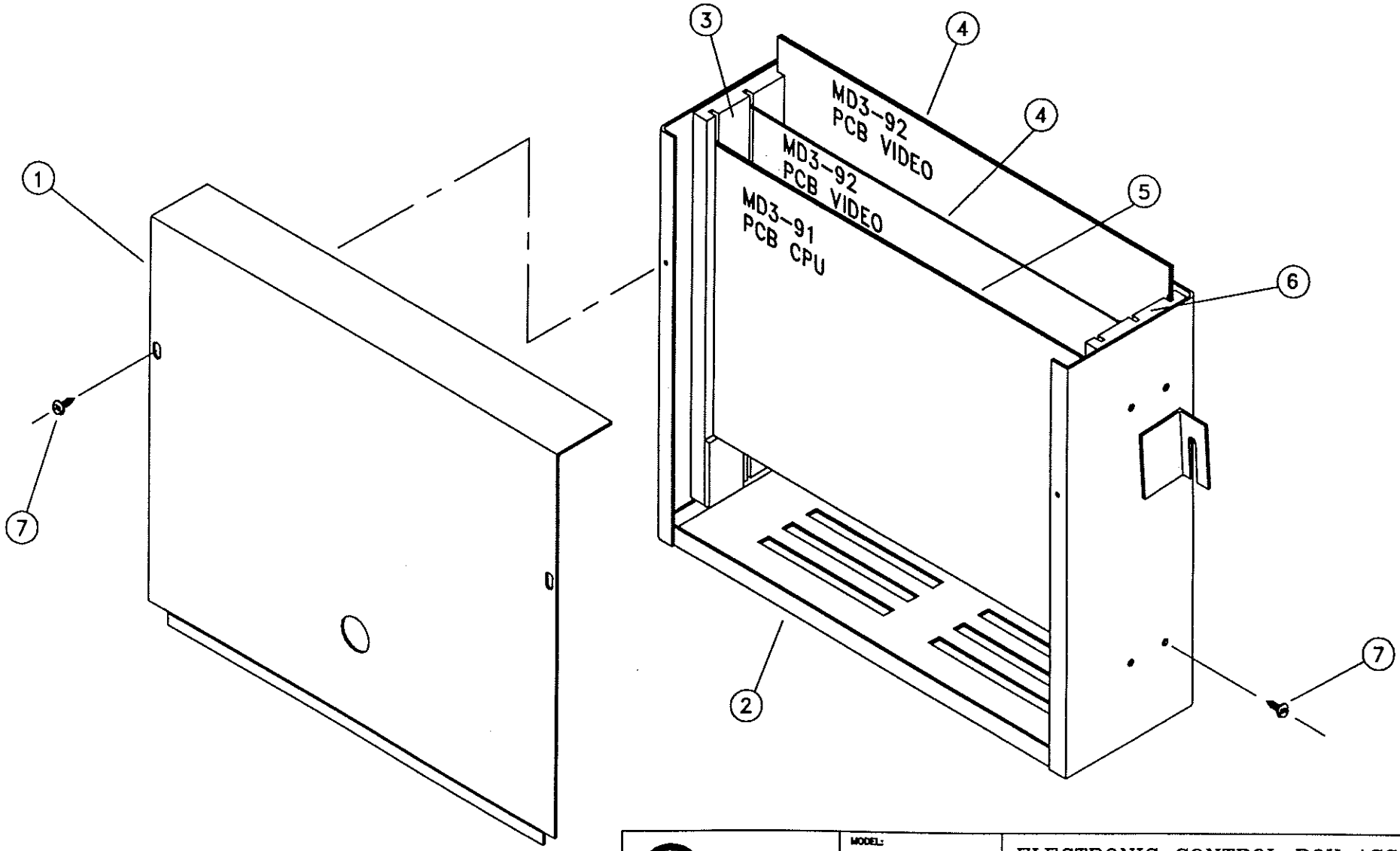
CONSOLE POWER BOX

SB-2500-36

INDEX	CODE NUMBER	DESCRIPTION
1	M-2500-36	SCORE BOARD POWER SUPPLY
2	M-2500-36-1	SCORE BOARD P.W.OUTLET
3	E-91000	TRANSFO 120/240V 50/60HZ
4	E-B1091	TRANSFO (MD3-91-92)
5	E-W28XQ1A-2	OVERLOAD 2A P&B
6	E-1090QC5-28	LAMPE TEMOIN 28V VERTEIDI
7	E-3302M	CONN. CORDON SOUPLE
8	E-564-01	CONN 3/8" COUDE 90DG #266
9	E-164800	PANDUIT RAIL #173220.05M
10	E-103002-26	STOPPER 103002.26
11	E-115118	BORNIER GROS #115118.11
12	E-118368	FLASQUE EXTR. SEPARATEUR
20	H-072-19	#8X1/2" RH SOCK TRUSS
21	H-072-16	#6 X 3/8"RH WOOD SCREW
22	E-F2716	FILTRE CORCOM

NUMBER (PRO)	DESCRIPTION
Q88-2900-92	SCORE BOARD DIGITAL

IDX	STOCK NUMBER	DESCRIPTION
1	M-2500-31	MONITOR PEDESTAL SUPPORT
2	F-2500-30	PEDESTAL BASE COVER
3	SB-2500-37	CPU AND VIDEO CTRL
4	SB-6410-02	CONSOLE POWER BOX
5	M-2500-31-1	MONITOR PEDESTRAL SPACER
6	MBQ88-2900	WOOD SCORE TOP
7	F-2900-13	FIBERGLASS TOP
8	M-2900-19-1	KEYBOARD RING
9	SB-2900-25	KEYBOARD ASSY.
10	M-2900-14-1	BLANK SPEAKER
11	E-PK85-3B0	BUZZER
12	E-SBT70	BLOCK GROUND 70A
13	E-09025	GRILLE PLAST.POUR FAN 3"
14	SB-900	KIT FAN 24 V DC
15	E-8080-W2	GRILLE METAL POUR FAN 3"
16	MFD-250-1	VELCRO 1/2"MALE
17	MFD-260-1	VELCRO 1/2"FEMELLE
20	H-072A	#8 X 3/4 RH SOCK WOOD SCW
21	H-083-15	8-32 SPRING NUT #TN-181
22	H-051-15	8-32 X 3/4"FH SOC.CAP SCW
23	H-081	5/16"-18 TEE NUT
24	H-051-3	6-32 X 2" RH SOC.MACH.SCW
25	H-024	3/16" I.D. FLAT WASHER
26	H-036-1	6/32" HEX KEP NUT
27	H-042	MACH.SCW FH1/4-20X1 1/2
28	H-082-05	1/4"-20 HEX KEP NUT
28	H-082-5	1/4"-20 HEX KEPS NUT
29	H-042B	5/16"-18X1" HH CAP SCW
30	H-022	11/32 ID FLAT WASHER
31	H-051A	10-32X1/2"SOCK M. SCW FH
32	H-060-17	5/16NC SINGLE STAR #1065
33	H-039A	5/16"-18X2"HH CAP SCW
34	H-072-09	#8X3/4" FH SOCK WOOD SCW



NO.	DATE	REVISION	BY

MENDES
QUEBEC CANADA

MODEL:
SCORE BOARD

ELECTRONIC CONTROL BOX ASS.

REV.

DRAW BY PIERRE BOLDUC
DATE 22/04/92
SCALE: –
APPR. BY
DWG. NO. SB-2500-37
PAGE

LIST OF MATERIAL

SCORE BOARD ELECTRONIC CONTROL BOX ASSY.

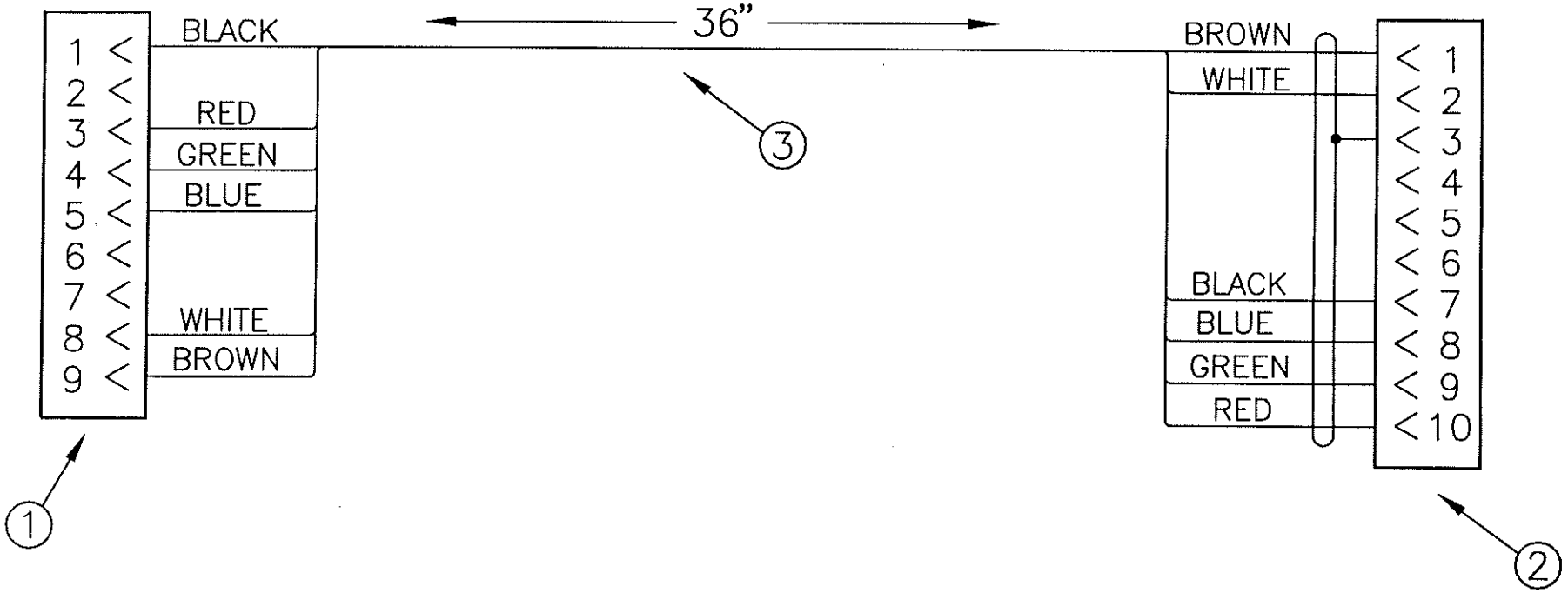
SB-2500-37

INDEX	CODE NUMBER	DESCRIPTION
1	M-2500-35-1	SCORE BOARD ELEC.CONT.COV
2	M-2500-35	SCORE BOARD ELECT. CONT.
3	P-2500-35-7	SIDE GUIDE BOARD LEFT
4	E-MD3-92	PCB VIDEO
5	E-MD3-91	PCB CPU
6	P-2500-35-4	SIDE GUIDE BOARD RIGHT
7	H-072-19	#8X1/2" RH SOCK TRUSS

NO.	DATE	REVISION	BY

E-MD3-092
CN302/CN602

COLOR MONITOR
P1 and P2



INDEX	PARTS#	DESCRIPTION	QT.
1	E-745492-2	TERMINAL DB9 F. 9 POS.	1
2	E-1-640433-0	TERMINAL 10 POS. MTA-156	1
3	E-020-6707	WIRE 7 COND. AWG22	1

B-18

MENDES
QUEBEC CANADA

MODEL:

C.ASS. 14" COLOR MONITOR

REV.

DRAW BY PIERRE BOLDUC

SCALE: –

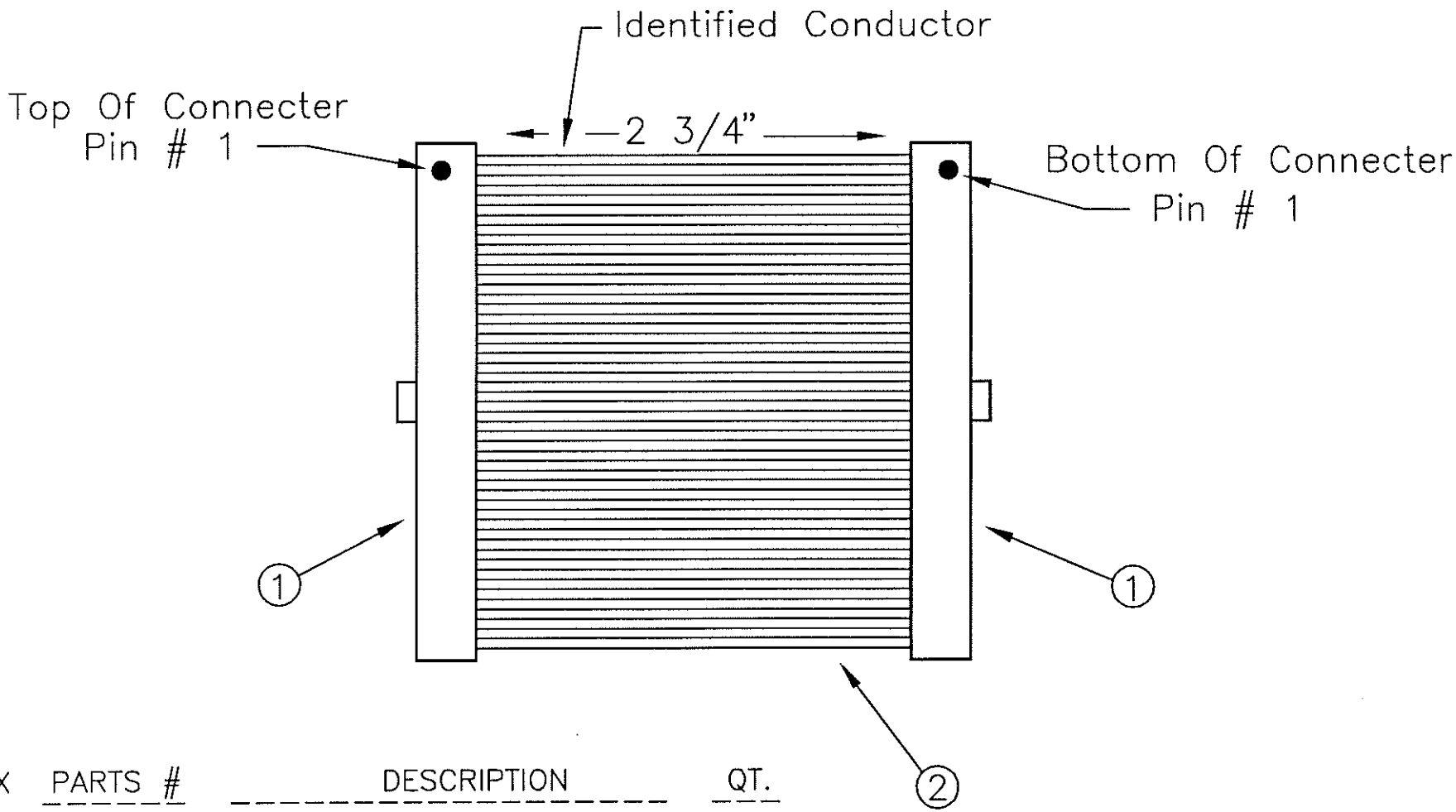
DWG. NO. EC-050-066

PAGE

DATE 25/05/92

APPR. BY

NO.	DATE	REVISION	BY



B-19

INDEX	PARTS #	DESCRIPTION	QT.
1	E-1-746285-2	AMP CON. 64 POS.	2
2	E-499116-7	FLAT CABLE 64 COND.	1

MENDES
QUEBEC CANADA

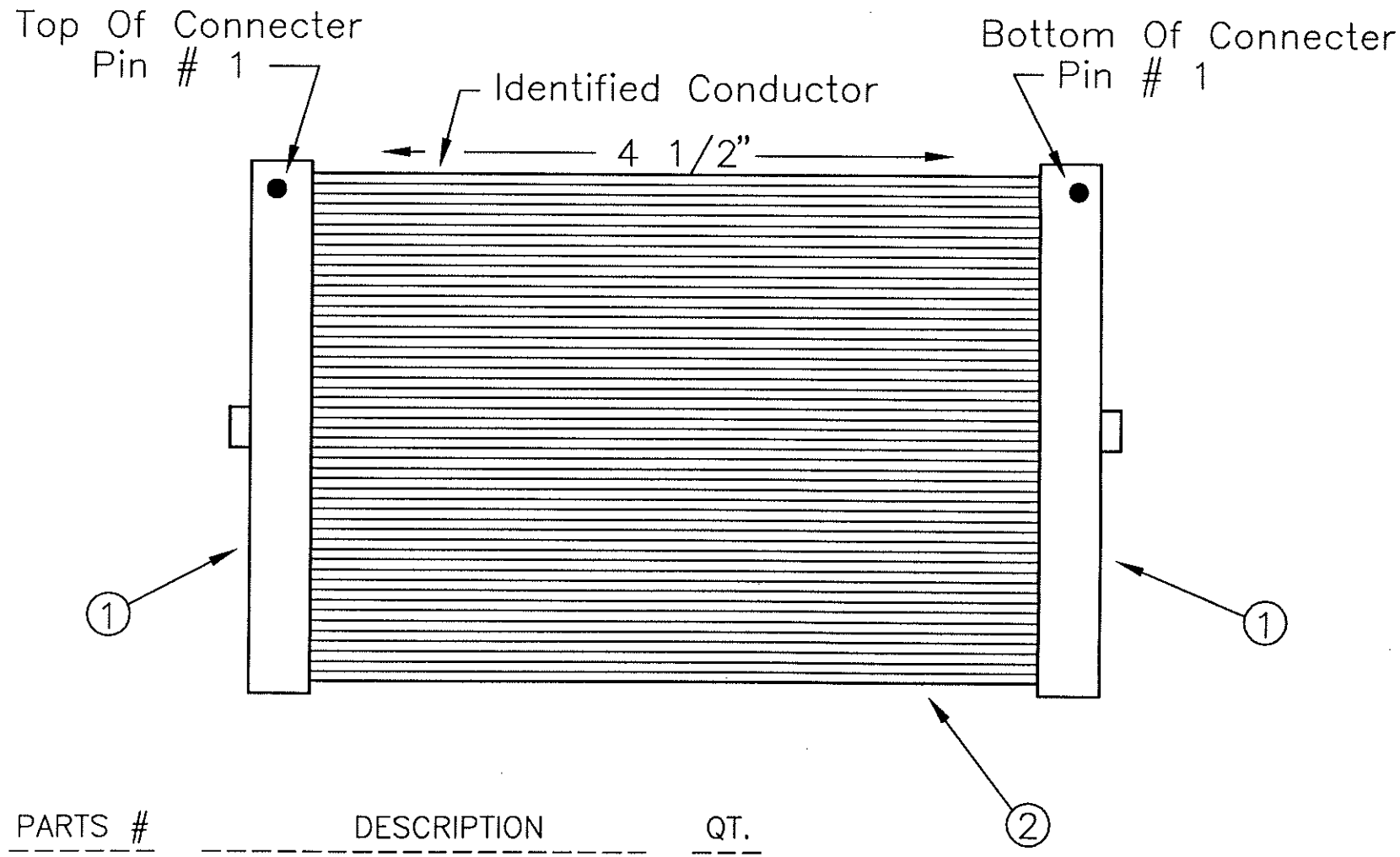
MODEL:

FLAT CABLE VIDEO 1

REV.

DRAW BY	PIERRE BOLDUC	SCALE:	–	DWG. NO.	EC-050-073	PAGE
DATE	21/05/92	APPR. BY				

NO.	DATE	REVISION	BY



B-20

INDEX	PARTS #	DESCRIPTION	QT.
1	E-1-746285-2	AMP CON. 64 POS.	2
2	E-499116-7	FLAT CABLE 64 COND.	1

MENDES
QUEBEC CANADA

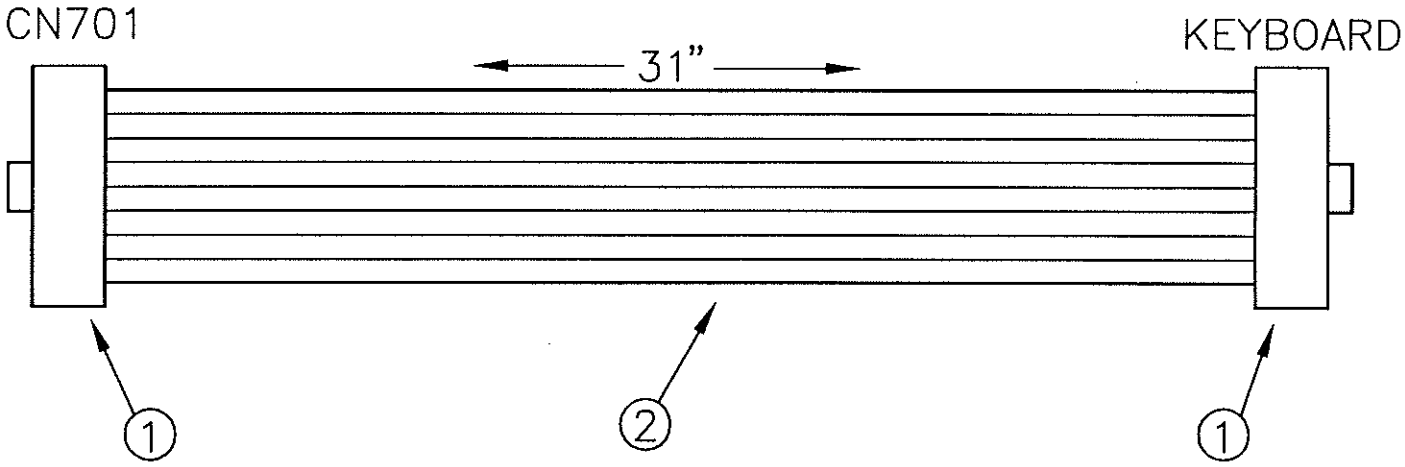
MODEL:

FLAT CABLE VIDEO 2

REV.

DRAW BY	PIERRE BOLDUC	SCALE:	–	DWG. NO.	EC-050-074	PAGE
DATE	21/05/92	APPR. BY				

NO.	DATE	REVISION	BY



INDEX	PARTS #	DESCRIPTION	QT.
1	E-746285-4	AMP CON. 20 POSITIONS	2
2	E-499116-3	FLAT CABLE 20 POSITIONS	1

MENDES
QUEBEC CANADA

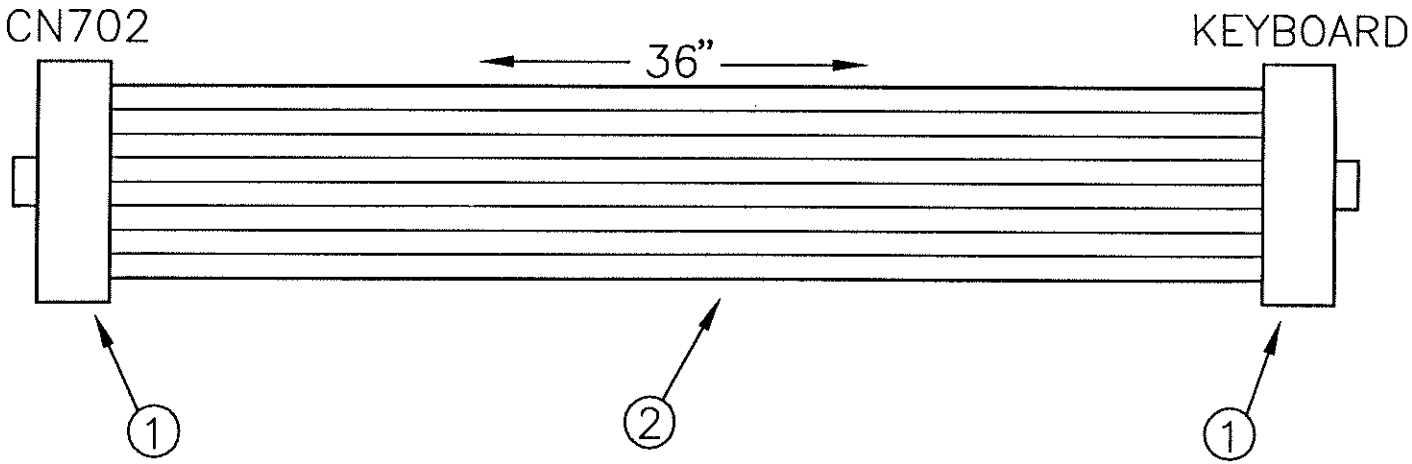
MODEL:

FLAT CABLE KEYBOARD L2

REV.

DRAW BY	PIERRE BOLDUC	SCALE:	–	DWG. NO.	EC-050-075	PAGE
DATE	21/05/92	APPR. BY				

NO.	DATE	REVISION	BY



INDEX	PARTS #	DESCRIPTION	QT.
1	E-746285-4	AMP CON. 20 POSITIONS	2
2	E-499116-3	FLAT CABLE 20 POSITIONS	1

MENDES
QUEBEC CANADA

MODEL:

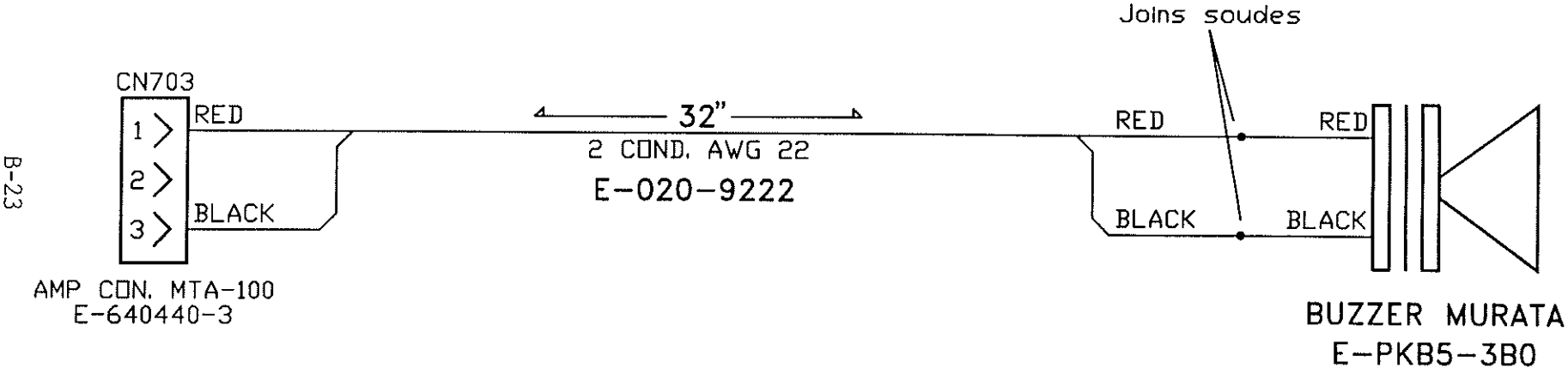
FLAT CABLE KEYBOARD L1

REV.

DRAW BY PIERRE BOLDUC | SCALE: – | DWG. NO. EC-050-076 | PAGE

DATE 21/05/92 | APPR. BY

NO.	DATE	REVISION	BY



B-23

MENDES
QUEBEC CANADA

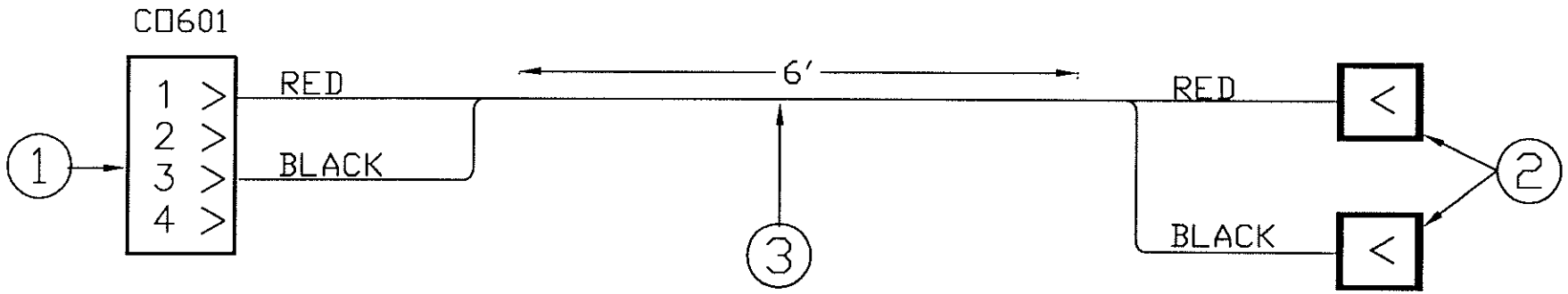
MODEL:

SCOREBOARD KIT SPEAKER

REV.

DRAW BY	PIERRE BOLDUC	SCALE:	—	DWG. NO.	EC-050-077	PAGE
DATE	19/05/92	APPR. BY				

NO.	DATE	REVISION	BY



INDEX	PARTS #	DESCRIPTION	QT.
1	E-640440-4	TERMINAL 4 POS. MTA-100	1
2	E-60487-2	TERMINAL AMP FASTON	1
3	E-020-9222	CABLE # 22 1 PR.	1

B-24

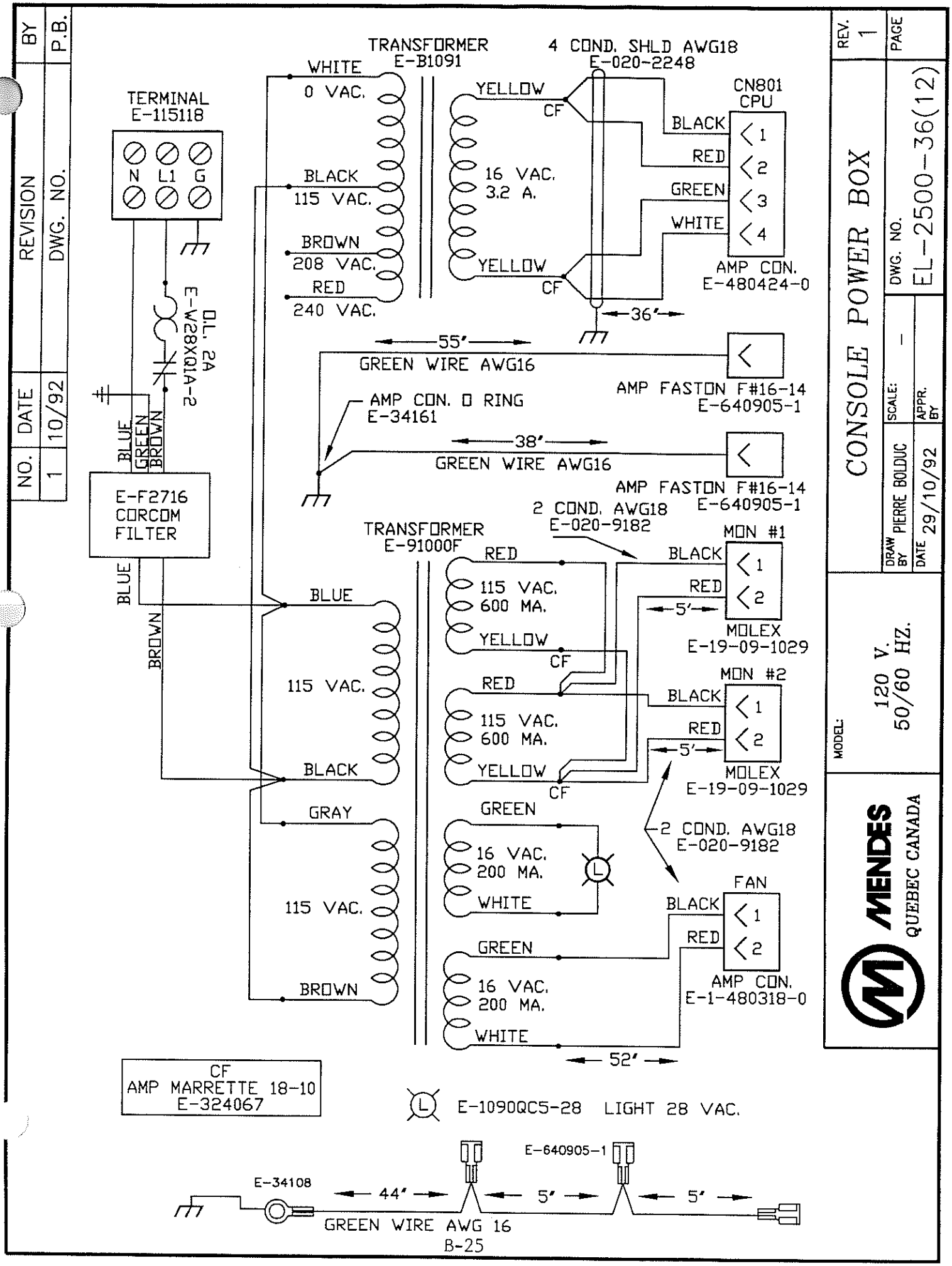
MENDES
QUEBEC CANADA

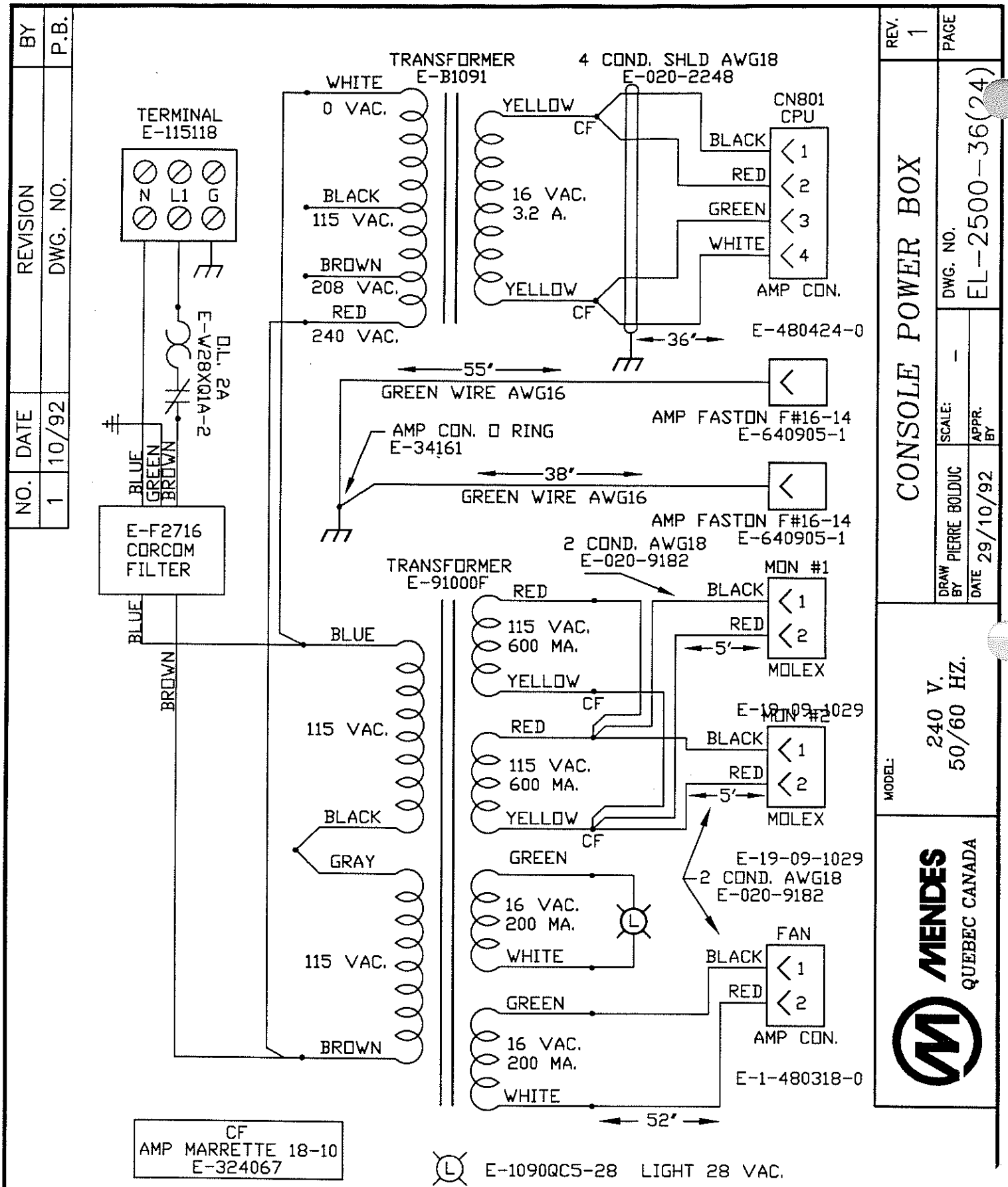
MODEL:

C. ASS. ANIMATION SPEAKER

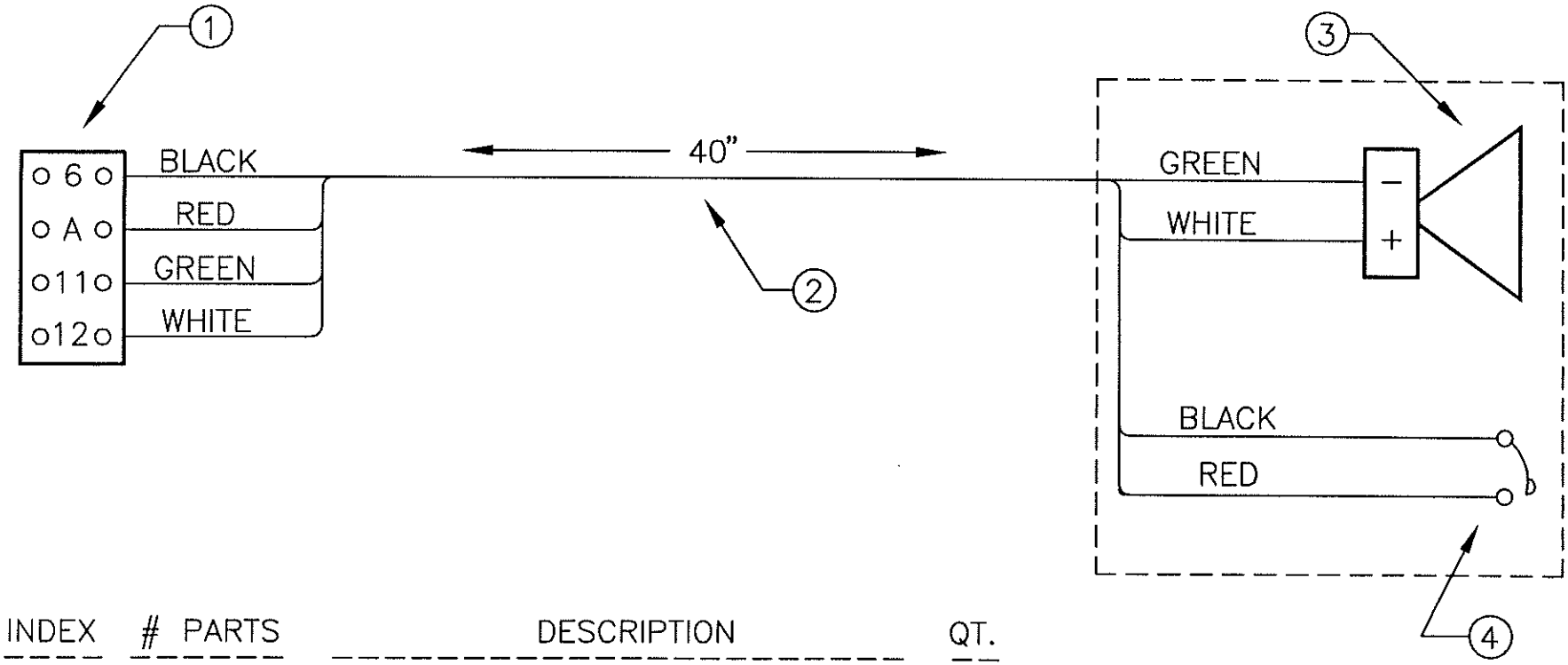
REV.

DRAW BY	PIERRE BOLDUC	SCALE:	–	DWG. NO.	EC-050-078	PAGE
DATE	18/06/92	APPR. BY				


REVISION
NO. 1
DATE 10/92
BY P.B.
DWG. NO.
TERMINAL
E-115118
N L1 G
O.L. 2A
E-W28X01A-2
BLUE
GREEN
BROWN
E-F2716
CORCOM
FILTER
BLUE
BROWN
TRANSFORMER
E-B1091
WHITE
0 VAC.
BLACK
115 VAC.
BROWN
208 VAC.
RED
240 VAC.
BLUE
115 VAC.
BLACK
GRAY
115 VAC.
BROWN
4 COND. SHLD AWG18
E-020-2248
YELLOW
CF
16 VAC.
3.2 A.
YELLOW
CF
CN801
CPU
BLACK
RED
GREEN
WHITE
1
2
3
4
AMP CON.
E-480424-0
36'
55'
GREEN WIRE AWG16
AMP FASTON F#16-14
E-640905-1
AMP CON. O RING
E-34161
38'
GREEN WIRE AWG16
AMP FASTON F#16-14
E-640905-1
2 COND. AWG18
E-020-9182
TRANSFORMER
E-91000F
RED
115 VAC.
600 MA.
YELLOW
CF
MON #1
BLACK
RED
1
2
5'
MOLEX
E-19-09-1029
RED
115 VAC.
600 MA.
YELLOW
CF
MON #2
BLACK
RED
1
2
5'
MOLEX
E-19-09-1029
2 COND. AWG18
E-020-9182
GREEN
16 VAC.
200 MA.
WHITE
L
FAN
BLACK
RED
1
2
GREEN
16 VAC.
200 MA.
WHITE
AMP CON.
E-1-480318-0
52'
CF
AMP MARRETTE 18-10
E-324067
L
E-1090QC5-28 LIGHT 28 VAC.
E-640905-1
E-34108
44'
5'
5'
GREEN WIRE AWG 16
REV. 1
PAGE
CONSOLE POWER BOX
DWG. NO. EL-2500-36(12)
SCALE: -
APPR. BY
DRAW BY PIERRE BOLDUC
DATE 29/10/92
MODEL:
120 V.
50/60 HZ.
MENDES
QUEBEC CANADA


NO. 1 | DATE 10/92 | BY P.B.
REVISION
DWG. NO.
REV. 1
PAGE
CONSOLE POWER BOX
DWG. NO. EL-2500-36(24)
SCALE: -
APPR. BY
DRAW BY PIERRE BOLDUC
DATE 29/10/92
MODEL:
240 V.
50/60 HZ.
MENDES
QUEBEC CANADA
TERMINAL
E-115118
N L1 G
E-W28X01A-2
DL. 2A
BLUE
GREEN
BROWN
E-F2716
CORCOM
FILTER
TRANSFORMER
E-B1091
WHITE
0 VAC.
BLACK
115 VAC.
BROWN
208 VAC.
RED
240 VAC.
4 COND. SHLD AWG18
E-020-2248
YELLOW
CF
16 VAC.
3.2 A.
YELLOW
CF
CN801
CPU
BLACK
RED
GREEN
WHITE
1
2
3
4
AMP CON.
36"
E-480424-0
55"
GREEN WIRE AWG16
AMP FASTON F#16-14
E-640905-1
AMP CON. O RING
E-34161
38"
GREEN WIRE AWG16
AMP FASTON F#16-14
E-640905-1
2 COND. AWG18
E-020-9182
TRANSFORMER
E-91000F
BLUE
BROWN
115 VAC.
BLACK
GRAY
115 VAC.
BROWN
RED
115 VAC.
600 MA.
YELLOW
CF
MON #1
BLACK
RED
1
2
5"
MOLEX
E-19-09-1029
MON #2
RED
115 VAC.
600 MA.
YELLOW
CF
BLACK
RED
1
2
5"
MOLEX
E-19-09-1029
2 COND. AWG18
E-020-9182
GREEN
16 VAC.
200 MA.
WHITE
L
FAN
BLACK
RED
1
2
GREEN
16 VAC.
200 MA.
WHITE
AMP CON.
E-1-480318-0
52"
CF
AMP MARRETTE 18-10
E-324067
L E-1090QC5-28 LIGHT 28 VAC.
E-640905-1
E-34108
44"
5"
5"
GREEN WIRE AWG 16

NO.	DATE	REVISION	BY



B-27

INDEX	# PARTS	DESCRIPTION	QT.
1	E-302HDS12	TERMINAL WECO	1
2	E-020-2233	WIRE AWG 22 4 COND.	1
3	E-66SFD5-45	SPEAKER 2.5" DIA.	1
4	E-ZF122VEE	SWITCH SHADOW	1

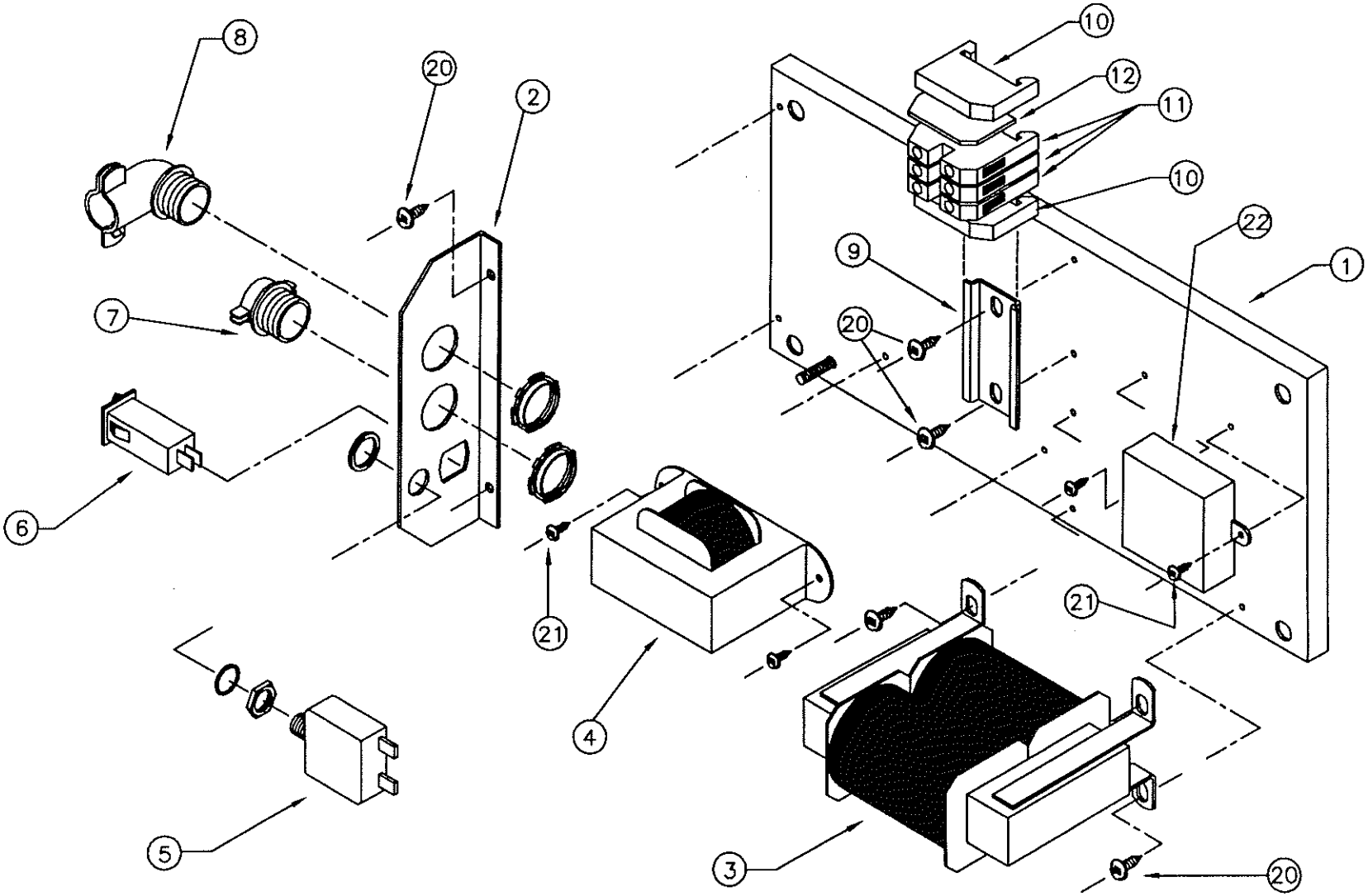
MENDES
QUEBEC CANADA

MODEL:

SPEAKER SCOREBOARD

REV.

DRAW BY	PIERRE BOLDUC	SCALE:	–	DWG. NO.	PAGE
DATE	19/05/92	APPR. BY		SB-2500-14	



NO.	DATE	REVISION	BY
1	10/92	DWG. NO.	P.B.

MENDES
QUEBEC CANADA

MODEL:

CONSOLE POWER BOX

REV. 1

DRAWN BY PIERRE BOLDUC | SCALE: — | DWG. NO. SB-2500-36 | PAGE

DATE 29/10/92 | APPR. BY

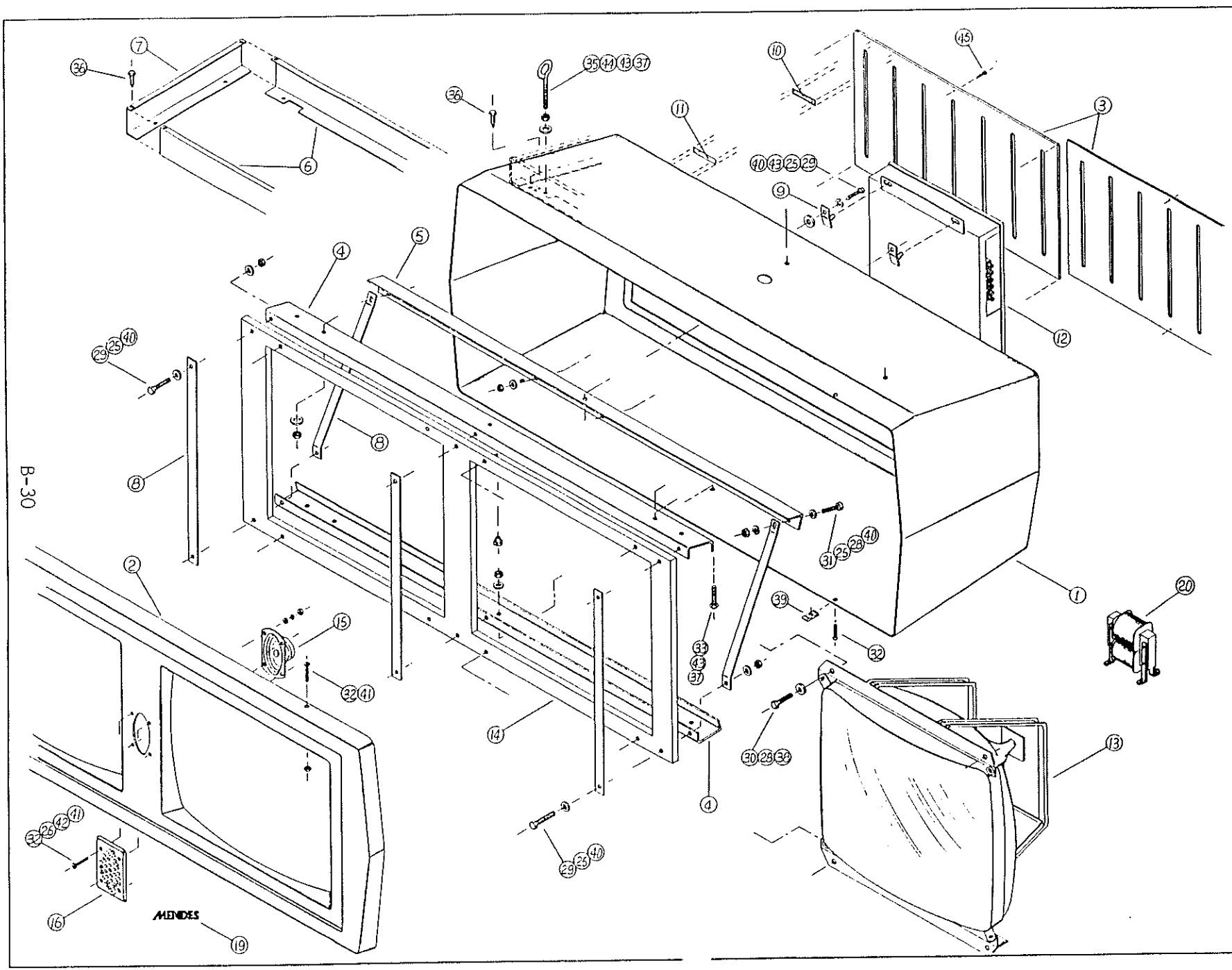
LIST OF MATERIAL

CONSOLE POWER BOX

SB-2500-36

INDEX	CODE NUMBER	DESCRIPTION
1	M-2500-36	SCORE BOARD POWER SUPPLY
2	M-2500-36-1	SCORE BOARD P.W.OUTLET
3	E-91000	TRANSFO 120/240V 50/60HZ
4	E-B1091	TRANSFO (MD3-91-92)
5	E-W28XQ1A-2	OVERLOAD 2A P&B
6	E-1090QC5-28	LAMPE TEMOIN 28V VERTEIDI
7	E-3302M	CONN. CORDON SOUPLE
8	E-564-01	CONN 3/8" COUDE 90DG #266
9	E-164800	PANDUIT RAIL #173220.05M
10	E-103002-26	STOPPER 103002.26
11	E-115118	BORNIER GROS #115118.11
12	E-118368	FLASQUE EXTR. SEPARATEUR
20	H-072-19	#8X1/2" RH SOCK TRUSS
21	H-072-16	#6 X 3/8"RH WOOD SCREW
22	E-F2716	FILTRE CORCOM

2 MONITOR AND 3 MONITOR OVERHEADS



B-30

FAIT PARTIE DU :

REVISIONS

NO	DATE	REPÈRES

SCEAU

MENDES

APPROUVÉ PAR :

MENDES

MODÈLE

DOSSIER	DATE
	30-06-92

DESSINÉ	ECHELLE
	—

NOM DU DESSIN

OVER HEAD
2 MONITORS
27"

NO DU DESSIN

SB-3350-02

LIST OF MATERIAL

OVER HEAD 2 MONITORS 27"

SB-3350-02

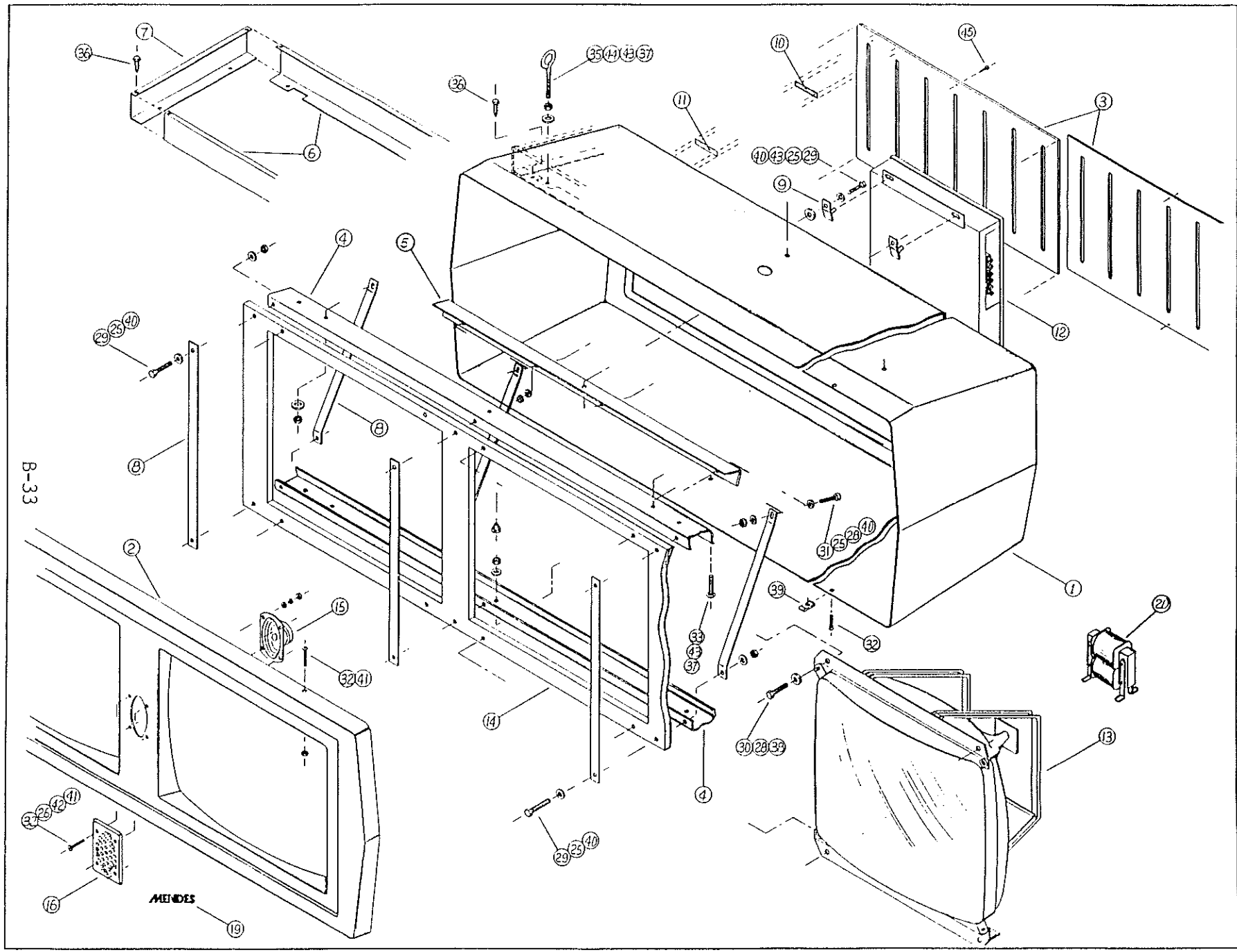
INDEX	CODE NUMBER	DESCRIPTION
1	P-3227-01	COVER O.H. 2 MON. 27"
2	P-3227-02	PLASTIC DOOR O.H.2 MON.
3	P-3227-3	PLASTIC BACK PANEL OH 2 M
4	M-3227-02	CHANNEL OVER HEAD 2 MON.
5	M-3227-04	TOP ANGLE OH 2 MON.
6	M-3227-06	TOP CASE MONITOR
7	M-3327-07	TOP CASE MONITOR (SIDE)
8	M-3327-08	REINFORCEMENT STRIP
9	M-3327-5	O.H.CONTROL BOX SUPPORT
10	MPD-250-1	VELCRO 1/2"MALE
11	MPD-260-1	VELCRO 1/2"FEMELLE
12	SB-3550-03	MONITOR CONTROL BOX GGA
13	E-27K7391	27" COLOR MONITOR
14	10W-3227-01	TV PANEL 2 MON
15	E-8LS3506-23	3"X 5" SPEAKER
16	E-40-1291	GRILLE 3"X5" #G305MBB
17	C-084	1/8"WIRE ROPE CLIPS
18	C-060	STEEL CABLE 1/8"(METRE)
19	Z-466	1"X 5"DECALQ.VINYL BLANC
20	E-91000	TRANSFO 120/240V 50/60HZ
25	H-023	9/32" I.D. FLAT WASHER
26	H-024	3/16" I.D. FLAT WASHER
27	H-024B	3/4"O.D.X3/16"I.D. WASHER
28	H-024C	11/32"ID X 1"OD X.062"FW
29	H-045	1/4-20 X 1 3/4 HH CAP SCR
30	H-046	1/4"-20X3/4"HH CAP SCW
31	H-046A	1/4-20 X 1" HH CAP SCW
32	H-052F-7	8-32NC BUTTON HEAD CAP SC
33	H-054A	5/16-18X1/4" CARR. BOLT
34	H-058-01	5/16-18 TURNBUCKLES EY-EY
35	H-058A	5/16-18X3 1/4"EYE BOLT

LIST OF MATERIAL

OVER HEAD 2 MONITORS 27"

SB-3350-02

INDEX	CODE NUMBER	DESCRIPTION
36	H-074-5	#10-16 X 1/2"VIS TECK HEX
37	H-080-5	5/16"-18 HEX KEP NUT
38	H-080C	1/4-20NC TEE NUT
39	H-082-12	10-24 SPRING NUT TN-188
40	H-082-5	1/4"-20 HEX KEPS NUT
41	H-086	8/32 HEX NUT PLATED
42	H-097	3/16" LOCK WASHER
43	M-0166	1 1/8"ODX5/16"ID FLAT WAS
44	H-080	5/16"-18 HEX NYLOCK NUT
45	H-072-19	#8X1/2" RH SOCK TRUSS



B-33

FAIT PARTIE DU:

REVISIONS

NO	DATE	REPÈRES

SCEAU

MENDES

APPROUVÉ PAR:

MENDES

MODÈLE

DOSSIER	DATE
	30-06-92

DESSINÉ	ECHELLE

NOM DU DESSIN

OVER HEAD
3 MONITORS
27"

NO DU DESSIN

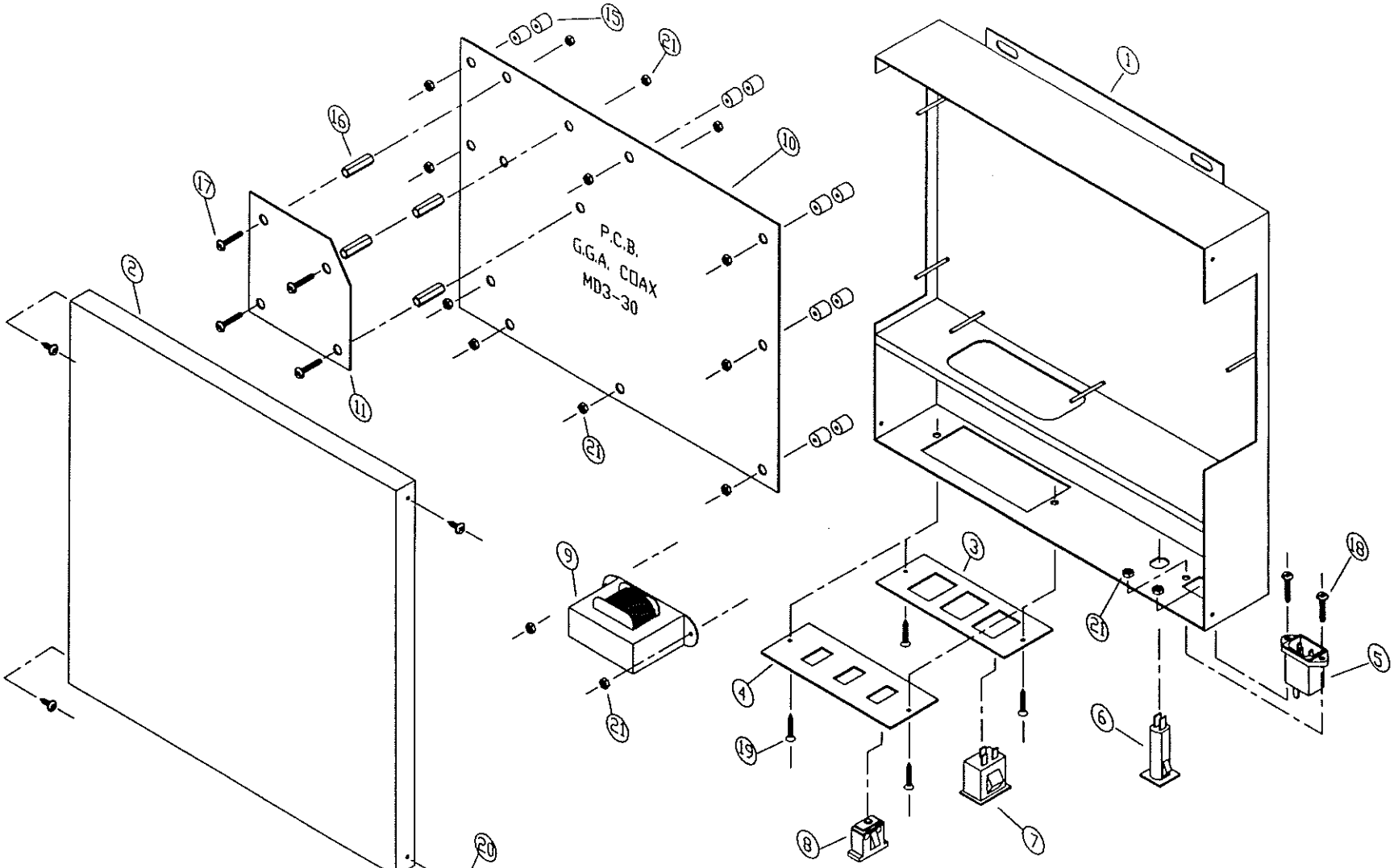
SB-3350-03

LIST OF MATERIAL

OVER HEAD 3 MONITORS 27"

SB-3350-03

INDEX	CODE NUMBER	DESCRIPTION
1	P-3327-01	BOITIER O.H.3 MON.27"
2	P-3327-02	PLASTIC DOOR O.H. 3 MON.
3	P-3327-03	PLASTIC BACK PANEL OH 3M.
4	M-3327-02	TOP CHANNEL O.H.3 MON.
5	M-3327-04	TOP TUBING SUPPORT
6	M-3327-06	TOP CASE MONITOR (F & R)
7	M-3327-07	TOP CASE MONITOR (SIDE)
8	M-3327-08	REINFORCEMENT STRIP
9	M-3327-5	O.H.CONTROL BOX SUPPORT
10	MPD-250-1	VELCRO 1/2"MALE
11	MPD-260-1	VELCRO 1/2"FEMELLE
12	SB-3550-03	MONITOR CONTROL BOX GGA
13	E-27R7391	27" COLOR MONITOR
14	10W-3327-01	TV PANEL 3 MON.
15	E-8LS3506-23	3"X 5" SPEAKER
16	E-40-1291	GRILLE 3"X5" #G30SMBB
17	C-084	1/8"WIRE ROPE CLIPS
18	C-060	STEEL CABLE 1/8"(METRE)
19	Z-466	1"X 5"DECALQ.VINYL BLANC
20	E-91000	TRANSFO 120/240V 50/60HZ
25	H-023	9/32" I.D. FLAT WASHER
26	H-024	3/16" I.D. FLAT WASHER
27	H-024B	3/4"O.D.X3/16"I.D. WASHER
28	H-024C	11/32"ID X 1"OD X.062"FW
29	H-045	1/4-20 X 1 3/4 HH CAP SCR
30	H-046	1/4"-20X3/4"HH CAP SCW
32	H-052F-7	8-32NC BUTTON HEAD CAP SC
33	H-054A	5/16-18X1/4" CARR. BOLT
34	H-058-01	5/16-18 TURNBUCKLES EY-EY
35	H-058A	5/16-18X3 1/4"EYE BOLT
36	H-074-5	#10-16 X 1/2"VIS TECK HEX
37	H-080-5	5/16"-18 HEX KEP NUT
38	H-080C	1/4-20NC TEE NUT
39	H-082-12	10-24 SPRING NUT TN-188
40	H-082-5	1/4"-20 HEX KEPS NUT
41	H-086	8/32 HEX NUT PLATED
42	H-097	3/16" LOCK WASHER
43	M-0166	1 1/8"ODX5/16"ID FLAT WAS
44	H-080	5/16"-18 HEX NYLOCK NUT



NO.	DATE	REVISION	BY

MENDES
QUEBEC CANADA

MODEL:

MONITOR CONTROL BOX GGA ASS

REV.

DRAW BY	SCALE:	DWG. NO.	PAGE
PIERRE BOLDUC	–	SB-3550-03	
DATE 16/06/92	APPR. BY		

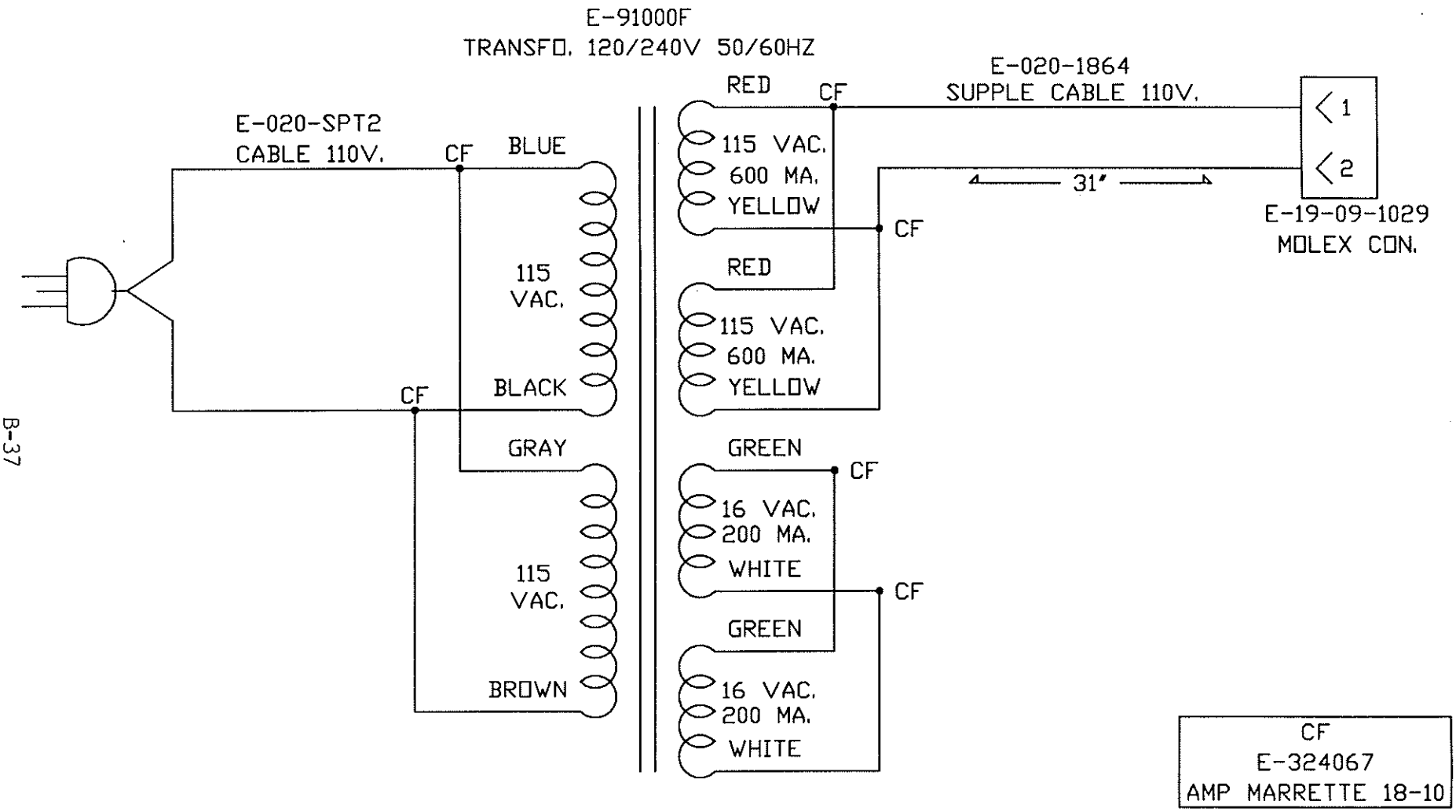
LIST OF MATERIAL

MONITOR CONTROL BOX GGA

SB-3550-03

INDEX	CODE NUMBER	DESCRIPTION
1	M-3350	GGA COAX BOX
2	M-3351	GGA COAX COVER
3	M-3354	CONNECTOR PLATE (240V)
4	M-3352	CONNECTOR PLATE (110V)
5	E-6EFIF	FILTRE EMI CORCOM
6	E-W28XQ1A-2	OVERLOAD 2A P&B
7	E-4300-022	AC CONNECTOR 250V F.
8	E-1306-001	OUTLET BLACK
9	E-B1089	TRANSFO. CGA (MD3-30)
10	E-MD3-30	PCB INTEGRATION COAX
11	E-26A1568-00	NTSC PCB
15	P-057	SPACER NYLON 1/2" X 1/2"
16	E-TSP10	1" X 6/32 NYL. SPA.HTSP10
17	H-052L-1	6/32 X 5/16 RH MACH SCREW
18	H-052L	6/32 X 1/2" RH MACH SCREW
19	H-072-16	#6 X 3/8"RH WOOD SCREW
20	H-072-19	#8X1/2" RH SOCK TRUSS
21	H-086-1	6/32" HEX KEP NUT

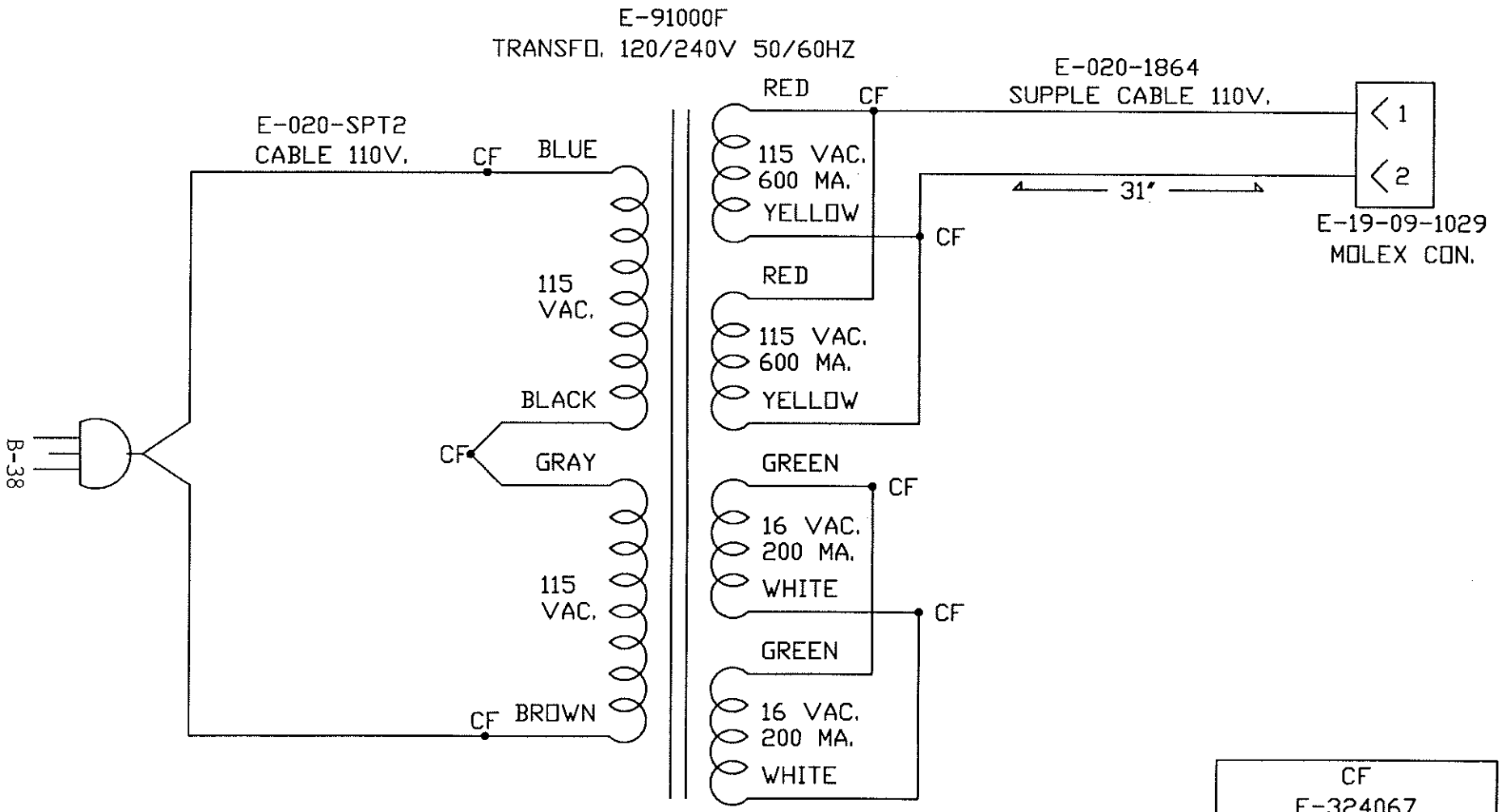
NO.	DATE	REVISION	BY



B-37

MENDES QUEBEC CANADA	MODEL:	TRANSFORMER 110 V.	REV.
	DRAW BY PIERRE BOLDUC	SCALE: –	DWG. NO. SB-91000-01
	DATE 15/05/92	APPR. BY	PAGE

NO.	DATE	REVISION	BY



CF
E-324067
AMP MARRETTE 18-10

MENDES
QUEBEC CANADA

MODEL:

TRANSFORMER 240 V.

REV.

DRAW BY	PIERRE BOLDUC	SCALE:	–	DWG. NO.	SB-91000-02	PAGE
DATE	15/05/92	APPR. BY				

PINSETTER ELECTRONICS

Pinsetter Control Unit

The Pinsetter Control Unit has 2 main functions: to control the pinsetter and transmit the pin count from the camera to the console. It is connected to:

- The camera;
- the ball detectors;
- the pinsetter interfaces (when installed on none Mendes pinsetters)and;
- the console.

The pinsetter control unit, through the pinsetter interface (one for each Machine), sends the proper signals (Part Set, Full set) that it receives from the Score Console. In turn the console receives the pin count that was transmitted from the camera to the Pinsetter Control Unit.

The Pinsetter Control Unit is made of 2 boards and a power section. The bottom board (MD3-32) contains the CPU and the Program EPROM (refer to Figure 1). The EPROM is about the only user changeable thing on the board. This board also contains a reset switch that is quite difficult to reach, but in any case the mere fact of unplugging the PCU has the same effect as a full reset. The top board in the PCU (MD3-31) is the board where most of the work is done. Refer to table 1 for a definition of the main elements of the board.

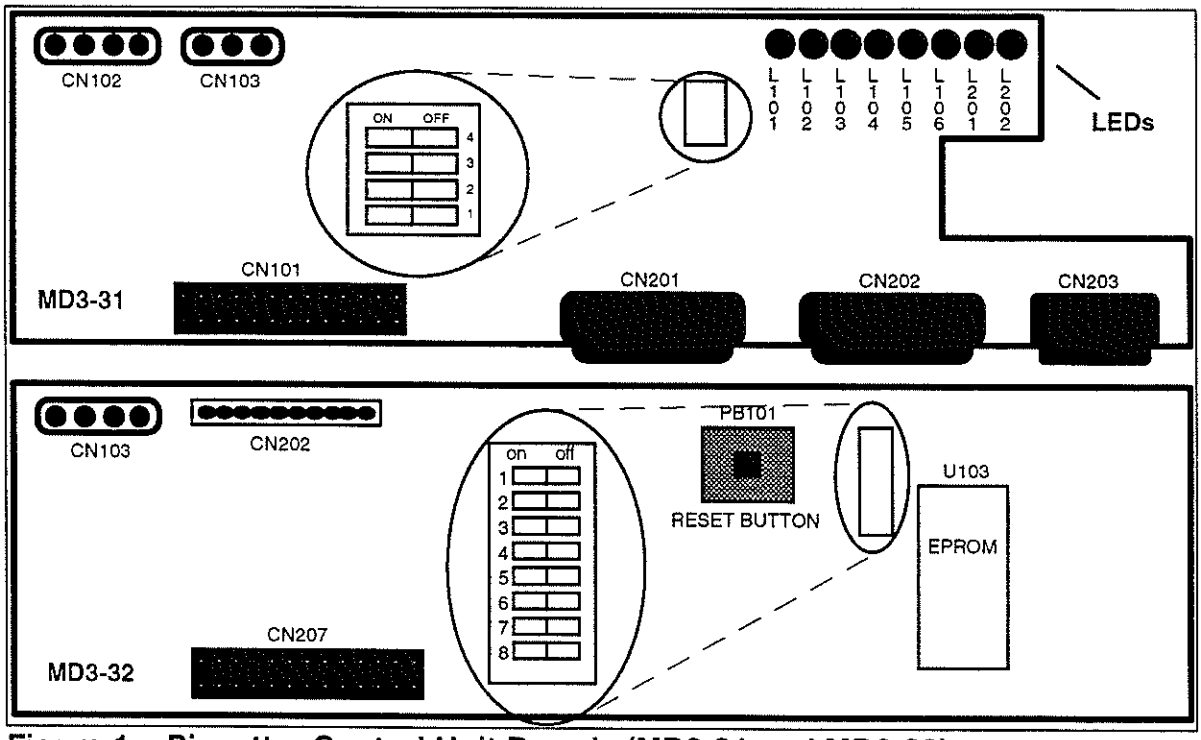


Figure 1. - Pinsetter Control Unit Boards (MD3-31 and MD3-32)

IDENTIFICATION	DESCRIPTION
MD3-31	
CN102	20 VAC INPUT FROM POWER SECTION
CN103	24 VAC INPUT FROM POWER SECTION
CN101	FLAT CABLE CONNECTOR TO MD3-32
CN201	OUTPUT (1 & 2) PINSETTER INTERFACES
CN202	INPUT (1 & 2) BALL DETECTORS AND INTERFACES
CN203	CAMERA COMMUNICATION
L101	PART SET LANE 1 LED
L102	PART SET LANE 2 LED
L103	FULL SET (OR SOLENOID CONTROL) LANE 1 LED
L104	FULL SET (OR SOLENOID CONTROL) LANE 2 LED
L105	POWER ON LANE 1
L106	POWER ON LANE 2
L201	NOT USED
L202	NOT USED
DS101	DIP SWITCH BANK (SEE TABLE 2)
MD3-32	
CN103	POWER INPUT FROM POWER SECTION
CN202	CONSOLE COMMUNICATION (MOUNTED TO CHASSIS)
CN207	FLAT CABLE CONNECTOR TO MD3-31
U103	CHANGEABLE EPROM
SW102	DIP SWITCH BANK (SEE BELOW)

Table 1. - Pinsetter Control Unit component identification.

DIP SWITCH	SETTING
DS101-1	ON (ONE SHOT PART SET LANE 1
DS101-2	ON (ONE SHOT PART SET LANE 2
DS101-3	NOT USED OFF
DS101-4	NOT USED OFF

Table 2. - DIP switch settings MD3-31

DIP Switch settings for the MD3-32 board

Dip switch selections are installation dependant. Therefore an exact table for each case is difficult to define The settings most commonly used are usually factory set (identified by an *).

SW 102 - 1,2,3 Reading delay (Pinsetter delay)

Approximate delay (seconds)	1	2	3
4.33	OFF	OFF	OFF
4.00	ON	OFF	OFF
3.67	OFF	ON	OFF
3.33	ON	ON	OFF
3.00	OFF	OFF	ON
2.67	ON	OFF	ON
2.33	OFF	ON	ON
2.00	ON	ON	ON

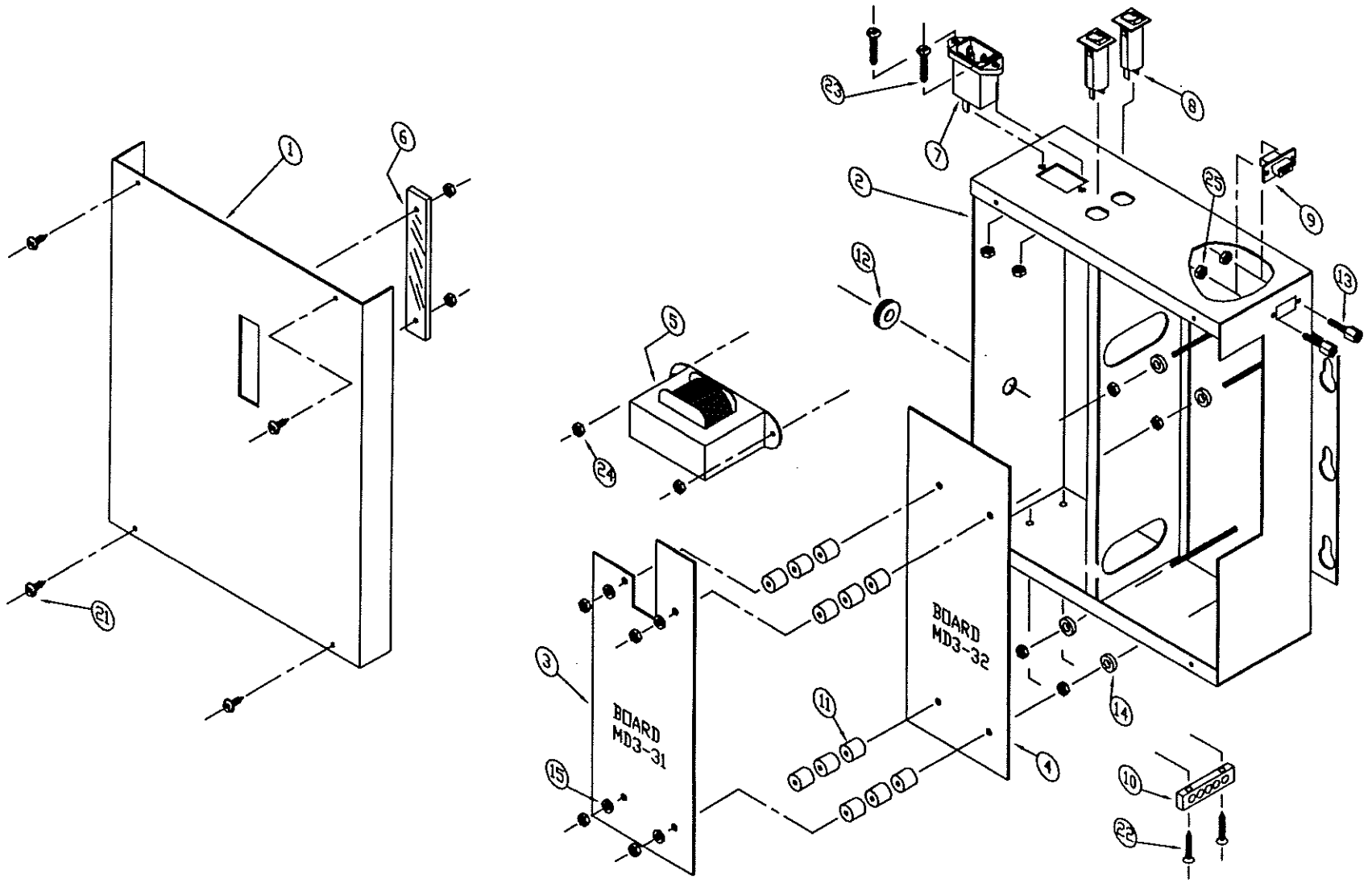
SW 102 - 4
ON: Detect of end of cycle with contact normally open.
OFF: Detect of end of cycle with contact normally closed.

SW 102 - 5
ON: Slave Mode (system is connected to autoscoring)
OFF: Stand alone will control the pinsetter without any interaction from the autoscorer. Acts as a lane controller.

SW 102 - 6
ON: Synchronisation of pinsetter on ball 1.
OFF: Synchronisation of pinsetter on ball 2.

SW 102 - 7
ON: Start cycle delay of AMF or GS-10 pinsetter of 0.25 seconds.
OFF: Start cycle delay of AMF or GS-10 pinsetter of 1.50 seconds

SW 102 - 8
ON: Watchdog ON. .
OFF: Watchdog OFF.



NO.	DATE	REVISION	BY

MENDES
QUEBEC CANADA

MODEL:

PINSETTER CONTROL ELECTRONIC

REV.

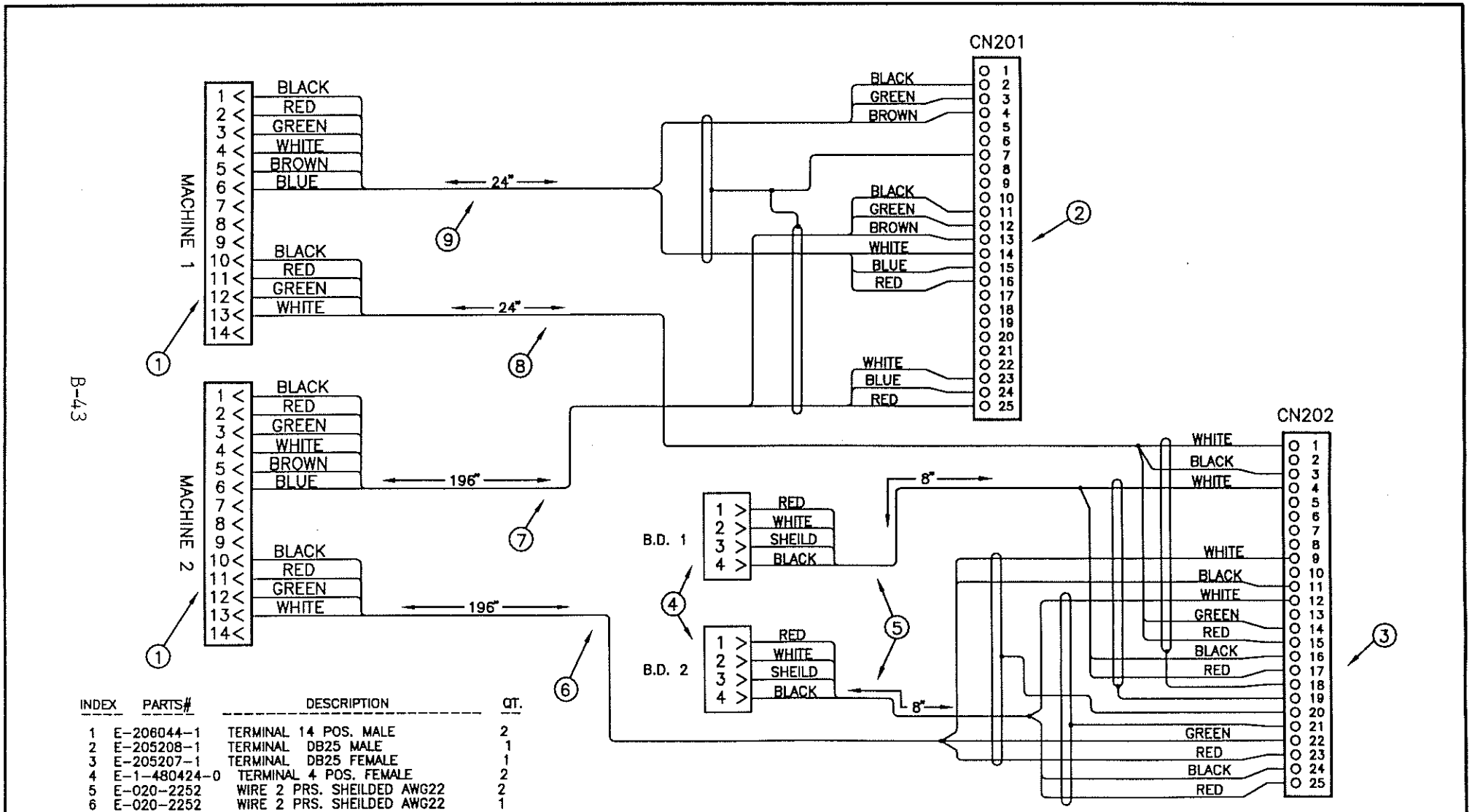
DRAW BY PIERRE BOLDUC	SCALE: --	DWG. NO. SB-6460	PAGE
DATE 15/06/92	APPR. BY		

LIST OF MATERIAL

PINSETTER CONTROL ELECTRONIC ASSEMBLY

SB-6460

INDEX	CODE NUMBER	DESCRIPTION
1	M-6461	CPU INTERFACE COVER
2	M-6460	CPU BOX INTERFACE PINSETT
3	E-MD3-31	PCB I/O
4	E-MD3-32P	PCB CPU PIN CONTRÔLEUR
5	E-B1092	TRANSFO (MD3-31-32)
6	P-6461	WINDOW PLASTIC
7	E-6EFIF	FILTRE EMI CORCOM
8	E-W28X01A-2	OVERLOAD 2A P&B
9	E-205203-1	AMP CONN. F DB9
10	E-SBT70	BLOCK GROUND 70A
11	P-057	SPACER NYLON 1/2" X 1/2"
12	RB-38	RUBBER GROMET 3/8
13	E-205817-1	AMP SCREW KIT F .3/2
14	E-219	NYLON ROUND SPACER VIS #8
15	E-W3751	NYLON WASH .172 ID X .375
21	H-072-19	#8X1/2" RH SOCK TRUSS
22	H-072-11	#8X1"FH SOCK WOOD SCW
23	H-052L	6/32 X 1/2" RH MACH SCREW
24	H-086-1	6/32" HEX KEP NUT
25	H-085-6	4/40 HEX KEP NUT 2X



INDEX	PARTS#	DESCRIPTION	QT.
1	E-206044-1	TERMINAL 14 POS. MALE	2
2	E-205208-1	TERMINAL DB25 MALE	1
3	E-205207-1	TERMINAL DB25 FEMALE	1
4	E-1-480424-0	TERMINAL 4 POS. FEMALE	2
5	E-020-2252	WIRE 2 PRS. SHEILDED AWG22	2
6	E-020-2252	WIRE 2 PRS. SHEILDED AWG22	1
7	E-020-6707	WIRE 7 COND. SHEILDED AWG22	1
8	E-020-2252	WIRE 2PRS. SHEILDED AWG22	1
9	E-020-6707	WIRE 7 COND. SHEILDED AWG22	1

NO.	DATE	REVISION	BY

MENDES QUEBEC CANADA

MODEL:

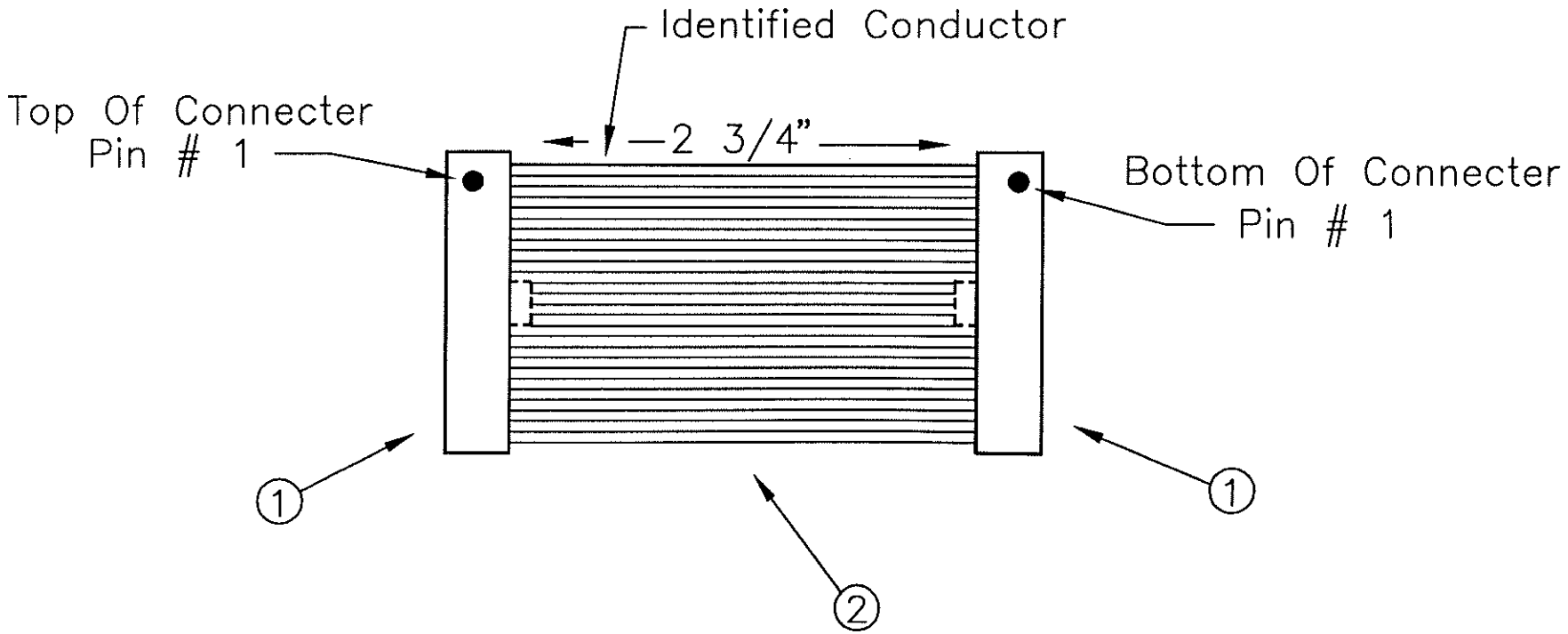
C. ASS. INTERFACE MACHINE

REV.

DRAW BY PIERRE BOLDUC | SCALE: -- | DWG. NO. EC-050-065 | PAGE

DATE 26/05/92 | APPR. BY

NO.	DATE	REVISION	BY



INDEX	PARTS #	DESCRIPTION	QT.
1	E-746285-6	AMP CON. 26 POSITIONS	2
2	E-499116-4	FLAT CABLE 26 COND.	1

MENDES
QUEBEC CANADA

MODEL:

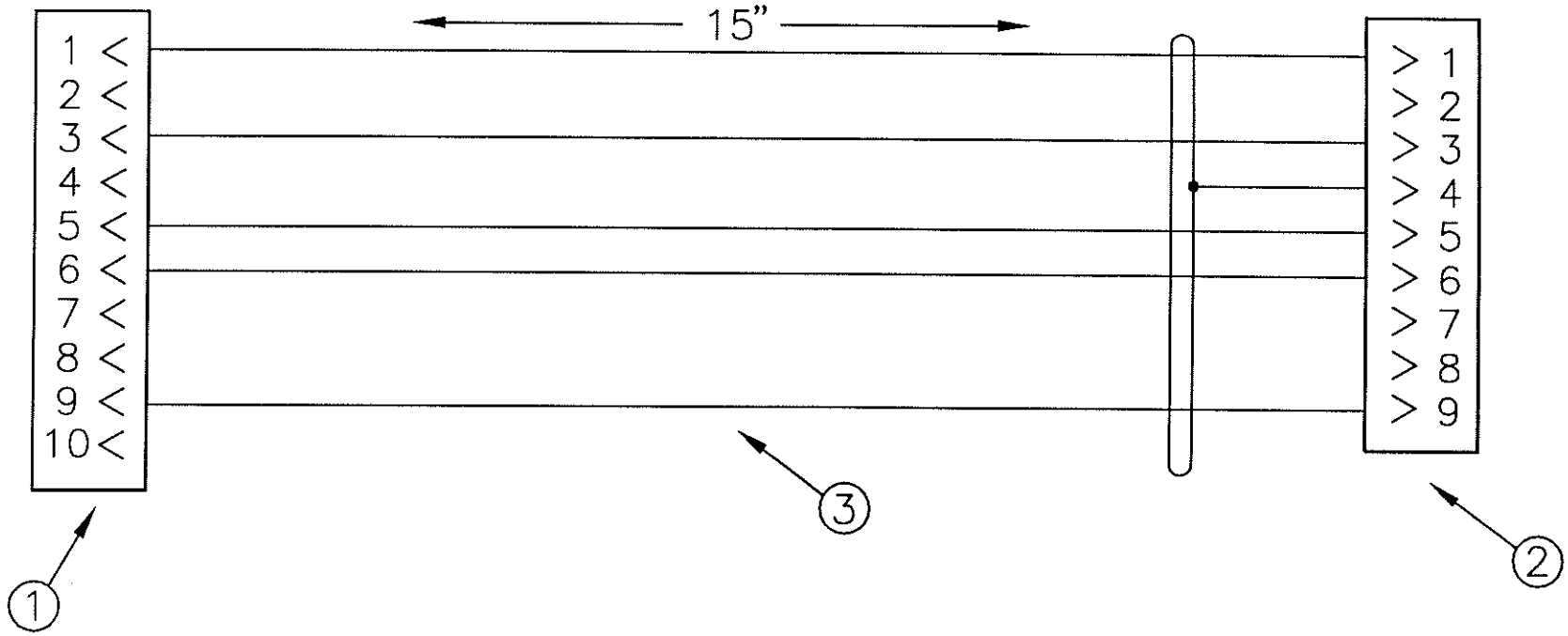
FLAT CABLE CPU-I/O

REV.

DRAW BY PIERRE BOLDUC | SCALE: - | DWG. NO. EC-050-071 | PAGE

DATE 22/05/92 | APPR. BY

NO.	DATE	REVISION	BY



INDEX	PARTS#	DESCRIPTION	QT.
1	E-1-640440-0	TERMINAL 10 POS. FEM.	1
2	E-205203-1	TERMINAL DB9 9 POS. FEM.	1
3	E-020-2263	WIRE 3PRS. SHEILDED AWG22	1

MENDES
QUEBEC CANADA

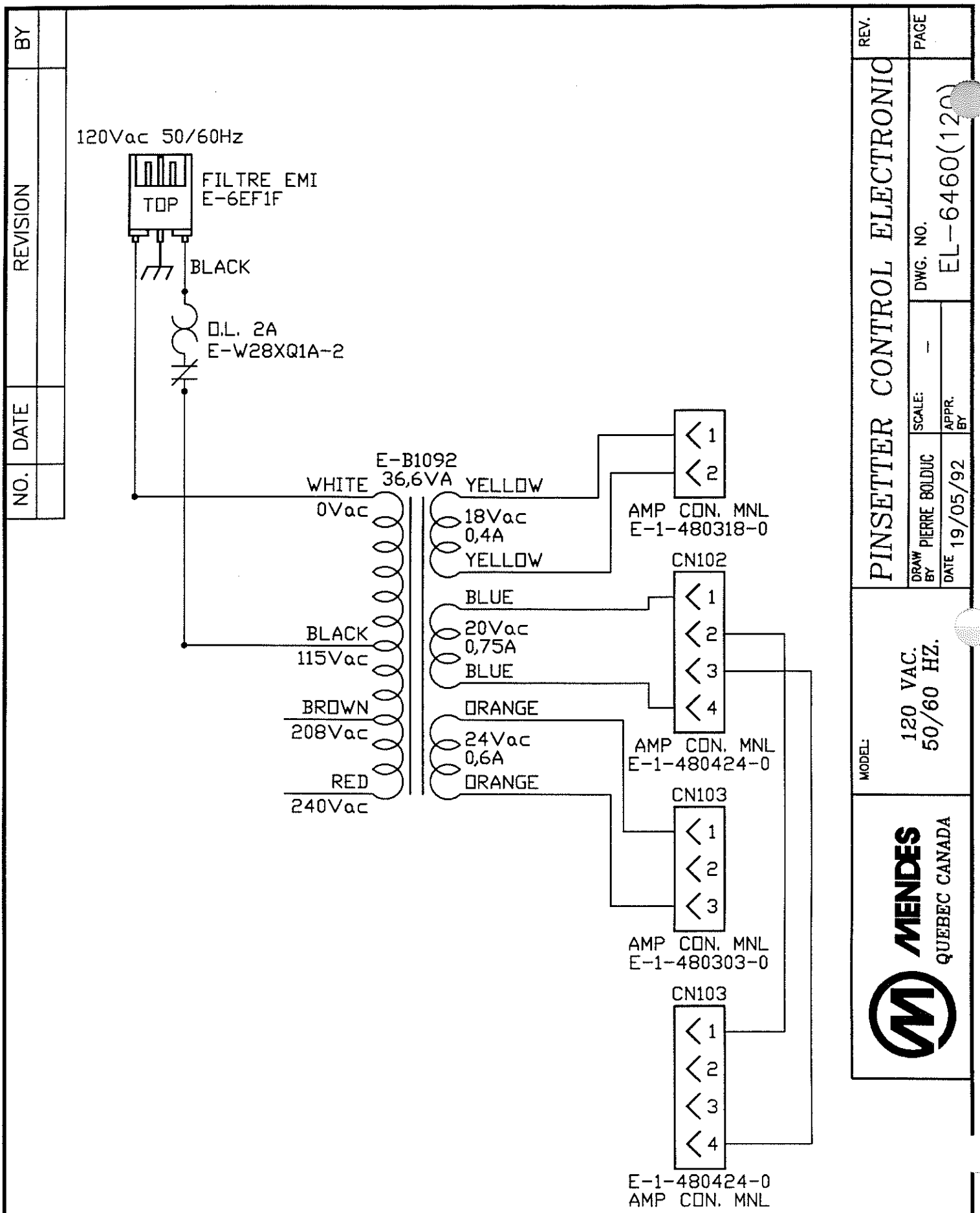
MODEL:

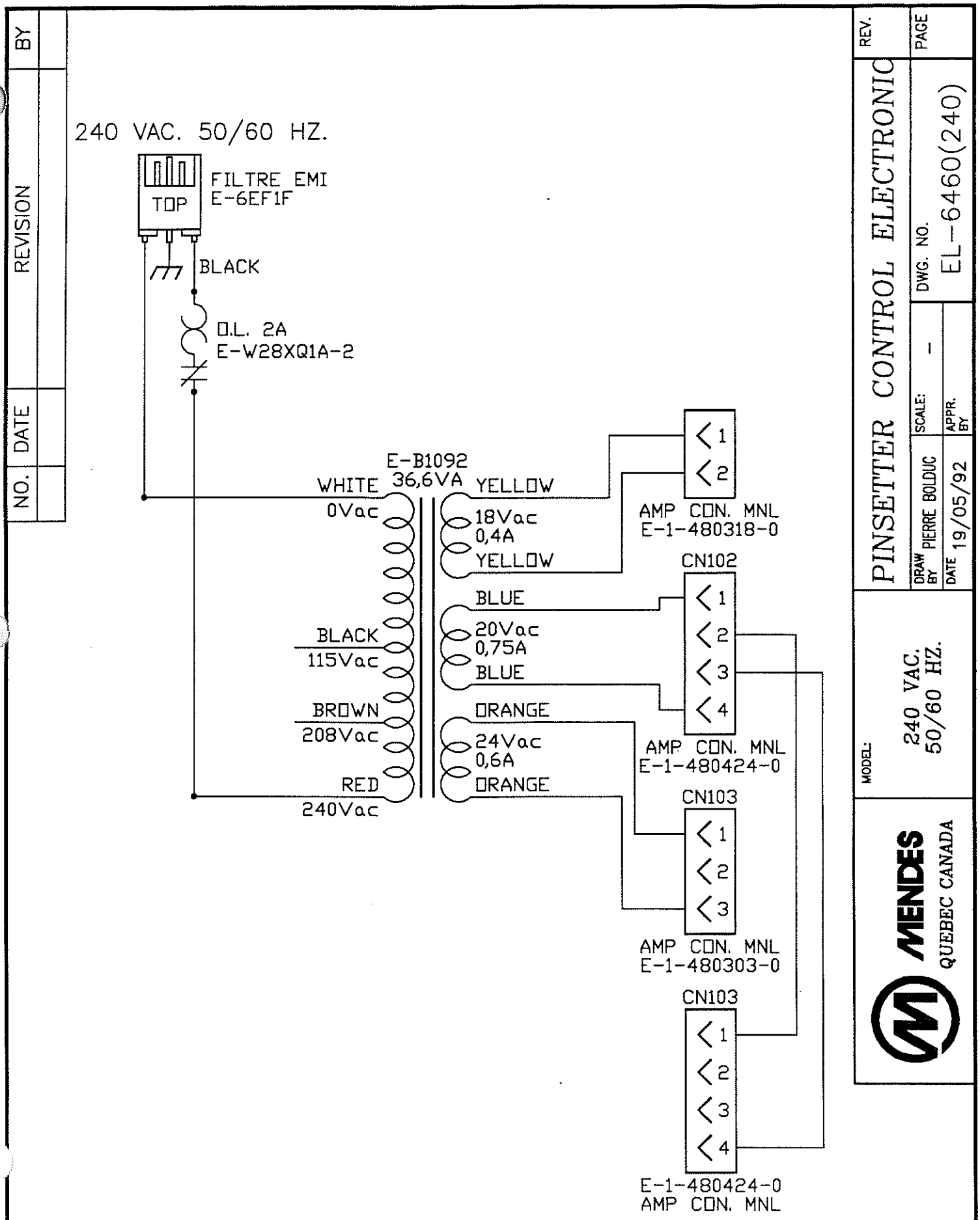
C. ASS. COMMUNICATION CPU

REV.

DRAW BY PIERRE BOLDUC | SCALE: _ | DWG. NO. EC-050-072 | PAGE

DATE 25/05/92 | APPR. BY


120Vac 50/60Hz
TOP
FILTRE EMI
E-6EF1F
BLACK
D.L. 2A
E-W28XQ1A-2
E-B1092
36,6VA
WHITE
0Vac
YELLOW
18Vac
0,4A
YELLOW
BLACK
115Vac
BLUE
20Vac
0,75A
BLUE
BROWN
208Vac
ORANGE
24Vac
0,6A
ORANGE
RED
240Vac
1
2
AMP CON. MNL
E-1-480318-0
CN102
1
2
3
4
AMP CON. MNL
E-1-480424-0
CN103
1
2
3
AMP CON. MNL
E-1-480303-0
CN103
1
2
3
4
E-1-480424-0
AMP CON. MNL
NO.
DATE
REVISION
BY
REV.
PAGE
PINSETTER CONTROL ELECTRONIC
DRAW BY PIERRE BOLDUC
DATE 19/05/92
SCALE: —
APPR. BY
DWG. NO. EL-6460(120)
MODEL:
120 VAC.
50/60 HZ.
MENDES
QUEBEC CANADA


240 VAC. 50/60 HZ.
FILTRE EMI
E-6EF1F
TOP
BLACK
O.L. 2A
E-W28XQ1A-2
E-B1092
36,6VA
WHITE
0Vac
YELLOW
18Vac
0,4A
YELLOW
BLUE
20Vac
0,75A
BLUE
BLACK
115Vac
BROWN
208Vac
ORANGE
24Vac
0,6A
ORANGE
RED
240Vac
CN102
CN103
CN103
AMP CON. MNL
E-1-480318-0
AMP CON. MNL
E-1-480424-0
AMP CON. MNL
E-1-480303-0
E-1-480424-0
AMP CON. MNL
NO.
DATE
REVISION
BY
REV.
PAGE
PINSETTER CONTROL ELECTRONIC
DRAW BY PIERRE BOLDUC
DATE 19/05/92
SCALE: -
APPR. BY
DWG. NO. EL-6460(240)
MODEL: 240 VAC. 50/60 HZ.
MENDES
QUEBEC CANADA

CCD CAMERA

MENDES

Introduction to the camera adjustment

The following chapter describes the necessary steps to adjust the tenpin[1] camera.

For most, the first method will be used. It covers the required steps using the Camera Adjustment Bracket (CAB), Camera Adjustment Unit (CAU) and a digital multimeter. This method is not the quickest but it is the easiest and does not require any special equipment other than a good quality digital multimeter (which any bowling center with autoscoring should have anyways) and a little knowledge.

For the more technically inclined the second method is quicker. It requires an oscilloscope (and a knowledge of its use) which can set you back about $1000. This method is the one used by our technicians and some of our larger installations.

Component Identification

The following pages give a description of the required equipment and their preparation for the subsequent adjustment of the cameras. Please note that for the sake of privity each component is given an abbreviated name which will be used throughout this manual.

(1) - Note to Candlepin Installations

The actual adjustment sequence for candlepin is exactly the same throughout this manual. The only difference is the height the Camera Adjustment Template (CAT) is set at. Therefore, please read "Candlepin" where ever you see "Tenpin".

MENDES

THE CAMERA ADJUSTMENT TEMPLATE (CAT)

The camera adjustment template (CAT) is used to adjust the horizontal level of the camera. Please note that it can vary in height depending on the type of bowling game since the pins are not the same height. Figure 1 gives you a general idea of the CAT.

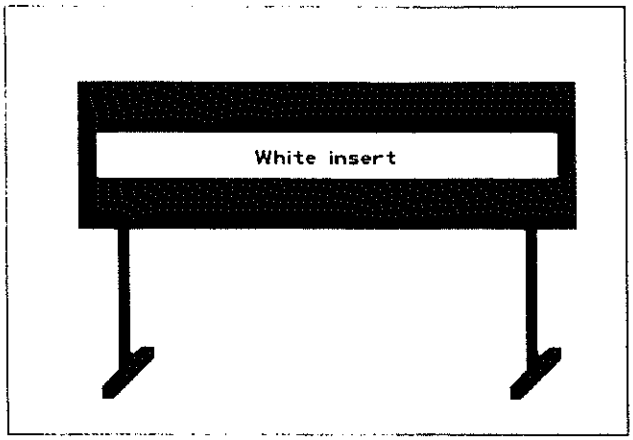


Figure 1
Camera Adjustment Template (CAT)

Using the metal Camera Adjustment Template (CAT) and placing it in front of the headpin perpendicular to the lane as shown in Figure 8 you will notice, if you view at the camera level, that the camera only uses the top of the pins during its readings. This is helpful to know and from this you can deduce the following:

1 - Pins must be relatively clean and in good condition (i.e.- plastic not chipped away, no belt burns etc) only at this level.

2 - Any bright reflections that can be seen on the aprons or kickbacks at this level can affect the readings. Be aware that if you have old shiny aprons they will not necessarily affect the adjustment of the camera but when the lane is in play and balls shake the apron it can send a reflection to the camera therefore throwing it off.

3 - You can still use coloured pins for promotional reasons so long as they are white at the top.

MENDES

THE CAMERA ADJUSTMENT BRACKET (CAB)

The Camera Adjustment Bracket (CAB) is a tool supplied with your installation that is used to rotate the camera eye-piece. The use of the CAB is critical to the proper adjustment of the CCD camera since without it is virtually impossible to adjust the camera. It ensures a precise and exact movement of the lens since a movement of 1 100th of an inch at the camera level corresponds to a movement of several inches at the pindeck level.

As Figure 2 shows there are two sets of screws on the CAB. The longer screws called attachment screws, are the screws that hold the CAB to the camera itself. The shorter set of screws with rubber extensions are the screws that will actually move the camera eye-piece in the desired directions (up or down and left or right).

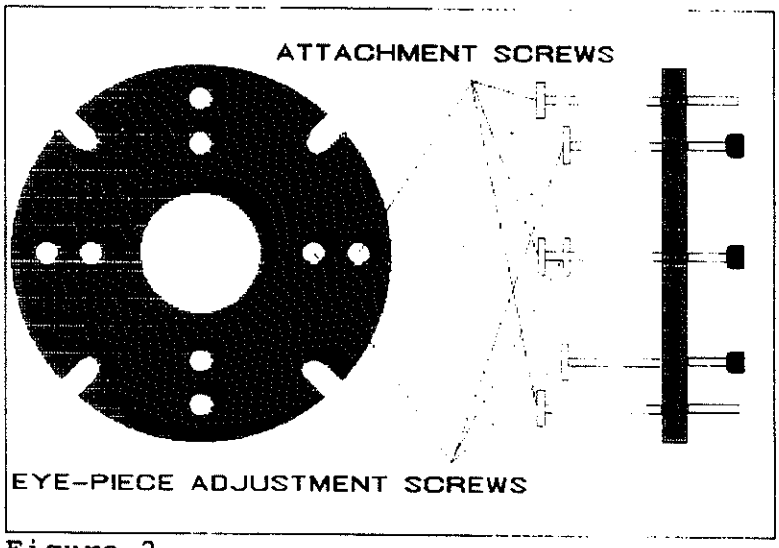


Figure 2
CAMERA ADJUSTMENT BRACKET (CAB)

MENDES

THE CAMERA PCB

The Camera PCB (PCB) is the electronic board found in the camera case itself. It contains the necessary electronics that decipher the image that the lenses actually sees.

The whole system is based on a CCD chip found in the lens itself. A CCD chip is a type of memory chip that is sensitive to light and therefore can differentiate between white (the pins) and black (the background).

NOTE: Never touch the P301 or P401 potentiometers (POTs) (refer to Figure 3) since these can only be adjusted at the factory.

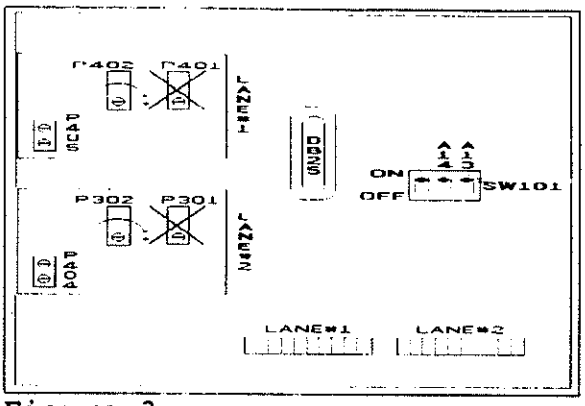


Figure 3
Camera PCB view

A14	A13	MODE
ON	ON	10 PINS
ON	OFF	5 PINS
OFF	ON	10 TEST
OFF	OFF	5 TEST

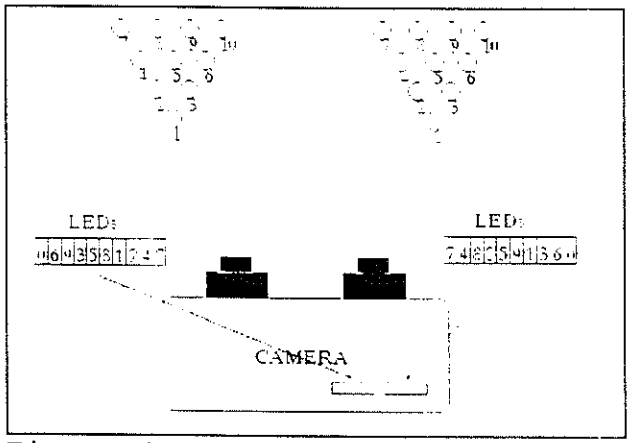


Figure 4
LED to PIN correspondence

In Figure 6 please take note of the pins and their corresponding LEDs found on the camera PCB. The LEDs are in the same sequence as the camera actually sees them. It might be worth while to lower your head to the same level and actually view with your own eyes the pin alignment. Be advised that the LED sequences are not the same for both lanes.

MENDES

THE CAMERA ADJUSTMENT UNIT (CAU)

The Camera Adjustment Unit is supplied with your installation. It is an electronic apparatus that helps you to fine tune your camera. With the LEDs you can easily adjust the camera to its optimum setting.

The CAU has 3 important features:

- The Multimeter terminals, this is where you connect your Digital Multimeter during the V_{max} test. Note that the red terminal is positive and the black one is negative.
- The CAU also as a wire with a DB-25 connector. This connector is subsequently connected to is receptacle on the Camera PCB board during the Horizontal Adjustment.
- The CAU also has 2 LED displays that indicate the adjustment level during the Horizontal Adjustment. Refer to the next paragraph on the LED display levels.

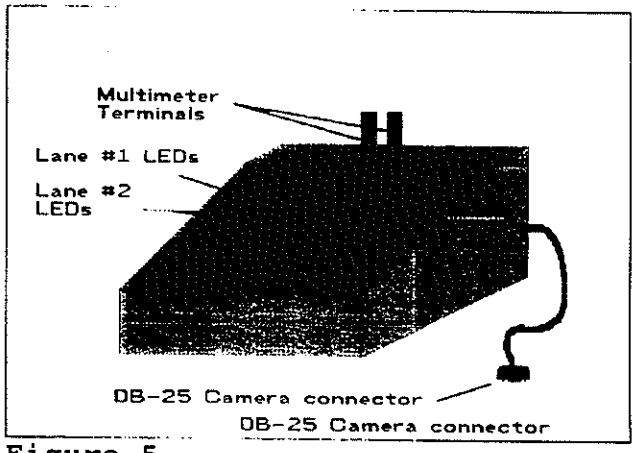


Figure 5
The Camera adjustment Unit (CAU)

In Figure 6 you can see the LED display orientation is from the top to bottom. During the adjustment procedure you will be asked to adjust the camera in such a way as to have either the Top LED (#1) the two Top LEDs (#1 & #2). Suffice to say that the higher the better.

LEVEL	LEDs	
1	#1	BEST
2	#1 and #2	
3	#2	
4	#2 and #3	
5	#3	
"	"	
"	"	
"	"	WORST

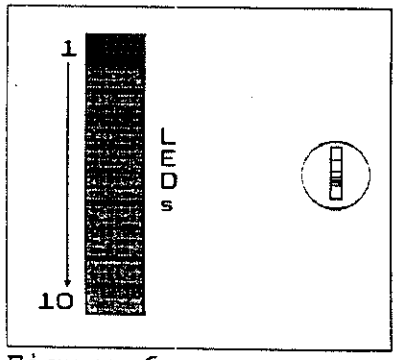


Figure 6
CAU LED display

MENDES

THE CAMERA EYE-PIECE

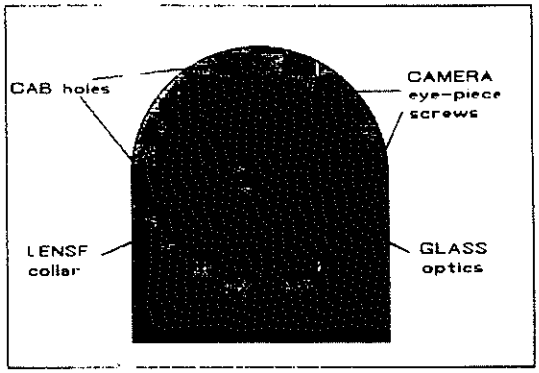


Figure 7
The Camera Eye-Piece

The Camera Eye-Piece (called camera for short) is the eye that the views the Pins. Its main components are:

- The camera eye-piece screws are the screws that hold the camera firmly in position. These screws must be loosened if you want to carry out any adjustments on the camera (other than the V_{max} adjustment). It is strongly recommended that you place the CAB before loosing these screws.
- The CAB holes are the holes where the Camera Adjustment Bracket screws are inserted and subsequently screwed in.
- The lens focus mechanism is locked into place by the lens collar. **Do not adjust** the focus unless you are very experienced with the adjustment of the camera. Usually, technicians using a scope can vary the focus because they have view of what is actually going on. In the case of the Camera adjustment Unit technique it is strongly recommended not to touch the lens collar.
- The glass optics is the actual lens. It should be kept clean at all times. Use only a soft tissue approved for lens optics.

All adjustments must be done in a normal environment (lights on, similar pins...).

MENDES

CAMERA ADJUSTMENT USING THE CAMERA ADJUSTMENT UNIT

Adjustment of height and parallelism.

A. Select the normal DIP SWITCH (10 pins) position (refer to Figure 3) for the location of the SW-101 DIP switch bank on the camera PCB board:

SW1	SW2	SW3
ON	ON	ON

B. Place all ten pins on the deck (FULL FRAME)

C. Position the CAT in front of the pins (with the white insert in place), refer to Figure 8 for the proper position of the template.

D. Install the CAB on the camera.

E. Screw the 4 large screws into the holes on the camera identified as the CAB holes (refer to Figure 7).

F. Unscrew the 4 camera eye-piece screws with an ALLEN key.

G. Adjust the camera eye-piece, by using the 4 eye-piece adjustment screws on the CAB (refer to Figure 2).

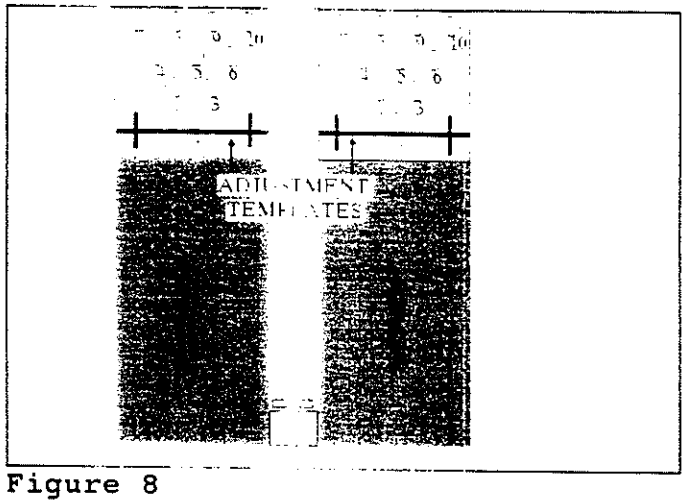


Figure 8
Template position

Carry-out the adjustment until all ten LEDs are ON for the Lane LED display on the camera PCB. (refer to Figure 3).

TIPS: To ensure that the camera is actually looking at the white strip raise the camera slightly until the LEDs turn OFF and then bringing it back again until they come back on and again disappear. By doing this you are confirming that the camera is actually centred on the strip and not on the pins that are visible under the template. Another trick you can use is to take a dark object and pass it along the strip when the LEDs are all on. You should be able to see the object cross the LED display, if not you are definitely not looking (the camera isn't) at the right place. If just can't seem to get all 10 LEDs on at the same time, it probable means that the lens is not oriented properly.

MENDES

CAMERA ADJUSTMENT USING THE CAMERA ADJUSTMENT UNIT

Horizontal Adjustment

A. Keep pins (Lane 1 - #7, #8 and #9, Lane 2 - #8, #9 and #10) on the deck.

B. Remove the white insert in the CAT.

C. Select the TENPIN TEST DIP SWITCH (10 pins) position (refer to Figure 3) for the location of the SW-101 DIP switch bank on the camera PCB board:

SW1	SW2	SW3
ON	OFF	ON

D. Camera eye-piece adjustment:

With the 4 screws, move camera eye-piece from right to left and back again so as have the LED display (ON TESTER) reach the highest level possible.

If no LEDs are lit the previous adjustments have to be done again.

E. Adjustment meaning.....

To obtain the best adjustment possible by moving lens left to right.

MENDES

CAMERA ADJUSTMENT USING THE CAMERA ADJUSTMENT UNIT

Maximum voltage adjustment (V_{max})

A. Remove the white insert from the CAT.You must also connect the digital multimeter to the terminals on your CAU, which in turn must be connected to the camera DB-25 connector.

B. Remove all pins from the pindeck.

C. Select the normal DIP SWITCH (10 pins) position on SW 101 DIP switch bank:

SW1	SW2	SW3
ON	ON	ON

D. Wait 1 minute.

E. No pins must be read on the LED indicator on the camera PCB.

F. Vary the P402 POT clockwise (slowly) until the display unit indicates one or many pins, at this point note precisely the value on the multimeter (call this value V_{max}).

G. Place the 10 pins on the deck.

H. You must be able to read the 10 pins on the indicator.

I. Vary the P402 POT anti-clockwise (slowly) until the display needs one pin less (i.e. 9 instead of 10). At this point again read the voltage (call this value V_{min}).

J. Calculate the following value:

$$V_{set} = (3*V_{max} + V_{min}) / 4$$

K. Vary the P402 POT clockwise until the value read is equal to the value calculated for V_{set}.

Adjustment verification.

A. Place all 10 pins on the deck.

B. Remove one pin after another while at the same time verifying the display (#10 followed by 9, 8, 7,....).

MENDES

NOTES

The Horizontal and Vertical adjustments must always be done in conjunction with the V_{max} adjustment. These two adjustments may be required in the following circumstances:

- Camera was hit by a ball;
- A new lens unit has been installed;
- Pinsetter has been adjusted for out of spot problems or pin setting has been modified;
- Camera isn't scoring properly.

Also take note that some times you (especially with a new camera board) you may have to do the V_{max} adjustment prior to the Horizontal and Vertical adjustments. Furthermore, the V_{max} adjustment may sometimes be the only adjustment required, as would be the case when:

- New pins are used on a lane;
- New lighting (new fluorescent tube) has been installed;
- New apron installed;
- A new camera board has been installed. (If the lens piece hasn't been moved or changed at the same time);
- If only the corner pins (i.e. - #7 and or #10) are not scoring properly (Note - That the other adjustments may be required but to save time start with the V_{max} adjustment.

MENDES

CAMERA ADJUSTMENT WITH AN OSCILLOSCOPE

OSCILLOSCOPE ADJUSTMENT

Probe adjustment

Adjust the magnification adjustment on the probe to X10. Calibrate the probes (refer to oscilloscope manual).

Channel coupling

Set Channel #1 to **AC**.
Set Channel #2 to **DC**.

Channel Sensitivity

Set Channel #1 to **0.2 volts.**
Set Channel #2 to **5 volts.**

Set the **TRIGGER MODE** to **NORMAL**.

Set the **TRIGGER SOURCE** to **EXTERNAL**.

Set the **TRIGGER COUPLING** to **DC**.

Set the **VERTICAL MODE** to **BOTH**.

CONNECTING THE OSCILLOSCOPE

Connect the three probes to the following locations:

- Channel #1;
- Channel #2;
- **EXTERNAL SYNC**;

on the oscilloscope.

MENDES

CAMERA ADJUSTMENT WITH AN OSCILLOSCOPE

Connect the Channel #1 probe to **OS1** (lane 2) or **OS2** (lane 1) on the camera signal module that you have connected to the DB-25 connector on the camera board.

Connect the Channel #2 probe to **WIN** on the camera signal module.

Connect the external sync probe to **AS1** (lane 2) or **AS2** (lane 1) on the camera signal module.

Connect the three probe alligator clips to the **GND** on the camera signal module.

PREPARING THE CAMERA EYE

Place the camera adjustment bracket (CAB) on the camera eye.

Free the appropriate screws that hold the camera socket in place.

POSITIONING THE CAMERA EYE

Place the camera template (with the white cardboard removed) in front of the pins.

On the oscilloscope, adjust the **TRIGGER LEVEL** to obtain a stable image. Adjust the Channel #1 signal (actual pin signal) at the top of screen and adjust the Channel #2 signal (comparison template) at the bottom.

With the CAB, you must adjust the camera eye so as to see and align on the oscilloscope the two images. This is done in three steps:

1 - You must obtain a maximum signal by varying the camera eye vertically.

MENDES

CAMERA ADJUSTMENT WITH AN OSCILLOSCOPE

2 - You must rotate the camera eye (CW and CCW) so as to balance the image parallelism.

3 - Adjust the horizontal position of the pins by aligning the actual picture with the comparison template. Note that the critical alignment must be made with the pins that are closest together.

FINAL OPERATION

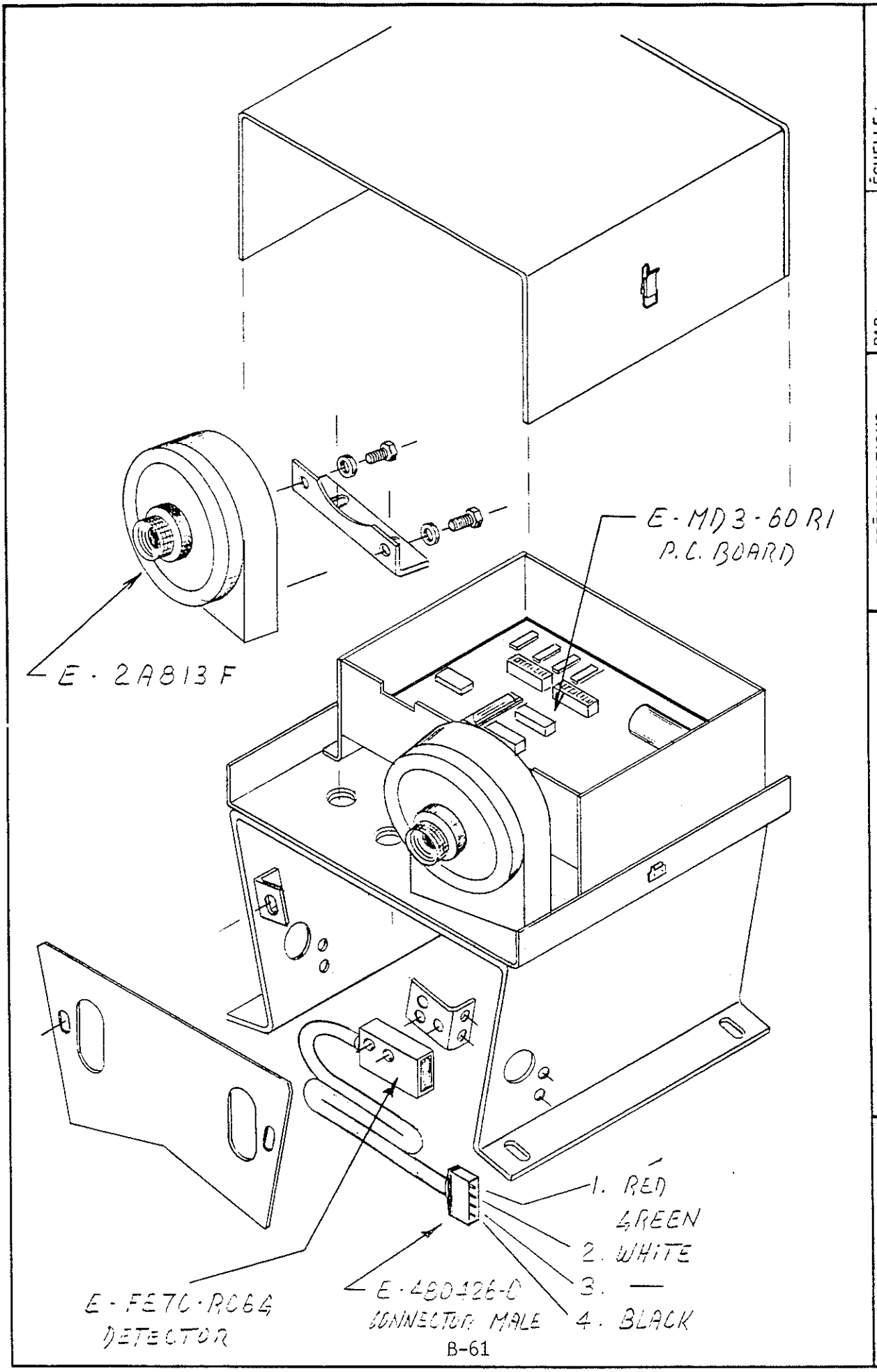
Tighten the camera eye screws evenly.

Remove the CAB.

Verify that the signals have not changed and are still aligned.

COMPARISON LEVEL ADJUSTMENT

Same as described in basic camera adjustment procedures.



DESCRIPTION: LCD PIN DETECTOR

VÉR. : ..... APPR. : ..... DATE : 12-09-89

SPÉCIFICATIONS

PAR: P.B.

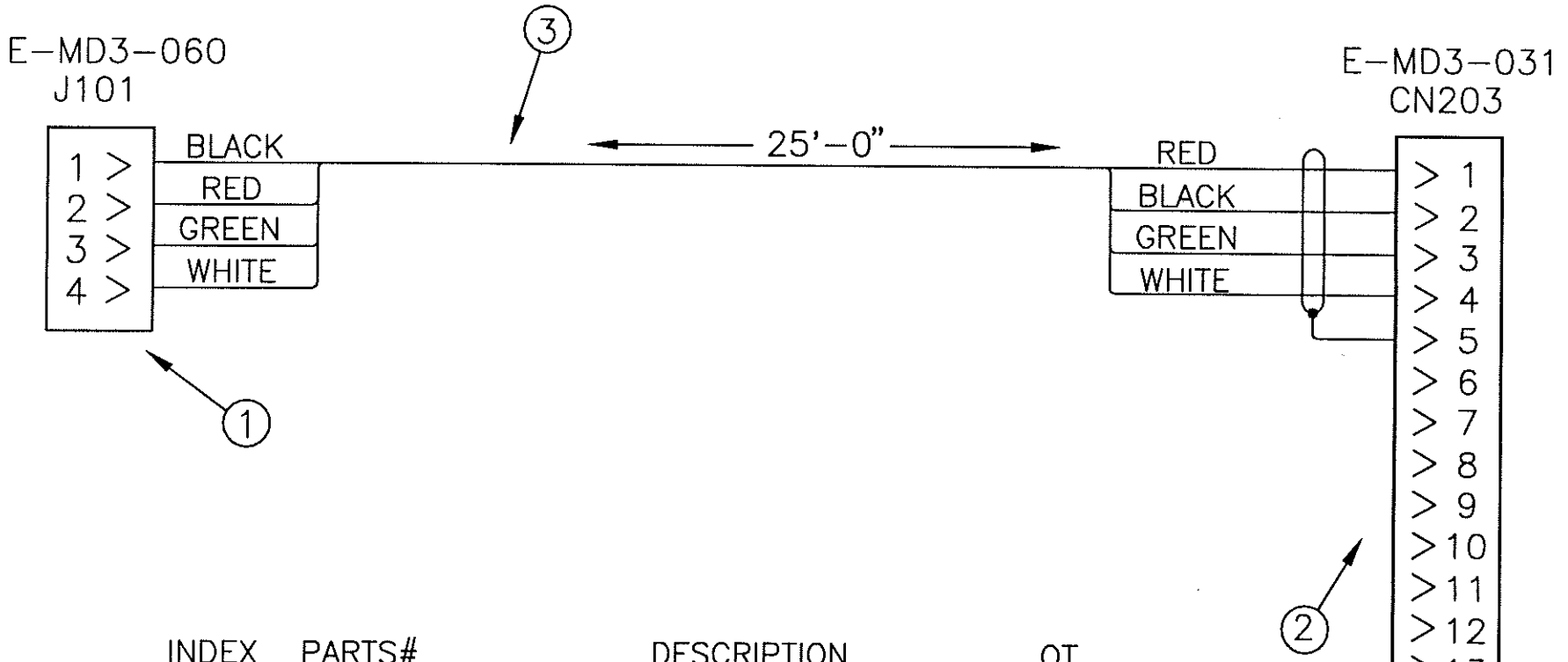
ÉCHELLE : —

PARTIE No. SB-6400

Québec Canada

MENDES

NO.	DATE	REVISION	BY



INDEX	PARTS#	DESCRIPTION	QT.
1	E-640440-4	TERMINAL 4 POS. MTA100	1
2	E-745494-2	TERMINAL DB15 MALE	1
3	E-020-2252	WIRE 2 PRS. SHEILDED AWG22	1

MENDES
QUEBEC CANADA

MODEL:

CAMERA COMMUNICATION

REV.

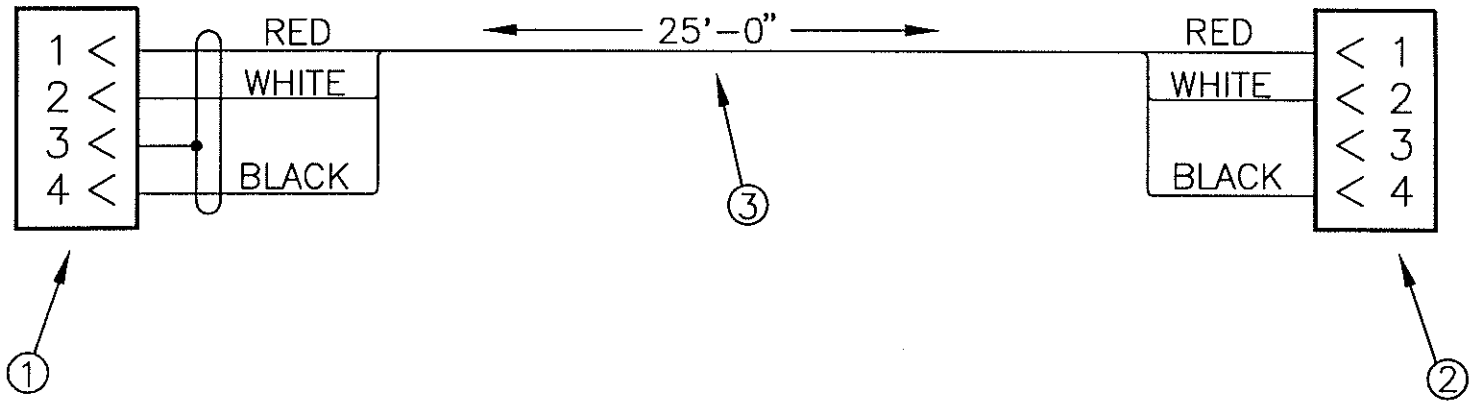
DRAW BY PIERRE BOLDUC | SCALE: – | DWG. NO. EC-050-064 | PAGE

DATE 25/05/92 | APPR. BY

NO.	DATE	REVISION	BY

Connect To
EC-050-065
On Lane Controller

Connect To
Ball Detector



B-62A

INDEX	PARTS#	DESCRIPTION	QT.
1	E-488426-0	TERMINAL 4 POS. MALE	1
2	E-1-480424-0	TERMINAL 4 POS. FEM.	1
3	E-020-2252	WIRE 2PRS. SHEILDED AWG22	1

MENDES
QUEBEC CANADA

MODEL:

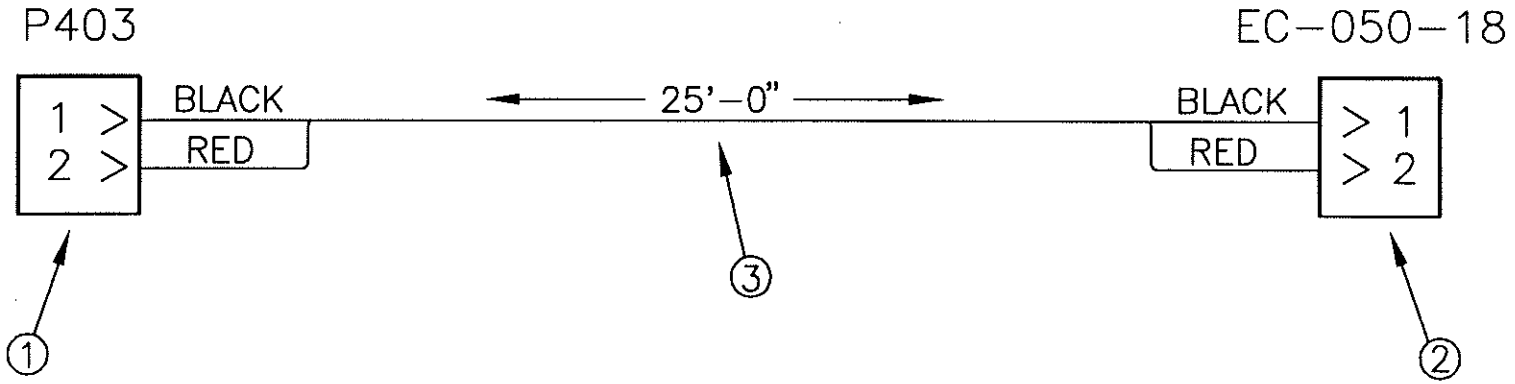
C.ASS. BALL DETECTOR

REV.

DRAW BY PIERRE BOLDUC | SCALE: – | DWG. NO. EC-050-016 | PAGE

DATE 25/05/92 | APPR. BY

NO.	DATE	REVISION	BY



INDEX	PARTS#	DESCRIPTION	QT.
1	E-640440-2	TERMINAL 2POS. MTA100	1
2	E-1-480319-0	TERMINAL 2POS. MNL	1
3	E-020-9222	WIRE 2 COND. AWG22	1

B-62B

MENDES
QUEBEC CANADA

MODEL:

ALIMENTATION CAMERA TEN

REV.

DRAW BY PIERRE BOLDUC

SCALE: –

DWG. NO. EC-050-018

PAGE

DATE 25/05/92

APPR. BY

CGA COAX

CGA Coax Unit

The CGA Coax board is found in the overhead unit. Its main function is to control the Video / Scoresheet / Sound capabilites of the overhead unit. Within it's casing it has it's own power supply. When, if ever, it becomes defective the complete unit should be replaced and not just the board. This is due to the fact that the board should never be touched other than by a qualified Mendes technician. The only important information for the installation of the unit is the identification of the various external connectors identified on the metal case itself. Refer to Figure 2 for an indepth detailed layout of the internal electronics.

An important fact that should be considered when trouble shooting any problems is that all control information is carried of the lane 1 Coax cable. Therefore, if the lane 1 coax cable is disconnected you will not be able to turn the monitors On or Off, control the volume or selcet betwenn Scoresheet display and Video display.

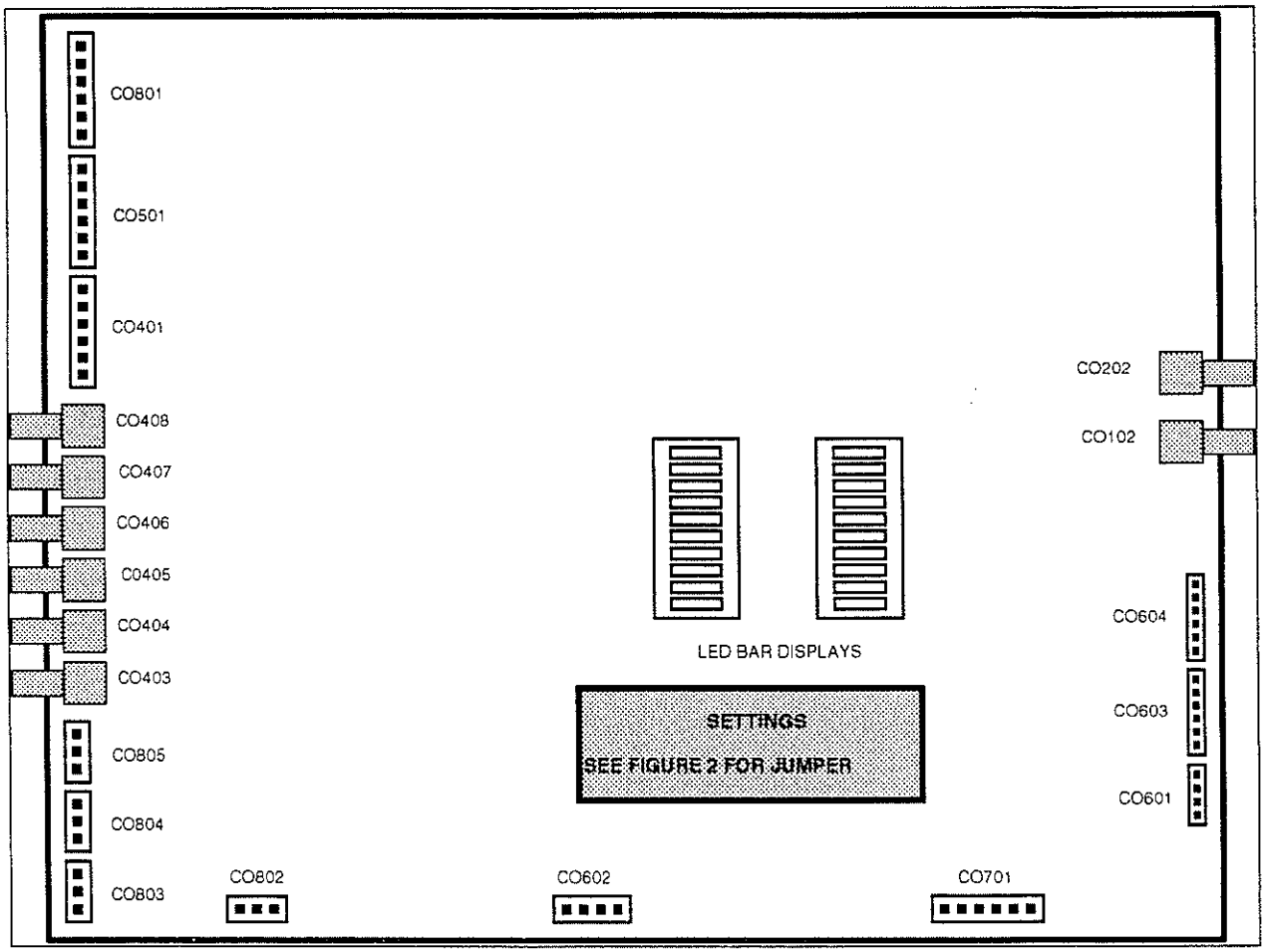


Figure 2. - CGA Coax connector identification.

IDENTIFICATION	DESCRIPTION
CO202	LANE 2 SCORESHEET SIGNAL
CO102	LANE 1 SCORESHEET SIGNAL
CO604	AUDIO INPUT/OUTPUT FOR 3 CHANNELS
CO603	AUDIO INPUT/OUTPUT FOR 3 CHANNELS
CO601	OUTPUT FOR 8Ω SPEAKER
CO701	POWER INPUT FROM TRANSFORMERS
CO802	NTSC GATE SIGNAL
CO602	POWER SUPPLY FROM TRANFORMER SECTION
CO803	GATE SIGNAL FOR SCREEN 1
CO804	GATE SIGNAL FOR SCREEN 2
CO805	GATE SIGNAL FOR SCREEN 3
CO403	INPUT / OUTPUT CHANNEL 3
CO404	INPUT / OUTPUT CHANNEL 3
CO405	INPUT / OUTPUT CHANNEL 2
CO406	INPUT / OUTPUT CHANNEL 2
CO407	INPUT / OUTPUT CHANNEL 1
CO408	INPUT / OUTPUT CHANNEL 1
CO401	OUTPUT FOR SCREEN 1
CO501	OUTPUT FOR SCREEN 2
CO801	OUTPUT FOR SCREEN 3 (MIDDLE SCREEN)
CO402	INPUT FROM RGB TO NTSC CONVERSION CIRCUIT
U310	LED DISPLAY (SEE TABLE 2)
U312	LED DISPLAY (SEE TABLE 2)
CO409	OUTPUT OF SELECTED NTSC SIGNAL

Table 1. - Connector identification on CGA Coax board.

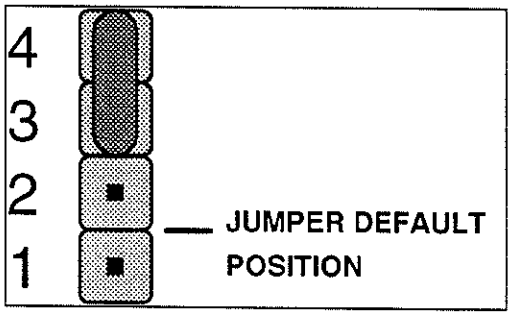


Figure 2.- Jumper diagram.

JUMPER DEFINITIONS

The jumper default settings should not normally vary. Refer to Figure 2 for the proper way to place jumpers.The standard settings for the jumpers on the CGA Coax board are described in Table 2.

JUMPER NUMBER	DESCRIPTION	JUMPER SETTING
CO302	CHANNEL SELECTION (SEE TABLE 4)	3 to 4
CO303	CHANNEL SELECTION (SEE TABLE 4)	3 to 4
CO304	VIDEO / SCORESHEET CHOICE SCREEN 1	3 to 4
CO305	VIDEO / SCORESHEET CHOICE SCREEN 2	3 to 4
CO306	SCREEN 1 ON / OFF	3 to 4
CO307	SCREEN 2 ON / OFF	3 to 4
CO308	SCREEN 3 ON / OFF	3 to 4
CO309	VOLUME CONTROL (SEE TABLE 5)	3 to 4
CO310	VOLUME CONTROL (SEE TABLE 5)	3 to 4
CO311	NOT USED	3 to 4
CO312	NOT USED	3 to 4
CO313	NOT USED	3 to 4

Table 2. - Jumper definition and default settings.

SET-UP		RESULT	LED DISPLAY
CO302 - OFF	CO303 - OFF	NOTHING	
CO302 - ON	CO303 - OFF	CHANNEL 1	
CO302 - OFF	CO303 - ON	CHANNEL 2	
CO302 - ON	CO303 - ON	CHANNEL3	

Table 3. - Channel selection.

SET-UP		RESULT	LED DSIPLAY
CO309 - OFF	CO310 - OFF	NO SOUND	
CO309 - ON	CO310 - OFF	LOW	
CO309 - OFF	CO310 - ON	MEDIUM	
CO309 - ON	CO310 - ON	HIGH	

TABLE 4. - Volume control.

The LED display bars are used to display the boxs various parameters and present set-ups. For the end user only a few of the LED's are of any use namely the LEDS U312-1 and U312-2, U310 -3 to U310-10. See Figure 4 for a description of these LED's.

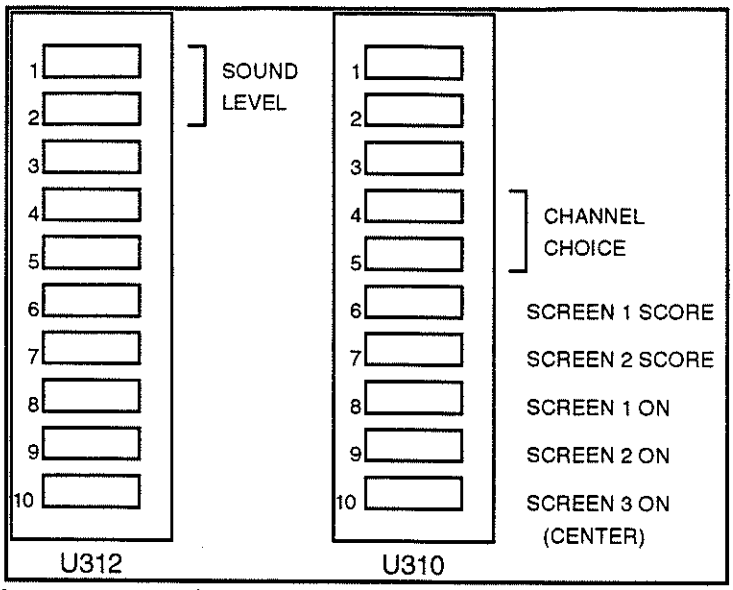
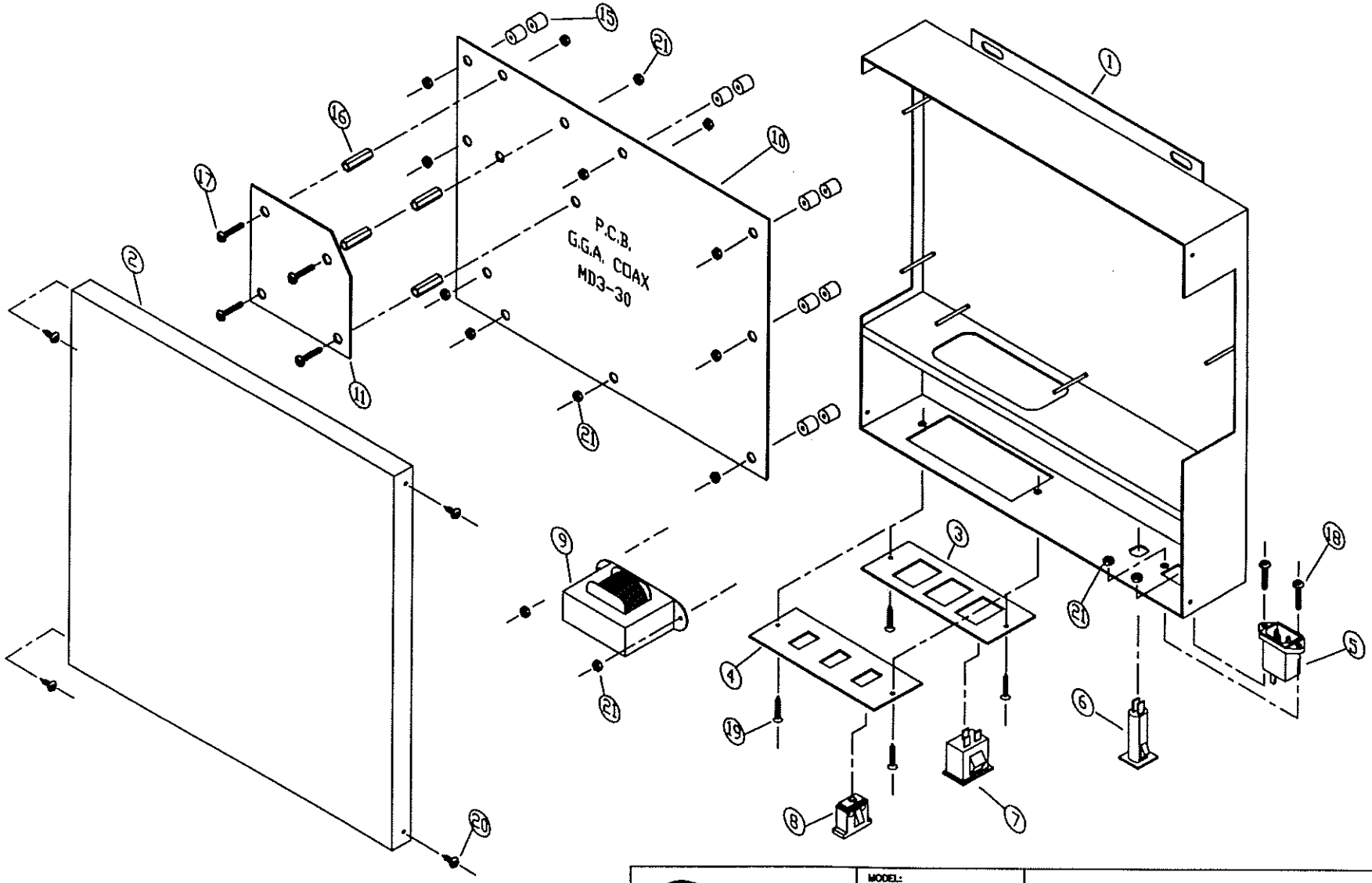


Figure 3 - LED bar Display



B-67

NO.	DATE	REVISION	BY

MENDES
QUEBEC CANADA

MODEL:

MONITOR CONTROL BOX GGA ASS.

REV.

DRAWN BY	SCALE:	DWG. NO.	PAGE
PIERRE BOLDUC	–	SB-3350-03	
DATE 16/06/92	APPR. BY		

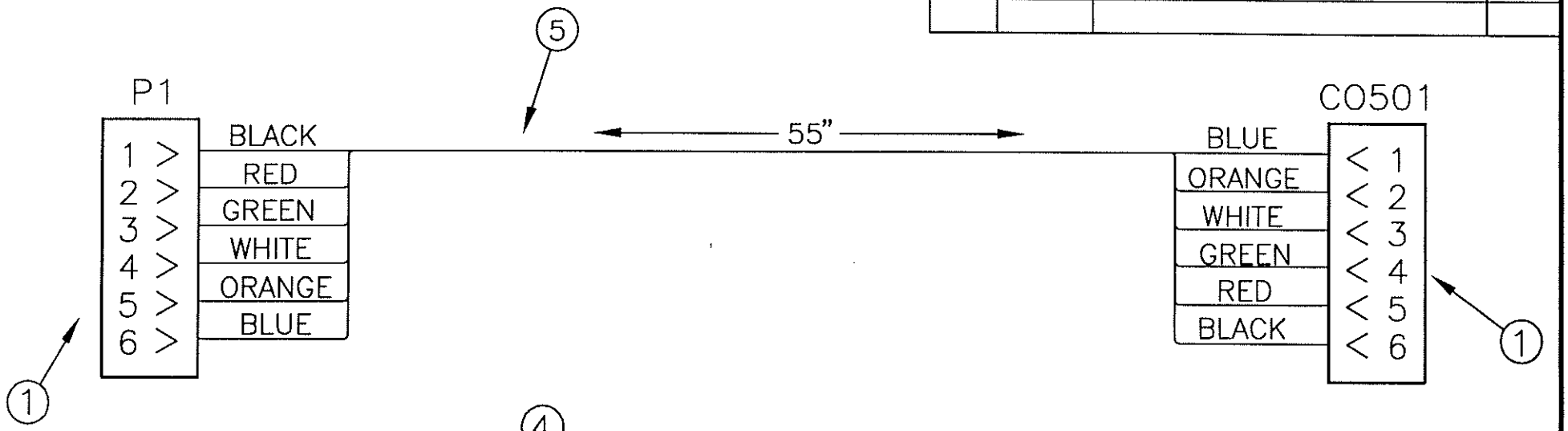
LIST OF MATERIAL

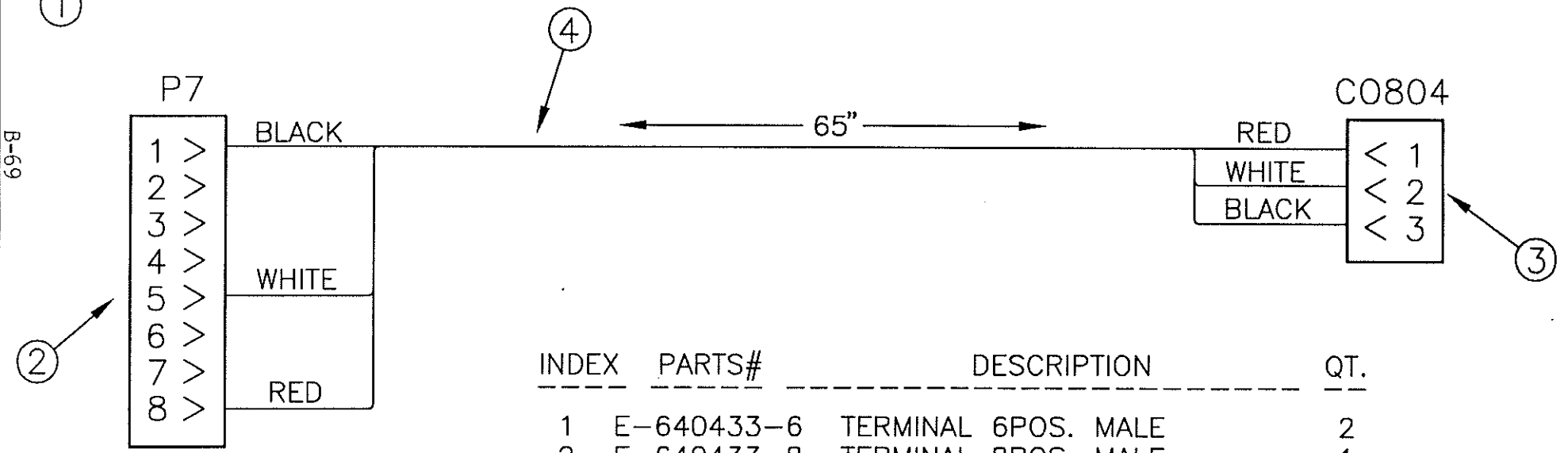
MONITOR CONTROL BOX GGA

SB-3550-03

INDEX	CODE NUMBER	DESCRIPTION
1	M-3350	GGA COAX BOX
2	M-3351	GGA COAX COVER
3	M-3354	CONNECTOR PLATE (240V)
4	M-3352	CONNECTOR PLATE (110V)
5	E-6EFIF	FILTRE EMI CORCOM
6	E-W28XQ1A-2	OVERLOAD 2A P&B
7	E-4300-022	AC CONNECTOR 250V F.
8	E-1306-001	OUTLET BLACK
9	E-B1089	TRANSFO. CGA (MD3-30)
10	E-MD3-30	PCB INTEGRATION COAX
11	E-26A1568-00	NTSC PCB
15	P-057	SPACER NYLON 1/2" X 1/2"
16	E-TSP10	1" X 6/32 NYL. SPA.HTSP10
17	H-052L-1	6/32 X 5/16 RH MACH SCREW
18	H-052L	6/32 X 1/2" RH MACH SCREW
19	H-072-16	#6 X 3/8"RH WOOD SCREW
20	H-072-19	#8X1/2" RH SOCK TRUSS
21	H-086-1	6/32" HEX KEP NUT

NO.	DATE	REVISION	BY





INDEX	PARTS#	DESCRIPTION	QT.
1	E-640433-6	TERMINAL 6POS. MALE	2
2	E-640433-8	TERMINAL 8POS. MALE	1
3	E-640433-3	TERMINAL 3POS. MALE	1
4	E-020-9203	WIRE 3 COND. AWG20	1
5	E-020-6707	WIRE 7 COND. AWG22	1

B-69

MENDES
QUEBEC CANADA

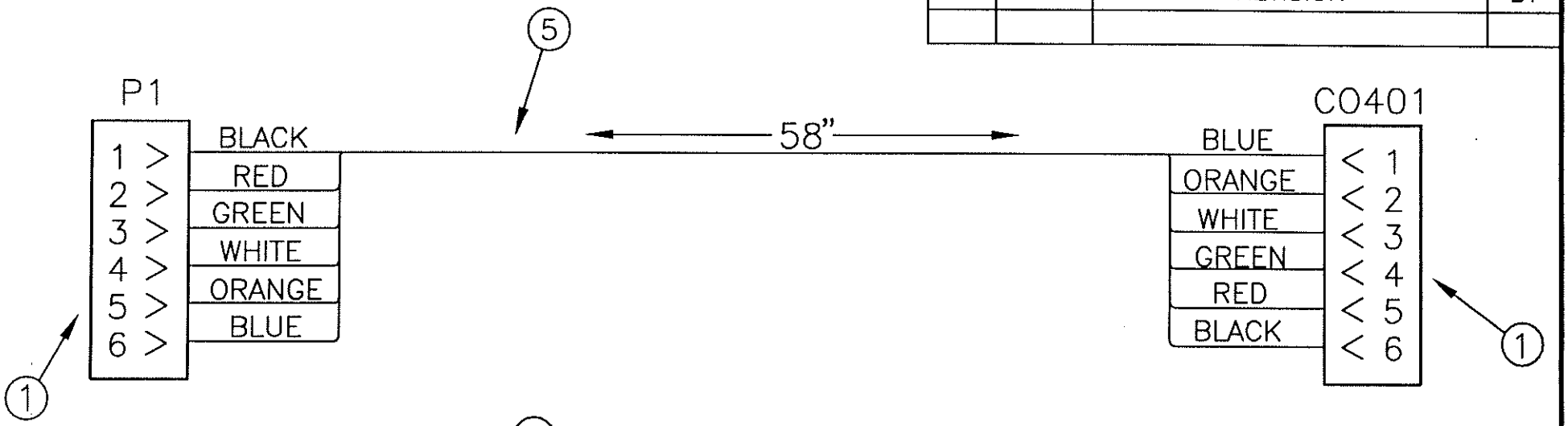
MODEL:

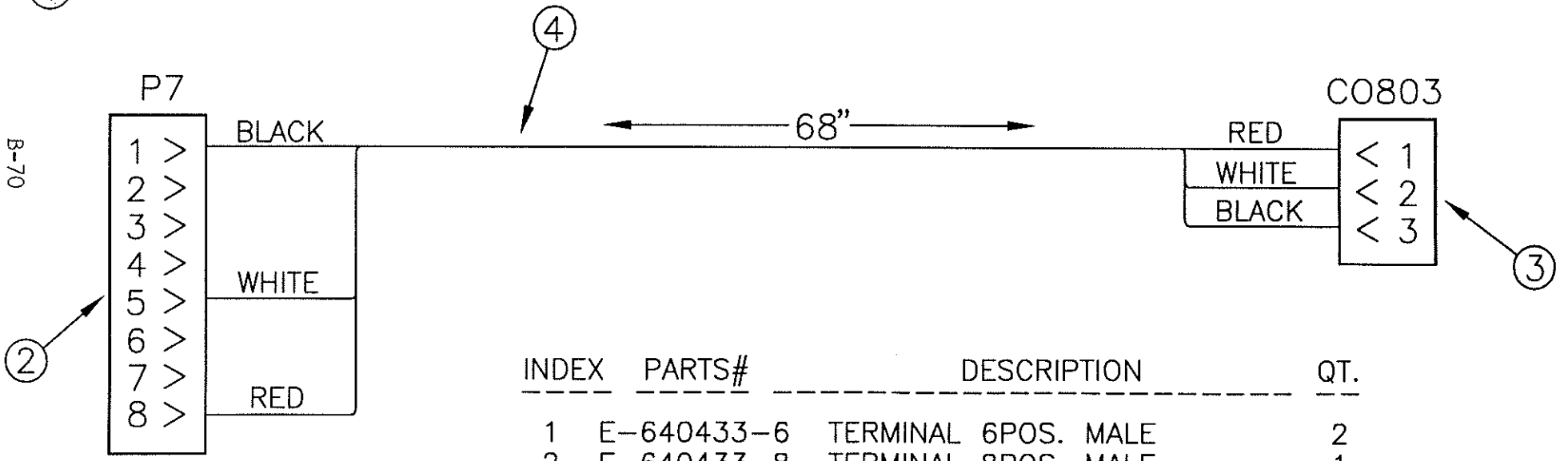
INTEGRATION COAX T.V. 1

REV.

DRAW BY	SCALE:	DWG. NO.	PAGE
PIERRE BOLDUC	–	EC-050-061	
DATE 25/05/92	APPR. BY		

NO.	DATE	REVISION	BY





B-70

INDEX	PARTS#	DESCRIPTION	QT.
1	E-640433-6	TERMINAL 6POS. MALE	2
2	E-640433-8	TERMINAL 8POS. MALE	1
3	E-640433-3	TERMINAL 3POS. MALE	1
4	E-020-9203	WIRE 3 COND. AWG20	1
5	E-020-6707	WIRE 7 COND. AWG22	1

MENDES
QUEBEC CANADA

MODEL:

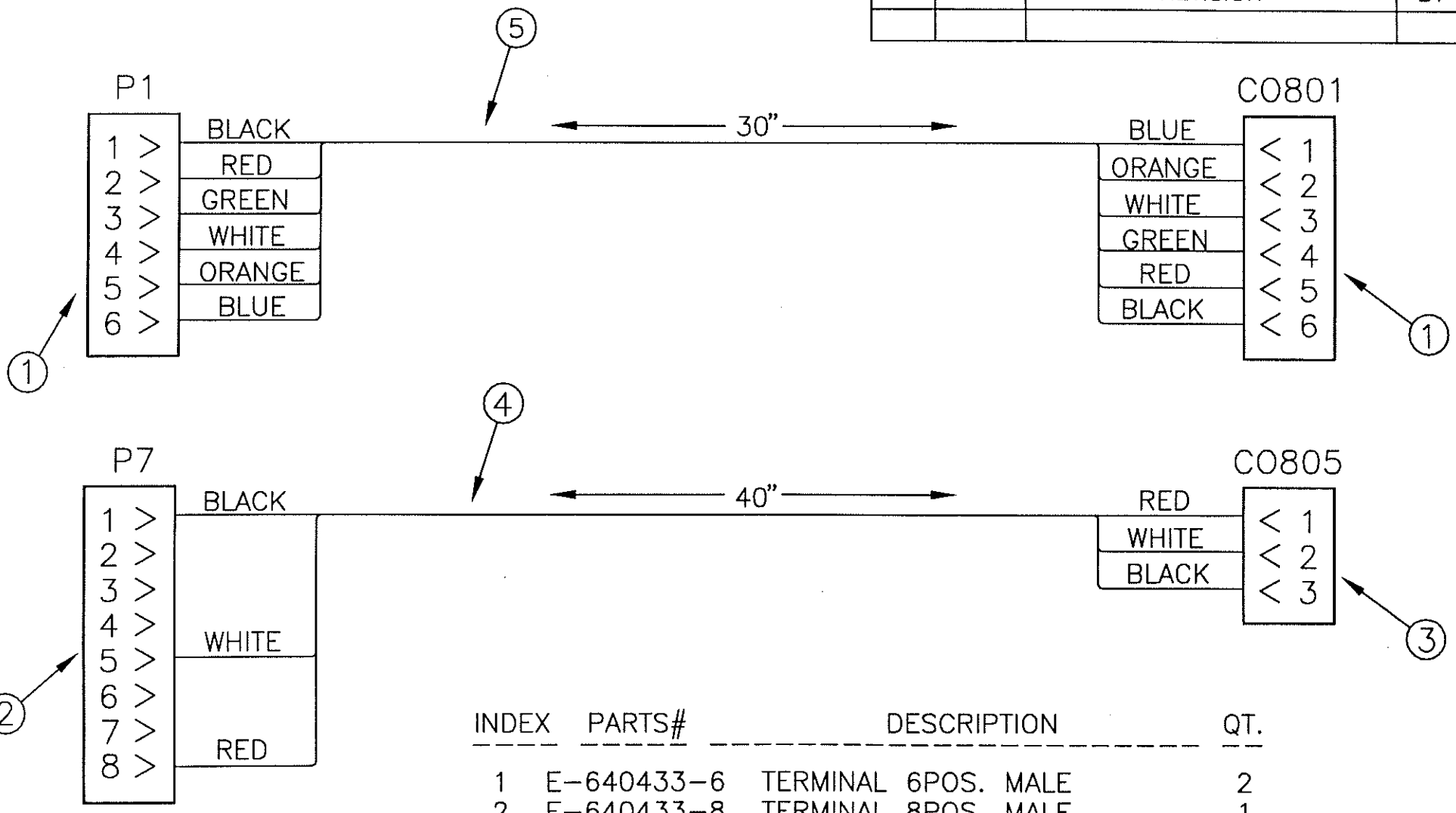
INTEGRATION COAX T.V. 2

REV.

DRAW BY PIERRE BOLDUC | SCALE: — | DWG. NO. EC-050-063 | PAGE

DATE 25/05/92 | APPR. BY

NO.	DATE	REVISION	BY



B-71

INDEX	PARTS#	DESCRIPTION	QT.
1	E-640433-6	TERMINAL 6POS. MALE	2
2	E-640433-8	TERMINAL 8POS. MALE	1
3	E-640433-3	TERMINAL 3POS. MALE	1
4	E-020-9203	WIRE 3 COND. AWG20	1
5	E-020-6707	WIRE 7 COND. AWG22	1

MENDES
QUEBEC CANADA

MODEL:

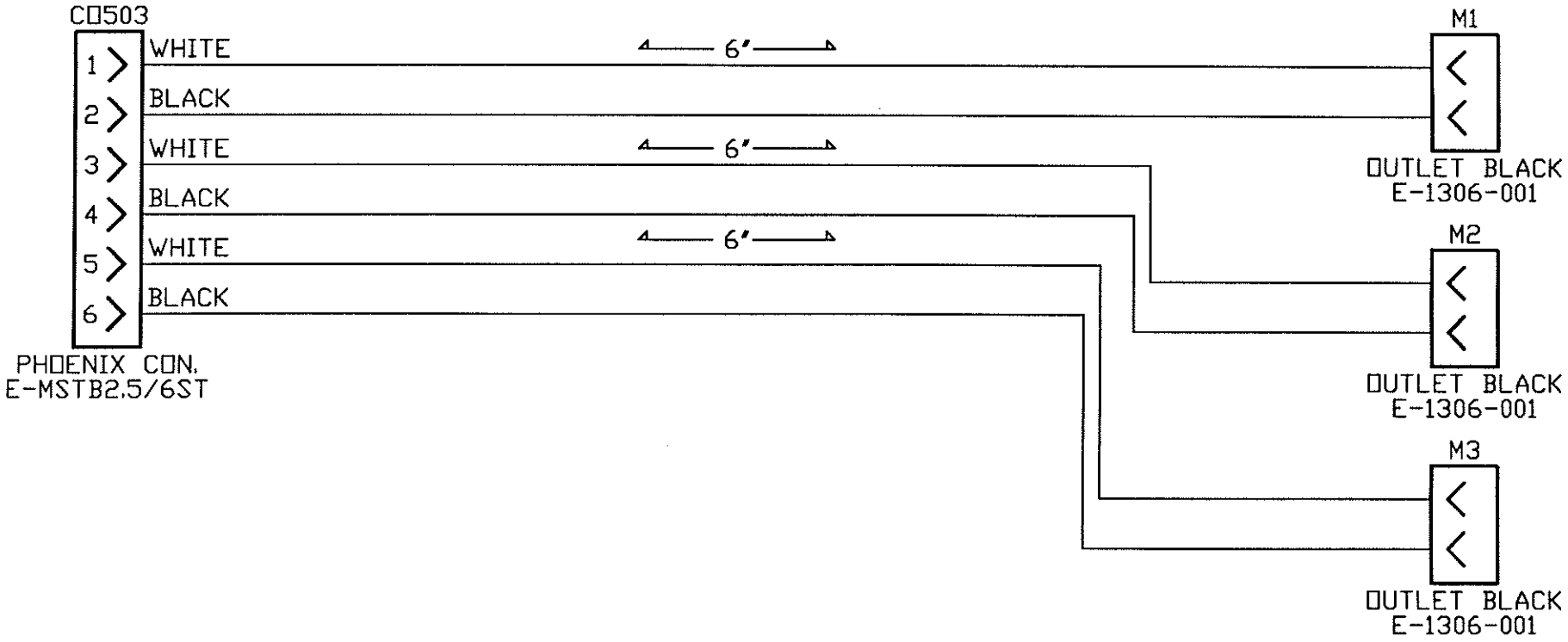
INTEGRATION COAX T.V. 3

REV.

DRAW BY PIERRE BOLDUC | SCALE: — | DWG. NO. EC-050-063 | PAGE

DATE 25/05/92 | APPR. BY

NO.	DATE	REVISION	BY



B-72

MENDES
QUEBEC CANADA

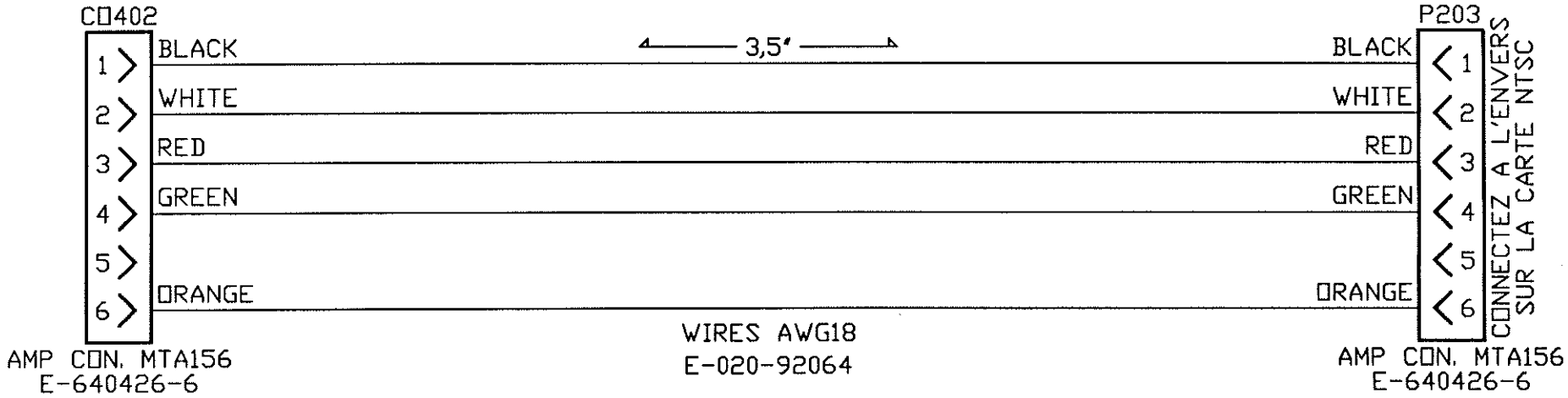
MODEL:

C.ASS. ALIMENTATION MON.27"

REV.

DRAW BY	PIERRE BOLDUC	SCALE:	–	DWG. NO.	EC-050-067	PAGE
DATE	15/05/92	APPR. BY				

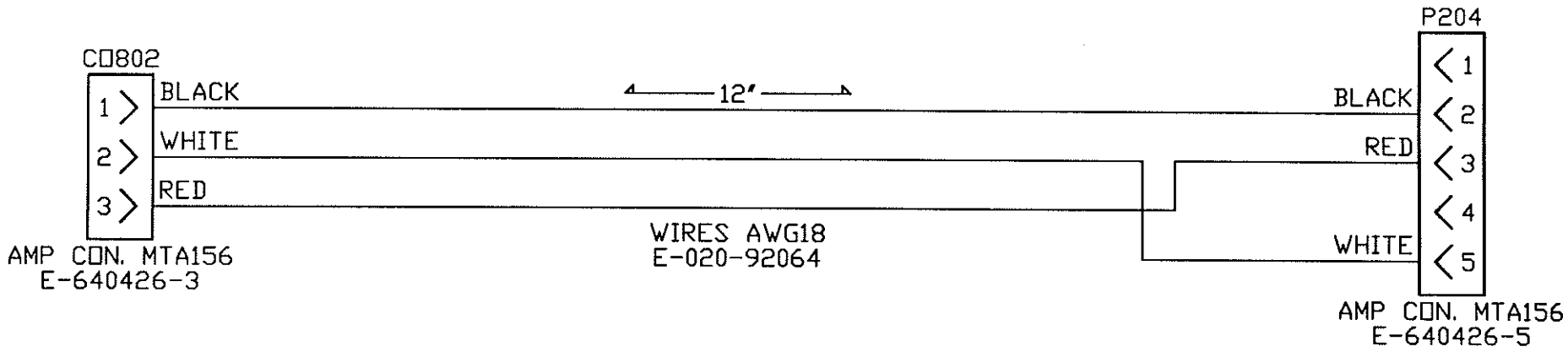
NO.	DATE	REVISION	BY



B-73

MENDES QUEBEC CANADA	MODEL:	C. ASS. NTSC RGB OUTPUT	REV.
	DRAW BY PIERRE BOLDUC	SCALE: —	DWG. NO. EC-050-068
	DATE 15/05/92	APPR. BY	PAGE

NO.	DATE	REVISION	BY



MENDES
QUEBEC CANADA

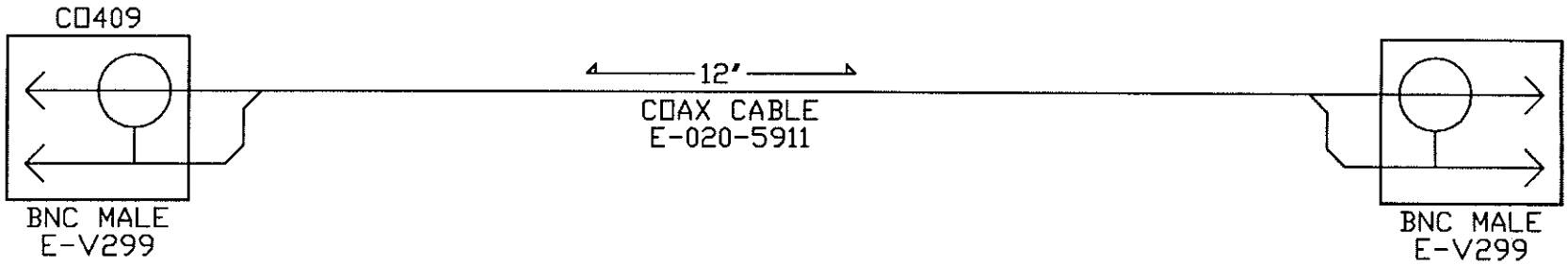
MODEL:

C. ASS. ALIMENTATION NTSC

REV.

DRAW BY	PIERRE BOLDUC	SCALE:	—	DWG. NO.	EC-050-069	PAGE
DATE	15/05/92	APPR. BY				

NO.	DATE	REVISION	BY



B-75

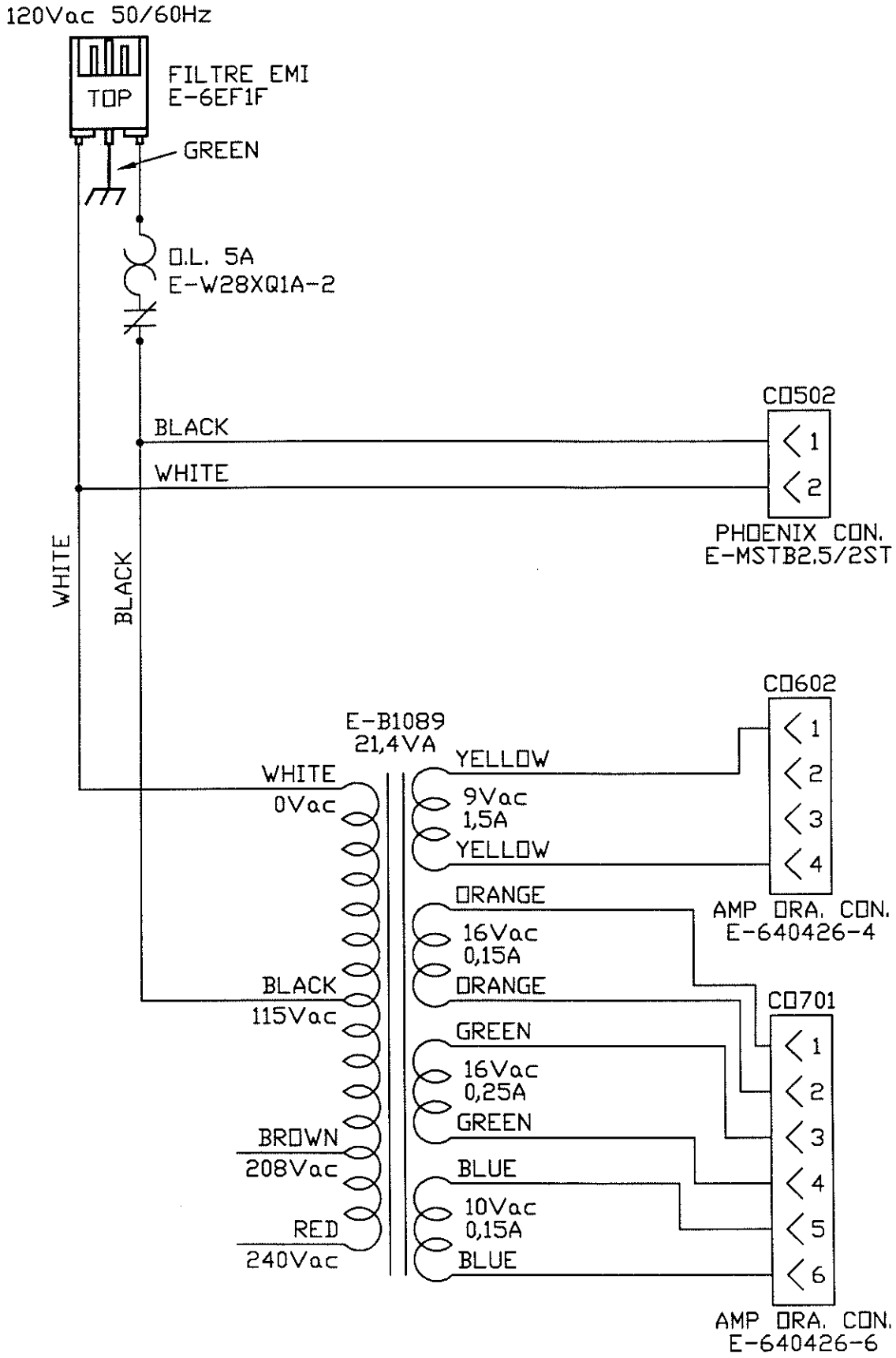
MENDES
QUEBEC CANADA

MODEL:

C.ASS. NTSC COMPOSITE SIGNAL

REV.

DRAW BY	PIERRE BOLDUC	SCALE:	—	DWG. NO.	PAGE
DATE	15/05/92	APPR. BY		EC-050-070	



NO. | DATE | REVISION | BY

REV. | PAGE

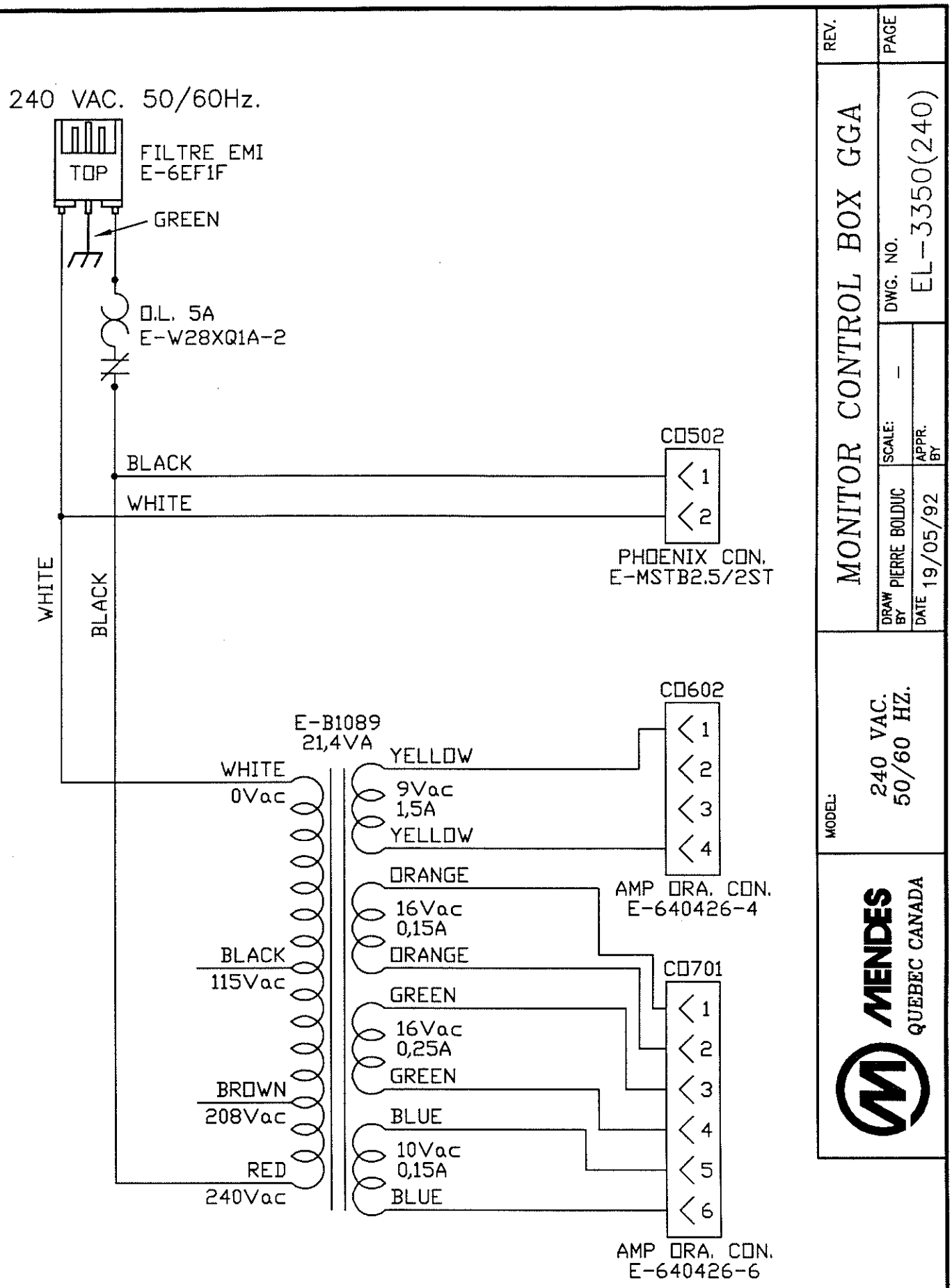
MONITOR CONTROL BOX GGA

DRAW BY PIERRE BOLDUC | SCALE: - | DWG. NO. EL-3350(120)

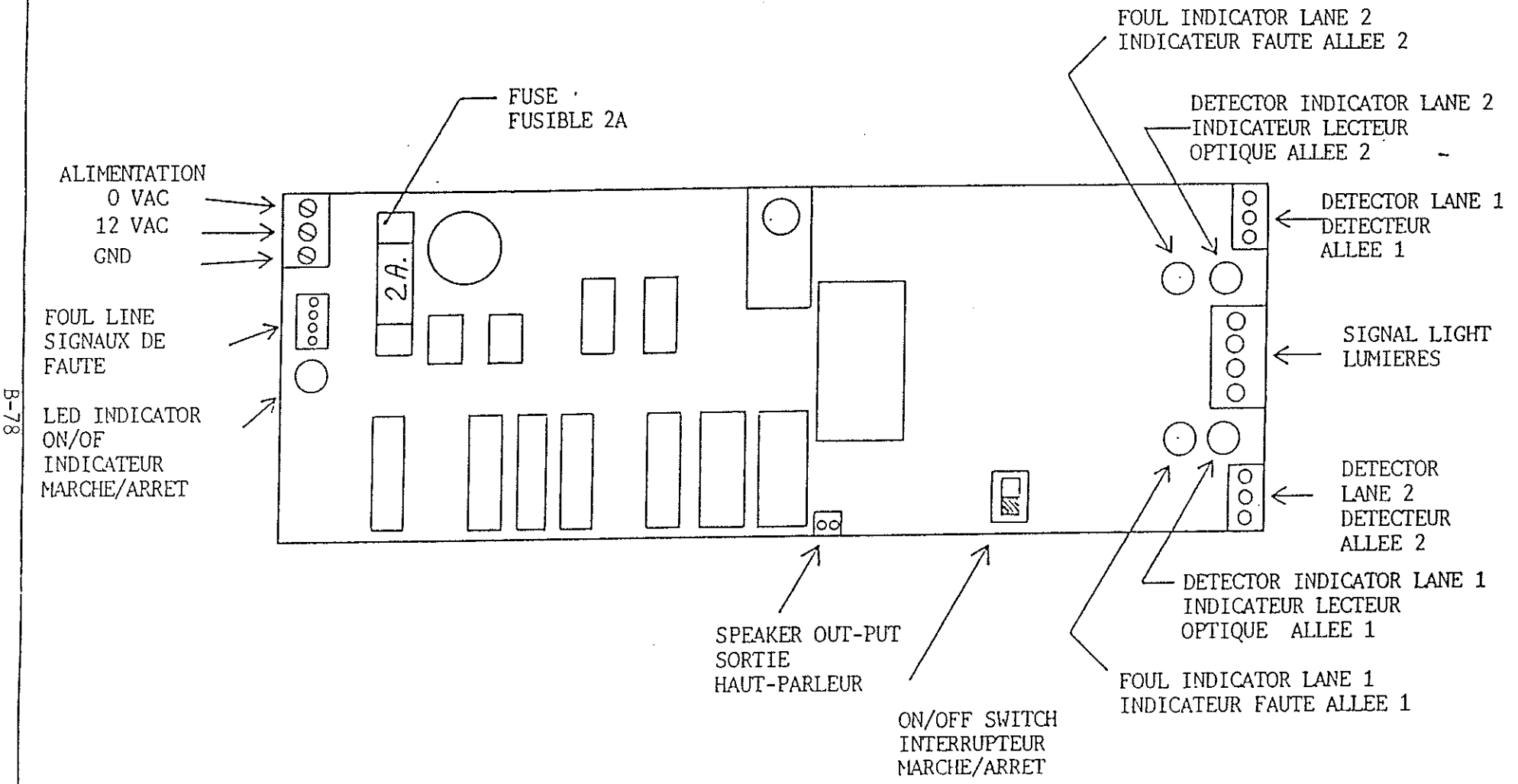
DATE 19/05/92 | APPR. BY

MODEL: 120 VAC. 50/60 HZ.

MENDES QUEBEC CANADA


240 VAC. 50/60Hz.
TOP
FILTRE EMI
E-6EF1F
GREEN
O.L. 5A
E-W28XQ1A-2
CO502
BLACK
WHITE
1
2
PHOENIX CON.
E-MSTB2.5/2ST
WHITE
BLACK
CO602
E-B1089
21,4VA
YELLOW
WHITE
0Vac
9Vac
1,5A
YELLOW
1
2
3
4
AMP ORA. CON.
E-640426-4
ORANGE
16Vac
0,15A
ORANGE
BLACK
115Vac
CO701
GREEN
16Vac
0,25A
GREEN
BROWN
208Vac
BLUE
10Vac
0,15A
RED
240Vac
BLUE
1
2
3
4
5
6
AMP ORA. CON.
E-640426-6
REVISION
BY
NO.
DATE
REV.
PAGE
MONITOR CONTROL BOX GGA
DRAW BY PIERRE BOLDUC
DATE 19/05/92
SCALE: –
APPR. BY
DWG. NO. EL-3350(240)
MODEL: 240 VAC. 50/60 HZ.
MENDES
QUEBEC CANADA

FOUL LIGHT DETECTOR



B-78

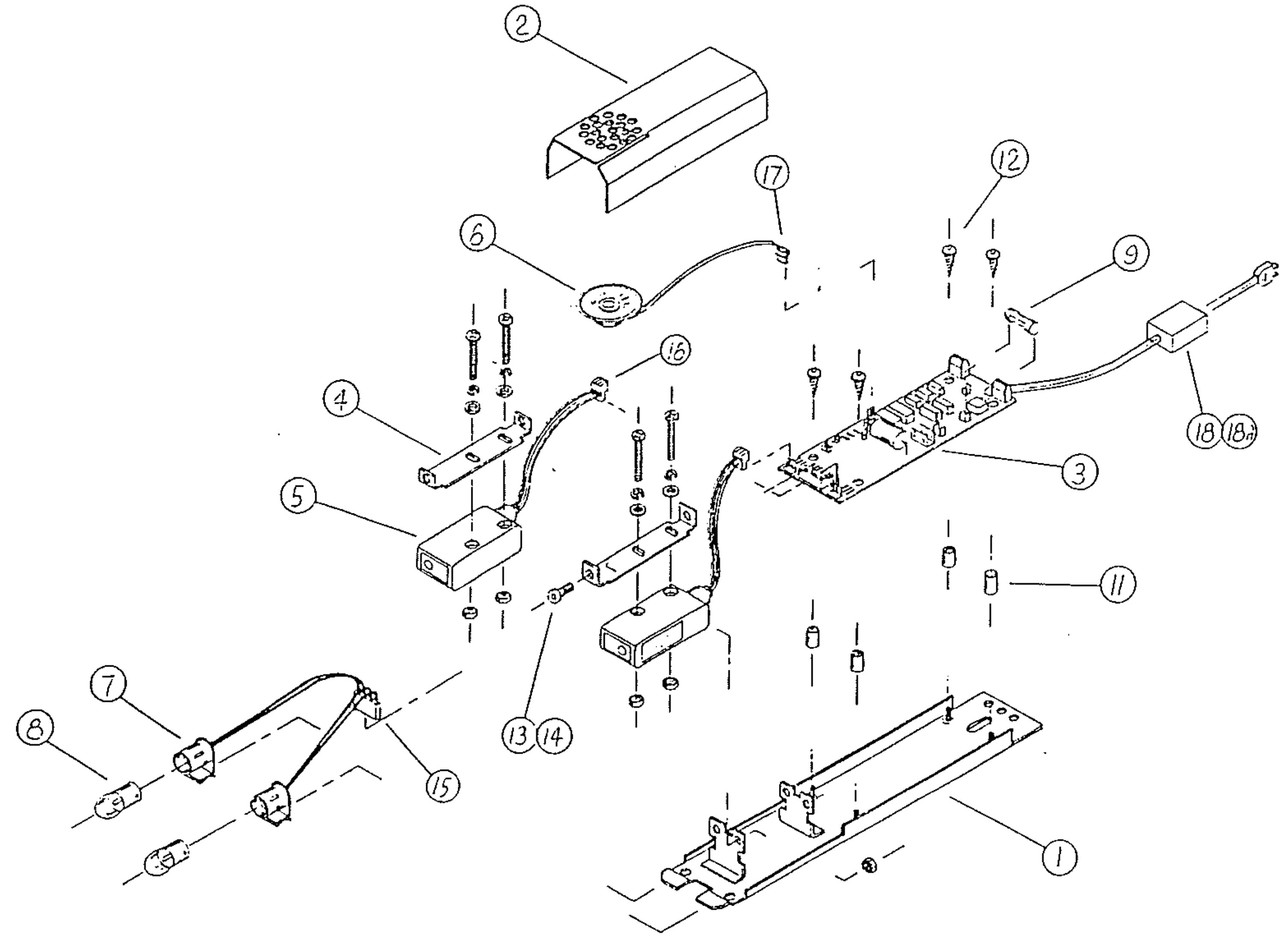
MENDES Québec Canada	DESCRIPTION: P.C.B. FOUL DETECTOR	SPÉCIFICATIONS	PAR: P Blais	ÉCHELLE: —
	VÉR.: ..... APPR.: ..... DATE: 17-08-89		PARTIE No. E-MD3-50	

LISTE DE MATERIEL

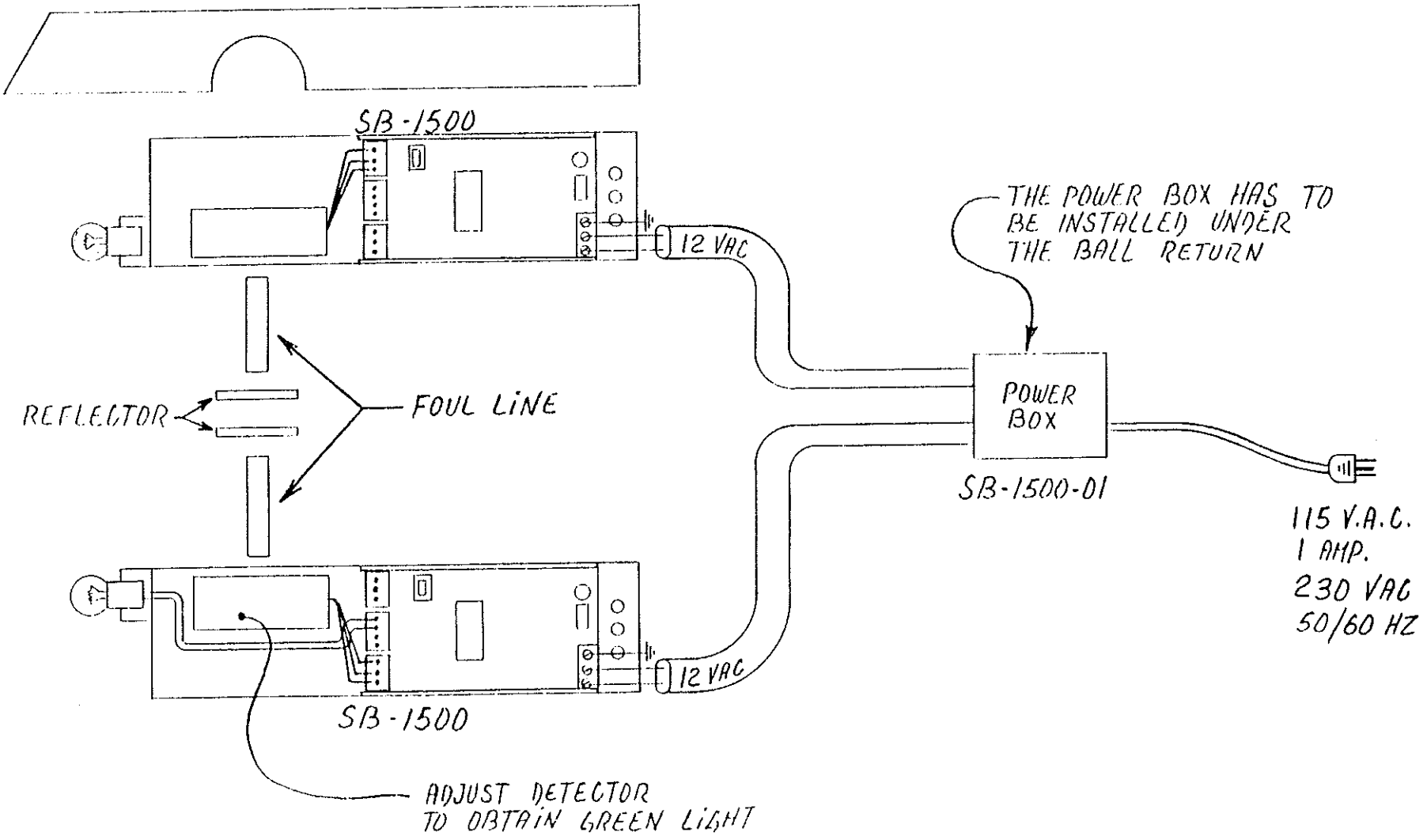
SOLID STATE FOUL LIGHT ASSEMBLY

Q88-1500

INDEX	NO DE CODE	DESCRIPTION DE LA PIECE
1	M-1500-03	FOUL LIGHT BASE
2	M-1500-01	FOUL LIGHT COVER
3	E-MD3-50	P.C.B. FOUL DETECTOR
4	M-1500-22	ADJUSTMENT BRACKET
5	E-FE7C-RC6V	DETECTOR
6	E-DAP50	SPEAKER 35 OHMS
7	E-12-245	SOCKET
8	E-090	LIGHT 12V #90
9	E-312002	FUSE 2 AMP. 3 AG
11	E-TSP8	NYLON SPACER
12	H-052F	6/32 X 1/2" RH S. MACH. SCW
13	H-086-1	6/32 HEX KEP NUT
14	H-072-16	#6 X 3/8" RH S WOOD SCW
15	E-1-480424-0	CON. AMP 4 POS. FEMALE
16	E-640440-3	CON. AMP 3 POS.
17	E-640440-2	CON. AMP 2 POS.
18	SB-1500-1	F. DET. POWER SOURCE 115 VAC
18A	SB-1500-2	F. DET. POWER SOURCE 230 VAC

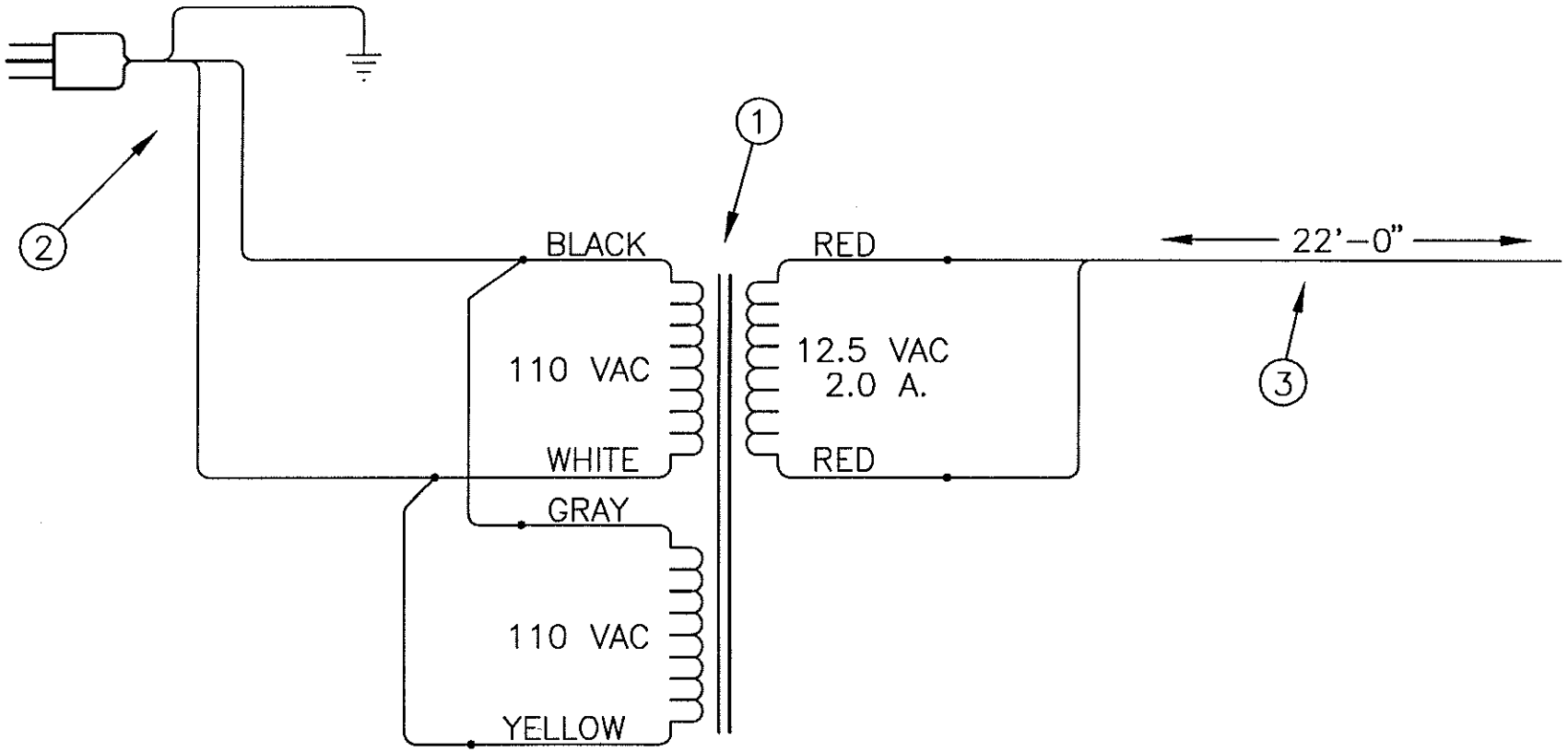


FAIT PARTIE DU	
REVISIONS	
NO / DATE / REPERES	
SCEAU	MENCES
APPROUVÉ PAR	
	MENCES
MODELE	
DOSSIER	DATE 02 05
DESSINE R.B.	ECHELLE —
NOM DU DESSIN	SOLID STATE FULL LIGHT ASSY
NO DU DESSIN	QBS·1500



MENDES Québec Canada	DESCRIPTION: FOUL DETECTOR INSTALLATION	SPÉCIFICATIONS	PAR: Pierre Blais / ÉCHELLE: —
	RÉV.: 16-06-92 / APPR: / DATE: 30-06-88		PARTIE No.: E-MD3-50-2

NO.	DATE	REVISION	BY



INDEX	PARTS#	DESCRIPTION	QT.
1	E-91115	TRANSFORMER 12V.	1
2	E-02-183-6	ALIMENTATION CABLE 6'	1
3	E-020-9182	WIRE 2 COND. AWG18	1

B-82

MENDES
QUEBEC CANADA

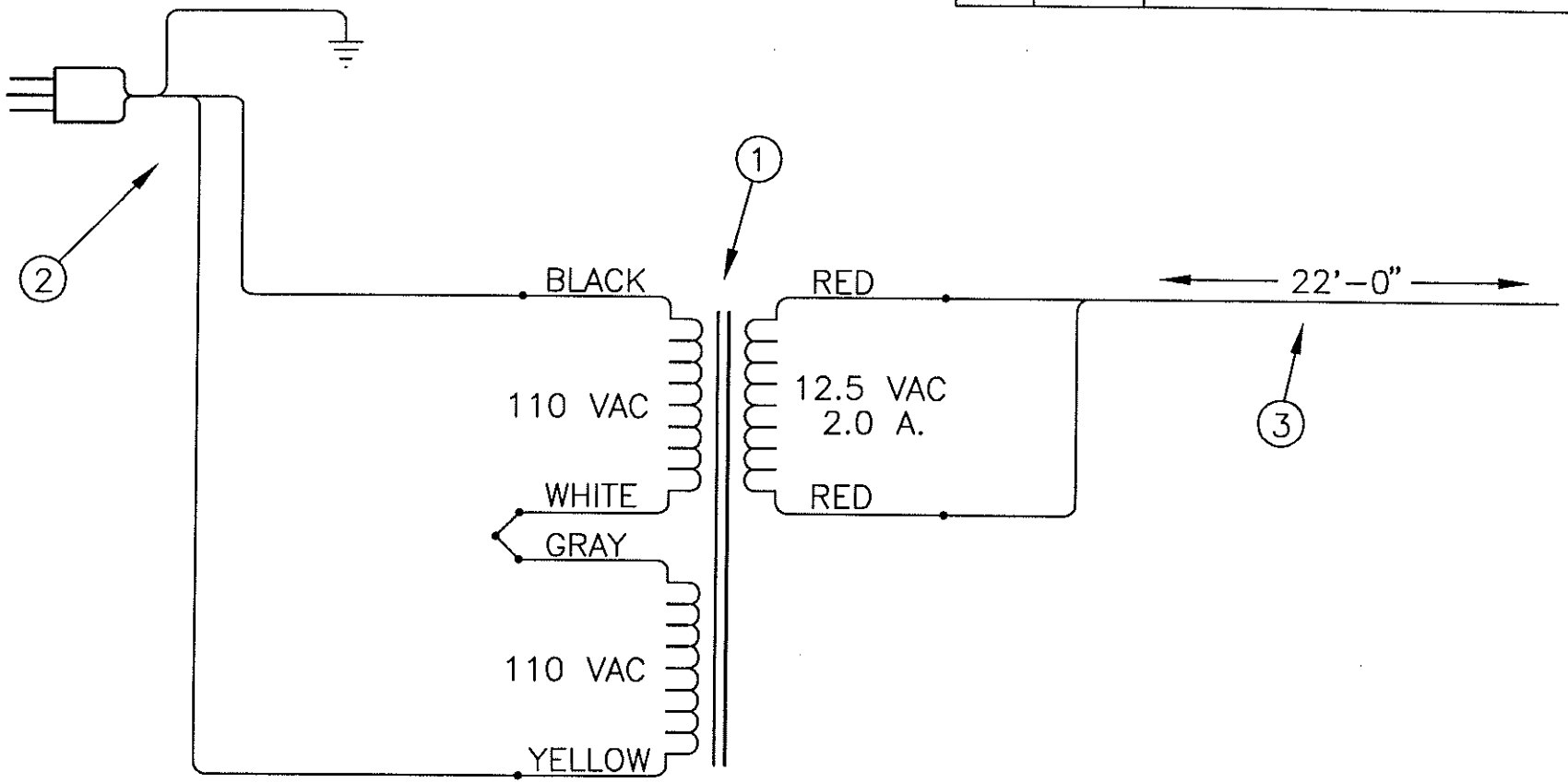
MODEL:
110 VAC.
60 HZ.

POWER BOX FOUL LINE

REV.

DRAW BY PIERRE BOLDUC
SCALE: --
DWG. NO. SB-1500(110)
PAGE
DATE 26/05/92
APPR. BY

NO.	DATE	REVISION	BY



INDEX	PARTS#	DESCRIPTION	QT.
1	E-91115	TRANSFORMER 12V.	1
2	E-02-183-6	ALIMENTATION CABLE 6'	1
3	E-020-9182	WIRE 2 COND. AWG18	1

B-83

MENDES
QUEBEC CANADA

MODEL:
240 VAC.
50 HZ.

POWER BOX FOUL LINE

REV.

DRAW BY PIERRE BOLDUC
SCALE: -
DWG. NO. SB-1500-(240)
PAGE
DATE 26/05/92
APPR. BY

VIDEO DISTRIBUTION UNIT

The Video / Audio distribution unit has as sole and unique function to take the VCR or cable company signal amplify it and distribute it to all the overhead monitors. Depending on the unit installed the video / audio amplifier can:

- support up to 96 overheads;
- support up to 3 different channels (be they VCR, Cable, or any Standard NTSC signal).

The unit installed in your location will vary depending on the number of channel options you purchased and on the number of individual overhead monitors you have. Therefore, if you order a replacement (which should never happen unless something dramatic happens i.e. - a fire) please specify the number of channels and overhead monitors you have.

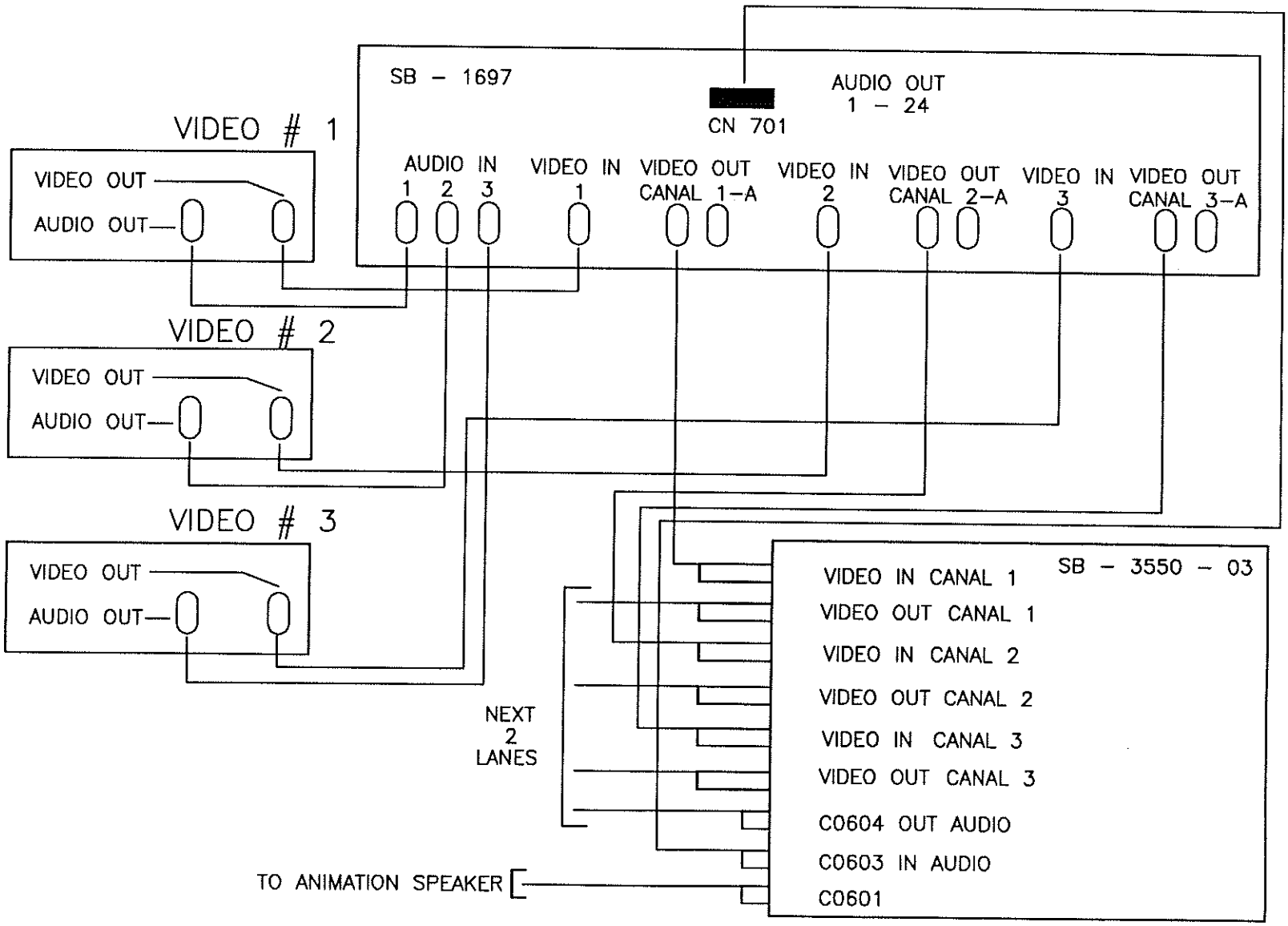
For the connection to the VCR's and general wiring diagrams please refer to plans EL-1967-01 and EL-1967-01.

The Video / Audio amplifier has no user servicable parts, therefore the unit should never be opened except by a qualified Mendes technician.

Note - For countries not using NTSC signals (MESCAM, SECAM, PAL) the use of multi-standard VCR's is required since the Video / Audio amplifier and CGA Coax boxes will only accept NTSC signals. Two such VCRs are made by:

Panasonic™ model:AG-W1
Aiwa™ model: M110

NO.	DATE	REVISION	BY



B-85

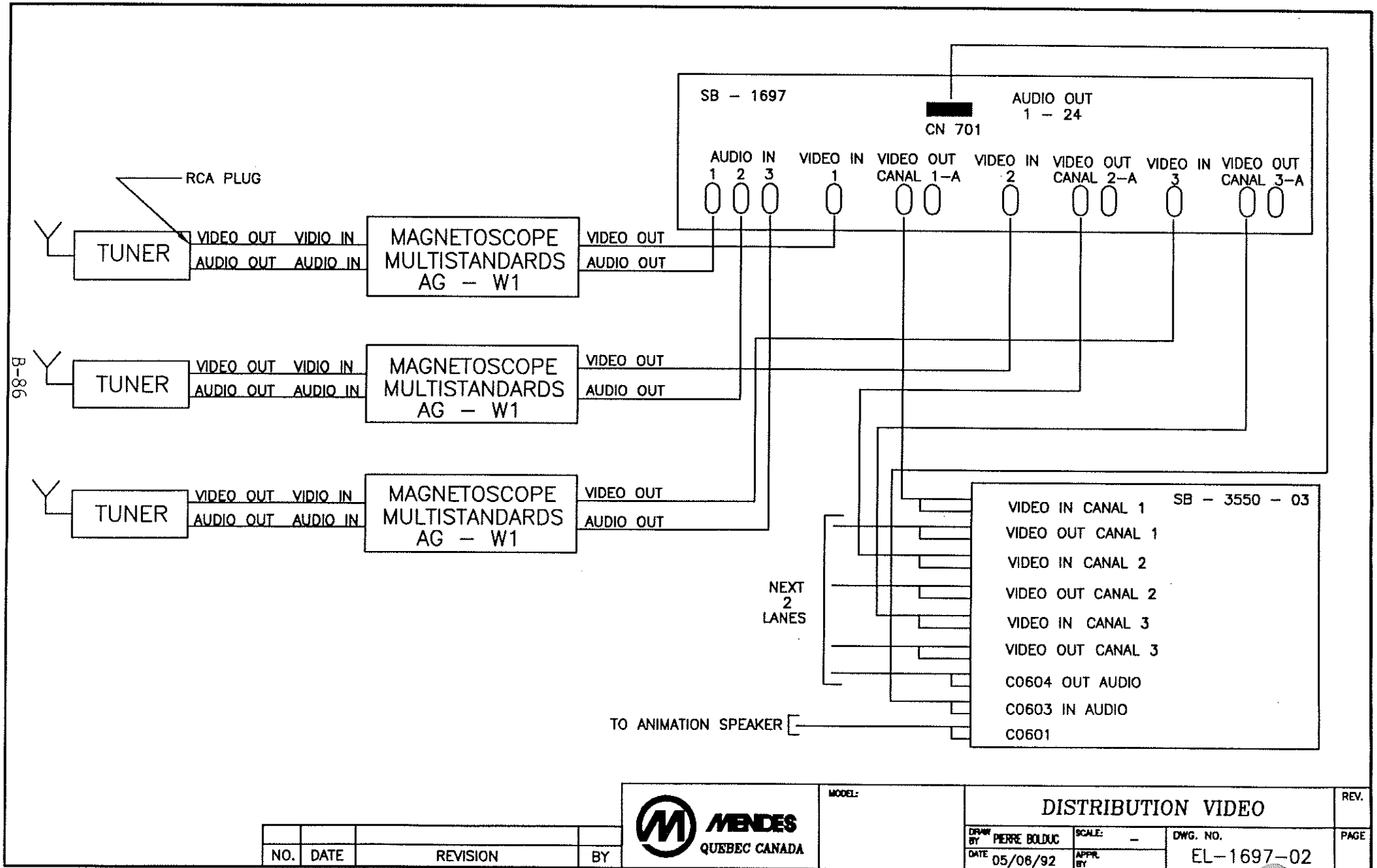
MENDES
QUEBEC CANADA

MODEL:

DISTRIBUTION VIDEO

REV.

DRAW BY	PIERRE BOLDUC	SCALE:	–	DWG. NO.	EL–1697–01	PAGE
DATE	05/06/92	APPR. BY				



B-86

NO.	DATE	REVISION	BY

MENDES
QUEBEC CANADA

MODEL:

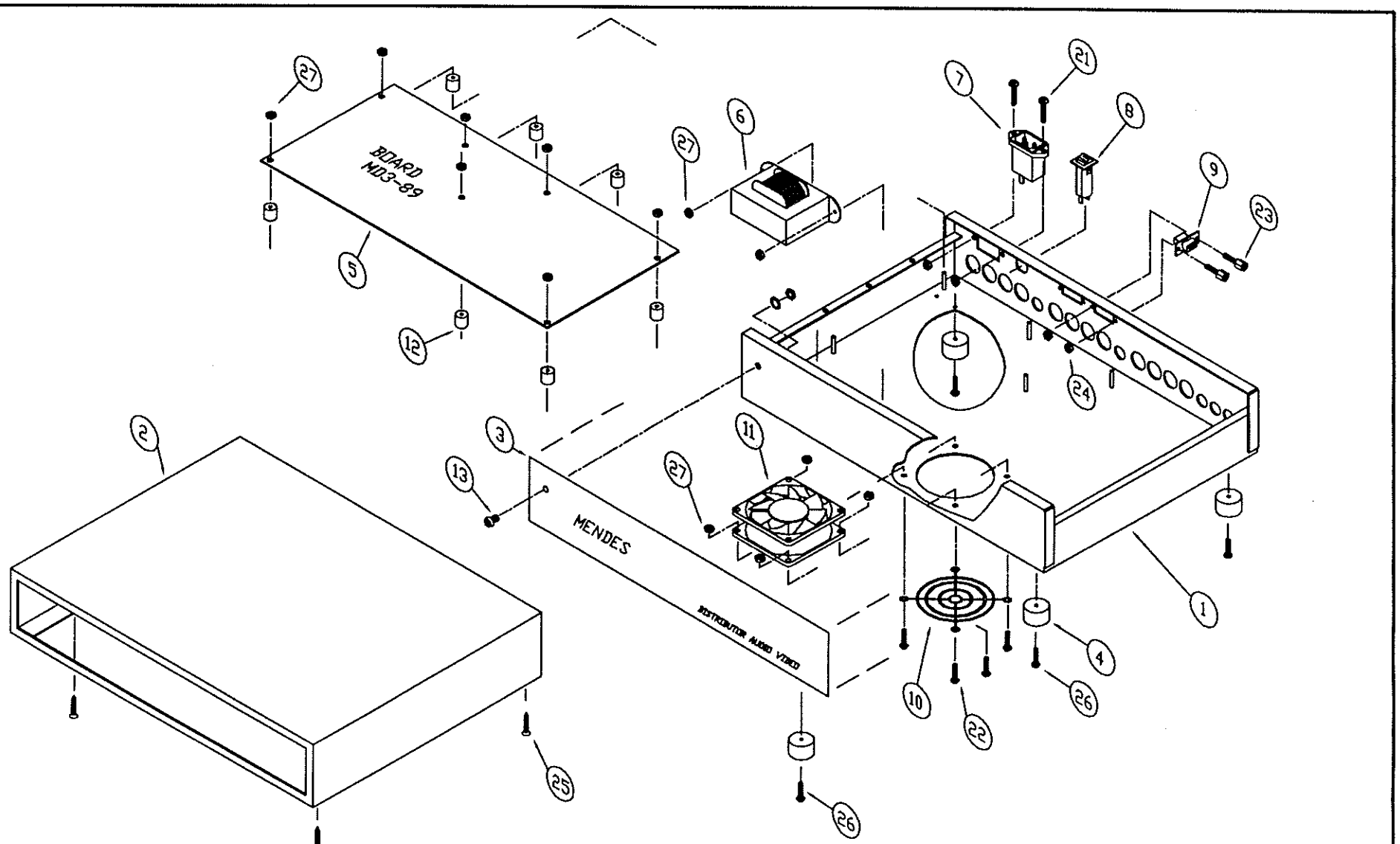
DISTRIBUTION VIDEO

REV.

DRAWN BY PIERRE BOLDUC
DATE 05/06/92
SCALE: –
APPR. BY

DWG. NO. EL–1697–02

PAGE



NO.	DATE	REVISION	BY

MENDES
QUEBEC CANADA

MODEL

DISTRIBUTOR AUDIO/VIDEO ASS.

REV.

DRAW BY PIERRE BOLDUC | SCALE - | DWG. NO. SB-1697 | PAGE

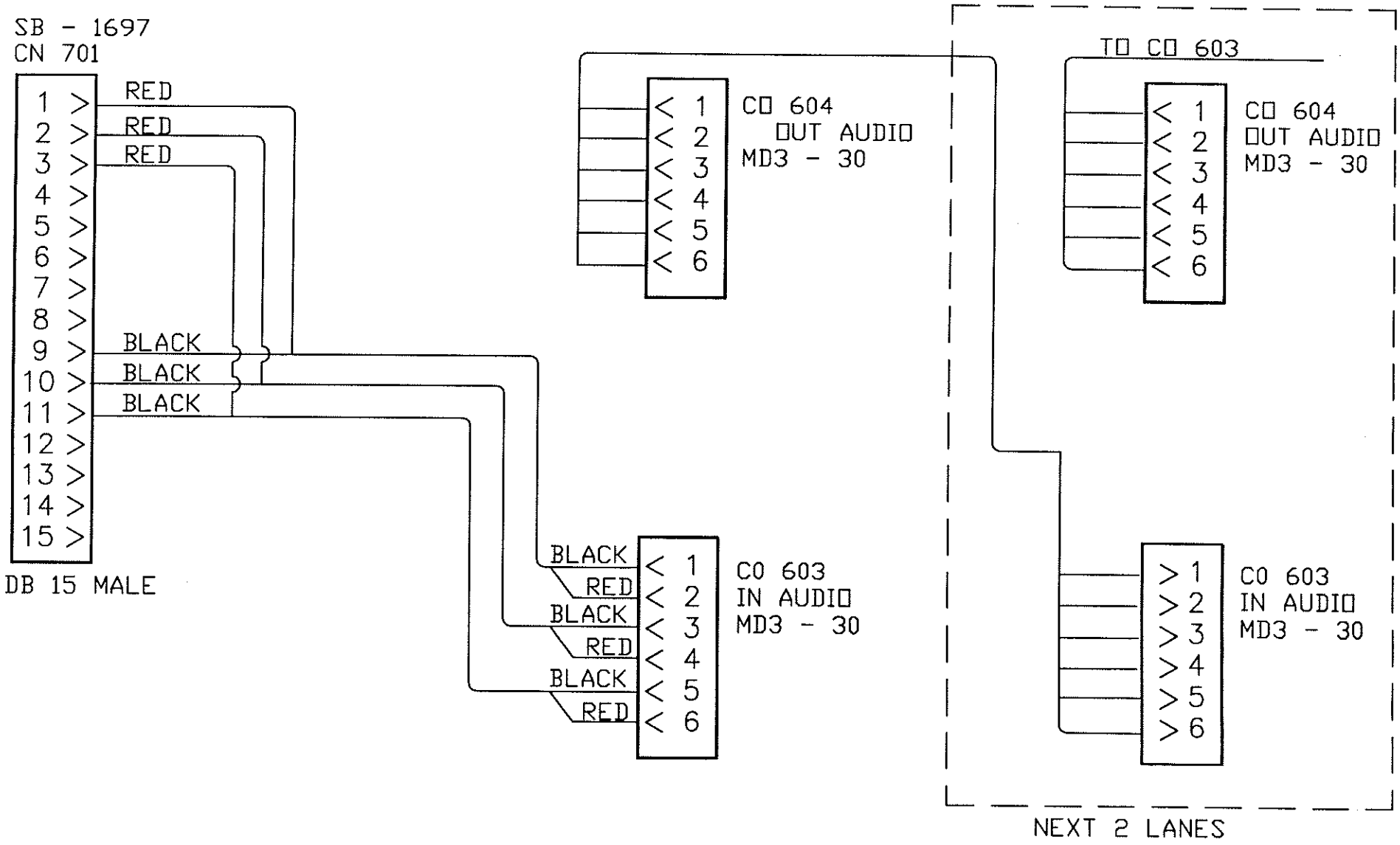
DATE 23/06/92 | APPR. BY

10/10/92

NUMBER (PRO)	DESCRIPTION
SB-1697	DISTRIBUTEUR AUDIO VIDEO

IDX	STOCK NUMBER	DESCRIPTION
1	M-1697	AUDIO-VIDEO BOX
2	M-1697-1	AUDIO-VIDEO COVER
3	[illegible]	[illegible] AUDIO-VIDEO
	E-AT19	FEET BUMPERS [illegible]
[illegible]	[illegible]	PCB AUDIO VIDEO
[illegible]	[illegible]	TRANSFO [illegible]
[illegible]	[illegible]	FILTRE EMI [illegible]
[illegible]	[illegible]	OVERLOAD [illegible]
[illegible]	[illegible]	AMP CONN [illegible]
10	[illegible]	WIRE NETTING FAN [illegible]
[illegible]	[illegible]	KIT FAN
[illegible]	[illegible]	SPACER NYLON [illegible]
[illegible]	[illegible]	RED SIGNAL LAMP
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	AMP SCREW [illegible]
[illegible]	[illegible]	[illegible] HEX [illegible] NUT [illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible] HEX [illegible] NUT

NO.	DATE	REVISION	BY



B-89

MENDES
QUEBEC CANADA

MODEL:

DISTRIBUTION AUDIO

REV.

DRAW BY	PIERRE BOLDUC	SCALE:	–	DWG. NO.	EC-1697-01	PAGE
DATE	05/06/92	APPR. BY				

MULTIPLEXOR

The multiplexor is one of the most important components of the Mendes 2001 Automatic Scoring System. It is the junction between the Manager's Control computer's and the consoles. All commands to and from the score consoles go through the multiplexor. Therefore, if is not functioning you can well imagine the headaches your center can suffer. It is for this reason the multiplexor should always be kept on the Manager's Control UPS (Uninterruptable Power Supply) and great care must be taken so as not to expose it to unnecessary abuse.

The multiplexor (called MUX for short) has a On/Off switch that has a pilot light incorporated which should always be left on (even when the center is closed). Furthermore, next to the on / off switch is located a spring loaded button, this is called the reset button.

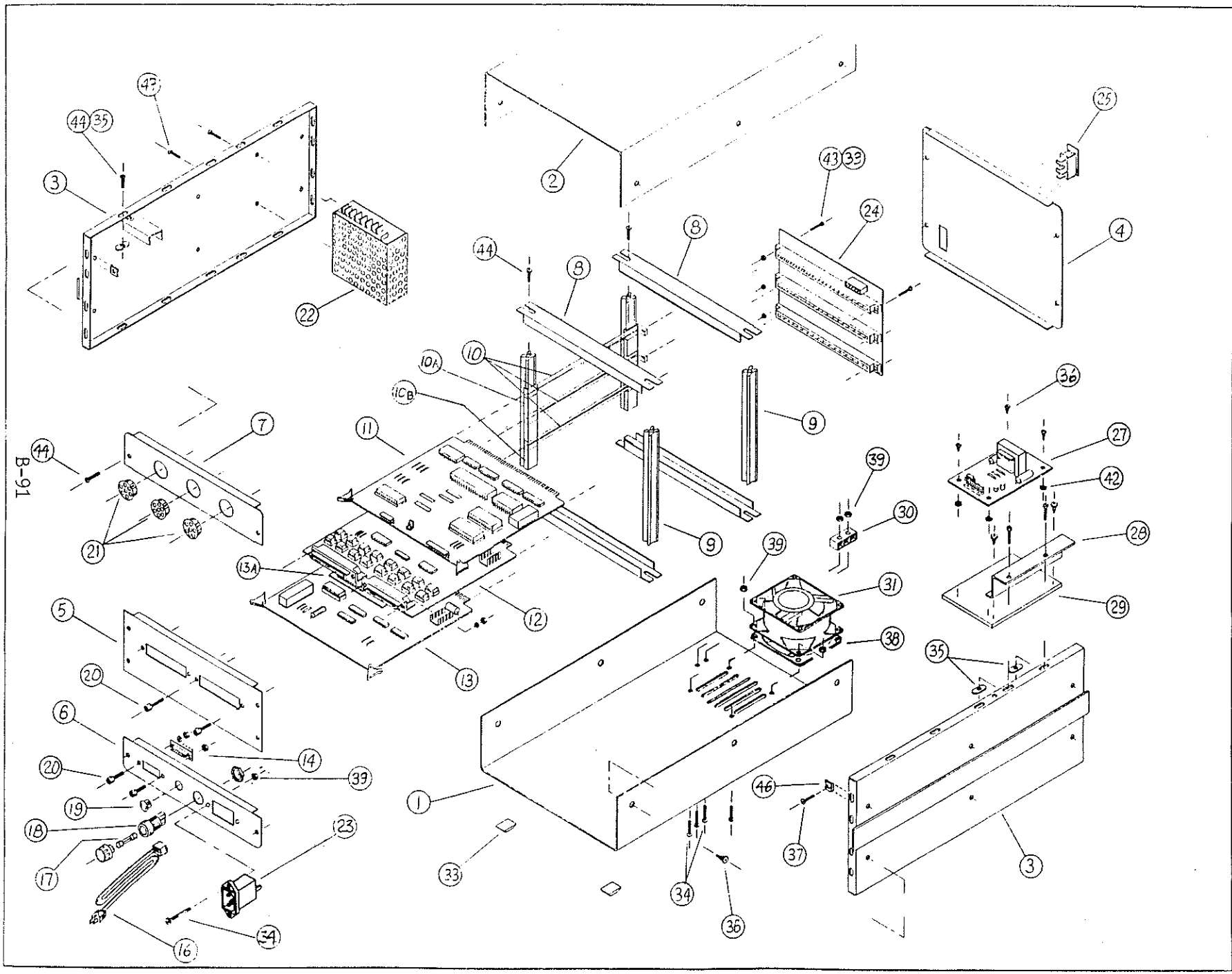
The reset button, as the name states, will reset the MUX. The sequence to reset the MUX is:

- turn the power off;
- press the button for at least 30 seconds;
- turn the power back on; and
- re-program the number of lanes in the manager's control software.

The resetting of the MUX is not required unless:

- You cannot communicated with your lanes;
- You seem to have intermittent problems communicating with the lanes;
- You seem to be having problems doing:
    - Making Manager's Control score corrections;
    - with score sheets, score sheets come out garbled;
    - with league transfers.
- A Mendes technician tells you to do so.

The multiplexor also has a user changeable EPROM that may be changed from time to time. If a change is to be done a special instruction handout will be supplied with the new EPROM instructing you on how to do it. The multiplexor has only one other user changeable component, a 250 volt 1 ampere slow blow fuse.



B-91

FAIT PARTIE DU :

REVISIONS

NO	DATE	REPERES

SCEAU

MENDES

APPROUVÉ PAR :

MENDES

MODÈLE

DOSSIER	DATE
	12-12-88

DESSINÉ	ECHELLE
	—

NOM DU DESSIN

MULTIPLEXOR

NO DU DESSIN

SB-6550

28/08/92

NUMBER (PRO)	DESCRIPTION
SB-6550	MULTIPLEXOR ASSEMBLY

IDX	STOCK NUMBER	DESCRIPTION
1	MU-3	BOTTOM BOX MULTIPLEXOR
2	MU-2	TOP BOX MULTIPLEXOR
3	MU-1	SIDE BOX MULTIPLEXOR
4	MU-7	FRONT PANEL MULTIPLEXOR
5	MU-4	MIDDLE REAR PANEL MUX.
6	MU-5	LOWER REAR PANEL MUX.
7	MU-6	HIGHER REAR PANEL MUX.
8	MU-8	CHANNEL CROSSING MUX.
9	E-TS803-17	MOUNTING BARS 17" SCAMBE
10A	E-T101-1000	SPACER 1"
10B	E-T101-500	SPACER 1/2"
10	E-T311-70V	CARD GUIDES
11	E-MD3-06A	PCB MASTER CPU 32K DOUBL
12	E-MD4-16A	PCB MUX
13	E-MD3-23	PCB CLOCK CIRCUIT
13A	E-MD3-24	PCB EXTENSION HORLOGE
14	E-205205-1	AMP CONN 15 POS F METAL
16	E-020-CH-05	ALIMENTATION CABLE 110 V.
17	E-312001	FUSE 1A 3 AG
18	E-342012A	FUSE HOLDER #342004
19	E-805	SNAP PLUG 1/2" PEINT 329A
20	E-207719-1	AMP SRCEW KIT F.
21	P-850-15	SNAP PLUG 1" #245-033
22	E-LUS-8A9	POWER SUP. 115V-23W/9V DC

28/08/92

NUMBER (PRO)	DESCRIPTION
SB-6550	MULTIPLEXOR ASSEMBLY

IDX	STOCK NUMBER	DESCRIPTION
23	E-6EFIF	FILTRE EMI CORCOM
24	E-MD3-11-10	PCB MOTHER BOARD MUX
25	E-295-R	SWITCH ON/OFF (RED)
27	E-MD3-55	PCB INTERFACE MUX RS422
28	MU-9	SUPPORT P.C. BOARD MUX.
29	P-6550-1	SUPPORT PLASTIC RS232
30	E-323HDS3	TERMINAL WECO 3 POS.
31	E-SV2C	FAN 115V 4" SU2C7
33	E-AF19	FEET BUMPERS GRAY
34	H-052L	6/32 X 1/2" RH MACH SCREW
35	H-086-2	6/32" WELD NUT SP-NR #241
36	H-072-19	#8X1/2" RH SOCK TRUSS
38	E-09325	GRILLE PLAST.POUR FAN 3"
39	H-086A	6/32 HEX.NUT PLATED
42	E-W3751	NYLON WASH .172 ID X .375
43	H-072-04	6/32 X 3/4" RH SCREW
44	H-052F	6/32 X 1/2 HEX SO #HX-255
46	H-082-4	SP-N TN-40 6-32 SPR. NUTS
47	H-052-10	6-32 X 1"FH SOC.MAC.SCW

BALL DETECTOR

The ball detector is connected to the Pinsetter control unit. The Pinsetter control unit in turn will activate the Pinsetter cycle and at the same time send the RED light signal to the scorer.

The ball detector is a simple standalone device it rarely becomes defective but can become mis-aligned once in awhile. In fact, the sure way of knowing that the ball detector is the cause of your problems is the tell tale symptom of the Pinsetter not reacting the action of a ball or the light stays stuck on RED or GREEN.

The Ball detector has as main features:

- the emitter / receiver;
- the LED indicator;
- the adjustment screws; and
- the reflector.

Be aware that the ball detector comes in 2 different varieties the only difference being the location of the emitter / receiver. Also the ball detector is the same unit that is used in the Mendes Foul Unit.

The ball detector has two (2) leds that simplify the adjustment of the unit. The Green light means the system is perfectly aligned while the Red light indicates that the alignment is borderline (usually requiring you to adjust until the light becomes green). The simple loosing of the ball detector screws is all that is required to move the unit until it becomes aligned. Note that the foul unit is adjusted in exactly the same manner.

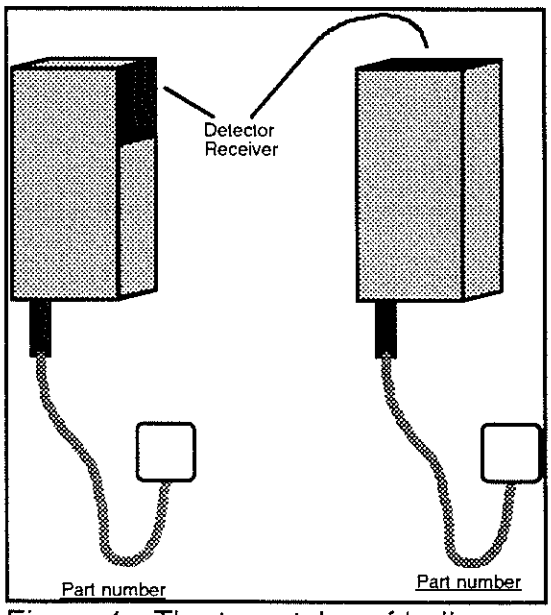


Figure 1 - The two styles of ball detectors

THE PURPOSE OF THIS MANUAL

This manual tries to cover possible solutions to all the problems that can occur when you have the Mendes 2001 Autoscoring system. The manual is broken down into the major components of the autoscoring system:

1 - Player's console;
2 - Overheads;
3 - Foul lights;
4 - Pin detector camera;
5 - Ball detector;
6 - Multiplexor.

This manual is a never ending one since as time goes on new problems arise each with there own solutions. In fact if you do come across a new problem, and with a solution please fill in one of the forms at the back of this book.

The page numbering is unique in its sort since each chapter starts anew this is to facilitate the updating procedure since when additions will following all that is required is to add it to the end of its corresponding chapter.

NOTE - WHEN THE AUTOSCORING SYSTEM SEEMS TO COUNT WRONG OR PINS ARE CONTINUOUSLY PRESENTED, BE AWARE THAT THE AUTOSCORING COMPUTER IS ACTUALLY COUNTING USING THE INFORMATION IT RECEIVES. MEANING THAT THE AUTOSCORING COMPUTER IS USUALLY NOT THE PROBLEM. ITS MORE LIKELY THE CAMERA OR PIN DETECTION SYSTEM THAT IS AT FAULT.

NOTE - IF IN DOUBT IF THE AUTOSCORING COMPUTER IS IN TROUBLE THE BEST TEST IS TO SET IT IN MANUAL MODE. MANUAL MODE ACTUALLY DISCONNECTS ALL THE AUTOSCORING AND RELEASES ALL CONTROL TO THE PINSETTER JUST AS IF THE AUTOSCORING IS NOT THERE.

IF YOU HAVE A PROBLEM PLEASE READ THE MANUAL BEFORE CALLING OUR SUPPORT LINE. OUR TECHNICIANS WILL INITIALLY REFER TO THIS MANUAL IF YOU DO CALL IN REFERRING TO THE MANUAL YOU WILL SAVE TIME AND MONEY FOR YOURSELF.

PLAYER'S CONSOLE

Lower Monitors:

Symptom #1 - One or both of the monitors is not ON when it should be.
Solution #'s - 1.001, 1.002, 1.003, 1.004, 1.005, 1.006

Symptom #2 - Image shakes or snow on screen.
Solution #'s - 1.004, 1.005, 1.006

Symptom #3 - IMAGE IS NOT CENTERED
Solution #'s - PUSH THE BUTTON ON THE BOARD AND CALL ME BAC.

Keyboards:

Symptom #1 - Keyboard does not react to any input.
Solution #'s - 1.1 , 1.1

Symptom #2 - Keyboard has one or a few non-reacting keys.
Solution #'s - 1.1 , 1.1

Symptom #3 -Keyboards regularly let go on the same console.
Solution #'s -1.1 , 1.1

Other:

Symptom #1 - Console beeper continuously on.
Solution #'s - 1.1

Symptom #2 - Monitor boards seem to continuously let go in the same console.
Solution #'s - 1.201

SOLUTION #DESCRIPTION

1.001 If both screens and the console fan are off chances are the breaker that controls the power to the console has inadvertently been shut off in the breaker room.

1.002 Check the transformer that supplies the power to the screen(s) in question. If it does not supply approximately 115 volts A.C. the transformer is defective. Note - When in doubt have monitor board repaired or replaced.

1.003 Check by switching the signal from working monitor to the defective one. If the does not appear on the screen either the board or the tube is defective. Note - 99% of the time it is the board, the monitor tubes are rarely defective.

1.005 Check the connections on the lower monitor Video board.

1.006 Change the lower monitor video board..

1.101 Reset the keyboard CPU, there is a presser switch on the CPU board by pressing it you reset the system without loosing your scores.

1.103 Check the flat cable connected between the keyboard and the CPU. Note - The best way to check the flat cable is to use a working lane's flat cable in its place to see if it solves the problem.

1.104 Connect the defective lane's flat cable to the working lanes keyboard or a spare keyboard. If this solves the problem the keyboard is defective.

1.105 Change the keyboard buffer chip on the CPU board. This chip takes the most of the shock when there is a large static discharge Note - It is located right near the keyboard flat cable connectors on the CPU board the chip number is 74LS???.

SOLUTION #DESCRIPTION

1.107 Is the console properly grounded? Retrace the ground wire installed with the autoscoring all the way to the main ground. Never depend upon the ground installed with your outlets, since many electricians do not reliably install these grounds. Note -If the console is not properly grounded the keyboard CPU and keyboard can literally blow its electronic chips when it receives a static discharge be it from the players or a defective screen.

1.108 Verify the relative humidity in your center. When humidity levels get to low static electricity transported by people can build up to enormous levels. These levels can be so large that even good grounds will not stop the destruction of these static discharges. Be advised that the recommend humidity level for a bowling center is between. Not only will you cut down on your autoscoring problems it will keep your wooden lanes in good condition.

1.201 Is the console fan working? Replace immediately if not. Note - The fan is an absolute necessity in the console it ensures a proper air circulation. Without it the boards will almost always let go after awhile.

OVERHEADS

Autoscoring screens

Symptom #1 - The screen does not come on when it should be on.
Solution #'s - 2.001, 2.002

Symptom #2 - The screen does not shut off when it should be off. Solution #'s -

Symptom #3 - The screen does have its power but doesn't display anything.
Solution #'s -

Symptom #4 - The screen has a color distortion present.
Solution #'s -

Symptom #5 -
Solution #'s -

Symptom #6 -

Video animation screen

Symptom #1 - The screen does not come on when it should.
Solution #'s - 2.001, 2.002

Symptom #2 - The screen has a color distortion present.
Solution #'s -

Symptom #3 - The screen image shakes or snow is present.
Solution #'s -

SOLUTION #DESCRIPTION

2.001 If all screens will not turn ON chances are the breaker that controls the power to the overheads has inadvertently been shut off in the breaker room. Or since all data information is carried over lane 1's Coax check and see if it is properly connected.

2.002 Replace the CGA Coax with a working one to see if it isn't defective, send in for repairs if required.

2.003

FOUL LIGHTS

Foul lights:

Symptom #1 - The foul light does not signal a foul when it should.
Solution #'s -

Symptom #2 - The foul light works but no sound is emitted.
Solutions #'s -

Symptom #3 - The foul light constantly screams.
Solution #'s -

Symptom #4 -
Solution #'s -

SOLUTION #DESCRIPTION

3.001 Foul light casting maybe misplaced and is actually cutting the light beam. Simply replace the casting in the proper position.

3.002 The wires that connect the Foul Light to the score console may have come loose and could possibly be hanging in the subway ball return tracks subsequently the may have been taken out by a ball.

3.003 The Foul light optical emitter may have become mis-aligned. Re-adjust.

3.004 The ###### chip may have blown. This chip is sensitive to static discharges and subsequently will have a tendency to let go in dry environments (when static electricity is at its worst).

3.005 The reflector may have come loose on its base and therefore is not properly reflecting the light beam. Reposition the reflector and re-adjust the beam.

BALL DETECTOR

Symptom #1 -The pinsetter never detects a ball. This can be seen if the pinsetter never recycles if you throw a ball.
Solution #'s -

Symptom #2 -The ball detector seems to miss a ball from time to time. Again this can be confirmed if the pinsetter does not react to a ball from time to time.
Solution #'s -

Symptom #3 -
Solution #'s -

SOLUTION #DESCRIPTION

5.001 Ball detector is not properly aligned. This can be confirmed by looking at the ball detector pilot LED. When it is properly aligned it should be GREEN. When it doesn't display any color this means that it is totally off. If it displays RED it means that it is on the border line of being off.

5.002 The ball detector might be indicating that it is properly adjusted but this may be misleading since the light ray may reflect of the lane directly into the reflector. This subsequently leads the problem of occasional misreads when the ball rolls on the exact spot where the ray reflects. In doing so the ray is not actually cut (or at least not long enough). The best way to test for this situation is to slide a black piece of paper across the lane at the same level as the beam. If the LED indicator turns GREEN to off you have found your problem.

5.003 The Ball detector may be defective.

5.004 Check the wiring from the Ball detector all the way to the Electronic Control Box. It may have been accidentally cut or unplugged.

5.005 The Ball detector communication line enters the Electronic Control Box. Within the electronic control box the Ball detector communication line goes directly to the I/O board. It may be this board that is defective.

5.006 Check if the ball detector or reflector is not obstructed by dust or dirt. You should clean the ball detector/reflector on a weekly basis so to prevent such problems.

Symptom #1 - Every time or quite regularly when you turn the lane on the autoscoring does not start up properly. (i.e. - Odd characters on the screens, never detects balls, etc.).
Solution #'s -

Symptom #2 - More specifically the autoscoring seems to work OK but the control of the pinsetters is not working. (i.e. - Does not cycle when it should, cycles continuously)
Solution #'s -

Symptom #3 -
Solution #'s -

PINSETTER INTERFACE, ACTUAL PINSETTER REACTIONS

Symptom #1 - Pinsetter continuously resets when in autoscoring mode. But works great in manual mode.
Solution #'s - 9.001

Symptom #2 - The pinsetter does not trigger in autoscoring mode but does in manual mode.
Solution #'s - 9.002, 9.003, 9.004

SOLUTION #DESCRIPTION

9.001 The ball 1/2 micro-switch on the brunswick pinsetter is defective or not properly adjusted. the autoscoring system synchronises itself with the ball 2 light. If the micro switch doesn't give it the ball 2 signal the autoscoring system will continuously recycle the pinsetter until it gets it.

9.002 The two micro switches installed on the rack arm are the switches that control the timing of when the trigger can actual be given if it isn't properly adjusted the trigger signal can never be given. The proper adjustment of these micro switches is to have both switches activated when the rake is in the up position.

9.003 The interface box contains two relays one of these relays (K?) is the relay that gives the signal to trigger the pinsetter. Verify if it is working, if not replace it.

9.004 The interface box relay K? is directly connected to the corresponding machine card board in the ECB. Verify the fuse replace if required. Verify that the board is good if not replace it.

MENDES

INTERFACING OF BRUNSWICK A-2 PINSETTER WITH THE MENDES AUTOSCORING SYSTEM.

1) INSTALL THE PINSETTER CONTROL UNIT AND INTERFACE KIT AS PER DIAGRAM 1.

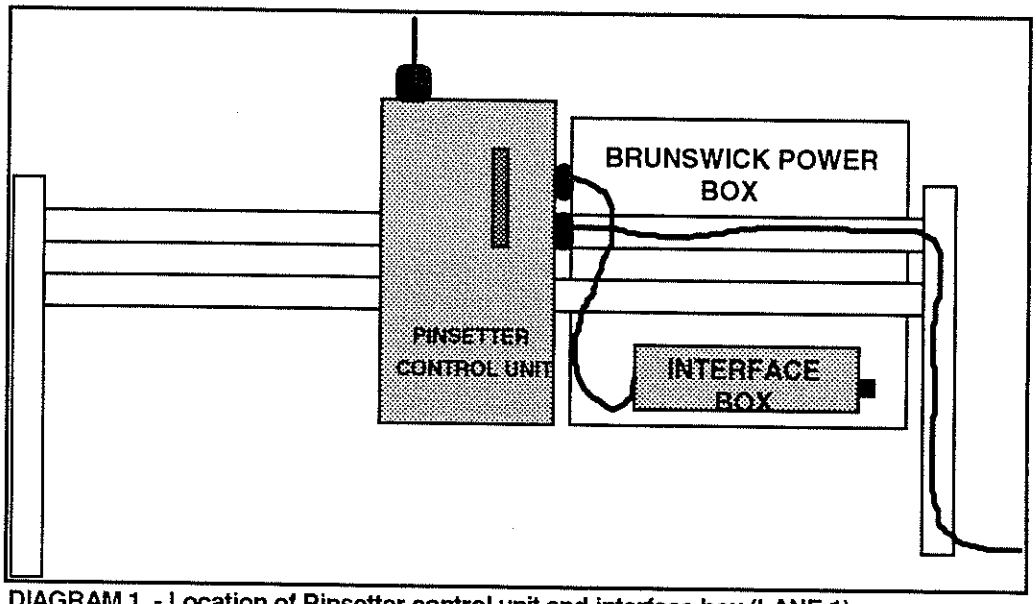


DIAGRAM 1. - Location of Pinsetter control unit and interface box.(LANE 1)

2) RUN ALL THE CABLES INTO THE LOW VOLTAGE SIDE OF THE BRUNSWICK POWER BOX.

3) **MACHINE RECYCLE** : IDENTIFY THE CABLE MARKED "RECYCLE"; CONNECT THE RED WIRE ON POSITION #20 OF TD1 AND CONNECT THE BLACK WIRE ON POSITION #19 OF TD1.

4) **RECYCLE BUTTON** : REMOVE WIRE #61 FROM THE CN2 CONNECTOR AND CONNECT THE BLUE WIRE INSTEAD. CONNECT THE ORANGE WIRE TO THE #61 WIRE.

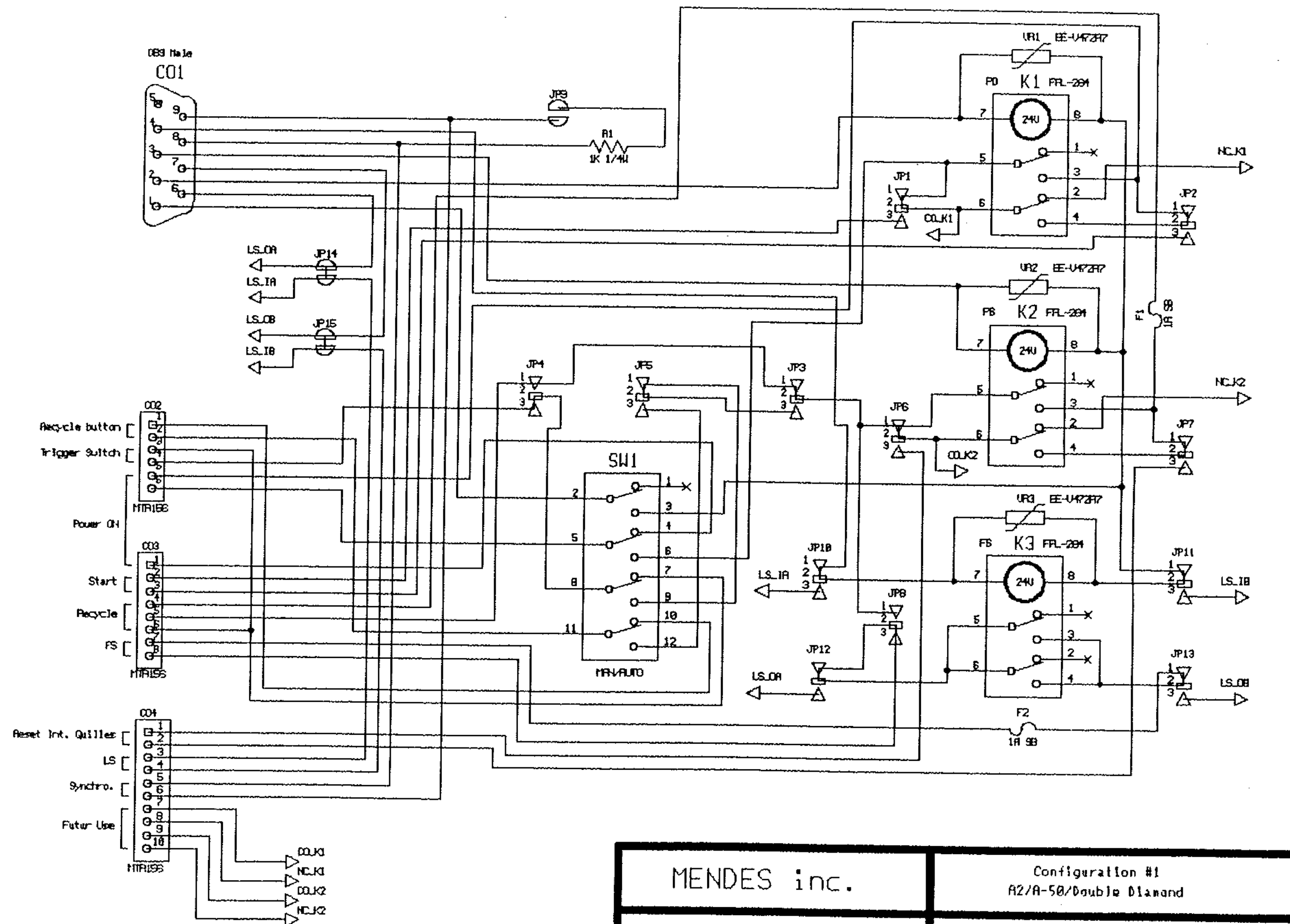
5) **TRIGGER SWITCH** (SEE NOTE #1): UNPLUG THE COMMON WIRE OF TSC1 AND CONNECT IT TO THE WHITE WIRE. CONNECT THE BLACK WIRE TO COMMON POSITION OF TSC1.

6) **POWER ON** : CUT WIRE #17, (THIS IS THE WIRE LOCATED BETWEEN CN3 AND CN5) AND CONNECT THE YELLOW WIRE TO POSITION B OF CN5. CONNECT THE RED WIRE TO POSITION B OF CN3. CONNECT THE GREEN WIRE IN PARALLEL WITH POSITION C OF CN3.

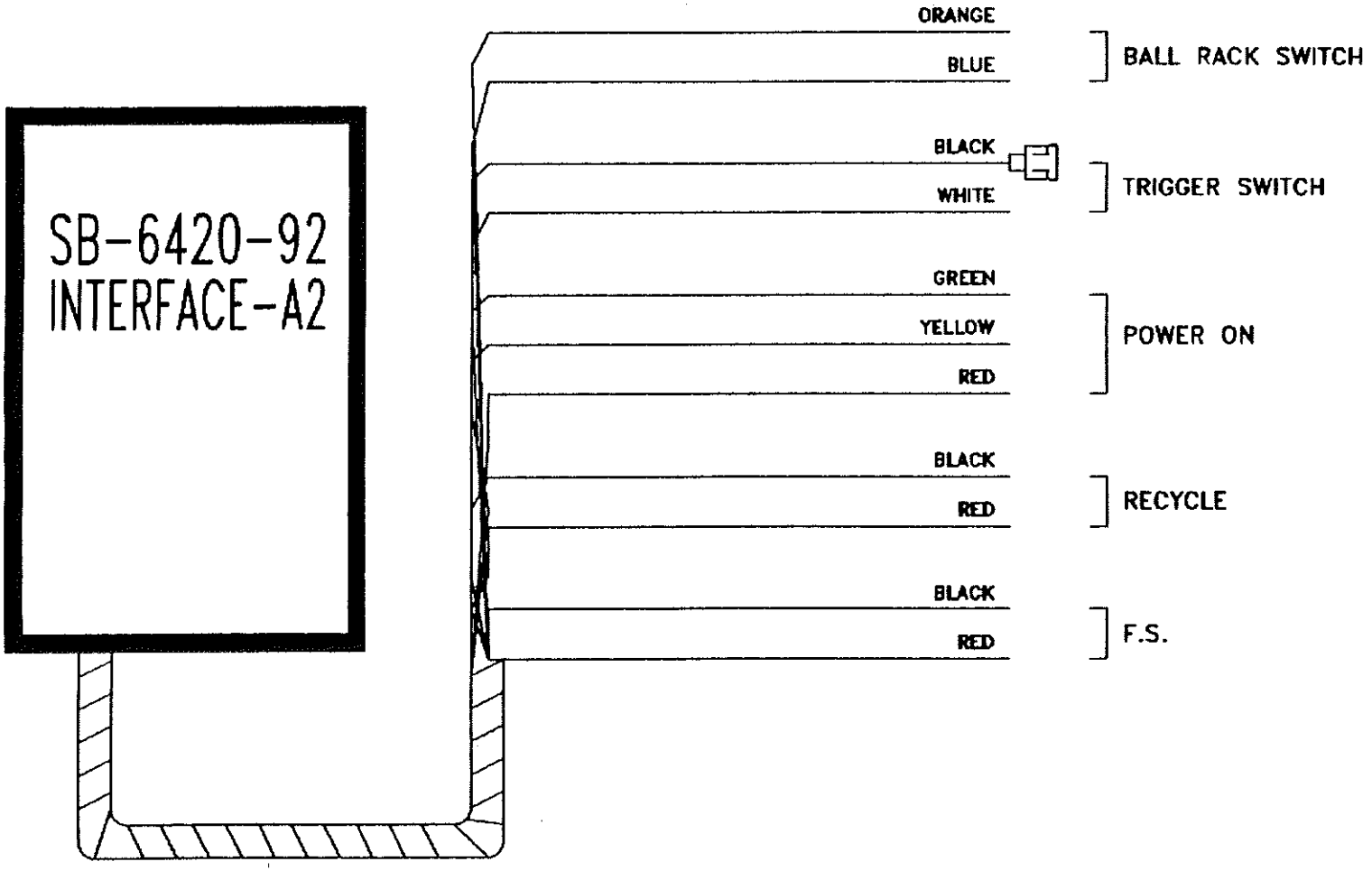
7) **SYNCHRO BALL 2** : CONNECT THE BROWN WIRE TO POSITION C OF CN5. CONNECT THE VIOLET WIRE TO POSITION 8 OF TS2. REMOVE WIRE #43 FROM THE #7 POSITION OF TS2 AND CONNECT IT TO POSITION #4 OF TS2.

8) **F.S. SOLENOID**: RUN THE CABLE FROM THE F.S. SOLENOID INSIDE THE BRUNSWICK POWER BOX. CONNECT THE GREEN WIRE OF THIS CABLE TO THE GROUND TERMINAL. CONNECT THE BLACK WIRE WITH THE F.S. CABLE'S BLACK WIRE OF THE INTERFACE BOX. CONNECT THE WHITE CABLE TO TSD-1 ON THE TERMINAL STRIP. CONNECT THE RED WIRE OF THE F.S. CABLE TO THE #3 POSITION OF THE RL3 BRUNSWICK ???.

NOTE #1: IF THE PINSETTER HAS THE NEW *BRUNSWICK ELECTRONIC PINSETTER TRIGGER/CONTROL SYSTEM* DON'T PROCEED WITH THE TRIGGER SWITCH MODIFICATIONS ABOVE. FOLLOW THESE INSTRUCTIONS INSTEAD: REMOVE THE WIRE FROM POSITION #13 OF THE TIME DELAY MODULE AND CONNECT IT WITH THE WHITE WIRE FROM THE MENDES INTERFACE. CONNECT THE BLACK WIRE FROM THE MENDES INTERFACE TO POSITION #13 ON THE TIME DELAY MODULE. PLEASE NOTE THAT WHEN WE MENTION THE TIME DELAY MODULE IN THE TEXT ABOVE, WE ARE REFERRING TO THE BRUNSWICK PINSETTER TRIGGER/CONTROL SYSTEM.



MENDES inc.	Configuration #1 A2/A-50/Double Diamond
DESIGNER: Claude Sylvain	PROJECT: Pins Setter Interface
DRAWER: Claude Sylvain	DATE: MARS 1994 · VERSION: 1 · 1/1



MENDES QUEBEC CANADA	DESCRIPTION: INTERFACE A2			SPECIFICATIONS	PAR: CS / ECHELLE:
	VER.:	APPR.:	DATE: Oct. 1994		PARTIE No.

INTERFACING OF BRUNSWICK GS-10 (RED BOX) PINSETTER WITH THE MENDES AUTOSCORING SYSTEM

1) **POWER ON** : RUN THE CABLE LABELLED "POWER ON" FROM THE MENDES INTERFACE TO THE 11-POSITION CONNECTOR IDENTIFIED AS "FERNLEITUNG" (FLBW1) ON THE L.V. BOX. CONNECT THE WHITE WIRE OF THE "POWER ON" CABLE IN PARALLEL WITH POSITION #8 OF CONNECTOR FLBW1. CONNECT THE RED WIRE IN PARALLEL WITH POSITION #11 OF CONNECTOR FLBW1. INSULATE THE BLACK WIRE FROM THE "POWER ON" CABLE.

2) **RECYCLE** : RUN THE CABLE LABELLED "RECYCLE" FROM THE MENDES INTERFACE TO THE 6-POSITION CONNECTOR IDENTIFIED AS "PHOTOZELLE" ON THE L.V. BOX. DISCONNECT THE RED WIRE FROM POSITION #1 OF THE PHOTOZELLE CONNECTOR AND CONNECT IT WITH THE BLACK WIRE OF THE RECYCLE CABLE. CONNECT THE RED WIRE OF THE "RECYCLE" CABLE TO POSITION #1 OF THE PHOTOZELLE CONNECTOR. CONNECT THE WHITE WIRE FROM THE "RECYCLE" CABLE IN PARALLEL WITH THE GREEN WIRE POSITION #5 OF THE PHOTOZELLE CONNECTOR.

3) **SYNCHRO BALL 2** : RUN THE CABLE LABELLED "SYNCHRO" TO THE MASKING UNIT INTERFACE (BLUE PLASTIC BOX). CONNECT THE BLACK WIRE OF THE "SYNCHRO" CABLE WITH POSITION #6 OF THE MASKING UNIT INTERFACE. CONNECT THE RED WIRE OF THE "SYNCHRO" CABLE WITH THE SECOND BALL SIGNAL, POSITION #4 OF THE MASKING UNIT INTERFACE.

4) **MICRO SWITCH L.S. 1** : INSTALL THE MICRO SWITCH ACCORDING TO THE DIAGRAM PROVIDED WITH THIS DOCUMENT. CONNECT THE CABLE LABELLED "L.S." FROM THE MENDES INTERFACE TO THE NORMALLY CLOSED (N.C.) CONTACT OF THE MICRO SWITCH.

INTERFACING OF AMF PINSETTER WITH THE MENDES AUTOSCORING SYSTEM. NEWER MODELS 82-70

1) **INSTALLATION OF THE MENDES INTERFACE** : INSTALL THE INTERFACE AS PER DIAGRAM #1. ALL WIRES FROM THE INTERFACE, EXCEPT FOR THE ONE IDENTIFIED "SYNCHRO BALL 2", MUST ENTER THE WIRE CHANNEL BELOW THE PINSETTER POWER CONNECTOR.

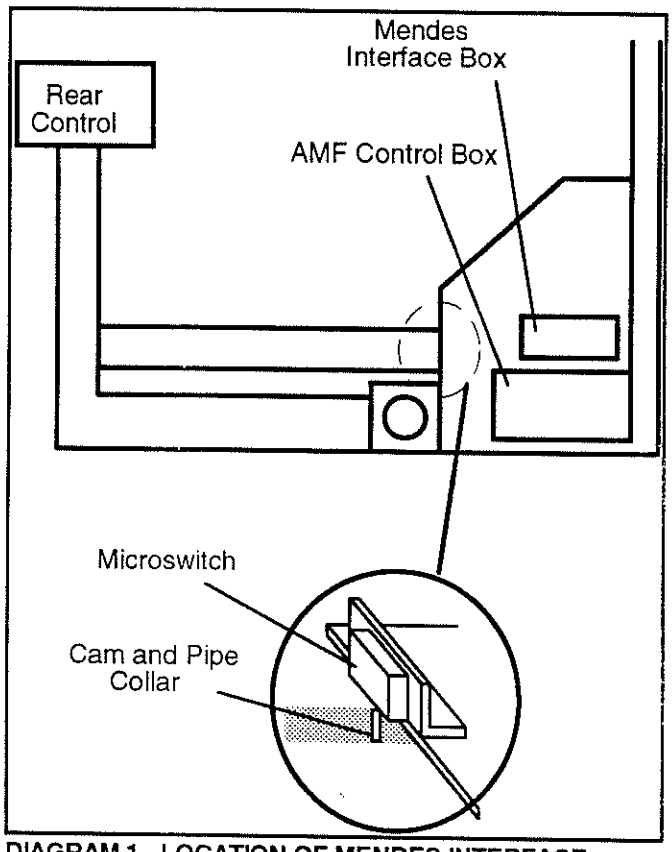


DIAGRAM 1 - LOCATION OF MENDES INTERFACE ELEMENTS.

2) **MICRO SWITCH ASSEMBLY INSTALLATION** : THE MICRO SWITCH ASSEMBLY IS INSTALLED AS PER DIAGRAM #1, ATTACH THE CAM WITH THE SUPPLIED PIPE COLLAR.

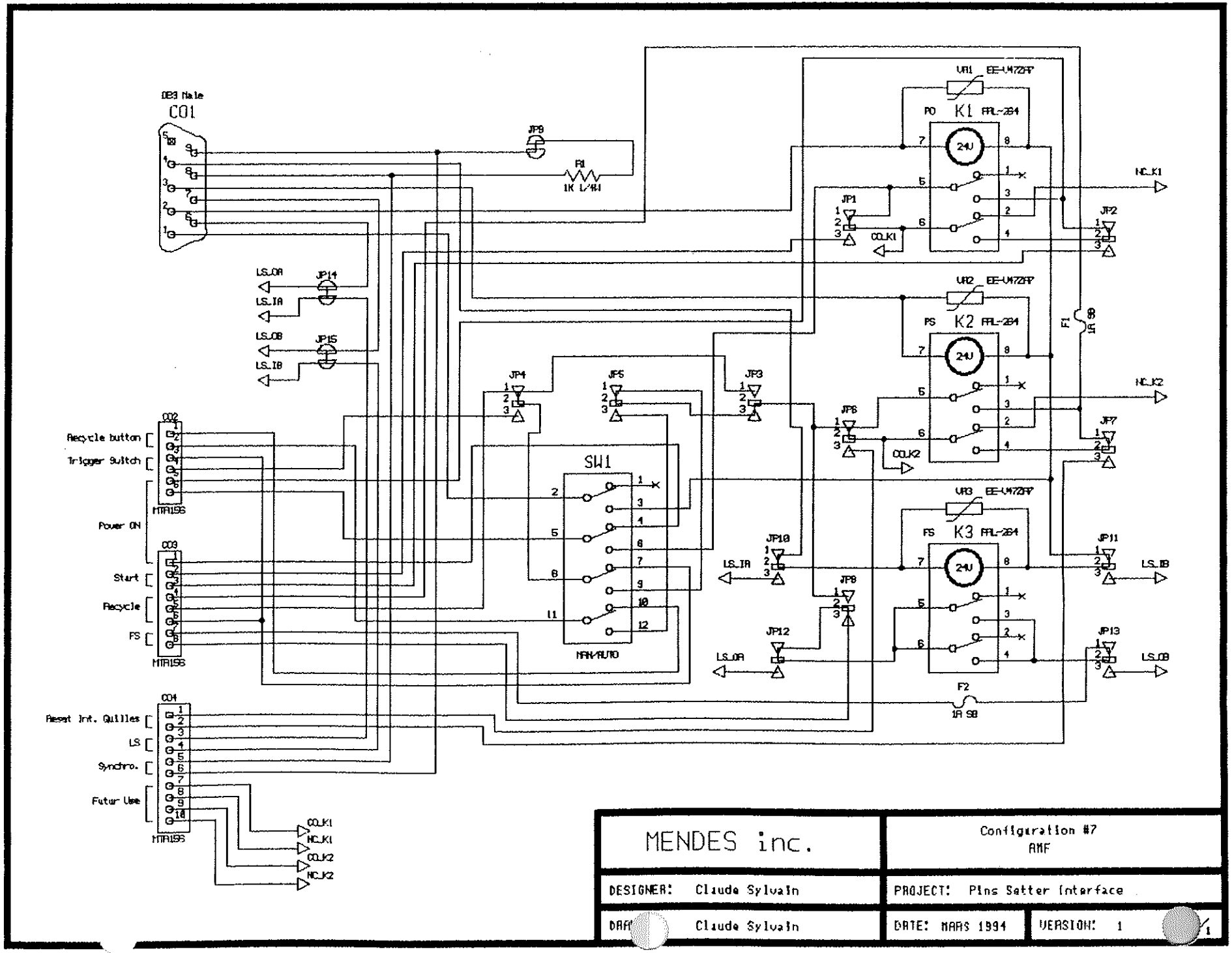
3) **CUSHION SWITCH RECYCLE** : LAY A 2-CONDUCTOR CABLE IN THE CABLE CHANNEL BELOW THE PINSETTER POWER CONNECTOR ALL THE WAY TO THE REAR CONTROL BOX. IDENTIFY THIS CABLE AS THE CUSHION SWITCH CABLE. IN THE REAR CONTROL BOX, DISCONNECT THE WHITE WIRE WITHIN THE 2-CONDUCTOR CABLE OF THE CYCLE SWITCH (THIS CABLE COMES DIRECTLY FROM THE CUSHION MICRO SWITCH) AND CONNECT IT TO THE BLACK WIRE OF THE 2-CONDUCTOR CABLE YOU JUST LAID. TAKE THE RED WIRE FROM THE SAME CABLE AND CONNECT IT INSTEAD OF THE WHITE WIRE YOU JUST REMOVED. WITHIN THE CABLE CHANNEL, NEAR THE PINSETTER POWER CONNECTOR, IDENTIFY THE BLACK WIRE FROM THE INTERFACE BOX AND CONNECT IT TO THE BLACK WIRE OF THE CUSHION SWITCH CABLE. TAKE THE WHITE WIRE FROM THE INTERFACE AND CONNECT IT TO THE RED WIRE OF THE CUSHION SWITCH CABLE. TAKE THE GREY WIRE FROM THE INTERFACE AND CONNECT IT TO THE TS-14 TERMINAL WITHIN THE CABLE CHANNEL.

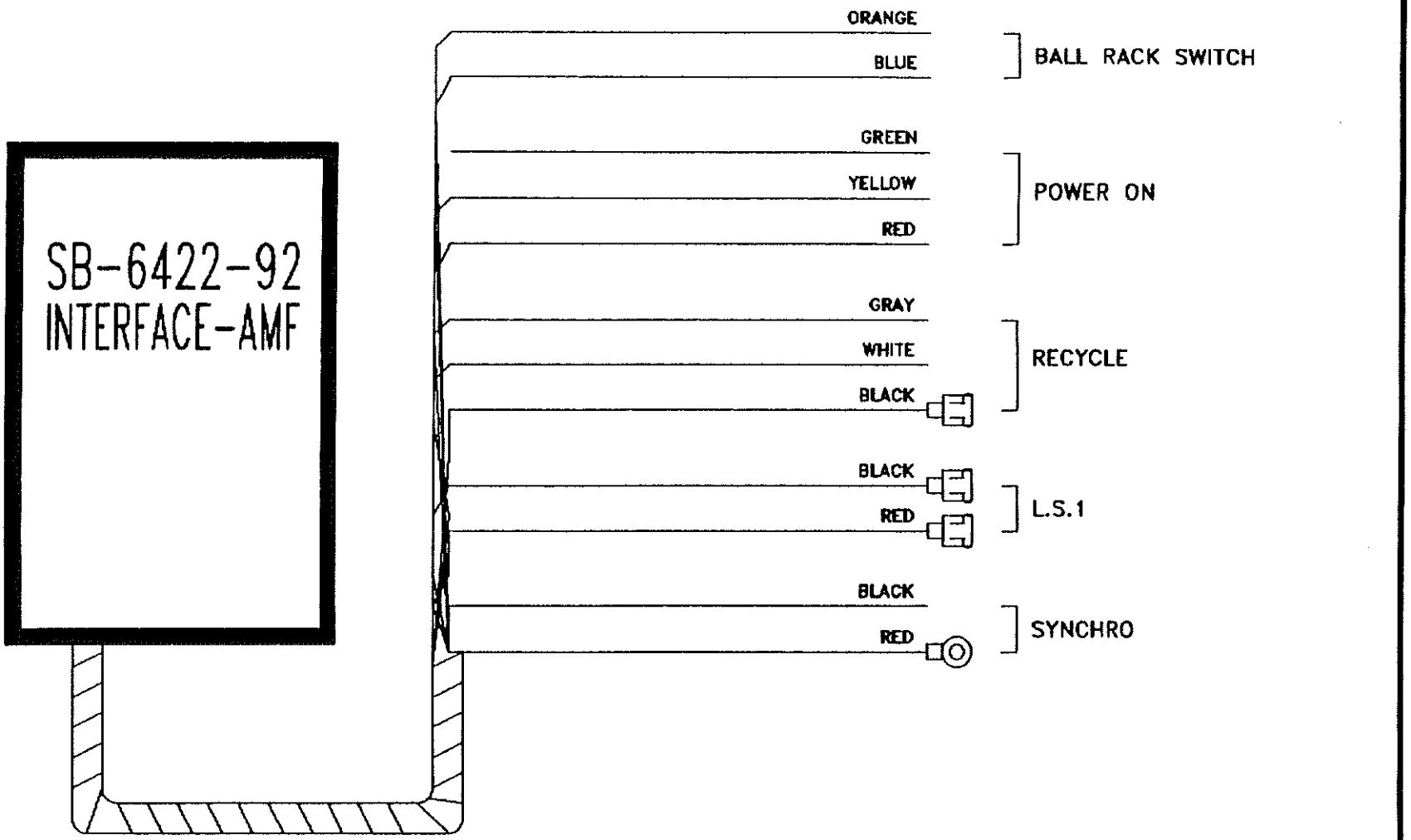
4) **BALL RACK SWITCH** : IDENTIFY THE CABLE THAT COMES FROM THE "L" POSITION ON THE A&MC PLUG (MANAGER'S CONTROL PLUG). CUT THE WIRE IN TWO. CONNECT THE ORANGE WIRE OF THE INTERFACE BOX TO ONE OF THE CUT WIRES AND THE BLUE WIRE OF THE INTERFACE BOX TO THE OTHER ONE.

5) **POWER ON** : IDENTIFY THE WIRE THAT COMES FROM THE "B" POSITION ON THE A&MC PLUG AND CUT IT IN TWO. CONNECT THE RED WIRE COMING FROM THE INTERFACE BOX TO THE END THAT COMES FROM THE CONNECTOR. CONNECT THE YELLOW WIRE OF THE INTERFACE TO THE OTHER END. IDENTIFY THE WIRE FROM THE "E" POSITION ON THE A&MC PLUG AND CONNECT THE GREEN WIRE OF THE INTERFACE BOX IN PARALLEL WITH IT.

6) **SYNCHRONISATION BALL 2** : TAKE THE WIRE LABELLED "SYNCHRO" FROM THE INTERFACE BOX AND MOVE IT TO THE RIGHT SIDE OF THE AMF CONTROL BOX. CONNECT THE BLACK WIRE TO THE #29 POSITION ON THE "MP" PLUG (MASK PLUG) AND CONNECT THE RED WIRE TO THE #25 POSITION ON THE SAME PLUG.

7) **CONNECTING THE "LS" (LIMIT SWITCH)** : CONNECT THE "L.S. 1" CABLE OF THE INTERFACE BOX TO THE MICRO SWITCH ON THE MICRO SWITCH ASSEMBLY. CONNECT THE WIRES BETWEEN THE COMMON (COM) AND THE NORMALLY OPEN (N.O.) POSITIONS.


DB9 Male
CO1
JP9
R1
1K 1/4W
VR1 EE-U472AP
PO K1 PRL-264
24V
JP1
CO_K1
NC_K1
JP2
LS_OA
JP14
LS_IA
LS_OB
JP15
LS_IB
VR2 EE-U472AP
PS K2 PRL-264
F1
5A
JP4
JP5
JP3
JP6
CO_K2
NC_K2
JP7
CO2
Recycle button
Trigger Switch
MTA156
Power ON
SW1
MAN-AUTO
VR3 EE-U472AP
FS K3 PRL-264
JP10
LS_IA
JP8
JP11
LS_IB
CO3
Start
Recycle
FS
JP12
LS_OA
JP13
LS_OB
F2
1A 5B
CO4
Reset Int. Quilles
LS
Synchro.
Futur Use
CO_K1
NC_K1
CO_K2
NC_K2
MENDES inc.
Configuration #7
AMF
DESIGNER: Claude Sylvain
PROJECT: Pins Setter Interface
DRAWN: Claude Sylvain
DATE: MARS 1994
VERSION: 1



MENDES QUEBEC CANADA	DESCRIPTION: INTERFACE AMF		SPECIFICATIONS	PAR: CS / ECHELLE:
	VER.:	APPR.: / DATE: Oct. 1994		PARTIE No.

INTERFACING OF AMF PINSETTER WITH THE MENDES AUTOSCORING SYSTEM

AMF 82-30 WITH 4400 CHASSIS

1) **INSTALLATION OF THE MENDES INTERFACE:** INSTALL THE INTERFACE AS PER DIAGRAM #1. ALL WIRES FROM THE INTERFACE, EXCEPT FOR THE ONES IDENTIFIED AS "LS1" AND "SYNCHRO", MUST ENTER THE JUNCTION BOX. LOOSEN ONE OF THE WIRE CLAMPS OF THE PINSETTER WIRING AND INSERT THE INTERFACE WIRES THROUGH THIS OPENING.

2) **MICRO SWITCH ASSEMBLY INSTALLATION:** THE MICRO SWITCH ASSEMBLY IS LOCATED ON TOP OF THE KICKBACKS, BETWEEN THE TWO PINSETTERS. FLATTEN OUT THE MICRO SWITCH LEVER AND PLACE THE MICRO SWITCH ASSEMBLY SO THAT THE BOTTOM SWEEP RAIL MAKES CONTACT WITH THE LEVER. THE NYLON CAMS ARE NOT USED.

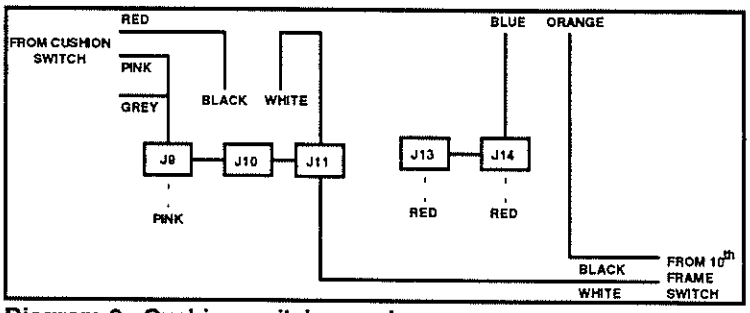


Diagram 2 - Cushion switch recycle

3) **CUSHION SWITCH RECYCLE:** LOCATE THE RED AND PINK WIRES COMING FROM THE CUSHION SWITCH. THEY ARE CONNECTED TO TERMINALS 9 AND 11. CUT THE RED WIRE IN TWO. CONNECT THE BLACK WIRE OF THE INTERFACE BOX TO THE RED WIRE THAT IS GOING TO THE CUSHION SWITCH. CONNECT THE WHITE WIRE WHICH COMES FROM THE INTERFACE ON THE OTHER END OF THE RED WIRE. CONNECT THE GREY WIRE OF THE INTERFACE TO TERMINAL 9. DISCONNECT THE BLACK WIRE WHICH LINKS UP THE 10TH FRAME SWITCH AND TERMINAL 14 AND CONNECT IT TO THE ORANGE WIRE OF THE INTERFACE BOX. CONNECT THE BLUE WIRE TO TERMINAL 14.

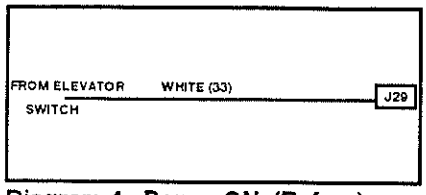


Diagram 4 - Power ON. (Before)

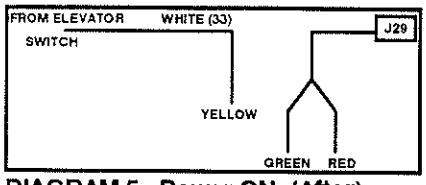


DIAGRAM 5 - Power ON. (After)

4) **POWER ON:** LOCATE THE WHITE WIRE COMING FROM THE ELEVATOR SWITCH AND CONNECT IT TO TERMINAL 29. CUT THIS WIRE IN TWO. CONNECT THE YELLOW WIRE OF THE INTERFACE BOX TO THE END OF THE WHITE WIRE THAT IS GOING TO THE ELEVATOR SWITCH. CONNECT THE GREEN AND RED WIRES THAT ARE COMING OUT OF THE INTERFACE BOX TO THE WHITE WIRE THAT IS CONNECTED TO TERMINAL 29.

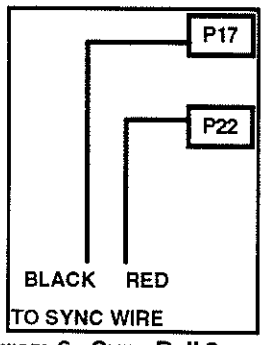


Diagram 6 - Sync Ball 2.

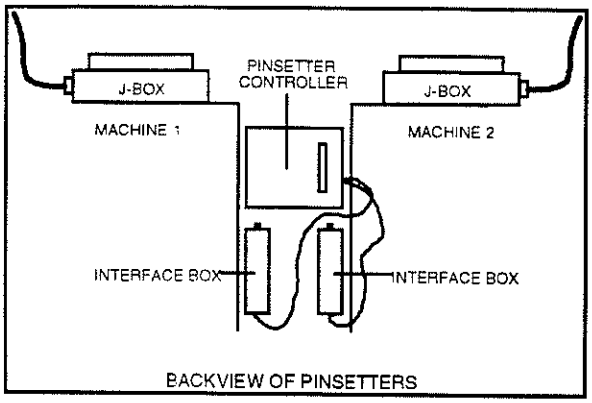
5) **SYNCHRONISATION BALL 2:** RUN THE CABLE LABELLED "SYNCHRO" TO REACH THE "P" BOX LOCATED IN FRONT OF THE MACHINE. CONNECT THE BLACK WIRE TO TERMINAL 17 AND THE RED WIRE TO TERMINAL 22. **VERY IMPORTANT - THE STEPPER SWITCH MUST BE WORKING FOR BALL SYNCHRONISATION TO WORK.** IF THE STEPPER SWITCH DOES NOT WORK, DO NOT CONNECT THE SYNC. LINES BUT BE AWARE THIS MAY CAUSE PROBLEMS FOR THE BOWLERS DURING SCORE CORRECTIONS AND/OR PART SETS.

6) **CONNECTING THE "LS" LIMIT SWITCH:** RUN THE CABLE LABELLED "L.S. 1" TO THE MICRO SWITCH. CONNECT THE RED AND BLACK WIRES TO THE MICRO SWITCH. THEY SHOULD BE CONNECTED TO THE COMMON (COM) AND THE NORMALLY CLOSED (NC) POSITIONS.

MENDES

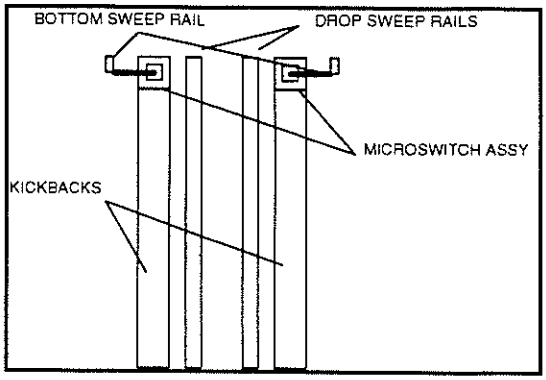
INTERFACING OF AMF PINSETTER WITH THE MENDES AUTOSCORING SYSTEM

AMF 82-30 WITH 6525 CHASSIS



1) **INSTALLATION OF THE MENDES INTERFACE**: INSTALL THE INTERFACE AS PER DIAGRAM #1. ALL WIRES FROM THE INTERFACE, EXCEPT FOR THE ONE IDENTIFIED AS "L.S. 1", MUST ENTER THE JUNCTION BOX. LOOSEN ONE OF THE WIRE CLAMPS OF THE PINSETTER WIRING AND INSERT THE INTERFACE WIRES THROUGH THIS OPENING.

2) **MICRO SWITCH ASSEMBLY INSTALLATION:** THE MICRO SWITCH ASSEMBLY IS LOCATED ON THE KICKBACKS, BETWEEN THE TWO PINSETTERS. FLATTEN OUT THE MICRO SWITCH LEVER AND POSITION THE MICRO SWITCH ASSEMBLY SO THAT THE BOTTOM SWEEP RAIL MAKES CONTACT WITH THE LEVER. THE NYLON CAMS ARE NOT USED.



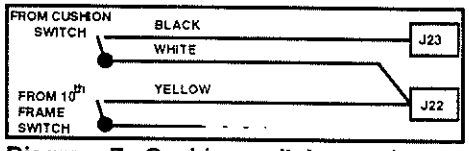


Diagram 7 - Cushion switch recycle (Before).

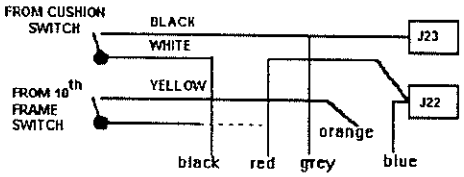


Diagram 8 - Cushion switch recycle (After).

3) **CUSHION SWITCH RECYCLE:** LOCATE THE BLACK AND WHITE WIRES COMING FROM THE CUSHION SWITCH. THEY ARE CONNECTED TO TERMINALS 23 AND 22. CUT THE WHITE WIRE IN TWO. CONNECT THE BLACK WIRE OF THE INTERFACE BOX TO THE WHITE WIRE GOING TO THE CUSHION SWITCH. TAKE THE WHITE WIRE OF THE INTERFACE BOX AND CONNECT IT TO THE OTHER END OF THE WHITE WIRE YOU JUST CUT. TAKE THE GREY WIRE FROM THE INTERFACE AND CONNECT IT TO THE BLACK WIRE OF THE CUSHION SWITCH. THIS WIRE IS CONNECTED TO TERMINAL 23. LOCATE THE YELLOW WIRE WHICH LINKS UP THE 10TH FRAME SWITCH AND TERMINAL 22 AND REMOVE IT. CONNECT THE ORANGE WIRE OF THE INTERFACE BOX TO THE YELLOW WIRE YOU DISCONNECTED AND CONNECT THE BLUE WIRE TO TERMINAL J22.

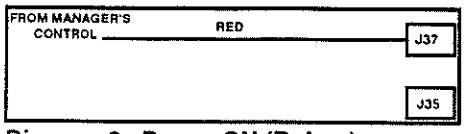


Diagram 9 - Power ON (Before).

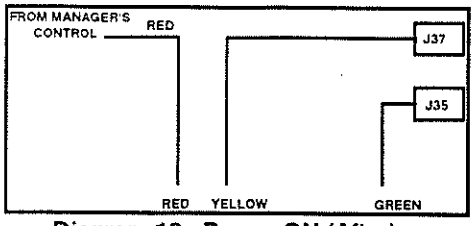


Diagram 10 - Power ON (After).

4) **POWER ON:** LOCATE THE RED WIRE THAT CONNECTS THE MANAGER'S CONTROL SWITCH TO TERMINAL 37. CUT THIS WIRE IN TWO. CONNECT THE YELLOW WIRE OF THE INTERFACE BOX TO THE END THAT IS GOING TO TERMINAL 37. CONNECT THE RED WIRE OF THE INTERFACE BOX TO THE END GOING TO THE MANAGER'S CONTROL SWITCH. THEN, CONNECT THE GREEN WIRE IN PARALLEL WITH A WIRE ON TERMINAL 35.

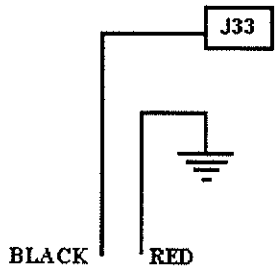


Diagram 11- Sync Ball 2.

5) **SYNCHRONISATION BALL 2:** TAKE THE WIRE LABELLED "SYNCHRO" OF THE INTERFACE BOX AND CONNECT THE BLACK WIRE OF THIS CABLE TO TERMINAL 33. THE POWER CORD AND GROUND POINT ARE LOCATED ON THE SIDE OF THE "J" BOX. CONNECT THE RED WIRE (THE ONE WITH A LOOP TERMINAL) ONTO THIS GROUND POINT. **VERY IMPORTANT - THE STEPPER SWITCH MUST BE WORKING FOR BALL SYNCHRONISATION TO WORK.** IF THE STEPPER SWITCH DOES NOT WORK, DO NOT CONNECT THE SYNC. LINES BUT BE AWARE THIS MAY CAUSE PROBLEMS FOR THE BOWLERS DURING SCORE CORRECTIONS AND/OR PART SETS.

6) **CONNECTING THE "LS" LIMIT SWITCH:** RUN THE CABLE LABELLED "L.S." TO THE MICRO SWITCH. CONNECT THE RED AND BLACK WIRES TO THE MICRO SWITCH OF LANE 1. THEY SHOULD BE CONNECTED TO THE COMMON (COM) AND THE NORMALLY CLOSED (NC) POSITIONS.

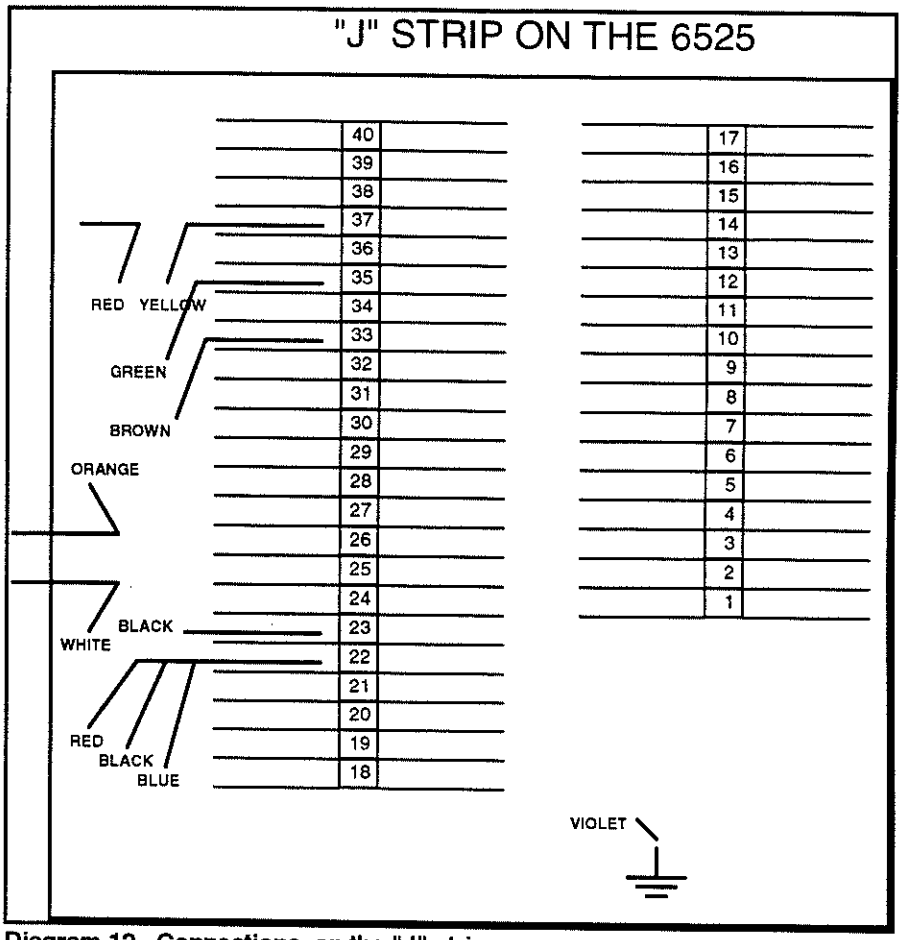


Diagram 12 - Connections on the "J" strip.

MENDES AUTOSCORING
PRE-INSTALLATION REQUIREMENTS

1. PHYSICAL SPECIFICATIONS

1.1 OVERHEAD UNITS

Each overhead unit consists of two or three 27 inch monitors mounted within a frame enclosed by a fibreglass casing. The unit is suspended from a suitable overhead structure (1) by wire cables supplied by Mendes. The unit is placed over the ball return area between the pair of lanes. See figure 1 for a typical installation of Overhead Unit.

(1) Please refer to Appendice A for the description of the requirements of a suitable structure.

1.2 INSTALLATION CONSOLE

The console base should be placed 4 ft away from the edge of the approach in line with the ball return. This distance can be varied plus or minus depending on the type of ball rack and/or space available in the player's area.

1.3 PINSETTER AREA

No special physical modifications are required in the pinsetter area

1.4 MANAGER'S CONTROL

No specific physical modifications are required in the Manager's Control area but enough space must be made to accept the computer and it's peripherals (be it the standard equipment and optionnal equipment). Refer to Figure 2 for a typical manager's control layout.

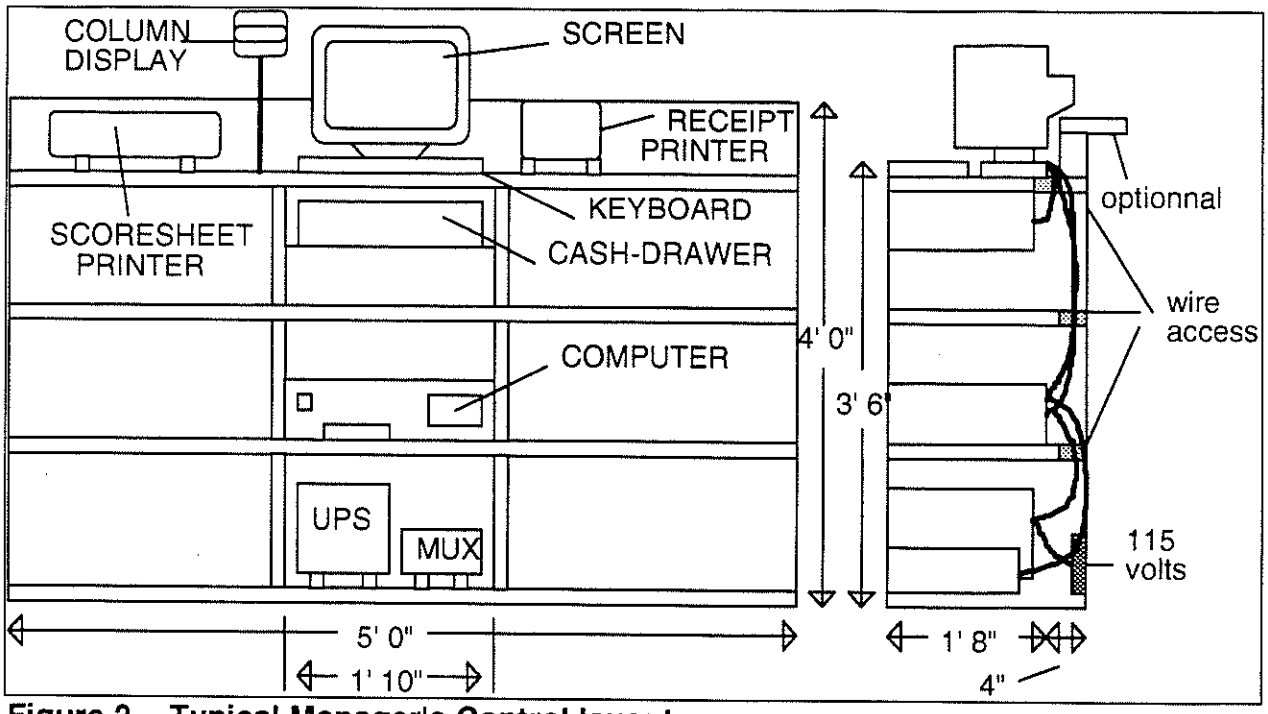


Figure 2. - Typical Manager's Control layout.

2. ELECTRICAL SPECIFICATIONS

All circuit requirements for the installation of the Mendes autoscoring are covered in the following pages. Please take great care in following the instructions. The autoscoring equipment is in fact a specialised computer. It is designed to work under the harshest of conditions but if the following electrical specifications are not followed damage can result to your equipment. In existing centers we do not require dedicated isolated circuits. **All circuits must be dedicated circuits and great care must be taken to ensure that no noise generating equipment such as: air conditioners, compressors, pinsetters, fluorescent lighting, etc. are installed on the same panels or subpanels as the Autoscoring circuits**. Noise generating equipment will cause problems that are sometimes very hard to find. A very important requirement when installing the electrical layout is the necessity of a third insulated ground wire. Some older installations use junction box grounds or BX grounding systems. Furthermore, other installations have neutral wire system with 208 volts or no grounding at all. In all cases such installations **MUST** be converted to an electrical wiring using an insulated ground wire. When wiring for autoscoring systems if there is any doubt on the reliability of the existing electrical wiring it is strongly recommended to redo the wiring. For the ease of operation all autoscoring elements should be connected to the same sub-panel when ever possible and this sub-panel must be free of noise generating equipment.

2.1 A1 - OVERHEAD DISPLAY POWER OUTLET

Requires a duplex insulated ground outlet, preferably hidden in the suspended ceiling. Where local construction law prohibits such an installation a flush mount duplex or a hanging duplex will do. Specs - one per pair of lanes centered on the pair approximately 6 ft from approach edge (this distance can vary to the proprietors liking). **Uses - 115 volts, 600 watts, 5.2 amps.**

2.2 A12 - SCORE CONSOLE POWER OUTLET

Requires an insulated ground outlet, to be pulled up through one of the two required conduits from the approach to the console base. It will be connected to the score tables internal power box. Specs - For its position refer to conduit location, suffice to say for most installations it is approximately 4 ft from the approach edge in line with the center of the pair of lanes. See blowup on diagram. Note - if the ball rack comes out too far, the conduits and A12 can be backed up to the required distance. **Uses -115 volts, 600 watts, 5.2 amps.**

2.3 A7 - PINSETTER ELECTRONICS OUTLET

Requires a hanging wire (or BX depending on local construction laws) with a single plug inlet. Specs - Plug must hang approximately one foot above the odd numbered pinsetter or 6 feet from the floor (most preferably over the center of the machine in such a way as not to obstruct free passage of the in-house mechanic). **Uses 115 volts, 200 watts, 1.75 amps.**

2.4 A2 - MANAGER'S CONTROL OUTLETS (COMPUTER OUTLETS)

Requires an isolated type circuit with an insulated ground. The number of such outlets and their locations will vary from installation to installation. The best way to plan the requirements of such circuits is to install one everywhere a computer or terminal are required (Front counter, back office, snack bar, etc.). For most installations, two outlets at the front counter are sufficient.

Note - All elements of the Mendes-2001 Autoscoring system are quoted as running on 115 Volts AC at 60 Hz. All components are available as running 115/208/230 Volts AC at 50/60 Hz. For the North American market all Autoscoring equipment is shipped as 115 Volt AC unless specified otherwise.

2.5 MODEM (NOT SHOWN ON DIAGRAM)

A modem will require its own dedicated phone line since many multi-line phone systems will not work with modems. A Fax line, if already installed, can be used also but the unhooking and subsequent hooking of the modem will be required

every time the modem will be used. Should normally be located near the Main Computer area.

3. CONDUIT SPECIFICATIONS

The installation of conduits in an existing center is not as difficult as the diagram suggests. Note that the diameter of the conduits is a strict minimum already therefore do not reduce the diameters. Conduits of a PVC plastic material are strongly recommended for conduit runs. Note - Some areas require metal type conduits.

3.1 C3, C4, C5 - OVERHEAD CONDUITS (VIDEO/ SCORESHEET / SOUND)

These conduits for the ceiling conduits are required only in the case where the overheads are to be installed and that the following situation is encountered:

- Local construction code requires that all cabling even low voltage, which the video and sound cables are classed as, must be enclosed in conduits when running in a ceiling structure.

- The type of ceiling does not allow any weight or is not accessible without major modifications. Note - Any holes or access points are at the proprietor's expense, as is the eventual closing of the holes.

3.2 CONSOLE CONDUITS

C1 - Regular Voltage Conduit

This conduit is use to carry the required power source to the console base. In no case is this conduit to be used for any other reason since the remainder of the cables that are to enter or exit the console are sensitive to crosstalk from the high voltage wires. In many older installations there already is a conduit for the telescore table which can be used for this purpose. Also note that a ground wire installed by the autoscoring technicians will be passed through this conduit. Furthermore, depending on the options, some other power source cabling for things such as the foul light, or intercom will be passed through this conduit since these wires are not affected by crosstalk. **Specs - 1 ½" conduit from the approach area to the console base.** See blowup on diagram.

C2 - Autoscoring Cabling Conduit

This conduit is used to carry the remainder of the required cabling. The cabling in this conduit must in no way be placed with any other high voltage cabling. **Specs - 1 ½" conduit from the approach area to the console base.**

3.3 C6 - MULTIPLEXOR CONDUIT

The use of a conduit is not absolutely not required, unless local construction code requires it. All that is absolutely required is an easy access between the score tables and the Manager's Control. On the diagram the conduit is shown as an underground conduit between the Manager's control and the center of each 8 lanes. This setup would normally be used during the construction of new centers and is the best way to gain access between the Manager's Control and the consoles. This is of course difficult to obtain in an existing center. In existing centers access to the consoles can vary from installation to installation. To give you an idea here is a list of the different ways you can reach the score consoles from the Manager's Control:

- A Conduit below floor level between Manager's Control and middle of 8 lanes to approach level.

- Conduit up through ceiling from Manager's Control to a column roughly centered on 8 lanes, then access the console by the sublane area.

- Run wires through the front surface of approach area, below the approach. Remove the front board of the approach and have wires run from each side of the center, half on one side and half on the other side. This method is not usually recommended for large installations.

Specs- If a conduit is to be used use 1 ½" for every 8 lanes.

3.4 C7 - JUNCTION BOX TO MULTIPLEXOR CONDUIT

Again, this conduit is not absolutely required unless local construction code requires it or access to the location of the multiplexor is difficult since the multiplexor must be next to the lane controlling computer. Remember that there will be one wire for each pair of lanes between the multiplexor and the junction box. Therefore, in smaller centers simple holes can be drilled to give access to the multiplexor while in larger centers you may be better off by laying a conduit. Suffice to say, that if the access seems straightforward no conduit is required. **Specs - 2" conduit.**

3.5 B1 - CONDUIT JUNCTION BOX

This is a junction box for all cables relating the autoscoring system. Usually you want to install it at the Manager's Control counter, more specifically in a central location. If conduits are to be used for the installation any conduit to the Manager's Control is to be connected to it. All cabling, Lane Communication, Video, Sound and Intercom will meet at this box. Specs - 18" x 14" x 4".

4. PRE-GROUNDING REQUIREMENTS

GENERAL

Due mainly to the fact that many bowling centers were built before electrical codes were as stringent as they are now, many modifications to the grounding systems are sometimes in order. Since all electronics and more specifically computers (which your autoscoring system is in fact) are very sensitive to bad grounds.

3.1 MAIN BUILDING GROUND (identified by GND)

If the main building ground is not one of the following, modifications must be carried out to do so:

1) Main electrical ground is installed on metal main water value which directly exits the earth.

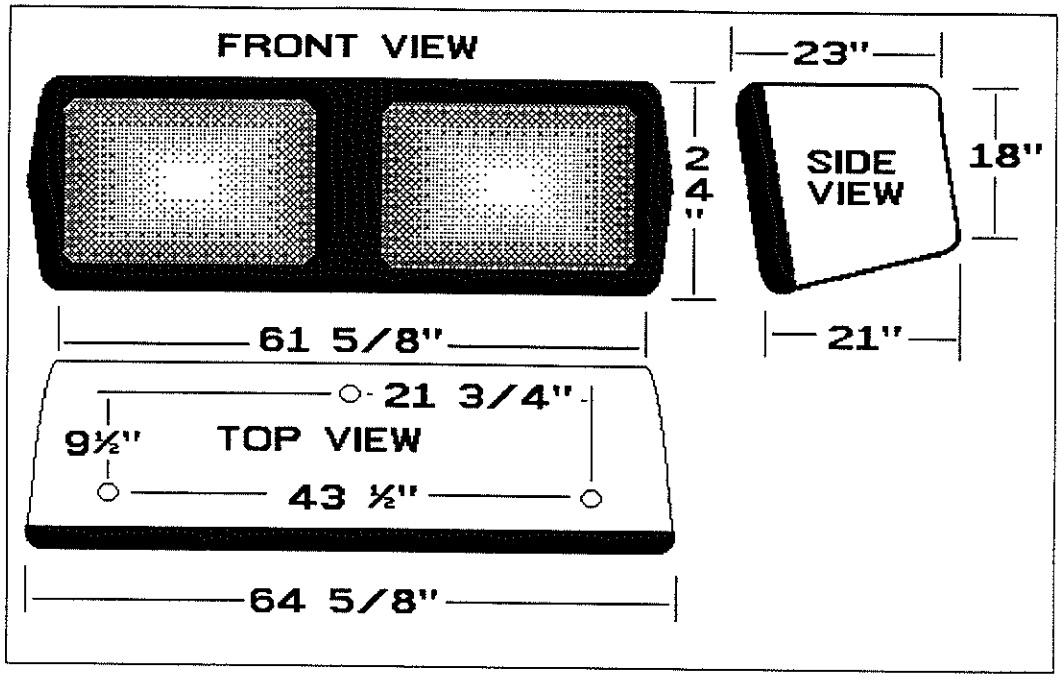
2) Same as main entrance panel. Which in itself fills the prerequisites of 1) or 3).

3) Ground rod.

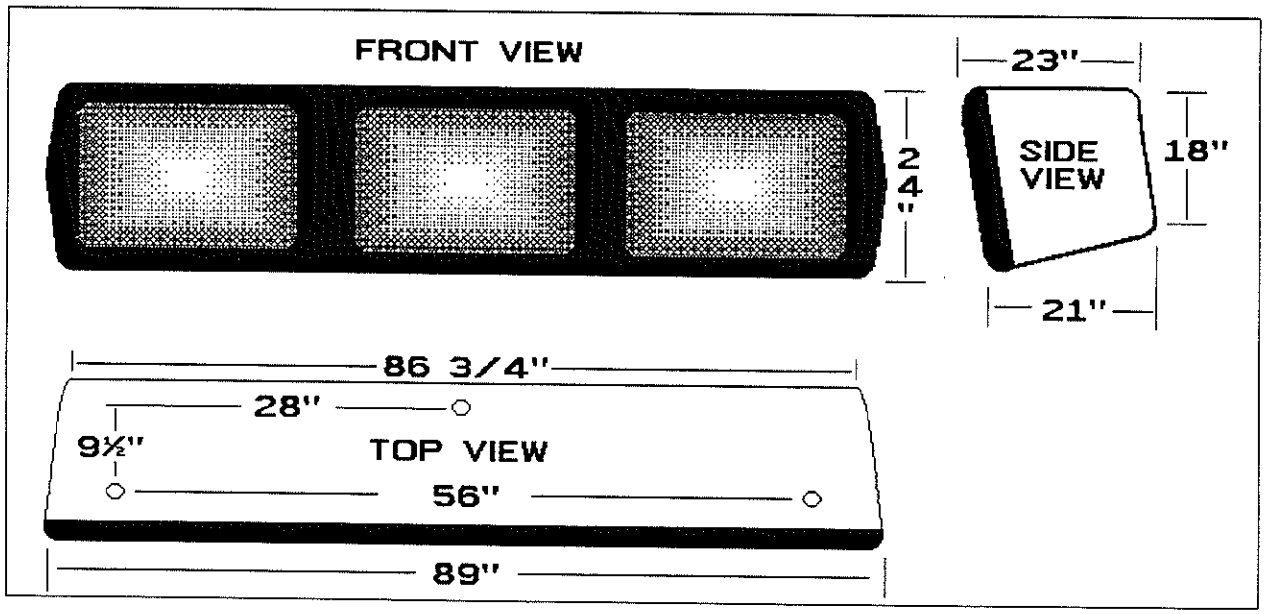
Note: The building structure is not a good ground.

If in doubt or if the grounding system does not fill the prerequisites it may be worthwhile to wait for the Mendes technicians since they may recommend a simple solution. If during the installation the technicians notice a faulty ground the Bowling Center owner must ensure that the ground is fixed before the departure of the technicians. If not the system cannot be guaranteed to work properly. The system will only be guaranteed once a Mendes technician does accept the grounding system.

GENERAL SPECIFICATIONS AND DIMENSIONS OF AUTOSCORING EQUIPMENT"\

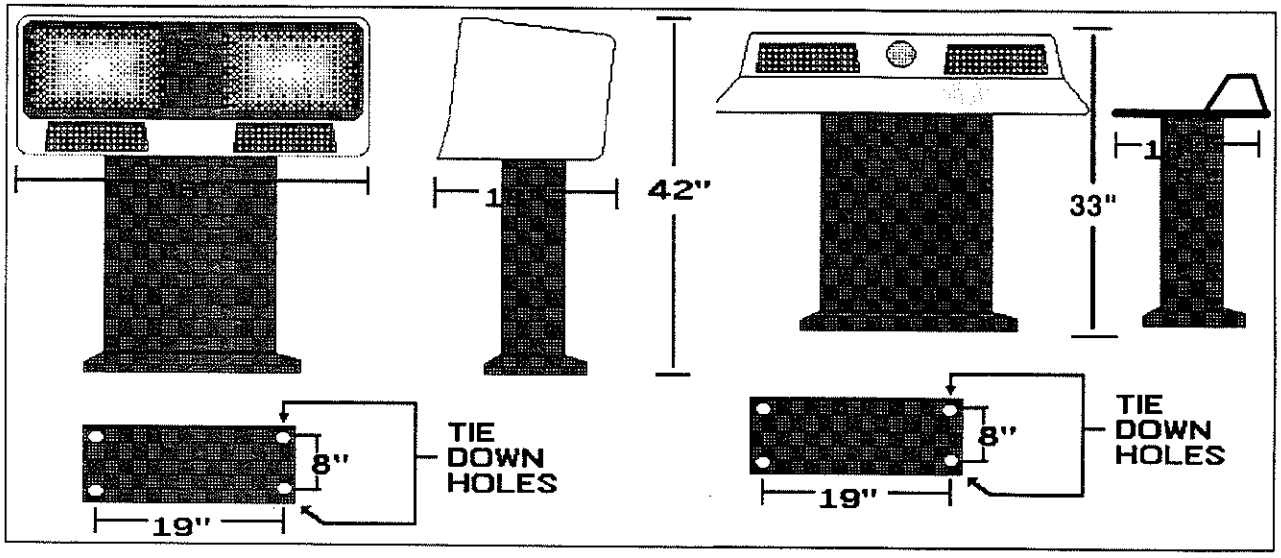


weight: 300 LBS



weight: 400 LBS

GENERAL SPECIFICATIONS AND DIMENSIONS OF AUTOSCORING EQUIPMENT



CABLING AND INSTALLATION OF AUTOSCORING SYSTEM

CABLING

The following section describes the cabling that is supplied with your Autoscoring system. Some cables are prepared in advance while others are prepared on the spot. All these cables are supplied and installed by a qualified Mendes technician.

QTY	TYPE	DESCRIPTION	ID
FROM SCORE CONSOLE TO LANE CONTROLLER			
1	3 PRS #22(T&S)	PINSETTER COMM.	EC-050-60
1	1 TEW #10	GROUND WIRE	
FROM SCORE CONSOLE TO 27" MONITORS (for MASS-V20 and higher)			
2	RG 59U COAX	SCORE SHEET SIGNAL	(STANADRD BNC MALE CONNECTOR E-V299 AT EACH END)
FROM CAMERA TO LANE CONTROLLER			
2	2 PRS #22 (T&S)	BALL DETECTORS	EC-050-16
1	2 PRS #22 (T&S)	CAMERA COMMUNICATION	EC-050-64
1	1 PRS #22	CAMERA POWER SUPPLY	EC-050-18
1	TEW #10	GROUND WIRE	
FROM FOUL LIGHT TO SCORE CONSOLE			
1	2 PRS #22 (T&S)	FOUL COMMUNICATION	EC-050-26-R2
1	TEW #10	GROUND WIRE	
FROM FOUL LIGHT TO POWER LIFT (POWER BOX FOUL LIGHT)			
1	1 PR #18	POWER SUPPLY	FROM SB-1500-01 FOUL LIGHT POWER SUPPLY
FROM SCORE CONSOLE TO MANAGER'S CONTROL (MULTIPLEXOR)			
1	2 PRS #22 (T&S)	MUX COMMUNICATION	MUX 1,2,3 ...

Refer to the following pages for the pinout of all the connectors to the above cables. As for the pinsetter interface and its installation to the pinsetter refer to the corresponding annex at the end of this manual. The MUX (Multiplexor) connector and its color codes are shown on plan EL-MD3-92 in this section.

For the installation of the Video / TV coax cables refer to Figure 2. For the connection to the actual distribution unit refer to the section on Video Distribution Unit in Part 4 of this manual.

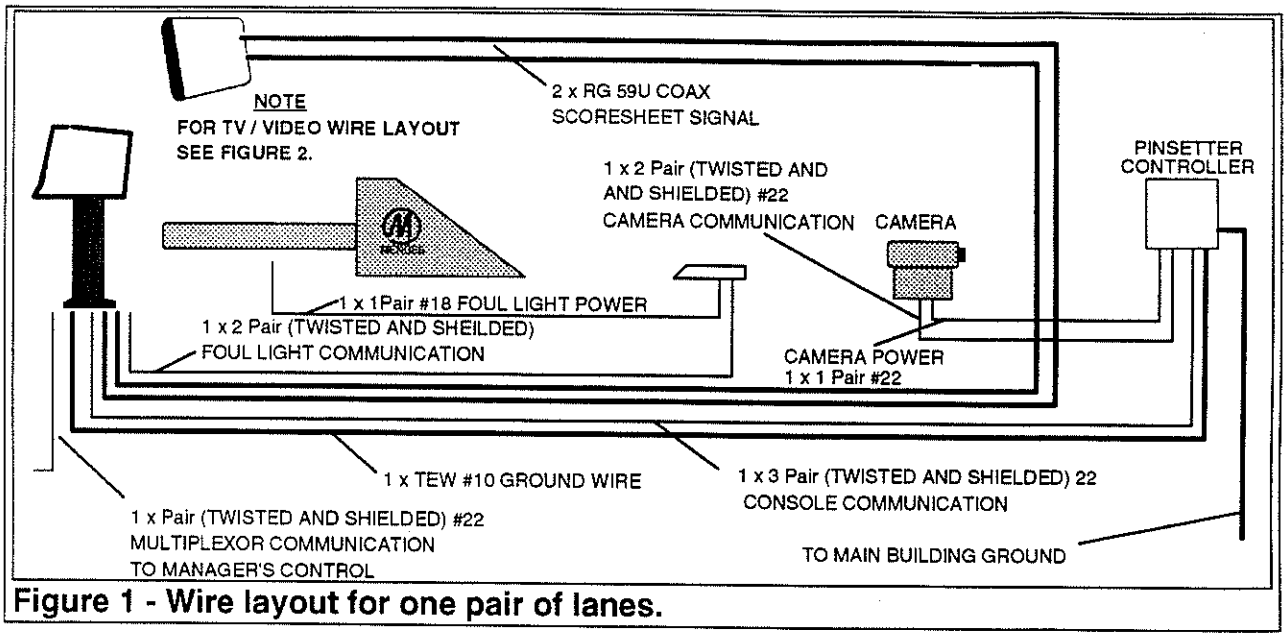


Figure 1 - Wire layout for one pair of lanes.

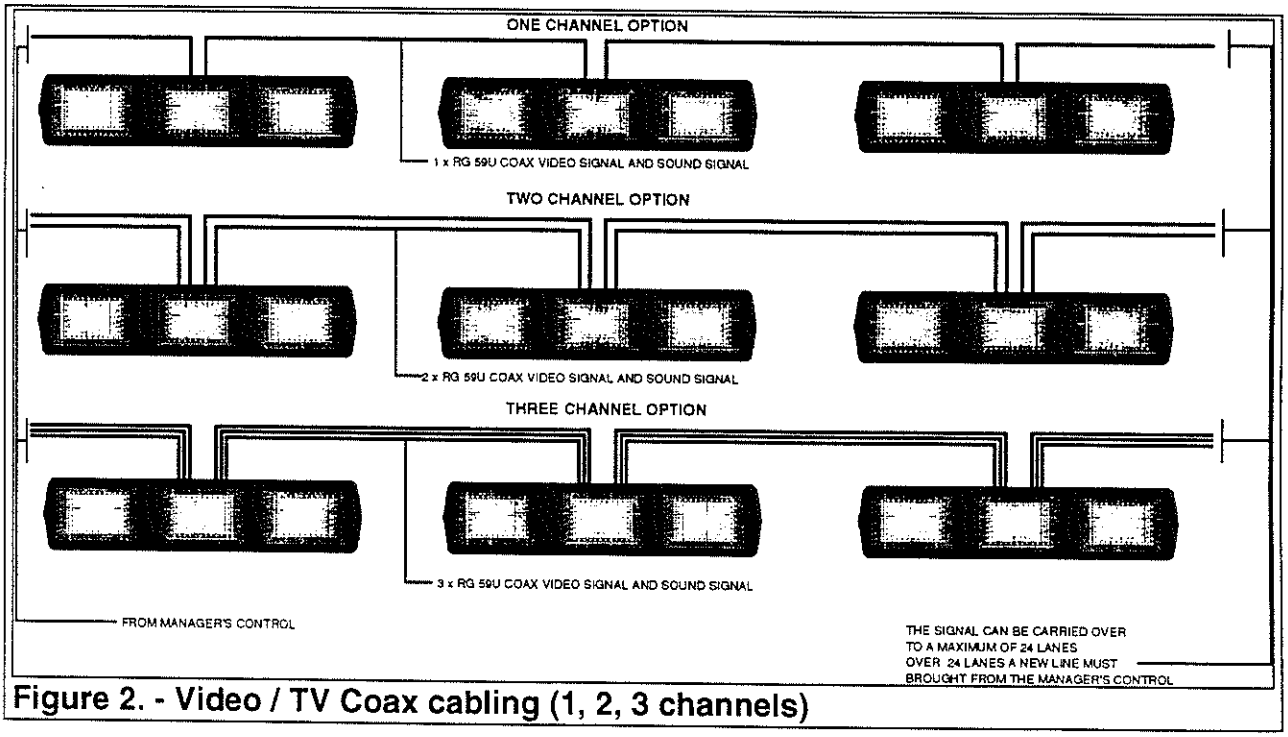
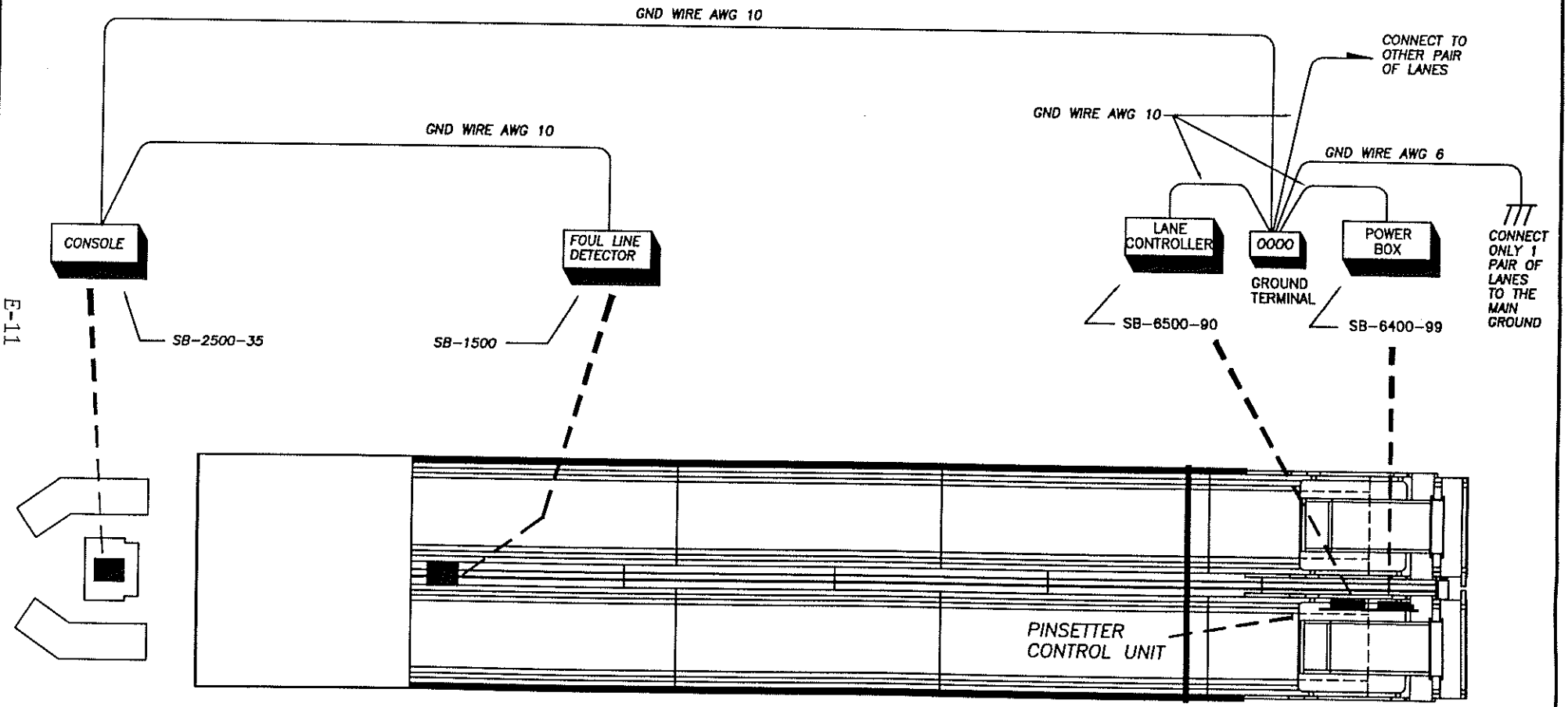


Figure 2. - Video / TV Coax cabling (1, 2, 3 channels)



E-11

NO.	DATE	REVISION	BY

MENDES QUEBEC CANADA

MODEL: ME-90

GROUND INTERCONNECTIONS

REV.

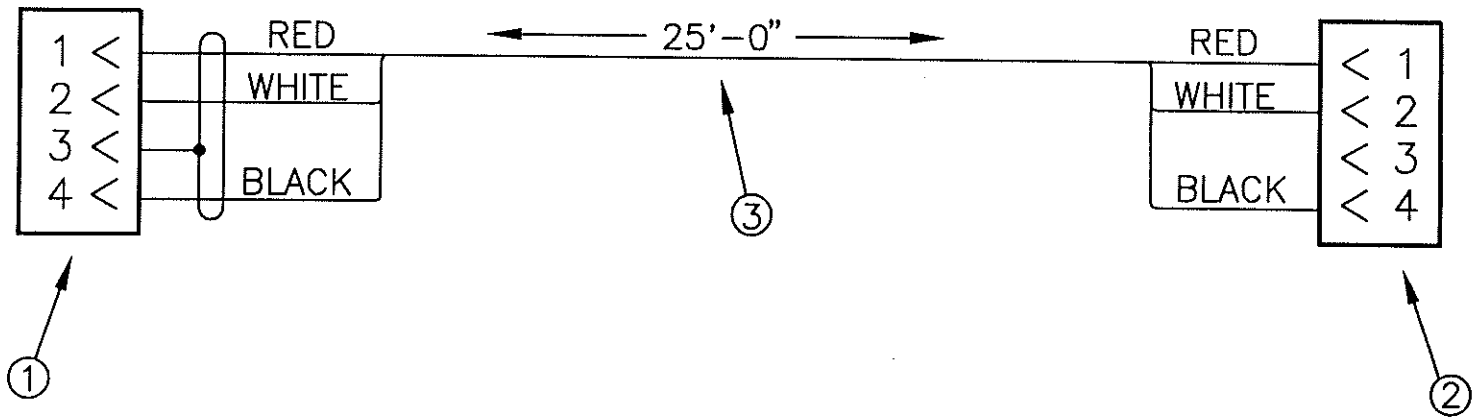
DRAW BY PIERRE BOLDUC | SCALE: – | DWG. NO. EL-90-25

DATE 22/06/92 | APPR. BY

PAGE

NO.	DATE	REVISION	BY

Connect To
EC-050-065
On Lane Controller



Connect To
Ball Detector

INDEX	PARTS#	DESCRIPTION	QT.
1	E-488426-0	TERMINAL 4 POS. MALE	1
2	E-1-480424-0	TERMINAL 4 POS. FEM.	1
3	E-020-2252	WIRE 2PRS. SHEILDED AWG22	1

MENDES
QUEBEC CANADA

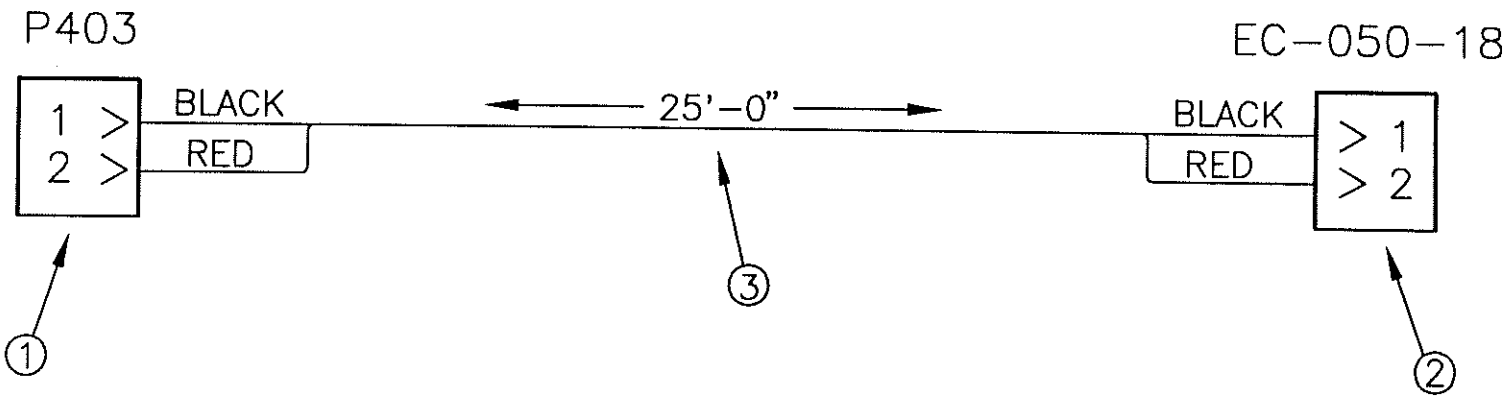
MODEL:

C.ASS. BALL DETECTOR

REV.

DRAW BY	PIERRE BOLDUC	SCALE:	—	DWG. NO.	EC-050-016	PAGE
DATE	25/05/92	APPR. BY				

NO.	DATE	REVISION	BY



INDEX	PARTS#	DESCRIPTION	QT.
1	E-640440-2	TERMINAL 2POS. MTA100	1
2	E-1-480319-0	TERMINAL 2POS. MNL	1
3	E-020-9222	WIRE 2 COND. AWG22	1

MENDES
QUEBEC CANADA

MODEL:

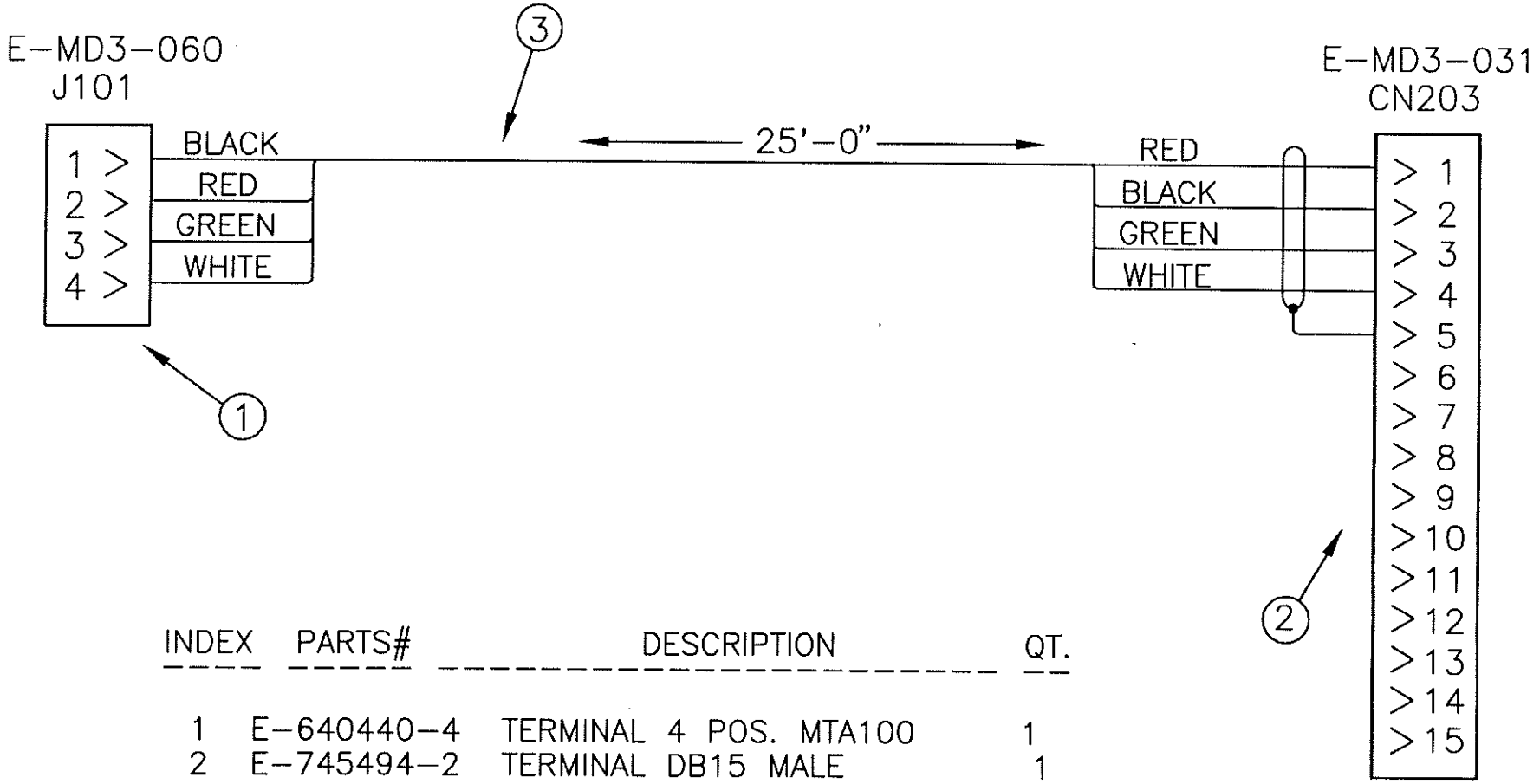
ALIMENTATION CAMERA TEN

REV.

DRAW BY PIERRE BOLDUC | SCALE: - | DWG. NO. EC-050-018 | PAGE

DATE 25/05/92 | APPR. BY

NO.	DATE	REVISION	BY



INDEX	PARTS#	DESCRIPTION	QT.
1	E-640440-4	TERMINAL 4 POS. MTA100	1
2	E-745494-2	TERMINAL DB15 MALE	1
3	E-020-2252	WIRE 2 PRS. SHEILDED AWG22	1

MENDES
QUEBEC CANADA

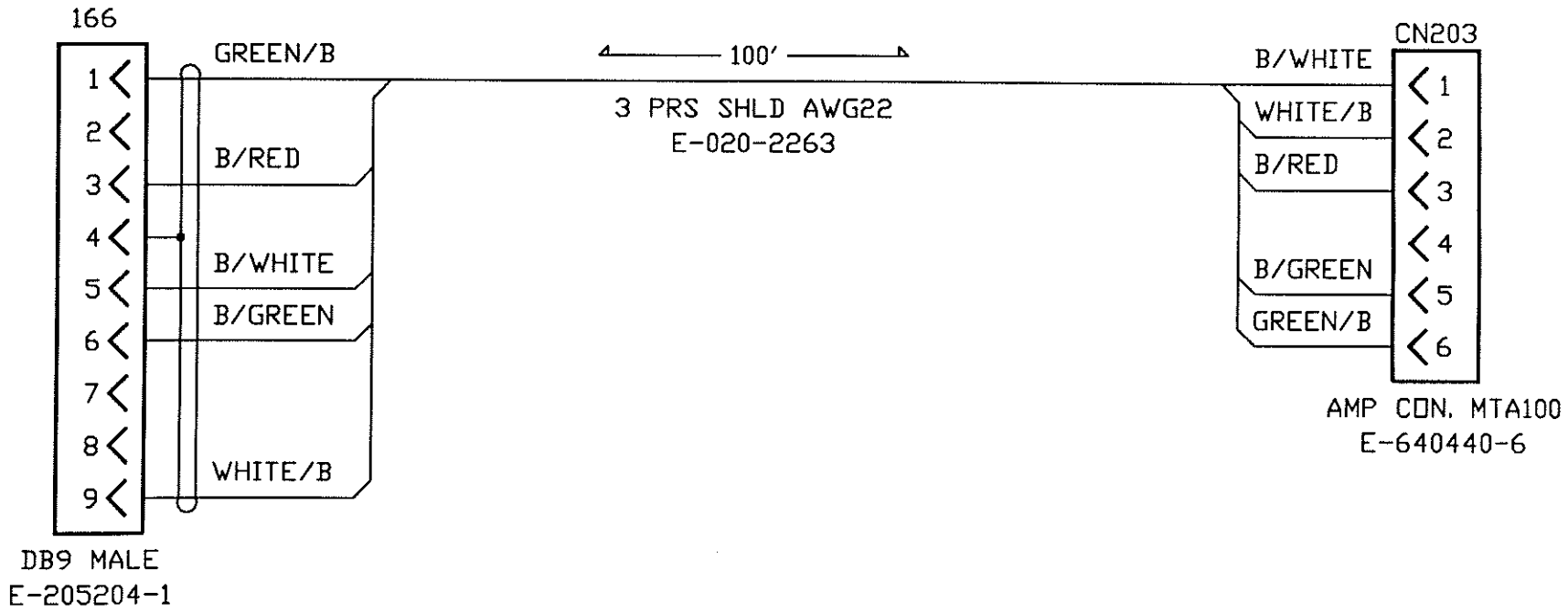
MODEL:

CAMERA COMMUNICATION

REV.

DRAW BY	PIERRE BOLDUC	SCALE:	–	DWG. NO.	EC-050-064	PAGE
DATE	25/05/92	APPR. BY				

NO.	DATE	REVISION	BY



MENDES
QUEBEC CANADA

MODEL:

C.ASS. COMMUN. SCOREBOARD

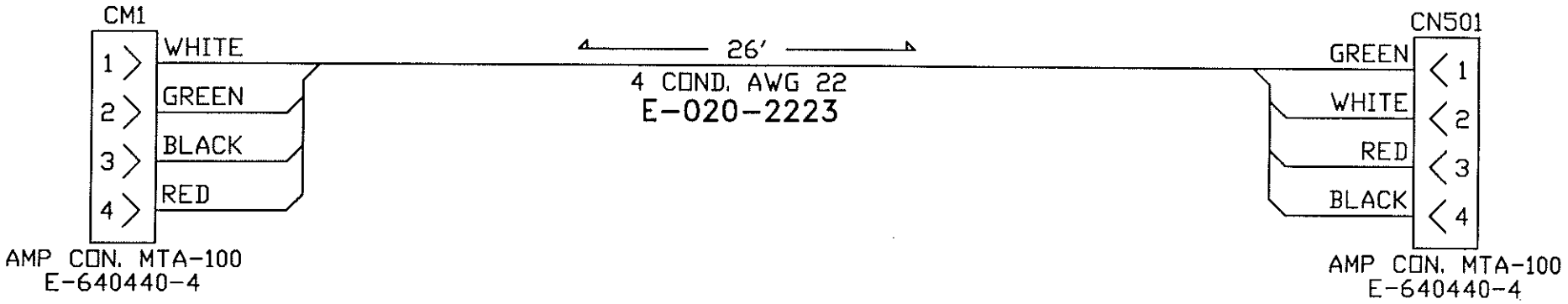
REV.

DRAW BY PIERRE BOLDUC | SCALE: _ | DWG. NO. EC-050-060

DATE 15/05/92 | APPR. BY

PAGE

NO.	DATE	REVISION	BY



MENDES
QUEBEC CANADA

MODEL:

C.ASS. COMMUN. FOUL LINE

REV.

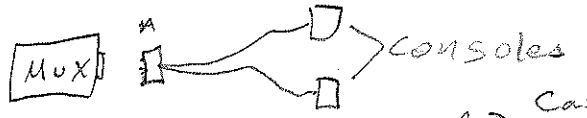
DRAW BY	PIERRE BOLDUC	SCALE:	—	DWG. NO.	EC-050-26-R2	PAGE
DATE	19/05/92	APPR. BY				

NO.	DATE	REVISION	BY

CN202

TXD	1 <	GREEN
$\overline{TXD}$	2 <	WHITE
N.C.	3 <	
GND	4 <	SHIELD
$\overline{RXD}$	5 <	BLACK
RXD	6 <	RED

CONNECTION OF MUX TO MD3-92



E-55008-1
A => Case Connector Junction Box
Connecteur AMP CON F 50pos
E-552064-1

COLOR CODE MULTIPLEXOR CONNECTOR

LANE 1-16

PIN		
1	WHITE	MUX 1
2	GREEN	
3	BLACK	
4	RED	
5	WHITE	MUX 2
6	GREEN	
7	BLACK	
8	RED	
9	WHITE	MUX 3
10	GREEN	
11	BLACK	
12	RED	
13	WHITE	MUX 4
14	GREEN	
15	BLACK	
16	RED	
17	WHITE	MUX 5
18	GREEN	
19	RED	
20	BLACK	
21	WHITE	MUX 6
22	GREEN	
23	RED	
24	BLACK	
25	WHITE	MUX 7
26	GREEN	
27	RED	
28	BLACK	
29	WHITE	MUX 8
30	GREEN	
31	RED	
32	BLACK	

LANE 17-32

PIN		
1	WHITE	MUX 9
2	GREEN	
3	BLACK	
4	RED	
5	WHITE	MUX 10
6	GREEN	
7	BLACK	
8	RED	
9	WHITE	MUX 11
10	GREEN	
11	BLACK	
12	RED	
13	WHITE	MUX 12
14	GREEN	
15	BLACK	
16	RED	
17	WHITE	MUX 13
18	GREEN	
19	RED	
20	BLACK	
21	WHITE	MUX 14
22	GREEN	
23	RED	
24	BLACK	
25	WHITE	MUX 15
26	GREEN	
27	RED	
28	BLACK	
29	WHITE	MUX 16
30	GREEN	
31	RED	
32	BLACK	

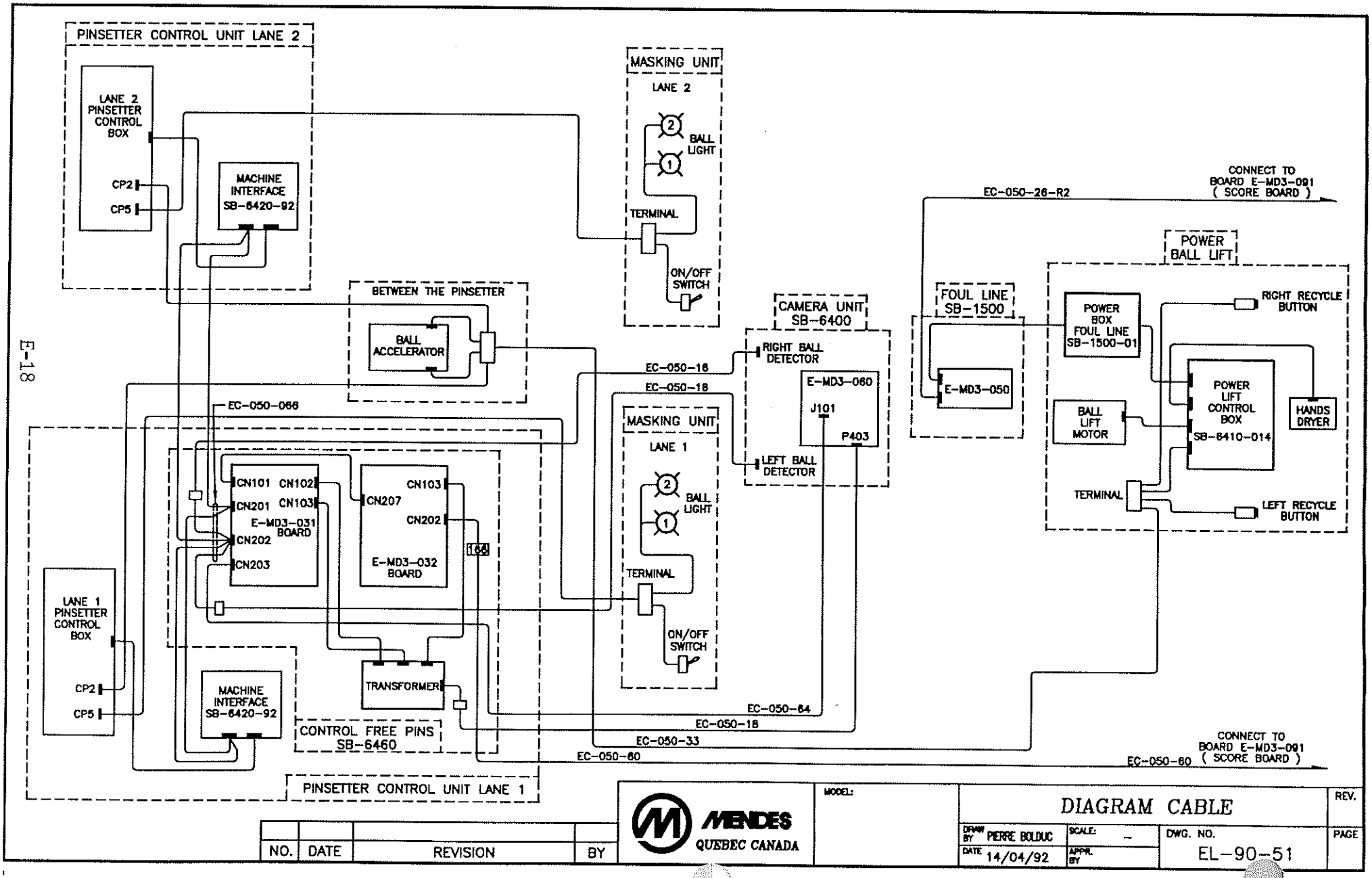
MENDES
QUEBEC CANADA

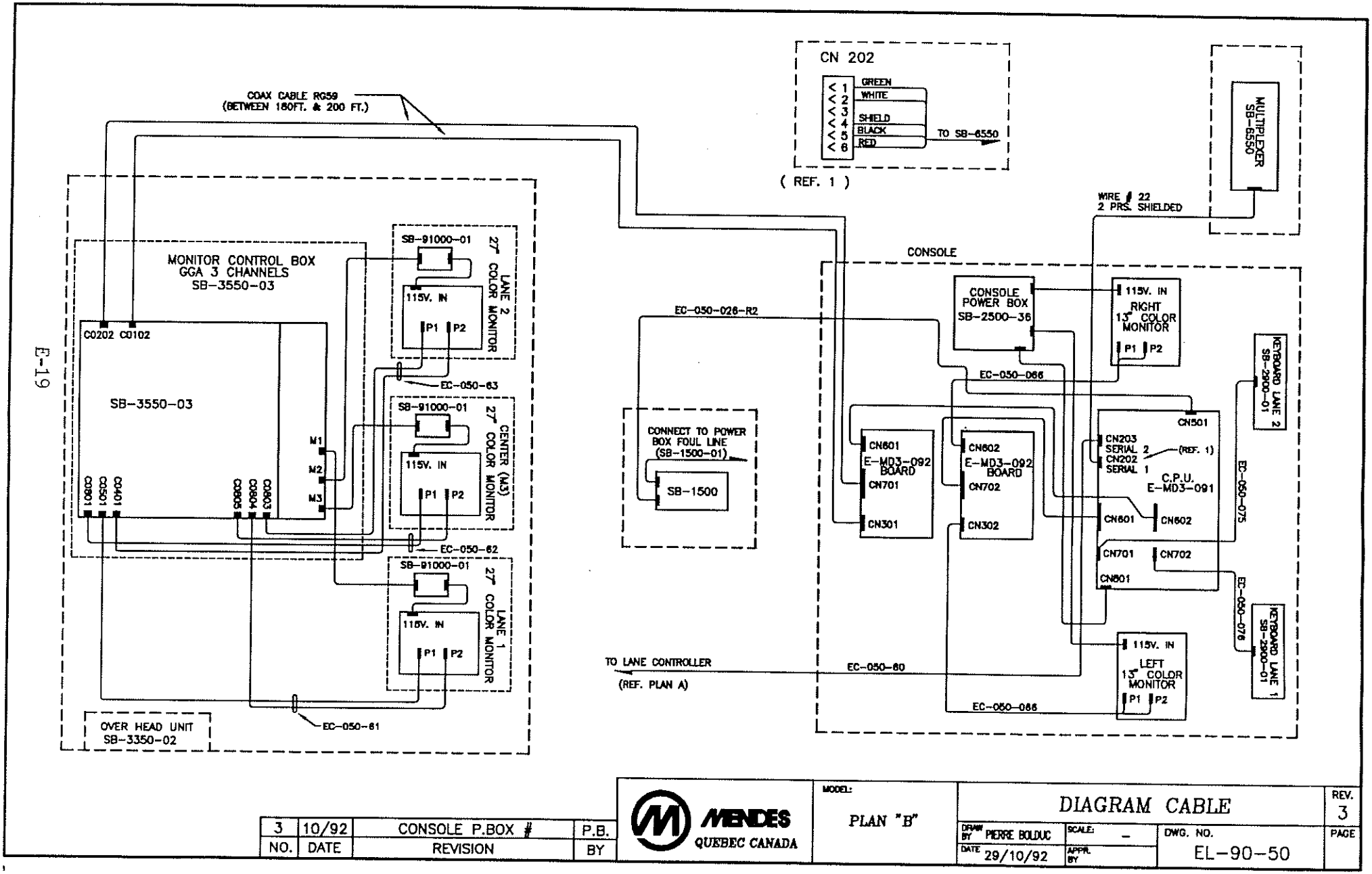
MODEL:

MULTIPLEXOR CONNECTOR

REV.

DRAW BY	PIERRE BOLDUC	SCALE:	—	DWG. NO.	EL-MD3-92	PAGE
DATE	20/08/92	APPR. BY				


PINSETTER CONTROL UNIT LANE 2
LANE 2 PINSETTER CONTROL BOX
CP2
CP5
MACHINE INTERFACE SB-6420-92
MASKING UNIT
LANE 2
BALL LIGHT
TERMINAL
ON/OFF SWITCH
CONNECT TO BOARD E-MD3-091 (SCORE BOARD)
EC-050-26-R2
POWER BALL LIFT
FOUL LINE SB-1500
E-MD3-050
POWER BOX FOUL LINE SB-1500-01
RIGHT RECYCLE BUTTON
BETWEEN THE PINSETTER
BALL ACCELERATOR
CAMERA UNIT SB-6400
RIGHT BALL DETECTOR
E-MD3-060
J101
P403
LEFT BALL DETECTOR
EC-050-16
EC-050-18
EC-050-066
MASKING UNIT
LANE 1
BALL LIGHT
TERMINAL
ON/OFF SWITCH
BALL LIFT MOTOR
POWER LIFT CONTROL BOX SB-6410-014
HANDS DRYER
TERMINAL
LEFT RECYCLE BUTTON
CN101 CN102
CN201 CN103
E-MD3-031 BOARD
CN202
CN203
CN103
CN207
CN202
E-MD3-032 BOARD
168
LANE 1 PINSETTER CONTROL BOX
CP2
CP5
MACHINE INTERFACE SB-6420-92
TRANSFORMER
CONTROL FREE PINS SB-6460
EC-050-64
EC-050-18
EC-050-33
EC-050-60
CONNECT TO BOARD E-MD3-091 (SCORE BOARD)
EC-050-60
PINSETTER CONTROL UNIT LANE 1
NO.
DATE
REVISION
BY
MENDES
QUEBEC CANADA
MODEL:
DIAGRAM CABLE
REV.
DRAWN BY PIERRE BOLDUC
SCALE: --
DWG. NO.
EL-90-51
PAGE
DATE 14/04/92
APPR. BY



E-19

NO.	DATE	REVISION	BY
3	10/92	CONSOLE P.BOX #	P.B.

MENDES QUEBEC CANADA

MODEL: PLAN "B"

DIAGRAM CABLE

REV. 3

DRAW BY PIERRE BOLDUC | SCALE: - | DWG. NO. EL-90-50

DATE 29/10/92 | APPR. BY | PAGE